1970-2020

Golden Jubilee Year

National Conference on
Multidisciplinary Research in Science and Technology
for Healthy Lifestyle Management

NCMRST-2020

Friday, 24th January 2020

Special Issue of
Aayushi International Interdiciplinary Research Journal
ISSN 2349-638x

Organized by
The Berar General Education Society's
Shri R.L.T. College of Science, Akola
Civil Lines, Akola, Maharashtra - 444 001
Re-accredited by NAAC with 'A' Grade, CGPA-3.12 (3rd Cycle)
Recognised by Government of Maharashtra
Affiliated to Sant Gadge Baba Amravati University, Amravati
Phone - 0724-2415480, Fax - 0724-2415650
E-mail - rltcollegeakola@gmail.com, Website - www.rltsc.edu.in

In association with

**Microbiologist's Society, India
Amravati University Chemistry Teachers' Association, Amravati
Amravati University Physics Teachers' Association, Amravati**

●

In collaboration with

Aayushi International Interdisciplinary Research Journal (AIIRJ)

ISSN-2349-638X

The Berar General Education Society, Akola

Executive Committee

Dr. R.B. Heda
President

Adv. Motisingh Mohta
Hon. Secretary

Shri Vijaykumar Toshniwal
Sr. Vice President

Dr. Ravindra Jain
Jr. Vice President

Shri Sharad Chaware
Jt. Secretary

Adv. P.W. Agrawal
Executive Member

Prof. S.R. Amraotikar
Executive Member

Dr. S.R. Baheti
Executive Member

Sau. D.M. Chaudhary
Executive Member

Adv. A.R. Gupta
Executive Member

Prof. V.T. Hajare
Executive Member

Shri P.N. Maheshwari
Executive Member

Shri V.R. Panpaliya
Executive Member

Er. A.G. Paranjape
Executive Member

Shri Avinash Sureka
Executive Member

Shri Anilkumar Tapadia
Executive Member

Invitee Members

Dr. R.D. Sikchi, Principal
Sitabai Arts, Commerce &
Science College, Akola

Dr. V.R. Kodape, Off.Principal
Shri K.N.G. Arts & Commerce
College, Karanja

Dr. S.G. Chapke, Principal
Smt. L.R.T. College of
Commerce, Akola

Dr. V.D. Nanoty, Principal
Shri R.L.T. College of
Science, Akola

Prof. G.V. Egaonkar, Off.Principal
Shri Nathmal Goenka
Law College, Akola

Mr. S.S. Chandanbatve, H.M.
N.M. Chaudhari Vidhyalaya, Akola

Sau. Ashwini Deshpande, H.M.
J.C. Digital Eng. School, Akola

Dr.Mrs. Jyoti H. Lahoti
Teaching Staff Representative

Shri Pankaj Agrawal
Non-Teaching Staff Representative

Shri Radhakisan Laxminarayan Toshniwal College of Science, Akola

Vision

"To become one of the best educational institutions in the country, aspiring for national recognition of excellence through teaching, learning, research and extension in the field of science and technology."

Mission

Shri Radhakisan Laxminarayan Toshniwal College of Science dedicates itself to the cause of science education and propagation of scientific temper among the students, it seeks to mould a student into a multifaceted person with a pragmatic mind and a humane out look capable of facing the challenges of the 21st century. Shri R.L.T. College expects every student entering its portal to be a disciplined, hardworking, well read member of the community ready to give his best to the country.

National Conference on

Multidisciplinary Research in Science and Technology

for Healthy Lifestyle Management

NCMRST–2020

Friday, 24th January 2020

Organized by

The Berar General Education Society's

Shri R.L.T. College of Science, Akola

In association with

Microbiologist's Society, India
Amravati University Chemistry Teachers' Association, Amravati
Amravati University Physics Teachers' Association, Amravati

Editorial Board

Dr. Rajesh D. Chandrawanshi

Dr. Sushil M. Nagrale

Dr. Pradip P. Deohate

Dr. Poonam T. Agrawal

In collaboration with
Aayushi International Interdisciplinary Research Journal (AIIRJ)

National Conference on

Multidisciplinary Research in Science and Technology

for Healthy Lifestyle Management

NCMRST–2020

The Berar General Education Society's
Shri R.L.T. College of Science, Akola

Patrons

Dr. Rajkumar B. Heda	**Dr. Murlidhar G. Chandekar**	**Adv. Motisingh G. Mohta**
Hon'ble President	Hon'ble Vice Chancellor, S.G.B.A.U., Amravati	Hon'ble Hon. Secretary
Shri Vijaykumar S. Toshniwal	**Dr. Ravindra C. Jain**	**Shri Sharad A. Chaware**
Hon'ble Sr. Vice President	Hon'ble Jr. Vice President	Hon'ble Jt. Secretary

Adv. Pramod W. Agrawal	**Prof. Shrikrushna R. Amraotikar**	**Dr. Satyanarayan R. Baheti**
Sau Devyani M. Choudhary	**Adv. Ajaykumar R. Gupta**	**Prof. Vishwanath T. Hajare**
Shri Pavan N. Maheshwari	**Shri Vijaykumar R. Panpaliya**	**Er. Abhijeet G. Paranjape**
Shri Avinash B. Sureka		**Shri Anilkumar S. Tapadia**

Hon'ble Executive Members of the B.G.E. Society, Akola

Convener
Dr. Vijay D. Nanoty
Principal, Shri R.L.T. College of Science, Akola

Co-Convener	Organizing Secretaries	Treasurer
Dr. Umesh K. Bhalekar	**Dr. Rajesh D. Chandrawanshi**	**Mr. Ram G. Chavan**
	Dr. Sushil M. Nagrale	
	Dr. Poonam T. Agrawal	

Joint Secretaries

Mrs. Vaishali N. Badgujar	**Dr. Rajendra L. Rahatgaonkar**	**Mr. Mangesh R. Ubale**
Dr. Sujata B. Tadam	IQAC Co-ordinator	**Mr. Prashant P. Gedam**

National Advisory Committee

Dr. R. S. Jaipurkar, Amravati	Dr. T. R. Deshmukh, Amravati	Dr. F. C. Raghuwanshi, Amravati
Dr. M.G Bodhankar, Pune	Dr. A. M. Deshmukh, Osmanabad	Dr. R. K. Sharma, New Delhi
Dr. V. S. Jamode, Amravati	Dr. K. M, Kulkarni, Pune	Dr. G. S. Khadekar, Nagpur
Dr. O. S. Sarate, Lucknow	Dr. R. S. Rajuskar, Pune	Dr. A. B. Ade, Pune
Dr. P. D. Lokhande, Pune	Dr. P. S. Wakte, Parbhani	Dr. S. S. Zade, Kolkata
Dr. P. R. Bhagat, Vellore	Dr. N. M. Dongarwar, Nagpur	Dr. V. V. Polshettiwar, Mumbai
Dr. C. N. Khobragade, Nanded	Dr. M. V. Thakare, Ahmedabad	Dr. R. Kasambe, Mumbai
Dr. P. M. Tumane, Nagpur	Dr. S. B. Kasbekar, Nagpur	Dr. D. P. Gogle, Nagpur
Dr. S. J. Sharma, Nagpur	Dr. S. B. Zade, Nagpur	Dr. T. M. Karade, Nagpur
Dr. P. R. Thorat, Barshi	Dr. J. M. Chatur, Yavatmal	Dr. A. M. Asanare, Amravati
Dr. K. D. Rithe, Nagpur	Dr. D. S. Dhote, Amravati	Dr. M. B. Wadekar, Gadchiroli
Dr. S. T. Ingle, Jalgaon	Dr. S. D. Patankar, Nagpur	Dr. R. S. Awasthi, Latur

National Conference on

Multidisciplinary Research in Science and Technology

for Healthy Lifestyle Management

NCMRST–2020

The Berar General Education Society's
Shri R.L.T. College of Science, Akola

Local Advisory Committee

Dr. V. G. Thakare, Amravati	Dr. P. R. Rajput, Karanja Lad	Dr. R. M. Bhise, Akola
Dr. S. G. Chapke, Akola	Dr. R. D. Sikchi, Akola	Dr. S. P. Rothe, Akola
Dr. A. S. Aswar, Amravati	Dr. P. B. Raghuwanshi, Amravati	Dr. A. M. Garode, Chikhali
Dr. J. M. Saboo, Akola	Dr. D. R. Gawande, Wanoja	Dr. D. N. Vyas, Akola
Dr. I. A. Raja, Akola	Dr. C. M. Jadhao, Shegaon	Dr. R. A. Mishra, Yavatmal
Dr. Y. B. Gandole, Dhamangaon	Dr. V. R. Kodape, Karanja Lad	Mr. G. V. Egaonkar, Akola
Dr. S. S. Deshmukh, Amravati	Dr. S. D. Thakur, Amravati	Dr. P. B. Raghuwanshi, Amravati
Dr. R. A. Gulhane, Karanja Lad	Dr. S. D. Katore, Amravati	Dr. V. M. Thakare, Amravati
Dr. N. S. Kulkarni, Washim	Dr. S. K. Omanwar, Amravati	Dr. U. S. Patil, Amravati
Dr. A. B. Lad, Yavatmal	Dr. G. N. Chaudhari, Amravati	Dr. A. B. Moharil, Amravati
Dr. M. R. Kherde, Amravati	Dr. J. A. Tidke, Amravati	Dr. G. G. Muley, Amravati
Dr. S. P. Yawale, Amravati	Dr. S. V. Dudul, Amravati	Dr. V. B. Bhatkar, Amravati
Dr. A. R. Deshpande, Akola	Dr. V. G. Gawande, Amravati	Dr. V. M. Patil, Akola
Dr. A. S. Pethe, Akola	Dr. S. P. Joshi, Amvarati	Dr. S. M. Padhye, Akola
Dr. D. S. Dabhade, Washim	Dr. N. B. Raut, Amravati	Dr. P. S. Dhabe, Akola
Dr. P. S. Kokate, Akola	Dr. S. K. Devade, Akola	Mr. K. K. Pathan, Khamgaon
Dr. V. B. Bhagat, Akot	Mr. D. B. Bobade, Chikhali	Dr. S. G. Shende, Akola
Dr. P. S. Pande, Akola	Dr. A. M. Metkar, Akola	Dr. G. V. Korpe, Akola
Mr. R. V. Salodkar, Akola	Dr. M. M. Dhore, Akot	Dr. P. P. Ade, Akola
Dr. C. S. Ukesh, Amravati	Dr. R. P. Sonekar, Khamgaon	Dr. N. V. Phirke, Amravati
Dr. S. P. Wagh, Akot	Dr. K. N. Puri, Amravati	Dr. P. E. Ajmire, Khamgaon
Dr. G. N. Budhalani, Dhamangaon	Dr. Y. S. Patil, Shegaon	Dr. V. A. Kamble, Dhamangaon
Dr. A. S. Sonone, Akola	Dr. A. S. Raut, Akola	Dr. M. V. Shirbhate, Akola

Local Organizing Committee

Dr. A. S. Sawarkar	Dr. P. P. Deohate	Mr. R. D. Chaudhari	Dr. P. M. Khadse	Dr. P. R. Kawle
Dr. S. R. Kohchale	Dr. K. M. Heda	Dr. A. A. Sangole	Dr. A. G. Sarap	Mr. R. B. Ghayalkar
Dr. H. S. Malpani	Mr. S. V. Madavi	Dr. R. P. Joshi	Dr. R. M. Agrawal	Dr. S. L. Munde
Mr. V. D. Deotale	Ms. S. N. Gawande	Mr. A. B. Khedkar	Mr. S. C. Zyate	Mr. S. R. Jaiswal

DR. MURLIDHAR CHANDEKAR
M.COM., M.Phil., Ph.D
VICE-CHANCELLOR

SANT GADGE BABA
AMRAVATI UNIVERSITY
AMRAVATI - 444 602
MAHARASHTRA (INDIA)

NAAC Accredited at the 'A' level

Date : **4 JAN 2020**

MESSAGE

I am delighted to know that, Shri R.L.T. College of Science, Akola is organizing the National Conference on "Multidisciplinary Research in Science and Technology for Healthy Lifestyle Management (NCMRST-2020)" on 24th January 2020 in association with Microbiologist's Society, India, Amravati University Chemistry Teachers' Association, Amravati and Amravati University Physics Teachers' Association, Amravati.

I appreciate the noble objective of this multidisciplinary conference being to bring together academicians, industrialists, researchers, students and other groups of scientific community on to a common platform towards cross fertilization of knowledge enabling them to meet the national challenges.

I am sure that, this conference will strengthen capabilities of all the participants and promote them towards the future advancement of research in science and technology for healthy lifestyle management. I hope that, the deliberations during the conference will prove a step forward in enhancing the efficiency of researchers and experts working in the field of science and technology.

I congratulate the organizing committee members of NCMRST-2020 and appreciate their endeavor to make this conference a grand success.

(Dr.Murlidhar Chandekar)

Phone : Office - 0721 - 2662373, Resi. 0721 - 2662108, 2662093, Fax No. 0721 - 2662135, Gram : sgbamuni
E-mail : vc@sgbau.ac.in Website : www.sgbau.ac.in

DR. RAJESH S. JAIPURKAR

M.Sc. (Tech.), Ph.D.

PRO-VICE- CHANCELLOR

**SANT GADGE BABA
AMRAVATI UNIVERSITY
AMRAVATI-444 602
MAHARASHTRA (INDIA)**

Accredited by NAAC at level 'A'

No. SGBAU/PVC/ 151 /2020
Date : 6|1|2020

MESSAGE

I am glad to note that, Shri R.L.T. College of Science, Akola is organizing the "National Conference on Multidisciplinary Research in Science and Technology for Healthy Lifestyle Management" (NCMRST-2020) on 24th January 2020 and also celebrating its "Golden Jubilee Year" of establishment.

I trust that, the conference will be a platform where researchers and scholars from different fields of science and technology in both academic and industry will have an opportunity to interact with each other and learn the state of art development in multidisciplinary areas.

This conference is going to cover all the important areas of research in the field of science and technology. It will help the participants to update knowledge and will give good exposure to some latest developments in this field for healthy lifestyle management. I am sure that, the deliberations being held during the conference will update one and all in the academic institutions, scientific organizations, industries and motivate the young minds of this nation to take up national challenges for the benefit of mankind.

I congratulate Shri R.L.T. College of Science, Akola for organizing this national event and wish all the grand success for NCMRST-2020.

(Dr. Rajesh Jaipurkar)
Pro-Vice-Chancellor

Phone : Office - 0721-2551961 Resi. - 0721-2672702 Fax No. 0721-2662135 Gram : SGBAMUNI
Website : www.sgbau.ac.in   E-mail : provc@sgbau.ac.in

Dr. F. C. Raghuwanshi
M.Sc., M.Phil., Ph.D.
Dean
Faculty of Science & Technology

**SANT GADGE BABA
AMRAVATI UNIVERSITY
AMRAVATI - 444 602
MAHARASHTRA (INDIA)**

NAAC Accredited at the 'A' level

Date : 11th January, 2020

MESSAGE

It gives me immense academic pleasure to know that, on the eve of "Golden Jubilee Year"; Shri R.L.T. College of Science, Akola is going to organize the "National Conference on Multidisciplinary Research in Science and Technology for Healthy Lifestyle Management" (NCMRST-2020) on 24th January 2020.

This conference will bring together leading multidisciplinary academicians, researchers and scholars to exchange and share their experiences on all aspects of sustainable development in the field of science and technology. I understand that, this conference enables one and all from various disciplines on to a common platform towards understanding the needs of the nation and fine tune their academic and research activities towards meeting the national objectives.

I am sure that, all the participants will not leave any stone unturned in their efforts to enlighten themselves with the latest scientific and technological innovations and advancements for healthy lifestyle management through this conference.

I congratulate Shri R.L.T. College of Science, Akola for its successful academic journey of 50 golden years and wish all the best to the organizing committee members of NCMRST-2020.

(Dr. F. C. Raghuwanshi)

Dr. R. B. Heda
President
**The Berar General Education Society,
Akola**

Date : 13th January, 2020

Message

    I am extremely happy that, Shri R.L.T. College of Science, Akola established under The Berar General Education Society, Akola is going to organize the "National Conference on Multidisciplinary Research in Science and Technology for Healthy Lifestyle Management" (NCMRST-2020) on 24th January 2020 with the objective of bringing together different groups of scientific community on to a common platform towards understanding the needs in the field of science and technology for healthy lifestyle management.

    It's my privilege that, I was the student of 1st batch of B.Sc. Part-I of this college. The "Golden Jubilee" of the college is therefore, an occasion of proud and joy for me.

    Modern age is the age of science and technology that has blessed us with many comforts in every sphere of human activity. I hope this conference will provide a platform to researchers and students from various colleges and institutions of our country to present the most recent advancements in innovative materials and devices for sustainable development of human society.

    I convey my best wishes to the participants. I am sure that, there will be fruitful interactions between the faculty and participants during this conference and it will result into some constructive output.

    I congratulate Shri R.L.T. College of Science, Akola for taking this initiative to organize the conference on occasion of "Golden Jubilee Year" celebration. I extend my best wishes to the organizers for the grand success of NCMRST-2020.

(Dr. R. B. Heda)

Adv. Motisingh G. Mohta
Hon. Secretary
**The Berar General Education Society,
Akola**

Date : 13ᵗʰ January, 2020

Message

It is a proud privilege that, Shri R.L.T. College of Science, Akola established under The Berar General Education Society, Akola is organizing the "National Conference on Multidisciplinary Research in Science and Technology for Healthy Lifestyle Management" (NCMRST-2020) on 24ᵗʰ January 2020.

On the occasion of "Golden Jubilee Year" of Shri R.L.T. College of Science, Akola, it's a nice initiative by college to organize the multidisciplinary conference with an object to provide a common platform to researchers and academicians for sharing their innovative ideas in the field of science and technology for the betterment of mankind and the society.

I am sure that, this conference will add value to the research activity in the field of science and technology for healthy lifestyle management. Conference provides the unique chance to young researchers to rub shoulders with senior and accomplished scientist. I hope that, participants will avail this opportunity at NCMRST-2020. I am confident that, deliberations during the conference will be helpful to strengthen the knowledge and to enhance the quality of research work.

I congratulate Shri R.L.T. College of Science, Akola for conducting this national scientific event while celebrating its "Golden Jubilee Year". I wish all the success to NCMRST-2020.

(Adv. Motisingh G. Mohta)

From the Desk of Principal and Convener

I am extremely pleased to welcome all the eminent speakers, delegates and participants of the "National Conference on Multidisciplinary Research in Science and Technology for Healthy Lifestyle Management" (NCMRST-2020) organized by Shri R.L.T. College of Science, Akola on 24th January 2020, on the occasion of celebration of its "Golden Jubilee Year" of establishment.

Shri R.L.T. College of Science, Akola was established under The Berar General Education Society, Akola on 1st April 1970 and since then, always keeps itself busy to develop the students through teaching, learning, research and extension in the field of science and technology. The college dedicates itself to the cause of science education and propagation of scientific temper among the students with social commitment and national integration. A journey of 50 years is a long period and it's a momentous occasion for us. Today, the recognition of college as one of the leading educational institutions stems largely from the dedication, devotion, discipline and cooperative efforts of all the past and present stakeholders of this college.

The aim of organizing this conference is to share and enhance the knowledge of researchers in the field of science and technology for healthy lifestyle management. Through this conference, we have tried to provide an opportunity to the participants to listen to the eminent speakers and personalities from different walks of society and to interact with them on to a common platform for exchanging information through the scientific presentations and discussion. The technical programme of conference will consist of a keynote address, invited talks, oral and poster presentations.

It is our privilege to organize this conference. I sincerely thank to Hon'ble Dr. R. B. Heda, President and Hon'ble Adv. Motisingh G. Mohta, Hon. Secretary and all Hon'ble Executive Members of The Berar General Education Society, Akola for allowing and motivating us to organize this national event. I would like to thank Microbiologist's Society, India, Amravati University Chemistry Teachers' Association, Amravati and Amravati University Physics Teachers' Association, Amravati for their support in organizing this conference.

I am obliged to the eminent speakers, delegates, authors, research scholars, teaching, non-teaching staff members and students who contributed in making this conference a grand success and memorable one. I must mention that, the organizing committee has been working hard for the resounding success and meaningful outcome of NCMRST-2020.

Dr. Vijay D. Nanoty
Principal
Shri R.L.T. College of Science, Akola
Convener, NCMRST-2020

From the Desk of Organizing Secretaries

Dear Delegates,

On behalf of the organizing committee, we are very much pleased to welcome you for the "National Conference on Multidisciplinary Research in Science and Technology for Healthy Lifestyle Management" (NCMRST-2020) organized by Shri R.L.T. College of Science, Akola on 24th January 2020.

Shri R.L.T. College of Science, Akola is committed to provide quality education and promote research since its inception. It was desire of our Principal Dr. V. D. Nanoty to celebrate the "Golden Jubilee Year" of the college by conducting some national events and accordingly, the conference is organized with the aim to integrate multidisciplinary research in science and technology for healthy lifestyle management.

The response for attending the conference has been overwhelming from the day of the release of conference brochure is really a joyful experience for us. The conference includes keynote address and invited talks by prominent personalities from various regions of country in addition to both oral and poster presentations by the delegates, research scholars and students. The present conference is a unique opportunity to discuss and explore best practices within the fields of science and technology. We are confident that, this conference will indeed generate a lot of interest among the students to explore and pursue the area of research for healthy lifestyle management.

We must mention that, the organizing committee has been working hard for the success of NCMRST-2020. Recognition should go to the local organizing committee and sub-committee members who have all worked extremely hard for the details of important aspects of the conference programme and overall arrangements. Our special thanks are due to the editors for their dedication and hardwork that has resulted in publication of this beautiful souvenir within stipulated time. Thanks are also due to Prakash Printers, Akola. We are thankful to the editor of "Aayushi International Interdisciplinary Research Journal" (AIIRJ) for collaborating with us to publish the research articles presented in NCMRST-2020.

Lastly, we wish all the delegates a very happy, memorable and scientifically stimulating time in Akola and return home with memorable experiences.

Thanks to all.

<div align="right">

Dr. Rajesh D. Chandrawanshi
Dr. Sushil M. Nagrale
Dr. Poonam T. Agrawal
Organizing Secretaries, NCMRST-2020

</div>

Acknowledgements

The organizing committee of "National Conference on Multidisciplinary Research in Science and Technology for Healthy Lifestyle Management" (NCMRST-2020) expresses their sincere thanks to the following organizations / associations and agencies for their kind support and financial assistance to make the conference a grand success.

- **Microbiologist's Society, India**
- **Amravati University Chemistry Teachers' Association, Amravati**
- **Amravati University Physics Teachers' Association, Amravati**
- **Digitech Systems, Akola**
- **Jyoti Chemporium, Akola**
- **Siddharth Computers, Akola**
- **Aakanksha Chemicals, Akola**
- **Solanki Enterprises, Pune**
- **Mayuree Enterprises, Akola**
- **Shri Ganesh Scientific Syndicate, Amravati**
- **Hi-Media Laboratories, Mumbai**
- **Shri R.L.T. College of Sci. Sevakanchi Sahakari Pat Sanstha Ltd., Akola**

With Best Compliments From...

Non-Teaching and Supporting Staff Members, Shri R.L.T. College of Science, Akola

Shri K.Y. Patil	Shri S.G. Solanke	Shri P.S. Shegokar
Shri V.S. Alane	Smt. S.S. Zatale	Shri G.B. Ingole
Shri C.V. Ahirkar	Shri S.V. Bhaltilak	Shri P.S. Murade
Shri S.J. Tarhale	Shri S.S. Rakhonde	Shri A.B. Tayade
Shri V.S. Shinde	Shri K.D. Giri	Shri D.J. Wankhade
Shri A.R. Agrawal	Shri B.D. Bhargade	Shri M.R. Amale
Shri P.P. Shegokar	Shri S.M. Alone	Shri V.S. Shegokar
Shri V.K. Kangte	Shri K.S. Shegokar	Shri R.B. Chondke
Shri G.P. Sharma	Shri P.M. Salphale	Shri R.S. Dandnaik
Shri H.A. Umbarkar	Shri R.S. Agrawal	Shri D.M. Ghonge
Shri S.S. Solanke	Shri A.D. Gawali	Shri G.B. Giri
Ku. M.V. Deshpande	Smt. J.A. Gite	Shri S.T. Khandare
Shri G.B. Mulatkar	Shri G.D. Rajbhoj	Shri M.M. Joshi
Shri M.M. Kulkarni	Shri G.B. Rothe	Shri C.N. Gaopande
Shri S.B. Kulkarni		Shri N.M. Umrekar

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293
(Special Issue No.70)   Peer Reviewed Journal   www.aiirjournal.com Mob. 8999250451

A

69	Mrs. Dewashri V. Mane Dr.D.N.Besekar	A Study of Zonal based, Hu's method and Zernik Moment Feature Extraction Techniques for Character Recognition	267
70	Hemant Yashwant Satpute Mrs. Aradhana Arvind Ambre	MATH-EXCEL – Teaching, learning and Evaluation AID for the CURRICULUM AT +2 level	270
71	K.A. Koparkar	Study Of Compact Fluorescence Lamp Phosphors	275
72	Yash Vidyasagar S.M. Nagrale,	Carbon Monoxide (CO) ppm Density Measurement with High & Low Heating Cycles using MQ7 Discrete Semiconductor Sensor	277
73	Hemant Yashwant Satpute Dattaraj Vidyasagar, Yash Vidyasagar	Implementation Of Multisim – A Circuit Simulation Software For Effective Teaching And Learning In Electronics At +2 Level	280
74	Yash Vidyasagar R. D. Chaudhari	Tricky Situation in Maximum Power Transfer Theorem in Special Case of an Amplifier	284
75	A. P. Pachkawade	The Initial Invesrion Density Is Constant Through Out The Laser Medium For Calculating Radial Variation Of Peak Power Across The Laser Beam	287
76	A.P.Pachkawade S. K. Devade	Study Of Glow Discharge Of Various Elements, At Different Wavelengths	294
77	Yash Vidyasagar	Comparative Analysis of Silicon over Germanium in the Manufacturing of LSI & VLSI Technology Semiconductor	298
78	S. R. Jaiswal V. B. Bhatkar P.A. Nagpure S. K. Omanwar	Investigation of Visible Quantum Cutting In KCaF3:Gd3+, Eu3+ Phosphor	300
79	Nagnath Bhusnar Pravin Bhadane A.D. Shaligram	Design and Development of Microcontroller Based System Using Commonly Available Sensors and its Possible Applications In Agriculture	304
80	Trupti R. Ugale Snehal D. Pophali Pooja G.Rathod Pritee D. Thakare Dattaraj Vidyasagar	Comparative Analysis of Ambient Temperature using Steinhart-Hart Empirical Equation & Digital Thermometer	311
81	Niteen Shridhar Mohod	Role of Electronics in Automation	316
82	Dr. Gajanan S. Wajire	Shri P. R. Sarkar's Concept Of Origin Of The Universe	318
83	Syed Ghause Ibrahim	Growth And Characterizations Of Tin Sulfide Thin Films	323

99	R. S. Palaspagar, S. R. Khandekar, Y. P. Manwar, R. P. Sonekar, S. K. Omanwar	Synthesis And Photoluminescence Investigations On Sm3+ Ions Doped Sodium Alumino-Borate Phosphor	387
100	Dr. S. M. Padhye Priti. P. Umarkar	Compatible Uniformities On Pseudometric Spaces	393
101	Dr. A.V. Joshi	Generalized Half Canonical Transforms And Some Reslults	398
102	Anjali J. Deshmukh	Virtual ECG Using Biomedical Toolkit	403
103	S. V. Nakade R. N. Ingle	Study Of Derivatives And Integrls Of Fractional Order With Their Applications	407
104	Rohan K Shirsat	A Review Of The Graphene A Wonder Material In The Field Of Vision / Nanoparticles Composites Synthesis And Applications	414
105	Y. P. Manwar, S.K.Tayde, R. S. Palaspagar, R. P. Sonekar, S. K. Omanwar	Photoluminescence Properties Of Sm3+ Doped Libabo3 Phosphor	418
106	Yash Vidyasagar	Implementation of "Circuit Wizard" for Effective Teaching & Learning in Practical Electricity, Electronics & Embedded Systems	422
107	Dr. R. G. Deshmukh	Dark Matter, Dark Energy and Cosmological Model	427
108	Vidhale S.G. Belsare N.G.	Effect Of Uv Radiation On The Dielectric Constant Of Salicylic Acid Doped Thin Films Of Ps	431
109	Neehan Aeman	Machine Learning & Deep Learning (ML/DL) For Security of IOT System For Facilitating Secure Communication between devices to Security Base- Intelligent System	435
110	Mayur Thete, Nikita Pulate, Ranjana Ubale	MQTT Based Raspberry Pi Home Automation System	439
111	Freni Malviya, Paulami Nath, Panchsheela Kamble	Smart Attendance System Using Bio-Metric Identifier with OLED Display	443
112	R. Risodkar R. Joat	Study of Structural & Optical Properties of PVA Doped with FeCl3	447
113	D. P. Deshmukh	Analytical Solution Of The Stress-Focusing Effect In Functionally Graded Hollow Sphere Subjected To Electromagnetic Or Γ- Ray Pulses	450

131	Dr.Nilima S.Tidke	Enhancing the language skill in English with ICT	505
132	Dr. Rakesh A. Badgujar	Comparative Study Among Sportsperson And None Sportsperson In Physical And Psycological Aspect	508
133	Mangesh Ramesh Ubale	Ranganathan's Five Laws and its Impact to the Technological Innovations of Library and Information Sciences	511
134	Dr. Vishalsingh R. Shekhawat	E- Learning and E- Services in Academic Libraries	514
135	Dr. Swati Dipak Damodare	Developing Communication Skills Effectively	517
136	Dr. Sagar Pralhadrao Narkhede	ABC of Sports And Exercise Science	522
137	Prof. Firoz Ansari	Sports Science And Sport Scientist	524
138	Prof. Dr. Anil A. Deshmukh	Importance Of Playing Sports And Their Impact On Children	526
139	Dr. Ravindra Devidas Sawarkar	A Critical Study of Exercise Science with Reference to Biomechanics	529
140	Prof.Sarjerao Rambhau Wagh	Sport Science And Exercise Science	532
141	Sangita Khare Dr.Taresh P . Agashe	The Role Of ICT, E-Learning And Communication Skills In Higher Education	534
142	R. L. Rahatgaonkar	Alterations In Some Haematological Parameters Andserum Proteins During Addiction To Opioid Drug Contramal	537

Physico-Chemical Assessment Of Bore Water From Malegaon Tahshil Of Washim District (Ms)

S. B. Gaikwad[1*], V. B. Bhise[2], S. M. Shende[3], S. N. Tayade[4], S. G. Kalane[1], R. E. Khadse[1]
[1]Department of Chemistry, Late P G Arts and Science Mahavidyalaya, Shirpur (Jain), Washim (MS), India.
[2]Department of Physics, Late P G Arts and Science Mahavidyalaya, Shirpur (Jain), Washim (MS), India.
[3]Department of Botany, Late P G Arts and Science Mahavidyalaya, Shirpur (Jain), Washim (MS), India.
[4]Department of Zoology, Late P G Arts and Science Mahavidyalaya, Shirpur (Jain), Washim (MS), India.

Abstract

Potable water is the most important resource on the earth for overall used with low risk of immediate or long term harm for all living thing. We collected water samples from four different villages (Shirpur (Jain), Medshi, Rajakinhi and Zodga) were subjected to physico-chemical analysis to evaluate the quality water in Malegaon tahshil region of district Washim (Maharashtra). In physico-chemical analysis, various quality parameters are measured including temperature, pH, turbidity, odour, specific conductivity (SC), total dissolved solids (TDS), total hardness(TH), content of calcium (Ca^{2+}), magnesium (Mg^{2+}), chloride(Cl^-), sulphate (SO_4^{2-}), iron (Fe), dissolved oxygen (DO), total alkalinity (TA) and Nitrate (No_3^{2-}) concentration present in bore well water. Each parameter was compared with the standard desirable limit prescribed by WHO. The quality of bore well water of four different villages has been investigated and discussed in this paper.
Keywords: Bore water, physio-chemical parameters, desirable limit and conductivity.

Introduction

Water plays a decisive role in human life. Although statistics, the WHO reports that approximately 36% of urban and 65% of rural Indian were without access to safe potable water [1]. Water has always been a significant and life-sustaining drink to humans and is necessary for the survival of all known organisms [2]. It accounts for about 70% of the weight of a human body. About 80% of the earth surface is covered by water out of which only a small fraction is available for consumption. The rest is locked up in oceans as salt water, polar ice caps, glaciers and underground [3].

Water is a good solvent and picks up impurities easily. Pure water is tasteless, colorless, and odorless is often called the universal solvent. When carbon dioxide is dissolved in water to form very weak carbonic acid, an even better solvent results. As water moves through soil and rock, it dissolves very small amounts of minerals and holds them in solution. Calcium and magnesium dissolved in water are the two most common minerals that make water "hard." The degree of hardness becomes greater as the calcium and magnesium content increases and is related to the concentration of multivalent cations dissolved in the water. Excessive groundwater exploitation has resulted in lowering of water table in rural and urban areas of India. The water quality parameters decide the portability of water [4]. In order to evaluate water quality index, we have carried out the physico-chemical assessment of bore wells drinking water.

Materials And Methods

The water samples were collected at 8:00 AM to 10:00 AM with the necessary pricaution from the four different villages (Shirpur (Jain), Medshi, Rajakinhi and Zodga), in polythene bottles. The water samples were used for the estimation of various physico-chemical parameters like water temperature, pH were recorded by using thermometer and digital pH meter (Systronics). Specific conductivities were measured by using digital conductivity meter. The TDS values were measured by using TDS meter. Calcium, magnesium, iron, chloride, sulphate and nitrate were estimated in the laboratory by using standard laboratory methods. Present study involves the analysis of water quality in terms of physico-chemical methods [5].

Results And Discussion

The difference in physico-chemical parameters is given in **Table-1**.
Sample 1: Shirpur (Jain) bore drinking water.
Sample 2: Medshi bore drinking water.
Sample 3: Rajakinhi bore drinking water.
Sample 4: Zodga bore drinking water.

There was no significant change in the pH value during the observation period; the observed values were in the range 6.8 to 7.3. Total hardness, odour, conductance and turbidity changed from **Sample 1** to **Sample 4**. Concentration of nutrients like chloride, sulphate, calcium, magnesium, iron, dissolved oxygen, total alkalinity and nitrate was within the permissible limits. The physic-chemical characteristics of water samples in the study area suggested that there was no harmful chemical contamination.

Table-1: Physico-chemical parameters of water samples of selected bore well water in Malegaon tahshil region, district Washim (MS)

Sr. No.	Parameters	Sample 1	Sample 2	Sample 3	Sample 4
1.	Temperature	29.3	29.5	30.0	29.2
2.	Odour	0	0	0	0
3.	pH	6.8	7.1	6.9	7.3
4.	Sp. Conductivity (mS)	281	290	335	370
5.	Total dissolved Solid (mg/l)	289	299	395	192
6.	Chloride (mg/l)	120	124	126	123
7.	Sulphate (SO_4^{2-}) (mg/l)	80	82	85	82
8.	Calcium (mg/l)	45	46	45	46
9.	Magnesium (mg/l)	19	24	29	27
10.	Iron (Fe)	0.39	0.42	0.40	0.43
11.	Nitrate (mg/l)	6.52	7.20	7.13	7.39
12.	Total alkalinity (mg/l)	139	150	188	162
13.	Total hardness (mg/l)	430	419	449	465
14.	Turbidity (NTU)	4	5	3	4
15.	Dissolved oxygen (m/l)	7.9	8.2	7.8	8.4

Conclusion:

Physico-chemical analysis such as temperature, pH, dissolved oxygen, total dissolved solids, chloride, calcium, magnesium, iron, dissolved oxygen, total alkalinity and nitrate, total alkalinity, total hardness, sulphate and nitrate of bore wells water was carried out. TDS value should be less than 500 mg/l for drinking water. The physic-chemical characteristics of water samples in the study area suggested that there was no harmful chemical contamination.

References

[1] Sexenal N., Mishra S. N., *J. Chem. Pharma. Res*., **2011**, 3(2), 162-167.
[2] Greenhalgh, Alison (**2001**). "Healthy living - Water". BBC Health. Retrieved 2007-02-19.
[3] Dara S. S., A Text Book Of Environmental Chemistry And Pollution Control, S. Chand and Company limited, **1995**, p 65.
[4] WHO. Guidelines for Drinking Water Quality, 2nd edition. World Health Organization, Geneva, **2004,** 231-233**.**
[5] Trivedy R. K., Goel P. K., Chemical and biological methods for water pollution studies, Environmental Publication, Karad, Maharashtra Kaushik, **1986**.

Study of Microwave Assisted Synthesis and Biological Activities of Some Pyrimidine Linked Oxadiazole Pharmacophores

Kalpana A. Palaspagar,
Pradip P. Deohate[*]
Department of Chemistry,
Shri Radhakisan Laxminarayan
Toshniwal College of Science,
Akola 444001, India

Abstract

In present work microwave assisted synthesis of (5-aryl/alkylamino-[1,3,4]-oxadiazol-2-yl-methyl)-(4,6-dimethyl-pyrimidin-2-yl)-amines have been carried out. Initially ethyl (4,6-dimethyl-pyrimidin-2-yl-amino)-acetate was prepared by reacting 2-amino-4,6-dimethyl-pyrimidine with ethyl chloroacetate. It was further reacted with hydrazine hydrate to afford (4,6-dimethyl-pyrimidin-2-yl-amino)-acetic acid hydrazide. This hydrazide was then reacted with N-aryl/alkyl isothiocyanates followed by oxidative cyclization using alkaline ethanolic solution of iodine in presence of potassium iodide to afford the respective title compounds with differently substituted pharmacophores. The constitutions of synthesized compounds were delineated on the basis of chemical transformation, elemental analysis, equivalent weight determination and IR, ^{1}H-NMR, mass spectral studies. Progress of the reactions was monitored by TLC. Title compounds were screened for their biological activities.

Keywords: Microwave, pyrimidine linked oxadiazoles, biological activities.

Introduction

The heterocyclic compounds especially with distinguished pharmacological activities have proved to be excellent and versatile drugs in the field of medicinal chemistry[1]. Pyrimidine as a heterocyclic compound is an excellent core structure with diversified therapeutic applications[2]. Its fascinating use as a medicinally important compound is evidential from its varied biological properties[3]. Similar to pyrimidine[4-5]; 1,3,4-oxadiazoles derivatives are introduced in medicinal substances as antibacterial, anti-inflammatory, antifungal, anti-tubercle, antiviral agents[6-8]. Oxadiazole ring is also used as a substantial part of the pharmacophore, which have anti-proliferative activity[9]. The fusion of pyrimidine nucleus with oxadiazole derivatives proved to be excellent biological compounds[10-12].

In the present work efforts are made for microwave assisted synthesis[13-14] and characterization of series of (5-aryl/alkylamino-[1,3,4]-oxadiazol-2-yl-methyl)-(4,6-dimethyl-pyrimidin-2-yl)-amines.

Results and Discussion

The starting product ethyl (4,6-dimethyl-pyrimidin-2-yl-amino)-acetate (2) was prepared by the reaction of 2-amino-4,6-dimethyl pyrimidine (1) and ethyl chloroacetate in 1,4-dioxane medium using anhydrous potassium carbonate as a catalyst[2]. The product ethyl (4,6-dimethyl-pyrimidin-2-yl-amino)-acetate (2) was reacted with hydrazine hydrate in 1,4-dioxane to give (4,6-dimethyl-pyrimidin-2-yl-amino)-acetic acid hydrazide (3) and further reacted with N-phenyl isothiocyanate (4a) to afford (4,6-dimethyl-pyrimidin-2-yl-amino)-acetic acid N-(N'-phenyl-thioamido)-hydrazide (5a). The compound (5a) was transformed into (4,6-dimethyl-pyrimidin-2-yl)-(5-phenyl-amino-[1,3,4]-oxadiazol-2-yl-methyl)-amine (6a) by oxidative cyclization using alkaline ethanolic solution of iodine in presence of potassium iodide with evaluation of hydrogen sulphide gas. Most of these reactions were carried by microwave irradiation. These reactions were extended to synthesize (5-aryl/alkylamino-[1,3,4]-oxadiazol-2-yl-methyl)-(4,6-dimethyl-pyrimidin-2-yl)-amines (6b-h) (Scheme-1).

Scheme-1
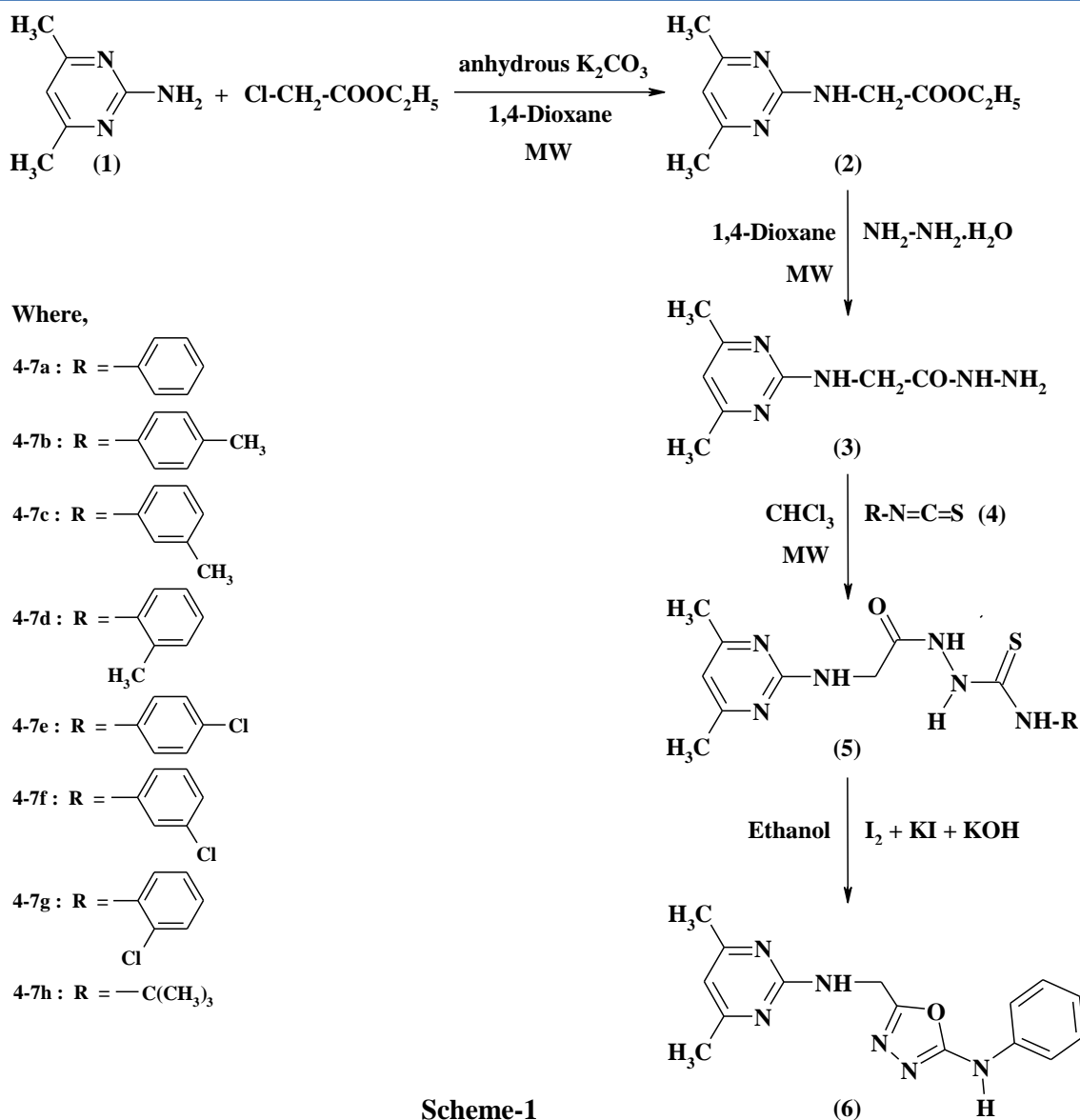
The products obtained were characterized by spectral method[15-17]. The elemental analysis[18] satisfied the structural properties of the synthesized compounds. To conclude, the chemistry of the reactions employed together with their chemical behaviour was discussed exhibiting the importance of novel molecular templates.

Antimicrobial activity

Various methods have been proposed and adopted for the measurement of antimicrobial activity[19]. In present antimicrobial study the newly synthesized compounds were screened for their antibacterial activity using disc diffusion method[20-22]. Sensitivity plates were seeded with a bacterial inoculum of 1×10^6 CIU/mL and 5 mm discs impregnated with test solution were placed on the nutrient media loaded in petri plates. The zones of inhibition were recorded after incubation for 24 hr at 37ºC, using Vernier caliper. The bacterial organisms used included both gram-positive as well as gram-negative strains. The medium used for the study of antibacterial activity of newly synthesized compounds was Muller-Hinton agar. It was of bacteristatic grade and found to be suitable for the growth of all bacterial strains used in the present study.

The antibacterial activity and inhibition effect of the compounds (6a-h) on the growth of various bacterial organisms is summarised in table given below along with the inhibition effect of standard drug ofloxacin for comparison purpose. The compounds (6b) and (6e) were found to be highly sensitive (bactericidal) against the microorganisms *E. coli* and *P. vulgaris* whereas moderately sensitive against *B. subtilis*. Majority of the compounds were found to be moderately sensitive against *S. aureus* and slightly sensitive against *B. subtilis*. Compound (6h) was resistant against almost all the microorganisms. To determine the minimum inhibitory concentration (MIC), the serial dilution technique was followed using nutrient broth medium. The MIC[23] values of compounds (6e) against *E. coli* and *P. vulgaris* were found to be 60 and 64 µg/mL respectively.

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293
(Special Issue No.70) Peer Reviewed Journal   www.aiirjournal.com Mob. 8999250451

4

The synthesized compounds (6a) and (6b) were screened for their antifungal activity[24] against *C. albicans*. The potato dextrose agar (PDA) was used as a nutrient media. Discs of 5 mm size impregnated with test compound solutions of 100 μg/mL were placed in the fungal culture of *C. albicans* in petri plates and allowed to incubate at 26^0C for 4 days. The zones of inhibition were measured and compared with the action of fluconazole. The compounds (6a) and (6b) showed prominent inhibitory activity against *C. albicans*.

Antibacterial and antifungal activity of (5-aryl/alkylamino-[1,3,4]-oxadiazol-2-yl-methyl)-(4,6-dimethyl-pyrimidin-2-yl)-amines (6a-h)

Compounds	Microorganisms					
	E. coli	*S. aureus*	*S. typhi*	*B. subtilis*	*P. vulgaris*	*C. albicans*
6a	R	S 14	R	S 14	S 11	S 20
6b	S 30	R	S 13	S 11	R	S 24
6c	S 15	S 17	R	S 12	S 12	-
6d	S 18	S 19	R	S 15	R	-
6e	S 22	S 15	S 11	S 17	S 23	-
6f	S 19	S 14	S 17	S 12	S 15	-
6g	R	S 16	S 19	S 14	S 14	-
6h	R	S 13	R	R	R	-
Standard	S 35	S 35	S 40	S 28	S 18	S 18
Standard drugs for antibacterial activity - ofloxacin and antifungal activity - fluconazole						

(Concentration 100 μg/ml) (Diameter of inhibition zone in mm)

R (Resistant)	:	(11 mm and below)
S (Sensitive) (Bactericidal)	:	(11 mm above)
Slightly Sensitive	:	(11 mm above to 15 mm)
Moderately Sensitive	:	(15 mm above to 20 mm)
Highly Sensitive	:	(20 mm above)

Experimental

Melting points of all the synthesized compounds were determined on a digital melting point apparatus (Veego, VMP-D) and are uncorrected. All chemicals used were of AR grade. The C, H and S analysis was carried out on Carlo-Erba analyser, N estimation was carried out on Colman-N-analyser-29. Purity of the title compounds were checked by TLC. All the reactions carried out in GMG20E-08-SLGX microwave oven at 800 W. IR spectra were recorded on Perkin-Elmer spectrophotometer using KBr disc. ^{1}H-NMR spectra were obtained on a Bruker-DRX-600 spectrophotometer in CDCl$_3$ with TMS as internal standard using CDCl$_3$ and DMSO-d_6 as solvents. Mass spectral measurements were carried out by EI method on a Jeol-JMC-300 spectrometer at 70 eV. The reagents used in the synthesis of (5-aryl/alkylamino-[1,3,4]-oxadiazol-2-yl-methyl)-(4,6-dimethyl-pyrimidin-2-yl)-amines (6a-h) have been prepared as follows.

Synthesis of ethyl (4,6-dimethyl-pyrimidin-2-yl-amino)-acetate (2)

The parent compound ethyl (4,6-dimethyl-pyrimidin-2-yl-amino)-acetate (2) was prepared by irradiating the mixture of 2-amino-4,6-dimethyl-pyrimidine (1) (0.01 mole) and ethyl chloroacetate (0.01 mole) in 1,4-dioxane under microwave for 4 min. 10 sec. using anhydrous potassium carbonate as a catalyst. When 1,4-dioxane was evaporated, crude solid mass was obtained, it was crystallised from absolute ethanol and identified as ethyl (4,6-dimethyl-pyrimidin-2-yl-amino)-acetate (2), yield 88%, m.p. 142^0C (Found: C, 55.11; H, 6.98; N, 20.10. Calcd. for C$_{10}$H$_{15}$N$_3$O$_2$: C, 57.41; H, 7.17; N, 20.09%).

Synthesis of (4,6-dimethyl-pyrimidin-2-yl-amino)-acetic acid hydrazide (3)

The compound (4,6-dimethyl-pyrimidin-2-yl-amino)-acetic acid hydrazide (3) was prepared by irradiating the mixture of ethyl (4,6-dimethyl-pyrimidin-2-yl-amino)-acetate (2) (0.01 mole) and hydrazine hydrate (0.01 mole) in 1,4-dioxane under microwave for 1 min. 30 sec., progress of the reaction was monitored by TLC. The crude solid mass obtained was crystallised from absolute ethanol in cold condition (3), yield 88%, m.p. 138^0C (Found: C, 48.17; H, 6.38; N, 35.01. Calcd. for C$_8$H$_{13}$N$_5$O: C, 49.22; H, 6.71; N, 35.87%); IR: 3401, 3310 (NH), 1705 (C=O), 1628 (C=N), 1336 (C-N), 1156 cm^{-1} (N-N); ^{1}H NMR (CDCl$_3$+DMSO-d_6): 7.38 (1H, s, CO-NH), 6.46 (1H, s, Pyrm-NH), 6.32 (1H, s, Pyrm-H), 3.57 (2H, s, CO-CH$_2$), 2.52 (2H, s, NH$_2$), 2.17 (6H, s, Pyrm-CH$_3$).

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293
(Special Issue No.70)   Peer Reviewed Journal   www.aiirjournal.com Mob. 8999250451

5

Synthesis of (4,6-dimethyl-pyrimidin-2-yl-amino)-acetic acid N-(N'-phenyl-thioamido)-hydrazide (5a)

The mixture of (4,6-dimethyl-pyrimidin-2-yl-amino)-acetic acid hydrazide (3) (0.01 mole) and N-phenyl isothiocyanate (4a) (0.01 mole) in chloroform was irradiated in a microwave oven for 1 min. 30 sec., progress of the reaction was monitored by TLC. The crude solid mass obtained was crystallized from ethanol in cold condition and identified as (4,6-dimethyl-pyrimidin-2-yl-amino)-acetic acid N-(N'-phenyl-thioamido)-hydrazide (5a), yield 79%, m.p. 134^{0}C (Found: C, 53.77; H, 5.05; N, 25.40; S, 9.08. Calcd. for $C_{15}H_{18}N_6OS$: C, 54.54; H, 5.45; N, 25.45; S, 9.69%); IR: 3402, 3311 (NH), 1764 (C=O), 1649 (C=N), 1311 (C-N), 1246 (C=S), 1170 cm^{-1} (N-N); ^{1}H NMR (CDCl$_3$+DMSO-d_6): 7.99 (1H, s, CO-NH), 7.75 (1H, s, Ar-NH), 7.73 (1H, s, CS-NH), 7.09-7.58 (5H, m, Ar-H), 6.41 (1H, s, Pyrm-NH), 6.29 (1H, s, Pyrm-H), 3.64 (2H, s, CO-CH$_2$), 2.21 (6H, s, Pyrm-CH$_3$). This reaction was extended to synthesize other compounds (5b-h) using different N-aryl/alkyl isothiocyanates (4a-h): (5b) (84%), m.p. 118^{0}C; (5c) (87%), m.p. 112^{0}C; (5d) (88%), m.p. 111^{0}C; (5e) (79%), m.p. 64^{0}C; (5f) (91%), m.p. 149^{0}C; (5g) (88%), m.p. 210^{0}C; (5h) (90%), m.p. 94^{0}C. The reactions were monitored on silica gel-G plates by TLC.

Synthesis of (4,6-dimethyl-pyrimidin-2-yl)-(5-phenyl-amino-[1,3,4]-oxadiazol-2-yl-methyl)-amine (6a)

A paste of (4,6-dimethyl-pyrimidin-2-yl-amino)-acetic acid N-(N'-phenyl-thioamido)-hydrazide (5a) (0.01 mole) was prepared in ethanol. To this, iodine solution in ethanolic potassium hydroxide containing potassium iodide was added drop by drop with constant stirring, the colour of iodine initially disappeared and addition was continued till the violet colour of iodine persisted. The mixture was allowed to stand for 2 hr. The separated solid (4,6-dimethyl-pyrimidin-2-yl)-(5-phenyl-amino-[1,3,4]-oxadiazol-2-yl-methyl)-amine (6a) was crystallized from ethanol, yield 85%, m.p. 111^{0}C (Found: C, 59.37; H, 5.31; N, 26.89. Calcd. for $C_{15}H_{16}N_6O$: C, 60.81; H, 5.40; N, 28.37%); IR: 3393, 3189 (NH), 1628 (C=N), 1313 (C-N), 1243 (C-O), 1163 cm^{-1} (N-N); ^{1}H NMR (CDCl$_3$+DMSO-d_6): 6.88-7.91 (6H, m, Ar-H, Pyrm-H), 6.36 (1H, s, Ar-NH), 6.32 (1H, s, Pyrm-NH), 3.38 (2H, s, NH-CH$_2$), 2.16 (6H, s, Pyrm-CH$_3$); MS: m/z 295 (M$^+$-H), 281 (M$^+$-CH$_3$), 204 (M$^+$-NH.C$_6$H$_5$), 160 (M$^+$-(CH$_3$)$_2$.C$_4$HN$_2$.NH.CH$_2$), 122 (CH$_3$)$_2$.C$_4$HN$_2$.NH$^+$), 92 (C$_6$H$_5$.NH$^+$). This reaction was extended to synthesize other compounds (6b-h): (6b) (80%), m.p. 97^{0}C (Found: C, 60.11; H, 5.49; N, 27.10. Calcd. for $C_{16}H_{18}N_6O$: C, 61.93; H, 5.80; N, 27.09%); IR: 3396, 3181 (NH), 1632 (C=N), 1315 (C-N), 1240 (C-O), 1165 cm^{-1} (N-N); ^{1}H NMR (CDCl$_3$+DMSO-d_6): 6.95-7.62 (5H, m, Ar-H, Pyrm-H), 6.39 (1H, s, Ar-NH), 6.33 (1H, s, Pyrm-NH), 3.47 (2H, s, NH-CH$_2$), 2.40 (3H, s, Ar-CH$_3$) , 2.16 (6H, s, Pyrm-CH$_3$); MS: m/z 310 (M$^+$), 295 (M$^+$-CH$_3$), 188 (M$^+$-(CH$_3$)$_2$.C$_4$HN$_2$.NH), 174 (M$^+$-(CH$_3$)$_2$.C$_4$HN$_2$.NH.CH$_2$), 122 (CH$_3$)$_2$.C$_4$HN$_2$.NH$^+$), 106 (CH$_3$.C$_6$H$_4$.NH$^+$); (6c) (82%), m.p. 155^{0}C; (6d) (90%), m.p. 162^{0}C; (6e) (84%), m.p. 119^{0}C; (6f) (85%), m.p. 122^{0}C; (6g) (80%), m.p. 186^{0}C; (6h) (86%), m.p. 141^{0}C. The reactions were monitored on silica gel-G plates by TLC.

Conclusion

In present work microwave irradiative synthesis of (5-aryl/alkylamino-[1,3,4]-oxadiazol-2-yl-methyl)-(4,6-dimethyl-pyrimidin-2-yl)-amines has been reported. The compounds obtained were of good quality and purity with high % yield. Microwave assisted method applied for the synthesis is simple, efficient, fast, clean, economic and eco-friendly.

References
1. R. S. Verma and R. J. Dahiya, *Tetrahedron Lett.*, **38**, 2034 (1997).
2. J. A. Joule and K. Mills, "*Heterocyclic Chemistry*", 5th Edn., Wiley & Sons, UK   (2010).
3. P. Lindstrom, J. Tieney, B. Wathey and J. Westmann, *Tetrahedron*, **57**, 9225 (2001).

4. K. S Babu, V. Prabhakar, L. K. Ravindranath and J. Latha, *Int. J. Pharma. Res. & Reviews*, **4**, 23 (2015).
5. H. E. M. Tolam, A-El. Saeyed, N. Tawfek, F. Abdul Megied and O. M. Kutkat, *Nucleotides and Nucleic Acids*, 1 (2019).
6. Z. Liu, G. Yand and X. Qin, *J. Chem. Tech.*, **76**, 1154 (2001).
7. R. H. Khan and R. C. Rastogi, *J. Agril. & Food Chem.*, 2300 (1991).

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293
(Special Issue No.70)   Peer Reviewed Journal   www.aiirjournal.com Mob. 8999250451

6

8. M. M. Sekhar, U. Nagarjuna, V. Padmavati, A. Padmaja, N. V. Reddy and T. Vijaya, *Eur. J. Med. Chem.*, **145**, 1 (2018).

9. S. M. Dalunge, P. Skoezny, B. Roth and B. S Raukman, *U.S Patent,* **4**, 590, 271 (1986).

10. N. Agarwal, S. K. Raghuwanshi, D. N. Upadhyay, P. K. Shukla and V. J. Ram, *Biorg. & Med .Chem. Lett.*, **10**, 703 (2000).

11. A. R. M. Coates and Y. Hu, *British J. Pharm.,* **152**, 1147 (2007).

12. K. Poole, *J. Pharm. & Pharmacol.*, **53**, 283 (2001).

13. R. N. Gedey, F. E. Mith and K. Westway, *Can. J. Chem.*, **17**, 66 (1988).

14. D. M. P. Mingos and A. G. Whittaker, *"Microwave Dielectric Heating Effects in Chemical Synthesis"*, New York and Heidelberg, **6B**, 479 (1997).

15. Williams and H. Dudley, "*Spectroscopic Methods in Organic Chemistry*", Tata McGraw-Hill, UK (2004).

16. R. M. Silverstein, G. C. Bassler and T. C. Morril, "*Spectrometric Identification of Organic Compounds*", John Wiley & Sons, New York (1981).

17. D. L. Pavia, G. M. Lampman, G. S. Kriz and J. R. Vyvyan, "*Spectroscopy*", Cengage Learning, Canada (2010).

18. B. S. Furniss, A. J. Hannaford, P. W. G. Smith and A. R. Tatchell, "*Vogel's Text Book of Practical Organic Chemistry*", 5th Edn., Longman, U.K. (1989).

19. C. H. Collins, "*Microbiology Methods*", Butter Worths, London, 364 (1967).

20. *British Parmocopoea*, Vol.-II, Her Majesty's Stationary Office, London (2004).

21. A. L. Barry, "*The Antimicrobial Susceptibility Test; Principle and Practices*" edited by Illus Lea and Fibiger (Philadephia, Pa, USA), 180 (1976).

22. F. Cavanagh, "*Analytical Microbiology*", Academic Press, New York, 126 (1963).

23. M. J. Pelczar, R. D. Reid and E. C. S. Chan, "*Microbiology*", London (1978).

24. R. Ananthanarayan, G. K. Jagram Pancka, "*Text Book of Microbiology*", 4th edn., Orient Longmans (1990)

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293
(Special Issue No.70)   Peer Reviewed Journal   www.aiirjournal.com Mob. 8999250451

7

Synthesis And Study Of Aryl Substituted 1,3-Thiazine And Its Nanoparticles With Special Reference To Plant Pathogens Of Some Vegetable Crops

Chhaya D. Badnakhe[1] ,
P. R. Rajput[2], D.D.Bhokare[3]
[1] Department of Chemistry, Dr.Manorama and Prof.H.S.Pundkar, Arts, Commerce and Science College, Balapur, Dist.-Akola, India.
[2]Department of Chemistry,Vidyabharti Mahavidyalaya, Amravati-444604. India
[3]Department of Microbiology,Shankarlal Khandelwal Arts,Science & Commerce College, Akola, India.

Abstract :

The synthesis, spectral analysis and biological activities of 4-phenyl-2-hydroxy-chlorosubstituted-2-imino-1,3 thiazine has been carried out. In this case 4-(2'-hydroxy-3',5'-dichlorophenyl)-6-(4"-nitrophenyl)-2-imino-3,6-dihydro-1,3- thiazine (A) has been screened. The compounds (A) was synthesized from 2'-hydroxy-3,5-dichlorophenyl-4-(4"-nitrophenyl) chalcone (a) by the action of thiourea. The compound (a) was synthesized from 2´-hydroxy-3´,5´-dichloroacetophenone by the action of p-nitrobenzaldehyde in ethanol and 40% NaOH. The nanoparticles of the compounds A has been prepared by using ultrasonic technique. The titled compound and its nanoparticles were assayed for antipathogenic impact against some common crop pathogens viz - Aspergillus niger, Pseudomonas lachrymans, Fusarium oxysporum and Fusarium solani.

Keywords : Chalcone, thiazine, thiourea, antipathogenic activities.

Introduction :

Thiazine is a six membered ring system, which contains two hetero atoms [N and S] placed in a heterocyclic ring at 1, 3 positions. Many workers have synthesized different 1,3-thiazines. The researchers have reported the synthesis of several thiazines[1-6] and also their potent biological activities such as antibacterial[7], antimicrobial[8-9] antifungal[10], plant pathogenic activity[11], pesticidal activity[12], insecticidal activity[13], and cancer[14]**.** Moreover thiazine nucleus is a pharmacophore of cephalosporin that occupy a very important place in the field, of antibiotics and drug chemistry. Chalcones and their analogues having α, β-unsaturated carbonyl system are very versatile substrates for the evolution of various reactions and physiologically active compounds. The reaction of thiourea with α, β-unsaturated ketones also results in the formation of 1,3-thiazines.The chlorosubstituted thiazines with amino group at position 2 in the ring exhibit promising biological activities[15-19]. Plant pathology deals with the cause etiology, resulting losses and control or management of the plant diseases. The normal physiological functions of the plants are disturbed when they are affected by pathogenic living organisms or by some environmental factors. As a result of the disease, plant growth is reduced, deformed or even the plant dies. Plant diseases are caused by the pathogens like *fungi, bacteria, viruses* etc.

In the present study, the chlorosubstituted 1,3-thiazine (A) has been prepared along with its nanoparticles and were assayed for antipathogenic impact against some common crop pathogens viz - *Aspergillus niger, Pseudomonas lachrymans, Fusarium oxysporum* and *Fusarium solani.*

Experimental :

All the glassware's used in the present work were of pyrex quality. Melting points were determined in hot paraffin bath and are uncorrected.The purity of compounds was monitored on silica gel coated TLC plate. IR spectra were recorded on Perkin-Elmer spectrophotometer in KBr pelletes, H[1] NMR spectra on spectrophotometer in $CDCl_3$ with TMS as internal standard. UV spectra were recorded in nujol medium. The analytical data of the titled compounds was highly satisfactory. All the chemicals used were of analytical grade. All the solvents used were purified by standard methods. Physical characterisation data of all the compounds is given in Table 1.

Table 1 : Characterisation data of newly synthesized compounds :

Compounds	Molecular formula	M.P. in ^{0}C	% of yield	% of element			
				C	**H**	**N**	**S**
	$C_8H_6O_2Cl_2$	54	80	47.90/48	2.95/3		
a	$C_{15}H_9O_4NCl_2$	250	70	53.10/53.25	2.40/2.66	3.98/4.18	
A	$C_{16}H_{11}O_3N_3Cl_2S$	120	70	48.50/48.60	2.35/2.53	10.40/10.63	8.00/8.10

2´-Hydroxy 3´,5´-dichloroacetophenone :

2´-Hydroxy-5-chloroacetophenone (3g) was dissolved in acetic acid (5 ml), and mixed with sodium acetate (3g). To this reaction mixture chlorine in acetic acid reagent (40 ml; 7.5 w/v) was added dropwise with

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293
(Special Issue No.70)   Peer Reviewed Journal   www.aiirjournal.com Mob. 8999250451

8

stirring. The temperature of the reaction mixture was maintained below 20°C. The mixture was allowed to stand for 30 minutes and then poured into water. A pale yellow solid thus obtained was filtered, dried and crystallized from ethanol to yield the compound.

Preparation of 2'-hydroxy-3,5-dichlorophenyl-4-(4"-nitrophenyl)-chalcone (a) :

2'-Hydroxy-3',5'-dichloroacetophenone (0.1 mol) was dissolved in ethanol (50 ml) and p-nitrobenzaldehyde (0.1 mol) was added gradually to the solution and the mixture was heated to boiling. Then aquous sodium hydroxide solution [40%; 40 ml] was added dropwise with constant stirring. The mixture was stirred mechanically at room temperature for about half an hour and kept for overnight. It was then acidified by hydrochloric acid (10%) solution . The solid product thus separated, was filtered, and washed with sodium bicarbonate (10%) followed by water. Finally it was crystallized from ethanol acetic acid mixture to get the compound (a).

Preparation of 4-(2'-hydroxy-3',5'-dichlorophenyl)-6-(4"-nitrophenyl)-2-imino-3,6-dihydro-1,3-thiazine (A) :

2'-Hydroxy-3,5-dichlorophenyl-4-(4"-nitrophenyl)-chalcone (a) (0.01 mol) and thiourea (0.02 mol) were dissolved in ethanol (30 ml). To this aquous KOH solution (0.02 mol) was added,. The reaction mixture was refluxed for three hours, cooled and diluted with water then acidified with 1:1 HCl. The product thus obtained was crystallized from ethanol to get the compound (A).

The newly synthesized compound was characterised on the basis of elemental analysis, molecular determination, UV, IR, NMR. spectral data.

The UV, IR, and NMR spectral data :-
Compound (A) :
UV : Spectrum No. 1
The UV-Vis spectrum of the compound A reported in dioxane showed λ_{max} value 495 nm corresponding to n→π* transition.
IR (KBr) :- Spectrum No. 2
3365.34 cm^{-1} (-OH phenolic), 2925.2cm^{-1} (aliphatic -C-H stretching), 3068.24cm^{-1} (aromatic -C-H stretching), 3017.30 cm^{-1} (-N-H stretching), 1648.7 cm^{-1} (-C=N stretching), 1342 cm^{-1} [(C-N) (C-NO$_2$) stretching], 738.13 cm^{-1} (C-Cl stretching in aliphatic), 1177.7 cm^{-1} (C-Cl) stretching in aromatic).
PMR :- Spectrum No. 3
∂ 1.2 (s, 1H, -C-**H**) ; ∂ 2.7 (s, 1H, =N -**H**) ; ∂ 3.6 (s, 1H, =N-**H**) ; ∂ 3.7 (s, 1H, =C-**H**) ; ∂ 7.6 to 8.1 (m, 6H, Ar-**H**) ; ∂ 12.6 (s, 1H, O-**H**)
Scheme :
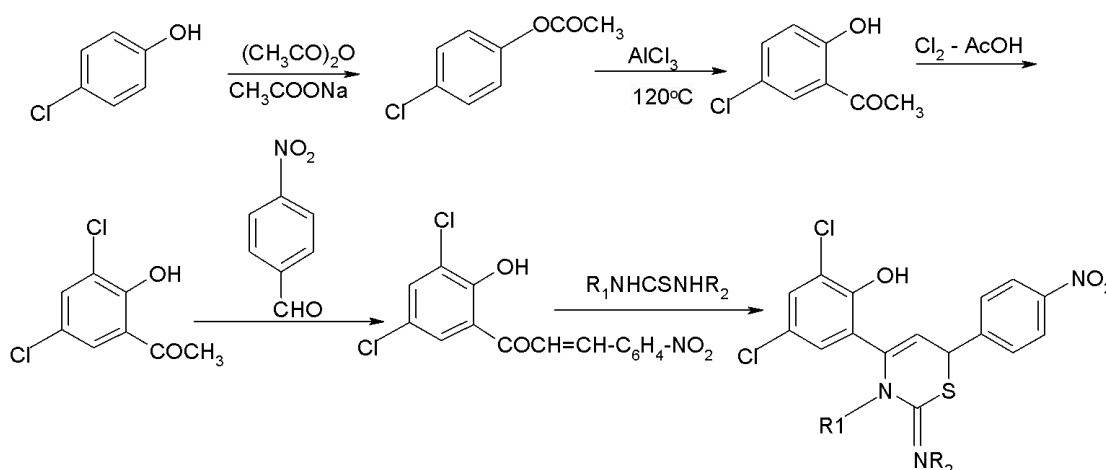
1) R$_1$ = -H,
2) R$_2$ = -H,

Experimental Details And Discussion Of Results :

The newly synthesized thiazine (A) and its nanoparticles in the study were tested against some common pathogens for their antifungal and antibacterial activities, using disc diffusion method. The vegetable crop

pathogens namely *Aspergillus niger, Pseudomonas lachrymans, Fusarium oxysporum, Fusarium solani* were procured from Department of Plant Pathology, Punjabrao Deshmukh Agriculture Krishi Vidyapeeth, Akola.

The punch discs of 6.25 mm diameter of whatman filter paper No. 1 were prepared and dispensed in the batches of 100 inch in screw capped bottles. These were sterilized by dry heat at 140^oC for 60 minutes. The solutions of 0.01 mole dilution of the nanoparticles of test compounds mentioned in the part V of the study were prepared in dioxane solvent. The discs were soaked assuming that each discs will contain approximately 0.01 ml of the test solution.

The culture media for pathogens was prepared by using the following composition for one litre distilled water.

Composition of nutrient agar-agar :-

Peptone	: 5.0 g/litre
Sodium chloride	: 5.0 g/litre
Beef extract	: 1.5 g/litre
Yeast extract	: 1.5 g/litre
Agar	: 15.0 g/litre
pH (approximately)	: 7.4 ± 0.2

The culture medium prepared was sterilized in an autoclave at 15 lbs/inch pressure at 121^oC temperature for 15 minutes. After sterilization it was cooled down to about 50^oC and poured into presterilized petriplates of 8.5 cm in diameter each and allowed to solidify the nutrient agar medium of about 14 m depth. The petriplates were kept with nutrient broth at 37^oC for 4 hours in an incubator.

The cultures of pathogens were innoculated separately in petriplates on the surface nutrient agar broth uniformly with all a septic precautions. The plates were dried again for 30 minutes and without further delay the discs soaked in the test compounds were applied at adequate spacing 2 cm or more apart to the surface medium with the help of sterilized forceps. The discs were pressed gently to ensure their full contacts with the medium. The control was run using plane dioxane solvent for aseptic conditions. The plates were kept in incubator at 37^oC for about 18 to 24 hours. Soon after the incubation period is over the degree of sensitivity to test the compounds were determined by measuring the visible clear area of growth free zones [zone of inhibition] produced by diffusion of the antibiotics into media from the discs by calipers in mm. The results are tabulated as:

Zones of Inhibition (mm)
Vegetable Crop Pathogens :-
Zones of Inhibition (mm)
Vegetable Crop Pathogens :-

Sr.No.	Aspergillus niger	Pseudomonas lachrymans	Fusarium oxysporum	Fusarium solani
(1) A (5a)	0.5 mm	2.5 mm	2 mm	0.5 mm
(2) Control	-	-	-	-
(3)Antibacterial agent	-	11 mm	11 mm	-
(4)Antifungal agent	8 mm	-	8 mm	-

Zero mm	:	Non active
0 – 2 mm	:	Weakly active
3 – 5 mm	:	Moderately active
6 – 8 mm	:	Active
9 – 11 mm	:	Strongly active
12 – 14 mm	:	Very strongly active

Result And Discussion :

The nanoparticles of test compounds when screened *in vitro* against test vegetable crop pathogens viz. *Aspergillus niger, Pseudomonas lachrymans, Fusarium oxysporum, Fusarium solani* then it was noticed that most of these compounds (A) showed remarkable inhibitory activity against all the test organisms.

Compound A shows remarkable inhibitory activity against vegetable crop pathogen *Pseudomonas lachrymans.*

Impact of newly synthesized chlorosubstituted heterocycles on some vegetable crop pathogens
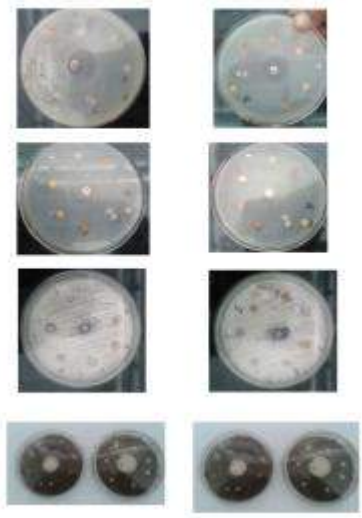
Impact of newly synthesized chlorosubstituted heterocycles on some vegetable crop pathogens
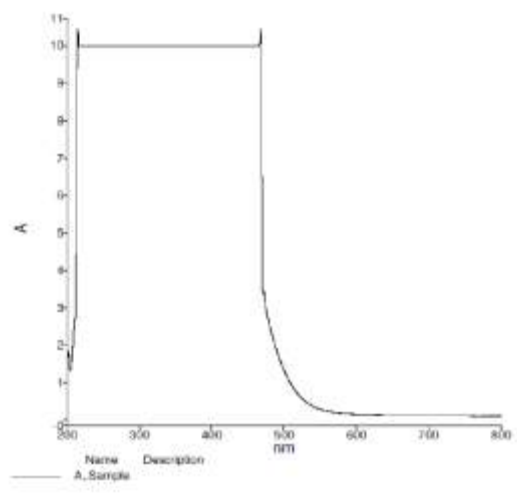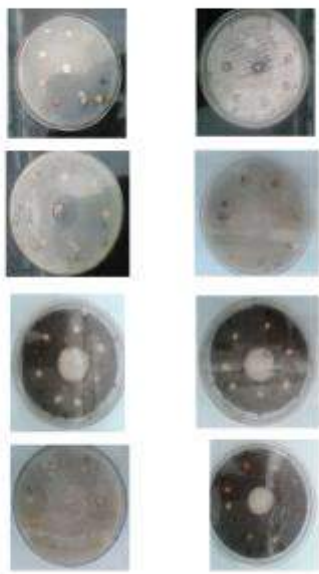
Spectrum No. 01
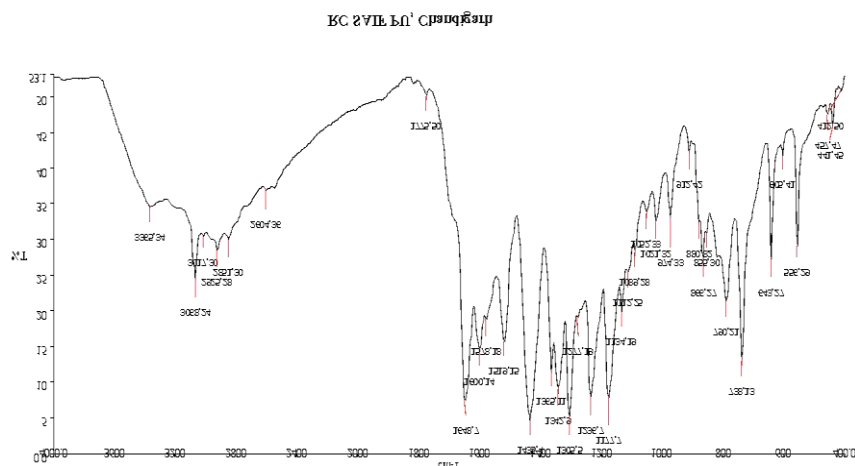
Spectrum No. 02
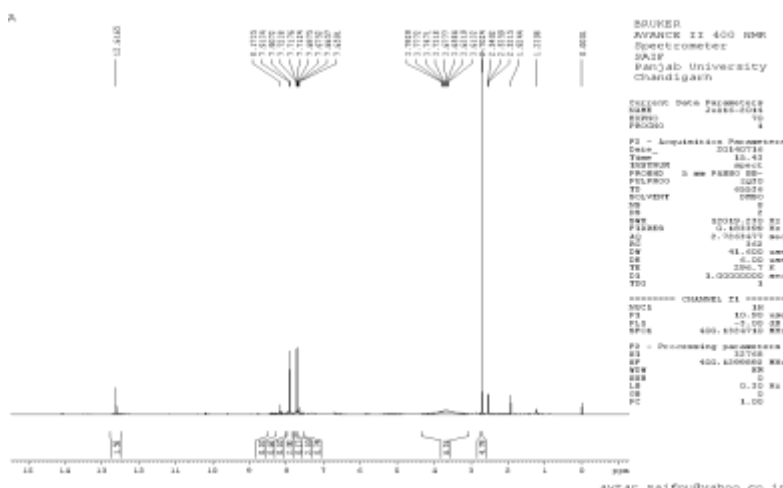
Spectrum No. 03

References :-
(1)   Swarnkar P.K., Kriplani B., Gupta G.N., Oijha K.G., synthesis and antimicrobial activity of some new phenothiazine derivatives, *E.J. Chem.,* vol. 4, no. 1, 14-20. Jan. **2007.**
(2)   Kakade B.S., "Synthesis in heterocyclic compounds (Role of DMSO as a solvent," Ph.D. Thesis, Nagpur University, **1981**.
(3)   Chincholkar M.M., and Ramekar M.A. *J. Ind. Chem. Soc.,* 71 (4) 199, **1994.**
(4)   S.P. Rathod, A.P. Charjan and P.R. Rajput, Rasayan *J. Chem.,* vol.-3, no. 2, 363-367, **2010.**
(5)   Dabholkar V.V. and F.Y. Ansari, *Indian J. Chem.,* vol. 47 B., pg.no. 1759 – 1761, Nov. **2008.**
(6)   D.H. Morey and S.N. Patil *ori., J. Chem.,* Mar., **2002.**
(7) Jayaseelan C.,A.A.Rahuman,A.V.Kirthi,S.Marimuthu and T.Santoshkumar (**2012**).Novel microbial route to synthesize ZnO nanoparticles using *Aeromonas hydrophila* and their activity against pathogenic bacteria and fungi. *Spectrochimica Acta A*: Mol.Biomol.Spectrosc.,90:78-84.
(8)   Azam,A.,A.S.Ahmed,M.Oves,M.S.Khan and A.Memic,(**2012**).Size-dependent antimicrobial properties of CuO nanoparticles against *Gram positive and Gram negative* bacterial strains.*Int.J.Nanomed*.,7:3527-3535.

**Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293
(Special Issue No.70) Peer Reviewed Journal   www.aiirjournal.com Mob. 8999250451**

12

National Conference on Multidisciplinary Research in Science and Technology for Healthy Lifestyle Management (NCMRST- 2020) Organizer :- Shri R.L.T. College of Science, Akola

24ᵗʰ Jan. 2020

(9)   Guzman,M.G.,J.Dille and S.Godet,(**2009**).Synthesis of silver nanoparticles by chemical reduction method and their antibacterial activity-*Int.J.Chem.Biol.*Eng.,2:104-111

(10) Bryaskova,R.,D. Pencheva,S. Nnikolov and T. Kantardjiev,(**2011**).Synthesis and comparative study on antimicrobial activity of hybrid materials based on silver nanoparticles (AgNps) stabilized by polyvinylpyrrolidone (PVP). *J.Chem.Biol.*,4:185-191.

(11) Krishnraj, C.,R. Ramachandran,K. Mohan and P.T.Kalaichelvan,(**2012**) Optimization for rapid synthesis of silver nanoparticles and its effect on phytopathogenic fungi.*Spectrochim.Acta* PartA: Mol.Biomol. Spectrosc., 93:95-99.

(12) Wang L, Li Z.Zhang G, Dong J, Eastoe J (**2007**) Oil-in water nanoemulsion for pesticide formulations.*J.Colloid interface Sci* 314,230-235.

(13) Scrinis G. Lyons K (**2007**) The emerging nano-corporate paradigm nanotechnology and transformation of nature,food and agriculture food system.*Int J.Sociol Agri Food* 15 (2):22-44.

(14) Chun-Mao Lin and Tan-Yi Lu, *Bentham Science*, ISSN : 2212-4020.

(15) Teodoro S.Micaela B.David K.W.(**2010**) Novel use of nanosaturated alumina as an insecticide.*Pest Manag Sci 66*(6):577-579.

(16) Andrel L. Gartel, University of Illinois, USA/*Pharmaceutica*-(**2013**).

(17) Anna BRYKA, Wojciech JUZWA, Wojciech BIALAS, Grazyna LEWANDOWICZ Polish *Academy of Sciences*,(**2014**), vol. 118, 335-341, ISBN 978-83-63714-17-8.

(18) Andrei L. Gartel, *Scientifica*, volume (**2014)** (2014), Article ID 59 658, http://dx. doi.org./10.1155/2014/59652

(19) S.P. Rathod, A.P. Charjan and P.R. Rajput, RJC., vol 3, No. 2, (**2010**) 363-367. 8.

**Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293
(Special Issue No.70)   Peer Reviewed Journal   www.aiirjournal.com Mob. 8999250451**

13

Screening And Evaluation Of Silver Nanoparticles Producing Bacteria From Lonar Lake, India

Harish. S. Malpani*, Ms. Sonali C. Bawane
Department of Microbiology,
Shri. R. L. T. College of Science, Akola

Abstract –

Lonar lake is known for unique microbial diversity, which is located at Deccan Plateau of West-centralof India.Water and sediment sample from lake were collected and screened for presence of silver nanoparticle synthesis. All isolates were grown and analyzed on Horikoshi medium B. The antibacterial activity of these crude silver nanoparticles produced by alkaliphilic bacteria were studied against pathogenic bacteria such as Staphylococcus aureus and Escherichia coli.The zone of inhibition shown by isolates code no. W1A, W1B, W1C, and W2B against S. aureus and E. coli was in the range of 20 mm to 28 mm. The zone of inhibition shown by silver nanoparticles is significant in comparison with traditional antibacterial agents.

Introduction –

Lonar Lake (Lonar Crater, Lonar Sarovar) is a notified National Geo-heritage Monument. It is a alkaline lake located at Lonar in Buldhana District, Maharashtra, India. It was created due to a meteor impact during the Pleistocene Epoch (Antony et al., 2010; Kanekar et al., 2012). A British Officer, C J.E Alexander identified it in 1823. Lonar Crater is filled with saline water and the uniqueness of water is its salinity and high alkalinity (Fredriksson et al.,1973). Alkalinity environments show diverse flora of alkaliphilic microbial culture growing at pH 8-10 and some at high salt concentration.

Nanotechnology has become one of the most promising technologies applied in all areas of science. Currently there is growing need to develop an environment friendly nanoparticles synthesis that does not use toxic chemicals in the process of its synthesis. The microbial mediated biological synthesis of metallic nanoparticles has recently been recognized as a promising source for mining nanoparticles. The microbial recovery of precious metals with the formation of their nanoparticles is a green alternative to the conventional method (Gandhi & Khan, 2016).

Materials and methods –

A) Enrichment, Isolation and identification of bacterial isolates –A total three samples,(two water and 1 sediment) were collected from different sites of Lonar lake. Enrichment of the cultures were out on Horikoshi media A, B and C respectively (Horikoshi K, 1999). After enrichment, the well isolated and differentiated colonies were transferred   on respective medium slants and cultures were maintained as stocks. Isolated Bacillus species were identified by cultural, morphological, biochemical tests.

B) Synthesis, Characterization and Antibacterial activity of crude silver nanoparticles (AgNPs) –   Total 8 isolates collected from Lonar lake were sub-cultured in test tube containing 10 mL of nutrient broth containing 3.5 mM AgNO3. The inoculated broth incubated at dark condition at room temperature for 15 days. After incubation period upon visual observation, the culture incubated in presence of silver nitrate. Along with these the control experiment was also run without AgNO3.The biosynthesized silver nanoparticles from bacteria isolated from Lonar lake were screened against one Gram – positive and one Gram - negative bacteria such as S. aureus and E. coli respectively. The method used for antibacterial potential was well diffusion method on nutrient agar. Zone of inhibition showed by silver nanoparticles against pathogenic bacteria were measured.

Result and Discussion

In the present study, total three samples comprising of two water and one sediment were collected from different sites of alkaline Lonar Lake, India. In the winter season December 2018. From these samples 8 morphologically different colonies were isolated. Out of these 8 isolates 4 isolates produce significant amount of silver nanoparticles. After synthesis of Agnp's supernatant used for the antibacterial activity.

Table 1 - Zone of inhibition against S.aureus & E. coli				
Sr No.	Culture code	Zone of inhibition showed by Bacterial suspension (mm)		Zone of inhibition showed by Bacterial AgNPs (mm)	
		against S.aureus	against E. coli	Against S.aureus	against E. coli
1	W1A	No zone	No zone	28 mm	20 mm
2	W1B	No zone	No zone	28 mm	20 mm

**Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293
(Special Issue No.70)   Peer Reviewed Journal   www.aiirjournal.com Mob. 8999250451**

14

National Conference on Multidisciplinary Research in Science and Technology for Healthy Lifestyle Management (NCMRST- 2020) Organizer :- Shri R.L.T. College of Science, Akola

24th Jan. 2020

| 3 | W1C | No zone | No zone | 25 mm | 20 mm |
| 4 | W2B | No zone | No zone | 25 mm | 20 mm |

Discussion –

Kanekar et al.,(2008) worked on the Lonar Lake, India to identified the bacterial diversity present in the lake. They collected water and sediment sample from the various sites of lake. Isolation of bacteria from samples was performed using Enrichment culture technique. 16S rRNA sequencing and phylogenetic analysis were carried out. Alkalibacillus haloalkaliphilus was the first report of obligately alkaliphilic organism from Lonar lake. In present study 16S rRNA sequencing phylogenetic analysis were also carried out . In the work of Tayde, (2012) Antibacterial Potential of silver nanoparticles produced from Lonar Lake Bacilli, Bacilli collected from Lonar Lake were studied. The isolates were grown on nutrient agar containing 3.5 mM AgNO3 under dark condition. In the present study, four silver nanoparticles synthesizing bacteria were isolated. The bacterial isolated were incubated in the presence of AgNO3 for 15 days after 15 days the colour of broth were changed yellow to brown. The supernatant was used further for antibacterial activity against pathogenic bacteria. Rathod et al.,(2016), the actinobacterium Nocardiopsis valliformis OT 1 strain isolated from soil collected from the rim of Lonar Lake. In present study silver nanoparticles producing bacterium were isolated from water sample of Lonar crater. The four isolates were showed efficient production of AgNPs.

Conclusion –

From above results, it was concluded that the bacteria were present in alkaline Lonar Lake has great potential. These isolates were efficient for production of silver nanoparticles.. Our study provides primary evidence that Lonar Lake isolates were promising source for silver nanoparticles as antimicrobial substance. The biosynthesis of silver nanoparticles from Lonar Lake bacteria is eco- friendly and commercially easy process and it can potentially recovers the severe problems caused by chemical antimicrobial agents.It is need to be further studied for its potency and broad spectrum activity for improvement in the antimicrobial activity and production of new drugs.

References -

1. Antony C.P., Kumaresan D.,&ShaucheY.S.,(2013). Microbiology of Lonar lake and other soda lakes. The ISME journal, 7 (6), 1252.
2. Deshmukh K.B., Pathak A.P.,& Karuppayil S.M., (2011). Bacterial diversity of Lonar Lake of India. Indian Journal of Microbiology,51 (1), 107 – 111.
3. Franci G.,Falanga A., Galdiero S., Plaomba L., Rai M., & Galdiero M (2015). Silver nanoparticles as potential antibacterial agents .Molecules,20 (5), 8856 – 8874.
4. Fredriksson K., Dube A., Milton D. J.,&BalasundaramM.S.,(1973).Lonar Lake, India : an impact crater in Basalt. Science,180 (4088), 862-4.
5. Gandhi H. & Khan S., (2016) Biological synthesis of silver nanoparticles and its antibacterial activity.Journal of nanomedicine and nanotechnology,7(2), 366.
6. Horikoshi K., (1999). Extracellular enzymes in Horikoshi K, (ed). Alkalophiles Harwood Acad Pub Japan, 147-285.
7. Kanekar P.P., Kelkar A. S.,& Joshi A.A., (2008).Alkaline LonarLake, India - A treasure of alkaliphilic and halophilic bacteria. World Lake Conferrence,1765-1774.
8. Kumar B., (2016). Characterization of microbial diversity in Soda Lake. 3rdInternational conference on Multidisciplinary research and practice, 4 (1), 474.
9. Maqusood Ahameda., (2010). Silver nanoparticle application and human health. Clinica Chimica Acta, 411, 1841 – 1848.
10. Rathod D., Golinska P., Waypij M., Dahm H., & Rai M., (2016).A new report of Nacardiopsis valliformis strain OT1 from alkaline Lonar Crater of India and its use in synthesis of silver nanoparticles with special reference to evaluation of antibacterial activity and cytotoxicity. Med Microbiol Immunol, 205, 435 – 447.
11. Tayde P. S., (2012). Antimicrobial potential of silver nanoparticles produced from Lonar lake Bacilli. Bioscience Discovery, 3 ,(3), 351 – 354.

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293 (Special Issue No.70) Peer Reviewed Journal www.aiirjournal.com Mob. 8999250451

15

Synthetic Study Of 3-Thio-4-Sugar-5-*O*-Tolylimino-1, 2, 4-Dithiazolidines And Its Applications As Antibacterial Agents

Usha W. Karhe[1], Kishor N. Puri[2]

[1]Department of Applied Chemistry, Anuradha Engineering College, Chikhli, Buldhana, (MS) 433201

[2]Department of Chemistry, Shri Shivaji Science College, Amravati, (MS)-444603

Abstract:

In view of the continued interest in the development of simpler and more convenient synthetic routes for preparing heterocyclic systems, an efficient and useful method is reported. A series of some 3-Thio-4-sugar-5-o-tolylimino-1,2,4-dithiazolidines **3** have been synthesized by the interaction of N- Sugar-S-chloro isothiocarbamoyl chlorides **1** with Ammonium o-tolyl dithiocabamate **2**. The identities of these new compounds have been established on the basis of chemical transformation and spectral studies. In the present investigation the In-vitro bacterial assay of compounds has been evaluated by using several bacteria such as Escherichia coli, Staphylococcus aureus and Pseudomonas aeruginosa. All compounds studied shows satisfactory bacterial assay.

Key Words: Synthetic study, sugar, Antibacterial activity, 1, 2, 4-dithiazolidines, spectral analysis.

Introduction:

Heterocyclic compounds and medicines are interconnected in the recent era. 1, 3, 5-thiadiazines and their derivatives have been shown to possess brightening and fibre finishing properties in textile industries[1-4]. Thiadiazines have exhibited remarkable pharmacological activities such as spasmolytic, anaesthetic, cardiovascular and hypo metabolic agents. They are also used as fungicidal[3], insecticidal[4] and as medicinal compounds. Heterocyclic compounds are found to exhibit anti-inflammatory, anti-parasitic, anti-tubercular, antidiabetic activity[3-5].

The resistance towards available drugs is rapidly becoming a major worldwide problem. The need to design new compounds to deal with this resistance has become one of the most important areas of research today. The nitrogen and sulfur containing 5/6 membered heterocyclic compounds have special[6] biological importance.

Chemistry of *S*-Chloro-*N*-phenyl isothocarbamoyl chloride with special utility in the synthesis of nitrogen and sulfur containing heterocyclic compounds has been exhaustively investigated by number of chemists[6-12]

In recent years, there has been increasing interest in the synthesis of heterocyclic compounds by cyclization of appropriate linear compounds. Organosulfur compounds play an important role in modern organic synthesis. In our laboratory there are various reports on sugar heterocyclic possessing antimicrobial and antifungal activities. In view of applications of these compounds in various fields, the current study was related to investigate the following reactions-

Synthesis of 3-Thio-4-sugar-5-*o*-tolylimino-1, 2, 4- dithiazolidines

The mixtures of Ammonium *o*-tolyl dithiocabamate **2** and *N*-Sugar-*S*-chloro isothiocarbomoyl chlorides **1** were refluxed in chloroform medium for 3 hr. The reactions were monitored by TLC. After the completion of the reactions, the solvent was evaporated and products obtained as solids.

Experimental

Melting points were recorded on electro thermal melting point apparatus are uncorrected. Specific rotations were measured on Equip-Tronic digital polarimeter model no. Eq 800 at 30^0c in CHCl$_3$. IR spectra were recorded on a Perkin Elmer spectrometer. ^{1}H NMR were obtained on a Bruker DRX-300 (300 MHz FT NMR) NMR spectrometer in CDCl$_3$ solution with TMS as an internal reference. The mass spectra were recorded on a DART mass spectrometer. Purity of the compounds was checked by thin layer chromatography using Merck silica gel coated aluminum plates and petroleum ether: ethyl acetate as eluent.

Preparation Ammonium *o*-tolyl dithiocarbamate 2

The Ammonium *o*-tolyl dithiocarbamate was prepared by already known method i.e. by interaction of *o*-Toluidine, Carbon disulphide and Ammonia

Synthesis of *N*-Sugar-*S*-chloro isothiocarbomoyl chlorides 1:-

N-Sugar-*S*-chloro isothiocarbomoyl chlorides obtained from interaction of sugar isothiocyanates with Cl$_2$ gas.

Spectral Analysis[13-20]:

The infrared spectrums of **3-Thio-4-sugar-5-*o*-tolylimino-1, 2, 4- dithiazolidines 3** shows the absorption bands :-

Assignment	Absorption observed (KBr cm^{-1})		
	3-Thio-4-sugar-5-*o*-tolylimino-1, 2, 4- dithiazolidines 3		
	3a	3b	3c
N-H stretching	3468	3479	3473
Aromatic C-H stretching	3142	3143	3143
Aliphatic C-H stretching	2956	2956	2954
C = O Streching	1743	1743	1747
C – N stretching	1527	1527	1525
C = S stretching	1228	1238	1224
Characteristics of Sugar	1105	1035	1139
C - S stretching	758	756	756
C – O stretching	800	790	800
Disubstituted benzene	762	761	775
Monosubstituted benzene	690	688	710

^{1}H NMR spectral analysis: The NMR spectrum of **3-Thio-4-hepta-*O*-acetyl-β-D-lactosyl-5-*o*-tolylimino-1, 2, 4- dithiazolidine 3c** showed signals at δ 7.34-6.96 (m, Ar. protons), 5.4551-3.67 (m, lactosyl protons), 1.93 (s, CH$_3$) (m, Acetyl protons)

Mass spectral analysis: The mass spectrum of **3-Thio-4-hepta-*O*-acetyl-β-D-lactosyl-5-*o*-tolylimino-1, 2, 4- dithiazolidine 3c** displayed molecular ion peak at m/z 858. The other important fragment peaks (m/z) are 807, 701, 659, 559, 457, 331, 257..

Antibacterial activity

.   All the compounds have been screened for antibacterial study against human pathogens using cup plate agar diffusion method[21-22] by measuring the inhibition zone in mm. the compounds were taken at a concentration of 1 mg/ml using dimethyl sulphoxide (DMSO) as solvent.

The compounds were screen for antibacterial activity against *Escherichia coli, Staphylococcus aureus and Pseudomonas aeruginosa* in nutrient agar medium. Amikacin (100 μg/ml) was used as standard for antibacterial activity. The results are presented in Table.

It has been observed that some of these compound exhibited interesting microbial activities. 3b exhibited most significant activity against *Escherichia coli,* 3b and 3c exhibited most significant activity against *Staphylococcus aureus* and 3a and 3b exhibited most significant activity against *Pseudomonas aeruginosa* respectively. All the other compounds exhibited low to moderate activity.

Acknowledgement:

Authors are thankful to SAIF/CIL, Panjab University, Chandigarh for providing spectral data. Principal, Shri Shivaji College, Akola for encouragement and providing necessary facilities.

References:

1. P.Y.Bruice, "Organic Chemistry", 3rd ed., Pearson Education, Inc. and Dorling Kindersley publishing Inc, (2001).
2. Flitsch, L. Sabine, Ulijn and V. Rein, "Sugars tied to the spot". Nature 421 (6920): 219–20 (2003).
3. H. U. Mehta, K. C. Gupte and V. R. Bhatta, Indian Patent, 142, 048 (1977);
    Chem. Abstr., 93, 26465 (1980).
4. K. Alfred and A. Tantaway, Aech. Pharma. (Weinheim Gr.), 311, 935 (1978); Chem. Abstr., 90, 45917 (1979)
5. N. Siddiqui and S. N. Pandeya, Indian J. Pharmacology, 24, 171 – 173 (1992).
6. Paresh Manna, R. Singh, K. Naranga and S. K. Manna Indian J. Chem, 9, 44B, 1880-1886 (2005).
7. M. G. Dhonde and S. P. Deshmukh J. Carbohydr. Chem., 23(4), 305 (2004).
8. M. G. Paranjpe and A. S. Mahajan Indian J. Chem., 10, 1138 (1972).
9. M. G. Paranjpe and A. S. Mahajan J. Indian Chem. Soc., 49, 585 (1972).
10. A. S. Mahajan, V. S. Kamble and M. G. Paranjpe J. Indian Chem. Soc., 51, 714 (1974).
11. N. M. Nimdeokar and M. G. Paranjpe Indian J. Chem., 15B, 1068 (1977).
12. N. M. Nimdeokar Chemistry of Nitrogen, Sulphur and Oxygen Containg Organic Compounds : Dithiazolines, Triazines and Related Compounds", Ph. D. Thesis, Nagpur University (1979).
13. E. Bejetti, N. Zilembo, E. Bichisao, P. Pozzi and L. Toffolatti, *Critical Reveiws in Oncology: Hematology,* **33**, 137, (2000).
14. A. Demirbas, S. Ceylan and N. Demirbas, J. Het. Chem., 44, 1271, (2007).
15. C. Foulon, C. Danel, C. Vaccher, S. Yous, J. P. Bonte and J. F. Goossens, J. Chromatography A., 1035, 131, (2004).
16. Krall H., Gupta R. D., *J. Indian Chem. Soc*., 1935, **12**, 629.

17. Silverstein R. M., Webster F. X. and Kiemle D. J., "Specrometric Identification of organic compounds", 7*th* *ed*, *Wiley, New York*, 2005.
18. Colthup N. B., Daly L. H. and Weberley S. E., "Introduction of Infrared and Raman Spectroscopy", *Academic, Press. New York*, 1964.
19. Biemann, Dejongh D. C. and Schnoes H. K., *J. Amm. Chem. Soc*. 1963, **85**, 1763.
20. Buclzikiewicz H., Djerassi C. and Williams D. H., "Structural Elucidation of natural product by mass spectrometry", *I* Alkaloids *Holden Day*, San Francisco, 1964, 207.
21. Kawangh F .,Analitical Micribology,Acadamic press,New York 199
22. British Pharmacipaeia –II Biological Assay and Test and ,the stationary office   Ltd

Reaction Scheme:

3-Thio-4-sugar-5-*o*-tolylimino-
1,2,4-dithiazolidine
3a-c
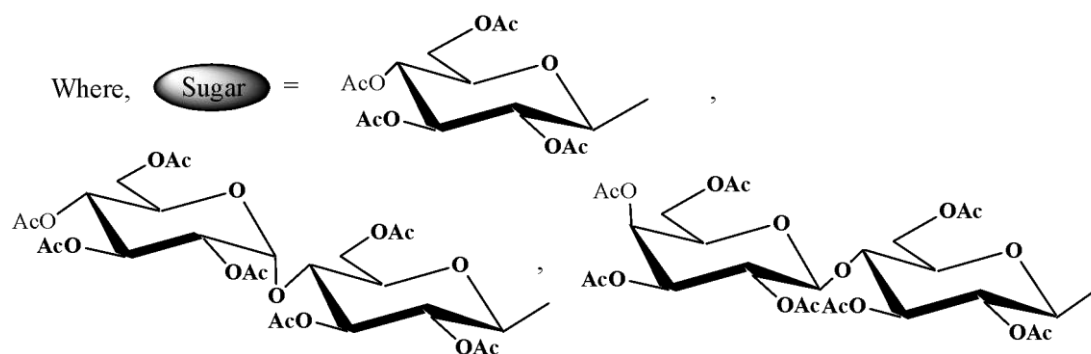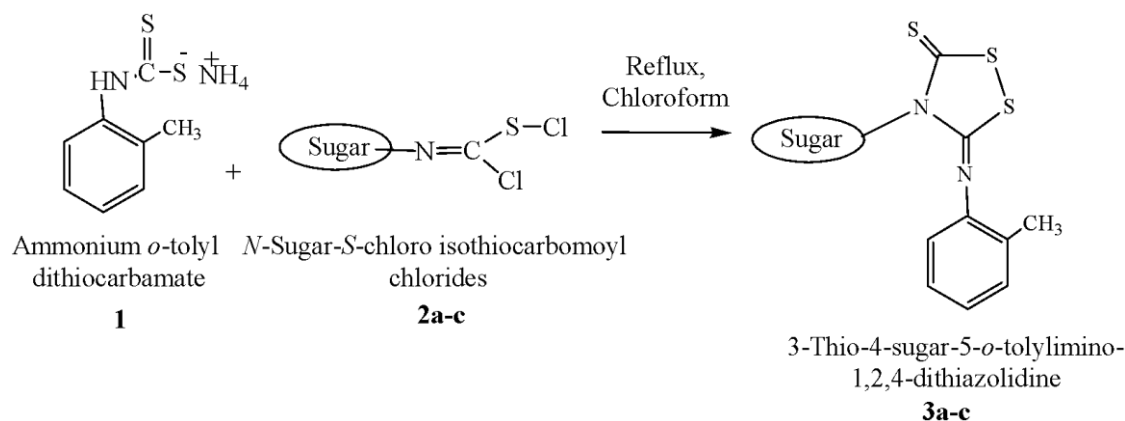
Table 1:- Physical Characterization of **3-Thio-4-sugar -5-*o*-tolylimino-1, 2, 4- dithiazolidine 3**

Sr. No.	Product	m.p. (°C)	Yield (%)	R_f Value	% N	% S
1.	**3-Thio-4-tetra -*O*-acetyl-β-D-glucosyl-5-*o*-tolylimino-1, 2, 4- dithiazolidine 3a**	110	77	0.805	5.10	17.44
2.	**3-Thio-4-hepta-*O*-acetyl-β-D-maltosyl-5-*o*-tolylimino-1, 2, 4- dithiazolidine 3b**	140	76	0.72	3.22	11.15
3.	**3-Thio-4-hepta-*O*-acetyl-β-D-lactosyl-5-*o*-tolylimino-1, 2, 4- dithiazolidine 3c**	170	66	0.80	3.20	11.18

Table 6 : Antibacterial study of Several 3-Thio-4-sugar-5-*o*-tolylimino-1,2,4- dithiazolidines (IIIa-c)

Sr. No.	Compounds	*S. aureus*	*P. aerugiosa*	*E.coli*
1.	**3-Thio-4-tetra-*O*-acetyl-β-D-glucosyl-5-*o*-tolylimino-1, 2, 4- dithiazolidine 3a**	9	10	R
2.	**3-Thio-4-hepta-*O*-acetyl-β-D-maltosyl-5-*o*-tolylimino-1, 2, 4- dithiazolidine 3b**	12	10	10
3.	**3-Thio-4-hepta-*O*-acetyl-β-D-lactosyl-5-*o*-tolylimino-1, 2, 4- dithiazolidine 3c**	15	R	R
4.	**Amikacin**	23	24	19

**zone of inhibition in mm (15 or less) resistance, (16-20mm) moderate and (more than 20mm) sensitive. *Escherichia coli* (*E. coli*), *Staphalococcus aureus* (*S*. aureus) and *Psudomonas auriginosa* (*P. auriginosa*).

Aeromycological Investigation of Indoor Environment of College Laboratories

Shailendra Madavi*
and Anjali Sangole
Department of Botany,
Shri R.L.T. College of Science, Akola (MS)

Abstract-
   Laboratories are major working areas of science colleges. They are being sterilized for better, contamination free environment time to time. Still these areas get contaminated due to airborne microorganisms. The major contaminants of the laboratory are aeromycoflora. Thus, the present investigation explores the aeromycoflora of indoor environment of Shri R.L.T. College of Science, Akola (MS). The study was undertaken at the beginning of monsoon i.e. from June to August. For this, 5 petri-dishes with Potato Dextrose Agar (PDA) media were kept open in each laboratory for 1 hour. After incubation period fungi were isolated and identified. Total 22 species belonging to 16 genera were isolated. Most dominant class was Ascomycotes, while Zygomycotes, Oomycetes and Deuteromycetes were quite less in number. Most dominant genera were Aspergillus, Rhizophus and Penicillium.
Key words- *Aeromycoflora, Indoor Environment, laboratories, fungi.*

Introduction-

   College is the place where students not only explore the knowledge of world but also, learn how to live in society. They study various theoretical as well as practical courses. But, the actual knowledge they get by practical experiments. These experiments are performed in laboratories. The laboratories are the rooms which are equipped with different instruments and used for various scientific experiments, testing and teaching. These laboratories are provided with sophisticated environment. But, still these laboratories get contaminated due to airborne microorganisms. The major contaminants of laboratories are aeromycoflora. Fungal spores constitute a significant fraction of bioaerosol and they are often much more numerous than other airborne bioparticulate matters. Airborne microfungal propagules are found in large numbers in indoor and outdoor environments and are widely distributed in nature in general. Some of them have the potentiality to cause allergies, spoilage of foods and many other adverse health effects, namely, bronchial asthma, allergic rhinitis and atopic dermatitis (Burge and Rogers, 2000; Terui et al., 2000; Akiyama, 2001). Since diverse fungal species constitute the major components of airborne flora are the major cause of respiratory ailment of humans, causing allergies, asthma and plant diseases and as well as important agents of degradation of cellulosic and non-cellulosic material in indoor closed environment, thus there is a great need for understanding, aerobiological studies from indoor environment of different laboratories where number of students work.

   So, present investigation was undertaken in Botany, Chemistry, Microbiology and Zoology department laboratories of Shri R. L. T. College of Science, Akola. Akola city is the district headquarter situated in the middle east of Maharashtra state. The average rainfall in this district is 750 mm to 1000 mm. and the average temperature is 30^0 C. In Akola city, Shri R. L. T. College of Science is one of the reputed science college, where thousands of students studies every year. So, the present investigation undertaken to understand relationship of aeromycoflora and health related issue.

Material and Methods-

   The aeromycoflora of four laboratories was isolated by Culture Plate Exposure method (Lanjewar and Sharma, 2014). For this, petri dishes containing potato dextrose agar (PDA) were exposed for 10 min. in Botany, Chemistry, Microbiology and Zoology laboratory during three monsoon months i.e. from June to August in different corners of the laboratories. The exposed petri dishes were incubated at 27^0C for 3-5 days. The appeared colonies on agar plates were recorded and species were identified by microscopic and morphological characters using compound microscope.

Result and Discussion-

   The present investigation was undertaken in four laboratories namely, Botany, Chemistry, Microbiology and Zoology laboratories of Shri R. L. T. College of Science, Akola. This investigation shows that, use of Culture Plate Expose method is one of the good method to isolate aeromycoflora. During this investigation, total 1269 fungal colonies were reported. From these colonies total 22 species belonging to 16 genera were identified (Table-1).

   The most dominant division was Deuteromycota with 12 genera followed by Ascomycota with 6 genera. Zygomycota and Oomycota had least number of genera i.e. 2 and 1 genera respectively. One unidentified sterile hyphae also reported. No genera of Basidiomycota was reported from any plate (Graph -1).

Aspergillus, Alternaria, Mucor and *Rhizophus* were most dominant genera reported with highest number of colonies in all the laboratories. Total 4 species of *Aspergillus* and 2 species of *Alternaria* and *Fusarium* each were reported with highest number of colonies. These genera were also reported dominantly in indoor aerosol in previous studies (Chakraverty and Sinha, 1985; Santra and Chanda, 1989).

Graph 1- Showing Division wise Number of Fungal Genera
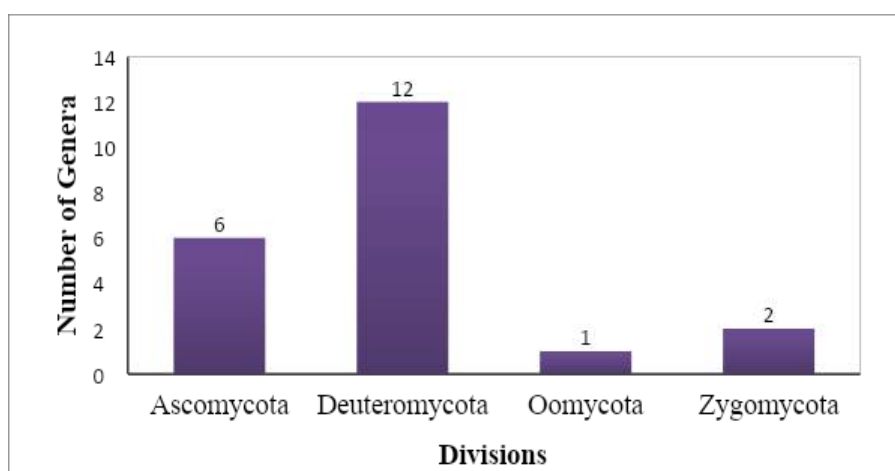
Table 1- Reported Fungal Species

Sr. No.	Division	Fungal Species	Botany Lab.	Chemistry Lab.	Zoology Lab.	Microbiology Lab.
1.	Ascomycota	*Aspergillus flavus*	✔	✔	✔	
2.		*Aspergillus fumigatus*	✔	✔	✔	
3.		*Aspergillus niger*	✔	✔	✔	✔
4.		*Aspergillus sulphureus*	✔	✔	✔	
5.		*Chaetomium glabosum*	✔		✔	
6.		*Penicillium oxalicum*	✔	✔	✔	
7.	Deuteromycota	*Alternaria alternata*	✔	✔	✔	✔
8.		*Alternaria solani*	✔	✔		✔
9.		*Botryodiplodia sp*		✔	✔	
10.		*Cladosporium cladosporoides*		✔		✔
11.		*Curvularia lunata*	✔		✔	
12.		*Curvularia tetramera*	✔		✔	✔
13.		*Fusarium moniliformae*	✔			✔
14.		*Fusarium oxysporum*	✔	✔	✔	
15.		*Helminthosporium tetramera*	✔	✔	✔	
16.		*Nigrospora sp.*	✔			✔
17.		*Pyricularia sp.*	✔		✔	
18.		*Trichothecium roseum*		✔	✔	✔
19.	Oomycota	*Phytophthora infestans*		✔		✔
20.	Zygomycota	*Mucor pusillus*	✔	✔	✔	✔
21.		*Rhizopus stolonifer*	✔	✔	✔	✔
22.		Unknown 1		✔	✔	

Optimum temperature and about 60% humidity requires for germination and growth of fungal spores. As the college campus is at surrounded by good vegetation, these fungal spores gets suitable environment to grow and propagate. People constantly being exposed to these spores of which a good number are known for their hypersensitive reactions leading to respiratory problems like bronchial respon-siveness (asthma), hypersensitivity pneumonitis, allergic alveolities such as bronchopulmonary aspergillosis, bronchoalveolar lavage or transbronchial lung problem (John, 1985; Bennett, 1995; Sugar, 1995).

Conclusion-

Health of students and staffs is of great concern. As it is well known that some fungi are allergic and responsible for causing various diseases, it is necessary to maintain cleanliness in laboratories. Certain corrective measures, strict maintenance or precautions which can reduce their frequency of occurrence include installation of exhaust fan to remove spores from the indoor environment before they get a chance to settle; air filtration; good ventilation; use of vacuum cleaner to remove dust; air conditioning machines and more frequent cleaning and preventive processes.

References

1. Akiyama K (2001). Fungal allergy-clinical aspect. Nippon. Ishinkin. Gakkai. Zasshi., 42: 109-111.
2. Burge HA, Rogers CA (2000). Outdoor allergens. Environ. Health. Perspect., 108: 653-659.
3. Terui T, Makino Y, Hashimoto A, Tagami H (2000). Learning from fungus allergy in atopic dermatitis patients. Nippon. Ishinkin. Gakkai. Zasshi, 41: 157-60.
4. Lanjewar S, Sharma K (2014) Intramural aeromycoflora of rice mill of Chhattisgarh, DAMA International, 1 (1): 39-45.
5. Chakraverty R, Sinha S (1985). The incidence of Aspergillus parasiticus in the indoor and outdoor environments of Calcutta, India. Grana, 24: 133-135
6. Santra SC, Chanda S (1989). Airborne fungal flora in indoor environments of the Calcutta Metropolis, India. Grana, 28: 141-145.
7. John PU (1985). Sistemik Mantar ÜnfeksiyonlarÝ. In: Berkow R (eds) The Merck Manual Teßhis / Tedavi El KitabÝ, Merck and Co. Inc (in Turkish), pp. 115-121.
8. Sugar AM (1995). Agents of mucormycosis and related species. In: Mandell GL et al. (eds) Principles and Practice of Infectious Diseases, Churchill Livingstone Inc, New York, pp. 2311-2321.
9. Bennett JE (1995). Aspergillus species. In: Mandell et al. (eds) Principles and Practice of Infectious Diseases, Churchill Livingstone Inc, New York, pp. 2306-2311.

Isolation, Partial Characterization And Extraction Of Alkaline Protease From Bacterial Isolates Of Lonar Lake

V. D. Nanoty*, Ankita R. Lokhande
Department of Microbiology,
Shri R.L.T. College of science, Akola

Introduction:

Lonar crater, is unique ecosystem situated in the Buldhana District of the Maharashtra State, India (Latitude 19˚58', Longitude 76˚36'). Lonar lake is a national geo-heritage, saline soda lake in basaltic rock with pH 9.5 to 10.5 (Frederickson et al., 1973). Extracellular enzymes like amylase, lipase, protease and cellulose are produced by *Bacillus cereus, Bacillus firmus, Enterococcus caseliflavus, Bacillus fusiformis, Bacillus cohnii, Bacilus horikoshi* isolated from water and sediment of alkaline Lonar Lake (Joshi et al., 2007).

Alkaline proteases are those which have the pH optima in the range of 8 to 11 and mainly belong to bacterial origin. Alkaline protease producers comprise many alkaliphilic, neutralophilic and alkalitolerent microbes. *Aeromonas hydrophilia, Bacillus licheniformis, Bacillus megaterium, Bacillus clausii and Bacillus subtilis are industrially important bacterial alkaline protease producers* (Sandhya et al., 2005).Starch degrading amylase enzymes are most important in the biotechnology industries with huge application in food, fermentation, textile and paper. Many microorganisms are able to produce amylases including *Bacillus sp.*, *Lactobacillus, Escherichia, Proteus, Streptomyces sp., Pseudomonas sp.*etc.

Materials and methods:
Isolation and Identification of bacterial isolates:

Isolated bacteria collected from Lonar lake, Maharashtra, Grown & maintained on Horikoshi B medium having pH 12. The pH is maintained by 1 N NaOH. On basis of morphological, biochemical analysis were performed.

Production, extraction and confirmation of enzymes:

For proteolytic and amylolytic activity, isolates inoculated on alkaline skim milk agar and alkaline starch agar was used having pH 12(maintained by 1N NaOH), incubated at 37°C for 48-72 hours. For extraction of crude enzyme protease two isolates inoculate in broth containing 1% casein & incubate at 37°C for 48 hours in shaking condition. Centrifuged at 3000-5000 rpm for 15 min. Clear supernatant serve as crude enzyme, and enzyme activity was checked by zone of solubalization around the well on skim milk agar plate.

Result and Discussion:

In the present study, total 3 samples comprising of 2 water and 1 sediment samples were collected from alkaline lonar lake. From these samples, 8 morphologically different colonies were isolated. Identification of isolates were based on cultural, morphological, and biochemical characteristics.

1. **Screening of isolates for proteolytic & amylolytic activity:** Out of 8 bacterial isolates 3 were a found to be positive for casein hydrolysis&   starch hydrolysis. The zone of casein hydrolysis given by isolates were 23mm and 25mm respectively. The zone of starch hydrolysis was found to be 5mm each by isolates.

2. **Production & confirmation of crude enzyme :** After centrifugation, the clear supernatant pour into well containing skim milk agar plates. After 48 hours incubation zone of solubalization indicates that crude enzyme may be protease.

3. **Conclusion:**
From above results, it was concluded that the bacteria were present in Lonar lake were grown only in alkaline conditions. These isolates were efficient for production of alkaline protease and amylase. The optimum pH required was 12, the optimum time required is 48-72 hours, and optimum temperature was 37°C. The crude enzyme extracted from the isolate code shows maximum zone of solubalization around well on skim milk agar plates which indicates the crude enzyme may be protease.

References:

1. Alariya, S.S., Sethi, S., Gupta S., & Gupta B., (2013). Amylase activity of starch degrading bacteria isolated from soil. *Archives of Applied Science Research, 5* (1), 15-24.

2. Das, G., & Prasad, M.P., (2010).Isolation, purification & mass production of protease enzyme from *Bacillus subtilis. International research journel of microbiology,1*(2) pp. 026-031.

3. Deshmukh, K.B., Pathak, A.P., &Karuppayil, S.M., (2011). Bacterial diversity of Lonar soda lake of India. *Indian journal of microbiology, 51* (1),107-11.

4. Frederickson, K., Dube A, Milton, D.J., & Balasundaram, M.S., (1973). Lonarlake, India. *An imapct crater in basalt. Sci, 180*(4088),862-864.*doi: 10.1126 / Science. 180.4088.862.*

5. Horikoshi, K.,(1999). Extracellular enzymes in Horikoshi K, (ed). *Alkalophiles Harwood Acad Pub Japan,* 147-285.

6. Joshi, A.A., Kanekar, P.P., Kelkar, A.S., Shouche, Y.S., Vani, A.A., Borgave, S.B., &Sarnaik, S.S., (2007). Cultivable bacterial diversity of Alkaline Lonar Lake India. *Microbial Ecol, 55*263-172.

7. Kanekar, P., Kelkar, A.S., & Joshi, A.A., (2008). Alkaline lonar lake, India- a treasure of alkaliphilic and halophilic bacteria. *The 12th world lake conference,*1765-1774.

8. Nilegaonkar, S.S., Kanekar, P.P., Sarnaik, S.S., & Kelkar, A.S., (2002). Production, isolation and characterization of extracellular protease of an alkaliphilic strain of *Arthrobacterramosus*, MCM B-351 isolated from the alkaline lake of lonar, India. *World journal of microbiology & biotechnology, 18* 785-789.

9. Saife, C., (2003), Blunting nature's swiss army knife, *Science, 277*1602-1603.

10. Sandhya, C., Sumantha, A., Szakacs, G., &Pandey, A., (2005). Comparative evaluation of neutral protease production by *Aspergillusoryzae* in submerged and solid state fermentation. *ProceessBiochem. 40*2689-2694.

11. Sethi, S., & Gupta, S., (2015). Isolation, characterization and optimization of cultural conditions for amylase production from fungi. *Journel of Global Biosciences ISSN 2320-1355, 4* pp 3356-3363.

12. Tamekar, D.H., &Tambekar, S.D., (2012). Partial characterization & optimization of alkaline protease production of *Bacillus pseudofirmus* from Lonarlake. *Int J Adv Pharm Bio/Sci.,2*(1), 130-138.

13. Thakker, C.D., &Ranade, D.R., (2002). Alkaliphlic*Methanosarcina*isolated from Lonar crater. *CurrSci, 82* (4),455-457.

14. Vaidya, S., &Rathore, P., (2015). Isolation, screening and characterization of amylase producing bacteria from soil of dump sites from different regions of Madhya Pradesh. *Life science international research journal, ISBN 978-93-84124-26-7.*

15. Vishnupriya, V.G., Preethi, S., Karthikeyan, S., &Rameshbabu N.G., (2016). Isolation and identification of protease producing bacteria from soil. *Int. research journel of engineering and technology, 03* e-ISSN 2395-0056, p-ISSN: 2395-0072.

Concepts In Chemistry With Perspective Of Communication Research

Dr.Bajirao B.Ahire
Post Graduate Department of Chemistry
N.V.P.Mandal's Arts, Commerce and Science College, Lasalgaon.Nashik. (Maharashtra) India.
Affiliated to Savitribai Phule Pune University.

Abstract

Communication term refers to information transfer across either space or time where the later refer to any storage device. This will help to present ideas in the subject of choice in very interesting manner. There were many avenues in the subject to work on and research topic and concepts can be varied according to the research interest, direction and requirements of researchers. Present investigation relates with the basic study of chemistry and level of understanding. Research on student experiences with chemistry as one of the subject in the classroom informs the discussion of participant perception, which often originates in the classroom. Although formal and informal education environments are different, there is little research on chemistry in informal way. However, relevant broad topic from formal chemistry education can be used to aid chemists interested in designing student activities to communicate chemistry. Spreading of new and innovative knowledge to the target group using suitable method. A new way of thinking in communication point of view. It enables the gathering and marshaling of collected data, which is necessary for making conclusions.

Present paper reveals that significant level judge by control and experimental group.

Key words-Communication skill, reactivity ,target group

Introduction

Communication is merely transmission of information, ideas or message and also involves some behavioral and various thought input from one person to another through certain mechanistic way. Communication is a message understood or sharing of experience. This process is either formal or informal, it depends upon the type of message and on the relation between sender and final beneficiary receiver[1].The transfer of information and understanding between teacher and students in educational media involved in the process of communication. Effective communication is the key part in the study of various disciplines like sciences and technology, social sciences, mental moral and languages.

Research in the particular subject indicates that new, innovative ideas and methods to produce the best results, when there has required adequate efforts for preparation of content. Research is carried out on the problem that are bound to come in the wake of innovation. The appropriate action taken in ample of time for development of many skills to experimentators.Research and development is always go hand in hand for developing the addition of knowledge for betterment society and country as well. Research in particular area has careful and critical inquiry or examination in seeking facts and principles. Basically there are three parts in a communication system as transmitter or sender, communication channels and receiver. Present investigation relates with the basic study of chemistry and level of understanding.

Many students struggle with chemistry subject. Research suggests that the abstract nature of chemical reactions, difficulty relating with microscopic structures , and a lack of fluency with the tools and apparatus, symbols in the field. These difficulties can form fundamental conceptual barriers to understand chemistry[2] and everyday real world applications that can carry forward from classroom experiences to later life and result in lifelong different attitudes about the chemistry subject .

Basic function of communication process

The main goal of a chemistry communication could be with participants, to stimulate a discussion about the chemistry and learn from participants what interests them, or to build an idea about an area for advancing research.

A chemist needs appropriate content that to be shared and an event plan. In designing an particular activity, a communicator must be explicit about what will be addressed, particularly at the conceptual or understanding level.

As this will frame the activity and aid in the creation of appropriate materials to support the experience[3] .Informal science learning communication skills add in the perspective. No one can prepare a comprehensive conceptual approach to communication skills in chemistry[4].

Developing effective skills in science or chemistry communication is a long-term process, particularly in countries where modern science is not an embedded component of national culture. Financial sustainability of intervention programmes, therefore needs to be a priority.

The role of the media in achieving real impact in research communication.

Sender:

There are certain questions concerned with sender, who and whom should the message send? Why for the present study, what, where when and how. If all processes are successfully completed, it is then said to be purposeful effective communication. Principal investigator is the sender in the process of under taken research. The investigator had taken selected concepts in chemistry concerned with the undergraduate syllabus of curriculum, the study material provided by the investigator, finally receives the feedback for analysis.

Receiver:

Actually the receiver is the individual or group to whom a message is directed. It was audience undergraduate students were the receivers. The total sample size was 340. Listen actively to the message being sent[5] to the target. Expectation ask for clarification of concept, repetitions, wherever necessary.

Message:

Selective concepts in chemistry as physical and chemical properties of elements, reactivity of elements and application of elements based on reactivity. Inorganic synthesis (coordination complexes) under solvent free condition means environmental friendly and its charecterisation.The concept of chemical bonding. Learning package was prepared and finalized by taking the expert comments into consideration.

Chemical properties based on reactions of elements with oxygen, water acids and bases because these reactions are very basic.

Medium and mode of message:

In research programme development of tool was plays an important role. In communication point of view spreading of developed knowledge is done by developed tool. Specially designed learning package and manual were prepared. Discussion and classroom lecture to undergraduate students on the topic selected for study. Find out the effectiveness.

Obstacles in the study:

1. Some students may not take subject seriously.
2. Some students may not give any response or interaction on the topic of investigation.
3. Some students may not report or not return the designed questionnaire, but rarely.
4. Sometimes not getting contact and communication between investigator and responders.
5. Sometimes may be absent during the activity purposely.

These obstacles may be overcome by personal contact in time to time and discussion with factors involved in the process.

Feedback:

Researcher received feedback of research work by specially designed questionnaire and used for controlled and experimental groups, pre and posttests from Savitribai Phule Pune University (SPPU) affiliated colleges. Discussion with experts in the subject knowledge, received reports, meetings and lectures. Feedback on gross was received by the investigator.

Effectiveness:

The effectiveness of communication qualitative and quantitative methods were measured. It was calculated statistically as standard deviation t-test and Sandler's 'A' statistics.

The components of communication

```
┌─────────────────┐
│  Information    │
│  Source         │
└─────────────────┘

┌─────────────────┐
│    Sender       │
└─────────────────┘

┌─────────────────┐
│  Design         │
│  methods        │
└─────────────────┘

┌─────────────────┐
│ Message sent    │
│                 │
│  * * *** **     │
Noise           Noise
│ * * * * * * *   │
│  Message        │
│  Received       │
└─────────────────┘
```
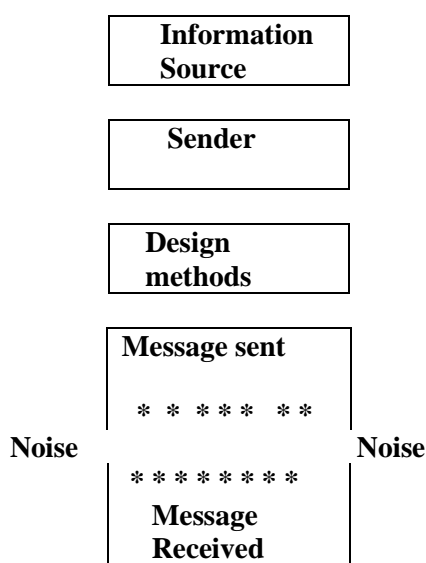
Feedback

Receiver

Evaluation

Figure 1.Block diagram for components of communication

Channels:

Investigation process was channelized by meeting to the students, teachers and university experts. Selected concepts in chemistry as reactivity property was explained, which is based on action with air or oxygen ,water, acids and bases. The chemical bonding and solvent free reaction was considered. These concept were discussed with teachers and distribute the questionnaire to the controlled group (students) and collect the completed questionnaire after time allotted. Another group of students' material was provided for study and lecture was delivered on the concepts. Test was taken after some time interval this group called experimental group.

Table 1: Data of questionnaires used to undergraduate students

Sr.No.	College Code	Class	Control group	Experimental group	Total number of students
1	CC-1N	F.Y.B.Sc.	20	20	40
2	CC-2N	F.Y.B.Sc	14	14	28
3	CC-3A	F.Y.B.Sc	20	20	40
4	CC-4A	F.Y.B.Sc.	20	20	40
5.	CC-5P	F.Y.B.Sc	15	15	30
6.	CC-6P	F.Y.B.Sc	12	12	24

[N=Nashik, A=Ahmednagar, P=Pune]

Statistical Analysis:

Questionnaire was designed of 50 marks with objective type questions and response of general question on chemical property as in the form of favorable, unfavorable and not attempted.

Table 2:Data of control and experimental group results

Sr.No.of Student	Marks of control group X_i	General que.on Chemical property	Marks of experimental group Y_i	General que.on Chemical property	Difference of marks D_i	Difference squared D_i^2
1	15	FAV	23	FAV	-8	64
2	05	NATD	16	FAV	-11	121
3	22	FAV	33	FAV	-11	121
4	19	FAV	24	UNFAV	-5	25
5	16	FAV	16	FAV	00	00
6	15	NATD	16	FAV	-1	01
7	17	FAV	30	FAV	-13	169
8	22	UNFAV	34	FAV	-12	144
9	03	NATD	16	FAV	-13	169
10	14	FAV	20	UNFAV	-6	36
11	17	FAV	14	UNFAV	3	9
12	22	FAV	28	FAV	-6	36
13	30	UNFAV	31	FAV	-1	01
14	30	UNFAV	30	FAV	00	00
15	10	FAV	26	UNFAV	-16	256
16	10	NATD	14	UNFAV	-4	16
17	10	NATD	11	NATD	-1	01
18	24	NATD	24	UNFAV	00	00
19	14	NATD	35	NATD	-21	441
20	08	NATD	40	NATD	-32	1024
N=20	∑=323		∑=481		∑=-158	∑=2634

Result and Discussion

A survey among random sampling for the study was done, it shows effectiveness of the designed product.

The 't' test statistics used for the analysis and efficacy as,

$$t = \frac{D - 0}{\sigma} \sqrt{n}$$

$$t = \frac{-7.9 - 0}{8.5403} \sqrt{20}$$
$$= -4.1368$$

$$A = \frac{2634}{(-158)^2}$$
$$= 0.10551$$

The value of 't' at 19 degree of freedom for the determination of 5% level of significance is 2.093 table value(t-statistics).The calculated value was greater than this value means 4.1368.Hence the difference in marks of control and experimental group is significant.

Conclusion

From the above discussion it can be concluded that, the theory which was added to highlight the concept of reactivity accepted with due appreciation. The work on reactivity selected was property accredited. The charts prepared was key of reactions, getting information at a glance. It proved to be a very efficient ,useful and active research in teaching learning process.

Acknowledgement

References

1. M,K, Joseph , Modern Media and Communication Vol.III New Delhi Anmol publications, 1996.
2. N., Morgan, Chemistry in action, Andromeda Oxford Ltd. pp.38, 1995.
3. Stieff M. Connected chemistry: A novel modeling environment for the chemistry classroom. *Journal of Chemical Education*. 2005;82(3):489–493.
4. A, Baram, Tsabari, et al., *Journal of Research in Science Teaching* 2015, -52(2) 135-144.
5. Ron Ludlow, Fergus Panton, The Essence of Effective Communication, New Delhi: Prentice –Hall of India, pp 102-113, 2000.
6. Koul., Methodology of Educational Research, New Delhi: Vikas Publication House 1988.
7. J,D, Lee, Concise Inorganic Chemistry,5th ed .ELBS Champman and Hall Ltd. University and Professional Division 2-6 Boundary Row London,1996
8. Philip Matthews, Advanced Chemistry Cambridge University Press, 1996.
9. C,R,Kothari , Research Methodology, New Delhi: Wiley, 1990
10. Wu HK, Shah P. Exploring visuospatial thinking in chemistry learning. *Science Education*. 2004;88(3):465–492.
11. V,K, Kothurar, S, J,Vanarase, Experimental psychology ,A Systematic Introduction Wily Eastern Ltd. New Delhi 1986.

A New Method For *N-Tert*-Butoxy Carbonylation Of Amines Using Urea As An Organocatalyst

Abdul Shahzad, Dharmendra B. Dupare*, Mohd Mujahid

Department of Chemistry, Shri. Dr. R. G. Rathod Arts & Science College,
Murtizapur, Dist: Akola, India.
*Corresponding author. D. B. Dupare

Abstract:

A simple, efficient and environmentally benign method for N-tert-butoxy carbonylation of amines using urea as a mild and cost effective catalyst has been described.

The salient features of the present protocol include high yields (65-99%), short reaction time, high selectivity, etc.

Introduction

Protection and deprotection plays an important role in the synthesis of various complex organic compounds. Among different functionalities, amine is one of the most important group present in plethora of bioactive compounds. So, its protection plays a pivotal role while designing the total syntheses of biologically active molecules. Till date, various protective groups are available for the amine functionality. Among these, *N-tert*-butyloxycarbonyl (Boc) group is commonly used due to the ease of protection as well as deprotection and also it is stable for various base-catalyzed nucleophilic substitutions and catalytic hydrogenation reactions.[1] Different catalytic methods are available for the *N-tert*-butyloxycarbonylation under basic as well as Lewis acidic conditions using di-*tert*-butyl-dicarbonate (Boc$_2$O) reagent that includes I$_2$,[2] Zn(ClO$_4$)$_2$.6H$_2$O,[3] ZrCl$_4$,[4] HClO$_4$-SiO$_2$,[5] ionic liquid,[6] Amberlyst-15,[7] sulfamic acid,[8] etc. However, many methods have their own advantages, but most of them suffer from one or more drawbacks like elevated temperatures, highly basic conditions, long reaction times and high toxicity. To tackle these limitations still there is a scope for a new catalyst system that can minimise these drawbacks. Recently, the use of low molecular weight organic compounds as a catalyst in various organic transformations has gained momentum. Organocatalysts have several advantages such as they are cheap, inexpensive, and readily available, also they act as a green catalyst etc. Now a days urea and their derivatives serves as a important organocatalysts and have been used in various organic reactions such as mannich reactions,[9] Biginelli reaction,[10] etc.

Keeping in mind all these advantages, we herein report for the first time use of urea as an organocatalayst for *N*-Boc protection of amines.

Results and Discussion

Initially, we carried out the reaction with equimolar quantities of aniline and di-*tert*-butyl dicarbonate (Scheme 1) using ethanol as a solvent and to our delight, the reaction was completed in 30 min with 98% yield.
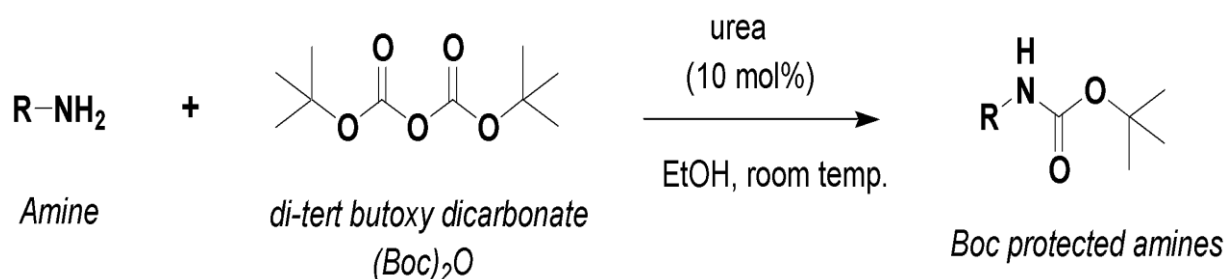
Scheme 1

Comparison of our result with few of the reported procedures is presented in Table 1. which clearly indicates the efficiency of urea in the synthesis of Boc protected amines.
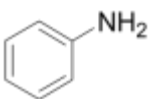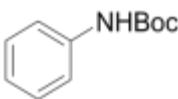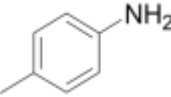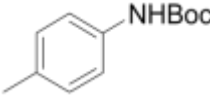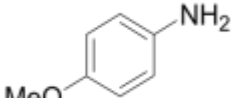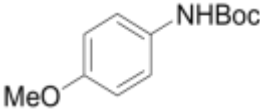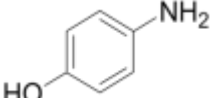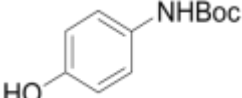
Table 1.

Comparision of various catalysts employed for the *N*-Boc protection of aniline[#]
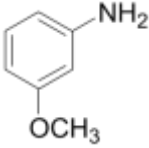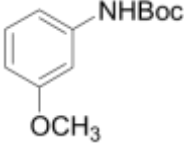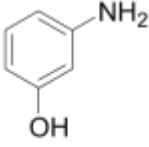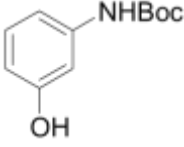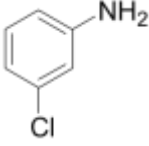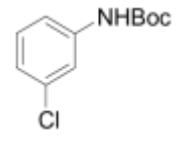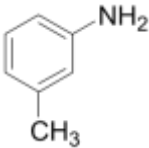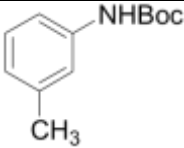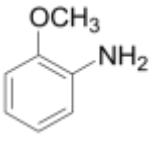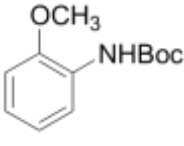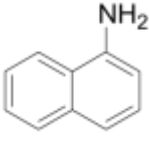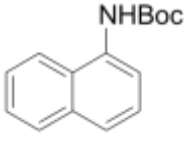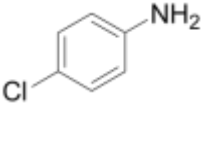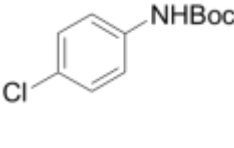
Entry	Catalyst (mol%)	Solvent	Time	Yield(%)	Ref.
1	Iodine	*Neat*	*30 min*	*95%*	2
2	Zn(ClO$_4$)$_2$.6H$_2$O	CH$_2$Cl$_2$	12 h	92%	3
3	Sulfonic acid functionalized silica	CH$_2$Cl$_2$	45 min	83%	11
4	*β*- cyclodextrin	H$_2$O	2.5 h	75%	12
5	Yttria-Zirconia	CH$_3$CN	14 h	90%	13
6	urea	C$_2$H$_5$OH	30 min	98%	**This work**
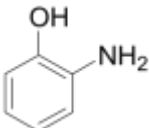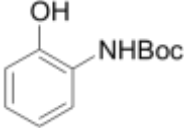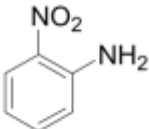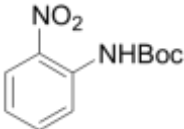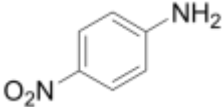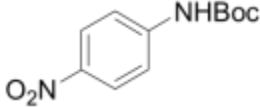
[#]Reaction conditions: Aniline: (1:1), (Boc)$_2$O, room temperature.

Here, in most of the cases, expensive catalyst system is required with long reaction time (entry 2-5) which limits the utility of the protocols. With the optimized reaction conditions in hand, we evaluated the scope of the reaction with various aromatic and aliphatic amines. Several amines were treated with 1 eq. di-*tert*-butyl dicarbonate in presence of 10 mol% of urea in ethanol as a solvent to obtain pure products without any column purification. The results (reaction time and the product yields) are depicted in Table 2.

Table 2. Synthesis of various Boc protected amines catalyzed by urea

Entry	Amine	Time	Product	Yield (%)
1.		30 min		98
2.		30 min		85
3.		15 min		99
4.		45 min		86

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293
(Special Issue No.70) Peer Reviewed Journal www.aiirjournal.com Mob. 8999250451

30

5.		45 min		86
6		30 min		75
7		210 min		57
8		30 min		75
9		45 min		99
10		45 min		78
11		60 min		87

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293
(Special Issue No.70)   Peer Reviewed Journal   www.aiirjournal.com Mob. 8999250451

31

12		20 min		92
13		60 min		28
14		50 min		40
15	$CH_3(CH_2)_3NH_2$	30 min	$CH_3(CH_2)_3NHBoc$	75

Anilines possessing electron withdrawing groups on the phenyl ring (such as chloro Table 2, entry 7, 11) shows decrease in product yields with longer reaction time. In contrast, aniline having electron donating groups on phenyl ring (methyl or methoxy, Table 2, entry 2, 3, 5, 9) results in higher yields with rapid product formation. Position of substituents on aniline does not affect much on the product yield but, the effect can be seen on the reaction time. For example, substituent on *ortho* position of aniline requires more time for the completion of reaction as compared to *para* positions due to the *ortho* effect (Table 2, entry 9).

Conclusion

In conclusion, we described here a simple, convenient and environment-friendly protocol for the *tert*-butyloxycarbonylation of amines using catalytic amount of urea. The present protocol shows several advantages such as high yields, shorter reaction times, safe handling, clean reactions, excellent selectivity and low cost. We envisage that this new method would be used as an alternative to other existing methods for the Boc protection of amines.

Experimental

General procedure for Boc protection of amines:

To a mixture of amine (0.5 mmol) and Boc$_2$O (0.5 mmol) was added urea (10 mol%) and stirred at room temperature for appropriate time as given in Table 2. The progress of reaction was monitored by TLC. After completion, the reaction mixture was washed with water and extracted with ethyl acetate (3 x 15 mL). The combined organic layer was dried over anhydrous sodium sulfate and concentrated *in vacuo* to afford the pure products.

Spectral data of selected compounds

(4-Methoxy-phenyl)-carbamic acid *tert*-butyl ester (entry 3, Table 2): White solid, M.P. 93-95°C; IR (KBr) υ 3363, 3074, 1691, 1523, 825 cm^{-1}; ^{1}H NMR (200 MHz, CDCl$_3$) δ 1.48 (s, 9H), 3.74 (s, 3H), 6.20 (br s, 1H), 6.76 (d, J=8.76 Hz, 2H), 7.24 (d, J=12.42 Hz, 2H).

Naphthalen-1-yl-carbamic acid *tert*-butyl ester (entry 10, Table 2): Clear solid, M.P. 94-96°C; IR (neat): υ 3257, 3051, 1687, 1541, 765 cm^{-1}; ^{1}H NMR (200 MHz, CDCl$_3$) δ 1.52 (s, 9H), 6.83 (br s, 1H, NH), 7.38-7.88 (m, 7H).

Acknowledgements

References

1. P. G. M. Wuts and T. W Greene, in Protective Groups in Organic Synthesis, John Wiley & Sons, New Jersey, 4th Edn. **2007**.
2. Varala, R; Nuvula,S; Adapa, S. R; *J. Org. Chem*. **2006**, *71*, 8286.
3. Bartoli, G.; Bosco, M.; Locatelli, M.; Marcantoni, E.; Massaccesi, M.; Melchiorr, P.; Sambri, L. *Synlett.* **2004**, 1794.
4. Sharma, G. V. M.; Reddy, J. J.; Lakshmi, P. S.; Radha Krishna, P.; *Tetrahedron Letters*, **2004**, *45*, 6963.
5. Chakraborti, A. K.; Chankeshwara, S. V. *Org. Biomol. Chem*., **2006,** *4*, 2769.
6. Tekale, S. V.; Kauthale, S. S.; Pawar, R. P.; *J. Chil. Chem. Soc.* **2013**, *58*, 1619.
7. Sarkar, A.; Roy, S. R.; Parikh, N.; Chakraborti, A. K. *J. Org. Chem.* **2011**, *76*, 7132.
8. Heydari, A.; Shiroodi, R. K.; Hamadi, H.; Esfandyari, M.; Pourayoubi, M.; *Tetrahedron Lett.* **2007**, *48*, 5865.
9. Wenzel, A. G. and Jacobsen, E. N. *J. Am. Chem. Soc*., **2002**, *124* (44), 12964.
10. Puripat, M.; Ramozzi, R. *J. Org. Chem*., **2015**, *80* (14), 6959.
11. Das, B.; Venkateswarlu, K.; Krishnaiah, M.; Holla, H. *Tetrahedron Lett.* **2006**, *47*, 7551.
12. Reddy, M. S.; Narender, M; Nageshwar, Y. V. D.; Rao, K. R. *Synlett.* **2006**, 1110.
13. Pandey, R. K.; Dagade, S. P.; Upadhyay, R. K.; Dongare, M. K.; Kumar, P. *Arkivoc*. **2002**, *VII*, 28.

Evaluation of Antioxidant Activity of Various Extracts of *Curcuma Longa*

P. S. Pande , P. D. Changle

P.G. Department of Chemistry,

Shankarlal Khandelwal College, Akola. Maharashtra,

India 444002

Abstract

Three different solvent extracts viz water, ethanol and n-hexane extracts of Curcuma longa have been screened for their qualitative and quantitative antioxidant activity. All extracts showed good antioxidant activity. IC_{50} values have also been determined. The IC_{50} values for water, ethanol and n-hexane extracts were found to be 0.029 mg/ml, 0.055 mg/ml and 0.055 mg/ml respectively.

Keywords Curcuma longa, Turmeric, antioxidant activity, Radical scavenging activity, 2,2-diphenyl 1-picryl hydrazyl.

Introduction

Turmeric has been used in Asia for thousands of years and is a major part of Ayurveda, Siddha medicine, traditional Chinese medicine, Unani[1] and the animistic rituals of Austronesian people.[2,3] It was first used as a dye, and then for its supposed properties in folk medicine.[4] Turmeric (Curcuma longa) is a herbaceous perennial plant belonging to the family Zingiberaceae. It is an ancient, most valuable, sacred spice of India and contains appreciable quantities of proteins (6.3%), lipids (5.1%), carbohydrates (69.4%) and fibers (2.6%). Turmeric is rich in minerals like phosphorus, calcium, iron and vitamin A.[5] Oral administration of Turmeric is found to be effective on acute inflammation. [6] The oral administration of Curcuma longa significantly reduces inflammatory swelling. The anti-inflammatory properties may be attributed to its ability to inhibit both biosynthesis of inflammatory prostaglandins from arachidonic acid, and neutrophil function during inflammatory infection.[7]

Material and method

The seeds of Turmeric (curcuma longa) were purchased from a local herbal store in Akola Maharashtra.

Preparation of extract

The seeds of turmeric were powdered with an electric grinder. The Powdered seeds were extracted in distilled water, ethanol and n hexane.

Preparation of aqueous extract of turmeric

10 g of powdered turmeric was taken in 50 ml distilled water and warmed at 40 °C for 10 min, and solution was then allowed to cool and filtered throw the filter paper, the filtrate so obtained used for studying antioxidant activity.

Preparation of ethanolic extract of turmeric

10g of powdered turmeric was taken in 50 ml ethanol and warmed at 30-35°C for about 10 min, the solution was allowed to cool and filtered through filter paper. The filtrate so obtained was used for studying antioxidant activity.

Preparation of turmeric extract in n-hexane

 10 g of powdered turmeric and 50 ml n-hexane was warmed at 35°C for about 10 minute, and the the solution was allowed to cool , and filtered. Filtrate was used for studying antioxidant activity.

Study of quantitative antioxidant activity of curcuma longa extract of ethanol, water and n-hexane by DPPH :

Antioxidant activity of different solvent extracts of curcuma longa were assessed on the basis of the radical scavenging effect of the stable 2,2-diphenyl-1-picrylhydrazyl (DPPH).

Ten solutions of each extract having concentration 0.01 to 0.1 mg/ml were prepared. 0.02% of DPPH was prepared in ethanol. 1.5 ml of this DPPH solution was mixed with 1.5 ml of each of the solution of turmeric extract, and optical density was measured at517 nm using U.V visible spectrophotometer. Optical

density of 0.02% DPPH was also recorded and labeled as blank. The optical density was recorded and % inhibition was calculated using formula giving below.

$$\text{Percent inhibition of DPPH (\%AA)} = \frac{A - B}{A} \times 100$$

A = O.D of DPPH Blank

B = O.D of sample solution

Result and discussion

Ten different solution of concentration 0.01 to 0.1 mg/ml of each solvent extract were prepared having different concentrations. 1.5 ml of each of this solution was mixed with 1.5 ml of 0.02% DPPH solution and resulting solution was used as sample. Optical density of the sample was recorded by U.V Visible spectrophotometer and the result obtained is reported in following tables. IC_{50} values have been determined for each extract.

Optical density and percent antioxidant activity of aqueous extract of *Curcuma longa*

O.D of Blank = 0.595

Conc. Mg/ml	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.1
O.D. of Turmeric	0.546	0.545	0.533	0.533	0.543	0.539	0.536	0.536	0.536	0.525
AA% of Turmeric	7.61	7.78	9.81	9.81	8.12	8.79	9.3	9.3	9.3	11.7

Optical density and percent antioxidant activity of ethanol extract of *Curcuma longa*

O.D of Blank = 0.595

Conc. Mg/ml	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.1
O.D. of C. longa	0.54	0.488	0.474	0.469	0.488	0.393	0.359	0.348	0.329	0.32
AA% of C. longa	9.21	17.9	20.33	21.17	24.7	33.94	39.66	41.51	44.7	46.21

Optical density and percent antioxidant activity of hexane extract of *Curcuma longa*

Conc. Mg/ml	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.1
O.D. of Curcuma longa	0.48	0.474	0.407	0.38	0.348	0.3	0.275	0.23	0.2	0.185
AA% of Curcuma longa	19.32	20.33	31.59	36.44	41.51	49.57	53.78	61.34	66.38	68.9

Remarkable decrease in O.D and increase in %AA was observed for each extracts of Curcuma longa. IC_{50} values have been elucidated by known method.[8]

IC_{50} values of Curcuma longa extracts.

S.N	Extracts	IC_{50}
1	Aqueous extract of Curcuma longa	0.029mg/ml
2	Ethanol extract of Curcuma longa	0.055 mg/ml
3	n-Hexane extract of Curcuma longa	0.055 mg/ml

Conclusion

From above study it is concluded that various extracts of *Curcuma longa* have good antioxidant activity. The IC_{50} values for each extracts have been found to be 0.029 mg/ml 0.055 mg/ml and 0.055 mg/ml for water, alcohol and n-hexane extract respectively.

Acknowledgement

References

1. Chattopadhyay I, Kaushik B, Uday B, Ranajit KB (2004). "Turmeric and curcumin: Biological actions and medicinal applications" . Current Science. 87 (1): 44–53. ISSN 0011-3891. Retrieved 16 March 2013.
2. Kikusawa, Ritsuko; Reid, Lawrence A. (2007). "Proto who utilized turmeric, and how?"). In Siegel, Jeff; Lynch, John; Eades, Diana (eds.). Language Description, History and Development: Linguistic indulgence in memory of Terry Crowley. John Benjamins Publishing Company. pp. 339–352. ISBN 9789027292940.
3. McClatchey, W. (1993). "Traditional use of Curcuma longa (Zingiberaceae) in Rotuma". Economic Botany. 47 (3): 291–296. doi:10.1007/bf02862297.
4. "Herbs at a Glance: Turmeric, Science & Safety". National Center for Complementary and Integrative Health (NCCIH), National Institutes of Health. 2012. Retrieved 11 October2012.
5. Arun pratap singh, R.P.Singh, Jagdiah singh and S.K. Shani January of HortFlora Research Spectrum, 1(4): 358-361 (2012).
6. KP. Rajesh, V. Balasubramanium, N. Remesh, V. Rajesh Kannan, International Journal of Medicobiological 1(1): 6-17, 2010. International Journal of Pharm Biomed Science ;5(1):17-23, 2014.
7. M. K. Hasan' and M. A. A. Mahmud, Int. J. Agril. Res. Innov. & Tech. 4 (1): 1-10, June, 2014.
8. P S Pande et al, International journal of Pharma and Bio Sciences, 2014, 5 (1), pp 396-400.

Preliminary Phytochemical Analysis And Pharmacological Studies of *Gloriosa superba* (L.)

P.M. Khadse
Assistant Professor, Department of Botany,
Shri R.L.T. College of Science, Akola, India

Abstract :-
        The use of plants as medicine is as old as human civilization. People of all ages in both developing and developed countries use plants in an attempt to care various diseases and to get relief from physical sufferings. Natural products are a source for a bioactive compound and have potential for developing some novel therapeutic agents. Hence in the present study pharmacological activity, traditional benefits and phytochemical analysis of Gloriosa superba (L.) confirms the presence of various phytochemicals like saponin, terpenoids, steriods, flavonoids, tannins, quinones and alkaloids. The result suggests that, this plant have a great potential for curing various ailments and can be source of useful drugs.
Key Words *:,Gloriosa superba (L), phytochemical screening, pharmacological activities, traditional uses.*

Introduction :-
        Medicinal plants have been used from centuries as remedy for human diseases because they contain the compounds of therapeutic values. The plant kingdom has proven to be the most useful in the treatment of various diseases and they have provides an important source of all the words pharmaceuticals. The most important bioactive constituents of plants are steroids, terpenoids, carotenoids, flavonoids, alkaloids, tannins and glycosides. Plants in a facet of life have served a valuable starting material for drug development. (Singh V.K. et. al. 2003). *Gloriosa superba (L),* (Colchicaceae) commonly known as flame lily. This plant grows in many types of habitat, including tropical jungles forest thickets,woodlands, grasslands and sand dunes. The species is perennial herb growing from a fleshy rhizome. The showy flowers has six tepals each up to 5 to 7.6centimeters long they are generally bright red to orange at maturity sometimes yellowish bases m It is, evergreen subshrub, with woody stems,grayish leaves and blue to purplish throughout the the quite wavy. (Thorp 1998).

Material and Methods :
        The plant material were collected from the Akola region and identified taxonomically by using standard floras (Cook 1967, Kathikeyan, Kambale &Pradhan, Naik). The seeds of the plant *Gloriosa superba (L),* were air dried under the shade. The dried seeds of the plant are crushed to obtain powder. These powdered samples are then stored in air tight polythene bags protected from sunlight until used. The organic solvent like petroleum ether, alcohol, chloroform, acetone, benzene & aqueous extracts of each sample was prepared by soaking as 1 : 10 ratio that is 3 gm of powder sample in 30 ml of organic solvents and distilled water for 18 hr. The extracts are then filtered using whatman filter paper, and used for phytochemical study.

Phytochemical Screening :
        Chemical test were carried out on the organic solvents & aqueous extract and on the powdered specimens using standard procedure to identified the constituents as described by Harborne (1973), Edeoga et. al. (2005) and Krishnaiah et. al. (2009).

Test for Alkaloids :
        To the 2-3 ml of filtrate, 1 ml of dil HCL and 1 lager's reagent was added and shake well. Yellow precipitate was formed showing the presence of alkaloids.

Test for Flavonoids :
        To the small quantity of extract lead acetate solution was added. Formation of yellow precipitate showed the presence of flavonoids.

Test for Steroids :
        To 2 ml of extract of chloroform & 2 ml of conc. H_2SO_4 was added. The solution was shaken well. As a result, chloroform layer turned red and acid layer showed greenish yellow fluorescence.

Test for Tannin :
        On addition of 5% $FeCl_3$ solution to the extract deep blue black colour appeared.

Test for Saponin :
        To 1 ml extract 20 ml distilled water has added and shake well in measuring cylinder. Then 1 cm layer of foam was formed.

Test for Cardiac glycosides :

To the 5 ml of extract 1 ml of conc. H_2SO_4, 2 ml of Glacial acetic acid and 1 drop of $FeCl^3$ solution was added, Appearance of brown ring shows the presence of cardiac glycosides.

Test for Quinones :

To the 2 ml of extract conc. H_2SO_4 was added and shake well for 5 min. shows the Red Colour.

Phytochemical analysis :-

i) *Qualitative phytochemical analysis*

The qualitative phytochemical screening of *Gloriosa superba (L),* in six different extracts i.e. Petroleum ether, benzene, chloroform, acetone, ethanol and water showed that there is presence of carbohydrates, glycosides, proteins, alkaloids, saponin, steroids, flavonoids, steroids, tannins, phenolic compounds. However coumarins and Cardiac glycosides were totally absent in all extracts. Ethanol extract of of *Gloriosa superba (L),* was accounted for the presence of alkaloids, carbohydrates, glycosides, proteins, steroids , flavonoids, phenol and tannin. While acetone and water extract ethanol showed the presence of alkaloids, carbohydrates, glycosides, flavonoids, proteins, , steroids, tannins, phenolic compounds. Only Benzene and extract showed the presence of fixed oil and fats, benzene , acetone and ethanol extract analyzed least number of compounds. All the six extract showed the presence of alkaloids, proteins, flavonoids, phenols and tannins. (Table-1).

This could make, this plant useful for treating infertility use against snakebites and different ailments as having a potential of providing useful drugs of human use. This is because of pharmacological activity of any plant is usually traced to a particular compound.

Table -1 : Qualitative phytochemical screening of various extract of *Salvia officinalis* (Linn.)

Sr. No.	Constituents	Chemical Test	Extracts					
			P.E.	B	C	A	E	W
1.	Alkaloids	Mayer's Test	+	+	+	-	+	+
		Wagner's Test	+	+	-	+	-	+
		Dragendroff's Test	-	+	+	+	+	+
2.	Carbohydrates & Glycosides	Fehling's Test	+	-	+	-	+	+
		Benedict's Test	+	-	+	+	+	+
3.	Steroids	Salkowski's Test	+	+	+	+	-	-
4.	Saponin	Foam Test	+	+	-	-	-	-
5.	Phenolics & Tannin	Fecl₃ Soln. Test	-	-	-	-	-	-
		Lead Acetate Test	+	+	+	+	+	+
6.	Fixed Oils & Fats	Spot Test	-	+	-	-	+	-
7.	Proteins	Biurret Test	+	+	+	+	+	+
		Millions Test	+	-	+	+	-	+
8.	Anthraquinone glycosides	Borntraggers Test	-	-	+	+	-	-
9.	Cardiac glycosides	Keller – Killiani Test	-	-	-	-	-	-
10.	Flavonoids	Shinoda Test	+	+	+	+	+	+
		Lead Acetate Test	+	+	+	+	+	+
11.	Quinone		+	+	+	-	-	-
12.	Coumarins		-	-	-	-	-	-

(*Note :* '+' = Present and '-' = Absent)

where, P.E. = Petroleum ether, B = Benzene, C = Chloroform, A = Acetone

E = Ethanol, and W = Water extract respectively.

Pharmacological Studies:-

The alkaloid rich plant has long been used medicines in many cultures . It has been used in the treatment of gout , infertility open wounds , snakebites,increasing womans fertility, ulcers, arthritis cholera, kidney problems, itching leprosy, cancer (Lal,2011) . Extracts of rhizomes are applied topically during child birth to reduce labor pain beneficial in uronogenital diseases, diuretic, haemostatic, emmenagogue and tonic (Dounias 2014). In past centuries, it was also used for hair care, insect bites and wasp stings, nervous conditions, mental conditions, oral preperation for inflammation of the mouth ,tongue and throat, and also to reduce to fevers (Kintzios ,Spiridon E 2000). The sap is used to treat acne and head lice, in pregnant woman it may cause abortion.The scientific studies have proven the clames of traditional system of medicine (Farzana et. al. 2014). Others uses

References:-

1) Singh V.K., Singh S., Singh D.K. (2003) – Pharmacological effects of spices. In recent progress in medicinal plants, phytochemistry pharmacology, vol. 2, Houston, Texas, USA : Stadium Press.

2) Thorp, J.R. and M.Wilson (1998). The National weeds strategy, *Gloriosa superba*.Archived 2012-02-05 at the wayback Machine weeds Australia.

3) Bairwa Ranjan, Singhal Manmohan, Balwant Singh (2011). Medicinal uses of Trachyspermum ammi : A Review, The pharma Research, 5 (2) : 247 – 258

4) Davidson Alan and Tom Jaine. (2014). The Oxford Companion to food, Oxford University Press, USA. 805

5) Kamble, S. Y. and Pradhan, S. G. (1988), Flora of Akola District, Maharashtra (B.S.I.)

6) Naik V. N. (1998), Flora of Marathwada, Vol. I & II, Amrut Prakashan, Aurangabad

7) Cok T. (1967), The Flora of Presidency of Bombay, Vol. II, B.S.I. Calcutta

8) Harborne, JB (1973) Phytochemical methods,London,Chapman & Hall Ltd. Pp. 49-188.

9) Chopra RN, Nayar SL, Chopra IC. (2002). Glossary of Indian medicinal plants.Ed 6, New Delhi NISCIR,2.

10) Farzana M.U.Z.N. et.al. (2014). A review of ethnomedicine, phytochemical and pharmacological activities of Acacia nilotica (Linn) willd. J. pharm. Phyto.chem.3(1): 84-90.

11) Greer, John Michael (2017). The encyclopedia of natural magic (first.ed.).Woodbury.MN: Liewellyn Publications.p. 185.

12) Kintzios ,Spiridon E (2000). The genus Gloriosa, CRC press.pp.10-11.

13) Lal,H.S. and P.K.Mishra.(2011). *Gloriosa superb* – an endangered plant spotted for the first time from forest of Tpchanchi, Hazaribag (Jharkhand) India. Science research reporter 1(2) 61-64.

14) Dounias,E.Gloriosa superba L. Archived (2014) at the wayback machine Protabase record display, plant esourcs of tropical Africa (PROTA).

Amylase Production, And Characterization From *Aspergillus Niger* In Solid State Culture

Meshram R.[1] , Motwani D. R[2].
[1&2] DRB Sindhu Mahavidyalaya,
Department of Biochemistry,
Panchpaoli, Nagpur.440017.
Corresponding Author Dr. Rahul L. Meshram

Abstract

The enzymes from microbial sources are more stable and can be obtained from cheap sources. Amylases are among the most important enzymes and are of great significance in present day paper, textile and food industries. The present study describes isolation of amylase producing fungus from the soil of Nagpur city,Maharashtra. Seven fungal isolates were screened for the production of amylase by starch agar plate assay. Among seven isolates the isolate which shows maximum amylase production on the basis of zone of clearence on the plate assay was selected and identified as Aspergillus niger. Solid state fermentation was performed using the cheap agro waste wheat bran, rice bran, potato peel and citrus peel as substrate and different bioprocess variables, such as incubation period , pH and temperature were optimized. The results showed that maximum amylase production obtained with potato peel as substrate 96 U/g. Maximum enzyme production was found to be optimum at incubation period 6th day (97 U/g), pH of 5.0 (96U/g) and temperature of 40ºC (93 U/g).

Key words*:Amylase,Aspergiillus niger, Solid state fermentation, wheat bran, rice bran, potato peel and citrus peel.*

Introduction

The present era says that microorganisms are used as biotechnological sources of industrially relevant enzymes.The microorganisms used for extracellular enzyme production is economical bulk and easy to manipulate to obtain enzymes of preferred characteristic. (Abu et al., 2005). Although amylases can be obtained from several sources, such as plants and animals, the enzymes from microbial sources generally meet industrial demand (Pandey et al., 1999, 2000a, 2000b, 2001).). Microbial amylases have successfully replaced chemical hydrolysis of starch in starch processing industries. Besides their use in starch saccaharification, they also find potential application in a number of industrial processes such as in food, baking, brewing, detergent, textile and paper industries. Nowadays recent attention is paid on using various agro industrial wastes for value addition using solid-state fermentation (SSF) by filamentous fungi (Pandey et al., 2001). It has been reported that SSF is the most appropriate process in developing countries due to the advantages it offers.The hyphal mode of growth and good tolerance to low water activity and high osmotic pressure conditions, make fungi most efficient for bioconversion of solid substrates (Raimbault, 1998). The objective of this study were selection of a suitable fungal strain for the production of amylase, screening of different agricultural waste as substrates for maximum enzyme production, application of different combinations of these substrates for enzyme production, and optimization of cultural conditions for the production of amylase.

Material and Methods

Isolation of Microorganism

Several species of *Aspergillus* were isolated from different soil sample and were identified on the basis of morphological characteristics.

Isolation and screening of isolates

Primary screening was done by starch agar plate method. The isolate *Aspergillus niger* showed a maximum hydrolysis halo on this medium and was selected for further investigation

Substrates

Wheat bran, Citrus peel, Pototo peel and rice bran were used as substrates. The substrates were ground into coarse powder with a blender.

Solid state fermentation

For production of enzymes in SSF, the fungi were grown at 25ºC in 250 ml Erlenmeyer flasks containing 5 g of the coarsely ground substrate. Distilled water was used to adjust the moisture content.

Assay of Amylase activity

Amylase activity was estimated by analysis of reducing sugar released during hydrolysis of 1% (w/v) starch in 0.1 M phosphate buffer, pH 6.5, at 25ºC for 20 min by the Dinitrosalicylic acid method (Miller, 1959). One unit of amylase activity was defined as the amount of enzyme that releases 1 µmol of reducing sugar as glucose per min under the assay conditions. Enzyme activity is expressed as specific activity, which is represented as U/mg of protein.

Assay of protein concentration

The protein concentration was determined by the Lowry's method (Lowry et al., 1951) using bovine serum albumin as the standard

Effect of incubation period on Amylase activity

Growth of the fungal isolate *Aspergillus niger* and production of amylase were carried out from 2th day to 10th day.

Effect of pH on Amylase activity

Effect of varying pH ranges of 3.0, 3.5, 4.0, 4.5, 5.0, 5.5 and 6.0 on the fungal isolate *Aspergillus niger* for the amylase enzyme production was investigated.

Effect of Temperature on Amylase activity

The effect of varying ranges of temperature on the production of amylase by the fungal isolate *Aspergillus niger* was investigated. The fermentation was carried out at 20, 25, 30, 35, 40, 45 and 50˚C respectively.

Effect of Substrare on Amylase activity

Effect of varying Sudstrates on the fungal isolate *Aspergillus niger* for the amylase enzyme production was investigated.

Results and Discussion.

Isolation of amylase producing fungus

Soil samples from agricultural field were collected, and used for isolation of fungal isolate producing amylase enzyme. Fungal isolate was further confirmed for its amylase production by using 1 % Potato dextrose starch agar plates. Depending on the zone of clearance, fungal isolates *Aspergillus niger* was selected for further studies.

Optimization of amylase production by SSF

Solid-state fermentation has gained renewed interest and fresh attention from researchers because of its edge in biomass energy conservation, solid waste treatment and its application to produce secondary metabolites over submerged fermentation (Sivaramakrishnan.et al S.,2006). Production of biocatalysts using agro-biotech substrates under solid-state fermentation conditions provide several advantages in productivity, cost-effectiveness in labour, time and medium components further the effluent production is less and thus it is ecofriendly (Mahalaxmi, Y., et al,2010).However, these production characteristics would have to offer a competitive advantage over existing products (Devarapalli, K.,et al,2011) Hence, the present study deals to exploit the locally available, inexpensive agro-substrate for amylase production using *Aspergillus* sp. under solid-state fermentation conditions.

Selection of substrate for amylase production

The selection of a suitable agricultural residue as a substrate for SSF is one of most critical factor to be considered. Several substrates have to be screened for high enzyme production through SSF(Prakasham, R. S.,et al,2006). The availability and the cost of the raw material are the two important parameters that have to be considered while selecting a raw material in SSF(Chimata, N. K.,et al,2010).The substrate selected should allow the maximum growth of the organism and also should ease in high product formation. The results in the present study have indicated that amylase production pattern varied with the type of raw material used. Maximum enzyme production obtained with potato waste as substrate 96 U/g followed by wheat bran waste, citrus peel and rice bran waste 84 U/g , 76U/g and 71U/g (Fig 1).
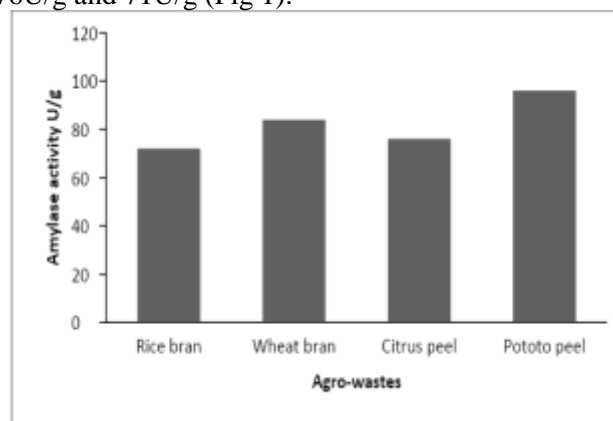
Figure 1. Effect of Agro-wastes on amylase production
Role of incubation period

Maximum enzyme production could be obtained only after a certain incubation time which allows the culture to grow at a study state .Enzyme production of each strain is based on the specific growth rate of the strain. Growth rate and enzyme synthesis of the culture are the two main characteristics which are mainly influenced by incubation time (Kalyanasundaram, I.,et al,2015).The results of the present study showed that amylase production increased with increase in incubation time linearly till 6th day (Fig 3) and on further incubation there was a decrease in the amylase production. Maximum enzyme production obtained on 6th day 97 U/g (Fig 2).
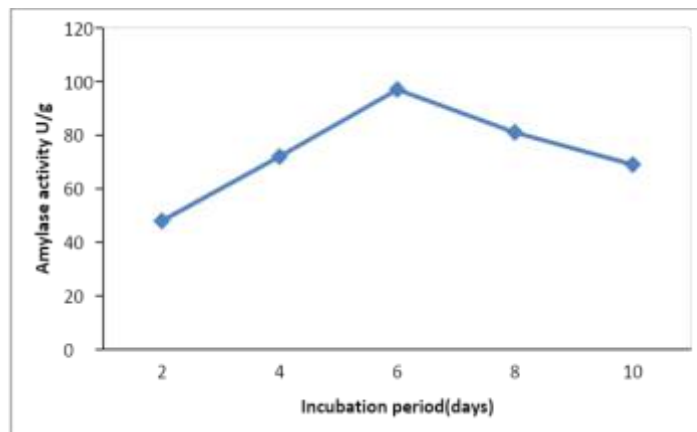
Figure 2. Effect of incubation period on amylase production
Influence of pH

Growth and metabolism along with enzyme production is governed by an important factor called pH(Varalakshmi, V.,et al,2013). Amylase production by microbial strains strongly depends on the extracellular pH as culture pH strongly influences many enzymatic reactions and also for the transport of various components across the cell membrane (Pandya, J. J.,et al,2012). Different organisms have different pH optima and any modification in their pH optima could result in a decrease in their enzyme activity. The results in the present experiment revealed that the fungal isolate *Aspergillus* niger had an optimum pH of 5.0 (Fig 3) with a maximum enzyme activity of 96 U/g. With increase in pH value from strong acidic phase to a neutral phase enzyme activity increased up to a pH of 5.0 and upon further increase in pH, enzymatic activity decreased.
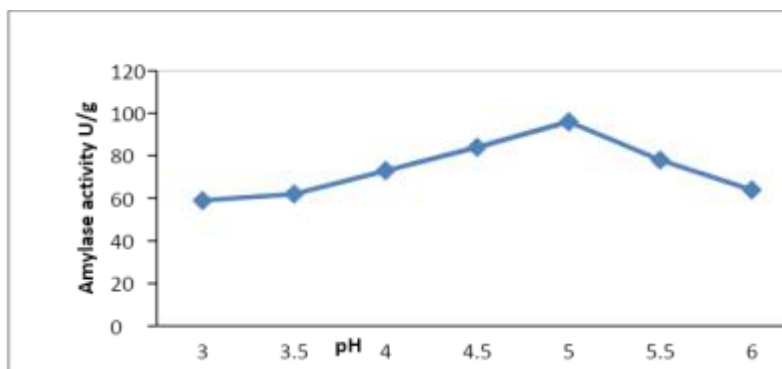
Figure 3. Effect of incubation pH on amylase production
Influence of temperature

Temperature is one of the most important parameter to be optimized for maximum enzyme production. Optimum temperature for maximum enzyme production depends on the characteristics of the strain. In solid state fermentation temperature plays a very important role in enzymatic synthesis (Mrudula, S., and Murugammal, R., 2011). The isolated *Aspergillus niger* was tested in a wide range of temperatures ranging from 25°C to 50°C. Maximum amylase production (93U/g) was obtained at a temperature of 40°C (Fig 4). In the present experiment with increase in temperature from 25°C enzyme production increased up to 40°C and upon further increase of temperature, production decreased.
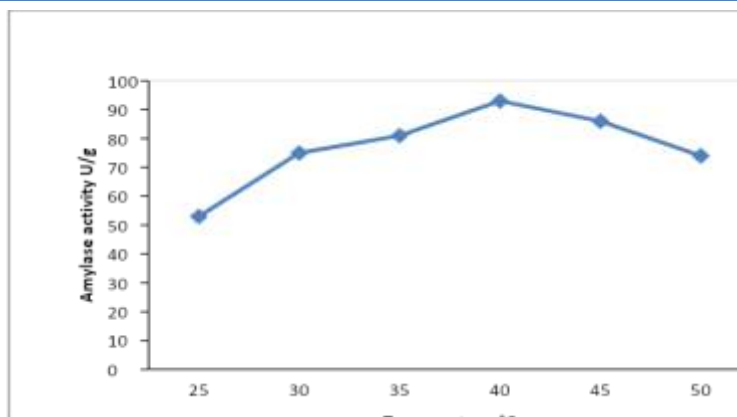
Figure 4 Effect of incubation temperature on amylase production

Conclusion

Amylase is one of the most widely used enzymes for the production of fermented foods and starch, and the demand for amylase is increasing with a widening spectrum of applications. From this investigation it can be concluded that *Aspergillus* species could be a potential strain for the production of amylase by SSF. Potato waste serves as a good substrate for amylase production which can be employed to reduce the cost of enzyme production.

References

1. Abu EA, Ado SA, James DB (2005). Raw starch degrading amylase production by mixed culture of *Aspergillus niger* and *Saccharomyces cerevisae* grown on *Sorghum pomace*, Afr. J. Biotechnol. 4(8): 785- 790.
2. Chimata, N. K., Sasidhar, P., and Challa, S., 2010, Production of extracellular amylase from agricultural residues by a newly isolated *Aspergillus* species in solid state fermentation, African Journal of Biotechnology, 9(32), 5162-5169.
3. Chimata, M. K., Chetty, C. S., and Suresh, C., 2011, Fermentative production and thermostability characterization of α amylase from *Aspergillus* species and its application potential evaluation in desizing of cotton cloth. Biotechnology research international, 2011.
4. Devarapalli, K., Velaga, P., Medicherla, N. R., and Naidu, S. V., 2011, Evaluation of well-adjusted solid substrate medium for enhanced protease production by *Bacillus subtilis* DKMNR: mixture design a case study, International Journal of Industrial Biotechnology, 1(1), 41-53.
5. Kalyanasundaram, I., Nagamuthu, J., Srinivasan, B., Pachayappan, A., and Muthukumarasamy, S., 2015, Production, purification and characterization of extracellular L-asparaginase from salt marsh fungal endophytes. World J Pharmacy pharmaceutical Sci, 4(3), 663-677.
6. Kalyanasundaram, I., Nagamuthu, J., Srinivasan, B., Pachayappan, A., and Muthukumarasamy, S., 2015, Production, purification and characterization of extracellular L-asparaginase from salt marsh fungal endophytes. World J Pharmacy pharmaceutical Sci, 4(3), 663-677.
7. Lowry OH, Rosebrough NJ, Farr AL, Randall RJ (1951). Protein measurement with the Folin-Phenol reagents. J. Biol. Chem. 48: 17-25.
8. Mahalaxmi, Y., Sathish, T., Rao, C. S., and Prakasham, R. S., 2010, Corn husk as a novel substrate for the production of rifamycin B by isolated *Amycolatopsis* sp. RSP 3 under SSF, Process Biochemistry, 45(1), 47-53.
9. Miller GL (1959). Use of dinitro salicylic acid reagent for determination of reducing sugar. Anal. Chem. 31:426-429.
10. Mrudula, S., and Murugammal, R., 2011, Production of cellulose by *Aspergillus niger* under submerged and solid state fermentation using coir waste as a substrate. Brazilian Journal of Microbiology, 42(3), 1119–1127.
11. Pandya, J. J., and Gupte, A., 2012, Production of xylanase under solid-state fermentation by *Aspergillus tubingensis* JP-1 and its application, Bioprocess and biosystems engineering, 35(5), 769-779.
12. Pandey A, Nigam P, Selvakumar P, Soccol CR (1999). Solid state fermentation for the production of industrial enzymes. Curr. Sci. 77:149-162.
13. Pandey A, Soccol CR, Mitchell D (2000a). New developments in solid state fermentation, Process Biochem. 35: 1153-1169.
14. Pandey A, Nigam P, Soccol VT, Singh D, Mohan R (2000b). Advances in microbial amylases, Biotechnol. Appl. Biochem. 31:135-152.
15. Pandey A, Soccol CR , Nigam P, Brand D, Mohan R, Roussoss S (2000c). Biotechnology potential of agro-industrial residues, Part II.
16. Raimbault M (1998). General and microbiological aspects of solid state fermentation. Electron. J. Biotechnol. 1: 1-20.
17. Varalakshmi, V., and Raju, K. J., 2013, Optimization of L-asparaginase production by *Aspergillus terreus* MTCC 1782 using bajra seed flour under solid state fermentation. International Journal of Research in Engineering and Technology, 2(9), 121-129.

Study of Butterflies from outskirts of Mandev Forest Udyan Yavatmal Dist. Yavatmal, Maharashtra.

Dr. P.W. Chaudhari [1] **, Dr. S.S. Gupta** [2]

[1]Department of Zoology
Shri Vitthal Rukhmini Mahavidylaya Sawana Tq. Mahagaon,Dist. Yavatmal
[2]Department of Zoology Amolokchand Mahavidyalaya, Yavatmal

Abstract

Butterflies are wonderful, winged flowers of the animal kingdom, which belongs to class insect. Butterflies are undoubtedly the masterpiece of nature, without butterflies we can't imagine the world. To achieve conservation of floral diversity presence of Butterflies plays vital role in an ecosystem as pollinating agent.

Present study was carried out from Mandev forest Udyan which is surrounded mainly by dense forest and quite rich in angiosperm flora with many important plants.

For present study, a check list was made comprising a total number of 19 Species belonging to 15 genera from 5 families. During this study Butterflies were observed from September to February 2017 for consecutive 6 months.

Key words: - Butterfly, Conservation and Diversity, Mandev Forest Udyan, Yavatmal.

Introduction:-

Butterflies are insects that belong to an order Lepidoptera, which includes moths too. Structurally butterflies are like all other insects but their most important difference is scale covering on wings and body. Butterfly adults are characterized by their four scale-covered wings, which give the Lepidoptera their name. Scientifically butterflies are term as Rhopalocera.

Butterflies are studied throughout the world except Antarctica, adding up to 18,500 species were recorded from universe. Of these, 775 are Nearctic 7,700 Neotropical 1,575 Palearctic; 3,650 Afrotropical; and 4,800 are distributed across the combined Oriental and Australian regions. The monarch butterfly is native to the Americas, but in the nineteenth century or before, spread across the world, and is now found in Australia and New Zealand. (Williams *et al* 2015) from India about 1504 species of butterflies were recorded (Tiple, 2011) which is about 8.74% of total butterfly species of world and constitutes of 65% of total Indian fauna. Different species of butterfly are supported by different ecosystems of our country.

It is not clear how it dispersed; adults may have been blown by the wind or larvae or pupae may have been accidentally transported by humans, but the presence of suitable host plants in their new environment was a necessity for their successful establishment.

Mainly the proper abiotic and biotic factors such as type of weather form, temperature and wind exposure, availability of host and larval plants (Barlow *et al*., 2007), food and vegetation (Ravindra *et al*., 1996; Khan et al., 2004; Jain & Jain, 2012; Kharat *et al*., 2012; Kumaraswamy & Kunte, 2013), topographic features (Amala *et al*., 2011),

Most of the butterflies are seasonal and they prefer only a particular type of habitat (Kunte, 1997). Butterflies are beautiful and delicately coloured winged Insect. They have always fascinated common man because of their delicacy and beauty (Arya et al., 2014). Their presence and diversity is considered to be a sign of good condition of any terrestrial biotope (Aluri and Rao, 2002). Hence butterflies are also considered as an ideal subject for ecological condition of landscape (Thomas and Malorie, 1985).

The aim of current study is to find out the abundance of butterflies from Mandev forest Udyan Yavatmal and to prepare a checklist of butterflies of Yavatmal district for the purpose of conservation of native species present in Yavatmal area.

Material and Method:-

Study Area:-

Mandev also called Manpur is famous for an ancient Lord Shiv Temple "Mandev". Mythologicaly the place has high importance for people around Yavatmal District. Yavatmal is a district of the state Maharashtra. It is located in the region of Vidarbha, in the east-central part of the state.The land offers a wide magnitude of natural diversity with river valleys bordering drier plateau. Two main rivers flow down the region Penganga and Wardha with their many rivulets framing this land of Cotton and Jowar. Mandev forest garden is well flourished with floral diversity with abundance of most Angiosperms and plants like Arjuna hence the area was selected as study area. Mandev is situated at the geographical coordinates $20^0.3061'$ North , $78^0.0481'$East.

Fig:-Satellite image: - Showing the study area, Mandev Forest Garden surrounded by dense forest, around out skirt of Yavatmal City.

B) Methods:-
   1) **Sweep netting:** Butterflies from flowers, shrubs and small tree vegetation were collected using standardized insect-collecting net. 15-20 sweeps were employed in selected area.
   2) **Active Searching and Photography:** Butterflies were actively searched near water bodies, rocks, shrubs, grounds debris, and on barks of trees on the ground surface for Photography. Photography was done by using Sony cyber shots with carl Zeis lense and Cannon p900 Cameras.

Identification: - Identification was done by available keys and with the help of experts.

Results and Discussion:-

In present study 19 Species belonging to 15 genus of 5 families were recorded. Where Nymphalidae representing highest numbers of species (08) which are followed by Pieriade (06), Lyncaenidae (03) While Papilinidae (01) and Hesperiidae (01) thus Nymphalidae is most dominant family exploring 42% of species second Familiy was Pieridae exploring 31% third largest family amongst survey was Lycaenidae with 15 % , Family Papilionidae and Hesperiidae explored 5 %.

Sr. No.	Name of Family	Number of Genus	Number of Species
1	**Hesperiidae**	**01**	**01**
2	**Lycaenidae**	**02**	**03**
3	**Nymphalidae**	**07**	**08**
4	**Papilionidae**	**01**	**01**
5	**Pieridae**	**04**	**06**

Table. Number of genera and species of Butterfly families from Mandev Forest Udyan.

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293
(Special Issue No.70)   Peer Reviewed Journal   www.aiirjournal.com Mob. 8999250451

45

Butterfly abundance with respect to genera and species from study area
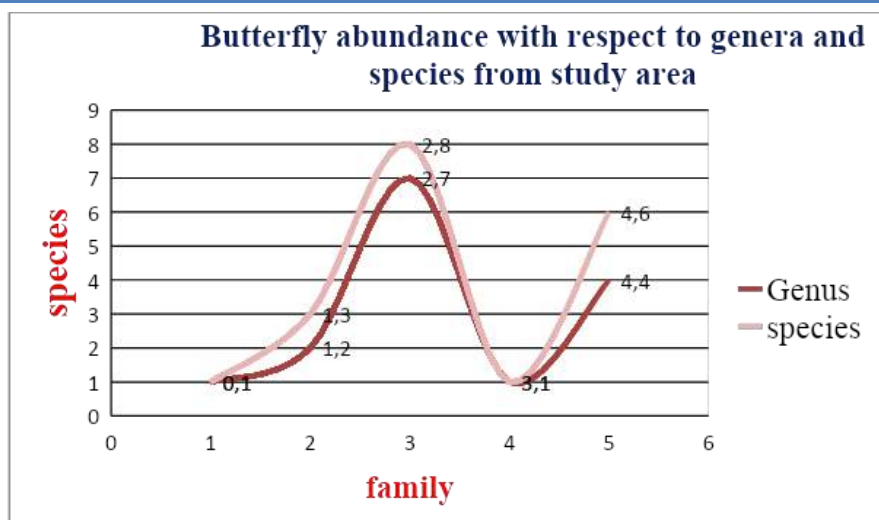
List of Butterflies Species recorded during Study

1 Family – Lycaenidae (Blue winged Butterfly)
- i)   *Castalius rosimon*
- ii)   *Castalius sp.*
- iii)   *Leptotes plinius*

2) Family – Nymphalidae(Bush Footed Butterfly)
- i)   *Ariadne ariadne*
- ii)   *Danus chrysippus*
- iii)   *Euploea core*
- iv)   *Hypolimnas bolina*
- v)   *Junonia lemonias*
- vi)   *Junonia almanac*
- vii)   *Melantis leda*
- viii)   *Parantica aglea*

3) Family – Papilionidae (Swallow tail Butterfly)
- i)   *Papilio demoleus*

4) Family – Pieridae (Yellow and Blue Butterfly)
- i)   *Catopsilia Pomona*
- ii)   *Catopsilia pyranthe*
- iii)   *Cepora nerissa*
- iv) *Delias eucharis*
- v)   *Eurema andersoni*
- vi) *Eurema brigitta*

5) Family – Hesperiidae (Skipper Buttterfly)
  Taractrocera maevius

References:-
1)   Aluri J.S.R., Rao S.P. (2002):- Psychophily and evolution consideration of   cadabafructicosa (capparaceae). Journal of the Bombay Natural History Society, 99(1): 59-63.
2)   **Amala, S., Rajkumar, M. and Anuradha, V. (2011):-** Species richness of butterflies in the selected areas of Siumalai Hills, International Journal of Pure Applied Science Technology, 6(2): 89-92.
3)   **Arya M., Daykrishna K., Chaudhary R. (2014):-** Species richness and diversity of butterflies in and around Kumaun University, Nainital, Uttarakhand, India. Journal of Entomology and Zoology Studies, 2(3): 153-159.
4)   **Barlow, J., Overal, W.L., Araujo, I.S., Gardner, T.A. and Carlos, A.P. (2007):-** The value of primary, secondary and plantation forests for fruit-feeding butterflies in the Brazilian Amazon, Journal of Applied Ecology, 44: 1001-1012.
5)   **Jain, N. and Jain, A. (2012):-** Butterfly diversity of Hadoti Region, Rajasthan, India, Flora and Fauna, 1892): 274-276
6)   **Khan, M.R., Khurshid, A., Ikram, B., Malik, A.I. and Mir, A. (2004):-** Biodiversity of Butterflies fro district Pooch and Sudhnoti, Azad Kashmir, Asian Journal of Plant Sciences, 3(5): 556-560.
7)   **Kharat, A., Nikam, S. and Gurule, S. (2012):-** Pattern of butterfly diversity from Nasik and Dhule Districts, Maharashtra, Flora and Fauna, 18(2): 243-252.
8)   **Kumaraswamy, S. and Kunte, K. (2013):-** Integrating biodiversity and conservation with modern agricultural landscapes, Biodiversity and Conservation, 22: 2735-2750.

9) **Kunte K. (1997):-** Seasonal patterns in butterfly abundance and species diversity in four tropical habitats in the northernWestern Ghats. Journal of Bioscience 22: 593-603.

10) **Ravindra, M., Viswanathan, S. and Ram, G.M. (1996):-** Checklist of butterfly species of Osmonia University Campus, Hyderabad, Zoo's Print Journal, 11(10): 5.

11) **Thomas C.D., Malorie H.C. (1985):-** Rarity, species richness and conservation: Butterflies of the Atlas Mountains in Morocco. Biological Conservation, 33: 95-117.

12) **Tiple A.D. (2011):-** Butterflies of Vidarbha region, Maharashtra State, central India. Journal of Threatened Taxa, 3(1): 1469-1477.

13.) Williams, Ernest; Adams, James; Snyder, John.(2015):- *"Frequently Asked Questions"*. The Lepidopterists' Society. Archived from the original on 13 May 2015. Retrieved 9 September 2015.

Electrical Conductivity of Co(II), Ni(II), Cu(II) and Cr(III) Complexes derived from thiazole Schiff base

S. R. Kelode[1], P. R. Jagnit[2]

Department of Chemistry, Arts, Commerce and Science College, Maregaon

Department of Chemistry, Indira Gandhi Mahavidyalaya Ralegaon

Abstract:

A thiazole Schiff base has been prepared by the condensation of 2-hydroxy-5-chloro-3-nitro acetophenone and thiazole. The ligand was characterized by elemental analysis and spectral methods. The coordinating ability of the ligand is investigated by preparing its metal complexes with Co(II), Ni(II), Cu(II) and Cr(III) have been prepared and characterized by elemental analysis, molecular weight determinations, conductance measurements, spectral and thermal studies. All the complexes have been studies and evaluated by electrical conductivity. The isolated products are coloured solids, soluble in DMF, DMSO and THF.

Keywords: Schiff base, Magnetic susceptibility, Electrical conductivity

Introduction:

The electrical conductivity of metal complexes varies with their nature and temperature. The variation of electrical conductivity of the metal complexes with temperature is the basis of their classification as semiconductors or metallic conductors. They are reported the possible use of such systems in biological applications for their antifungal properties and antioxidant activities[1]. The Schiff base prepared by using variety of aldehydes and amines or any other amines possessed antitubercular, antitumer, anticancer, fungicidal medicinal and agrochemical activities. Schiff base and their metal complexes are becoming increasingly important in recent years due to their biological activity and their used as catalysts photoluminescent, electroluminescent properties Antimicrobial screening, biological great significance of Schiff base metal complexes research and play a significant role in the area of coordination chemistry. Antimicrobial evaluation of 2-amino pyridine-derived Ligand Schiff base and its complexes with Cu (II), Hg (II), Ni (II), Mn (II) and Co (II)[2]. Synthesis and Characterisation of new Heterocyclic Schiff base ligand derived from 4-Amino Antipyrine[3] Synthesis Spectral, Thermal Stability and Bacterial Activity of Schiff Bases Derived From Selective Amino Acid and Their Complexes[4] The present Research paper focus on synthesis, characterisation and various methods of Schiff base derived from sulphanilic acid and salicylaldehyde and Comparative study of Schiff base using various synthesis methods and their theoretical prediction of activities[5].

Experimental :

All the chemicals were of A.R. grade and used as received. 2-hydroxy-5-chloro-3-nitro acetophenone (HCNA) and 4-(p-hydroxyphenyl)-2 amino thiazole was prepared by known methods[6-9]. The solvents were purified by standard methods[10].

Synthesis of 4-(phydroxyphenyl)-2aminothiazole;

4-hydroxy acetophenone + 4-(p -hydroxyphenyl)-2 amino thiazole
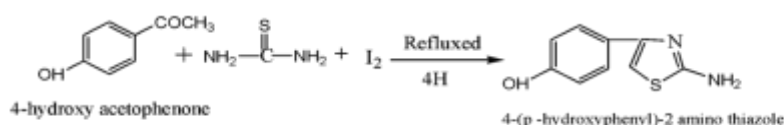
Synthesis of 2-hydroxy-5-chloro-3-nitro acetophenone 4-(p-hydroxyphenyl)-2 imino thiazole [HCNAT]: A solution of 4-(p-hydroxyphenyl)-2 imino thiazole (0.02M) in 25ml of ethanol was added to an ethanolic solution(25ml) of 2-hydroxy-5-chloro-3-nitro acetophenone (0.02M) and the reaction mixture was refluxed on a water bath for 4h. After cooling a pale yellow coloured crystalline solid was separated out. It was filtered and washed with ethanol, crystallized from DMF and dried under reduced pressure at ambient temperature. The purity of ligand was checked by elemental analysis and m.p. It was also characterized by IR and ^{1}H NMR spectral studies. Yield:70%; m.p. 310[0]C

**Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293
(Special Issue No.70) Peer Reviewed Journal www.aiirjournal.com Mob. 8999250451**

48

2-hydroxy-5-chloro-3-nitro acetophenone + 4-(p hydroxyphenyl)-2 amino thiazole → HCNAT
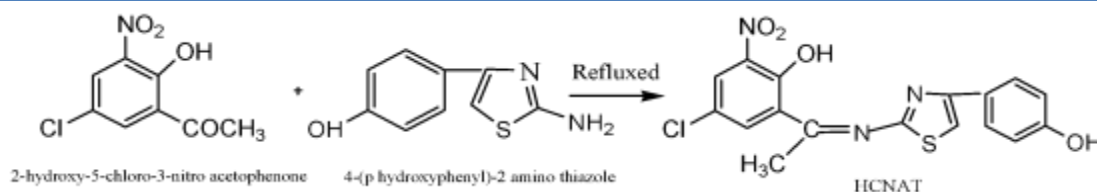
Table1. Analytical data of the Ligand.

Ligand	Molecular Formula	Formula Weight	Color and nature	Elemental Analysis			
				C% found (Cal.)	H% Found (Cal.)	Cl% Found (Cal.)	S% Found (Cal.)
HCNAT	$C_{17}H_{13}N_3O_4SCl$	390.6	Yellow Crystalline	52.34 (52.22)	03.26 (03.32)	9.02 (9.08)	08.12 (08.21)

Preparation of complexes: All the metal complexes were prepared in a similar way by following method. To a hot solution of ligand HCNAT (0.02M) in 25ml of ethanol a suspension of respective metal salts was added drop wise with constant stirring. The reaction mixture was refluxed on a water bath for 4-5 h. The precipitated complexes were filtered, washed with ethanol followed by ether and dried over fused calcium chloride. Yield : 50-55%

The complexes are soluble in DMSO and DMF but insoluble in water and common organic solvents. The metal chloride content of complexes were analyzed by standard methods[12] The ^{1}H NMR spectra of ligand was recorded and obtained from RSIC Chandigarh. IR spectra of the compounds were recorded on Perkin Elmer 842 spectrophotometer in the region 400-4000cm^{-1}, Carbon, Hydrogen and Nitrogen analysis were carried out at RSIC, Punjab University, Chandigarh. The molar conductance of the complexes at 10^{-3} M dilution in DMF were determined using equiptronic digital conductivity meter EQ-660 with a cell constant 1.00 cm^{-1} at room temperature. The magnetic moment measurement were made on a Gouy balance at room temperature using $[HgCo(SCN)_4]$ as the calibrant. The thermogravimetric analysis were performed on laboratory set up apparatus in air atmosphere at 10^0 C min^{-1} heating rate. The molecular weights of the complexes were determined by Rast method.

Table 2. Analytical data and molar conductance of the compounds.

Ligand	Formula weight g mole^{-1}	Colour	Elemental Analysis Found (Calcd.)				μ_{eff} B.M	Λ_M (Ω^{-1} cm^2 mol^{-1})
			M%	C%	H%	Cl%		
$[CoL_2(H_2O)_2] H_2O$	892.1	Brown	6.25 (6.60)	44.86 (45.73)	3.25 (3.36)	7.70 (7.95)	4.6	6.8
$[NiL_2(H_2O)_2] H_2O$	891.9	Green	6.30 (6.58)	45.58 (45.74)	3.16 (3.36)	7.72 (7.96)	3.1	7.6
$[CuL_2(H_2O)_2] H_2O$	896.7	Brown	6.90 (7.08)	45.26 (45.50)	3.12 (3.34)	7.72 (7.91)	1.6	8.2
$[CrL_2(H_2O)Cl] H_2O$	902.7	Green	5.32 (5.76)	44.90 (45.19)	2.36 (2.88)	11.08 (11.79)	3.8	18.6

Result and Discussion :

The Schiff base HCNAT and its complexes have been characterized on the basis of ^{1}H NMR, IR spectral data, elemental analysis, molar conductance, magnetic susceptibility measurements and thermo gravimetric analysis data. All these values and analytical data is consistent with proposed molecular formula of legend. All the compounds are coloured solid and stable in air. They are insoluble in water but soluble in coordinating solvents like DMF and DMSO. The molar conductance values in DMF (10^{-3} M) solution at room temperature (Table2) shows all the complexes are non electrolytes.

The ^{1}H NMR spectra of ligand HCNAT shows signals at δ 12.11, (1H, s phenolic OH), δ 9.52 (1H, s, phenolic OH), δ 7.56, 7.54, 7.53 and 7.52 (4H, m, phenyl) δ 6.81, 6.80, and 6.78(3H, s Phenyl), 6.68 (1H s thiophene),

and 2.56(3H, s, methyl) [11,13-15]. IR spectra of ligand and metal complexes shows ν(C=N) peaks at 1620 cm^{-1} and absence of C=O peak at around 1700 – 1750 cm^{-1} indicates the Schiff base formation[16-19].

Table 3. IR spectra of ligand and metal complexes

Compound	ν(O−H) hydrogen bonded	ν(C=N) imine	ν(C−O) phenolic	ν(M−O)	ν(M−N)	ν(C−S)
HCNAT (LH)	3119	1620	1514	--	--	1122
[CoL$_2$(H$_2$O)$_2$] H$_2$O	--	1608	1506	472	432	1098
[NiL$_2$(H$_2$O)$_2$] H$_2$O	--	1585	1464	469	423	1090
[CuL$_2$(H$_2$O)$_2$] H$_2$O	--	1610	1503	508	412	1110
[CrL$_2$(H$_2$O)Cl] H$_2$O	--	1590	1505	475	410	1115

Electrical conductivity: The conduction in solid crystalline Inorganic and organic compounds takes place by the exchange of charges from a molecule to another molecule through the overlapping of nearest molecules. For broad intermolecular potential barriers the overlap is poor and the band width is narrow. Electrical conductivity of the complexes lies in the range of 2.10×10^{-9} to 6.69×10^{-7} Ω^{-1}cm^{-1} at 373 K. The electrical conductivity of these complexes at 373 K follows the order Ni > Cu > Cr > Co. The electrical conductivity and activation energy of complexes[20-24] are shown in table 4. The activation energy of electrical conduction of the complexes has been found to increase in the order Ni < Cr < Cu < Co.

Table 4. Electrical Conductivity (σ) at 373 K and Activation Energy (Ea) of the complexes

Metal		Co(II)	Ni(II)	Cu(II)	Cr(III)
HCAT	σ (Ω^{-1} cm^{-1})	2.20×10^{-9}	1.18×10^{-8}	4.12×10^{-8}	4.86×10^{-8}
	Ea (eV)	0.0724	0.0247	0.0499	0.066

Conclusions:

In conclusion we have synthesized new ligand 2-hydroxy-5-chloro-3-nitro acetophenone 4-(p-hydroxyphenyl)-2 imino thiazole and their metal complexes. Ligand was found to bind the metal ion monobasic (ON) bidentate manner. The electrical conductivity of the synthesized complexes were measured in the temperature range 298-423 K .All the complexes indicating their semiconducting behavior.

References

1. Siham Slassi, Adeline Fix-Tailler, Gérald Larcher, Amina Amine and Abdelkrim El-Ghayoury, J. of Heteroatom Chem., 2019, 6862170,1
2. Rehab K A.S., Wurood A J., and Ali N N., J. Pharma, Bio and Chem Sci., 8(3), 2017, 174.
3. Thamarai S. E., Mahalakshmi S., Int. Jour.l of Advance Res.and Development, ,2(2), 2017,55.
4. Bushra K., Raghed A.G and Kahtan A. A., Adv. Appl. Sci. Res, 8(3), 2017, 4
5. Varsha Dayma, Poonam Sharma, Pushplata Salvi, Meena K Rathore, Prabhat Kumar Baroliya5, Int. J. Res. Advent Technology, 6, (8), 2018,1826
6. Aswar A., Bahad P.,.Pardhi A. and Bhave N., J. Poym. Mater. 5, 1988, 232.
7. Pattan S.,.Ali M, Pattan J., Purohit S., Reddy V. and Nataraj B., Indian J. Chem., 45B, 2006, 1929.
8. Khrustalev D., Suleimenova A. and Fazylov S., Russian J. App. chem., 81(5), 2008, 900
9. Maradiya H., and Patel V., J. Fibers and poly., 3(1), 2002, 43.
10. Furniss B., Hannaford A., Smith P.   and Tatchell A., Vogel's practical organic   chemistry 5 thEd. (Logman Scientific Technical, John Wiley and Sons), (1989).
11. Sadigova S., Magerramov A. and Allakhverdiev M., Russian J. Org. chem., chem., 81(5), 2008, 900.
12. Vogel AI, "A Text book of quantitative inorganic chemistry"3thEd., (ELBS,London,1961).
13. Campbell E. and Nguyen S., J. Tetrahedron, 42, 2001, 1221.
14. Pietikainen P. and Haikarainen A. J. Mole. Catalysis., 180, 2002, 59.
15. Kidwai M., Poddar P. and Singhal K., Indian J. Chem., 48B, 2009, 59.
16. Sonwane S., Srivastava S. and Srivastava S., Indian J. Chem., 47B, 2008 633.
17. Patel K. and Mehata A., E. J. Chem., 3(13), 2006, 267.
18. Maurya R., Antony D.,Gopinathan S., Puranic V., Tavale S. and Gopinathan C., Bull. Chem. Soc.Jpn., 68,1995, 2847.
19. Boghaei D. and Mohebi S. J. Tetrahedron, 58, 2002, 5357.
20. El-Mallah, H.M., Indian J. Pure and Appl. Physics, 49, 2011, 769.
21. Chetia, J.R., Moulick, M. and Dutta, A., Indian J. Chem. Tech., 11, 2004, 80.
22. Shaktawat, V.,Jain, N., Dixit, M., Saxena, N.S., Sharma, K.and Sharma, T.P.,Indian J. Pure and Appl. Physics, 46, 2008, 427.
23. Katon, J.E. (Ed.), "Organic Semiconducting Polymers", Marcel, Dekker, Inc. New York, 1968, 89.
24. Ahmed, A.M., Indian J. Pure and Appl. Physics, 43, 2005, 535.

A Study of Glycogen Estimation in the Body of Senga Nathsagarensis From A Fresh Water Fish Clarias Batrachus

Dr. Nilima M. Kankale
Assistant Professor, Department of Zoology,
G.N.A. Arts, Commerce & Science College, Barshitakli, Dist. Akola, (M.S.), India

Abstract

Cestode when live in the intestine of hosts they utilize food from the gastrointestinal tract. The metabolism of these cestodes depend on the feeding habits and the rich nourishments available in the gut of the host. These warms use their nourishments for their normal development and growth. The metabolic and in microstudies suggest that a complex nutritional relationship occur between a cestode and its host.

Glycogen content is variable in different strobila. H. diminuta (Good Child 1961) percentage of Glycogen changes as age of worm (Mettric & Cannon1970) in posterior segments, lipid is more than anterior segment. Therefore, it is a variation to the Glycogen content of one species to other species. In view of greater magnitude of tapeworm distribution, the study of cestode requires the biochemical data of all the worms living in different habitats.

Key Words: - Clarias batrachus, Biochemical composition of Glycogen

Introduction: -

Research in the field of parasitology have started knowing the physiological and biochemical aspects of the parasites right from beginning of the nineteenth century. Importance of biochemical studies has been the light during the beginning of the 20th century (Cheng 1964). Notable contribution to the biochemical & physiological fields were made by Ried (1942); Bueding (1949); Hop King (1950). For instance remarkable differences in the levels of Glycogen in various helminthes parasites and also similarities in the properties polysarcharides, isolated from different families of tapeworms was observed by Bueding (1965). Similarly, wide variation in the total protein content in the species. Some of the helminthologists of India who made extensive work in the biochemical field. The biochemical composition of the parasite is subjected to variation and these variations are likely to be influenced by the variations of the host. Some intestinal helminths have adopted to live an aerobically by involving a special type of mitochondria called anaerobic mitochondria which enables the parasites to fix CO_2 and to live in an environment (Intestine) rich in CO_2. Biochemical studies have revealed important metabolic differences between the host and parasite.

Materials and Method: -

Glycogen estimation in cestode parasites was carried by Kemp et.al. (1954) method. Twenty intestines of Clarias batrachus were brought to laboratory and dissected for collection of cestode. Out of twenty intestines, four of them were found to be heavily infected with cestode parasites. By observing the identical worms under the microscope, few of them were fixed in 4% formalin for morphological study.

Small pieces of infected intestine were also collected for estimation of Glycogen. The collected worms kept on blotting paper to remove excess of water from the body of cestodes. This material was transferred on a sensitive balance for 30 mgs. This weighted material was ground into a homogenous paste in a morter paste, to this paste 1 ml of 30% KOH is added and taken in centrifuge tube and digested in hot water bath for 20 minutes, cooled and to the same 1.5 ml of 95% ethanol was added by stirring with a glass rod. Brought gently to boil in hot water bath, cooled and centrifuge for 15 minutes at 2000 R.P.M. Supernatant was drained on filter and 5 ml of distilled water was added reacted with 5 ml of test solution, 5 ml of glucose standard solution, 5 ml distilled water separately in three test tube, in each 10 ml if Anthrone reagent was added and mixed, then heated for 10 minutes and immediately cooled and reading were taken with the help of colorimeter at 620 mu by setting blank 100.

The amount of Glycogen in the aliquot was calculated by the formula

% of Glycogen = 100 x U/ 1.11x S

U= O.D. of unknown test solution.   S= O.D. of 100 mg of glucose std.

1.11= Conversation factor of glucose to glycogen. U= 0.53.   S= 2.

% of Glycogen = 100 x 0.53/ 1.11 x 2 = 23.87 mg/100 ml solution.

By using same techniques, the Glycogen content of host intestine were calculated.

Conclusion: -

From the above result it can be concluded that the worm senganathsagarensis n. sp. could maintain a good balance in Glycogen content and also maintaining histopathalogical relation with the host Clarias Batrachus (Linnoeus, 1758)

References: -

1. Brand, T. Von (1966), Biochemistry of parasites, Academic Press, New York.
2. Culling c.f.a, (1974), Text book of Histochemical & Histopathological Techniques, 3rd Edition, Butter worths & co. Ltd., London.
3. Day, F (1994), The Fishes of India Vol. I & II, William Dawson & Sons Ltd., London.
4. Chubb, J. C., Pool D. V., Veltkamp, C. J. (1887), A key to species of cestodes (tapeworms) parasitic in British & Irish fresh water fishes. J. of Fish Biol, 1887, 31 (4): 517-543 (En. 56 ref) Dept. of Zool Univ. P. B. 147 Liverpool, L. 69,3BX. U.K.
5. Dogiel, V. A. et.al (1958), Parasitology of fish, Leningard University Press, Oliver & Boyd. Edinburgh & Londo
6. Ginetsinhaya, T. A, and Usponskaya (1905), The Characteristic of Glycogen & E. I. store in tissue of some fish helminths regarding their localization in the body of the host, Helminthologia, 6;319-333.
7. Smith, J. D. (1963), Biology of Cestode life cycles, Comm. Agric. Bureau. No. 34: 1-38.
8. Smith, J. D. (1969), Physiology of Tape worms (cestodes) oliver and Boyd., Edinburg.
9. Hiware, C. J. and Jadhav, B. V. (1994), Quantitative studies on tGlycogen in some Cestodes collected from different hosts and localities of Western Maharashtra, Dr. C. B. Srivastava Comm.Vol. 19946, 219-222.

Role Of Bat Guano In Bioremediation Of Aquatic Ecosystem

*Bharambe, C. M.; *Manohar Narkhede , **Devshree Sonowane
Department Of Zoology
*Vidnyan Mahavidyalaya, Malkapur Dist- Buldana (Ms)
**M. J. College Jalgaon

Abstrct

  The word guano originated from the Quichua language of the Inca civilization and means "the droppings of bat". The bats forage at night for insects over a particular area, and they return to the old temples during the day to sleep and care for their young. They attach themselves to ceiling, and their excrement accumulates on the floor below. In some situations the guano can reach a depth of feet in many years and appeared as guano-hip, and it has a valuable importance.

  Bat guano was collected from the temple of Lonar crater of Lonar, Buldana District, Maharashtra. The bat guano, it dissolved in water of Purna River, (10:100) concentration was prepared and kept undisturbed till 30 days and parameters was noted at an interval of 2 hour and thereafter 5 days for about 24 hours and 30 days respectively. Resulted into increasing in pH and decline in chloride, nitrate, phosphate and sulphate content of industrial effluent after the addition of bat guano. Our investigation results indicated that bat guano used for degradation of water pollutants and bioremediation of aquatic ecosystem.

Key words: Bioremediation, bat guano, industrial effluents. Water pollutants etc.

Introduction

  Lonar crater is situated in village Lonar in the Buldhana District of Maharashtra, India. It has an almost perfectly circular shape and accumulated with water in the deeper parts of basin. Rocks in the crater reveal many characteristic features of the moon rocks. There are many old temples on the peripheral boundary of the crater which have now become roosting places for bats. Ramgaya Temple has become the source of sweet drinking water, as this is the only sweet water stream available in the crater; rest of the crater water is highly saline. Kamalja Devi temple is situated at the southern base of the crater. Morache temple (Peafowl's temple) is now famous for existence of thousands of bats and peacocks. Waghache temple (Leopards temple) is also famous for bats and people have seen leopard found in it many times.

Bat Guano

  The word guano originated from the Quichua language of the Inca civilization and means "the droppings of bat". The bats forage at night for insects over a particular area, and they return to the old temples during the day to sleep and care for their young. They attach themselves to ceiling, and their excrement accumulates on the floor below. In some situations the guano can reach a depth of feet in many years and appeared as guano-hip, and it has a valuable importance.

Bioremediation And Bat Guano

  One of the most serious universal, international problems facing us today is the removal of harmful compounds from industrial and municipal waste. If it is discharged into lakes and rivers, a process called eutrophication occurs (Prince, 2003).

  Environmental contamination whether it is from industrial or municipal toxic waste that degrades the various environments is a vital concern to the public. Thus it is crucial to develop and implement accurate means to clean and preserve our precious and deteriorating environment. Although there are many techniques in cleaning environmental contaminations, one process has the most potential, namely bioremediation. Bioremediation, or commonly referred to as biodegradation, is a process in which microbes such as bacteria, fungi, yeast, or micro algae are involved in degrading toxic wastes (Pace, 1997 and Knezevich, 2006).

  A marvelous symbiosis exits between the microorganisms and bat guano. Bacteria in the mammalian intestinal tract aid in the breakdown of food during digestion. These organisms synthesize enzymes capable of degrading a vast array of substances. Innumerable microbes are regularly excreted along with waste products and together with other organisms; they constitute the microbial population of a bat guano deposit (Steele, 1989).

  Large populations of bat deposit thousands of kilograms of dropping annually. An ounce of bat guano contains billions of bacteria, and a single guano deposit may contain thousands of bacterial species. Guano being rich in bioremediation microbes cleans up toxic substances, (Barry et al., 1997). At present we do not know these species.

Material And Method

  To study the impact of bat guano on water, 10 mg bat guano was dissolved in 100 ml of Purna River water (10:100 proportions) for both times. After addition of bat guano in water, then the water was analyzed for the change in its pH, chloride, nitrate (NO_2), phosphate (PO_4) and sulphate (SO_4) contents. The change in water

parameters were noted after every two hour upto 24 hours. Thereafter, the samples were kept undisturbed and analyses were carried out for 30 days at an interval of 5 days. The water was analyzed by using standard methods for water analysis suggested by APHA (1998).

Observations And Results

When bat guano was dissolved in river water with pH 5.00. After 2 hours the pH was found to be changed to 6.15 and after 4 hours increased gradually and it reached to 7.25 after 24 hours (Table, 1). The river water was kept undisturbed till 30 days and the pH was noted after every 5 days upto 30 days. After 5 days the pH was seen to be increased upto 20 days and then it remained constant during 25 to 30 days of observations (Table, 2).

When bat guano was dissolved in river water with chloride (201); nitrate (56.5); phosphate (57.5) and sulphate (46.0), after 2 hours the parameters was found to be changed to chloride (187), nitrate (52.4), phosphate (56.5) and sulphate (46.0) and after 4 hours decreased gradually to chloride (91), nitrate (24.4), phosphate (29.5) and sulphate (29.6) upto 24 hours (Table, 1). The river water was kept undisturbed till 30 days and the chloride, nitrate, phosphate and sulphate was noted after every 5 days upto 30 days. After 5 days the parameters was seen to be decreased upto 20 days and then it remained constant during 25 to 30 days of observations (Table, 2).

Discussion

Tilak et al. (2005) reported a number of bacterial species associated with the bat guano belonging to genera, *Azospirillum, Alcaligens, Arthrobacter, Acinetobacter, Bacillus, Burkholderia, Enterobacter, Erwinia, Flavobacterium, Pseudomonas, Rhizobium* and *Serratia*. He also suggested that this bacterium has high bioremediation capacity. Hutchens et al. (2004) had demonstrated aerobic methane oxidizing bacteria, Methylomonas and Methylococcus in bat guano.

The bacterial enzymes capable of degrading a number of substances (Martin, 1991; Dvorak et al., 1992; Edenborn et al., 1992; Bechard et al., 1994; White and Chang, 1996; Frank, 2000; Kaksonen, et al., 2003; Vallero et al., 2003; Boshoff, et al., 2004; Miranda, 2005; Seena, 2005; Tilak et al., 2005). Murphy (1989) demonstrated a nutritious broth formation when the bat guano was added in water and further he proved that this broth supported the growth of numerous microbes.

Alley and Mary (1996) stated that an ounce of bat guano contains billions of bacteria and thousands of bacterial species and these bacteria are important to bioremediation. Sridhar et al. (2006) and Pawar et al. (2004) examined the fungal fauna of bat guano and used for bioremediation of Lack soil.

Conclusions

Anthropogenic activities, municipalities, various industries disposing their waste into the various aquatic resources. It is of utmost importance, hence, to prevent the pollution of aquatic resources by all possible means to control its quality from further deterioration. Applying microorganisms for river pollution control is an area of interest all over the world.

In the present investigation is an attempt to study the impact of bat guano with its rich microbial flora on bioremediation of aquatic resource as Purna river. The results revealed that within a period of 30 days, there was a remarkable reduction in the physico-chemical parameters of river pollutants, thus stabilizing the river pollutants, suggesting that water pollutants can be effectively treated by bat guano andis the excellent bioremediatant.

References

1. **Aaranson, S. (1970):** Experimental Microbial Ecology. Academic Press, New York. pp. 236.
2. **APHA, (1998):** Standard methods for the examination of water and wastewater, 20th ed. APHA, AWWA and WEF New York, Washington DC.
3. **Boyd, S. A. and E. G. Patricia (2005):** An Approach to Evaluation of the Effect of Bioremediation on Biological Activity of Environmental Contaminants: Dechlorination of Polychlorinated Biphenyls. *Environmental Health Perspectives*, Vol. 113, No. 2: pp. 180-185.
4. **Chapelle, F.H.:** Bioremediation: Nature's Way to a Cleaner Environment. U. S. Geological Survey. URL: http://water.usgs.gov/wid/html/bioremed.html.
5. **Conde-Costas, C (1991):** The effect of bat guano on the water quality of the Cueva EL Convento stream in Gauayanilla, Puerto Rico. Nss. Bull. 53(1):15.
6. **Dash, M. C., Mishra P. C., Kar G. K. and Das R. C. (1986):** Hydrobiology of Hirakund Dam Reservoir. In: Ecology and pollution Shf Indian Lakes and Reservoirs. Mishra Publishing House, New Delhi, p. 317-337.
7. **Dilip, K. M. and N. R. Markandey (2002):** Microorganisms in Bioremediation/edited by. New Delhi, Capital Pub., viii, 190 p., tables, figs., ISBN 81-85589-08-9.

8. **Dvorak, D.H.; R. S. Hedin; P. E. McIntire (1992):** Treatment of metal contaminated water using bacterial sulphate reduction: results from a pilot-scale reactor. Biotechnol. Bioeng.40:609-616.

9. **Edenborn, D.H., R. S. Hedin (1992):** Treatment of water by using sulphate reducing bacteria: Biotech. Bioeng. 30:512-516.

10. **Everett, J. W.; J. Gonzales; L, Kennedy (2004):** Aqueous and Mineral Intrinsic Bioremediation Assessment: Natural Attenuation. Journal of Environmental Engineering, Vol. 130 Issue 9, 942-950.

11. **Faison, B. D; and R. B. Knapp (1997):** A bioengineering system for in situ bioremediation of contaminated groundwater. Source: Journal of Industrial Microbiology and Biotechnology, Vol. 18 (2-3).189-197.

12. **Keleher, S. (1996):** Guano: Bats' Gifts to Gardeners. 14(1): pp. 15-17.

13. **Knezevich, V.; O. Koren; E. Z. Ron; E. Rosenberg (2006):** Petroleum Bioremediation in Seawater Using Guano. Bioremediation Journal, Vol. 10th Issue 3, p83-91, 9p.

14. **Pace, N. R. (1997):** A molecular view of microbial diversity and the biosphere. Science 276:734-740

15. **Pawar, K. V. and S. S. Deshmukh (2004):** Bioremedition of Lack soil using bat guano. Indian J. Environ and Ecoplan. 8(3):699-704.

16. **Pierce, W. (1999) :** Speech on '' Bat guano '' Sept., 1999. Cassette from National Vanguard Books, P.O. Box 330, Hillsboro, WV 24946.

17. **Prince, R. C. (2003):** Bioremediation in marine environments. Prince RC. Exxon Research and Engineering, Annandale, NJ 08801. Bioremediation.

18. **Steele, D. B. (1989):** Bats, Bacteria and Biotechnology. 7(1):3-4.

19. **Tuttle, M.D. (1986):** Endangered gray bats benefits from protection. Bat, Vol. 4(4), 1986.

20. **Vidali, M. (2001):** Bioremediation. An overview. Dipartimento di Chimica Inorganica, Metallorganica, e Analitica, Università di Padova Via Loredan, 435128 Padova, Italy. Pure Appl. Chem., Vol. 73, No. 7, pp. 1163–1172, 2001.

21. **Walecha, V., Vyas V. and Walecha R. (1993):** Rehabilitation of the twin lakes of Bhopal. In: Ecology and pollution on Indian lakes and reservoir. Ashish Publishing House New Delhi, p 317-337.

Table, 1: Impact of bat guano on water content of Purna River at an interval of 2 hrs.

Ps	Sg	Time (Hrs)												
		0	2	4	6	8	10	12	14	16	18	20	22	24
pH	W1	5.00	6.15	6.49	6.55	6.65	6.82	6.55	6.84	6.85	7.91	7.95	7.02	7.25
Cl	W1	201	187	173	160	155	143	132	125	115	107	98	93	91
NO2	W1	56.5	52.4	48.8	47.0	44.8	41.5	39.5	29.5	27.8	26.1	25.4	24.8	24.4
PO4	W1	57.5	56.5	55.0	45.0	44.0	43.5	39.5	35.5	32.0	31.5	30.5	29.5	29.5
SO4	W1	46.8	46.0	45.6	44.5	43.8	42.3	39.5	37.2	34.8	33.2	30.5	29.6	29.6

All values are the mean of five replicates; Ps – Parameters; Sg – Sampling; W1 – Water from Purna River.

Table, 2: Impact of bat guano on water content of Purna River at an interval of 5 days.

Ps	Sg	Time (days)							
		0	1	5	10	15	20	25	30
pH	W1	5.00 ±0.37	7.25 ±0.39 (+45.00)	7.42 ±0.24 (+48.40)	7.38 ±0.30 (+47.60)	7.40 ±0.32 (+48.00)	7.43 ±0.40 (+48.60)	7.55 ±0.45 (+51.00)	7.55 ±0.40 (+51.00)
Cl	W1	201 ±7.60	91 ±8.83 (-54.73)	86 ±10.95 (-57.21)	84 ±10.09 (-47.26)	83 ±9.73 (-58.21)	82 ±9.41 (-58.71)	81 ±11.06 (-59.70)	81 ±9.68 (-59.70)
NO2	W1	56.5 ±2.71	24.4 ±1.12 (-56.81)	24.0 ±1.25 (-57.52)	23.6 ±1.49 (-58.23)	23.1 ±1.28 (-58.94)	22.8 ±1.13 (-59.29)	22.2 ±1.29 (-59.29)	22.2 ±1.40 (-59.29)
PO4	W1	57.5 ±3.05	29.5 ±1.68 (-48.70)	27.5 ±1.96 (-47.83)	26.4 ±1.45 (-54.09)	25.3 ±1.29 (-56.00)	23.0 ±1.15 (-60.00)	21.4 ±1.28 (-62.78)	21.4 ±1.20 (-62.78)
SO4	W1	46.8 ±2.48	29.6 ±1.68 (-37.18)	28.9 ±1.59 (-38.25)	28.1 ±1.43 (-39.96)	27.8 ±1.39 (-40.60)	26.9 ±1.61 (-42.52)	26.1 ±1.46 (-44.23)	26.1 ±1.70 (-44.23)

All values are the mean ±SE of five replicates; Figures in parenthesis indicate percent change over the result on 0 day; Ps – Parameters; Sg – Sampling; W1 – Water from Purna river.

Extraction And Antioxidant Activity Of Extracts Of *Artemisia Pallen* (Davana) Plant.

M. O. Malpani*[1] , P. R. Rajput[2]

1. Department of Chemistry, Shankarlal Khandelwal Arts, Science and Commerce College, Akola 444 002 (M.S), India.

2. Principal, S.S.S.K.R. Innani College, Karanja (Lad), Maharashtra 444105, India

Abstract

  Artemisia pallen commonly known as Davana is the medicinally potential plant which is used to cure various diseases such as hypotensive properties and brings down blood pressure. Davana oil is also used in making perfumes. Essential oil fights infections from bacteria microbes, fungi and viruses and help to cure infectious diseases. The present investigation was undertaken to screen the extraction and antioxidant activity of Artemisia pallen (Davana) plant extracts.
Keywords: *Antioxidant activity, Davana, Artemisia pallen, plant extracts, DPPH .*

Introduction

  The genus Artemisia is a member of the Asteraceae (formerly Compositae) family and is reputed to have hundreds of species, cultivars, and hybrids. Depending on which reference one consults, two hundred to four hundred varieties are spread from Siberia through Asia on into the Middle East, North Africa, Europe, and finally North America. South Africa claims a few, but with the exception of several in tropical environs, this genus originated and belongs to the drier climes of the Northern Hemisphere. Davana is an annual *Artemisia* which is native to tropical Asia(India); *pallens* refers to its gray foliage. It grows from 1.5 to 2 feet tall.

  Its leaves are aromatic, lobed halfway to the midrib, and gray. *Davana* is easily propagated from seeds or from cuttings and reaches maturity in four months. It is grown commercially for its fragrant leaves and flowers. The plant's essential oil contains *cis-davanone* and *nerol* which give it a fruity-rose fragrance. It is used as a flavouring ingredient for beverages, candies, tobacco, and baked goods. *Davana* oil is used in making perfume with sweet and fruity fragrances. When applied on the skin, the oil is said to smell differently on different persons—a property highly valued in perfumery.

  Davana (*Artemisia pallens*) is an important annual aromatic herb belonging to asteraceae family, which is much priced in India for its delicate fragrance. The davana springs are commonly used in garlands, bouquets and religious offerings in most parts of the year. The application of *Artemisia* has a long history in folk medicine. *A. pallens* commonly known as "Davana" has been traditionally used in Indian folk medicine for the treatment of diabetes mellitus, wound healing, immune-modulating, anthelmintic, antipyretic and wound healing[1-5].

Materials And Method

  The plant materials of *Artemisia pallen* were collected seasonally and authenticated by the taxonomists Dr. S. P. Rothe from the Department of Botany, Shri Shivaji College, Akola.

Chemicals

  All the chemicals used in the study were obtained commercially and of analytical grade.

Materials And Methods

  The Leaves, flowers and fruits of *Artemisia pallen* plants were shade dried at room temperature and ground in a manual mill to get coarse powder. The coarse powdered materials of leaves and fruits were kept in the airtight polythene bag and stored in dry place. These powders were extracted with ethanol by using soxhlet apparatus. The extracts were concentrated at 40 ^{o}C using rotary evaporator. Finally it was dried, crushed and stored in air tight bottles at 4 ^{o}C for further study.

Study Of Antioxidant Activity By Dpph[10-11]

  The antioxidant activity of the water and ethanol extracts of Leaves, flowers and fruits of *Artemisia pallen* plants were assessed on the basis of the radical scavenging effect of the stable 1, 1-diphenyl-2-picrylhydrazyl (DPPH). The diluted working solutions of the test plant extracts were prepared in ethanol. 0.004% of DPPH was prepared in ethyl alcohol and 3 ml of this solution was mixed with 3 ml of sample solutions. These solution mixtures were kept in dark for 30 min and optical density was measured at 517 nm using UV Visible spectrophotometer. Alcohol (3 ml) with DPPH solution (0.004%, 3 ml) was used as blank. The optical density was recorded and % inhibition was calculated using the formula given below

$$\text{Percentage (\%) Inhibition of DPPH (\% AA)} = \frac{A - B}{A} \times 100$$

Where A=Optical density of the blank and B=Optical density of the sample.

Results And Discussion

The stock solutions 1 mg/ml of water/ethanol were prepared. The required dilutions 0.1 mg/ml to 0.9 mg/ml were prepared by appropriate dilutions. The optical density and percent antioxidant activity were calculated.

Table 1: Optical density and percent antioxidant activity for *Artemisia pallens* plant water extract. O.D of blank DPPH=0.595

Conc.mg/ml	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.1
O.D. of *Artemisia pallens*	0.585	0.575	0.570	0.540	0.532	0.515	0.512	0.495	0.480	0.477
%AA *Artemisia pallens*	1.6	3.3	4.2	9.2	10.5	13.4	13.9	16.80	19.32	19.83

Figure 1: Decrease in optical density of sample with increase in concentration of test plant water extracts

Figure 2: Increase in percent antioxidant activity with increase in concentration of test plant water extracts

Calculation of IC$_{50}$ for *Artemisia pallen* plant water extract = max - ½ (max-min)

$$=19.83 - ½ (19.83 – 1.6)$$
$$= 19.83 – 9.115$$
$$= 10.71$$

IC$_{50}$ value corresponding to *Artemisia pallen* plant water extract is 0.05 mg/ml.

Table 2 : Optical density and percent antioxidant activity for *Artemisia pallen* ethanol extract

O.D of blank DPPH=0.595

Conc.mg/ml	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.1
O.D. of *Artemisia pallen*	0.552	0.530	0.497	0.432	0.405	0.379	0.324	0.302	0.282	0.278
%AA *Artemisia pallen*	7.22	10.92	16.47	27.39	31.93	36.30	45.54	49.25	52.60	53.27

Figure 3: Decrease in optical density of sample with increase in concentration of test plant ethanol extracts
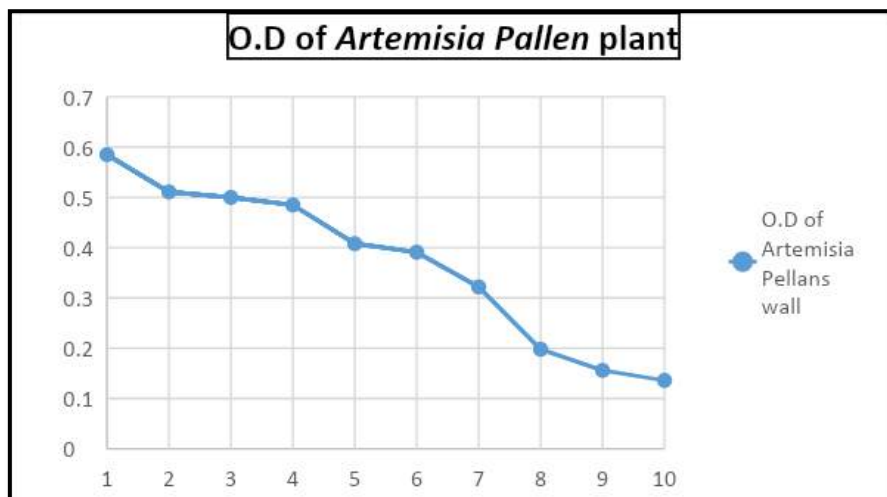
Figure 4: Increase in percent antioxidant activity with increase in concentration of test plant ethanol extracts
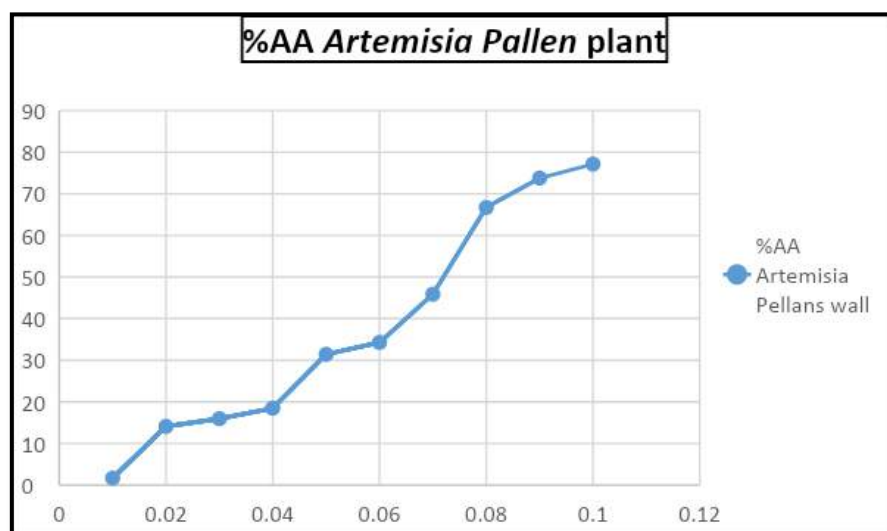
Concentration of *Artemisia pallen wall* vs %AA

Calculation of IC_{50} for *Artemisia pallen* plant extract = max - ½ (max-min)

$$= 53.27 - ½ (53.27 – 7.22)$$
$$= 53.27 – 23.02$$
$$= 30.25$$

IC_{50} value corresponding to *Artemisia pallen* plant ethanol extract is 0.047mg/ml.

Conclusion

The results obtained for the antioxidant assay by DPPH for water and ethanol extracts of *Artemisia pallen* plants are reported. Remarkable decrease in O. D. value of test plant samples were observed from the graph, showed antioxidant activity. The IC_{50} value for water and ethanol extracts of *Artemisia pallen* plants were found to be 0.05 mg/ml, 0.047 mg/ml respectively.

Acknowledgement

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293
(Special Issue No.70)   Peer Reviewed Journal   www.aiirjournal.com Mob. 8999250451

58

References

1. Book- Artemisia An Essential Guide From The Herb Society Of America,©2014 Available From: Http://En.Wikipedia.Org/Wiki/Artemisia_Pallens.)

2. Book- A Guide To Medicinal Plants:An Illustrated, Scientific And Medicinal Approach Koh Hwee Ling Chua Tung Kian Tan Chay Hoon *Published By* World Scientific Publishing Co. Pte. Ltd. 5 Toh Tuck Link, Singapore 596224 Isbn-13 978-981-283-709-7

3. Book - Selected medicinal plants of Chittagong hill tracts. Mohammad kamal Hossain , et. al. IUCN (International union for conservation of Nature) Bangladesh Country Office -2011.

4. Poonam, K., Singh, G. S., 2009. Ethnobotanical study of medicinal plants used by the Taungya community in Terai Arc Landscape, India. Journal of Ethno pharmacology 123, 167-176.

5. R. K. Sharma, R. Arora, Herbal drugs-A twenty first century perspective, first ed., Jaypee Brothers Medical Publishers (P) Ltd., New Delhi, 2006.

6. J. B. Harborne, Phytochemical Methods: A guide to modern techniques of plant analysis, sixth Indian reprint, Springer International Edition, 2010.

7. Singh, V., Raghav, P.K., 2012. Review on pharmacological properties of *Caesalpiniabonduc*L. Int. J. Med. Arom. Plants 2(3), 514-530.

8. Trivedi, A., Mishra, S.H., Sethiya, N.K., 2011. Preliminary pharmacognostic and phytochemical analysis of "Granthika" (*Leonoticnepetaefolia*): An ayurvedic herb. Indian J. Traditional Knowledge 10(4), 682-688.

9. Krishna Rao, R.V., Seshajiri Rao, J.V.L.N., Vimaladevi, M., 1979. Phytochemical investigation of *Cassia absus* (roots and leaves), *J. Nat. Prod.*, 42(3), 299–300.

10. Pande P. S., Mane V. D. and Mishra M. N., 2014. Evaluation of antioxidant activity of saponin and tannin fractions isolated from the leaves of *Tridaxprocumbens.* Int. J Pharm Bio Sci. 5(1), 396-400.

11. Tailor Chandra Shekhar and Goyal Anju, 2014. Antioxidant Activity by DPPH Radical Scavenging Method of *Ageratum conyzoides* Linn. Leaves 1(4), 244-249.

A New Species Of The Genus Polyoncobothrium Diesing, From Fresh Water Fish Channa Marulius In Wan River And Its Tributories (M.S) India

R .N. Khade[1] , D. S. Dabhade[2]

[1]Late. Pushpadevi Patil Arts and Science College Risod, Dist. Washim, India.
[2]Post Graduate and Research Department of Zoology, R.A. Arts, Shri M. K. Commerce and Shri S. R. Rathi Science Mahavidhyalaya, Washim 444505, India.

Abstract

The present investigation deals with the systematic observation of a new species of tapeworm *Polyonchobothrium hammerata* Sp.nov.from freshwater *Channa marulius* (F.Hamilton, 1822) at Wari (Hanuman) Tehsil Telhara Dist Akola (M.S.) India. The worm come closer to all species of genus *Polyonchobothrium* Diesing, 1854 in general topography of organs but differs due due to long having Scolex, immature, mature segment. Scolex hammer shaped, broader at anterior and posterior sides than middle. The rostellum armed with rostellar hooks, 29-32 rostellar hooks arranged in circular manner form apical disc, hooks are large. Testes 63-93 in number spread all over in the proglottids. The cirrus pouch is rounded in shape, present in the middle position of the proglottid. Cirrus pouch pyriform, present in middle position of proglottid. The vas deferens is medium. The vagina and cirrus pouch both open common in opening known as genital pore, which is small, circular in shape. The vagina is a thin tube, starting from the genital pore and forms receptaculum seminis, Ootype oval and small. Uterus Sac like having eggs. Eggs oval and non-operculate. Uterine pore oval.

Keywords: *Channa marulius*, Diesing.

Introduction:

Diesing, 1854 erected the genus *Polyoncobothrium* with *P. polypteri* as its type species. Subsequently, many species viz. *P.pseudopolypteri* (Meggit, 1930); *P.indicum* (Nama, 1979) from *Channa (Ophiocephalus) punctatus.P. armatii*, Malhotra,(1982) (unpubl. D.Sc. Thesis, University of Garhwal) *P.allahabadense(Gairola,1987)* from *Mystus vittatus; P. mastacembeli (Maulik,1993); P. humadii (Gitanjali, Yadav and Malhotra, 2003); P.srivastavai (Pande et. al., 2006)* from intestine of *Channa punctatus*; *P. chauhani* Pande *et al.,* (2006) collected from *Clarias batrachusand P.yamunica* (Sunil Kumar *et al.,* 2007) from *Mastacembelus armatus* have been added to the genus *Polyoncobothrium* Diesing,1854. Recently Deshmukh, V.S. *et al*., (2014) reported *Polyonchobothrium armatusae* from intestine of freshwater eel, *Mastacembelus armatus* in Nanded (M.S.) India.

The present study is the first record of new species of genus *Diesing* i.e. *Polyonchobothrium hammerata* Sp.nov.from freshwater *Channa marulius* (F.Hamilton, 1822) at Wari (Hanuman) Tehsil Telhara Dist Akola (M.S.) India.

Materials And Methods: 29 cestode parasites were collected from 25 infected *Channa marulius* (F.Hamilton, 1822) out of 65 examined in Wan River at Wari (Hanuman) Tehsil Telhara Dist Akola (M.S.) India, during the period January 2013 to December 2014. The cestode parasites were preserved in 4% hot formalin and five species staining was done by Harris haematoxylin and Borax carmine, dehydrated by different alcoholic grades, cleared in xylene, mounted in D.P.X. and drawings were prepared with the aid of a Camera Lucida, Photomicrograph were taken by Standard Research Microscope. All measurements were recorded in millimeters unless otherwise stated with average values.

Study Area: Wan river past at Wari (Hanuman) village in Satpuda range belonging to Akola district Maharashtra state.
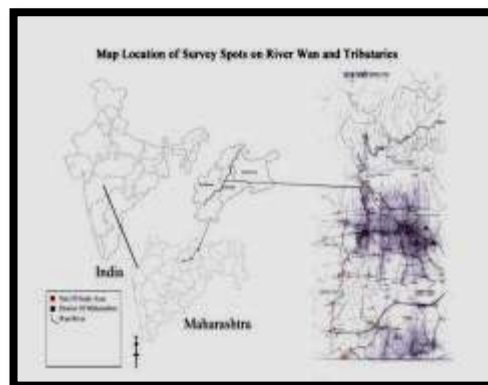
Results And Discussion:

Description :   **(Based on Five Specimens)** During the period of study on helminth parasites of freshwater fishes of Wan River, 29 cestode parasites were collected from 25 infected *Channa marulius* (F.Hamilton, 1822)

out of 65 examined in Wan River at Wari (Hanuman) Tehsil Telhara Dist Akola (M.S.) India, during the period January 2013 to December 2014.

The cestode parasites were preserved in 4% hot formalin and five species staining was done by Harris haematoxylin and Borax carmine, dehydrated by different alcoholic grades, cleared in xylene, mounted in D.P.X. and drawings were prepared with the aid of a Camera Lucida, Photomicrograph were taken by Standard Research Microscope. All measurements were recorded in millimeters unless otherwise stated with average values. Identification was done by (Yamaguti, S., 1959; Wardle, R.A., Mcleod, J.A. and Radinovsky, 1974; Khalil, Jones and Bray, 1994). These cestodes are long having Scolex, immature, mature segment. Scolex hammer shaped, broader at anterior and posterior sides than middle and measures 3.500(3.250-3.750) in length and 0.935(0.820-1.051) in breadth. Bothria two separated by a hidden margin extend upto posterior end of scolex and measures 2.492(2.325-2.660) in length and 0.403(0.291-0.515) in breadth. The rostellum armed with rostellar hooks, 29-32 rostellar hooks arranged in circular manner form apical disc, hooks are large and measures 0.120(0.115-0.125) in length and 0.0025(0.002-0.003) in diameter.

Mature segment two times broader than long and measures 1.039(0.824-1.254) in length and 1.475(1.321-1.629) in breadth. Testes 63-93 in number, circular spread all in the proglottid and measures 0.017(0.015-0.019) in length and 0.008 (0.007-0.009) in breadth.Cirrus pouch pyriform, present in middle position of proglottid and measures 0.209 (0.192-0.226) in length and 0.102 (0.084-0.121) in breadth.Cirrus thin, present in cirrus pouch and measures 0.103 (0.094-0.113) in length and 0.013 (0.009-0.018) in breadth. Vas deferens medium, measures 0.047 (0.043-0.051) in length and 0.018 (0.012-0.024) in width. Vagina and cirrus pouch commonly opens in genital pore, which is small, circular in shape and measures 0.025 (0.020 - 0.030) in length and 0.015 (0.010 - 0.020) in width. Vagina thin tube, starting from genital pore and forms receptaculum seminis and measures 0.224 (0.214-0.235) in length and 0.015 (0.010-0.020) in width. Receptaculum seminis curved tube and measures 0.154 (0.145 - 0.163) in length and 0.029 - (0.024 - 0.034) in breadth. Ootype oval, small and measures in 0.039 in diameter. Ovary clearly bilobed, elongated and each lobe measures 0.246 (0.215-0.277) in length and 0.067 (0.038-0.097) in breadth.Vitellaria follicular. Gravid proglottids are four to five times broader than long and measures 1.001 (0.510-1.493) in length and 2.505 (2.257-2.753) in width. Uterus Sac like having eggs and measures 0.212 (0.178-0.246) in length and 1.143(1.117-1.169) in breadth. Eggs oval, non-operculate and measures 0.041 (0.030-0.053) in length and 0.075 (0.071-0.079) in breadth. Uterine pore oval and measures 0.073 (0.064-0.083) in length and 0.054 (0.047-0.062) in breadth.
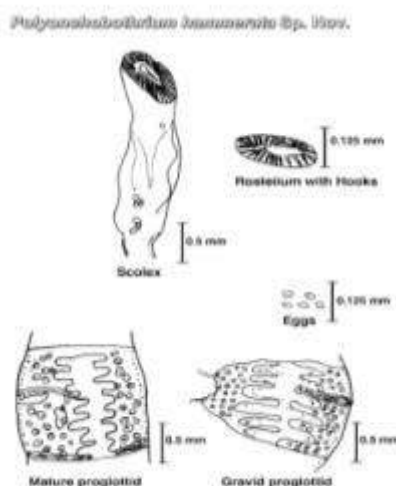
Photoplate of. *Polyonchobothrium hammerata* **Sp.novCamera lucida of** Polyonchobothrium hammerata Sp.nov.

Discussion:

The present form comes closer to all known species of the genus *Polyonchobothrium* Diesing, 1854 in general topography, but differs from *P.polypteri* Diesing, (1854) due to small scolex, this form differs from *P.pseudopteri,* Meggit, (1930) in having smaller scolex; from *P.indicum,* Nama, (1979) due to smaller scolex and collected from *Channa punctatus*. It is differs from *P. armatii*, Malhotra, (1982) (unpubl. D.Sc. Thesis, University of Garhwal) in possessing longer worms, larger scolex, bothria, mature proglottids and eggs, longer immature and gravid proglottids and ovary.The new species could be differentiated from *P. allahabadense* (Gairola and Malhotra,1987) in shorter body, scolex, rostellar hooks, smaller immature, mature and gravid

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293 (Special Issue No.70) Peer Reviewed Journal www.aiirjournal.com Mob. 8999250451

61

proglottides, testes, eggs and onchosphere;narrower ovary and wider bothria. The present worm is differ from *P.mastacembeli* (Maulik,1993) in having longer worms, smaller scolex, rostellum and rostellar hooks, mature proglottides, ovary, cirrus pouch and testes; narrower bothria; shorter but wider immature proglottides, larger gravid proglottides and longer but narrower uterine sac and collected from *Mastacembelus armatus*. It differed from *P.humidii* (Geetanjali, Yadav and Malhotra, 2003) in possessing larger worms, bothria, immature mature and gravid proglottides, ovary, testes and cirrus pouch and longer scolex. *P.srivastavai* Pande *et al*., (2006) in having scolex elongated, large, flat, armed with oval apical disc, hooks 24 in numbers, bothrium shallow, neck absent, testes 28 in numbers, scattered lateral to ovary, vitellaria follicular, eggs non operculate and collected from *Channa punctatus.* It differs from *P. chauhani* Pande *et al.,* (2006) in having Scolex long, pear shaped, armed with oval apical disc, hooks 25-29 in numbers, bothridia fleshy, shallow, four in numbers, neck absent, testes 24 in numbers, uterus conspicuous, eggs non operculate and collected from *Clarias batrachus*. *Polyonchobothrium hammerata* Sp.nov differs from *P.yamunica*, Sunil Kumar *et al.,* (2007) in having scolex pear shaped, broader at middle, rostellum armed with four groups of a total of 24-48 rostellar hooks, each group having 6-12 hooks, neck absent, proglottids acraspedote, testes 202-218, cirrus pouch oval, ovary post equatorial, vagina anterior to cirrus pouch, vitellaria follicular and collected from *Mastacembelus armatus* in Yamuna river. *Polyonchobothrium hammerata* Sp.nov differs from *Polyoncobothrium armatusae,* Deshmukh V.S., *et al*., (2014) in having Scolex triangular, arrow shaped, bothria sessile, neck long, mature proglottids broader than long, testes 20-25 in numbers, cirrus pouch cylindrical, ovary dumbell shaped and vitellaria granular and recovered from *Mastacembelus armatus* at Hadgaon, Dist. Nanded M.S. India.

Polyonchobothrium hammerata Sp.nov. differs from *Senga bothriolata Sp.nov* (2017) and *Senga microtrigularis Sp.nov.* (2016) having Scolex, immature, mature segment. Scolex hammer shaped, broader at anterior and posterior sides than middle. The rostellum armed with rostellar hooks, 29-32 rostellar hooks arranged in circular manner form apical disc, hooks are large. Testes 63-93 in number spread all over in the proglottids. The cirrus pouch is rounded in shape, present in the middle position of the proglottid. Cirrus pouch pyriform, present in middle position of proglottid. The vas deferens is medium. The vagina and cirrus pouch both open common in opening known as genital pore, which is small, circular in shape. The vagina is a thin tube, starting from the genital pore and forms receptaculum seminis, Ootype oval and small. Uterus Sac like having eggs. Eggs oval and non-operculate. Uterine pore oval and reported from freshwater *Channa marulius* (F.Hamilton, 1822) at Wari (Hanuman) Tehsil Telhara Dist Akola (M.S.) India.

On the basis of differentiating morphological character of the status of a new species and named *Polyonchobothrium hammerata* Sp.nov.after hammer shaped scolex.

Taxonomic Summary

Genus   : *Polyoncobothrium*Diesing, 1854.

Species   **: *Polyonchobothrium hammerata* Sp.nov.**

Type host   : *Channa marulius* (F.Hamilton, 1822)

Habitat (Site)   **:** Intestine.

Type locality   **:** Wari (Hanuman) Tehsil Telhara Dist Akola (M.S.) India

Prevalence   : 29 mature tapeworms collected from 25 infected hosts out of 65 examined.

Period of collection: January, 2013 to December, 2014.

No. of Specimen   : 29.

Accession number: PGDZ/RACW/1-05/ January, 2013 to December, 2014.

Deposition   : Research and PG Department of Zoology, R.A.College Washim (M.S.) India.

Etymology   : The present species is named on account of having hammer shaped scolex.

References:

1. **Nama, H. S (1979):** On new Cestodes *Polyoncobothrium indicum* n.sp from the fish *Channa (Ophiocephalas) punctatus* in Rajasthan. *Rajasthan Bioresearch,* (3): 5-6.
2. **Gairola, D and S. K. Malhotra (1987):** Cestodes fauna of food fishes in river Gangas around in India sub-humid region IV *Polyonchobothrium allahabadensis* n.sp. from *Mystus vittatus* at Allahabad. *Jap. J. Parasitol,* 36: 49-52.

3. **Maulik, K (1993):** *Bioecological analysis of some Helminthes in two different ecosystems. Unpubl. D.Phil. Thesis, Awarded, Univ. Allahabad,* 353.

4. **Geetanjali, S. N Yadav and S. K. Malhotra (2003):** Taxometric Assessment of Organisms in Ichthyoparasitology of Indian Sub-Humid Region I-Cestodes. *Polyonchobothrium humidii* n.sp. *Proceeding of Parasitology*, 36: 13-17.

5. **Pande, P. N., S .R. Dubey and N. Mittal (2006):** On two new species of the genus *Polyonchobothrium* Diesing, 1854 from freshwater fishes. *India J. Hel. (N.S.),* 24:1-5.

6. **Deshmukh, V. S (2014):** Bio-systematic Studies on Pseudophyllidean Cestodes Genus *Polyoncobothrium,* Diesing, 1854 (Cestoda: Ptychobothriidae, Luhe, 1902) From Freshwater Fish *Mastacembelus Armatus* (Lacepède, 1800) With Description of a New Species. *Biolife (A Quarterly Jounal of Life Sciences),* 2 (4):1229-1233.

7. **Kumar, S., N. Jaiswal., A. Malhotra., K. Sandeep and V. N. Capoor (2007):** Taxometric Assessment of Organisms in Ichthyo parasitology of an Indian Sub-Humid Region III-Cestodes. *Polyonchobothrium yamunica* n.sp. from *Mastacembelus armatus* at Allahabad (U.P.). *National Journal of Life Sciences,* 4(3): 19-22.

Synthesis and Thermokinetic studies of Co(II), Ni(II) and Cu(II) with tetradentate Schiff Base

S. R. Kelode[1] , P. R. Jagnit[2]

[1]Department of Chemistry, Arts, Commerce and Science College, Maregaon-445303.(M.S.).India.
[2]Department of Chemistry, Indira Gandhi Kala Mahavidyalaya Ralegaon-445402.(M.S.).India.

Abstract:

The newly tetradentate Schiff base have been synthesized by condensing 2-hydroxy-5-bromo acetophenone with ethylene diamine. The metal complexes were obtained as a result of interaction of Schiff base ligand and metal ions Co (II), Ni (II) and Cu (II). The complexes have been characterized on the basis of elemental analysis, infrared, molar conductance, magnetic Susceptibilities, electronic spectra and theromogravimetric analysis. Thermodynamic activation parameters were computed from the thermal data using Broido, Horowitz-Metzger and Freeman-Carroll method, which confirm first order kinetics and kinetic compensation effect.

Keywords: Tetradentate Schiff base, Molar conductance, Thermal.

Introduction:

The Schiff bases play a significant role in the area of coordination chemistry. The thermogravimetric technique has been great significance research method on thermal stabilsation and thermal decomposition. Thermogravimetric could provide theory for material heating treatment and application.[1,] Synthesis, characterization and antifungal activity of manganese (II) complex with Schiff Base derived from acetylacetone andl leucine[2] The newly synthesized Schiff bases, 2-acetylthiophene thiosemicarbazone and thiophene-2-aldehyde thiosemicarbazone and their metal complexes with Co(II), Cu(II), Zn(II) and Ni(II) complexes and Their Schiff bases metal complexes were tested for antibacterial activity[3] and Spectral and thermal characterization of metal complexes containing schiff Base ligands.[4] Compounds containing an azomethine group (CH=N), known as Schiff bases, were formed by the condensation of a primary amine with a carbonyl compound. Schiff bases of aliphatic aldehydes were relatively unstable and were readily polymerizable. Schiff bases and their complexes are shows good progress in thermal analysis[5]. Photoluminescent and electroluminescent properties.[6] The Schiff base prepared by using variety of aldehydes and amines possessed antitubercular, antitumer, anticancer, fungicidal medicinal and agrochemical activities[7,8] Thermogravimetric in an easy, quick, precies measure method. The mathematical calculating thermogravimetric data, thermal decomposition activation parameters can be obtained.[9,10] Schiff bases and their complexes have a variety of applications in biological clinical and analytical fields.[11] Recently there has been a considerable interest in the chemistry of hydrazine and hydrazone compounds because of their potential pharmacological applications.[12]

This paper discusses the kinetic of the thermal decomposition and the accompanying compensation effect for Schiff base complexes of Co (II), Ni (II) and Cu (II)

Experimental: All the chemicals were of A.R. grade and used as received ethylene diamine and 2-hydroxy-5-bromo acetophenone (HBA) was prepared by known methods.[13] The solvents were purified by standard methods.[14]

Synthesis of 2-Hydroxy-5-bromoacetophenone-N,N'-ethylenediimine (HBAE).

A hot ethanolic solution of ethylene diamine (0.05 mol) was added to an ethanolic solution of respective acetophenone (0.05 mol). The reaction mixture was refluxed in a water-bath for 4-5 h. The colour product was filtered off and recrystallised. Yield 70%. M. P. 270[0]C
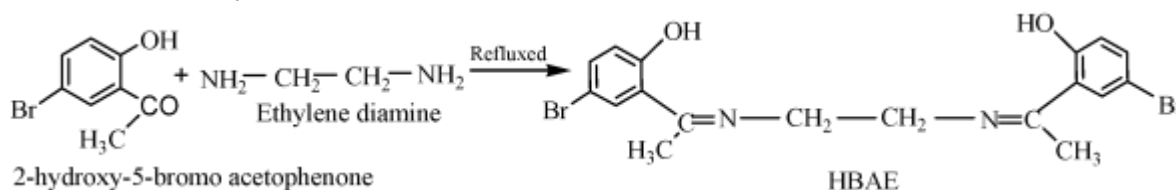
Preparation of complexes:

All the metal complexes were prepared in a similar way by following method. To a hot solution of ligand HBAT (0.02M) in 25ml of ethanol a suspension of respective metal salts was added drop wise with constant stirring. The reaction mixture was refluxed on a water bath for 4-6 h. The precipitated complexes were filtered, washed with ethanol followed by ether and dried over fused calcium chloride. Yield : 45-50% .

Table 1. Analytical data and molar conductance of the compounds.

Compounds	Colour	Mol.wt.	Analysis % Found (calc.)				μ_{eff} B.M.	Λ_M (Ω^{-1} cm^2 mol^{-1})
			M	C	H	N		
$C_{18}H_{18}N_2O_2Br_2$	Yellow	453.8	--	47.83 (47.59)	3.85 (3.96)	6.07 (6.17)	--	--
[COL(H_2O)_2] H_2O	Brown	564.7	10.32 (10.43)	38.12 (38.25)	3.72 (3.89)	4.80 (4.95)	4.27	6.1
[NiL] H_2O	Black	528.5	11.02 (11.10)	40.72 (40.87)	3.25 (3.40)	5.17 (5.29)	Dia	5.6
[CuL(H_2O)_2] 2H_2O	Brown	587.3	10.61 (10.81)	36.61 (36.77)	3.95 (4.08)	4.62 (4.76)	2.02	18.8

The complexes are soluble in DMSO and DMF but insoluble in water and common organic solvents. The metal chloride content of complexes were analyzed by standard methods[11].

The ^{1}H NMR spectra of ligand was recorded and obtained from RSIC Chandigarh. IR spectra of the compounds were recorded on Perkin Elmer 842 spectrophotometer in the region 400-4000cm^{-1}, carbon, hydrogen and nitrogen analysis were carried out at RSIC, Punjab University, Chandigarh. The molar conductance of the complexes at 10^{-3} M dilution in DMF were determined using equiptronic digital conductivity meter EQ-660 with a cell constant 1.00 cm^{-1} at room temperature. The magnetic moment measurement were made on a Gouy balance at room temperature using [HgCo(SCN)$_4$] as the calibrant. The thermogravimetric analysis were performed on laboratory set up apparatus in air atmosphere at 10^0 C min^{-1} heating rate. The molecular weights of the complexes were determined by Rast method.

Result and Discussion:

The Schiff base ligand HBAE and its complexes have been characterized on the basis of ^{1}H NMR, IR spectral data, elemental analysis, molar conductance, magnetic succeptibility measurements and thermogravimetric analysis data. All these values and analytical data is consistent with proposed molecular formula of ligand . All the compounds are coloured solid and stable in air. They are insoluble in water but soluble in coordinating solvents like DMF and DMSO. The molar conductance values in DMF(10^{-3} M) solution at room temperature (Table 1) shows all the complexes are non electrolytes[11] The ^{1}H NMR spectra of ligand HBAE shows signals at: ☐ 15.97 (1H, s, phenolic OH); 8.06(1H, s, phenyl); 7.67 and 7.31 (2H, m, phenyl), 3.29(4H, s, CH$_2$☐ CH$_2$); 2.51 ppm (3H, s, methyl)[15-24]

Table 2. IR spectra of ligand and metal complexes.

Compound	☐ (O☐ H) hydrogen bonded	☐ (C=N) imine	☐ (C☐ O) phenolic	☐ (M☐ O)	☐ (M☐ N)	☐☐☐
$C_{18}H_{18}N_2O_2Br_2$	2900	1614	1480	--	--	----------
[COL(H_2O)_2] H_2O	--	1589	1440	520	455	3400, 1640, 815, 770
[NiL] H_2O	--	1586	1460	510	495	3326, 1630
[CuL(H_2O)_2] 2H_2O	--	1595	1440	590	490	3406, 1642, 818, 780

Thermogravimetric studies:

The nature of thermograms of HBAE and its metal complexes indicates that the complexes of Co(II), Ni(II), Cu(II), decompose in three stage All the complexes are stable upto 70°C. Elimination of one water molecule from Co(II) and Ni(II)) upto 130°C and two water molecules from the Cu(II) complexes upto 150°C have been observed (%wt loss obs./calcd. : Co(II) : 3.26/3.18; Ni(II) : 3.52/3.40; Cu(II) : 6.26/6.12; Further loss in weight upto 220-240°C indicating presence of two coordinated water molecule in CO(II) and Cu(II) each. The half decomposition temperature and the basic parameters calculated for the compounds are given in (Table 3). Thermal activation energy was calculated by Freeman-Carroll,[25] Horowitz-metzger[26] and Broido[27] method. On the basis of half decomposition temperature, the relative thermal stability order is found to be The relative thermal stability on the basis of half decomposition temperature is found to be Cu(II)> Co(II)>Ni(II)> HBAE.

Table 3. Thermal decomposition data of HBAE and its complexes.

Compound	Half Decomposition Temperature (°C)	Activation Energy (kJ mole^{-1})			Frequency Factor Z (sec^{-1})	Entropy Change -ΔS (J mol^{-1} K^{-1})	Free Energy Change ΔF (kJ mol^{-1})
		B*	H-M**	F-C***			
$C_{18}H_{18}N_2O_2Br_2$	260.51	3.27	5.45	4.36	87.25	212.55	117.75
[COL (H$_2$O)$_2$] H$_2$O	395.17	3.41	8.54	8.54	170.89	208.83	148.07
[NiL] H$_2$O	265.33	2.77	5.55	4.99	98.63	211.61	118.94
[CuL (H$_2$O)$_2$] 2H$_2$O	591.16	11.41	14.27	11.41	228.33	206.62	189.78

* Broido, ** Horowitz-Metzger and *** Freeman-Carroll

Conclusion:

The thermal decomposition of the complexes is not simple and involves different stage decomposition. It is assumed that dehydration of the complexes containing water occurs within an active reaction interface. The compensation effect of thermal decomposition of the complexes indicating the change of sample mass on the estimated values of activation energy .

References:

1. R. Sharma, N.K. Kaushik, J. Therm. Anal. Cal., 2004, 78, 953
2. Aishatu S. M., Fatima A. and Abigail E. A., *American J. Nano Res. and Appli., 2017; 5(6), 110.*
3. Chandra Mohan, Vinod Kumar, Sarla Kumari, *Int. Res. J. Pharm. 2018, 9 (7),153*
4. S.A. Dalia, F. Afsan, Md. Hossain, Md. Mannan, M. M. Haque and Md. Kudrat-E-Zahan., Asian J. of Chem. Sci., 2018, 4(4), 1.
5. W.A.Zoubia, A.A. Salih, Al-Hamdanib, and Y.G Koa, Sepra. Sci.& tech. 2017,52(6),1052.
6. M.E. Emam, I.M. Kenawy, M.A.H. Hafez, Thermochim. Acta, 1995, 249, 169.
7. Dincer Sebla, Indian J. Chem., 1996, 33B, 1335.
8. P.R. Panditrao, S.D Deval, S.M.Gupta, S.D. Samant and L.D. Deodhar Indian J.Chem., 1981 20B, 929.
9. D.N. Kumar, B.S. Gare, J. Thema. Anal. Cal., 2004, 69, 607.
10. B.K. Singh, P. Mishra, B.S. Garg, Spectrochin. Acta, 2007, 67, 719.
11. R.N, Muthuraj, V. Ravichandran S. Kulandaisamy *Journal of Chemical Sciences.* 2003, 115(3), 161.
12. Z.H. Chohan, S.K.A. Sherazi, *Metal-Based Drugs*., 1997, 4(6), 327.
13. A.S. Aswar, P. Bahad., A. Pardhi, N.Bhave., J. Poym. Mater., 1988, 5, 232.
14. Furniss B., Hannaford A., Smith P. and Tatchell A., Vogel's practical organic chemistry 5thEd. (Logman Scientific Technical, John Wiley and Sons), 1989.
15. J.D. Joshi, N.P. Patel, S.D. Patel, J. Indian Poly., 2006, 15(3), 219.
16. N.Raman, Y.P. Raja, A. Kulandaisamy, J. Indian Acad. Sci., 2001, 113(3), 183.
17. B. Naik, K.R. Desai, Indian J. Chem., 2006, 45B, 267.
18. E.J. Campbell, S.T. Nquyen, J. Tetrahedron, 2001, 42, 1221.
19. P. Pietikainen, A. Haikarainen, J. Mole. Catalysis, 2002,180, 59.
20. M. Gottschaldt, R.Wegner, H. Gorls, P. Klufers, E.G. Jager, D. Klemm, J. Carbohydrate, 2004, 339, 1941.
21. T. Matsushita, T. Shono, J. Polyhedron, 1986, 5(3), 735.
22. S.K.Gupta, P.B. Nutchcock, Y.S. Kushwah, G.S. Argal, J. Inorg. Chimica Acta, 2007, 360, 2145.
23. L.H. Cai, P.Z. Hu, X.L. Du, L.X. Zhang, Y. Liu, Indian J. Chem., 2007, 46B, 523.
24. M. Kidwai, P.R. Poddar, K. Singhal, Indian J. Chem., 2009, 48B, 886.
25. K.Mallikarjun, E. J. Chem., 2004, 1(2), 105.
26. H.Horowitz and G.Metzger, Anal. Chem., 1963, 35, 1464.
27. A.Broido, J. Polym. Sci. Part A2, 1964, 1761.

National Conference on Multidisciplinary Research in Science and Technology for Healthy Lifestyle Management (NCMRST- 2020) Organizer :- Shri R.L.T. College of Science, Akola

24th Jan. 2020

Effect On Germination Pattern Of Jowar (*Sorghum Vulgare*) Of Some Sulphur And Nitrogen Containing Heterocyclic Compounds

S.W. Suradkar, S. A. Waghmare

Ghulam Nabi Azad Arts, Comm. & Science College,
Barshitakli Dist. Akola, (MS) 444401.

Abstract:

Present research work states the effect some sulphur and nitrogen containing heterocyclic compounds on germination pattern of jowar. Nitrogen containing heterocycliccompounds used (2E)-1-{4-[3-(2-chlorophenyl)thiocarbamido]phenyl}-3-(3,4-dimethoxy phenyl)prop-2-en-1-one (III), (2E)-1-{4-[5-(2-methylprop-2-yl)-2,4-dithiobiureto]phenyl}-3-(3,4-di methoxyphenyl)prop-2-en-1-one (V), (2E)-1-{4-[3-(2-methylprop-2-imino)-3H-1,2,4-dithiazol-5-yl]amino phenyl}-3-(3,4-dimethoxyphenyl) prop-2-en-1-one (VI), (2E)-1-{4-[2-(2-methylprop-2-yl)imino-4-(2-methylprop-2-yl)imino-1,3,5-dithi azino-6-yl]aminophenyl}-3-(3,4-dimethoxyphenyl)prop-2-en-1-one (VIII), (2E)-1-{4-[2,4-dithio-3-(2-methylprop-2-yl)-5-(2-methylprop-2-yl)-1,3,5-triazino-6-yl]ami nophenyl}-3-(3,4-dimethoxyphenyl)prop-2-en-1-one (IX), etc.

Keywords: germination pattern Jowar, thiocarbamido, -2,4-dithiobiureto, 1,2,4-dithiazolo, 1,2,4-dithiazolo, 1,3,5-dithiazino, 1,3,5-triazino-compounds .

Introduction:

Agriculture is main pillar of Indian economy; it's a science and technology. It is the art and practice of filling the earth to produce food for humans and to nurture animals. Farming is the oversimplification of natures food ensnare and the rechanneling of energy for human planting and animal consumption. It involves cyclic pathway of natures natural flow of the food web. From the origin and development of human race, human beings are dependence on plant for the essentials of his existence.

Vitamins and minerals plays important role in human nutrition. The main source vitamins and minerals are grains, fruits and vegetables. The civilization of any country can be decided on its crop farming. Before farming, human beings are totally dependent on hunting of animals and birds as well as gathering of fruits and berries. The history of farming records the domestication of plants and animals and the development and dissemination of techniques for raising them productively for the security of food.

Today the India is almost self-sufficient for the production of food grains, vegetables and fruits. Our greatest achievement is self-sufficient in cereal, food and vegetables. To meet the need of increased population, researchers are continuously working for improvement of quality as well as yield of agricultural products.

Historical Development:

Agriculture began independently in different parts of the world, and included a diverse range of species. Indian agriculture began by 9000 BCE on north-west India as a result of early cultivation of plants, and domestication of crops and animals. and it was developed, although even earlier people began altering crop or plant and animals communities for their own benefit through fire- stick farming. Several intellectuals proposed number of theories for explaining the historical development of farming. Early forms of farming are called protofarming.

To meet the need of increased population human started different ways to take more yield from small agricultural land. One of them is heavy use of synthetic fertilizers, insecticides and pesticides, selective breeding. In the recent era for vegetables and fruits farming new techniques are invented for human consumptions

History of plant pathology[1-8] is as old as the history of human civilization. In 1996 Randhawa explores the term vegetable which includes all types of foods which have vegetable origin. But the definition now excludes cereals and dried seeds of pulses; however, it includes grain on the cob, potatoes, sweet potatoes and several other tubers. Horticulture is one of the important major branch which includes vegetable production.

Hymexazole was found to accelerate root and shoot growth of many kinds of plants at seeding stages besides controlling soil borne disease, biological activities[9] were also observed.

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293
(Special Issue No.70) Peer Reviewed Journal www.aiirjournal.com Mob. 8999250451

67

Orton (1900) and Biffen (1905) are the pioneers in the field of genetics. In the beginning of 21st century, scientist started research on plant disease resistance. They worked on control of rusts and wilt diseases of cotton, watermelon, cowpea etc. and developed resistance verities in crops. First antifungal activity of phorate against Rhizoctonia Solani in cotton was reported in 1958 by Erwin and Reyonolds[10].

Withenbank[11] studied antimicrobial activities and herbicidal properties of imazoquin (a) and imazethapyr (b) it also showed pre and post emergence to control grasses and dicot weeds in soyabeans and other leguminous crop.

(a)   (b)
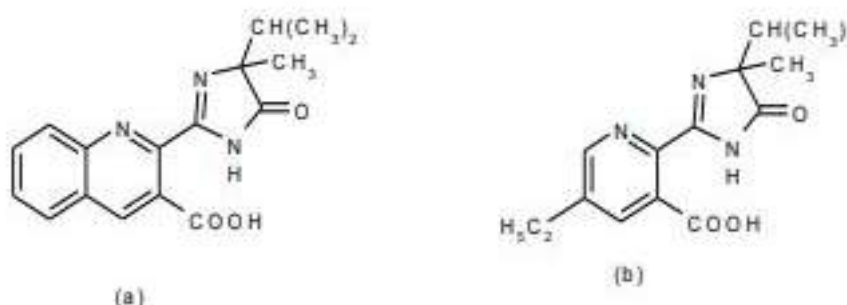
In last three decades, we are dependent on the technological developments through new and disquieting problems.
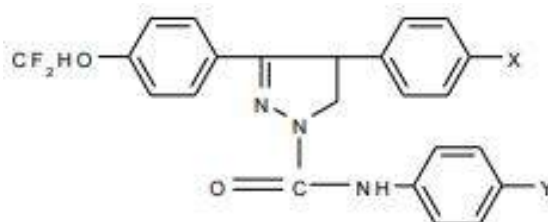
Ozawa et al 12 reported insecticidal property of 1N-phenyl carbomoyl-3-(4-difluromethoxyphenyl) -4-phenyl-2- pyrazoline and its derivatives.

In the last 15 years it has become more and more evident that the use of pesticides is at best a mixed blessing. Slowly the information has accumulated on the effects of the widespread use of other compounds. Today we know that organochloride e.g. DDT such substances spread throughout our biosphere regardless of the site of applications. Some instances developed resistance to the effect of the poisons some of them got metabolic dependence on it.

Origin of the Work:

Since 1991, changing consumption patterns led to a 'revolution' in 'high value' agriculture while the need for cereals and pulses is experienced a decline. Domestication of plant and animals was necessary for the evolution of agriculture and population increase of humans being during the Holocene, which facilitated the evaluation of technically innovative societies[13]. Recently scientists across the globe are emphasizing on an interdisciplinary approach to control plant disease to enhance vegetative growth and to increase the yield. In the field of agricultural sciences the production of containerized vegetable and crops has been reported by Vavrina[14]. Jakabi *et al*[15] synthesized and studied the herbicidal and plant growth regulators activities of substituted 1-(3-pyridinyl)pyrazol-4-glacetic acids. Bhagwatkar *et al*[16] and Raghuwanshi *et al*[17] studied of triazino and their derivatives on the growth promoting effects on crop Plants.

Research on fungi and plant diseases based on long term planning was started in the year 1934 at Imperial Agricultural Research Institute which is situated at Delhi. This institution became mile stone in the field of plant growth and diseases management research. Literature survey reveals that many heterocycles of each class showed medicinal, pharmaceutical, agricultural, industrial, biochemical and biotechnological applications. By making the use of cyanoguanadine as an intermediate these compounds can be prepared Imines, thiocarbamides, 1,3,5-thiadiazines, 1,3,5-triazines and 1,2,4-thiadiazles are an important organic compounds due to its significant, versatile and biological and pharmacological activities various applications and significances in medicinal, pharmaceutical, drug and industrial sciences. In the last four decades the

importance of these molecules had been increased due to its most resourceful properties.

Jowar:

Jowar Botanically known as *Sorghum vulgare* belongs to family Poaceae. Jowar is the third important food crop of the country after rice and wheat both in terms of area and production. Among the different kinds of cereal crops in India, jowar occupies a major prominence. Besides being a staple diet for the poorer section of the society, it is also used for animal feed and industrial raw materials. Near about 50% of sorghum is grown directly for human consumption and the rest is used primarily as fodder, alcohol production and industrial products[18] Different parts of the country have the potential to have this important cereal crop grown, which is also a major product of agriculture in many other countries. Since it can grow in semi arid climates, where other crops do not have a chance of growing, this crop has been grown in these areas. Requiring semi arid climatic conditions, the jowar crop has proved to be a good agricultural practice in the country. In comparison to other cereal food items, jowar has a significant value. Now-a-days the demand for sorghum is increases in developing countries. This is due to not only the increasing population but also to policy to enhance its processing and industrial utilization[19] is continuously done by researcher. More than 7000 sorghum varieties have been identified[20].

Sorghum contains noticeable amount of vitamin, notably the vitamin B (thiamine, riboflavin, pyridoxine etc.) and the lip soluble vitamin A, D, E and K. It is also rich in potassium, phosporous, iron and zinc[21]. Various sorghum species are used for food as grain and in sweet sorghum syrup is called molasses more properly to different sweet syrup model as a byproduct of sugar cane of sugar beet production. Seed analyst may accept morphological change such as protrusion of radical but to grower germination means seedling emergence. Technically germination is the resumption of active growth that results in rupture of seed coat and emergency of seedlings[22]. A seed is an embryo of plant and contain within itself nearly all the materials and energy to start of new plant. To get the most form one"s seed at is needful to understand a little about their needs. So, right conditions can be given for successful growth. When a viable seed is wetted, water is taken out, respiration, protein synthesis and other metabolic process and after certain period of time, the embryo emerges from the seed, generally the radical first, the seed has germinated. Germination involves ambition, rapid oxygen uptake and hydrolysis of stored reserves and synthesis of new tissues.

The first process of seed germination requires aspiration of water with cardinal temperatures. The seed germination by Reed and Faris[23-24], Marcy[25-26] germinated sorghum seed in approximately neutral sand at 180-230C and to moisture contains of [27].

Different processing methods have been employed; germination was superior to other processing methods in improving the nutritional and functional qualities of sorghum to improve the nutritive value of cereal grains, tannin extraction[27] and malting. Malting[28-29] increased the protein, lysine and reduced tannin contains of sorghum. Idris[30] reported that malting of low-tannin Sorghum reduced tannin content of seeds. Falfiolu[31] noticed that average weight of growing hens increased with increasing levels of malted sorghum sprout. In the arid and semi arid region of India where scarify of water is a major problem. Researcher reported faster emergence, more vigorous plants, drought tolerance, earlier flowering and high grain yield in primed seed of various crop species seed riming[32].

Germination induces the synthesis of hydrolytic enzymes, it is important to note that it increases the content of nitro nitrilosides of the grain[33] e.g. starch degrading enzymes and proteases[34]. The breakdown of protease resistant proclaims and the increased availability of the minerals and essential amino acids upon germination have been reported[35-36]. germination of sorghum is important for the preparation of weaning foods with low paste viscosity and high energy density[37].

Dalve[38] had proposed germinating systems as a mode system for assessing the toxicological potentials of pesticides. Choudhri[39]studied the effect of pesticides on germination and early seedling growth of Rye. Stom[40] studied the effect of polyphenols on shoot and root growth hand on seed germination. Borthwick[41], Rollin[42] study the germination of light sensitive seeds. Fratianne[43] study the effect of fumes on germination pattern. The treatment of the seeds with pesticides significantly reduced seed germination, seedling height and root lengths[44]. In the present investigation, an attempt has been made to study the effect of thiocarbamide, dithiazole, thiadiazole and triazine on germination pattern of *sorghum vulgare.*

It was found by many workers that nitrogen and sulpher containing heterocyles have broad spectrum of growth promoting hormonal effect so the present study was undertaken to investigate the effect of these chemicals on germination patter on Jowar(*Sorghum Vulgare*)

Scientist across the globe are emphasizing on an interdisciplinary approach to control the plant diseases to enhance vegetative growth and to increase the yield of crops of various types. In the agricultural sciences there is a continuous evolution occurs due to change in the climatic conditions and evolutionary phenomenon of pathogens.

Considering all these facts it was thought interesting to synthesize nitrogen and sulphur containing heterocyclic compounds viz. imines, thiadiazines, triazines, thiadiazoles etc. and were used for seed treatment and to test their growth promoting hormonal effect on Jowar. In this investigation, following six synthesized compounds are used.

1	(*2E*)-1-{4-[3-(2-chlorophenyl)thiocarbamido]phenyl}-3-(3,4-dimethoxy phenyl)prop-2-en-1-one (III),
2	(*2E*)-1-{4-[5-(2-methylprop-2-yl)-2,4-dithiobiureto]phenyl}-3-(3,4-dimethoxyphenyl)prop-2-en-1-one (V),
3	(2*E*)-1-{4-[3-(2-methylprop-2-imino)-3*H*-1,2,4-dithiazol-5-yl]amino phenyl}-3-(3,4-dimethoxyphenyl) prop-2-en-1-one (VI),
4	(*2E*)-1-{4-[2-(2-methylprop-2-yl)imino-4-(2-methylprop-2-yl)imino-1,3, 5-dithi azino-6-yl]aminophenyl}-3-(3,4-dimethoxyphenyl)prop-2-en-1-one (VIII),
5	(*2E*)-1-{4-[2,4-dithio-3-(2-methylprop-2-yl)-5-(2-methylprop-2-yl)-1,3,5-triazino-6-yl]ami nophenyl}-3-(3,4-dimethoxyphenyl)prop-2-en-1-one (IX),
6	(2E)-1-[4-(2,4-dithio-3-phenyl-5-phenyl-1,3,5-triazino-6-yl)amino phenyl]-3-(3,4-dimethoxyphenyl)prop-2-en-1-one

Jowar seeds were strilised and washed thoroughly with water and 25 seeds were soaked for 6 hours in different test solutions as well as in water as a control. Traces of chemicals were removed by washing by water, and kept for germination in moisture petri dishes in dark at   22 ℃. moisture was maintained by periodically addition of water. Germination was recorded after each 24 hours up to 5 days. Seeds produced plumules and radicles were recorded as germinated.SIG were calculated according to method[45]. Morphological characters like shoot and root length 61 were recorded on 5th day to calculate percentage fo germination and vigour index.

Formulae used:

1) Speed of germination index= SGI = 4(5g + 4g + 3g + 2g + g)

Where, g = number of germinated seeds after each 24 hour period

2) Vigour Index = % germination [(root length + shoot length)mm]

Effect of synthesized compounds on Germination of Jowar

Table No.1 Day 1st

System	Root length (cm)	Shoot length (cm)	Root / Shoot ratio	Seedling height	% Germination	Vigor Index
Control	1.0	1.7	0.59	2.3	68	183.6
1) C1	0.8	0.9	0.89	2.1	64	108.8
2) C2	0.9	1.2	0.75	2.1	67	140.7
3) C3	0.8	1.3	0.62	2.1	59	123.9
4) C4	1.0	1.6	0.63	2.0	72	187.2
5) C5	1.1	1.8	0.61	2.2	82	237.8
6) C6	1.2	2.0	0.60	2.3	76	243.2

Table No. 2 Day 2nd

System	Root length (cm)	Shoot length (cm)	Root / Shoot ratio	Seedling height	% Germination	Vigor Index
Control	1.5	2.0	0.75	2.7	**70**	245
1) C1	1.3	1.3	1.00	2.5	65	169

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293 (Special Issue No.70) Peer Reviewed Journal   www.aiirjournal.com Mob. 8999250451

70

2)	C2	1.4	1.5	0.93	2.4	68	197.2
3)	C3	1.6	1.5	1.07	2.7	60	186
4)	C4	1.4	1.9	0.74	2.5	73	240.9
5)	C5	1.8	2.0	0.90	3.1	82	311.6
6)	C6	1.7	2.2	0.77	3	79	308.1

Table No. 3 Day 3rd

System	Root length (cm)	Shoot length (cm)	Root / Shoot ratio	Seedling height	% Germination	Vigor Index
Control	1.7	2.4	0.71	3.1	**71**	291.1
1) C1	1.5	1.8	0.83	2.5	58	191.4
2) C2	1.6	1.8	0.89	2.9	68	231.2
3) C3	1.8	2.0	0.90	3.1	62	235.6
4) C4	2.0	2.2	0.91	3.4	74	310.8
5) C5	1.9	2.2	0.86	3.1	82	336.2
6) C6	1.9	2.1	0.90	3.2	79	316

Table No. 4 Day 4th

System	Root length (cm)	Shoot length (cm)	Root / Shoot ratio	Seedling height	% Germination	Vigor Index
Control	2.2	2.7	0.81	3.4	**72**	352.8
1) C1	2.0	2.5	0.80	3.3	60	270
2) C2	2.1	2.6	0.81	3.2	69	324.3
3) C3	2.5	2.8	0.89	3.8	63	333.9
4) C4	2.6	2.9	0.90	3.9	74	407
5) C5	2.5	2.9	0.86	3.6	82	442.8
6) C6	2.7	2.9	0.93	4	79	442.4

Table No. 5 Day 5th

System	Root length (cm)	Shoot length (cm)	Root / Shoot ratio	Seedling height	% Germination	Vigor Index
Control	3.0	3.1	0.97	4.3	**72**	439.2
1) C1	3.2	3.0	1.07	4.6	61	378.2
2) C2	2.8	2.9	0.97	4.1	70	399
3) C3	2.9	3.2	0.91	4.0	63	384.3
4) C4	3.2	3.6	0.89	4.5	74	503.2
5) C5	3.6	3.7	0.97	4.9	82	598.6
6) C6	3.2	3.2	1.00	4.5	79	505.6

Table No 6: Germination index of Jowar.

System	Germination percentage	Germination Index
Control	71	381
C1	62	305
C2	68	341
C3	61	250
C4	73	389
C5	82	390
C6	78	315

Result and Discussion:

Jowar is rated among top fie healthy grains in the world due to gluten free property and innumerable health benefits that it provides. Earlier it was used as fodder but now people incorporated it in food due to its huge benefits like Improve digestion, fights against free radicals, boosts immunity and improve heart health. The medicinal practitioner gives reason for this, due to change in the life style of the human beings. The people are not aware about their diet and meal. Hence, the medicinal practitioners advised the patients who suffer from this type of diseases take roti of Jowar. Hence, it becomes prior duty of chemist and agriculturist to investigate such species of jowar which have productive value and resist to pathogens.

It is prior duty of chemist to synthesize such type of drugs, insecticides and pesticides which are useful to destroy pathogens and insects which are dangerous to crops. Hence the above work was carried out.

The initial process of plant developments are germination, cell division and seedling growth. In germination seed dormancy could be derived from either tissues enclosing embryo or from the embryo itself.

National Conference on Multidisciplinary Research in Science and Technology for Healthy Lifestyle Management (NCMRST- 2020) Organizer :- Shri R.L.T. College of Science, Akola

24th Jan. 2020

The inhibitory effect of synthetic compound on seed germination is related to the regulation of the endogenous auxin, oxygen supply and seed coat permeability[38].

There is only one synthetic compound having different molar concentrations showed good root/shoot ratio than control systems. The root length and simultaneously shoot length reduced and increased. Hence, it may affect production of substrate for respiration and consequently limited energy production but the resistivity[39-40] of crop increases. As we are interested in synthetic part, but as a wider programme of this laboratory to investigate significances and applications of synthesized compounds for human beings. This attempt was carried out. This study open new doors for the chemist in agricultural field.

References:

1. Mehta P.R., Plant pathology in India- Past, Present and Prospects, Indian Phytopath, 16, 1963, 1-7.
2. Raychaudhari S.P., History of Plant Pathology in India, Annu. Rev. Phatophol, 10, 1963, 21- 36.
3. Raychaudhari S.P., Development of mycological and plant pathological researchers, education and extension work in India, Rev. Appl., Mycol.,46, 1963, 577-583.
4. Grover R.K., Plant pathology research in India-An introspection and prospects, pesticides Annual, 1975.
5. Wareing P.F., Phillips L.D.I., "The Control of Growth and Differentiation in Plants", Second Edition, New York, Pergaman, 1978.
6. Singha R.S., Plant Diseases, Fifth Edition, Oxford and IBH Publishing Co., New Delhi, 1983.
7. Singha R.S., Plant Diseases, Seventh Edition, Oxford and IBH Publishing Co., New Delhi, 1983.
8. Frankine P., Gardner R., Roger B.P.L., Mitchell, "Physiology of Crop Plants", First Edition,1885.
9. Takahi Y., Tamita K., Hymexazol a new plant protecting agent, Ann. Sankya Res. Lab., 25, 1973, 1-51.
10. Yesugi Y., Development of Organophophorous Fungicides, Japan Pestic. Inf., 2, 1971, 11.
11. Withenbank C.S., Fifth International Congress Pestic Chem. Tokyo, Abs.II, C-7, 1982.
12. Kiyomi O., Yasuyuki N., Makota T., Shigeru I., Masataka H., Masayoshi H., Masaki K., US., 4, 1985, 540,706.
13. Gupta A.K., Amelioration Current Science, 87(1), 2011, 54-59.
14. Vavrina C.S., Cultural Practice for Vegetables Adopted from Lorenz and Maynard, 1988.
15. Jakobi H., Ort O., Hills M., Kehne H., Rosinger C., Feucht D., Patent Application Publication(U.S)US, 2009/0036310A1.
16. Bhagwatkar A.K., Tayade D.T., Orbital Brazi. Elec. J. Chem., 3(1), 2011, X-2-4.
17. Raghuwanshi M.R., Tayade D.T., Bhagwatkar A.K., Aswale S.R., Canadian Int. J. chemistry, 3(2), 2011, 74-78.
18. Awika J.M., Rooney L.W., Phytochemistry, 65, 2004, 1199-1221.
19. Akintayo I., Sedgo J., J. Eds., WASRN/CRISAT, 1999,162.
20. Kangama C.O., Rumei X., Afr. J. Biotech, 4, 2005, 575-579.
21. Anglani C., Plant foods Hum. Nutr., 52, 1998, 85-89.
22. Vohl G.J., Pflanzeribau, 14, 1938, 465-480.
23. Reed, Faris J.A., A.M.J. Bat., 11, 1924, 518-534.
24. Reed, Faris J.A., American Journal Bot., 11, 1924, 579-599.
25. Marcy D.E., Bull Torrey Bot. Club, 64, 1937, 209-228.
26. Marcy D.E., Bull Torrey Bot. Club, 64, 1937, 245-267.
27. Musharaf N.A., Latshaw J.D., Sudan J. Anim. Prod., 4, 1991, 53-64.
28. Shaya N.B., Laswai S.H., Tiisekwa B.P.M., Nnko S.A.M., Gidamis A.B., Njoki P., Inter., J. Food Sci.Nutri., 52, 2001, 117-126.
29. Okoh P.N., Kubiczek R.P., Njoku P.C., Lyeghe G.T., J. Sci. Food Agri., 49, 1989, 271-279.
30. Idrix W.A., Hassan A.B., Babikar E.E., Eltinay A.H., Arch. Zootech., 55, 2006, 361-371.
31. Falfiolu A.O., Oduguwa O.O., Ikeobi C.O.N., Onwuka C.F.I., Arch. Zootech., 55, 2006, 361-371.
32. Rashid A., Harris D., Hollington P.A., Rafiq M., Centre for Arid Zone Studies, Univ. of Wales, UK., 40, 2004, 233-244.
33. Dicko M.H., Gruppen H., Traore A.S., Voragen A.G.J., Van Berkel W.J.H., African J. of Biotechnology, 5(5), 2006, 384-395.
34. Traore T., Mouquet C., Icard-verniere C., Toroxe A.S., Trech, J. Food Chem., 88, 2004, 105-114.
35. Mazhar H., Chandrashekar A., Moench Central Chem., 70, 1993, 667-671.
36. Anglani C., Plant food, Hum. Nutr., 52, 1998, 85-89.
37. Malleshi N.G., Desikachar H.S.R., J. food Sci. Technol, 25, 1998, 103.
38. Dalvi R.R., Singh B., Salunke, J. Ags, Food Chem., 20(5), 1972, 1000-1003.
39. Chaudhari U.S., Dixit A.J.,J. Ecotoxicoi, Envioron Monit, 11(4), 2001, 245-249.
40. Stom D.J., Biologia, Platarum (Praha), 24(1), 1982, 1-6.
41. Borthwick H.A., Hendricks S.B., Toole E.H., Toole V.K., Bot. Gaz, 115, 1954, 205-225.
42. Rollin A., Mitrakos P., In phytochrome, Academic press, New York.
43. Fratianne D.G., The Ohio J. of Sci, 74(5), 1974, 291-295.
44. Augusthy P.O., Mani A.S., J. Environ. And Pollution, 22(2), 2001, 137-139.
45. Geetha S., Vemb B., J.Exotoxicol.Environ.Monit., 8(3), 1998, 183-186.

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293 (Special Issue No.70) Peer Reviewed Journal www.aiirjournal.com Mob. 8999250451

72

Diverse Nature Of Barks Of Many Tree Species Are Valuable, Medicinaly Important & Helps In Identification Of Trees

Ranjan B. Kalbande
Dept. of Botany, Shri Dr. R. G. Rathod Arts & Science College,
Murtizapur, Dist Akola, M.S. India

Abstract

Tree bark is protective and valuable. It was found that bark has its uses to human as well as to trees was acting as the 'skin' of the tree. The bark was protecting cover of the tree, and for protection purpose form infections, fires etc. The tree bark was traditionally used for medicinal purposes. The tree bark was broadly classified on the basis of morphological characters, colour and texture whether it was smooth, scaly, furrowed, warty or shaggy. An interesting fact about bark is that main ingredient in aspirin, salicylic acid is obtain from poplar and willow bark. Bark has become a necessity in the production of clothing and recreational objects. In this present work the bark specimens were collected by cutting small portion of the bark of the trees and tagged. External features like colour and texture of the bark was studied. On the basis of these characters the bark was classified in different types such as smooth, furrowed, scaly, warty and shaggy. The diverse nature of the bark was supporting character for tree identification. The information on medicinal use of the bark was collected from local tribal. It was evident that the diverse natures of the barks of the forest trees supports for identification of species. Tree bark was a source of organic matter for soil.
Key Words: Morphodiversity, Tree bark, Medicinal bark, Variation in bark, Bark in tree Identification.

Introduction

Bark is the outer covering of a tree. It adapts to protect the living tree from the environment, and protects delicate tissue from diseases and insect attack. It is composed of non living tissue on the outside and living tissue on the inside. From cork to canoes, bark can be used to create a variety of practical objects. Currently, the uses of bark are both endless and pragmatic. There is an enormous amount of research being conducted in the medical field to determine the benefits of bark. Researchers recently declared that anti-inflammatory compound called Phenolics found in the bark of Scotch pine may prove effective in fighting arthritis. Europe, the willow bark extract is currently being prescribed to treat lower back pain. A popular anesthetic, tubocurarine, is extracted from bark. A few cancer drugs are also extracted from bark. Bark has become a necessity in the production of clothing and recreational objects. It is woven into capes, blankets, rain ponchos, baskets and mats. Canoes are now being produced using a synthetic equivalent of birch bark, and birch bark is still widely used in the production of souvenirs in Europe.

Review Of Literature

Hedge *et al.,* (1998) studied variation in bark thickness in a tropical forest community of Western Ghats in India. They examined the relation between bark thickness and girth in a large sample of trees from evergreen and semi-evergreen rain forest. There was a significant tendency for bark thickness to increase with tree girth. They found a significant trend for species from more disturbed habitats to possess thicker bark. Species from more disturbed habitats also had a greater propensity for secreting gums and resins. Nine of the 29 species occurring in more than one habitat type and with a sample size of at least 11 individuals showed a tendency for possession of a thicker bark by individuals in the more disturbed habitats. Fasola and Egunyomi (2005) carried out investigations on Nigerian usage of bark in phytomedicine. A comparison of the phytochemicals of re-grown stem bark (after debarking) with those of older bark of the same tree species, revealed that almost all the phytochemicals screened were present in both old and new bark, indicating that the newly-grown bark was also medicinally useful. A taxonomic key that would facilitated the identification of dry bark of 15 frequently used tree species had been constructed. Although, morphological features of some bark might change with increasing storage period, the key would still be useful for the identification of the most common species encountered. Hargreaves (2006) studied vegetative morphology for species identification of tropical trees. This work provided information on the distribution of 22 vegetative characters among 16 families having 10 or more species described. The study found marked differences, even discontinuities of distributions of characters between those families. Therefore it was possible to incorporate phylogenetic relationships into the identification process. Furthermore, very often the majority of identifications of some surveys must be based on sterile or vegetative material such as leaves, stems and bark and certain filed characters. Udayan *et al.,* (2003) surveyed medicinal plants conservation areas located in Karnataka for the study of plant diversity. Intensive field work undertaken during all seasons resulted in authentic collection of 933 medicinal plant species represented by 147 Families, including 556 genera. Of the 933 medicinal plants, 912 were native Angiosperms, 20 Pteridophytes and 1 Gymnosperm. Among the 147 Families, the families Rubiaceae, Euphorbiaceae,

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293
(Special Issue No.70)   Peer Reviewed Journal   www.aiirjournal.com Mob. 8999250451

73

Asteraceae, Laminaceae, Fabaceae, Acanthaceae, and Apocynaceae shared a large proportion of medicinal plant species. Their study revealed that a high percentage of medicinal plants were recorded from dry deciduous scrub forest. Kumar *et al.,* (2003) surveyed medicinal plant species of Indian Thar with respect to total number of species occurring in forest areas. The first 10 families having larger than expected number of the medicinal species included, in decreasing order, Fabaceae, Solanaceae, Lamiaceae, Euphorbiaceae, Tiliaceae, Malvaceae, Mimosaceae, Menispermaceae, Acanthaceae and Capparaceae. The high used families have 57 species out of a total of 65 (87.7%) as household remedies, 28 species out of a total of 34 species as traditional remedies and all the 17 as commercialized remedies.

Materials & Methods

The bark specimens are collected by cutting small portion of the bark of the trees and tagged. External features like colour and texture of the bark was studied. On the basis of these characters the bark was classified in different types such as smooth, furrowed, scaly, warty and shaggy. The diverse nature of the bark was supporting character for tree identification in morphodiversity studies. The information on medicinal use of the bark was collected from local tribal inhabitants. The 'Bark Library' (**Fig. 1**:) was prepared.

(Fig **1:** Tree identification on the basis of bark surface)

MORPHODIVERSITY OF BARKS

Observations & Results

Bark was broadly classified on the basis of morphological characters, colour and texture whether it was smooth, scaly, furrowed, warty or shaggy. This study it was evident that the diverse natures of the barks the forest trees pave way for identification of species. Tree bark was an important ethnobotanical source of tribal life to control health related problems such as skin diseases, cuts, dysentery, digestion, acidity, body power, bone fracture and cough. The tree bark was traditionally used for medicinal purposes. Tree bark is protective and valuable It was found that bark has its uses to human as well as to trees. The bark served to protect a tree, without bark there would not be the survival of trees. Some tree bark found affected by beetles and used to cause damage to the external surface of the trunk. Tree bark was source of organic matter i.e. the powder of the dried bark as the organic material by mixing it with the soil. The plants growing on such a soil showed improvement in the growth rate, flowering and fruiting. This indicated that bark powder was useful for nursery soils for rapid growth of plant species. It was because of bark having many more chemical features, resulting positively on the tree growth. So, this nutritive quality of the bark was the notable feature that could be properly utilized in the nursery practices. Trees have special characteristic bark features which vary with age, growth rate, and habitat. Identification of bark was possible by keen observations and through experience. Bark samples were collected from the trees growing. Morphological features were studied and recorded. Collected samples were carried to work place and properly identified, labeled and classified on the basis of external features

Discussion

Jain (1998) studied cultural relationship between bioresources and human race/s utilizing natural products as ethnobotanical material in different parts of India. These included traditional wild edibles, drug, fibres, fodder and ornamentations of body, cultural, mythological and religious relationships, bioresources in art and literature, and taboos, faith and worship. Nigerian usage of bark in phytomedicine and indicating that the newly-grown bark was also medicinally useful. A taxonomic key that would facilitate the identification of dry bark of 15 frequently used tree species had been constructed. In present study ethnobotanical information of the bark was collected from knowledgeable persons. Ethnobotanical use of the bark of trees species on various human health problems such as bone fracture, acidity, injury, worm control, body power, blood impurity, antidote to snake poison, cough, and dysentery were recorded. In present study 40 trees species having 34 genera belonging to 24 families of dicotyledons were studied. During this study some visible differences of bark type, leaf type, flower, fruit and other morphological and medicinally important characters were studied. The bark types showed variability in morphology ranging from thin scaly, papery, smooth, greenish, to thick furrowed, and spiny; most of them showing vertical cracks, ridges and furrows and of various colours. The barks were classified on the basis of their colors and textures. Yunus *et al.,* (1990) broadly categorized systematic bark morphology of some tropical trees. Barks on the basis of diverse surface patterns and configurations as: deep fissured, dippled, and entire. Identification of species was facilitated by the nature of the periderm and expansion tissue. The significance of bark anatomy in relation to systematics was studied. In

present study some visible differences of bark type, leaf type, flower, fruit and other morphological and medicinally important characters were studied. The bark types showed variability in morphology ranging from thin scaly, papery, smooth, greenish, to thick furrowed, and spiny; most of them showing vertical cracks, ridges and furrows and of various colours. The barks were classified on the basis of their colors and textures. The study provided base line information to understand the diversity of the species.

Conclusion

The bark of the trees species exhibited diverse surface patterns e.g. smooth, scaly, furrowed, warty and shaggy types, e.g. spiny nature of *Aegle marmelos* (L.) Corr. and *Ziziphus mauritiana* Lamk. and papery bark of *Boswellia serrata* Roxb. ex. Coleb. helped in tree identification. It was further to conclude that bark could become one of the important taxonomic characters for plant description.

References

1. Fasola TR, Egunyomi A. 2005. Nigerian Usage of Bark in Phytomedicine. From http://hdl.handle.net/10125/156. Ethanobotany Research & Application 3: 073-077.
2. Hedge V, Chandran MDS, Gadgil M. 1998. Variation in Bark Thickness in a Tropical Forest Community of Western Ghats in India. Functional Ecology 12: 313-318.
3. Hedge V, Chandran MDS, Gadgil M. 1998. Variation in Bark Thickness in a Tropical Forest Community of Western Ghats in India. Functional Ecology 12: 313-318.
4. Jain SK. 1998. Some Aspect of Biodiversity and Indian Traditions. Indian Journal of History of Science 33(1):51-62.
5. Kumar S, Parveen F, Mertia RS. 2003. Taxonomic Analysis of Medicinal Plants of the India Thar: A Prioritization Strategy. Scientific Publisher (India) J. Econ. Taxon. Bot. 27 (1): 160-169.
6. Pandit BR. 2003. Biodiversity of Tropical Dry Deciduous Forest Ecosystem. Paper submitted to the XII World Forestry Congress, 2003, Quebec City, Canada. 1-8.
7. Seetharam YN, Haleshi C, Vijay. 2000. Structure and Floristic Composition of a Dry Deciduous Forest of Bidar Distri
8. Udayan PS, Begum SN, Mudappa A, Kumari A. 2003. Plant Diversity of Medical Plants Conservation Areas Located in Karnataka. J. Econ. Taxon. Bot. 27(3): 635-639.

Potential Benefits Of Vermicompost On The Organoleptic Evaluation Of Sensory Characteristics Of Fenugreek In Comparison To Artificial Fertilizer

Mrs. Archana A. Dupare, Dr. Yogita G. Thakre

*Department of Home Science (Family Resource Management), Yeshwant Mahaviyalaya, Wardha.

Department of Home Science (Chemistry), Yeshwant Mahaviyalaya, Wardha.

`*Author for correspondence. Email: duparearchana@gmail.com. Add: Yeshwant Mahavidyalaya, Wardha, M.S. (357, Hiwari Layout, Wardhaman Nagar, Nagpur, M.S.)

Abstract

To satisfy the growing food demands of the increasing population, traditional way of farming is replaced by new methods and technologies employing chemicals fertilizers and pesticides and that has created harmful effects on the soil as well as on the water bodies disturbing the life. Substantial farming was done in olden days with the use of organic manures. Due to which no side effect were observed on our environment and the nutritive value of vegetables and grains, as well as the organoleptic acceptability was high. With this view, in the present study a leafy vegetable, fenugreek, was grown using vermi-compost and artificial fertilizer, and was studied for its sensory characteristics. Recipe was formulated and evaluated. Three trials (T1,T2 and T3) were conducted for testing of various sensory characteristics such as appearance, colour, texture, taste, flavor, and acceptability. For this purpose, six human panelists, coded as J1, J2, J3, J4, J5 & J6, were the judges. Recipe was served fresh. Based on the mean values, results were tabulated and analyzed statistically by applying 't' test. It was observed that vermicompost variety significantly scored maximum than artificial fertilizer variety. A significant difference was observed in the organoleptic characteristics of the two varieties. Thus it was concluded that the Vermicompost variety was highly appreciated and more superior in all the sensory characters over artificial fertilizer which was statistically proved. Thus by using organic manure for farming, we can save our ecosystem as well as our health by consuming these vegetables.

Keywords - J1–J6 (Judges), vermicompost, artificial fertilizers, sensory characteristics, organoleptic characteristics.

Introduction:

About 80% of Indian population depends directly or indirectly on agriculture as their occupation, India being an Agro-based country. In early days organic or substantial farming was practiced. The growth in the agriculture production had to be enhanced to feed the growing population. This is possible only when the soil is in good health. One of the primary factor that influences the soil and hence its production rate is the status of organic matter in the soil. In our country, since centuries, organic manures were the primary sources of plant nutrients for crop growth and development. Recycling of organic waste and application of bulky organic manures were the most popular agronomic measures adopted to sustain soil health.(Sehgal and Chauhan 2000).

To satisfy the ever increasing demand of food production to feed the increasing population, Indian Agriculture Research, since 1960, focused its attention on increased productivity, high yielding varieties, fertilizers and pesticides along with irrigation. To feed the growing population scientists modified through technology, seeds, fertilizers and pesticides so as to get better yield. Genetically modified seeds having disease resistance and better yield have been made by scientists through "Genetic Engineering" techniques. In this technique DNA of one species is transferred to another unrelated species and made to express itself in the recipient cell by molecular biology techniques (Pandey 2000). These genetically modified crops are cultivated through the year but repeated growing of crops removes nutrients from the soil. Also the application of too much of fertilizers results in the leaching of nitrates and phosphates into groundwater, rivers and lakes. This encourages bacterial growth and kills aquatic life in the water bodies (Lade 2005). The chemical fertilizers played significant role in providing large quantities of nutrients needed for intensive crop production which brought about manifold increase in agricultural production in the initial days. But its repeated use has led to degradation of soil health, pollution of ground water, salinity, and soil biodiversity went down. (Jackson 1967)

Due to the above reasons, organic farming is being practiced now-a-days, which involves the use of humus, cow dung, compost and vermi-compost that improves and maintains soil fertility. The use of organic matter such as animal waste, human waste, kitchen waste, vegetable wastes, yard wastes, sewage sludges and composts has long been recognized in agriculture as beneficial for plant growth and yield and the maintenance of soil fertility. The new approaches to the use of organic amendments in farming have proven to be effective

means of improving soil structure, enhancing soil fertility and increasing crop yields. (Norman Q. Arancon and Clive A. Edwards,2005)

Compost is a dark brown crumbly material that is produced when plant and animal material is decomposed into fine organic matter and humus. During composting the biological degradation of organic material takes place, due to enzymes produced by micro-organisms and other decomposing organisms. A process related to composting which can improve the beneficial utilization of organic wastes is vermicomposting. It is a non-thermophilic process by which organic materials are converted by earthworms and microorganisms into rich soil amendments with greatly increased microbial activity and nutrient availability. Vermicomposts are products derived from the accelerated biological degradation of organic wastes by earthworms and microorganisms The breakdown of these materials or the degraded organic matter by worm activity is called 'Vermicompost' (Norman Q. Arancon and Clive A. Edwards,2005). Earthworms, especially belonging to the species *Eisenia foetida, Perionyx excavates and Eudrilus Eugenia* , are used for vermicompost preparation, as they are easily adaptable to agricultural wastes like, sugarcane thrash, coir waste, paper pulp, faecal matter of cow, sheep, horse, activated sludge and biogas sludge of poultry droppings. Vermicompost is a nutrient rich natural fertilizer and soil conditioner which can be used as the top soil or the organic manure in the fields to prevent organic carbon deficiency and soil erosion (Bhatnagar & Palta, 1996). Although the chemistry and microbiology of vermicompost extract are complex, it is believed that soluble mineral nutrients extracted from vermicompost have a positive effect on plant growth with foliar and soil applications of vermicompost extract.(Ingham, E., 2005)

Vermicompost application to the soil drastically improves the soil fertility increase the yield, improves soil pH, release more available nutrients, increased pest resistance, enhances water infilteration and water holding capacity of the soil, reduces irrigation requirement, improves soil microbial activities, yield produces with the better taste, luster, keeping quality and low pesticide residues enhancing its exportability. (Bhawalkar and Bhawalkar, 1991). Vermicompost could be a good substitute for chemical fertilizers in practicing organic farming as most of the nutrients in vermicompost are in readily available form and it increases availability of nutrients to planted crops (Raut & Malewar, 1995) and hence can support high yields of crop.

MATERIAL AND METHODS **-** The experimental procedure of the present study was carried out as under:

Preparation of Vermi-compost (Method of preparation was followed from Sathe 2004):

Kitchen garden of my house was selected for preparation of vermi-compost, a cemented tank/pit was prepared on the land, the size of which was 76cms. long, 72cms. wide and 35cms. in depth/height. There was a hole/exit at base to remove excess water in the tank. Kitchen waste, cow dung and earthworms were used for preparation of vermi-compost. Gunny bags were used for covering the mixture. Gunny bags were altered twice in a week. To maintain the optimum moisture level in the bed water was added. Vermi-compost was ready for use within 45-60 days. The garden land that was used for sowing seeds, was firstly harrowed and pre-sowing irrigation was done so as to create a favourable soil moisture level. When the soil reached the field condition, then the prepared vermi-compost was applied uniformly and mixed with soil by harrowing. Seeds were sown in the month of July and vegetable (Fenugreek) was harvested in August. Same procedure was followed for artificial fertilizer. Full dose of fertilizer was added to the soil i.e. Nitrogen, phosphorus and potassium.

Sensory evaluation – It was done on the basis of organoleptic characteristics of the Fenugreek vegetable that was prepared using fresh Fenugreek, ploughed from the experimental plot, grown on vermi-compost. After collection of 100gms of Fenugreek it was cleaned, washed, chopped and10 ml water was added to it. It was covered, cooked till tender after adding salt, and was served hot to the judges. Same procedure was followed for Fenugreek grown on artificial fertilizer. The cooking time for vermicompost grown Fenugreek vegetable was 6 min 30sec and that for artificial fertilizer grown vegetable was 8min. Score card was developed for the recipe on the basis of – appearance, colour, texture, taste, flavor, consistency and acceptability.

Scoring test used was "10 point rating scale. Recipe was served fresh with respective codes and score card to each judge separately. Scores were collected, tabulated and analysed statistically to draw conclusions. Means were calculated for trial scores for different sensory attributes and were compared using student's "t"

test. A level of significance at both 5% and 1% levels was assumed to draw inferences. Null hypothesis was formulated.

Statistical Appriasal of the data was done using –

  i) Arithmatic mean/Average
  ii) 't' test
  iii) Graphical representation

Null Hypotheses:-

    'HO'- "There is no real difference between the sensory characters of leafy vegetable grown on vermicompost and artificial fertilizer and if it is, it is just by chance."

Result And Discussion-

    The purpose of the present study was comparative study of fenugreek grown on vermicompost and artificial fertilizer. Fenugreek vegetable recipe was prepared and standardized and results were tabulated, analyzed and discussed under the following heads :

1.Preparation of vermicompost by using household waste.

2.Time required for preparation of vermicompost.

3.Expenditure incurred in growing the leafy vegetable.

4.Sensory characteristics of cooked vegetable.

Preparation of vermi-compost by using household waste :

    The materials required and expenditure incurred in growing the leafy vegetables by two methods (i.e. Vermi-compost and Artificial fertilizer) is given in **Table 1**and **Table 2.**

Table 1– Material Required And Expenditure Incurred For Vermi-Compost

Sr.No.	Material Required	Quantity	Cost in Rs.
01.	Kitchen waste	2 Kgs.	-
02.	Cowdung	2 Kgs.	50/-
03.	Earthworm	50 Nos.	100/-
04.	Compost tank	01 Nos.	150
05.	Fenugreek seeds	25 gms	15/-
	Total		315/-

Table 2 - Expenditure Incurred For Artificial Fertilizer

Sr.No.	Material Required	Quantity	Cost in Rs.
01.	Mixed Fertilizer	2 Kg.	90/-
02.	Seeds of Fenugreek	25 gm	15/-
	Total		105/-

Time required for preparation of vermi-compost: Time is one resource, which is very important. We usually indicate the need for synchronizing our activity with that of others whether it may be for food, work, rest, etc. Vermi-compost is the excreta of earthworms, which is rich in humus. Earthworms eat cow dung or household waste along with other kitchen waste and pass it through their body and in the process convert it into vermin-compost. The time required for Vermi-compost preparation is 60 days.

Sensory characteristics of cooked vegetables: Fenugreek vegetable was prepared and evaluated for sensory characteristics, and discussed with results as under –

Fenugreek vegetable: Fenugreek vegetable was prepared and tested for its appearance, colour, consistency, flavor, taste and acceptability. Each sensory characteristics with statistical treatment is discussed below –

a) **Appearance :** Appearance (**Table-3)** is the first appraisal of the food. Eye appeal is gained through contrasting and interesting combination of foods differing in types of colour and form.

Table 3 - Palatability Evaluation Scores for Fenugreek Vegetable

Judges	Appearance of Fenugreek Vegetable							
	Vermi-compost				Artificial fertilizer			
	T1	T2	T3	Mean Score	T1	T2	T3	Mean Score
J1	10	8	8	8.66	10	8	8	8.66
J2	10	8	8	8.66	10	10	10	10
J3	10	10	10	10	10	10	10	10
J4	10	10	10	10	10	10	10	10
J5	10	10	10	10	10	10	10	10
J6	10	10	10	10	10	8	8	8.66
Mean				9.55				9.55

't' value = 0 #

From the above table it can be noticed that the appearance of fenugreek vegetable of both the variety had scored same meaning that both the varieties are equally accepted in their appearance and it was statistically proved significant. Hence, the Hypothesis is accepted at both the levels of significance.

b) **Colour :** Colour is an important factor that regulates overall appearance of the product (**Table-4**). The colour of the green leafy vegetable vary according to the chlorophyll content of these vegetables.

(NB– 1)*=Indicates Significant difference at 1% and5% Level of Significance
2) # = Indicates Insignificant difference at 1% and 5% Level of Significance
3) Table Value for degree of freedom 10 is 2.22 at 5% level and 3.16 at 1% level of significance5% Level of Significance)

Table 4- Palatability Evaluation Scores of Fenugreek Vegetable

Judges	Colour of Fenugreek Vegetable							
	Vermi-compost				Artificial fertilizer			
	T1	T2	T3	Mean Score	T1	T2	T3	Mean Score
J1	10	8	8	8.66	8	8	8	8
J2	10	8	8	8.66	10	10	10	10
J3	10	10	10	10	8	8	8	8
J4	10	10	10	10	8	8	8	8
J5	10	10	10	10	10	10	10	10
J6	10	10	10	10	10	8	8	8.66
Mean				9.55				8.77

't' value = 3.9*

From the above table it is clear that the colour of fenugreek vegetable of vermin-compost variety had. scored more because it had retained its original green colour and was appreciated more than artificial fertilizer variety. This showed highly significant difference in both the varieties when compared on the organoleptic characteristics. Hence, it can be concluded that vermi-compost variety was appreciated more than artificial fertilizer variety.

c) **Consistency/Texture:** Consistency (**Table-5**) may be considered a textural quality attribute, in many instances we can see consistency and so it is another factor in food appearance

Table 5- Palatability Evaluation Scores of Fenugreek Vegetable

Judges	Consistency/Texture of Fenugreek Vegetable							
	Vermi-compost				Artificial fertilizer			
	T1	T2	T3	Mean Score	T1	T2	T3	Mean Score
J1	10	10	10	10	10	10	10	10
J2	10	10	10	10	10	10	10	10
J3	10	10	10	10	8	8	8	8
J4	10	10	10	10	8	8	8	8
J5	10	10	10	10	10	8	8	8.66
J6	10	10	10	10	8	10	8	8.66
Mean				10				8.88

't' value = 11.2*

From the above table it is seen that the texture of fenugreek vegetable of vermin-compost variety had scored highest because after cooking it was tender and firm and artificial fertilizer variety was slightly hard in texture. Thus vermin-compost variety is superior to artificial fertilizer variety. It was statistically proved significant when compared on the organoleptic characteristics.

d) **Flavour:** Flavour **(Table-6)** depends on taste, odour or aroma, temperature sensation of hot and cold and texture. Flavour is the result of a number of components, some of which may be present in a high proportion but most are present in low proportion.

Table 6- Palatability Evaluation Scores of Fenugreek vegetable

Judges	Flavour of Fenugreek Vegetable							
	Vermi-compost				Artificial fertilizer			
	T1	T2	T3	Mean Score	T1	T2	T3	Mean Score
J1	10	10	10	10	10	10	10	10
J2	10	10	10	10	10	10	10	10
J3	10	10	10	10	8	10	8	8.66
J4	10	10	10	10	10	8	8	8.66
J5	10	10	10	10	8	10	8	8.66
J6	10	10	10	10	8	10	8	8.66
Mean				10				9.10

't' value = 12.8*

From the above table it can be said that the flavor of fenugreek vegetable of vermin-compost variety had a mean score of 10 and artificial fertilizer variety scored 9.10, which showed highly significant difference in both the varieties when compared on the organoleptic characteristics.

e) **Taste:** Taste **(Table-7)** plays a very dominating role in food acceptability.

Table 7- Palatability Evaluation Scores of Fenugreek Vegetable

Judges	Taste of Fenugreek Vegetable							
	Vermi-compost				Artificial fertilizer			
	T1	T2	T3	Mean Score	T1	T2	T3	Mean Score
J1	10	10	10	10	10	10	10	10
J2	10	10	10	10	10	10	10	10
J3	10	10	10	10	8	8	8	8
J4	10	10	10	10	8	8	8	8
J5	10	10	10	10	8	8	8	8
J6	10	10	10	10	8	8	10	8.66
Mean				10				8.77

't' value = 12.3*

From the above table it is observed that the taste of fenugreek vegetable of vermin-compost variety has scored highest because it had maintained its original bitter taste and artificial fertilizer variety scored less in taste 8.77, because its bitterness is reduced which suggest that taste of fenugreek vegetable prepared from vermin-compost variety was better than artificial fertilizer. Hence, it can be concluded that vermi-compost variety was appreciated more than artificial fertilizer variety.

f) **Acceptability:** The term acceptability **(Table-8)** or unacceptability is used to describe whether the product is liked or disliked by the consumer. Exterior part plays an important role for acceptability.

Table 8- Palatability Evaluation Scores of Fenugreek Vegetable

Judges	Acceptability of Fenugreek Vegetable							
	Vermi-compost				Artificial fertilizer			
	T1	T2	T3	Mean Score	T1	T2	T3	Mean Score
J1	8	8	8	8	10	8	8	8.66
J2	10	10	10	10	10	10	10	10
J3	10	10	10	10	8	10	8	8.66
J4	10	10	10	10	8	6	6	6.66
J5	10	10	10	10	6	6	8	6.66
J6	10	10	10	10	8	10	8	8.66
Mean				9.66				8.21

't' value = 7.2*

From the above table it is clear that the acceptability of fenugreek vegetable of vermin-compost variety had scored more because it is highly accepted than artificial fertilizer variety. This showed significant difference in both the varieties when compared on the organoleptic characteristics.

Thus, it can be concluded that when compared on the organoleptic characteristics vermi-compost variety had been appreciated more than the artificial variety. Thus it shows that vermi-compost was more superior over artificial fertilizer variety which is statistically proved. The graphical representation of the sensory characteristics of the two varieties is given in **Figure-1**.
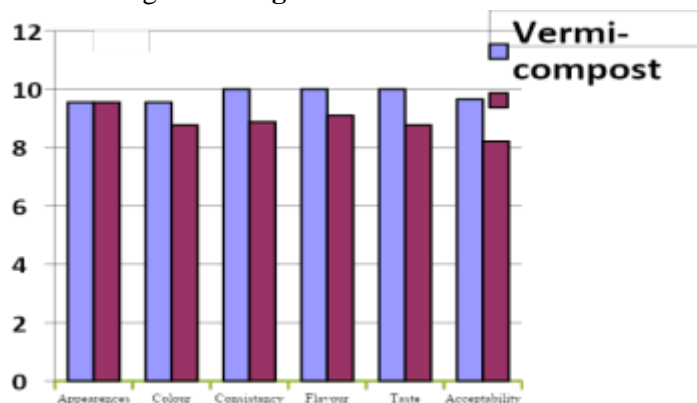
Fig. 1 - Palatability Evaluation of Fenugreek Vegetable

Conclusion :

Vermi-compost can be prepared from household and kitchen waste by housewives at household level, which is also called as organic manure. Use of this manure for farming is known as organic farming. Organic farming is Eco-friendly and also enhances the quality of soil. It helps in increasing the productivity, and helps in keeping the environment clean and balanced. Fruits and vegetables grown on this compost are healthy, highly nutritious and harmful residues are not left in the soil, water and in crop. At the same time original colour, texture, flavor, and taste are retained. Artificially cultivated vegetables require lots of chemical fertilizers and pesticides. These chemicals get accumulated in vegetables, fruits, soil and water. If these fruits and vegetables are not washed properly they remain in the food and causes ill effects on human body. Thus by using organic manure for farming, we can save our ecosystem and health by consuming these vegetables.

The technology of utilizing household waste and kitchen waste for preparation of compost need to be popularized among the community at the household level. By doing so, we can save our environment from pollution, money, energy and time. For this purpose, extensive training is required to be given to the farming community of the entire state. This technique can also be popularized among common masses by organizing exhibitions, demonstrations and other such activities.

References:-

1. Bhatnagar, R. K. and Palta, R. K., (1996), "Vermicompost and Vermicomposting", First Edition, Entomology Division; Indian Agriculture Research Institute, New Delhi: 1-6, 21-23, 53-58, 73-82.
2. Bhawalkar and Bhawalkar (1991) "Vermiculture Biotechnology", Bhawalkar Earthworm Research Institute, Pune M.S.
3. Lade Vijita (2005), "Comparative Study of Hybrid and Non-Hybrid Vegetables Grown on Fertilizer and Organic Manures Respectively with Organoleptic Evaluation"; 1-4.
4. Norman Q. Arancon and Clive A. Edwards,(2005) Effects of Vermicompost on Plant Growth, International Symposium Workshop on Vermi Technologies for Developing Countries (ISWVT 2005), Los Banos, Philippines November 16-18, 2005.
5. Pandey, A., (2000), "Special Articles: Genetically Modified Food," Food Digest Acknowledge; 101-108.
6. Raut, R. S. and Malewar, G. U., (1995), "Vermicompost The Multipurpose Manures, Baliraja; 26(11) : 73-76
7. Sathe, T. V. (2004) "Vermiculture and Organic Farming", Entomology Division, **1-29**
8. Sehgal, G. and Chauhan, G.S., (2000), "Genetically Modified Foods – A Biotechnology Achievement" ; Indian Journal of Food Industry, Vol. 19(1):17-28.
9. Ingham, E.,(2005**) "** The Compost Tea Brewing Manual; Latest Methods and Research". Soil Food Web, Corvallis, OR (2005).

Websites :

1. http://en.wikipedia.org/wiki/fertilizer
2. http://www.tfi.org/facts and stats/fertilizer.com

Synthesis, Spectral Studies And Screening Of 1-Phenyl-3-(2)-Hydrazino-1,3 -Substituted Benzothiozolyl Thiocarbamides

Heda [*] Kavita. M.

[*]Department of Chemistry,Shri R. L. T. College of Science, Akola – 444001(M.S.) India

Abstract:-

Benzothiazole is one of the most important heterocyclic compound, a weak base, having varied biological activities and still of great scientific interest nowadays. They are widely found in bioorganic and medicinal chemistry with application in drug discovery. Benzothiazole is a privileged bicyclic ring system. Due to its potent and significant biological activities, it has great pharmaceutical importance; hence, synthesis of this compound is of considerable interest. The small and simple benzothiazole nucleus if present in compounds involved in research aimed at evaluating new products that possess interesting biological activities. Keeping in this view, when one biological active molecule is linked to another, the resultant molecule generally has increased potency.

Hence for the first time, in present work, we have interacted two pharmocophores, phenyl isothiocynate and substituted 2-hydrazino-1,3-benzothiazoles in acetone medium to yield   1-Phenyl-3-(2)-Hydrazino-1,3-Substituted Benzothiozolyl thiocarbamides. 1-Phenyl-3-(2)-Hydrazino-1,3-Substituted Benzothiozolyl thiocarbamides have been established on the basis of usual chemical transformations and IR , ^{1}H NMR and Mass spectral studies. The antibacterial activities of also reported. Some of these derivatives exhibit significant antimicrobial activity.

Keyword: 2-hydrazino-1,3 benzothiozole , substituted benzothiozolyl thiocarbamide, phenyl isothiocyanate, Biological studies.

Introduction:

Benzothiazoles are bicyclic ring system with multiple applications.A number of 2-aminobenzothiazoles were intensively studied, as in medicinal chemistry[1,2]and reported cytotoxic on cancer cells[3]. Benzothiazole moieties are part of compounds showing numerous biological activities such as antimicrobial [4-8,] anticancer [9-13,] anthelmintic [14], and anti-diabetic[15] activities. They have also found application in industry as antioxidants, vulcanization accelerators. Various benzothiazoles such as 2-aryl benzothiazole received much attention due to the unique structure and its uses as radioactive amyloid imagining agents and anticancer agents. In this review, we have discussed in brief about some commonly developed benzothiazole derivatives and various structural alterations conducted on benzothiazole ring and preferential specificities imparted in their biological responses. Hydrazino benzothiazole and isatin derivatives are an important class of organic heterocycles because of their potential activities are reported to be effectivein CNS disorders such as convulsion and depressions Indole and benzothiazoles its analogs constitute the active class of the compounds possessing wide spectrum of antimicrobial, anthelmintic, analgesic, anti-inflammatory, and tuberculosis activities

Results and discussion

Herein, we report the synthesis of various 1-Phenyl-3-(2)-Hydrazino-1,3-Substituted Benzothiozolyl thiocarbamides **III(a-g)** by interaction of Phenyl isothiocyanate **(I)** and substituted 2-hydrazino-1,3-benzothiazole **II(a-g)** in acetone medium. All products were crystallized from ethanol before recording the physical data (Table-1). The purity of compounds was checked by TLC. The spectral analysis[15-17] IR, 1H NMR and Mass spectra of the product were observed. Optical rotation of the product was also recorded. **III (a-g)**

Scheme for synthesis shown as follows:

Scheme 1

Scheme 2

Scheme 3

Phenyl isothiocyanate + 2-Hydrazino-1,3 benzothiozole → Acetone / Room Temp. → 1 phenyl-3-(2)-hydrazino-1,3-benzothiazolyl Thiocarbamide
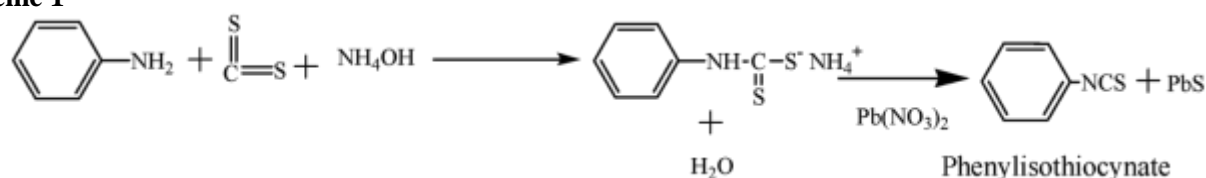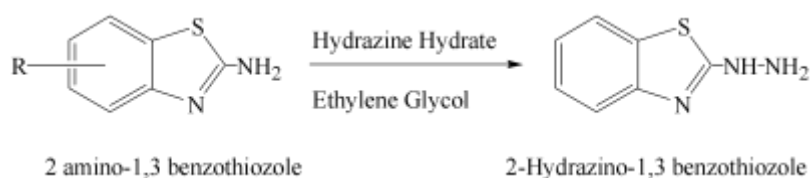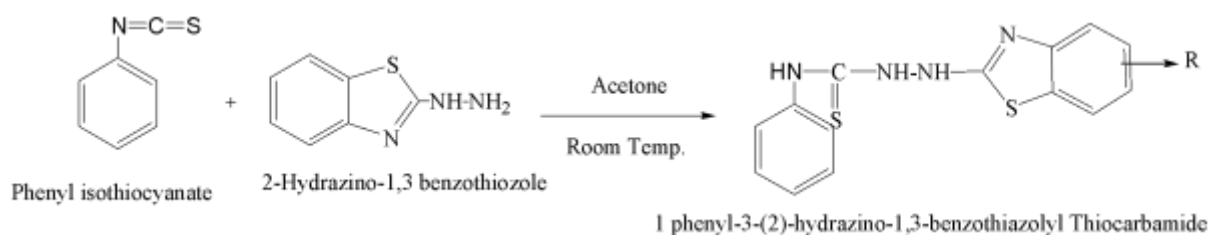
Where, R= (a) Phenyl, (b) *o*-tolyl, (c) *m*-tolyl , (d) *p*-tolyl, (e) o-Cl-Phenyl, (f) m-Cl-Phenyl, (g) p-Cl-Phenyl

Experimental
Material and Methods

All chemicals were research grade. Melting points determined are uncorrected. IR spectra were recorded in KBr on a FT-IR Perkin-Elmer RXI(4000-450cm^{-1}) spectrophotometer. ^{1}H NMR measurements were performed on a Bruker DRX-300 (300 MHz FT NMR) NMR spectrometer in CDCl$_3$ solution with TMS as internal reference. The Mass spectra were recorded on a THERMO Finnigan LCQ Advantage max ion trap Mass spectrometer. Thin layer chromatography (TLC) was performed on silica Gel G and spots were visualized by iodine vapour. The compounds were screened for their antibacterial and antifungal activities by the disc diffusion assay method [18]. The compounds describe in this paper were first time synthesized by the multistep reaction protocol.

1] Preparation of Phenyl isothiocyanate:

Equip a 500 ml three-necked flask with a powerful mechanical stirrer and separatory funnel leave the third neck open or loosely stopper. Introduce, while the flask is cooled in a freezing mixture ice and salt, 30ml of concentrated ammonia solution (d.0.88) and 15ml of pure carbon disulphide. Stir the mixture and run in 18ml of aniline from the separatory funnel during about 20 minute. Stir for the further 30 minutes and allow standing for another 30 minutes. A heavy precipitate of ammonium phenyl dithiocarbamate separate. Transfer the salt to 2-litre RBF by four extractions with 100ml portion of water. Add to the resulting solution with constant stirring a solution of 65gm of Lead Nitrate in 150ml of distilled water Lead Sulphide precipitate. Steam distils the mixture into a receiver containing 10ml of 0.5m H$_2$SO$_4$ as long as organic material possess over. Separate the oil dry it over anhydrous Calcium Chloride or Magnesium sulphide and distilled under diminished pressure. Scheme 1

2] Preparation of 2- hydrazino-1,3-benzothiozole

Concentrated HCl (1mL) was added drop wise to hydrazine hydrate (0.2 M, 1mL 80%) at 5-10°C followed by ethylene glycol (20mL). To the above solution 2-aminobenzothiazole (0.01 M, 1.85g) was added in portions. It was then refluxed for 3 h, cooled and poured onto crushed ice. The separated solid was filtered, dried and recrystalized from ethanol. **II(a-g). Sceme 2:**

3] Preparation of 1-Phenyl-3-(2)-Hydrazino-1,3-Substituted Benzothiozolyl thiocarbamides

A acetone solution of Phenyl isothiocyanate (0.025M, 2.5g in 20mL) was mixed with acetone solution of 2-hydrazino-1,3-benzothiazole (0.025M, 0.37g in 10mL), and mixture after shaking for sometime was kept at room temperature for 24 h. Acetone was distilled off to obtained sticky residue. This residue was triturated several times with petroleum ether to afford a light coloured solid. **III(a-g). (Scheme-III).**

3a: IR (KBr):ʋ 3363 (N-H), 3201 (Ar-H), 1523 (C=N), 1159 (C=S), 939. 694 (C-S), ^{1}H NMR (δ in ppm, CDCl$_3$): δ 5.58-5.21 (4H, s, N-H), δ8.07-7.04 (9H, m, Ar-protons) Mass (m/z): 300 (M$^+$), 223, 165, 77; Anal. Calcd for C$_{14}$H$_{12}$N$_4$S$_2$: C, 56; H, 4; N, 18.66; S, 21.33; Found: C, 55.25; H, 3.8; N, 18.70; S, 21.45.

On the basis of all above facts the product with m. p. 145°C was assigned the structure 1-Phenyl-3-(2)-Hydrazino-1,3-Substituted Phenyl Benzothiozolyl thiocarbamides When the reaction of Phenyl isothiocyanate was extended to several other 2- hydrazino-1,3-benzothiozole corresponding 1-Phenyl-3-(2)-Hydrazino-1,3-Substituted Benzothiozolyl thiocarbamides has been synthesized.

3b: IR (KBr):ʋ 3360 (N-H), 3021 (Ar-H), 1523 (C=N), 1159 (C=S), 939. 694 (C-S), ^{1}H NMR (δ in ppm, CDCl$_3$): δ 5.58-5.21 (4H, s, N-H), δ8.07-7.04 (9H, m, Ar-protons) Mass (m/z): 334 (M$^+$), 300, 166, 77; Anal. Calcd for C$_{14}$H$_{11}$N$_4$S$_2$Cl: C, 50.29; H, 3.29; N, 16.76; S, 19.16; Found: C, 50.25; H, 3.33; N, 16.80; S, 19.20.

On the basis of all above facts the product with m. p. 135°C was assigned the structure 1-Phenyl-3-(2)-Hydrazino-1, 3-Substituted o-Cl-Phenyl Benzothiozolyl thiocarbamides

3c: IR (KBr):υ 3358 (N-H), 3100 (Ar-H), 1525 (C=N), 1168 (C=S), 700 (C-S), ^{1}H NMR (δ in ppm, CDCl$_3$): δ 5.58-5.21 (4H, s, N-H), δ8.07-7.04 (9H, m, Ar-protons) Mass (m/z): 314 (M$^+$), 300, 165, 77; Anal. Calcd for C$_{15}$H$_{14}$N$_4$S$_2$: C, 57.32; H, 4.45; N, 17.83; S, 20.38; Found: C, 57.28; H, 4.52; N, 17.90; S, 20.44.

On the basis of all above facts the product with m. p. 110°C was assigned the structure 1-Phenyl-3-(2)-Hydrazino-1,3-Substituted o-tolyl Benzothiozolyl thiocarbamides

Table -1: Physical data for characterization of compounds (3a-g)

Compd	Yield %	R$_f$	M.P. ^{0}C	Analysis (%): Found (calcd)	
				N	S
3a	45.00	0.52	145	18.70 (18.66)	7.50(21.33)
3b	50.00	0.65	135	16.80 (16.76)	7.40(19.16)
3c	78.00	0.53	120	16.70 (16.76)	7.42(19.16)
3d	65.00	0.48	140	16.72 (16.76)	7.48(19.16)
3e	75.00	0.59	110	17.90 (17.83)	7.30(20.38)
3f	69.00	0.62	130	17.85 (17.83)	7.35(20.38)
3g	53.00	0.40	148	17.80 (17.83)	7.32(20.38)

C and H analysis was found satisfactory in all cases.

Antimicrobial Studies

All the compounds have been screen for both antimicrobial and antifungal activity using cup plate agar diffusion method18-20 by measuring the inhibition zone in mm. the compounds were taken at a concentration of 1 mg/mL using Dimethyl Sulphoxide (DMSO) as solvent. Amikacin (100 μg/mL) was used as standard for antibacterial activity and Fluconazole (100 μg/mL) as standard for antifungal activity. The compounds were screen for antibacterial activity against *Escherichia coli, Staphylococcus aureus, Proteus vulgaris, Pseudomonas aeruginosa* and *Klebsiyella species* by using Nutrient Agar medium. These sterilized agar media were poured into Petri dishes and allowed to solidify. On the surface of the media microbial suspensions were spread with the help of sterilized cotton swab. After inoculation the well was punched by using sterile stainless steel cork borer of 6mm diameter. In to these wells were added 0.1 mL portion of the test compounds in solvent. The drug solution was allowed to diffuse for an hour into the medium. The plate was incubated at 37°C for 24 h and 30°C for antibacterial activitiesThe zone of inhibition observed around the cups after respective incubation was measured. The results are presented in Table 2. Antibacterial studies of these compounds indicated that compounds exhibited most significant activity against All the other compounds exihibited low to moderate activity. (Table2)

Sr. no	*E. c.*	*S. a.*	*P.v*	*P.a*	*S.t*	*K.p*
1(3a)	17	20	20	19	18	21
2(3b)	10	19	15	12	20	19
3(3c)	18	14	19	17	15	18
4(3d)	14	20	18	18	19	20
5(3e)	16	--	16	--	12	--
6(3f)	10	10	20	10	10	12
7(3g)	--	12	18	14	08	17
Amikacin	18	21	23	19	20	21

Sample	Disc content	Resistant	Intermediate	Sensitive
Amikacin	100ug/ml	≤ 15 mm	16-20 mm	≥ 21 mm

Conclusion

Derivatives were synthesized and characterized for their structure elucidation. As outline in synthesis process, important novel -1,3- substituted benzothiozolyl thiocarbamide has been synthesized. All the structure of the above compounds was in good agreement with Spectral and Analytical data. Various chemical and spectral data supported the structures. Some of the compounds synthesized showed promising antimicrobial activities. The newly synthesized thiocarbamides exhibits comparable antibacterial and antifungal activities

against the organisms tested. The method adopted in this investigation is simple, efficient and inexpensive and is useful in synthesizing pharmacologically important molecules.

Acknowledgement

References:

1. P. Reddy, Y. Lin and H. Chang, Arkivoc., xvi., 113-122 (2007).
2. Y. Heo, Y. Song, B. Kim and J. Heo, Tetrahedr. Letters. 47, 3091-3094 (2006)
3. F. Piscitelli, C. Ballatore and A. Smith, Bioorg. Med. Chem. Lett.,20, 644-648
4. Gupta A and Rawat S: Synthesis and cyclization of benzothiazole: Review. Journal of Current Pharmaceutical Research 2010; 3(1): 13-23.
5. Gupta S, Ajmera N, Gautam N, Sharma R and Gauatam D: Novel synthesis and biological activity study of pyrimido [2,1-b] benzothiazoles. Ind J Chem 2009; 13(48B): 853-858.
6. Kumbhare RM and Ingle VN: Synthesis of novel benzothiozole and benzisoxazole functionalized unsymmetrical alkanes and study of their antimicrobial activity. Ind J Chem 2009; 48B: 996-1000.
7. Maharan M, William S, Ramzy F and Sembel A: Synthesis and *in-vitro* evaluation of new benzothiazole derivaties as schistosomicidal agents. Molecules 2007; 12: 622-633.
8. Murthi Y and Pathak D: Synthesis and Antimicrobial screening of Substituted 2-Mercaptobenzothiazoles. J Pharm Res 2008; 7(3): 153-155.
9. Rajeeva B, Srinivasulu N and Shantakumar S: Synthesis and antimicrobial activity of some new 2-substituted benzothiazole derivatives. E-Journal of Chemistry 2009; 6 (3): 775-779.
10. Kini S, Swain S and Gandhi A: Synthesis and evaluation of novel benzothiazole derivates against human cervical cancer cell lines. Ind J Pharm Sci 2007; 69(1): 46-50.
11. Stanton HLK, Gambari R, Chung HC, Johny COT, Filly C and Albert SCC: Synthesis and anti-cancer activity of benzothiazole containing phthalimide on human carcinoma cell lines. Bioorg Med Chem 2008; 16: 3626-3631.
12. Wang M, Gao M, Mock B, Miller K, Sledge G, Hutchins G and Zheng Q: Synthesis of C-11 labeled fluorinated 2-aryl benzothiazoles as novel potential PET cancer imaging agent. Bioorg Med Chem 2006; 14: 8599-8607.
13. Sathe BS, Jayachandran E, Jagtap VA and Sreenivasa GM: Anthelmintic activity of newly synthesized moieties of fluoro benzothiazole Schiff's bases. Research Journal of Pharmaceutical, Biological and Chemical Sciences 2011; 2 (1): 510-515.
14. Pattan S, Suresh C, Pujar V, Reddy V, Rasal V and Koti B: Synthesis and antidiabetic activity of 2-amino[5"(4-sulphonylbenzylidine)-2, 4-thiazolidinenone]-7-chloro-6-flurobenzothiazole. Ind J Chem 2005; (44B): 2404-2408.
15. R. M. Silverstein, G. C. Bassler and T. C. Morrill, "Spectrometric Identification of Organic Compounds", 5th ed., John Wiley and Sons, Inc, New York, (1991).
16. N.B. Colthup, L.H. Daly and S.E. Wibereley, Introduction to Infrared and Raman Spectroscopy, Academic Press, New York (1964).
17. D.H.Williams and L.Fleming, Spectroscopic Methods in Organic Chemistry, 4th ed., Tata-McGraw-Hill (1988).

A Novel Synthesis And Characterization Of Nanoparticles Of Maltosylated Formadimides

Poonam T. Agrawal

P.G. Department of Chemistry, Shri R.L.T. College of Science,
Akola-444001 (M.S.)

Abstract:

Nanoparticles and desulphurized compounds of carbohydrates shows incrassating importance in industrial and medicinal research, we here by report the synthesized series of 1-Hepta –O-benzoyl –β-D-maltopyranosyl-3H/aryl formadimides nanoparticles and are characterized by IR, NMR and X-ray diffractions.

Index Terms: Dithiobiurets, Formadimides, Nanoparticles and characterization.

Introduction:

Sulfur in crude oil, natural gas, process gas and natural gas liquids (LNG) may take many forms, including hydrogen sulfide (H_2S), carbonyl sulfide (COS), sulfur oxide.(Sox) and the whole family of marcaptans. Raney nickel typically used in the reduction of compounds with multiple bonds, such as alkynes, alkenes, nitriles, dienes, aromatics and carbonyl containing compounds. Raney nickel is a spongy nickel, is a fine grained solid composed of mostly of nickel derived from a nickel- aluminium alloy. Several grades pyrophoric, most are used as air-stable slurries. Raney nickel is used as a reagent and as a catalyst in organic chemistry.

Desulfurization is the removal of sulfur or sulfur compounds (as from coal or flue gas), mostly from fuels. The most commonly required desulfurization process is natural gas, but it is also required for flue gas, coal and oil.

Similarly In view of this application[1] of maltosyl compounds and Nanoparticles in this we have synthesis to investigate the chemistry of this new compound with reference to their application.

Nanostructure materials are attracting a great deal of attention because of their potential for achieving specific processes and selectivity, especially in biological and pharmaceutical applications [2,3]. Recent studies have demonstrated that especially formulated nanoparticles have good antibacterial activity [4,5].

Experimental:

UV-visible Spectra is measured using UV Spectrophotometer by using model Single Beam UV-Visible Spectrophotometer with software(BI/CI/SP/SB-S-03)of Bio Era make.. IR spectra were recorded on Perkin-Elmer spectrum RXI FTIR spectrophotometer (4000-450 cm^{-1}). ^{1}H NMR was recorded in $CDCl_3$ on Bruker DRX-300 spectrometer operating at 300 MHz.

a) Synthesis of hepta-O-benzoyl-α-D-maltosyl bromide:

The finally powdered maltose octabenzoate(0.03M, 21.0g) was added gradually to the brominating agent. After the addition the flask was kept for 2hr at room temperature. Then the reaction mixture with chloroform (130ml) then the mixture was shaken vigorously for about 15 min. The resultant mixture was poured into ice cold water. The chloroform layer was then separated. It was washed several with aqueous sodium bicarbonate to remove excess of acetic acid followed by aqueous sodium metabisulphite to remove excess of bromine and finally 2-3 times with water. To the chloroform addition of petroleum ether afforded a solid (16.5 gm). This solid was expected hepta-O-benzoyl-α-D-maltosyl bromide (yield 77%). It was purified by dissolving it in minimum quantity of chloroform and reprecipitating it with petroleum ether,m.p.168^{0}C.

b) Preparation of lead thiocyanate :

Lead thiocyanate was prepared by mixing aqueous solution of lead nitrate and ammonium thiocyanate. The white granular lead thiocyanate was filtered washed with distilled water and dried at 50^0 C.

c) Preparation of hepta-O-benzoyl-β-D-maltosyl isothiocyanate[6] :

To a suspension of hepta-O-benzoyl-α-D-maltosyl bromide (21 gm, 0.03M) in sodium dried xylene (80ml) was added lead thiocyanate (6gm, 0.03M). The reaction mixture was then treated for microwave synthesis for about 3 min. This solution was then cooled and liberated lead bromide was removed by

filtration. The xylene filtrate was then treated with petroleum ether (60-80^{0}C) with stirring, a white solid mass obtained (13gm). This solid was expected hepta-O-benzoyl- β-D-malttosyl isothiocyanate.

It was purified by dissolving it in minimum quantity of chloroform and reprecipitating it with petroleum ether, m.p. 118-120^{0}C. [Found; C; 67.07, H; 4.46, N; 1.22, S; 2.9; $C_{62}H_{49}O_{17}NS$ requires; C; 66.96, H; 4.41, N; 1.26, S; 2.88%].

Preparation of 1-hepta O-benzyl –β-D –maltosyl 5 phenyl 2,4,Dithiobiuerts:

A suspension of 4 gm of Hepta O-benzyl-β-D maltosyl isothiocyante   with 20 ml of benzene and 1 gm of aniline thiourea was treated for microwave synthesis for about 3 min. This solution was then cooled and the benzene filtrate was then treated with petroleum ether (60-80^{0}C) with stirring, a white solid mass obtained (13gm). This solid was expected 1 –hepta-O–β–D maltosyl 5-phenyl 2, 4 dithiobiurets.

It was purified by dissolving it in minimum quantity of chloroform and reprecipitating it with petroleum ether, m.p. 145-146^{0}C.

Desulphurization of Hepta-O-benzoyl-β-D-maltosyl-5-aryl-2,4dithiobiuret

1. Preparation o Raney Nickel:

The required Raney nickel was prepared by earlier method [29] by action of sodium hydroxide solution on powdered NI-Al alloy.

Preparation o 1-Hepta-O-Benzoyl –D-maltosylpyranosyl-3-H/aryl formaides:

Preparation of Nanoparticles 1-Hepta- O-benzyl –β-D-maltosyl- 5-phenyl 2,4

Dithiobiurets

Take about 1 gm of 1-Hepta-O-benzyl –β-Dmaltosyl -5-phenyl 2, 4 Dithiobiurets and dissolve complete 1 Hepta O-benzyl –β-D –lactosyl- 5 –phenyl 2,4 Dithiobiurets in the 50ml of solvent in 250 ml beaker. Now put this beaker in sonicator. The highly penetrating acoustic waves are passed through mixture, which create high pressure bubbles in the beaker due to which breakdown of the bulk material is takes place and desired sized nanoparticles are formed. The size determination of nanoparticles was done by the X-ray diffraction studies.

IR spectrum of 1-Hepta- O-benzyl –β-D-maltosyl 5-phenyl 2,4 Dithiobiurets[7]

Absorption Observed (Cm^{-1})	Assignment	Absorption Expected (Cm^{-1})
3068	C-H Ar-stretching	3040-3010
1728	C=O stretching	1750-1735
1176	C-O stretching	1210-1153
1026, 909	Characteristic of lactose	1100-1000 and 910-900
710	Monosubstituted benzene	770-680

Nmr Spectral Studies[8,9]:

The NMR Spectrum of compound distinctly displayed signals due to N-H Proton at δ 9.05 and d 6.57 ppm, Aromatic Protons at δ7.47-7.15 ppm, lmaltosyl protons at d 5.77-3.76 ppm.

Characterization of Nanoparticles:

1. **Charterisation using UV – Visible Spectrophotometer:** Characterization of nanoparticles was done using visible Spectrophotometer by using model Single Beam UV-Visible Spectrophotometer with software (BI/CI/SP/SB-S-03)of Bio Era make. The UV-Visible Spectroscopy reveals the formation of nanoparticles by showing different absorption those from bulk material.

2. **Size determination of Lactose Octabenzoate Nanoparticles by X-Ray Diffraction Studies:** From the X-Ray diffraction it comes to know that size of nano octabenzoate is 132nm.

References:

1. [L. Mazur, 2004,Electrochemistry Communication.,6,400-403.].
2. [L.Mazzola,2003,Nature Biotechnology.,21,1137-1147.].
3. [M. Maillard, S.Giorgo.,M.P.Pilent, 2002, Adv. Material.,14(15),1084-1086.].
4. [Z.Chen.,L.GaoMaterial,2007, Research Bulletin.,42,1657-1661.].
5. [C.H.Cao, C.J.Zhou, H.Y.Gao, Y.T. Liu, 2001, J.Chin.Chem.Soc. 48,207-210.].
6. [P. T. Agrawal, S. P. Deshmukh, 2010, International Journal of Chem. Tech.Research,2(2) 1209 – 1213.].
7. [R.M. Silverstein, G.C. Bassler and T.C.Morril., "Spectrometric Identification of
8. Organic Compounds," 2003, 5th Ed.;John Wiley and sons, INC, New York, ,P 108, 119, 120, 123.].
9. [N.B.Colthup, L.H.Daly and S.E.Wiberley.: Introduction to Infrared and Raman
10. Spectroscopy,"2003, Academic Press, New York, P-279.].
11. [D.H.Williams and I.Flemming "Spectroscopic methods in organic chemistry" 4th Ed.,Tata McGraw-Hill Publication New Delhi, 2003, 40, 41, 47, 53.].

Assessment of Efficiency of Carp Pituitary Extract, Ovaprim, Ovatide & Combination on Breeding Performance of Asiatic Catfish, *Clarias Batrachus*

Dr. Tushar G. Deshmukh
Assistant Professor, Department of Zoology,
Shri. Shivaji College of Arts, Commerce and Science, Akola

Abstract

    Experiments were conducted to evaluate the breeding performance in Asiatic catfish, Clarias batrachus at 40mg dose of Carp Pituitary Extract (CPE), 1ml dose of ovaprim & Ovatide and combination of CPE+ovaprim+ovatide (10mg+0.1ml+0.1ml) dose. The breeding performance was observed on the basis of latency period, fecundity, fertilization and hatching percentage and deformed larvae percentage. The results indicated that the total fecundity was highest (P<0.05) when female fish injected with combination dose than CPE, ovaprim and ovatide doses individually. The latency period (14.00hrs) was lower at combination dose than other inducing agents. More fertilization and hatching percentage was also observed at combination dose i.e. 88.95% & 82.27% respectively. More normal larvae were produced in all inducing agents treated fish but combination dose was most promising.
Key words : Clarias batrachus, Artificial breeding, Inducing agents.

Introduction

    Asian catfish, *Clarias batrachus* is considered as a potential aquaculture species in Indian subcontinent. The production potentiality of this species in aquaculture has been reported (Thakur and Das, 1986; Arrerat, 1987). The easy availability of stocking material is always considered important for successful culture of any fish species. The availability of wild caught catfish seed is insufficient to meet out demand due to a combination of over exploitation, aquatic pollution, spread of diseases, uncontrolled introduction of exotic fishes and habitat modification. To conserve this species and to sustain large scale culture as an economic proposition especially in Vidarbha region of Maharashtra State, it is becoming increasingly necessary to take up breeding and larval rearing of Asiatic catfish under controlled conditions.

    The successful aquaculture of the fish *Clarias batrachus* may bring about socio-economic sustainability of the rural community. Intensive culture of this species will gain popularity mainly because; the species required no special conditioning and the growth factors unlike many other aquaculture species. A comparatively simple culture characteristic with efficient food conversion (Ali and Jauncey, 2005) and excellent nutritional profile (Rui *et al.,* 2007) makes Asiatic catfish more suitable for commercial intensive culture. The steadily growing importance of fish farming has compelled improvements in the technologies necessary for securing the initial and basic requirements for productive aquaculture, mainly the production of fish seed for stocking. Fish culture today is hardly possible without the artificial propogation of fish seeds of preferred cultivable fish species. The need for the production of quality fish seed for stocking the fish ponds and natural water bodies has indeed increased steadily (Brain and Army, 1980). Artificial propogation methods constitute the major practicable means of providing enough quality seed for rearing in confined fish enclosure water such a fish ponds, reservoirs and lakes (Charo and Oirere, 2000).

    Several available synthetic ovulating agents in ready form containing GnRHa and dopamine antagonist like ovaprim, ovatide and Aquaspawn are becoming very famous now a day and found to be effective spawning agent in different fish species. Several hormone preparations have been tried in India with varying degrees of success. Among various reproductive hormones CPE, human chorionic gonadotropin (HCG) and GnRH-a are commonly used for inducing or maintaining spermatogenesis and oogenesis in fish species.

    Use of exogenous hormones is an effective way to induce maturation of eggs. Furthermore, in the most cultured fishes, hormonal manipulations may be used as management tools to enhance and synchronized egg maturation, spermiation and facilitate hatchery operations (Mylonas *et al.,* 2010). Hormonal preparations applied in fish aquaculture allow improving artificial reproduction techniques both during and outside the spawning season.

Materials and Methods

The male and female *Clarias batrachus* were collected from the river Adan, nearby Karanja town, Dist. Washim (M.S.) available from the monsoonal migrating stocks prior to three months before the breeding season which is from June to August. Collected fish were stocked in glass aquaria. These glass aquaria having 50% water from collected location and 50% aged tap water. These aquaria were conditioned with 24hrs aerator for dissolved O_2 and temperature was maintained with thermostat at 28^0C to 30^0C. The Asiatic catfish is locally known as magur, which becomes mature at the age of one year, when it attains the weight around 100 – 150gms.

Healthy matured male and female brooder fish were selected carefully. The care was taken to assure that the brooders are healthy and free from obvious signs of disease, with intact barbells and at least one year old. It is easy to identify mature male or female broods on the basis of secondary sexual characters. During breeding season, the males were selected on the basis of pointed and reddish genital papilla, while females by rounded and reddish papilla and softness of abdomen. A fully matured female looks little heavier as its abdomen is distended with eggs. A male on other hand looks slender and streamlined.

The doses of inducing agents like CPE, Ovaprim and Ovatide were given the female fish as below:

CPE (Carp Pituitary Extract)	=	40mg /kg BW of fish,
Ovaprim	=	1.00ml/kg BW of fish,
Ovatide	=	1.00ml/kg BW of fish
Combination Dose of above inducing agents	=	10mg + 0.1ml + 0.1ml/ kg BW of fish.

This species does not ooze sperms at its own and thus the males are to be cut open for collection of sperms from the testes. Eggs were collected from the fish by hand stripping. Stripping was carried out after a latency period. The latency period is a period between injection and eggs collected.

When stripping was done, milt suspension was taken with the help of dropper and spread over stripped eggs. The eggs and milt suspension was mixed thoroughly with fine soft brush for fertilization. Thereafter, drops of freshwater were added in the bowl to reactivate the sperms. The bowl was vigorously shaken for few seconds to enhance fertilization rate. After transferring the fertilized eggs to the flow through system, a feeble flow of water was provided to maintain oxygen rich water quality. Water temperature was maintained at 28 to 29^0 C, which is ideal for development and hatching.

Result and Discussion

The various breeding performance of Asiatic catfish, *Clarias batrachus* induced with control (0.9% NaCl), Carp Pituitary Extract, ovaprim, ovatide and combination of CPE+Ovarim+Ovatide is depicted in Table 1. The various breeding performances like latency period, fecundity/kg BW, fertilization, hatching and deformed larvae percentage was estimated.

Table 1 : Effect of Selected inducing agents on latency period, fecundity, fertilization rate, hatching rate and deformed larvae percentage of Asiatic catfish, *Clarias batrachus*.

Sr. No.	Inducing agents	Gender	Wt. of Fish (g)	Hormone Dose (Per Kg BW)	Latency Period (Hrs)	Fecundity/ Kg BW	Fertilization Rate (%)	Hatching Rate (%)	Deformed Larvae (%)
1	Control (0.9% NaCl)	Male	135 +2.96	-	-	-	31.20+1.79	48.42 +3.77	33.52 +6.27
		Female	130 +3.88	1.00 ml	33.00 +1.41	12523 +60.55			
2	CPE	Male	141 +4.89	-	-	-	78.98+14.52	80.67 +6.19	5.03 +1.82
		Female	135 +4.02	40 mg	19.00 +1.20	49800 +154.71			
3	Ovaprim	Male	122 +3.66	-	-	-	81.81 +8.73	77.60 +11.68	5.03 +1.70
		Female	131	1.00 ml	18.00+3.24	49335+274.62			

			±4.10						
4	Ovatide	Male	135 ±4.12	-	-	-	75.63 ±8.38	75.23 ±3.70	5.02±1.34
		Female	138 ±4.01	1.00 ml	17.00±2.19	38304±108.22			
5	CPE+Ovaprim+ Ovatide	Male	119 ±3.22	-	-	-	88.95 ±5.13	82.27 ±12.51	4.23 ±1.79
		Female	117 ±3.45	10mg+0.1ml+ 0.1ml	14.00±3.44	55538±217.58			

The data are based on the Means (± SD) of five replicates.

Mean values bearing different superscript differ significantly (P<0.05).

The latency period (14.00hrs) was lower at combination dose than the other inducing agents and as compared to control (33.00hrs). The latency period is the time interval between injection and spawning of fish. Hawarry *et al.,* (2008), who noted the shorter latency period in *Hypophthalmichthys molitrix* induced with the combination of CPE and hormonal analogues with dopamine antagonist. The result of present investigation are in agreement with Mohammad Afzal *et al.,*(2008), who noted 11-12 hrs latency period in Bighead carp, *Aristichthys nobilis* induced with HCG+Ovaprim and with HCG+Ovatide. Zonneveld *et al.,* (1988) opined that optimum quantity of eggs is obtained in right combination of hormones and latency period in catfish, *Clarias batrachus.*

The results drawn in the present work for fecundity/kg BW in *Clarias batrachus* was higher at the doses of 40mg of CPE (49800), 1ml of ovaprim (49335), 1ml of ovatide (38304) and combination dose (55538) than the control fish (12523). The successful ovulation in fish, *Clarias macrocephalus* was observed by administering 13-39mg.kg^{-1} pituitary gland by Sidthimunka *et al.,* (1966). The results of present investigation are in conformity with Kale and Patil (2010) who recommended the 1-1.5ml dose of ovaprim for quality egg production in catfish *C. batrachus.* Marimuthu and Haniffa (2011), who recorded the highest number of eggs when *Channa punctatus* were injected with ovaprim. According to Sahoo *et al.*, (2005), the 1ml ovatide per kg BW ensuring the high quality eggs and more normal larvae in the *C. batrachus.*

In the present investigation, the highest number of egg production was noticed in combination dose than the other doses. According to Nayak *et al.*, (2001), the combination dose (LHRHa + PIM) induced in catfish *H. fossilis* showed 100% ovulation and more normal eggs after 15-18hrs. The similar results were noticed by Mohammad Afzal *et al.*, (2008) who injected the fish, *Aristichthys nobilis* with HCG + ovaprim and HCG + ovatide combination.

In the present study, the fertilization and hatching rate was more at all inducing agents than the control group. The CPE treated fish showed fertilization rate (78.98%) and hatching rate (80.67%). The similar results were also noticed by Mahmood (2006) in *Anabas testudineus* induced with single and double dose of pituitary gland. The results of present investigation are also in confirmity with Das *et al.*, (2007) who observed fertilization rate (40-90%) and hatching rate (25-75%) in the induced breeding of *Clarias batrachus*. The fertilization and hatching percentage was 81.81% & 77.60% for ovaprim and 75.63% & 75.23% for ovatide respectively. The similar findings were reported by Srivastava *et al.*, (2012) who noticed the highest fertilization (72.80%) and hatching rates (60.70%) in catfish *Clarias batrachus* induced with 1.00ml of ovaprim. Sharma *et al.*, (2010) who noticed successful percentage of fertilization and hatching in Asiatic catfish *C. batrachus* induced with 1.00ml/kg of ovatide. Shinkafi and Ilesanmi (2014) recorded the 85% and 65.28% of fertilization and hatching rate for sample of this study in catfish *C. gariepinus* induced with ovatide.

In the present work, the combination dose gave most successful results of fertilization (88.95%) and hatching (82.27%) than all inducing agents. Sharma (2008) who observed 87.50 to 90% of fertilization and 91.50 to 96.00% of hatching in *C. mrigala* induced with combination of PG extract and ovaprim. El-Hawarry (2012) also observed 91.33% (fertilization) and 87.33% (hatching) in fish *H. molitrix* induced with the combination of LHRHa and dopamine.

The deformed larvae percentage in present study was lower in all inducing agents i.e. CPE (5.03%), ovaprim (5.03%), ovatide (5.02) and Combination dose (4.23%) treated fishes than the control fish (33.52%). Our results are in well agreement with that of Goswami and Sharma (1997) who noticed the low deformed larvae percentage (2.00%) at 40mg dose of CPE in catfish *C. batrachus*. The results of present investigation are in conformity with Sahoo *et al.,* (2005), who also observed the lower deformed larvae when 1ml of ovatide injected in fish, *Clarias batrachus*. According to Lam *et al.,* (1978) the over ripe eggs did not form previtelline space when placed into fresh water, suggesting that there had been a change in permeability of chorion. The reduced permeability of the chorion to water might be adversely affect utilization of yolk, leading to retarded or abnormal development of embryo (Smith, 1957).

Conclusion

The study indicated that the best breeding performance in *Clarias batrachus* was obtained at 14.00 hrs latency in combination with combination dose. This combination dose ensured high quality eggs and more normal larvae than other inducing agents in the environmental condition of Vidarbha region of Maharashtra State. However, the CPE, ovaprim and ovatide also gave promising results but combination dose is more beneficial regarding good production during induced breeding of this Asiatic catfish.

References

1. Ali, M.Z. and K. Jauncey (2005): Effect of dietary lipid to carbohydrate ratios in body composition, digestive enzyme activities and blood plasma components in African catfish Clarias gariepinus (Burchell, 1822). Journal of Aquaculture in the Tropics, 20(1): 57–70.
2. Arrerat S. (1987): Clarias culture in Thailand. Aquaculture, 63: 355-362.
3. Brain F.D. and C. Army (1980): Induced Fish Breeding in South East Asia. Report of the Workshop Held in Singapore 25th-26th November, 1980, pp. 10RC-178e.
4. Charo H. and W. Oirere (2000): River based artificial propagation of the African Clarias gariepinus: an option for small fish farmers. Naga, The ICLARM Quarterly 23(1):14-16.
5. Das M., M. A. islam and G.U. Mughal (2007): Induced breeding and fry rearing catfish, Clarias batrachus (Linn.). Bangladesh J. Zool. 20(1):87-95.
6. El-Hawarry Waleed N. (2012): Biochemical and non-specific immune parameters of healthy nile tilapia (Oreochromis niloticus), blue tilapia (Oreochromis aureus) and their interspecific hybrid (male O. aureus × female O. niloticus) maintained in semiinsentive culture system. Animal and Feed Research. 2(1): 84-88.
7. Kale R.L. and G.P. Patil (2010): Studies on the breeding behaviour of the Asian catfish Clarias batrachus in the Vidarbha region of Maharashtra. Ph.D. Thesis, S.G.B. Amravati University, Amravati.
8. Lam, T.J. (1978): Environmental influences on gonadal activity in fish. In: Fish Physiology? B (eds.W.S. Hoar, D.J. Randall and E.M. Donaldson), Academic Press, London pp: 65-116.
9. Mahmood S.U. (2006): Comparison between single and double injection of pituitary gland (pg) on the breeding performance of climbing perch, Anabas testudineus (bloch). J. bio-sci. 14: 57-60.
10. Marimuthu K. and M. A. Haniffa (2011): Induced spawning of native threatened spotted snakehead fish Channa punctatus with ovaprim.
11. Muhammad Afzal, A. Rab, N. Akhtar, M. F. Khan, S. U. Khan and M. Qayyum (2008): Induced Spawning of Bighead Carp, Aristichthys nobilis (Richardson), by Using Different Hormones/ Hormonal Analogues. Pakistan J. Zool., vol. 40(4): 283-287.
12. Mylonas C.C., A. Fostier and S. Zanuy (2010): Brood stock management and hormonal manipulation of fish reproduction. Aquaculture. 197:99-136.
13. Nayak, P.K., T.K. Mishra, B.N., Singh, A.K. Pandey and R.C. Das (2001): Induced maturation and ovulation in Heteropneustes fossilis by using LHRHa, pimozide and ovaprim for production of quality eggs and larvae. Indian Journal of Fisheries 48:269-275.
14. Rui R., N. Bandarra and M.L. Nunes (2007): Nutritional quality of African catfish, C. Gareipinus (Burchell, 1822): a positive criterion for the future development of the European production of Siliroidei. Int. J. of Food Sci. and tech. 43(3): 342-351.
15. Sahoo, S.K., S.S. Giri and A.K. Sahu (2005): Effect on Breeding Performance and egg Quality of Clarias batrachus (Linn.) at various Doses of Ovatide During Spawning Induction. Asian Fisheries Sci., 18: 77-83.
16. Sharma K., N.K. Yadava and M. Jindal (2010): Effect of doses of ovatide on the breeding performance of Clarias batrachus (Linn.) Livestock Research for Rural Development 22:4.

17. Sharma, C. (2008): Assessment of synergistic efficiency of pituitary extract with ovaprim and ovatide on breeding performance and survival of spawn of cirrhinus mrigala.

18. Sidthimunka, A., J. Sanglert and O. Pawaputanon (1966): The culture of catfish (Clarias spp.) in Thailand, Proceedings of the World Symposium on Warmwater Fish Culture, Rome, May 1966. FAO Fisheries Report No. 44(5): 196–204.

19. Srivastava P.P., S. Raizada, R. Dayal, S. Chowdhary, W. Singh Lakra1, A. Kumar Yadav, P. Sharma and J. Gupta1 (2012): Breeding and larval rearing of asian catfish, Clarias batrachus (Linnaeus, 1758) on live and artificial feed. J Aquacult, 3:4.

20. Thakur N.K. and Das P. (1986): Synopsis of biological data on magur, Clarias batrachus (Linnaeus, 1758). CIFRI, Bulletin No. 41: 1-82. 638.

21. Zonneveld N., W.J. Rustidja, A.R. Viveen and W. Maduna (1988): Induced spawning and egg incubation of the Asian catfish, Clarias batrachus. Aquaculture 74:41-47.

Comparative Phytochemical Screening Of Leaves Of *Peltophorum Pterocarpum* And *Tephrosia Purpurea*

Anjali Sangole, Shailendra Madavi

Department of Botany Shri. R.L.T. College of science Akola (MS)

Abstract:

Flower of pletophorum pterocarpum and Tephrosia purpurea ,have been used for several purposes such as medicine, food and garnishing . The present study investigated on phytochemical analysis of leaves of Peltophorum pterocarpum and Tephrosia purpurea was carried out. Peltophorum p.and Tephrosia p. is belongs to family Fabaceae and has been widely used for therapeutic applications of the many diseases. The phytochemical study of various extracts of leaves of Peltophorum pterocarpum and Tephrosia purpurea revels the presence or absence of phytochemical components such as Tannin, Saponin, Flavonoid, Phenol, Alkaloid was carried out.

Keywards: Phytochemical analysis, Tannin, Saponin, Flavonoid, Phenol, Alkaloid

Introduction :

World Health Organization had reported that nearly 65-80% of world's population in developing countries depends on the traditional medicine for their primary health care and treatment of various diseases. Herbal medicine is the oldest form of health care. Many drugs commonly used today are of herbal origin. Medicinal plants are rich so of novel drugs that forms the ingredients in traditional system, modern medicines, pharmaceutical intermediates and lead compounds in synthetic drugs {4}. Many plants are a good source of herbal medicine and natural products for many therapeutic application. The bioactive natural sources which are extracted from medicinal plants which shows many used and no side effects. In addition to therapeutic applications of medicinal plants, they are also a great source of chemical constituents which could be act as newer leads and guide for modern drug design and development [8].Different parts of this tree are used to treat many diseases like stomatitis, insomnia, skin diseases, constipation, ringworm and its flower extract is known to be a good sleep inducer and used in insomnia treatment [1-6]. In recent times focus on plant research has increased all over the world and a large body of evidence has collected to show immense potential of medicinal plants used in various traditional systems [7] including treatment against hepatocellular carcinoma [3]. In addition to therapeutic applications of medicinal plants, they are also a great source of chemical constituents which could be act as newer leads and guide for modern drug design and development.[6] The plants consist of very important class of phytoconstituents such as alkaloids, flavonoids, steroids, glycosides, terpenes, tannins and phenolic compounds, which were used treatment of various diseases.[2] It is well known that there is a strong correlation between the phytoconstituents and their bioactivity towards the diseases is potential tool for the design and synthesis of new bioactive compounds with specific activities for treatment of various diseases.[5] Therefore, it is highly desirable to investigate preliminary phytochemical screening of plants in order to discover and develop novel bioactive therapeutic drugs with improved efficacy.

Material and Methods

Collection and extraction of medicinal plants

The sample of these two plants was studied and was collected from Akola in month of November 2018. The leaves of plants were dried in normal temperature and were made coarse power. The powder was extracted with 600 ml of methanol using soxhlet apparatus till exhaustion for about 48 h. The methanol extract was concentrated under vacuum at 40 °C to get the residues

Phytochemicals	*Peltophorum pterocarpum*	*Tephrosia purpurea*
Alkanoids	+	+
Flavonoids	+	+
Phenols	+	+
Saponin	-	+
Steroids	+	+
Tannins	+	+

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293
(Special Issue No.70)   Peer Reviewed Journal   www.aiirjournal.com Mob. 8999250451

94

Preliminary Phytochemical Analysis

Test for Alkaloid

To 1mL of flower extract, 1mL of conc. Sulphuric acid was added. To that 1mL of mayer's reagent is added. The formation of green or white precipitate was regarded as positive for the presence of alkaloids

Test for Flavonoid

To 1mL of 2N NaoH was added to 1mL of flower extract. Appearance of yellow colour indicates the presence of flavonoid

Test for Phenol

To 1mL of leaf extract,1mL of sodium carbonate was added. To that 1mL of folin was added. Formation of blue or green colour indicates the presence of Phenols

Test for Saponin

To 1 mL of flower extract was added to 2mL of distilled water in a test tube. The solution was shaken for 15minutes observed for stable persistent foam of about 0.5 to 1 cm layer indicates the presence of saponin

Test for Steroids

To 1mL of flower extract was added to 1mL of chloroform and 1.5mL of conc.sulphuric acid. The appearance, at the interphase,a reddish brown colour showed a positive reaction

Test for Tannin

1 mL of flower extract was taken in a test tube. To that 1mL of 5% ferric chloride was added. Formation of greenish black colour indicates the presence of tannin

Results and Discussions

The phytochemical investigation of all extracts of leaves of Peltophorum pterocarpum reveals presence of Alkanoids, Flavonoids, Phenols, Steroids and Saponins was absent. *Tephrosia purpurea* presence of Alkanoids, Flavonoids, Phenols, Steroids and Saponins

Conclusion

The preliminary phytochemical investigation of of all extracts of leaves of Peltophorum pterocarpum and *Tephrosia purpurea*. Selected ten medicinal plants are the source of the secondary metabolites i.e Alkanoids, Flavonoids, Phenols,Steroids and Saponin. Medicinal plants play a vital role in preventing various diseases. The antidiuretic, anti-inflammatory, antianalgesic, anticancer, anti-viral, anti-malarial, anti-bacterial and antifungal activities of the medicinal plants are due to the presence of the above mentioned secondary metabolites. Medicinal plants are used for discovering and screening of the phytochemical constituents which are very helpful for the manufacturing of new drugs. The previous phytochemical analysis and present studied show nearly the similar results due to the presence of the phytochemical constituents. The phytochemical analysis of the medicinal plants are also important and have commercial interest in both research institutes and pharmaceuticals companies for the manufacturing of the new drugs for treatment of various diseases. In this connection, the authors investigated the stated parameters. This is an attempt to establish the scientific basis for identifying crude drugs

Acknowledgements

Referances

1. Burkill HM: The useful plants of West Tropical Africa. Royal Botanic Gardens, Kew, Second Edition, 1995; Vol. III: 100– 143
2. Doss A: Preliminary phytochemical screening of some Indian medicinal plants. Ancient Science of Lif 2009; 29: 12-16.
3. Gnanaraja R, Prakash V. Preventive Effect of Tephrosia Purpurea Against N,N-Diethylnitrosamine Induced Hepatocellular Carcinoma In Swiss Albino Mice. Journal of Biology and Life Science 2014; 5(2):1-9.
4. Nostro A, Germano MP, Angelo V, Marino A, Cannatelli MA. Extraction methods and bioautography for evaluation of medicinal plant antimicrobial activity. Lett Appl Microbiol 2000; 30(5):379.

5. Pandey P, Mehta R and Upadhyay R: Physico-chemical and preliminary phytochemical screening of Psoralea corylifolia. Archives of Applied Science Research 2013; 5:   261-265

6. Satish S, Mohana DC, Ranhavendra MP and Raveesha KA: Antifungal activity of some plant extracts against important seed borne pathogens of Aspergillus sp. Journal of Agriculture and Technology 2007; 3(1): 109–119.

7. Umamaheswari A, Niveditha. Anticancerous effect of Hibiscus sabdariffa leaves on hepatocellular carcinoma cell line Hep 3B. Res J Medicinal Plant 2007; 3:100-105.

8. Vijyalakshmi R and Ravindran R: Preliminary comparative phytochemical screening of root extracts of Diospyrus ferrea (Wild.) Bakh and Arva lanata (L.) Juss. Ex Schultes. Asian Journal of Plant Science and Research 2012; 2: 581-587

9. Nostro A, Germano MP, Angelo V, Marino A, Cannatelli MA. Extraction methods and bioautography for evaluation of medicinal plant antimicrobial activity. Lett Appl Microbiol 2000; 30(5):379.

10. Vijyalakshmi R and Ravindran R: Preliminary comparative phytochemical screening of root extracts of Diospyrus ferrea (Wild.) Bakh and Arva lanata (L.) Juss. Ex Schultes. Asian Journal of Plant Science and Research 2012; 2: 581-587

11. Burkill HM: The useful plants of West Tropical Africa. Royal Botanic Gardens, Kew, Second Edition, 1995; Vol. III: 100– 143

12. Satish S, Mohana DC, Ranhavendra MP and Raveesha KA: Antifungal activity of some plant extracts against important seed borne pathogens of Aspergillus sp. Journal of Agriculture and Technology 2007; 3(1): 109–119.

13. Umamaheswari A, Niveditha. Anticancerous effect of Hibiscus sabdariffa leaves on hepatocellular carcinoma cell line Hep 3B. Res J Medicinal Plant 2007; 3:100-105.

14. Gnanaraja R, Prakash V. Preventive Effect of Tephrosia Purpurea Against N,N-Diethylnitrosamine Induced Hepatocellular Carcinoma In Swiss Albino Mice. Journal of Biology and Life Science 2014; 5(2):1-9.

15. Vijyalakshmi R and Ravindran R: Preliminary comparative phytochemical screening of root extracts of Diospyrus ferrea (Wild.) Bakh and Arva lanata (L.) Juss. Ex Schultes. Asian Journal of Plant Science and Research 2012; 2: 581-587.

16. Doss A: Preliminary phytochemical screening of some Indian medicinal plants. Ancient Science of Lif 2009; 29: 12-16.

17. Pandey P, Mehta R and Upadhyay R: Physico-chemical and preliminary phytochemical screening of Psoralea corylifolia. Archives of Applied Science Research 2013; 5: 261-265

Ichthyofaunal Diversity Of Kumbhar Kini Dam, Darwha Dist Yavatmal, M.S.,India

Dr. Shubhangi B.Misal
Assitant Professor,
Department Of Zoology,
Shri. Shivaji College Of Arts, Commerse & Science ,Akola

Abstract

The survey was under taken for Ichthyofaunal diversity study in Kumbhar Kini Dam,Darwha of Yavatmal District.The survey was mainly focused on Ichthyofaunal diversity. Total of 34 species belonging to 06 orders (Cypriniformes , Perciformes, Siluriformes, Synbranchiformes, Beloniformes and Osteoglossiformes) and 11 families were recorded. These families were; Cyprinidae (20), Bagaridae (03), Ambassidae (02), Mastocembelidae (02), Cobitidae (01), Cichlidae (01), Gobiidae (01), Channidae (01), Siluridae (01), Belonidae (01) and Notopteridae (01), Of these species; 07 were Abundant, 10 were Common, 04 were Frequent, 07 were Occasional while 06 were rare. This is first ever study on the fish diversity of this reservoir and would help in explore the fish fauna of Kumbhar Kini dam.
Key words: Abundance , Ichthyofaunal Diversity ,Kumbhar Kini dam

Introduction

The freshwater ecosystems include rivers, streams, lakes, ponds and springs and the total water content of these systems is called terrestrial waters. The main source of terrestrial water is rainfall, although thermal spring beneath the earth's surface also contributes to the freshwater systems. The amount of freshwater on earth is insignificant as compared to that of the world ocean; yet the freshwater ecosystems; the rivers are important geo-chemically because they are responsible for the most of the weathering erosion of landmasses. A large proportion of the fresh water is stored as ice and snow at higher altitudes and around the poles or ground water as and less than 0.5 % is available for use by organisms, including for human civilization. However, increasing human populations have resulted accelerating demands on water supplies for drinking, industrial, hygiene and agricultural process.

Moreover natural aquatic ecosystems are being used as disposal sites for a wide variety of wastes (Sarojini, 1996). The toxic chemicals; human wastes and sewage by affected on all the species interactions them. Direct human activities in the form of washing, bathing are important factors causing the pollution in water bodies. The increasing human influences in recent years in and around our aquatic systems and their catchment areas, have led to the deterioration of water quality and eutrophication (Bhatt *et al.,* 1999).

Among all the fauna of this universe, fish exhibit greater species diversity than any other group of vertebrates with 33,600 described species. Of these, about 58 % are marine, 41 % are freshwater species, and only 1 % move back and forth between salt- and freshwater. As expected, marine fishes are the most diverse because saltwater covers 70 % on the earth. Only 1 % on the earth is covered by fresh.

Fish are an important resource for humans worldwide, especially as food. Commercial and subsistence fishers hunt fish in wild fisheries or farm them in ponds or in cages in the ocean. They are also caught by recreational fishers, kept as pets, raised by fishkeepers, and exhibited in public aquaria. Fish have had a role in culture through the ages, serving as deities, religious symbols, and as the subjects of art, books and movies (Shubin, 2009).

Materials And Method

Kumbhar-kini dam is located between 20° 18' N AND 77° 40' E. Dam was constructed as part of irrigation projects by Government of Maharashtra in the year 1976. It is built on and impounds a local nallah, nearest city to dam is Darwha in Yavatmal District of Maharashtra. The dam is an Earthfill Gravity Dam .The length of dam is 1079 m, while the height of the dam above lowest foundation is 18.1 m. During monsoon reservoir gets enough water but in post monsoon period particularly March and April water level is very much reduced. The reservoir is surrounded by red laterite soil and black cotton soil. The inland reservoir is fed by seasonal drainage to its periphery and nearby local streams and springs. After detailed survey of the lake, five convenient stations were fixed for study.

Fish specimens were collected personally as well with the help fisher man by using dragnets, cast-nets, gillnets etc. in the study period. The trapped fishes were handled carefully, immediately photographed and immediately released into water streamed. The fishes were identified with help of visible morphological characters. The morphometric characters were observed and identified with the help of standard keys and books of Talwar and Jhingran (1991); Jayaram and Sanyal (2003): Jayaram (2010); also with the help of Zoological survey of India, Pune, Maharashtra.

Assuming that the fishing effort for a given type of net was constant, the relative abundance of the fish was grossly categorized (for each type of net separately) into four categories, **namely**: abundant (76–100 % of the total catch), common (51–75 % of the total catch), moderate (26–50 % of the total catch) and rare (1–25 % of the total catch) (Joshi *et al.,* 2012).

Map of Kumbhar-Kini Dam

Oservations And Result

During study, total of 34 species belonging to 06 orders (Cypriniformes , Perciformes, Siluriformes, Synbranchiformes, Beloniformes and Osteoglossiformes) and 11 families were recorded. These families were; Cyprinidae (20), Bagaridae (03), Ambassidae (02), Mastocembelidae (02), Cobitidae (01), Cichlidae (01), Gobiidae (01), Channidae (01), Siluridae (01), Belonidae (01) and Notopteridae (01), Of these species; 07 were Abundant, 10 were Common, 04 were Frequent, 07 were Occasional while 06 were Rare.

Percent Occurrence of different Ichthyological families
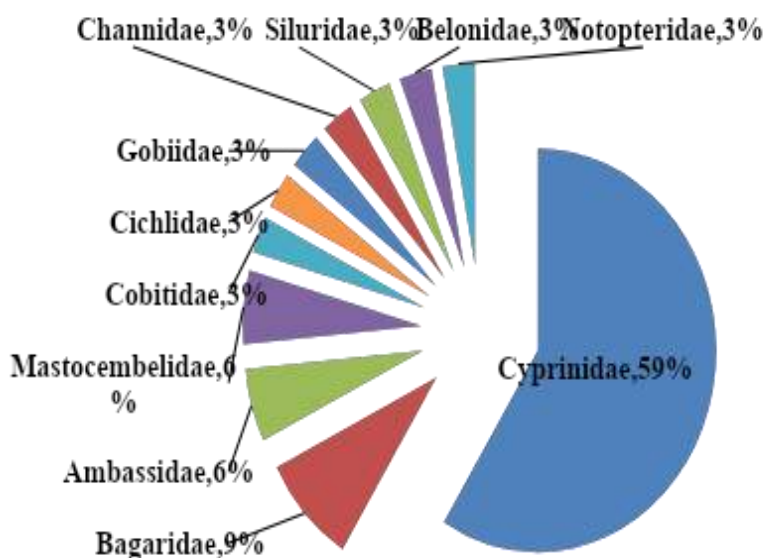
Ichthyofauna of Kumbhar Kini Dam of Yavatmal District (M.S.)

A	ORDER: CYPRINIFORMES		Common Name	Status
I	**Family:** Cyprinidae			
	1.	*Amblypharyngodonmola (Hemilton,1822)*	Mopda	O
	2.	*Catla catla (Hamilton-Buchanan,1822)*	Catla	A
	3.	*Cirrhinus mrigala(Hemilton,1822)*	Lalpari	R
	4.	*Crossocheilus latius (Hemilton,1822)*	Borai	C
	5.	*Cyprinus carpio(Linnaeus,1758)*	Kaman	A
	6.	*Garra mullya(Hemilton,1822)*	Dende	C
	7.	*Hypothalmichthys molitrix (Valenciennes,1844)*	Chandera	C
	8.	*Labeo rohita(Hamilton-Buchanan,1822)*	Rohu	A
	9.	*Labeo boga (Hamilton- Buchanan,1822)*	Tembti	C
	10.	*Labeo calbasu (Hemilton,1822)*	Karaunt	F
	11.	*Labeo pangusia (Hemilton-Buchanan,1822)*	Boharya	O
	12.	*Osteobrama catio (Silas,1952)*	Kharpati	F
	13.	*Puntitus chola (Hemilton-Buchanan,1822)*	Tepri	O
	14.	*Puntius sophore(Hemilton,1822)*	Kharati	C
	15.	*Puntius sarana (Hamilton, 1822)*	Shikkar	C
	16.	*Puntitus ticto (Hemilton – Buchanan,1822)*	Pepdi	R
	17.	*Rasbora daniconius* (Hamilton-Buchanan, 1822)	Ajra	F
	18.	*Salmostoma bacaila* (Hamilton, 1822)	Chal	C
	19.	*Thyririchthys sandkhol (Sykes,1838)*	Sandkoli	O
	20.	*Tor khudree (Sykes,1839)*	Temri	F
II	**Family:** Cobitidae			
	21.	*Lepidocephalus thermalis (Valenciennes,1846)*	Girgos	R
B	**ORDER : PERCIFORMES**			
III	**Family:** Ambassidae			
	22.	*Parambassis ranga* (Hamilton, 1822)	Zanjra	C
	23.	*Chanda nama (Hemilton-Buchanan, 1822)*	Chandva	O
IV	**Family:**Cichlidae			
	24.	*Oreochromis mossambica (Peters,1852)*	Kombada	O
V	**Family:**Gobidae			
	25.	*Glossogobinus giuris(Hemilton-Buchanan,1822)*	Dhangarya	R
VI	**Family:**Channidae			
	26.	*Channa punctatus (Bloach, 1793)*	Marrel / Dokh	A
C	**ORDER: SILURIFORMES**			
VII	**Family:** Bagaridae			
	27.	*Mystus cavasius (Hamilton-Buchanan, !822*	Katirna	C
	28.	*Mystus montanus (Jerdon,1849)*	Shingat	C
	29.	*Sperata seenghala (Sykes,1841)*	Singata	A
VIII	**Family:** Siluridae			
	30.	*Ompak bimaculatus (Bloch,1797)*	Patola	A
D	**ORDER: SYNBRANCHIFORMES**			
IX	**Family:**Mastacembelidae			
	31.	***Macrognathus*** *pancalus (Hamilton,1822)*	Bam	O
	32.	*Mastocembelus armatus(Lacepede,1800)*	Wair	R
E	**ORDER: BELONIFORMES**			

X		**Family:** Belonidae		
	33.	*Xenentodon cancila (Hemilton-Buchanan,1822)*	Chatari	A
F		**ORDER: OSTEOGLOSSIFORMES**		
		Family: Notopteridae		
XI	34.	*Notopterus notopterus* (Gunther, 1839)	Bhangad	Rare

Discussion

For fishing, the methods commonly employed in the concern area mainly fall into five categories viz. Disabling types, Trap and barriers types, Filtering types, Entangling types and Miscellaneous types and have been discussed. Disabling types included rod and wire, drift long line and fixed ling line; Trap and barriers included the pot traps, bundh methods and cover basket method; filtering type covers the drag net and gunny bags; entangling type had gill nets and cast nets while the Miscellaneous type had the mosquito net, muslin cloth, hand net, stick, iron rod etc. such types of method are also reported by Joshi *et al.* (2013), Mukwane and Avinashe (2016).

The present study cleared that the Kumhar-kini Dam accommodates the rich diversity of edible fishes. It was also noticed that fish production plays an important role in the socio-economic life of study area. It is an important source of income and employment to millions of rural farmers. Hence it is necessary to adopt the better strategy for conservation of water body and fish diversity of Kumhar-kini Dam of Yavatmal District of Indian state Maharashtra.

Summary And Conclusion

During study, total of 34 species belonging to 06 orders (Cypriniformes, Perciformes, Siluriformes, Synbranchiformes, Beloniformes and Osteoglossiformes) and 11 families were recorded. These families were; Cyprinidae (20), Bagaridae (03), Ambassidae (02), Mastocembelidae (02), Cobitidae (01), Cichlidae (01), Gobiidae (01), Channidae (01), Siluridae (01), Belonidae (01) and Notopteridae (01), Of these species; 07 were Abundant, 10 were Common, 04 were Frequent, 07 were Occasional while 06 were Rare.

The maximum diversity was reported during late monsoon the winter. The least species were encountered during the months of summer to early monsoon. The catch success was high during winter and it was least during summer while moderate in the months of monsoon.

The present lake seems to be productive and moderately polluted due to agricultural run-off and domestic sewage which is indirectly suggests the beginning of eutophication. The present study also provides an insight into distribution, abundance diversity and ecology of ichthyofuna in reservoir.

Referances

1. **Bhatt, L.R., Lacoul, P., Lekhak, H.D.andJha, P.K.1999.** Physico-chemical characteristics and phytoplankton's of Taudaha Lake, Kathmandu, Poll.Res.18(4) 353-358
2. **Jayaram K., Sanyal A., 2003**. A taxonomic revision of he fishes of the genus *Mystus scopoli* (Family: Begridae) *Records of the Zoological survey of India occasional paper no. 207:* 141-152
3. **Jayaram K.C., 2010.** *The fresh water fishes of the Indian Region*. Narendra Publishng House, Delhi: pp. 551
4. **Joshi P. S., Tantarpale V. T., Kulkarni K. M., 2013.**Fishing Methods Commonly Employed In Buldhana District and Neighborhood, Maharashtra State, India. *Biosci. Disc.,* 4(1):54-57.
5. **Mukwane R., Avinashe A., 2016.** Fishing techniques used in Uma river Basin, Karanja, Dist – Washim, Maharashtra State, India.*Vidya Bharati Int. Int. Res. J.* 5(4): 144-147.
6. **Sarojini, Y.1996.** Physico chemical characteristics and phytoplankton assemblages of sewage entering harbor water at Visakapatanam, East Coast of India. Ind. J. of Envtl. Prtcn. 16(9) 645-650
7. **Shubin N., 2009.** Your inner fish: A journey into the 3.5 billion year history of the human body. Vintage Books Pp 354.

Species Richness And Distribution Of Rotifers In Lentic Ecosystem Of Sonala Dam, Sonala, Dist. Washim, (M.S.)

Dr. U.P. Lande

Assistant Professor, Derpartment of Zoolgy,

Shri Shivaji College of Arts, Commerce & Science, Akola, (M.S.), India

Abstract :-

Sonala dam is an earthen dam, constructed by irrigation department of Maharashtra Govt. The dam is presently used for irrigation and drinking for regional rural areas. Rotifers are microscopic soft-bodied fresh water invertebrates, which have been used to indicate the tropic status of a water body. They are one of the connecting link organisms between primary producers and consumers in aquatic food web. The present study reports the species richness and diversity of rotifers in Sonala dam, Sonala, Dist. Washim. Quantitative assessment of rotifers was undertaken during February 2012 to January 2013. During the study period total 16 species of rotifers were collected from Sonala dam. . Conservation of this water body is essential, as this habitat may reveal interesting rotifer fauna present there. There is no report of study on the species richness and distribution of rotifers in this reservoir and that is the reason the present study was planned.

Key words: Sonala dam, Diversity, Rotifers, Zooplanktons

Introduction:-

Studies on fresh water bodies, natural or manmade have recently gained much importance, mainly because of their multiple uses. A central position is occupied by zooplanktons between the autotrophs and other heterotrophs. Planktons are the most sensitive living and drifting communities in water bodies that forms tropic levels for feeding of aquatic fauna. Among the zooplanktons, rotifers are apparently the most sensitive indicators of water properties. Small pseudocoelomate animals that inhabit a wide variety of aquatic habitats are rotifers (Pejler 1995; Wallace *et al.,* 2006). The habitats of rotifers include both, lentic and lotic environments (Sharma, 2009). They have been widely used in assessment of aquatic pollution due to their sensitivity to small changes in environment, short generation time, parthenogenic mode of reproduction. Rotifers play an integral role in the aquatic food chains due to their qualitative and quantitative occurrence (Vanjare 2013). The occurrence of rotifers is affected by the complex interaction of various physical, chemical, geographical, biological and ecological parameters. The rotifer fauna of freshwater bodies has a potential value as bio-indicators of changing the tropic condition. Some rotifers are highly specialized but most are opportunistic feeders since they consume and assimilate different types of food. Some rotifers are highly specialized but most are opportunistic feeders since they consume and assimilate different types of food (Wallace et al., 2006 and Wallace and Snell, 2010) reaching high population densities and diversities, as well as high tolerances to environmental conditions, thus making them among the most diverse group in environment (Verma, et al., 2014). The present work has been undertaken to study the species richness and distribution of copepods and their correlation with some physico-chemical factors.

Materials and Methods

The present study is a part of limnological survey undertaken (during February, 2012 - January, 2013) in Sonala dam, Sonala, Dist. Washim. Sonala Dam reservoir was constructed in the year 1981. Agricultural fields surround the reservoir. The reservoir is mainly used for drinking water supply to nearby villages and for irrigation. The nearby villages also use the water for bathing and washing purposes. The dam is constructed by irrigation department of Maharashtra Govt. The Sonala dam is located at 77^0, 12', 30" Longitude and latitude of 20^0, 19', 00" in Sonala village of Washim district in Maharashtra (India). It is an earthen dam with 19.20 meter maximum height and 446.90 hector submergence with 132.50 square Km. of catchment area. The dam is presently used for irrigation and drinking for regional rural areas. The reservoir is constructed on the River Aran also known as River Adan a tributary of River Godavari. Adan River in its way runs through the Maraldoh village, before draining in the dam.

The selection of six sampling stations was made on the basis of human and other domestic activities. For biological analysis in water, 50 liter of water sample was filtered through standard plankton net of bolting silk cloth No.25 (56 mesh size). 125 ml was the final volume of the filtered sample which was transferred to

another 125 ml plastic bottle and labeled mentioning the time, date and place of sampling. The samples were preserved by adding 2ml of 4% formalin. After 24 hours, the supernatant was carefully discarded and the final volume of concentrated sample was 50 ml. Preserved 50 ml water sample bottles were brought to the laboratory and examined under a Binocular microscope with different magnification. Quantitative analysis was done by Drop Count Method. Detailed taxonomic identification was carried out with Pennak (1989), Koradkar (1992) and Dhanpati (2000). Karl Pearson's formula was used to calculate correlation coefficient between some of the physico-chemical parameters and rotifers.

Observations and Results

In the present investigation total 16 species of rotifers were recorded in dam water namely *Brachionous angularis, Brachionous calyciflorous, Brachionous species, Lecane reculata, Lecane ovalis, Anuraeopsis fissa, Ascomorpha species, Asplancha brrightwalli, Cephadella gibba, Ellosa species, Horaella brehmi, Keratella species, Lepadella ovalis, Lepadella patella, Monostyla species* and *Trichotria similisstrumosa.* Rotifers showed seasonal variations and showed dominance during the winter season. During the study period *Anuraeopsis fissa* 30.1 ± 2.5 ind/l *showed dominance at all stations* followed by *Cephadella gibba* 27.5 ± 1.2 ind/l*, Lepadella patella* 21.5 ± 1.0 ind/l *and Monostyla species* 19.7 ± *1.0* ind/l. Least appearance was shown by *Ellosa species* 4.4 ± 3.5 ind/l. Stationwise abundance of rotifers was in the order Station S_6 > Station S_2 > Station S_3 > Station S_1 > Station S_5 > Station S_4. Pollution indicator species from Rotifers such as *Cephalodella gibba, Lepadella patella* and *Monostyla* species were abundant at stations S_1, S_2, S_3 and S_6. Station S_6 > Station S_2 > Station S_3 > Station S_1 > Station S_5 > Station S_4

Table No. 1. Station wise Average values of Zooplanktons during year 2012-2013

Sr.No.	Plankton	S_1			S_2			S_3			S_4			S_5			S_6			Average		
Rotifera																						
1	*Anuraeopsis fissa*	30.8	±	2.5	35.8	±	2.3	31.7	±	2.0	22.5	±	1.5	21.7	±	1.9	38.3	±	2.8	30.1	±	2.5
2	*Ascomorpha species*	29.2	±	1.8	33.3	±	2.0	30.0	±	2.4	23.3	±	1.7	21.7	±	1.8	35.8	±	2.5	28.9	±	1.4
3	*Asplancha brrightwalli*	6.7	±	4.5	9.2	±	5.9	7.5	±	5.1	9.2	±	5.9	10.0	±	6.5	8.3	±	5.5	8.5	±	5.6
4	*Brachionus angulariis*	5.8	±	4.1	8.3	±	5.2	5.8	±	4.1	9.2	±	5.9	8.3	±	5.5	8.3	±	5.7	7.6	±	5.1
5	*Brachionus calyciflorous*	6.7	±	4.7	9.2	±	5.9	6.7	±	4.7	10.8	±	7.1	11.7	±	7.6	9.2	±	6.2	9.0	±	6.0
6	*Brachionus species*	3.3	±	2.9	7.5	±	5.2	5.8	±	4.3	5.8	±	4.3	8.3	±	6.0	5.0	±	3.5	6.0	±	4.4
7	*Cephallodell gibba**	29.2	±	2.1	31.7	±	2.2	30.0	±	2.6	19.2	±	1.2	18.3	±	1.8	36.7	±	23	27.5	±	1.2
8	*Ellosa species*	3.3	±	2.9	3.3	±	2.8	3.3	±	3.3	5.8	±	4.2	5.8	±	4.2	5.0	±	3.6	4.4	±	3.5
9	*Horaella brehmi*	5.0	±	4.0	3.3	±	2.8	4.2	±	3.7	3.3	±	2.9	7.5	±	5.2	6.7	±	5.3	5.0	±	4.0
10	*Keratella species*	14.2	±	1.1	19.2	±	1.5	15.8	±	1.0	12.5	±	1.9	12.5	±	1.0	22.5	±	1.9	16.1	±	1.2
11	*Lecane raculta*	4.2	±	3.3	4.2	±	3.2	4.2	±	3.7	5.0	±	4.0	5.0	±	4.0	5.0	±	3.7	4.6	±	3.7
12	*Lecane species*	7.5	±	5.5	10.0	±	7.5	9.2	±	7.0	7.5	±	5.1	10.0	±	6.9	13.3	±	1.8	9.6	±	7.0
13	*Lepadella ovalis*	4.2	±	3.2	5.0	±	4.0	4.2	±	3.2	7.5	±	5.2	5.8	±	4.4	6.7	±	4.7	5.6	±	4.1
14	*Lepadella patella**	20.0	±	1.3	25.8	±	1.7	20.0	±	1.4	19.2	±	1.4	20.0	±	1.9	24.2	±	1.5	21.5	±	10
15	*Monostyla species**	20.8	±	1.3	22.5	±	1.5	20.0	±	1.7	15.0	±	1.6	15.0	±	1.6	25.0	±	1.4	19.7	±	1.0
16	*Trichotria similisstrumosa*	7.5	±	5.1	9.2	±	6.1	7.5	±	5.1	5.8	±	4.4	5.8	±	4.4	10.0	±	6.7	7.6	±	5.3

Discussion

The monthly population and seasonal variation of rotifers in Sonala Dam were studied from February 2012-January 2013. Data harvested during the study period, Rotifers showed dominance during the winter season and minimum was found in the monsoon season. Maximum diversity of rotifers found in winter season which may be due to the abundance in the food. Less diversity during monsoon may be due to rainfall and

heavy floods and less food available. (Sharma *et al.,* 2013). Present observations of Rotifers in Sonala Dam were similar with the observations of Edmondson (1965), Dhanpati (2000), Kumar (2001), Sitre S. R.(2012) and Sharma (2013). Edmondson (1965) observed high rotifer population in winter, which could be attributed to the favorable temperature and the availability of abundant food in the form bacteria, nanoplanktons and suspended particles. Present study, reports rich rotifer population represented by 16 species. Rotifers were found in maximum at stations, S_1, S_3, and S_6 during winter. In the present investigation, low nutrient level has been recorded but the influence of water temperature was found negative. Rotifers are chiefly freshwater forms and presence of these organisms in abundance is related to suitable conditions for their survival (Dhanpati, 2000). The diversified rotifer fauna of lake can be linked to favorable conditions and availability of abundant food in the form of bacteria, nanoplankton and suspended detritus in the lake water (Sitre S. R. 2012). During monsoon season lower values of rotifer population density and diversity was observed which could be due to dilution of water resulting in less nutrients (Kumar, 2001).

Three pollution indicators species were observed during the study period among the observed rotifers, *Cephallodella gibba, Lepadellla patella* and *Monostyla* species and they were abundantly found at stations S_1, S_2, S_3 and S_6. The specific distribution of pollution indicators indicated different food habits and presence of pollutant in water at station S_1, S_3 and S_6 where the water depth was shallow in which the activities of domestic animals and human being with respect to washing and bathing were predominant. These factors were responsible for creation of unstable conditions and therefore, much pollutant tolerant species were observed from sampling stations S_1, S_3 and S_6. Sudzaki (1964) also observed more resistant species of rotifers at unstable polluted zone of various lakes in Japan. Rotifers are considered as ideal indicators of water quality assessment (Berzens 1989). More work is still required to study regional indicator species from different parts of India. It is presumed that rotifers utilize the nutrients as well as phytoplankton more rapidly to build up their population. This may be the reason for the worldwide distribution of Rotifers (Peenak 1978).

Conclusion

Sonala dam is nutrient rich and contain diversified rotifer fauna. Rotifers are microscopic soft-bodied fresh water invertebrates, which have often been used to indicate the tropic status of a water body. Rotifers utilize the nutrients as well as phytoplankton more rapidly to build up their population and due to their enormous reproductive potential; they play a significant role in aquatic ecosystem to maintain the ecological balance. They were most abundant during winter season and showed least abundance during monsoon season.

References

1. **APHA, (1998)**: Standard methods for the examination of water and wastewater 20theds. American Public Health Association. American water works Association WaterEnvironment Federation. Washington, D.C.
2. **Berzens, B. and Pejler, B. (1989)**: *Hydrobiologia,* 27: 171-180.
3. **Dhanpathi, M.V.S.S.S (2000)**: Taxonomic notes on the rotifers from India, IAAB, Hyderabad, 1-78.
4. **Edmondson, W. T. (1965)**: Reproductive rate of plank tonic rotifers as related to food and temperature. *Ecol Manoir.*, 35: 61-111.
5. **Kodarkar, M. S. (1992)**: Methodology for water analysis, physico-chemical biological and micro-biological. Indian Association of Aquatic Biologists, Hydeabad, Publ. 2: pp.50.
6. *Gazonato Neto, A.J., Silva, L.C., Saggio, A. A., Rocha, O. (2014):* Zooplankton communities as Eutrophication bioindicators in tropical reservoirs. *BiotaNeotropica 14 (4):1-12.*
7. **Kumar, K. S. (2001)**: Studies on freshwater copepods and cladocera of Dharmapuri Dist. Tamil Nadu. *J.Aqua.Biol.* 16 (1 & 2): 5-10.
8. **Mahajan, C. L. (1981):** Zooplankton as indicators for assessment of water pollution ibid. PP: 135-148.
9. *Pattnaik, B. S. (2014):* Determination of Rotifer Distribution to Trophic Nature of Ponds. *Indian Journal of Applied Research. 4(4) 25-26*
10. **Pejler, B. (1995)**: Relation to habitat in rotifers. *Hydrobiologia* 313-314: 267-278.
11. **Pennak, R. W. (1978)**: Freshwater invertebrates of the United States, 2nd Ed. New York: John Wiley-Interscience Pp.803.
12. *Pennak, R. W. (1989)*: Fresh water invertebrates of the United States 2/e. 628: *John Wiley and Sons Inc., New York.*

13. **Sharma, B. K. (1983)**: The Indian Species of the genus *Brachionus* (Eurotatoria, Monogonata, Brachionidae), *Hydrobiologia*, Vol.104: 31-39.

14. **Sharma, B. K. (2009)**: Diversity of Rotifers (Rotifera: Eurotatoria) of Loktak lake, north-eastern India. *Tropical Ecology* 50 (2): 277-285.

15. **Sharma, S., Solanki C. M., Sharma D., Zahoor Pir (2013)**: Distribution and diversity of zooplanktons in Madhya Pradesh, India. *International Journal of Advanced Research*, 1(1): 16-21.

16. **Sitre, S. R. (2012):** Assessment Of Biodiversity Of Rotifers In Ambazari Lake Of Nagpur City With Respect To Water Quality *International Interdisciplinary Research Journal, {Bi-Monthly}, Volume-II, Issue-II 104-110.*

17. **Somani, V. and M. Pejawar (2003):** Rotifer diversity in Lake Masunda, thane (Maharashtra). *J. Aqua. Biol., 18 (1): 23-27.*

18. **Sudzaki, M. (1964):** New systematical approach to the Japanese planktonic rotararia. *Hydrobiologia*, 23(1): 1-25.

19. **Vanjare – Pai (2013):** Ecology of freshwater rotifera in a seasonal pond of the University of Pune (Maharashtra, India) *Applied Ecology and Environmental Research* 11(4): 525-539.

20. **Verma, D. R., Ahmad, T. and Bajpai, S. (2014):** Population Dynamics of Rotifer fauna in two Eutrophic ponds of Bahraich district Uttar Pradesh. *Cibtech Journal of Zoology. 3(2) MayAugust.pp37-42.*

21. **Wallace, R. L., Snell, T. W., Ricci, C., and Nogrady, T. (2006):** Rotifera: Biology, Ecology and Systematics. In: Guides to the identification of the microinvertebrates of the continental waters of the world (Eds. Segers, H., and D).

Assessment Of Spiders Diversity And Composition Along The Grassland Near Charghad River Morshi, Distirct Amravati, Maharashtra.

U.S. Deshmukh [*] **A.P. Tekade**

Government Vidarbha Institute of Science and Humanities,
Amravati 444604 (M.S) India.

Abstract

Spiders are at the pinnacle of the lower food web. Definite information on structural patterns of species richness and species distribution is significant for conservation. This study assesses and compares the effect of environmental variation on spider species from September 2018 to March 2019 in different microhabitat (open, grass, trees, foliage) across heterogeneous grassland. A total of 50 species from 28 genera belonging to 11 families where recorded. Among them 18 species belonging to family Salticidae followed by family Araneidae with 16 species where most abundant of total species recorded. Followed by Oxyopidae (4 species), Thomisidae (3 species), Hersilidae (2 species), Lycosidae (2 species) and Erasidae, Gnaphosidae, Sparassidae, Theridiidae, Uloboridae comprises one species each. Since the spiders have expanded zone of predation the variation is highly affected by vegetation structure and distinct microhabitat in the study area. The study suggested that the environmental structure of habitat influences the diversity and composition of spiders.

Keywords: SPIDER, DIVERSITY, VEGETATION STRUCTURE, COMPOSITION OF SPECIES, CHARGHAD

Introduction

Today grasslands are at the highest priority for conservation as they provide essential habitat for many rare and endangered plant and animal species (Rao et al. 2011; Tubbesing et al. 2014). Recording of structural patterns in spider diversity in grassland is difficult because taxonomic, functional, trophic, genetic biodiversity have been relatively poorly studied. The majority of studies on grassland ecology have focused either on vegetation and vertebrate responses. Thus it remains unclear how spiders diversity influence and function in grasslands (Nemec et al. 2014). Spider responds faster than vegetation and vertebrate to environment variations because of the high degree of mobility and short generation time. Spiders are air- breathing predatory animal having two body segments; among Arthropods Spiders, Scorpions, Pseudoscorpion, Harvestman, Mites with some other forms belongs to Class Arachnida (Lamarck, 1815). Spiders are represented globally with 48,394 known species under 4154 genera distributed over 120 families (WSC, 2019). In India they are represented by 1686 species belonging to 438 genera of 61 families) with 111 species of Mygalomorphae distributed over 32 genera under eight families from India.   (Keswani et al., 2012). Spiders are not only diverse in form, but also are diverse in hunting strategies and play fundamental roles in the terrestrial food web as both predators and prey (Malumbres-Olarte et al. 2013). This study aims to describe not only the spider communities present in grassland near Charghad river, but also to examine habitat differences that influence spiders in these communities.

Material And Method

The study has been conducted from September 2018 to March 2019 along the grassland near Charghad river Morshi, district Amravati, Maharashtra**.** The study area is located latitude 21.324196^0 N and longitude 78.013832^0 E at an elevation of 303 meters from sea level. Charghad river originated in Satpuda ranges in Madhya Pradesh and is a tributary of Wardha river. Morshi taluka heaving climatic condition 32^0 to 48^0 C temperature in summer and 16^0 to 22^0 winters. The rainfall is with southwestern monsoon from June to September having an annual average rainfall of 758.40 mm. The site was selected on the basis of accessibility, type of vegetation.

The fieldwork was designed in 10 quadrants each covering all significant areas with natural vegetation along 5 km of river patch. Where sampling sites of 10 sq. meters were selected and marked. Sampling was done from this 10 sq. meters quadrants in grassland every weekend; mostly from early morning to late night. Sampling was done by visual search, sweeping by insect net, beating using the inverted umbrella, pitfall trapping.

Only mature spiders were collected for identification and were photographed with the help of DSLR canon 1500D camera and release back in natural habitat. Identification was done with the help of the following keys: Roberts (1985); Tikader (1987); Platnik (2004); Gajbe (2005); Biswas and Biswas (1992) with other Z.S.I literature available was also used for species identification and to record classification.

Result And Discussion

In present study observations regarding spider diversity of grassland ecosystem 50 species belonging to 28 genera of 11 families were recorded. But family like Araneidae (16 species), Salticidae (17 species) was the most abundant of total species recorded in grassland. Followed by Oxyopidae (4 species), Thomisidae (3 species), Hersilidae (2 species), Lycosidae (2 species) and Erasidae, Gnaphosidae, Sparassidae, Theridiidae, Uloboridae comprises one species each. The study suggested that several habitat variables can be important drivers of the spider community in Charghad river grasslands ecosystem.

The most abundant family found in Charghad river ecosystem is Salticidae (Jumping spider) with 17 species. The spiders belonging to this family were found abundant within small grass habitat like Cynodon *dictylon* (hariali) and less litter cover ground. This suggested that it may be due to the ideal hunting ground for forging prey. The second most abundant spider family was found to be Araneidae (Orb web spiders) with 16 species. This suggested that the most important factors for the abundance of Araneidae appear to be the presence annual grasses, like *Andropogon martini* (tikhari), *Sorghum halepense* (boru), *Ichamum sulcatum* (paonia), *Ichamum laxum* (sahada) and *Andropogon contorlus* (kusal). This helps them to prepare orb webs for food capturing and provide an ideal retreat for nocturnal spiders. Spiders of family Oxyopidae (4 species) were found abundant in all grassland this suggests that may be due to their prey preference by hunting. The spiders belonging family Hersilidae (2 species) were very scarcely distributed due to a few numbers of wooded trees in the grassland. Some ground- dwelling spider families like Lycosidae (2 species) and Gnaphosidae (1 species) rely on litter for hunting and studies have shown these groups increase with greater litter depth. The present result shows that spider families like Sparassidae, Theridiidae, Uloboridae where less abundant may be due to low preference for habitat. The vegetation of grasses appears to play a key role in structuring spider communities through their substantive influence on the grassland ecosystem.

Table: Family wise distribution of spider species in grassland ecosystem in Charghad river valley.
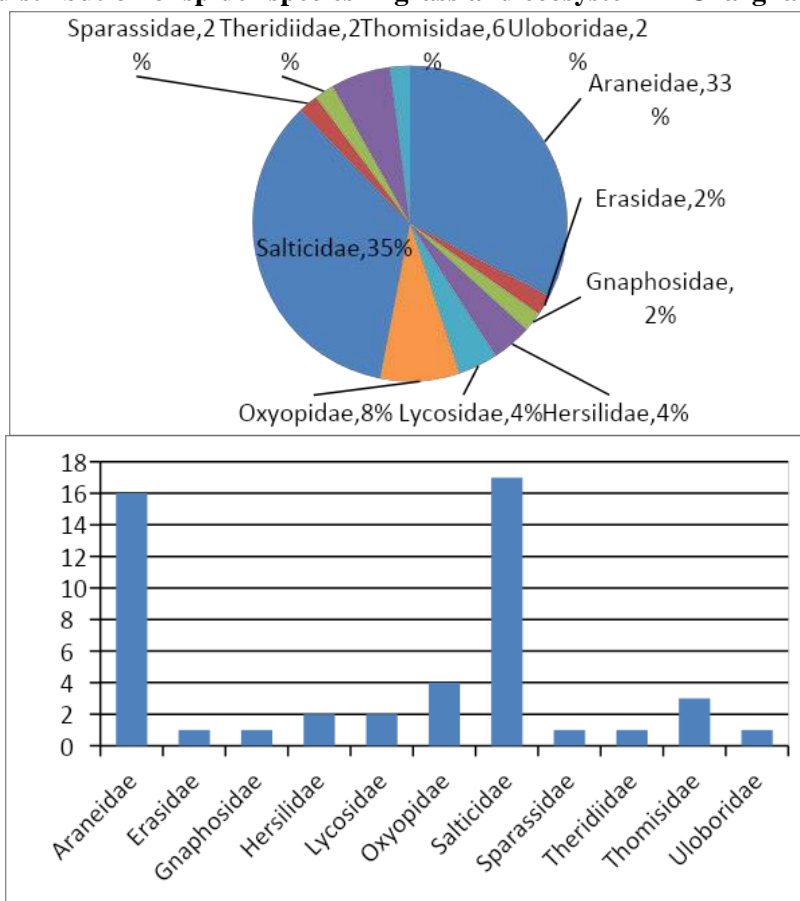
Table: Family wise list of spider species distribution from grassland ecosystem of Charghad river basin 2018-19.

Sr.no	Family	Species in grasslandnear Charghad river
1	Araneidae	*Araneus sp* (Female)
		Cyclosa hexatuberculata (Female)
		Cyclosa insulana (Female)
		Cyclosa sp (Female)
		Cyclosa sp (Male)
		Larinia directa (Female)
		Larinia directa (Female)
		Neoscona bengalensis (Female)
		Neoscona crucifera (Male)
		Neoscona lugubris (Female)
		Neoscona mukerjei (Male)
		Neoscona nautica (Female)
		Neoscona pavida (Female)
		Neoscona sp (Female)
		Neoscona sp (Female)
		Neoscona sp (Female)
		Poltys (Female)
2	Erasidae	*Stegodyphus sp* (Female)
3	Gnaphosidae	*Porecilochora barmani* (Female)
4	Hersilidae	*Hersilia savignyi* (Female)
		Hersilia sp (Female)
5	Lycosidae	*Acantholycosa lignaria* (Female)
		Hippasa holmerae (Female)
6	Oxyopidae	*Oxyopes burmenicus* (Female)
		Oxyopes pankaji (Female)
		Oxyopes pawanii (Male)
		Oxyopes sp. (Male)
7	Salticidae	*Attidops youngi (Male)*
		Harmochirus brachiatus (Female)
		Hasarius adansoni (Male)
		Marpissa decorata (Female)
		Marpissa sp. (Male)
		Marpissa sp. (Male)
		Marpissa sp. (Female)
		Myrmarachne sp (Female)
		Myrmarachne sp (Male)
		Phidippus paykuli. (Female)
		Phidippus sp (Male)
		Phintella vittata (Female)
		Plexippus petersi (Female)
		Plexippus paykullii (Male)
		Plexippus paykullii (Female)
		Plexippus paykullii (Female)
		Plexippus sp (Male)
		Plexippus sp (Male)
		Rhene sanghrakshti (Female)
		Rhene sp. (Female)

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293
(Special Issue No.70)   Peer Reviewed Journal   www.aiirjournal.com Mob. 8999250451

107

8	Sparassidae	*Heteropoda phasma* (Female)
9	Theridiidae	*Theridion indicum* (Female)
10	Thomisidae	*Misumena sp.* (Male)
		Thomisus sp (Female)
		Xysticus minutes (Female
11	Uloboridae	*Zosis sp.* (Female)

Refrences

1. Gajbe .P (2004): Description of three new species of crab spiders (Araneae : Thomisidae) from Madhya Pradesh, India. Rec. Zoological Survey of India, Kolkatta. 103 (Part 1-2): 123-130.

2. Gajbe U.A (Jan 2008): Fauna of India and adjacent countries, Volume III Spider Oxyopidae Zoological Survey of India, Calcutta India.

3. Keswani S, Vankhede G (2014): Description of one new species of the genus Clubiona (Araneae: Clubionidae) from India, Indian J Arachnol 3(1): 35-40

4. Majumder SC, Tikader B K (1991): Studies on some spiders of the family Clubionidae from India. Rec. Zool Surv India Occ Pap 102: 1-174.

5. Nemec K, Allen CR, Danielson SD, Helzer CJ (2014): Responses of predatory invertebrates to seeding density and plant species richness in experimental tallgrass prairie restorations. Agriculture, Ecosystems and Environment 183:11–20.

6. Malumbres-Olarte J, Vink CJ, Ross JG, Cruickshank RH, Paterson AM (2013): The role of habitat complexity on spider communities in native alpine grasslands of New Zealand: habitat complexity and alpine spiders. Insect Conservation and Diversity 6:124–134.

7. Platnick N.I. (1981-1987): Advances in Spider Taxonomy A Supplement to Brignoli's A Catalog of the Araneae Described Between 1940 and 1981 (edited by P. Merrett). Manchester University Press, 1989, 673. 18.

8. Pocock R. I (1900): The fauna of British India including Ceylon and Burma.

9. Rao S, Stephen WP, Kimoto C, DeBano SJ (2011): The status of the 'red-listed' Bombus occidentalis (Hymenoptera: Apiformes) in northeastern Oregon. Northwest Science 85:64–67.

10. Tubbesing C, Strohm C, DeBano SJ, Gonzalez N, Kimoto C, Taylor RV (2014): Insect visitors and pollination ecology of Spalding's catchfly (Silene spaldingii) in the Zumwalt prairie of northeastern Oregon. Natural Areas Journal 34:200–211.

11. Tikader B.K (1963): Studied spider fauna of Maharashtra and Mysore state-Part I.J University of Poona, Sci. and Tech., 24:29-54.

12. Tikader B.K (1977): Studies on some Mygalomorph spiders of the families Ctenizidae and Theraphosidae from India. Journal of Bombay Natural History Society 74:306-319.

13. Tikader B.K and M.S Malhotra (1980): The fauna of India. Spiders (Thomisidae and Lycosidae). Zoological Survey of India, Calcutta 446pp.

14. Tikader B.K and B. Biswas, (1981): Spider fauna of Calcutta and vicinity Part-I, Rec. Zoological Survey of India Occ.Pap.30:1-49.

15. Tikader B.K (1987): Hand book of Indian spiders. Zoological Survey of India, Calcutta India, 251.

16. Tikader B.K (1980): Fauna of India Part I Thomisidae and Part II Lycosidae Zoological Survey of India, Calcutta India.

17. World spider Catalog (2015): Natural History Museum Bern, online at http://wsc.nmbe.ch, version 16.5 (Accessed on 20.11.2019).

Isolation And Identification Of AM Fungi From Some Spices
Of Gurukunj & Mozri Region (M.S.)

Lubna P. Khalid , Shraddha P.Jambhole

P.G department of Botany, Vidyabharati Mahavidyalaya,
Amravati.

Abstract:

Arbascular mychorhiza enhance the soil fertility and soil quality by increasing minerals amount in soil. In the present work some spices are selected and observed the AM diversity in it they are Allium cepa(Onion), Zingiber offcinale(Zinger) and Curcuma longa(Turmeric). All three spices samples collected from different sites of Mozari and Gurukunj Ashram region Maharashtra. VAM spores isolated from the soil sample by Wet sieving and decanting technique by Gerdemon and Nicolson,1963 and counting it by the procedure described by Gaur and Adholey;1994. In the present work Observed species in all three spices are Glomus.aggregatum, Glomus albidum, Glomus glomeralatum, Glomu scitruculata, Glomus albidium, Glomus fassiculatum, Aculospora bireticulatum, Aculospora sporocarpa, Aculospora foveata, Aculospora bireticulatum, Aculospora scrobiculata, Aculospora delicate, Gigaspora gigantean, Gigaspora gigantum and Entrophospora kantinensis but most dominant observed AM spores are Glomus aggregatum and Glomus fasciculatum and Aculospora bireticulata.

Keywords: Allium cepa, Zingiber offcinale,Curcuma longa, Rhizosporic soil sample, AM spores.

Introduction:

"Mycor-rhiza" literally means "fungus" - "root" and defines the mutually beneficial relationship between the plant root and fungi. More than 90 percent of plant species in natural areas form a symbiotic relationship with the beneficial mycorrhizal fungi.(George and marschner1995).Arbuscular mycorrhizal fungi (AMF) compose a key functional group of the soil biota that can substantially contribute to yield the ecosystem sustainability in crop production strategies. Presently, application of beneficial microbial inoculants are increasingly attracting toward sustainable agriculture and life quality as a consequence of the need to solve health and environmental problem.

In the present study some spices are used for observing diversity of Am fungi in rhizosporic soil. Turmeric [*curcuma domestica* Vahl. N O .Family zingiberaceae] is popular in south Asian countries including Bangladesh for its medicinal value and usage as spice. Because of its antiseptic properties in to low fertile soil , mycorrhizal symbiosis has great potential to reduce production coast improving plant growth by taking up phosphorus and micronutrients, controlling soil born plant disease, improving water balance and reducing drought stress.

The onion plant (*Allium cepa*) is an important vegetable crop of the world. The onion bulb which is an underground stem modification .Onion are unable to complete their life cycle in the absence of AMF because of insufficient P uptake hence insufficient growth.

Ginger [Zingiber offincial Rose] is a creeping perennial on a thick tuberous rhizome. It is native of south East Asia;it is cultivated in most of the country it grows well at an elevation of 1, 500 meters from the sea level. The arbuscular mycorrhizal fungi enhance tolerance of plant in water deficit condition (Ricardo Aroca et,al, 2008). In most of the experiment it has been indicated that arbuscular mycorrhizal fungi are able to alter water relation of its host plant.

Material and Method:

The rhizosphere soil of *Onion, Ginger, Turmeric* are collected in sterile Polythene bags from Mozari field, Gurukung area site of Amravati District. All the soil sample having different soil texture like sandy,sandy loamy,sandy loamy ,clay and clay loamy with different P^H range, collected samples are dried under shade condition for further analysis. Different methods are used for counting AM fungal spores. The procedure described by (Gaur and Adholey;1994) is used for counting AM spores. Different methods are used to isolate VAM spores from the soil sample. In the present study, the Wet sieving and decanting technique(Gerdemon and Nicolson,1963) is used. The VAM fungi are identified by using manual of Schenek and apaerez(1990), Keys of Morton and Benny(1990) and Mehrotra and Baijal(1994).

Ginger(ZingiberOfficinale)   *Onion(Allium cepa*   *Turmeric(Curcuma longa)*

Observation and Result: In the present work number of species are observed in all collected rhizosperic sample all belongs to genera *Glomus, Gigaspora, Acaulospora, Sceutelospora and Entrophosphora*. Out Of these five genera *Glomus and Acaulospora* observed more frequently. Observed species are *Glomus aggregatum, Glomus albidum, Glomus glomeralatum, Glomu scitruculata, Glomus albidium, Glomus fassiculatum, Aculospora bireticulatum, Aculospora sporocarpa, Aculospora foveata, Aculospora bireticulatum, Aculospora scrobiculata, Aculospora delicate, Gigaspora gigantean, Gigaspora gigantum* and *Entrophospora kantinensis* but most dominant observed AM spore are *Glomus aggregatum* and *Glomus fasciculatum* and *Aculospora bireticulata* and along with them one species of *Enthrophosphora* is also observed ,result mention in Table No. 1

Table No.1 Isolation and Identification of Am Fungi from selected spices

Sr.no.	No. of slide	Name of Spices and identified AM species in each sample		
		Zingibar officinale	*Allium cepa.*	*Curcuma longa*
1.	Slide 1	*Glomus albidum*	*Glomus glomerculatum*	*Glomus fasciculatum*
		Glomus glomeralatum	*Aculospora foveata*	*Glomus aggregatum*
		Glomus albidium	*Aculospora bireticulatum*	*Aculospora bireticulatum*
		Glomus.fassiculatum	*Gigaspora gigantum*	*Aculospora sporocarpa*
		Glomus.aggregatum	*Glomus albidum*	*Aculospora foveata*
2.	Slide 2	*Glomus. fasciculatum*	*Glomus albidum*	*Glomus albidum*
		Glomus.agreegatum	*Aculospora bireticulata*	*Aculospora sporocarpa*
		Glomus.aggregatum	*Aculospora scrobiculata*	*Aculospora formosanu*
		Glomus.glomerculatum	*Glomus aggregatum*	*Aculospora sporocarpa*
		Glomus albidum	*Glomus fasciculatum*	*Glomus aggregatum*
3.	Slide 3	*Glomus fasciculatum*	*Glomus arborense*	*Glomus albidum*
		Aculospora bireticulatum	*Glomus giganta*	*Gigaspora sps.*
		Glomus fasciculatum	*Glomus mosseae*	*Glomus fasciculatum*
		Glomus fulvum	*Glomus acculatum*	*Aculospora sporocarpa*
		Aculospora sporocarpa	*Glomus gallosum*	*Glomus glomerultum*
4.	Slide 4	*Glomus glomerulatum*	*Glomus giganta*	*Glomus fasciculatum*
		Gigaspora gigantean	*Glomus mosseae*	*Aculospora bireticulatum*
		Glomus , albidum	*Glomus albidum*	*Glomus gigantean*
		Glomus fascculatum	*Aculospora Denticulata*	*Glomus fasciculatum*
		Glomus aggregatum	*Glomus fasciculatum*	*Aculospora cirtrucutum*
5.	Slide 5	*Glomus fasciculatum*	*Glomus giganta*	*Aculospora delicate*
		Aculospora tuiwania	*Glomus Fascicultum*	*Aculospora foveata*
		Glomus fasciculatum	*Glomus giganta*	*Aculospora mellea*
		Glomus albidum	*Aculospora foveata*	*Glomus fassciculatum*
		Aculospora sporecarpa	*Glomus fasciculate*	*Aculospora sporocarpa*
		Aculospora bireticulata	*Glomus aggregatum*	*Glomus albidum*

6.	Slide 6	Glomus albidum	Glomus Albidum	Aculospora mellea
		Glomus albidum	Aculospora denticulate	Aculospora delicate
		Aculospora bireticulata	Aculospora scrobiculata	Glomus albidum
		Glomus callosum	Glomus fasciculatum	Aculospora sporocarpa
7.	Slide 7	Glomus fasciculate	Aculospora foveata	Glomus mellea
		Aculospora denticulatum	Aculospora denticulatum	Aculospora foveata
		Aculospora bireticulatum	Aculospora giganta	Gigaspora giganta
		Glomus albidum	Glomus giganta	Aculospora bireticulatum
		Glomus mosseae	Glomus albidum	-
8.	Slide 8	Glomus fasciculatum	Aculospora foveata	Gigaspora giganta
		Aculospora bireticulatum	Gigaspora gigantean	Aculospora biretuculatum
		Aculospora foveata	Glomus albidum	Glomus mellea
		Aculospora sporocarpa	Glomus fasciculatum	Glomus albidum
		Glomus aggregatum	Glomus albidum	-
9.	Slide 9	Glomus albidum	Glomus albidum	Aculospora bireticulatum
		Glomus callosum	Gigaspora gigantean	Glomus albidum
		Glomus aggregatum	Glomus citruculata	Glomus albidum
		Gigaspora gigantum	Glomus albidum	Glomus fascicilata
		Glomus fasciculatum	Glomus fasciculate	-
10.	Slide 10	Glomus albidum	Aculospora foveata	Glomus citriculata
		Glomus callosum	Glomus giganta	Glomus albidium
		Glomus glomeraltum	Glomus albidum	Aculospora bireticulata
		Glomus fasciculatum	Glomus albidum	Enthrophosphora kantinensis
			Aculospora bireticulatum	-
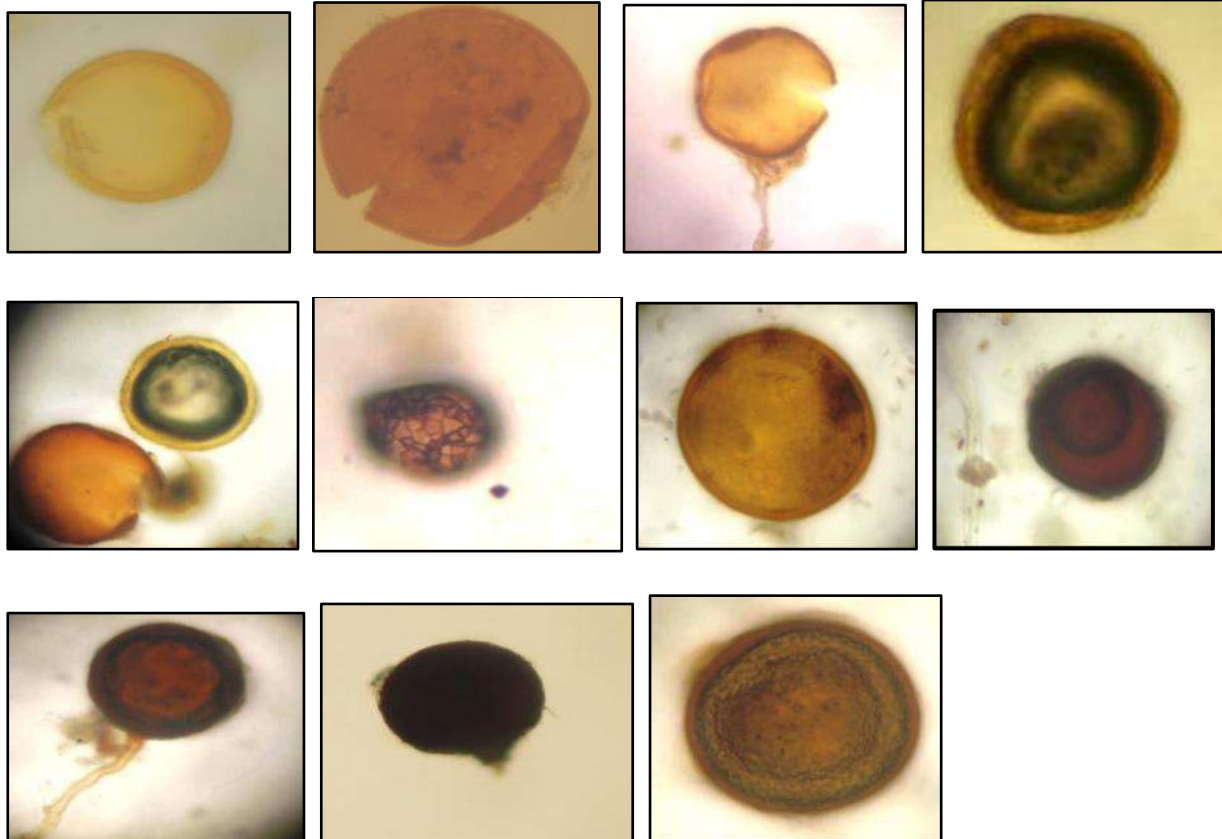
Figure 1: showing **A-B** Glomus agregatum, **C-**G. fasciculatum, **D-**G.Glomerulatum, **E-**G. albidum, **F-** Acaulospora bireticulata,**G-** Aculospora taiwania, **H-** Acaulospora sporocorpa,   **I-** Acaulospora formosanu, **J-** Gigaspora   gigantum, **K -** Entrophospora Kentinensis

Table No.2   Quantification data of AM fungi in collected rhizosporic soil of Spices

Sr.no.	Name of Spices	No. of AM spores quantified in each rhizosporic soil			
		Glomus	*Acaulospora*	*Gigaspora*	**Enthrophosphora**
1.	*Zingibarofficinale*	34	10	02	00
2.	*Allium cepa.*	31	14	03	00
3.	*Curcuma longa*	18	19	02	01
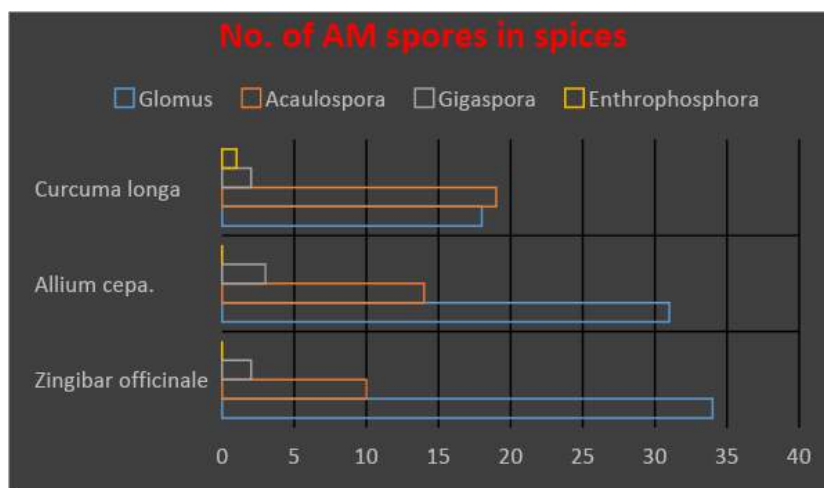
Figure: 2 showing the no. of spores isolated from collected soil sample

References:

1. George and Marschner, (1995) gigaspora gigantia seasonal abundance and ageing of spore in a sanddune , mycorrhiza, 98 443-457.
2. Ricardo A, K, Gharh H,J mallick (2008) .Zigiber officinal anatomical gold journal of pharma bio science 283-292.
3. Gaur A, Adholeya ; 1994 . Estimation of VAMF spore in soil mycorrhiza . A modified method .mycorrhiza newes 6 10 -11.
4. Gerdemann, J.W. and T.H. Nicholson. 1963. Sporesof mycorrhizal Endogone species extractedfrom soil by wet sieving and decanting. Trans.Br. Mycol. Soc. 46*:*235-244.
5. Schenck and Perez; (1990). A manual for identification of vesicular arbuscular mychirrhizal fungi. 3rd Edn. Synergistic Publication, Gainesville. Florida. USA: p. 286.

Inventory of Antimicrobial potential of *Pholcus phalangioides* spider's silk on E*. coli* and *S. aureus.*

*Dr. U.S. Deshmukh, A.S. Pansare

Department of Zoology

*Corresponding author Govt. Vidarbha Institute of Science and Humanities,

Amravati

Abstract:

Antimicrobial activity of Pholcus phalangioides spider silk was observed against two bacteria Escherichia coli and Staphylococcus aureus. Extracts of silk with different solvents i.e. ethanol, methanol and acetone with proportion as 1gm dissolved in 10ml were prepared. Cultures were prepared of two bacteria E. coli and S. aureus, separately loaded with silk extracts and observed after 24 hours for zone of inhibition. Zone of inhibition was measured in diameter. Solvents without silk do not show any antimicrobial activity whereas extracts in ethanol, methanol and acetone showed zone of inhibition as 10 mm, 13 mm and 12 mm diameter for E. coli and 8 mm, 10 mm, 14 mm for S. aureus respectively.
Key words: Antimicrobial activity, Pholcus phalangioides, spider silk, E. coli, S. aureus

Introduction:

Pholcus phalangioides commonly inhabits buildings and therefore leads a normal life even under the strong influence of human activities, especially lighting and air conditioning (kazuyoshi 1987). *Pholcus phalangioides* mostly found in dark and undisturbed areas. Some are also found in basements, in crevices of stones, in caves. They make their webs large, loose, flat, but they make it in irregular shape so that it can be fit into the surrounding environment. The webs of spiders are specially fabricated to capture their prey and to save them from predators (Mishra *et al*. 2012).

Apart from being crucial for spiders, spider silk has gained much attention in recent years for its potential to be utilized by mankind. Currently, the medical and pharmaceutical industries are trying hard to develop an effective treatment against the prevailing infectious diseases.

Many Bacterial diseases are contagious and can result in many serious and life threatening complications. *Escherichia coli* and *Salmonella* cause food poisoning. *Helicobacter pylori* causes gastritis and ulcers. *Neisseria gonorrhoea* causes sexually transmitted disease gonorrhoea. *Neisseria meningitides* causes meningitis. *Staphylococcus aureus* causes variety of infections in the body including boils, cellulitis, abscesses, wound infections, toxic shock syndrome, pneumonia and food poisoning. *Streptococcal* bacteria causes ear infections, strep throat, meningitis and many other infections (Deshmukh 2019)

In recent years, spider silk has attracted much attention as a substance with potent antibacterial activity due to the wealth of antimicrobial compounds (Roozbahani *et al.* 2014). Nowadays due to rapid change in atmosphere various bacterial as well as fungal infections are very common to human. These bacteria are becoming resistant to many antibiotics. In this aspect this is a step toward searching a new pharmaceutical product which is natural as well as eco-friendly.

 It has been observed that there is no any microbial growth on spider's web even after it is rich source of proteins. The indication of its resistance to microorganism is its longevity. Studies by Vollrath *et. al.* (2006) has investigated the compounds present in spider silk and has found that spider silk contains molecules that are known to have antimicrobial properties. There are many ancient examples of applications of spider silk in medicines. Rendering to Heimer (1988) traditional use of *Atypus* spider's web seen in primeval times that it was used by the peasants in Carpathian Mountains for healing wounds.

Material and method:

Spider silk used of *Pholcus phalangioides* from family Pholcidae. Silk was collected from different locations like from garages, institute campus, ceilings, etc. It was collected by using brush and forceps in polythene bags of 50μ maintaining aseptic conditions. Webs were washed with distilled water to remove dust and prey remains captured by the spider. After washing the silk is oven dried. Then used further for extract preparation. Bacterial cultures used were *Escherichia coli* (Gram-negative) and *Staphylococcus aureus* (Gram-

positive). Bacterial cultures were collected from Department of Microbiology Bhartiya Mahavidyalaya, Amravati. Cultures were in the form of nutrient broth.

Extract was prepared using three different solvents i.e. Ethanol, Methanol, Acetone. 1 gm. of web is dissolved in 10 ml of Ethanol, Methanol and Acetone separately for a week followed by centrifugation. Extracts of web in different solvents showed different colour appearance of supernatant. Agar liquid was poured in petri plates and kept undisturbed for a while until it gets solidified into gel. 5µl desired bacteria was inoculated with 'L' shaped spreader. A place was marked on the petri plate; a punched filter paper was deep into the extract in a cavity block and kept on the mark place. Incubation was done in incubator at 37ºc, for 24 hours. After 24 hours petri plates were observed.

Observations and Results:

For control the three blank solvents (solvent without silk) were tested against two bacterial strains *E.coli* and *S. aureus*. This showed no activity on these bacteria. Web extract in distilled water also did not show inhibition for growth of bacteria. For three different extracts in Ethanol, Methanol and Acetone zone of inhibition was observed for two bacteria *E.coli* and *S.aureus* gram negative and gram positive bacteria respectively. Zone of inhibition was measured millimeter as the diameter of zone of inhibition. For *Pholcus phalangioides* Ethanol extract has shown the diameter of zone of inhibition as 10 mm for *E. coli* and 8 mm for *S. aureus*. For methanol extract the zone of inhibition was 13 mm for *E. coli* and 10 mm for *S. aureus.* Acetone extract shown 12 mm diameter for *E. coli* and 14 mm for *S. aureus.*

Table: Zone of inhibition measured the diameter in mm.

Solvents	Diameter in mm	
	E. coli	*S. aureus*
Ethanol	10 mm	8 mm
Methanol	13 mm	10 mm
Acetone	12 mm	14 mm

Outcomes of this work specify that the silk of spider *Pholcus phalangioides* holds antimicrobial activity when extracts are prepared with solvents Ethanol, Methanol and Acetone. This showed highest zone of inhibition in Acetone solvent for bacteria *S. aureus*. This investigation can be a base for further exploration.

References:
1. **Chakraborthy, D. and Das, S. (2009**). Antibacterial activities of cobweb protein.19th *ECCMID* (European Congress of Clinical Microbiology and Infectious Diseases), Helsikni, Finland. Abstract No. R2127.
2. **Heimer, S., 1988**.Wunderbare Welt der Spinnen, UraniaAgents 16:19–24.and Apparel, Technology and Management, 5(1), 1-20.
3. **Ujjwala Shivaji Deshmukh and Ankita S. Pansare (2019),**Antimicrobial activity of web of spider, *Stegodyphus sarasenorum*on*E. coli* and *S. aureus.* Department of Zoology,12(3): 787-789 ,10.21786/bbrc/12.3/35
4. **Kazuyoshi Miyashita :**Department of Biology, Faculty of Science, TokyoMetropolitan University, Fukazawa 2-1-1, Setagaya-ku, Tokyo 158, Japan.
5. **Mishra R., Ahmad G., & Chaubey, S. N. 2012.** Study on the morphology,
6. feeding capacity and prey preference of *Neoscona crucifera* and *N. adianta*(Orb-Weaving Spiders). Indian Journal of Life Sciences 1: 29–34.
7. **Roozbahani H., Asmar M., Ghaemi N. &Issazadeh K. 2014.**Evaluation of Antimicrobial Activity of Spider Silk *Pholcus phalangioides* against Two Bacterial Pathogens in Food
8. Borne. International Journal of Advanced Biological and Biomedical Research 2: 2197–2199.
9. **Vollrath, F. and D. Porter (2006).** "Spider silk as a model biomaterial." Applied Physics A: Materials Science & Processing 82(2): 205-212

Effect of *Pholcus phalangioides* web extract on *S. aureus* and *E. coli.*

S. aureus	E. coli.

Ethanol Extract
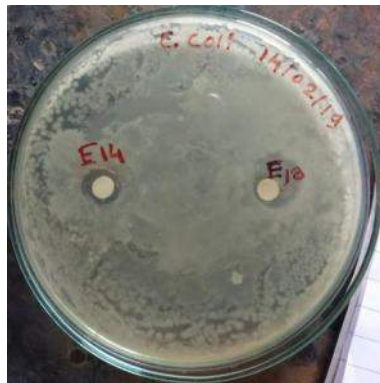
Methanol Extract

Acetone Extract

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293
(Special Issue No.70)   Peer Reviewed Journal   www.aiirjournal.com Mob. 8999250451

115
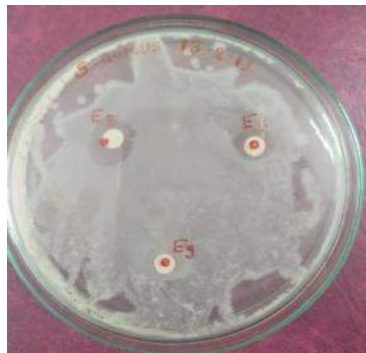
One Pot, Synthesis, Characterisation And Biological Activity Of Thiazolidinone

Nadeem A. Sheikh[*]

P.G. Department of Chemistry, Amolakchand Mahavidyalaya,
Yavatmal.

Abstrac*t:*

It was through interesting to synthesized Thiazolidin-4-one. A simple and efficient procedure for the synthesis of Thiazolidinone. In this work some new substituted Thiazolidinone have been reported in one pot synthesis Thiazolidinone were obtained from Substituted aromatic aldehydes, substituted aromatic aniline in presence of sodium acetate. Nucleus play a vital role in Anti-microbial, Anti- inflammatory, antibacterial, anticancer anti-tubercular, anti-inflammatory and as antiviral agents, especially as anti-HIV etc. The Characterization of this compound was made by chemical property. Elemental analysis as well as spectral analysis (Like IR, H^1-NMR)

Keyword*s: Substituted aldehyde, Substituted aniline, Thiazolidinone.*

Materials And Methods:-

Acetone, Ethanol. Thioglycolic acid. Etc.

Substituted aromatic aldehydes, substituted aromatic aniline,ethanol, DMF, Thioglycolic acid are required chemicals purchased from S-d fine chemicals. The chemicals were used as received. All the used chemicals were of analytical grade. Melting points were measured in open capillary tube and are uncorrected. The purity of compounds was checked by TLC on silica gel in solvent system petroleum ether and ethyl acetate (80:20) and the spots were located under iodine vapours as visualizing agent.All the spectral analysis done by VIT, Vellore, Tamil Nadu.

Introduction

Heterocyclic chemistry is the branch of chemistry dealing with synthesis, properties, and applications of heterocycles. The history of heterocyclic chemistry began in the 1800s, in step with the development of organic chemistry.

● Literature survey revealed that the history of heterocyclic chemistry began in the 1800's, in step with the development of organic chemistry. After World War II, there was an enormous explosion research in the field of heterocycles. About one half of over six million compounds recorded in Chemical Abstracts are heterocyclic.Heterocyclic chemistry is one of the most complex and intriguing branch of organic chemistry and heterocyclic compounds constitute the largest and most varied family of organic compounds. Vinod D. Ramani et al[1] reportd Synthesis,characterization and antimicrobial activity of 2,3 di substituted thiazolidin - 4-one derivatives. Rodrigo abonia et al[2] reported three component synthesis of novel di substituted thiazolodin-4-one., Devprakash and uday kumar A Bhol et al[3] reported thiazolidine-4-one., Andreela-Teodora Panzariu et al[4] reported synthesis and biological evaluation of new 1,3 .thiazolodine-4-oneAshraf Mashrai et al[5] reported the synthesis Thiazolidinone Heterocycles. Chandra kant Belwal et al[6] reported the synthesis of some Schiff bases and thiazolidinone derivatives of 5-amino-1H-imidazole-4-carboxamide. Ali Almasirad et al [7]reported the novel 4- thiazolidinone derivatives as agonists of benzodiazepine receptors: Design, Synthesis and Pharmacological evaluation.Where, d- thioglycolic acid, ZnCl, dry toluene. Gaikwad . S.V et al[8] *reported the synthesis of 4- thiazolidinone derivatives.*. Vishnu Shinde et al[9] reported the synthesis of some new thiazolidinone derivatives containing naphthofuran moiety. Muhammad Naeem et al[10] reported the synthesis of potentially biologically active. Novel 4-thiazolidinone derivatives.Parikh A.R et al[11] reported the synthesis of some 4-Thiazolidine Derivatives as antitubercular Agents. Many broader aspects of heterocyclic chemistry are recognized as disciplines of general significance that impinge on almost all aspects of modern organic chemistry, medicinal chemistry and biochemistry.

Thiazolidinone

There are numerous biologically active molecules which contain various heteroatoms such as nitrogen, sulphur and oxygen, always drawn the attention of chemist over the years mainly because of their biological importance. Thiazolidinones are thiazolidine derivatives and have an atom of sulphur at position1, an atom of nitrogen at position 3 and a carbonyl group at position 2, 4, or 5.However , its derivative belong to the most frequently studied moieties and its presence in penicillin was the first recognition of its occurrence in nature. Similarly 1,3-thiazolidin-4-ones are heterocyclic nucleus that have an atom of sulphur and nitrogen at position 1 and 3 respectively and a carbonyl group at position 4 have been subjected to extensive study in the recent year. The 4-thiazolidinone scaffold is very versatile and has featured in a number of clinically used drugs

They have found uses as anti-tubercular, antimicrobial, anti-inflammatory and as antiviral agents, especially as anti-HIV agents. It has been extensively reported that presence of arylazo, sulfamoylphenylazo or phenyl hydrazono moieties at different positions of the thiazolidone ring enhanced anti-microbial activity and its antibacterial activity may be due to its inhibitory activity of enzyme Mur B which is a precursor acting during the biosynthesis of peptidoglycan.
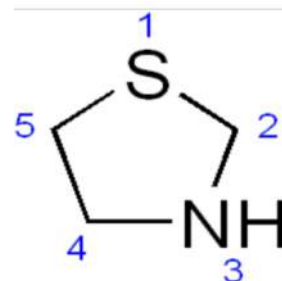
Experimental work:-

● **Preparation of 2-(4-hydroxyphenyl)-3(4-nitrophenyl)thiazolindin-4-one.**

4 Hydroxy- Benzaldehyde (0.2 M) + P- nitro aniline (0.2 M) and Thioglycolic acid in 50 ml Acetone was dissolved, and add 5 grams of sodium acetate and refluxed for 4 hours. The Reaction mixture was cooled and it was poured into ice- cold water and the Solid obtained was filtered.

The product purified by chromatography over silica gel coated plates by using ethyl acetate. Recrystallised from ethanol.

Reaction:-

2-(4-hydroxyphenyl)-3-(4-nitrophenyl)thiazolidin-4-one
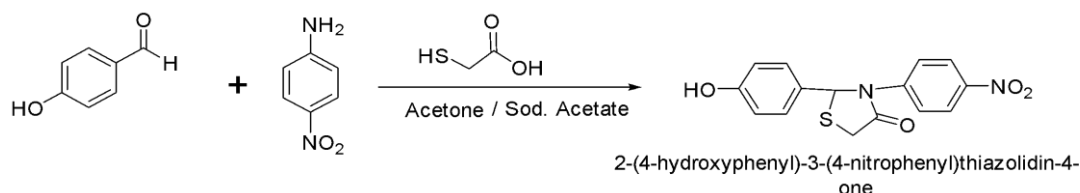
● **Preparation of 3-(4-hydroxyphenyl)-2(-4 methoxyphenyl) thiazolidine-4-one.**

4-Methoxy benzaldehyde (0.2 M) + 4-amino phenol (0.2M) and Thioglycolic acid (0.2 M) in 50 ml Acetone was dissolved and add 5 grams of sodium acetate and refluxed for 4 hours. The Reaction mixture was cooled and it was poured into ice- cold water and the Solid obtained was filtered.

The product purified by chromatography over silica gel coated plates by using ethyl acetate. Recrystallised from ethanol.

3-(4-hydroxyphenyl)-2-(4-methoxyphenyl)thiazolidin-4-one
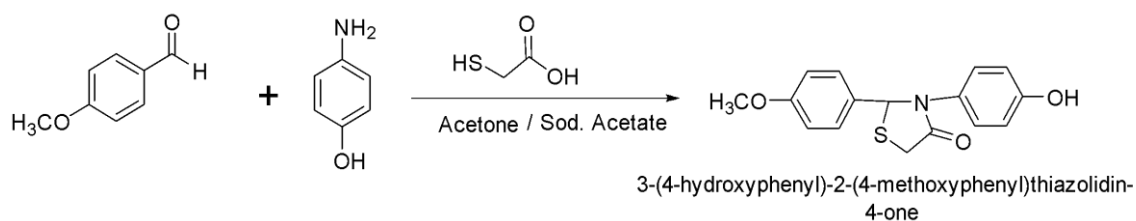
● **Preparation of 2-(furan-2-yl)-3-(p-tolyl) thiazolidin-4-one:**

A mixture of Furfur aldehyde, P-toluene and Thioglycolic acid and add pinch of $ZnCl_2$ was dissolved in DMF (50ml).Thioglycolic acid was added drop wise. The reaction then refluxed for 4 hours the mixture was cooled, then poured into ice cold water.

The product purified by chromatography over silica gel coated plates by using ethyl acetate. Recrystallised from ethanol.

2-(furan-2-yl)-3-(p-tolyl)thiazolidin-4-one
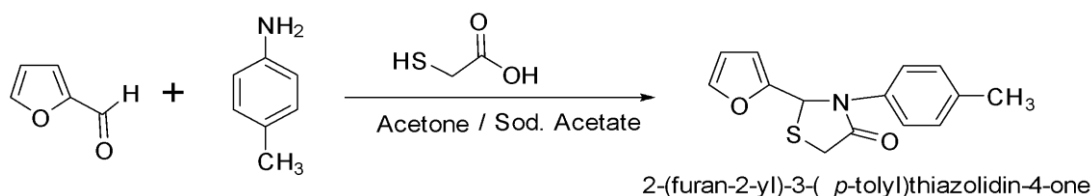
Elemental

Physical characterization of all the compounds are given in table.

Charecterization Data Of Newly Synthesized Compounds.

Analytical Data

Compd.	Imperical formula	Yield	M.P ^{0}C	Elemental composition				
				%C	%H	%O	%N	%S
				Calcd.	Calcd.	Calcd.	Calcd.	Calcd.
Compd-1	C$_{15}$H$_{12}$N$_2$O$_4$S (316)	82.	130^{0}C	56.95	3.82	20.23	8.86	10.13
Compd-2	C$_{16}$H$_{15}$NO$_3$S (301)	75.76	120^{0}C	63.01	5.02	15.93	4.65	10.64
Compd-3.	C$_{14}$H$_{13}$NO$_2$S (259)	78.51	128^{0}C	64.46	4.1	19.8	11.57	12.56

Results And Discussion.

Antimicrobial activity:-

The antimicrobial activity of both categories of compound was determined by the Muller Hinton agar media used.

The anti-antimicrobial activity was carried out in 2 gram positive bacteria and 2 gram negative bacteria for 24 hours. The gram positive bacteria used were staphylococcus aures and streptococcus pyogenes. Gram negative bacteria used were Escherichia coli (E-Coli) and Salmonella typhy.

The compound were tested at a concentration of 100µg/ml. In general all synthesized compound. The zone of inhibition was compared after 24 hours of incubation at 37 ^{0}c.under exhibited good inhibitory activity against test pathogenic microorganism.

ZONE OF INHIBITION IN MM				
TEST	GM + VE BACTERIA		GM –VE BACTERIA	
Compound	Staphylococcus aures	Streptococcus Pyogenes	Escherichia Coil	Salmonella.typhy
Ns1	23mm	23mm	16mm	20mm
Ns 2	22mm	22mm	19m	223mm

- **Preparation of 2-(furan-2-yl)-3-(p-tolyl) thiazolidin-4-one:**
- NMR:- ∂ 2.33 (Ar-CH$_3$), ∂ 3.3 (CH-N), ∂ 6.10 (Ar-CH), ∂ , ∂ 7.17 (AR-H).
- IR (KBr V max) (cm^{-1}) IR (KBr V max.) (cm^{-1}),1671.39 cm^{-1}(CO-NH),1249.73cm^{-1} 746 cm^{-1}C-Cl,1110 cm^{-1} C-N, 1578 cm^{-1} C=C.
- **Preparation of 3-(4-hydroxyphenyl)-2(-4 methoxyphenyl) thiazolidine-4-one.**
- NMR :- ∂ 2.9 (Co-CH$_2$), ∂ 3.7 (CH-N), ∂ 6.89 (Ar-CH), ∂ 8.7 (O-H), ∂ 7.8 (AR-H).
- IR (KBr Vmax.) (cm^{-1}) . 1671.39 cm^{-1}(CO-NH), 1253.73 cm^{-1}, 746 cm^{-1}, C-N, 1568 cm^{-1} C=C.

Conclusion:

This type of study will be applicable for the medicinal, pharmaceutical, agriculture, industrial and biochemical sciences, this study also be useful to the industrial fields. It was through interesting to synthesize some new series of Thiazolidinone and screen them for anti-microbial activities.

Acknoledgement:

Reference:

1. Vinod D. Ramani, *Journal of chemical and pharmaceutical Reaseach*, **2016**, 8(8):868-873.
2. Rodrigo abonia, *Arabian journal,* **2019** *12,132-133*
3. Devprakash and uday kumar A Bhol, *Journal of pharmacy research*, **2011** 4(7), 2436-2440.
4. Andreela-Teodora Panzariu, Chemistry central journal, 2016,10 (6).
5. Ashraf Mashrai, *Medicinal Chemistry,.***2016**,2161 -0444
6. Chandra Kant Belwal, *Der Pharma. Chemica.***2012**, 1873-1878
7. Ali Almasirad*,-Excli Journal* **2017***; pp 1611-2156*
8. Gaikwad S.V, *Int.J.chem*. **4(3), 2015**, 1393-1400
9. Vishnu Shinde, *Letter inorganic chemistry,, 4(1).***2007,**16-19
10. Muhammad Naeem**-** *Asian Journal of chemistry* **2012**, 4317-4323
11. Parikh**.,** *Journal of science***, 2004,** pp 143-148
12. Saundane A.R - *J of Chemistry VAnolume,* **2013**, Article ID 543815
13. Arjun Singh,- *Der.Pharma Chemica*,3 (6), **2011**, pp 124-129
14. Cecilia Saiz , *Tetrahedron letter* 50 **,2009,**901-904

Effect Of Biopesticide Vip3 On Biomolecules Containt And Growth Parameters Of *Helicoverpa Armigera,* A Devastating Agricultural Pest.

Dr. Prachi Pimparkar , Dr. I. A. Raja

Shri Shivaji College of Arts, Commerce and Science, Akola

Absract-

   Helicoverpa armigera, Hubner (Lepidoptera – Noctuidae) is the major agriculture pest which feed on all types of crops causing extensive economical lost. Ability of Helicoverpa armigera, to survive on diverse host plant is it's adaptive mechanism. Bioinsecticide called vegetative insecticidal protein Vip3 has been discovered from Bacillus thurigiensis (Bt) during it's vegetative growth phase is considered as having insecticidal activity against many lepidopteran pests. Physiological and morphological effect of Vip3 biopesticide on Helicoverpa armigera is studied in this research. Vip3 causes remarkable reduction in the amount of major biomolecules such as Carbohydrate, Proteins, Lipids and Uric acid in the haemolymph and midgut tissue of Helicoverpa armigera and it directly impairs the growth of this devastating agriculture pest.

key words- *Agriculture pest, Helicoverpa armigera, Vip3, major biomolecules, impairing growth.*

I - Introduction-

   The cotton bullworm or pod borer, *Helicoverpa armigera* Hubner (Lepidoptera – Noctuidae) is one of the most devastating insect pest worldwide, infesting about 300 plant species of 45 families. It is a rapacious feeder that causes significant reduction in yield of economically important crops like chickpea, maize, sorghum, sunflower, rapseed, groundnut, various vegetables like Okra, Bengan, Couliflower and also different flowers and fruits.

   Helicoverpa armigera is able to survive in highly adverse conditions due to features such as polyphagy, high mobility, high fecundity and facultative diapauses.

   Improved understanding of the crop losses, distribution, bio-ecology and the development of control techniques such as biological control, host plant resistance, cultural practices, rational use of chemical and/or botanical pesticides, are of paramount importance to evolve strategies to minimize the crop losses. In the past, there has been a predominance of research/extension focus on chemical control. Collaborative and multidisciplinary efforts are currently gaining attention through regional integrated pest management (IPM).

   Among the various control measures, chemical control is the quick, effective and most popular method of pest control. Chemicals (Pesticides) used to control pests are called insecticides. Taking into consideration, various adverse effects, reduction in practice of chemical insecticides and inventing new class of safe and effective pesticides is a need of time.

   Biopesticides is an good alternative to chemical pesticides. In the field of Bio-pesticides bacterium *Bacillus thuringiensis* has set a mile-stone. Another class of Bt toxins are produced during the vegetative stage of growth by several strains of *Bacillus thuringiensis.* They are Vegetative Insecticidal Proteins (Vip) . Vip3 insecticide have a broad range of activity spectra against a broad spectrum of economically important lepidopteran insects. In order to know the potential of Vip3 proteins for use in the control of *Helicoverpa armigera*, we assayed its insecticidal activity and investigated the physiological change in the midgut and haemolymph of *Helicoverpa armigera* caused by this toxin. Such information will be certainly important to develop stable, a resistant bio-pesticide against *Helicoverpa armigera* and will definitely help to offer a promising alternative for insect Resistance Management (IRM).

II - Materials And Methods –

This work was conducted in four phases-

Phase I - Collection of insects

   Larvae of *Helicoverpa armigera* were collected from field of Okra, chicken pea from Dr.Punjabrao Krishi Vidyapeeth, Akola. Large number of larvae of same larval in-stars stage are required at a time and also year around availability of insect pest is important. To meet this demand, lab culture of insect pest is carried out. Culture of Ha is carried out in Zoology Laboratory of Shri Shivaji College, Akola at following   maintained

parameters Larvae were reared on chickpea based artificial diet. Large number of larvae of a specific in-star were available in lab.

Phase II- Availability and LC50 of Vip3 -

Vegetative insecticidal protein used for bioassay was made available from Dr. PDKV, Akola by Dr. Mangesh Mohoril, HOD, Dept. of Biotechnology, PDKV Akola. The concentrations of Vip3 protein were estimated using the Bradford method. Toxic effects of an insecticide can be highly age dependent. Bio-pesticides are known to exhibit variable toxicity to different stages of insects (K. R. Kranthy, 2004). Bioassay is studied on 3 main in-star intervals of *Helicoverpa armigera* larvae. They are 1st instar, 3rd instar and 5th instar. These instar larvae can be sorted on basis of body weight, body length, head capsule width (Arms *et al.,* 1992).

Vip3 is an oral toxicant, so diet incorporation method is used for bioassay (K. R. Kranthy,2001). All the rest of other factors were kept constant for accurate bio-efficacy measures of bio-pesticide. LC50 value was determined for 1st, 3rd and 5th instar larvae.

Phase III- Estimation of Biomolecules

Bio-molecular assay was done from Gut extract tissue and Haemolymph tissue.

Collection of Haemolymph -

A proleg of larva was clipped off and larval haemolymph was collected into micropipette. Haemolymph thus collected is mixed with Phenylthiourea (1mg) to avoid melanisation due to the activity of prophenol oxidase. Haemolymph samples collected from 30 (each) control and experimental, early and late in-star larvae was used for quantification of major bio-molecules.

Preparation of Mid-gut Tissue-

After extraction of haemolymph same larvae can be used for purpose of gut tissue extraction. These larvae were cold-immobilized, then dissected ventrally and gut were removed. The midguts including contents are collected into a known volume of distilled water, homogenized with a hand held pre-cooled mortal and pestal on ice and the homogenates centrifuged at 16,000 rpm for 10 min at 4°C. The resulting supernatant was collected, frozen and stored in -20°C. Samples collected from 30 (each) control and experimental, early and late in-star larvae was used for quantification of major bio-molecules.

Bio-molecular assay was done from Gut extract tissue and Haemolymph tissue. Alterations in the quantity of major biomolecles such as Carbihydrate Protein, Lipids and Uric acid were studied by Chemical analyser.

Carbohydrate Assay -

Estimation of Carbohydrates :-

Total carbohydrate content in the haemolymph and mid-gut extract was estimated by following procedure mentioned in format and readings were taken using ELICO chemical analyser and glucose content is estimated in the gut extract sample and in the haemolymph.

Protein Assay

Estimation of Total Proteins –

Amount of total proteins in the haemolymph and midgut tissue extract was estimated by Total Protein Test Kit from Span Diagnostics Ltd., Gujarath, India by Modified Biuret, Endpoint Assay method, and readings were taken on ELICO,Chemical Analyser.

Test was taken in triplet and mean of the 3 test was considered.

Lipid Assay :-

Estimation of Triglycerides

Lipid content in the insect body is estimated in the form of Triglycerides.

Amount of Triglycerides in the haemolymph and midgut tissue extract was estimated by Test kit from Excel Diagnostics Pvt. Ltd., Hyderabad, India snd readings were taken on ELICO, Chemical Analyser.

Tests of gut extract samples as well as haemolymph samples from early and late in-star larvae fed on controlled and experimental diet were carried out separately. Each test was performed in triplet and the mean of three readings was taken into consideration.

Uric Acid Assay :-

Uric Acid Test was carried out from the samples haemolymph and gut extract tissue of early and late instars of experimental and control larvae.

Test was carried out using a kit from Excel Diagnostics Pvt. Ltd., Hyderabad, India. Reading were taken on ELICO clinical chemical analyser.

Tests of gut extract samples as well as haemolymph samples from early and Late in-star larvae fed on controlled and experimental diet were carried out separately. Each test was performed in triplet and the mean of three readings was taken into consideration.

Quantification of major bio-molecules is thus carried out from Haemolymph and mid-gut tissue of early and late in-star larvae of test insect *Helicoverpa armigera.*

Phase IV -Effect of Vip3 on Growth Parameters of *Helicoverpa armigera* –

Effect of Vip3 is studied on growth of *Helicoverpa armigera* larvae.

Set A (Controlled) - Rearing of larvae on the artificial diet without addition of Vip3 protein.

Set B (Experimental) - Rearing of larvae on the Vip3 incorporated diet (Artificial diet with Vip3)

This experiment is done on two different groups of larvae.

Group 1 -Larvae – neonatal to 3rd in-star.

Group 2 -Larvae - 4th in-star to 6th in-star.

Both groups of larvae were exposed to both set A and set B.Other parameters such as Temperature, Humidity, Photoperiod are kept constant for both groups on both diets.Feeding responses and Growth of larvae were observed minutely.

Larval body weight was recorded after each twelve hours. In-star growth was recorded according to body length, weight and accordingly larvae were categorized in the next group.

III - Observations and Results –

3.1 Effect of Vip3 on biochemical constituents in Mid-gut and of *Helicoverpa armigera*

Effect of Vip3 on major biomolecularl constituents of mid-gut of *Helicoverpa armigera* are studied in the Midgut tissue in early and late instar larvae feeded on controlled diet and experimental diet separately. Quantification of major bio-molecules -carbohydrate, Proteins, lipids and uric acid was carried out. Results are summarized in table 3.1 and represented graphically in Fig 3.1

Carbohydrate assay is indices of Glucose contain in the body of animal. As the animal grows in age, it's carbohydrate values go on increasing. In the controlled i.e. in normal larvae, carbohydrate amount increases to 4.745 mg% in late in-star larvae as compared to 3.731 in early in-star larvae. Vip3 protein caused reduction in the carbohydrate amount in early as well as late in-star larvae. It got lowered to 3.128 mg% in early in-star and 4.421 mg% in late in-star in experimental larvae. Due to infestation of Vip3 amount of carbohydrate got reduced . It is seen by decrease in height of bar in the graph 3.1

Protein Assay - Protein is most abundant in the insect body. As the animal grows in age, it's protein values go on increasing. In the controlled i.e. in normal larvae, protein amount increases to 14.347 mg% in late in-star larvae as compared to 8.853mg% in early in-star larvae. Vip3 protein caused reduction in the protein amount in early as well as late in-star larvae. It got lowered to 6.279 mg% in early in-star and 10.361mg% in late in-star in experimental larvae. Due to infestation of Vip3 amount Protein got reduced in early instar larvae. It is seen by decrease in height of bar in the graph 3.1

Lipids Assay - In the insect body most of lipids are present in form of Triglycerides. There is variation in Triglyceride amount in body of test larvae according to age and diet. It is revealed from table3.1.Graph 3.1 In the controlled i.e. in normal larvae, lipid amount increases to 9.811mg% in late in-star larvae as compared to 6.615 mg% in early in-star larvae. Vip3 protein caused reduction in the lipid amount in early as well as late in-star larvae. It got lowered to 4.866 mg% in early in-star and 8.392mg% in late in-star in experimental larvae. Due to infestation of Vip3 amount of Lipase got reduced in early and late instar larvae.

Uric Acid Assay - Uric acid is the excretory material of insect body. An exponential rise was seen due to effect of Vip3 in early as well as late in-star larvae. Uric Acid amount increases to 12.485mg% in late in-star larvae as compared to 11.417mg% in early in-star larvae. Vip3 protein caused large increase in the Uric Acid amount in early as well as late in-star larvae. It got increased to 32.52 mg% in early in-star and 89.57 mg% in late in-

star in experimental larvae. It is seen by increase in height of bar in the graph 3.1. Due to infestation of Vip3 amount of Uric Acid got increased greatly in late instar larvae.

Table 3.1 Quantification of Total carbohydrate, Protein, Lipids and Uric Acid amounts in the midgut tissue of *Helicoverpa armigera* larvae of early and late instars fed on control and experimental (incorporated with Vip3 protein) diet.

Sr. No.	Quantification of	In Controlled Larvae		IN Experimental Larvae	
		Early instar	Late Instar	Early instar	Late Instar
1	Carbohydrate (mg %)	3.731 ± 0.37a	4.747 ± 0.47	3.128 ± 0.14	4.421 ± 0.07
2	Proteins (g %)	8.853 ± 0.46	14.347 ±0.52b	6.279 ± 0.23	10.361 ± 0.49
3	Lipids (Triglycerides) (mg %)	6.615 ± 0.08	9.811 ± 0.08	4.866 ± 0.58a	8.392 ± 0.46
4	Uric Acid (mg%)	11.417 ± 0.1a	12.485 ± 0.28	32.52 ± 0.66	59.57 ± 0.06

Fig 3.1 Quantification of Total carbohydrate, Protein, Lipids and Uric Acid amounts in midgut tissue of *Helicoverpa armigera* larvae of early and late instars fed on control and experimental (incorporated with Vip3 protein) diet-
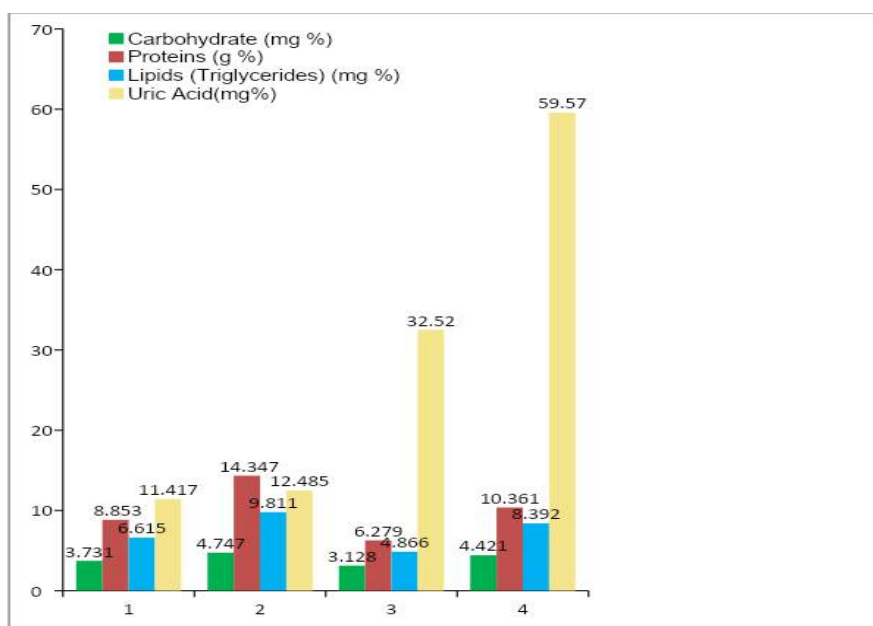
3.2 Effect of Vip3 on biochemical constituents in Haemolymph tissue of *Helicoverpa armigera*

Quantification of major biomolecules Viz Carbohydrates, Proteins, Lipids and Uric Acid in the Haemolymph of *Helicoverpa armigera* larvae of early and late instars fed on control and experimental (incorporated with Vip3 protein) diet is carried out by methods as mentioned before. Result of individual assay is presented graphically in the Fig 3.5.2 A These graphs indicated that Carbohydrate, Proteins and Lipid value increased in late instar stage than in early instar on the both controlled and experimental diet. But Uri Acid values went on increasing continuously in a steady pace. It is explained from the graphs.

These values are summarised in the Table 3.2. When the Table 3.2 is studied, it explains Carbohydrates, Proteins, Lipids and Uric Acid quantification.

Table - 3.2   Quantification of Total carbohydrate, Protein, Lipids and Uric Acid amounts in the Haemolymph of *Helicoverpa armigera* larvae of early and late instars fed on control and experimental (incorporated with Vip3 protein) diet-

Sr. No.	Quantification of	In Controlled Larvae		IN Experimental Larvae	
		Early instar	Late Instar	Early instar	Late Instar
1	Carbohydrate (mg %)	3.268 ± 0.21a	4.402 ± 0.17	2.945 ± 0.52	3.901 ± 0.37
2	Proteins (g %)	7.953 ± 0.28	12.67 ± 0.66	6.113 ± 0.1b	9.521 ± 0.67
3	Lipids (Triglycerides) (mg %)	5.811 ± 0.31b	8.392 ± 0.25	4.407 ± 0.19	7.814 ± 0.56
4	Uric Acid (mg%)	10.627 ± 0.14a	11.521 ±0.66	19.628 ±0.41	34.146 ±0.23

Conc : Concentration, mean + SE followed with the same letter (a): is not significantly different (P>0.05), (b): significantly different (P<0.05),
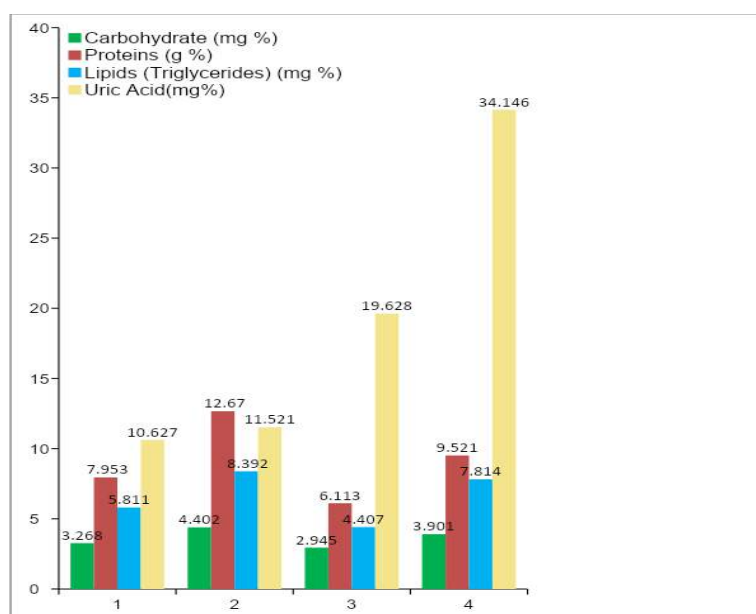
Graph   3.2 Quantification of Total carbohydrate, Protein, Lipids and Uric Acid amounts in the Haemolymph of *Helicoverpa armigera* larvae of early and late instars fed on control and experimental (incorporated with Vip3 protein) diet-

Carbohydrate Assay - Vip3 protein caused reduction in the carbohydrate amount in early as well as late in-star larvae. It got lowered to 2.945 mg% in early in-star and 3.901 mg% in late in-star in experimental larvae. Amount of Carbohydrate increased in controlled late instar larvae than controlled early instar larvae. Therefore height of bar representing carbohydrate show increase in height. Due to infestation of Vip3 amount of carbohydrate got reduced in early and late instar. It is seen by decrease in height of bar in the graph.

Protein Assay - Vip3 protein caused reduction in the protein amount in experimental diet in both instars. Protein assay in haemolymph of *Helicovrpa armigera* larvae of early and late instar reared on controlled and artificial diet is represented graphically in graph 3.2. Amount of Protein increased in controlled late instar larvae than controlled early instar larvae. Due to infestation of Vip3 amount Protein got reduced in early instar larvae. It is seen by decrease in height of bar in the graph 3.2 and Graph 3.2

Lipids Assay - It is revealed from table 3.2,Graph3.2 that, In the controlled larvae, lipid amount increases to 8.392 mg% in late in-star larvae as compared to 5.811 mg% in early in-star larvae. Lipase assay in haemolymph of Helicovrpa armigera larvae of early and late instar reared on controlled and artificial diet is

represented graphically in graph 3.2 Amount of Lipase increased in controlled late instar larvae than controlled early instar larvae. Therefore height of bar representing Lipase show increase in height. Due to infestation of Vip3, amount of Lipase got reduced in early instar larvae

Uric Acid Assay - It is observed from table 3.2 Graph3.2 that, In the controlled larvae, Uric Acid amount increases to 11.521mg% in late in-star larvae as compared to 10.627 mg% in early in-star larvae. Vip3 protein caused abrupt increase in the Uric Acid value in early as well as late in-star larvae. It got raised to 19.628 mg% in early in-star and 34.146 mg% in late in-star in experimental larvae fed on diet incorporated with Vip3.

Result-

From the above tables 3.2 and graph 3.2, it is observed that carbohydrate, lipids and proteins contain decrease due to effect of incorporation of Vip3 insecticidal protein which suggest negative impact on physiology . At the same time exponential increase in the Uric acid contain indicate hampered excretory system of infected or experimental larvae in early as well as late in-star.

3.3 -Effect Of Vip3 On Growth Parameters of test insects

Observations in relation to behavioural pattern, growth and development of *Helicoverpa armigera* were recorded by taking larval weight, larval period, number of larvae mature and larval mortality. Larvae fed on controlled and experimental diet showed unique patterns of growth. Larvae fed on Set 1(controlled diet) showed higher larval mass and developed more rapidly than larvae in Set 2 (Experimental diet). They undergo moulting and increase in size and weight. Larvae are voracious feeder and eat the diet continuously.

In Set 1-larvae are cultured successfully in controlled atmosphere on the artificial diet. Larvae obtained maximum growth at a regular pace

When larvae were fed on Vip3 incorporated diet it showed alterations in it's growth patterns. Growth parameters such as Mass Gain, Larval period, number of larvae mature and % mortality are graphically represented separately in the Fig 3.3Alterations in the growth parameters can be understood very easily from it. Bar of Mass gain is highest in 4th to 6th instar larvae fed on controlled diet. It is lowest in early instar larvae of experimental diet. Larval period is less in controlled diet and more in experimental diet. That means growth of larvae is slower on experimental diet. Number of larvae mature is maximum on controlled diet and % mortality is minimum on controlled diet. Larval growth was stunted when they were fed on diet mixed with Vip3 protein.

Those who (68%) remained alive showed prolonged stadiel time for pre-pupation and pupation. Their further development also hampered. Although they did not die, their fecundity was very less. Very few emerged successfully as adult and very less amount of eggs were laid by female moth as compared to that of from Set I. Female laid few eggs and very few was viable. Egg turn out into brown colour very early and unable to hatch. So fecundity of larvae from set B was very less as compared to Set A. It can be estimated as 15 – 20 %

Table –3.3 Effect of Vip3 protein on various growth parameters such as Mean mass gain, Mean larval period,Total number of larvae matured and total % mortality of early and late instars of *Helicoverpa armiger* larvae fed on controlled and experimental diet -

Set	Larval Exposed	Mass Gain		Larval Period		Larvae Mature		% Mortality	
		$0-3^{rd}$ in-star	4th -6th in-star	$0-3^{rd}$ in-star	4th -6th in-star	$0-3^{rd}$ in-star	4th -6th in-star	$0-3^{rd}$ in-star	4th -6th in-star
A (Controlled Diet)	25	0.268+0.12 gm	0.782+0.02a gm	5.38+0.13 days	7.8+0.13a Days	24	24	4%	4%
B (Experimental Diet)	25	Negligibile	0.48+0.01a gm	7.4+0.01 days	11.2+0.12b Days	00	17	100%	32%

Graph 3.3   Effect of Vip3 protein on various growth parameters of early and late instar larvae of *Helicoverpa armigera* fed on controlled and experimental diet
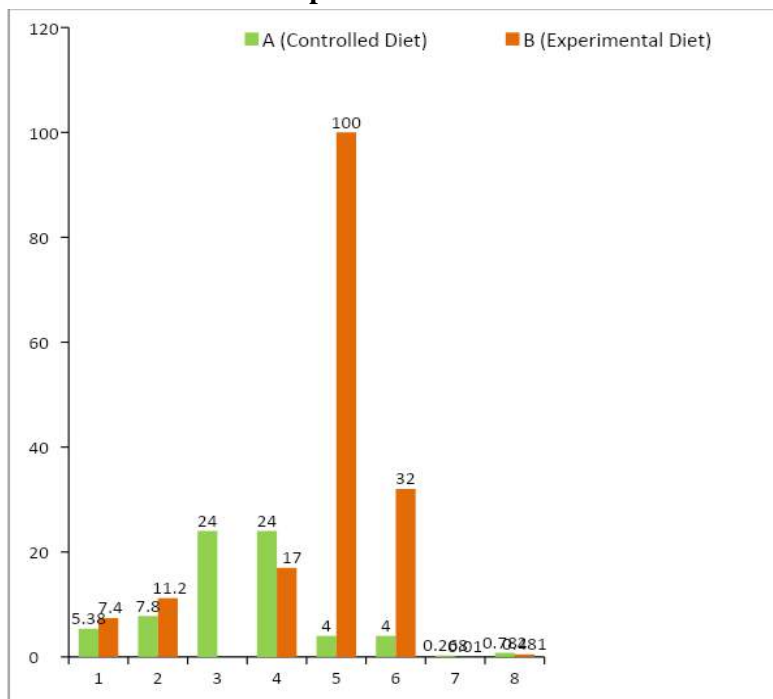
Experimental diet i.e. diet incorporated with Vip protein, showed extensive negative effect on growth and development of larvae. But the feedback of larvae changes according to their age.

IV Summary and Conclusion-

4.1 Effect of Vip3 on biochemical constituents of Mid-gut and Haemolymph tissue of *Helicoverpa armigera*

Major biochemical constituents were determined in gut extract and haemolymph tissue. Assay of **Crbohydrate, Protein, Lipids and Uric Acid** were performed .

The Carbohydrate, lipids and proteins contain decrease due to effect of incorporation of Vip3 insecticidal protein which suggest negative impact on physiology . At the same time exponential increase in the Uric acid contain indicate hampered excretory system of infected or experimental larvae in early as well as late in-star.

4.2 Effect Of Vip3 on Growth Parameters of *Helicoverpa armigera* –

Experimental diet showed extensive negative effect on growth and development of larvae. But the feedback of larvae changes according to their age. Group 1 larvae (neonatal to 3rd in-star) showed decline in the larval weight and larval period. Number of larva death also increase and the survival rate of young larvae on experimental diet was zero %. It showed 100% mortality. This proves that Vip3 protein is 100% toxic/fatal for young larvae.

But as the larvae grows older their ability to face Vip3 protein increases. It is expressed directly by decrease in mortality in 2nd group of larvae (4th – 6th in-star). This indicates the ability of *Helicoverpa armigera* larvae to get adapt to the experimental Vip3 diet.

Considering the toxic effects, Vip3 may provide more benefits to an integrated pest management program for *Helicoverpa armigera* and similar polyphagous pests in the study area where agricultural products are greatly affected by changing environmental conditions. Similarly the feeding deterrence and nutritional physiology effects of Vip3 reported in the present study, demonstrate its potential for controlling the polyphagous insect pest, *Helicoverpa armigera.*

V Refrences-

1. Abbasi B.H., Ahmed K., Ayub F.K., Liu J.H., Kazmi S.A., Aftab M.N. et al., Rearing the cotton bollworm, Helicoverpa armigera, on a tapioca-based artificial diet. Journal of Insect Science. 7(35):1-7.
2. Abbgtt, W.S. (1925). A method for computing the effectiveness of an insecticide. J Econ. Entomol., 18: 265 267.

3. Abdul Razak T. and Sivasubramanian P. (2007). Effects of three botanical oils on carbhohydrate content in Cheilomenes sexmaculata Fabricius and Chrysoperla carnea Stephens. Asian journal of Biochemistry, 2(2):124-129.

4. Armes N.J., Jadhav, D.R., De Souza and K.R.(1996). A survey of insecticide resistance Helicoverpa armigemm. Indian subcontinent. Bull. Entomol. Res., 86: 499 514.

5. Aronson A.I., Geng C. and WU L. (1999). Aggregation of Bacillus thuringiensis Cry1A toxins upon binding to target insect larval midgut vesicles. Applied and Environmental Microbiology, vol. 65, no. 6, p. 2503-2507.

6. Arora Richa, Sharma H.C., Dreissche V.E.and Sharma K.K.(2005). Biological activity of lectins from grain legumes and garlic against the legume podborer, Helicoverpa armigera. SAT ejournal 1:1-3.

7. Azmi M. A., Sayed N. H. and Khan M. F. (1998). Comparative toxicological studies of RB-a (Neem Extract) and Coopex (Permethrin + Bioallethrin) against Sitophilus oryzae with reference to their effects on oxygen consumption and Got, Gpt activity. Journal of Zoology, 22: 307-310.

8. Baines D., Schwartz J.L., Sohi S., Dedes J. and Pang A. (1997). Comparison of the response of midgut epithelial cells and cell lines from lepidopteran larvae to CryIA toxins from Bacillus thuringiensis. Journal of Insect Physiology, vol. 43, no. 9, p. 823-831.

9. Baines D., Schwartz J.L., Sohi S., Dedes J. and Pang A. (1997). Comparison of the response of midgut epithelial cells and cell lines from lepidopteran larvae to CryIA toxins from Bacillus thuringiensis. Journal of Insect Physiology, vol. 43, no. 9, p. 823-831.

10. Beenakkers A. M. T.,Van der Horst D. J. and Van Marrewijk W. J.A.(1985). Insect lipids and lipoproteins, and their role in physiological processes. Prog. Lipid. Res., 24 : 19-67.

11. Bhatnagar, V.S and Davies, J.C., (1978), Factors affecting populations of gram pod borer, Heliothis armigera (Hubner) in the period 1974-77 at Patancheru (Andhra pradesh). Paper presented at the Oriental Entomology workshop on population ecology in relation to insects of economic importance, Bangalore, India, 18-20 January, 1978.

12. Bhattacharjee, N.S., 1972, Heliothis armigera (Hub.) – A polytypic species. Entomological Newsletter, 2: 3-4

13. Bilapate G.G., Raodeo A.K., Pawar V.M.(1983) Investigations on Heliothis armigera Hubner in Marathwada ,Life fecundaty Tables on Sunflower and Maize. AcadB46 No5 pp 652-658

14. Bird L.J. and Downes S.J.(2014)CLSharon J. Downes Toxicity and Cross-Resistance of Insecticides to Cry2aAResistant and Cry2Ab-Susceptible Helicoverpa armigera and Helicoverpa punctigera (Lepidoptera: Noctuidae). t

15. Blum MS. 1985. Fundamentals of insect physiology. John Willey & Sons. New York.

16. Chippendale and Kilby, Chippendale G.M., Kilb B.A.(1969).Relationship between the proteins of the haemolymph and fat body during development of Pieri Journal of Insect Physiology Volume 15, Issue 5, May 1969, Pages 905-926 ...

17. Chitra K. C. and Ramakoteswara Rao. (1996). Effect of certain plant extracts on the consumption and utilization of food by Spodoptera litura (Fab.). Journal of Insect Science, 9: 55-58

18. Chitra K.C., Reddy T.S.V. (2000). Effects of Annona squamosa L. seed extract on protein metabolism of Spodoptera liture. Fab.Insect Environ. 6: 39-40.

19. Chitra K.C., Reddy T.S.V. (2000). Effects of Annona squamosa L. seed extract on protein metabolism of Spodoptera liture. Fab.Insect Environ. 6: 39-40.

20. El-Sheikh T.A.A. (2012): Biological, biochemical and histological effects of spinosad, Bacillus thuringiensis var. kurstaki and cypermethrin on the cotton leafworm, Spodoptera littoralis (Boisd.). Egyptian Academic Journal of Biological Sciences, 4: 113–124.

21. El-Shershaby M., Farag N.A., Ahmed A.A...I. Impact of Bacillus thuringiensis on protein content and enzymes activity of Spodoptera littoralis. Research. Journal of Agriculture and Biological Science. 2008; 4(6):861-865.

22. El-Shershaby M., Farag N.A., Ahmed A.A.I.(2008). Impact of Bacillus thuringiensis on protein content and enzymes activity of Spodoptera littoralis. Research Journal of Agriculture and Biological Sciences: 4 (6): 861-865.

23. Faiza Saleem and Abdul Rauf Shakoori (2017). The First Cry2Ac-Type Protein Toxic to Helicoverpa armigera: Cloning and Over expression of Cry2ac7 Gene from SBS-BT1 Strain of Bacillus thuringiensis. Toxins, 9, 358; doi:10.3390/toxins9110358.

24. Fengxia et al., (2004) The effect of Bt toxins on Helicoverpa armigera populations.

25. Gajendra Babu et al.(2002) The effect of Bt toxins on Helicoverpa armigera populations.

26. Gilmour D. (1961). The biochemistry of insects. New York: Academic Press.

27. Giri, A.P., Harsulkar, A.M., Ku, M.S.B., Gupta, V.S., Deshpande, V.V., Ranjekar, P.K., Franceschi,V.R. 2003. Identification of potent inhibitors of Helicoverpa armigera gut proteinases from winged bean seeds. Phytochemistry. 63(5): 523-532.

28. Hamed M., Nadeem S.(2008). Rearing of Helicoverpa armigera (Hub.) on artificial diets in laboratory. Pakistan J Zool. 2008; 40(6):447-450.

29. Hamed M., Nadeem S.(2008). Rearing of Helicoverpa armigera (Hub.) on artificial diets in laboratory. Pakistan J Zool. 2008; 40(6):447-450.

30. Harsulkar A.M., Giri A.P., Patankar A.G., Gupta V.S.,Sainani M.N., Prabhakar K., Deshpande V.V.(1999). Successive Use of Non-Host Plant Proteinase Inhibitors Required for Effective Inhibition of Helicoverpa armigera Gut Proteinase and Larval Growth. Published October 1999, American Society of Plant Physiologists/10.1104/pp. 121.2.497

31. Hashem A.M., El-Ansary A., Faddah L.M. (1993). Effect of some organophorus insecticides on amylases and cellulases in Biophalaria alexandrina snails. Egypt. J. Bilh, 219: 35

32. Jalali et al.,(2004) The effect of Bt toxins on Helicoverpa armigera populations.

33. K. R. Kranthi, Insecticide Resistance, Monitoring, Mechanisms and Management Manual (2001)

34. Kotkar H.M., Sarate P.J., Tamhane V.A., GuptaV.S., Giri A.P. (2009). Responses of midgut amylases of Helicoverpa armigera to feeding on various host plants. Journal of Insect Physiology 55(8): 663-670.

35. Kramer J.W., HoffmanW.E. (1997): Clinical Enzymology. In: Clinical Biochemistry of Domestic Animals. Academic Press. San Diego, London, Boston, New York, Sydney, Tokyo, Toronto. pp. 303-325.

36. Kranthi K.R., Kranthi S. & Waniari R.R. International Journal of Pest Management Volume 47, 2001 - Issue 2ISSN printed: 1679-9275 ISSN on-line: 1807-8621

37. Liao et al., 2002). The effect of Bt toxins on Helicoverpa armigera populations.

38. Michitsch J. and Steele J. E. (2008). Carbohydrate and lipid metabolism in cockroach (Periplaneta americana) fat body are both activated by low and similar concentrations of peram-AKH II. Peptides, 29 : 226-234.

39. Mohan M., Rangeshwaran R., Sivakumar G., Verghese.(2014) Relative toxicity of subspecies of Bacillus thuringiensis against lepidopterous insect pests of agricultural importance. Journal of Biological Control, 2014; 28(4):197-203.

40. Patankar A.G., Giri A.P., Harsulkar A.M., Sainani M.N., Deshpande V.V., Ranjek.ar P.K., Gupta V.S.(2001). Complexity in specificities and expression of Helicoverpa armigera gut proteinases explains polyphagous nature of the insect pest. Insect Biochemistry and Molecular Biology 31 (4-5): 453-464.

41. Sarate P.J., Tamhaneb V.A., Kotkar H.M., Ratnakaran N.,Susane M., Gupta V.S. and Giri A.P. Developmental and digestive flexibilities in the midgut of a polyphagous pest, the cotton bollworm, Helicoverpa armigera. Journal of Insect Science: Vol. 12 | Article 42 .

42. Singh, H. N., Jose Rox and Singh, H. H., 1994, Helicoverpa armigera insecticide resistance management at Varanasi, Pod borer Management Newsletter, 4: 3.

43. Sinha A.K., Chaudhary S.K. and Sengupta K., Changes in free amino acids in the larval and pupal haemolymph of A.mylitta Drury reared on T.arjuna and T.tomentosa A & W. Ind J Seric (1988); 27: 95-108.

44. Tripathi R. and Singh N. P. (2002). Biochemical Alterations in the Haemolymph of Bacillus thuringiensis var. kurstaki (B.t.k.) Infected Larvae of S. litura (Fab). Asian J. Exp. Sci., 16 (1and2) : 35-39.

45. Young C.J., Li M.S., Shim H.J., Roh J.Y., Woo S.D., Jin B.Y., et al., Isolation and characterization of Strain of Bacillus thuringiensis subsp. Kenyae containing Two Novel cry1- Type Toxin Genes. Journal of Microbiology and Biotechnology, 2007, 17(9):1498-1503.

46. Zalucki, M.P., Clarke, A.R. and Malcolm, S.B. 2002. Ecology and behavior of first instar larval Lepidoptera. 47: 361-393.

Qualitative Phytochemical Analysis Of Different Parts Of Lantana Camara

Kishor S. Itankar[1], Yogesh P. Thawari[2]

[1][2] Department of chemistry, Nevjabai Hitkarini College Bramhapuri (441206), Dist. Chandrapur

Abstract

Lanthana is native to subtropical and tropical America and also in India. It occurs approximately 50 countries, where several Lanthana species varies from 50 to 270 specific and sub specific entities. In India 7 to 8 Lanthana species id occurs namely- L. Camara, L. Indica, L. Veronicifoila, and L. Trifolia. Amongs them L. Camara is widely noticed in sayghata forest of Bramhapuri taluka of Chandrapur district. The existing research take part in qualitative phytochemical analysis of various parts of L. Camara, the analysis was carried out for the presence of alkaloids, terpenoids, anthocyanin, flavonoids, reducing sugar etc. The point such analysis is due to the medical uses of Lanthana species. It shows the antibacterial activity, Cytotoxic activity, antifungal and antimotality activity and many more which was already reported. So it is needed to be perform qualitative analysis of L. Camara species occurs in Bramhapuri region. The detail examination of various parts of L. Camara was carried out from petroleum extract prepared by Soxhlate.

Keywords: L. Camara, Phytochemical, Soxhlate extraction.

Introduction:

Phytochemicals are bioactive chemicals of plant origin, they are regarded as secondary metabolites because the plant that manufacture them may have little need of them, they are naturally synthesized in all parts of plant, such as leaves, roots, flowers, steam, fruits, etc. Any plant body may contain this active compounds.

Sayghata forest region in Bramhapuri Taluka of Chandrapur District in India, we immense range of medicinal plant. This forest the plant kingdom of Sayghata forest is treasure house of potential drugs. Drugs from plant are easily available, less expensive, safer and efficient with little of no side effects. Medicinal plants would be the best source to obtained variety of drugs. About 80% of individual from developed countries use traditional medicine which has compound derived from medical plants. The quality and quantity of phytochemical present in plant parts, may differ from one of another in fact there is lack of information in the distribution part essentially related to the difference in distribution of active compound. Medicinal plant contains some organic compound which provide definite physiological action on the human body the biological substance includes tannins, alkaloids, carbohydrates, terpenoids, steroids and flavonoids and many more.

Since in age-old period the extract of various parts of plants used for the treatment of human illness specifically those caused by pathogenic bacteria, fungi as well as virus, for the reason that may scientist community and drugs industries have been focussed to trace the extraction and development from plants as well as from traditional used rural herbal remedies. In the present situation, there is active curiosity in natural plant product as they are biologically active compounds.

The leading intention of current research was to study the qualitative phytochemical of *L. Camera* leaf, steam, root and flower extract in petroleum ether solvent, because L. Camera species is found to shows the various activities like Antibacterial, Anti-inflammatory, Antidiabetic, Antifertility, etc.

1. Experimental: -

1.1 Plant Material: -   In the given systematic examination L. Camera belonging to family Verbenaceae was suitable for the investigation. Beside the healing properties if this plant is also recruited by several researchers.

1.2 Plant Collection: - The plant named Lantana Camera was collected from Sayghata forest region of Chandrapur District. The botanical name was confirmed by Department of Botany N. H. College Bramhapuri. The current task was performed at Department of Chemistry N. H. College Bramhapuri. The bits of plants were washed and cleaned with water and become dry directly below the shadowed for about seven days. The dried part was reduced to fine particle using mixture grinder. The fine reduced particle was saved in sir tight polythene bags at room temperature before extraction.

1.3 Extract Preparation: - The extract of L. Camera plant was prepared in 80 ml petroleum ether using Soxhlate extraction apparatus. For the extraction 10 g of fine powder of leaf, root and flower was taking. Soxhlate required 18 hrs continue for the preparation of extract. Extract were used for different test.

1.4 Phytochemical Analysis: -

The qualitative phytochemical analysis of plant was doing according to standard procedure. These screening was carried out for identification of different constituent such as tannin, Anthroquinone, alkaloids, reducing sugar, etc. Present in bits of plant using various test.

Test of Phytochemicals: -

Sr. No.	Test	Observation	Inference
1	**Anthocyanin's and Anthocyanidins Test: -** a) Given extract + 2ml HCl (acidified and maintain pH 3-4) b) Given extract + few drops of dil. HCl (to maintain pH 8-9)	Red colour appeared Red colour changed to light yellow	Anthocyanin is present Anthocyanin is present
2	**Coumarins Test: -** Given extract + covered with filter paper + moistened with dil. NaOH solution + place n water bath at boiling temp. 20-30 min. + filter paper removed and test tube observed in UV light.	Yellow green fluorescence appeared	Coumarins is present
3	**Flavonoids test: -** **Shinoda's reaction** A) Given extract + evaporated + residue + add ethanol + add magnesium powder + conc. HCl B) Given Extract + 1 ml dil. HCl + 1ml NaOH.	Yellow/ Red colour appeared Yellow solution turn red	Flavonoid is present Flavonoids present
4	**Tannin Test:-** A) Given extract + 2 ml dil. H_2O + filter + filter was boil with 2% HCl solution B) Given extract + 1ml H_2O + heat on water bath + filter + add 2-3 drops of $FeCl_3$	Blue black / green black colour appeared. Dark green colour appeared	Tannin is present Tannin is present
5	**Libermann-Burchardd reaction: -** Extract =+ evaporate + take residue in test tube +add 1-2 ml chloroform + add 3-4 drops of acetic anhydride + add 2-3 drops of conc. H_2SO_4 from side of test tube	Transient greenish colour appeared.	Steroid is present
6	**Triterpenoids test: -** **Libermann-Burchardd reaction: -** Extract + chloroform + few ml acetic anhydride + add 2-3 drops of conc. H_2SO_4 from side of test tube	Red / violet colour appeared	Triterpenoid is present
7	**Terpenoids test: -** Given extract + 2 ml chloroform +2-3 ml conc. H_2SO_4	Reddish brown colouration of interface was formed	Terpenoids is present
8	**Alkaloids test:-** For all extract 2 ml extract taken separately in 5 ml of 1.5 % v/v aq. HCl + filter + these acidic solution was divided into 4 parts' 3 parts were tested with Mayer's, Wagner's and Dragendroff 's reagent and 4th as a blank. a) **Wagner Reagent: -** 1.27 gm of iodine + 2 gm KI + 5 ml distilled H_2O + solution was diluted 200ml b) **Mayer's Reagent:** - 1.36gm of HgI + 60ml distilled H_2O + solution mix. + diluted to makeup volume 100 ml	. Brown flocculent precipitate appeared. Faint turbidity, light opalescence or yellowish white precipitate Orange precipitate appeared	Alkaloids is present Alkaloids is present Alkaloids is present

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293
(Special Issue No.70) Peer Reviewed Journal www.aiirjournal.com Mob. 8999250451

130

9	**Carbohydrate test: -** **Molish Test: -** Few ml given extract + 0.5 ml of water + mix with 2 drop of 10% solution of alcoholic α-napthol + 1 ml conc. H_2SO_4 was added by the side of test tube.	Red-violet colour appeared	Carbohydrate present
10	**Reducing sugar Test: -** A) 0.5 ml given extract + few drop Fehling solutions A + Fehling solution B + heat 5 min.	Brick red precipitated appeared	Reducing sugar is present
	B) Given extract + 2-3 ml dis. H2O + shake well + filter + Fehling's solution A + Fehling's solution B + boil for 1 min.	Orange precipitated appeared	Reducing sugar is present
11	**Proteins test: -** A) **Biuret test: -** given extract + 1 ml 4% NaCl solution of $CuSO_4$	Violet colour appeared	Protein is present
	B) **Xanthoprotein test:-** extract + 0.5 ml con. HNO3	White/yellow colour precipitate appeared	Protein is present

Observation Table:-

Result of Phytochemical screening of lantana camera (+) indicates present and (-) indicates absence.

Sr. No.	Test Name	Petroleum ether			
		Leaf	Steam	Root	Flower
1	Anthocynine and anthocynidene	-	-	-	+
2	Anthracinine glycoside	-	-	-	-
3	Cumarine	-	-	+	-
4	Flavonoid a) Shinoda reaction	-	-	+	-
5	Phlobatanins	-	-	-	-
6	Tannins	-	-	-	+
7	Emodins a) Bornterager reaction	-	-	-	-
8	Caroteonoids	-	-	-	-
9	Saponis	-	-	-	-
10	Steroids a) Salkowaski reaction	-	-	-	-
	b) Libermann burchard reaction	-	-	+	-
11	Triterpenoid a) Libermann burchard reaction	-	-	+	-
12	Terpenoids	-	+	+	-
13	Alkaloid a) Mayer's reagent	+	-	+	+
	b) Dragendroff reagent	-	-	-	-
	c) Wagner's reagent	+	-	+	+
14	Cardiac glycoside a) Keller-killiani Test	-	-	-	-
15	Carbohydrates a) Molish test	+	-	+	-
	b) Fehling's solution (reducing test)	+	-	+	-
	c) Benedict	+	-	+	-

16	Proteins				
	a) Biuret	+	-	+	-
	b) Xanthoprotein	+	+	+	-
17	Amino acid	+	-	+	-
18	Fatty acid	-	-	-	-
19	Gums and mucilage	-	-	+	-
20	Starch	-	-	-	-
21	Volatile oils	-	-	-	-
22	Anthroquinone	-	-	-	-
23	Phenolic	-	-	-	+

Result and Discussion: -

The qualitative analysis of petroleum ether extract from parts of L. Camera showed the presence of phytochemical constituents such as Anthocynine coumarine,Flavanoids,Tannins,Triterpenoids, Methanol extract of leaf showed the presence of Benedict's test, phenolic test, phenolic compounds.

In the present investigation Alkolides were present in leaf, root and flowers of L. Camera whereas Glycosides, Carotenoids, Saponins, Cardiac glycoside wee absent in L. Camera. In given result the methanol and acetone extract of leaf of L. Camera gives the conformation of Tannins and the Molish test, Fehling's test, Benedict's test. Methanol extract of leaf indicates the presence of carbohydrate.

Conclusion: -

The medicinal plants are the source of innumerable chemicals compounds which are synthesized by plant naturally. The chemicals analysis of the plant material collected from the natural habitat shows the presence of phytoconstituents tested present study shoes that, this plant is ware house of chemo diversity which will be useful in the screening of medicines like alkaloids, steroids, flavonoids and some other chemicals.

Acknowledgement: -

Special thanks to the principal of N. H. College, Bramhapuri to make available chemistry department laboratory for concerned work.

References: -

1. Cannon PF, Damm U, Johnston PR, Weir BS. Colletotrichum current status and future directions. Mycology. 2012;73: 181-213.
2. Gujar J, Talwankar D. Antifungal activity of leaf extract on growth of Macrophomina phaseolina on Soyabean seed. Indian Streams Res J. 2012;2(6):1-3.
3. Jabeen K, Hanif S, Naz S, Iqbal S. Antifungal activity of Azadirachta indica against Alternaria solani. J Life Sci Technol. 2013; 1:89-92
4. Mariajancyrani J, Chandramohan G, Ravikumar S. Terpenes and antimicrobial activity from Lantana camara leaves. Res J Recent Sci. 2014;3(9):52-55.
5. Karim M, Jabeen K, Iqbal S, Javaid A. Bioefficacy of Datura metal extracts against pathogen of anthracnose disease of mango. Planta Daninha. 2017; 35:1-7.
6. Kumar NK, Venkataramana A, Allen JA, Chandranayaka S, Murali HS, Batra HV. Role of Curcuma longa L. essential oil in controlling the growth and zearalenone production of Fusarium graminearum. LWT-Food Sci. Technol. 2016; 69:522-528.
7. Omoruy BE, Anthony JA, Graeme B. Chemical composition profiling and antifungal activity of the essential oil and plant extracts of Mesembryanthemum edule (L.) bolus leaves. Afr J Tradit Complement Altern Med. 2014;11(4):19-30.
8. Sherazi AZ, Jabeen K, Iqbal S, Yousaf Z. Management of Ascochyta rabiei (Pass). Lab by Chenopodium album L. extracts. Planta Daninha. 2016; 34:675-680.
9. Waheed N, Jabeen K, Iqbal S, Javaid A. Biopesticidal activity of Calotropis procera L. against Macrophomina phaseolina. Afr J Tradit Complement Altern Med. 2016;13:163-167.
10. Amit Subedi, et al., Antioxidant and Antibacterial Activity of Methanolic Extract of Machilus Odoratissima. Kathmandu University Journal of Science, Engineering and Technology, 2012.

11. Halilu M.E, A. Abubakar, Garba M.K. and Isah A. A: Antimicrobial and Preliminary Phytochemical studies of Methanol Extract of Root Bark of Crossopteryx febrifuga, Journal of Applied Pharmaceutical Science Vol. 2 (12), pp. 066-070, December, 2012

12. "Forest Invasive Species: Country Report" (PDF). Food and Agriculture Organization of the United Nations. Retrieved March 23, 2014.

13. Sathish, R.; et al. (March 2011). "Antiulcerogenic activity of Lantana camara leaves on gastric and duodenal ulcers in experimental rats". J Ethnopharmacol. **134** (1): 195–7. doi:10.1016/j.jep.2010.11.049. PMID 21129476.

14. Hanif S, Jabeen K, Iqbal S. Management of damping off disease by extracts of *Albizia lebbeck* (L.) Benth. Bangl J Bot. 2017;46(3):1019-1024.

15. Jabeen K, Hanif S, Naz S, Iqbal S. Antifungal activity of *Azadirachta indica* against *Alternaria solani*. J Life Sci Technol. 2013;1:89-92

16. Mariajancyrani J, Chandramohan G, Ravikumar S. Terpenes and antimicrobial activity from *Lantana camara* leaves. Res J Recent Sci. 2014;3(9):52-55.

17. Sherazi AZ, Jabeen K, Iqbal S, Yousaf Z. Management of *Ascochyta rabiei* (Pass). Lab by *Chenopodium album* L. extracts. Planta Daninha. 2016;34:675-680.

Analysis Of Phytochemicals And Antioxidant Property Present In The Fenugreek Plant.

V. D. Mane

Department of Chemistry, Shankarlal Khandelwal Arts, Science and Commerce College, Akola 444 002 (M.S), India

A. P. Chopade

P. G. Student Department of Chemistry Shankarlal Khandelwal College, Akola. 444002 (MS), India

Abstract

Fenugreek (Trigonella Foenum-Graecum) leaves are beneficial in the treatment of indigestion and cure for sluggish liver. It is used to show antidiabetic activity, antioxidant activity. The present investigation was undertaken to screen the phytochemical analysis and antioxidant activity of fenugreek (Trigonella Foenum-Graecum) plant extracts by using various concentration of DPPH solutions. The result showed that the plant has good antioxidant property.

Keywords: phytochemicals, Antioxidant activity, Fenugreek plant.

Introduction

Most of the diseases caused due to free radicals. Free radicals are fundamental to any biochemical process and represent an essential part of aerobic life and metabolism Fenugreek (Trigonella foenum-graecum) is an annual herb that belongs to the family Leguminosae commonly grown in India, Pakistan, and some Middle Eastern countries, which has many beneficial medicinal effects. Both the leaves and seeds of the fenugreek plants were widely consumed as food and medicine in India and other countries. The green leaves of Fenugreek contain numerous phytochemicals, including various nutrients. The herb fenugreek is used both in cooking and for the treatment of diabetes in many parts of the world specially in China, Egypt, India and middle eastern countries. Fenugreek leaves and herbs are well known for their distinct Aroma and slightly bitter test. It has wide therapeutic applications including carminative, aphrodisiac, lactation stimulant in women after child birth in traditional Chinese medicines as well as in Indian Ayurvedic medicines. it has many effects e.g. anthelmintic , antinociceptive anticancer, antibacterial, anti-dicer, gastro and hepato protective , immune modulatory, it has antioxidant property. The bioactive compounds of fenugreek include polyphenolic compounds, saponins flavonoids, alkaloids, steroids and many volatile compounds.

Materials And Methods

The whole plant of *Trigonella Foenum-Graecum* were collected from market of Akola in month of January. The Leaves and fruits of *Trigonella Foenum-Graecum* plants were shade dried at room temperature and ground in a manual mill to get coarse powder. The coarse powdered materials of leaves were kept in the airtight polythene bag and stored in dry place. These powders were extracted with ethanol and water by using soxhlet apparatus. The extracts were concentrated at 40^0C using rotary evaporator in case of ethanol . Finally it was dried, crushed and stored in air tight bottles at 4^0C for further study.

Phytochemical Screening

The chemical tests were performed for testing different chemical groups present in ethanolic and water extracts of the plant.

Table No 1. Qualitative phytochemical investigation of Trigonella foenum graecum plant extracts

Phayto constituents	Ethanol	Water
Carbohydrate	+	+
Protein	+	+
Amino acid	-	+
Alkaloids	+	+
Cardiac Glycoside	+	+
Flavonoids	+	-
Steroids/triterpenoid	-	-
Saponins	-	+

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293 (Special Issue No.70) Peer Reviewed Journal   www.aiirjournal.com Mob. 8999250451

134

Anthroquinones	-	-
Cynogenetic glycoside	-	-
Barberine	+	+
Hesperidin	-	+
Morphine	-	-
Quinine	+	-
Brucine	+	+
Ergometrine	+	+
Conine	+	+
Chinchonine	-	+
Alkali	+	+

Study Of Antioxidant Activity By Dpph

The hydrogen donating property of the extracts were determine in the presence of the DPPH stable radical.antioxidant activity of the ethanol extracts of Leaves of *Trigonella Foenum- Graecum* plants were assessed on the basis of the radical scavenging effect of the stable 1, 1-diphenyl- 2 picrylhydrazyl (DPPH). The diluted working solutions of the test plant extracts were prepared in ethanol. 0.004% of DPPH was prepared in ethyl alcohol and 3 ml of this solution was mixed with 3 ml of sample solutions. These solution mixtures were kept in dark for 30 min and optical density was measured at 517 nm using UV Visible spectrophotometer at room temperature. Alcohol (3 ml) with DPPH solution (0.004%, 3 ml) was used as blank. The optical density was recorded and % inhibition was calculated using the formula given below

Percentage (%) Inhibition of DPPH (% AA) $= A - B / A \times 100$

Where A=Optical density of the blank and B=Optical density of the sample.

Results And Discussion

Phytochemical investigation of the plant extract revealed the presence of alkaloids, saponins, tannins, carbohydrates and protein. DPPH is widely used to evaluate the free radical scavenging effect of natural antioxidant. DPPH is a stable free radical at room temperature, which produces a purple violet solution in ethanol. DPPH shows a strong absorption band at 517 nm in visible spectrum. As the electron became paired in the presence of free radical scavenging the absorption vanishes and the resulting discoloration stochiometrically coincides with the number of electrons taken up. The bleaching of DPPH absorption is representative of the potential of the test drugs to scavenge free radicals independently. The bleaching of DPPH molecules can be correlated with the number of available hydroxyl groups. We can conclude that, the very good activity of the extract may be probably due to the presence of substance with an available hydroxyl group.

Flavonoids are wide spread in all natural compounds and posses a broad spectrum of biological activities. The chemical composition of Trigonella foenum graecum indicates the presence of phenolic compounds including tannins and flavonoids, which are known to possess antioxidant activities.

Table No 2 O. D. And Antioxidant Activity of ethanolic extract of Fenugreek plant

Conc.mg / ml	0.01	0-02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.1
O. D. of Fenugreek plant	0.21	0.18	0.17	0.14	0.13	0.11	0.08	0.07	0.05	0.03
% AA of Fenugreek plant	64.70	69.74	71.42	76.42	78.15	81.51	86.55	88.23	91.59	96.59

National Conference on Multidisciplinary Research in Science and Technology for Healthy Lifestyle Management (NCMRST- 2020) Organizer :- Shri R.L.T. College of Science, Akola
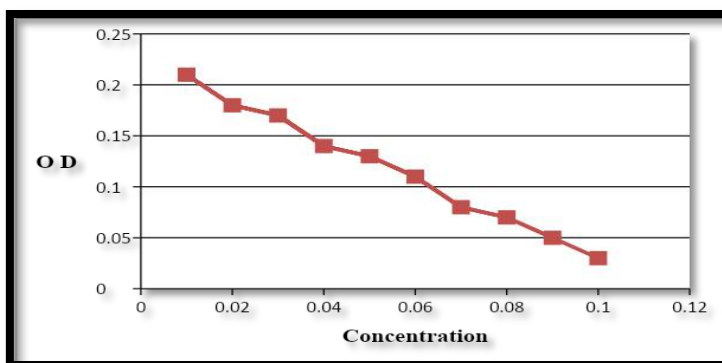
24th Jan. 2020

Fig. O.D. Extract of Fenugreek plant

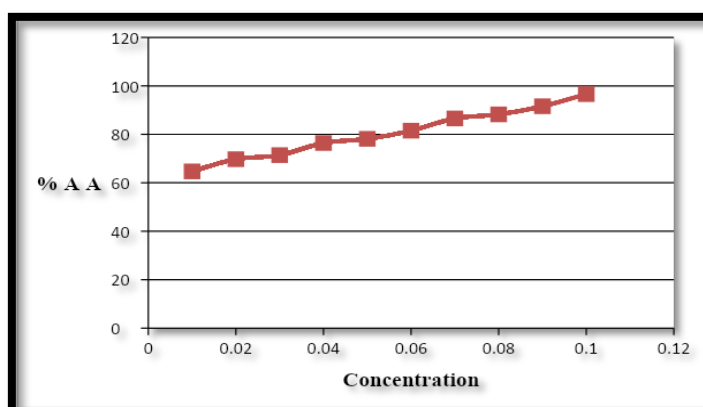**Fig. % AA of Extract of Fenugreek plant**

Calculation of IC50 Value for **Fenugreek plant** = max - ½ (max-min)

= 96.59 - ½ (96.59 – 64.70)

= 96.59– 15.94

= 80.65

IC50 = 0.07 mg/ml

Table No 3 O. D. and antioxidant activity of water extract of Fenugreek plant

Conc.mg / ml	0.01	0-02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.1
O. D. of Fenugreek plant	0.58	0.54	0.49	0.47	0.46	0.40	0.37	0.30	0.27	0.20
% AA of Fenugreek plant	2.52	9.24	17.64	21.00	22.68	32.77	37.81	49.57	54.62	66.38

Fig. O.D. Extract of Fenugreek plant

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293
(Special Issue No.70)   Peer Reviewed Journal   www.aiirjournal.com Mob. 8999250451

136
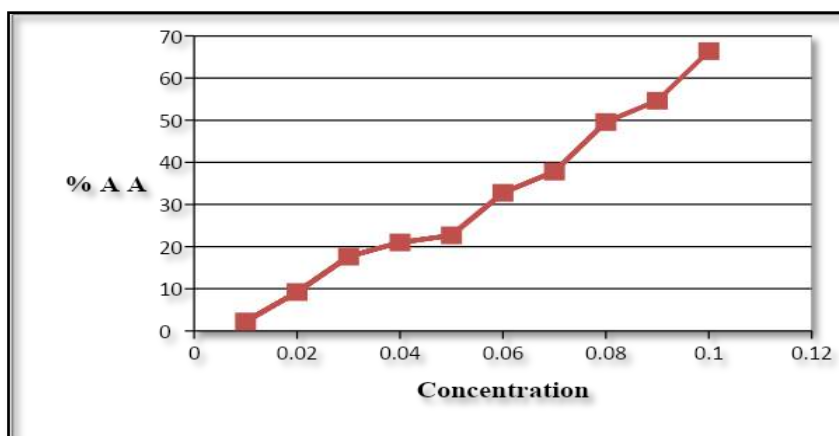
Fig. % AA of Extract Fenugreek plant

Calculation of IC50 Value for Fenugreek plant = max - ½ (max-min)

= 66.38 - ½ (66.38 – 2.25)

= (66.38 - 31.93)

= 34.45

IC50 = 0.06 mg/ml

Conclusion

The results obtained for the antioxidant assay by DPPH for ethanol and water extracts of Leaves of *Trigonella Foenum-Graecum* plants are reported. Remarkable decrease in O. D. value of test plant samples were observed from the graph, showed antioxidant activity. The IC_{50} value for ethanol and aqueous extracts of Leaves of *Trigonella Foenum-Graecum* plants were found to be 0.075 mg/ml, 0.063 mg/ml respectively. From the result it prove that increase in percent antioxidant activity with increase in concentration of test plant extracts. Overall, the plant extract is a source of natural antioxidant that can be important in disease prevention, health preservation and for healthy file

References

1) **N. Shubhasini, A Thangathirupathi, N. Lavnya.,** *Int J pharm pharm Sci,* **Antioxidant activity of** *trigonella foenum graecum* **using various** *in vitro* **and** *Ex vivo* **models, 2011,vol.3, 2,96-102.**

2) Gomes A J, Lunardi CN, Gonzalez S, Tedesco AC. The antioxidant action of *Polypodium leucotomos* extract and kojic acid: reactions with reactive oxygen species. Braz J Med Biol Res 2001; 34: 1487-1494.

3) Syed Ayesha Abdul Rasheed, Vaishali Wankhade, Shaikh Sarah Khalid Saifuddin, Agrawal Rinku Sudarshan Physico-Chemical Properties of Fenugreek (Trigonella Foenum-Graceum L.) Seeds, International Journal of Engineering Research & Technology, 2015,vol 4,9,

4) J. B. Harborne, Phytochemical Methods: A guide to modern techniques of plant analysis, sixth Indian reprint, Springer International Edition, 2010.

5) *Bharathi sambandhi, Devasena Thiyagaraj AN2, Arivarasan Ayyaswamy, Panchaiappan Raman* International Journal of pharmacy and pharmaceutical science volume8 4,**2016.**

6) Ramya Premanath, J. Sudisha, N. Lakshmi Devi and S.M. aradhya antibacterial and Anti-oxidant Activities of Fenugreek (*Trigonella foenum graecum* L.) Leaves

Comparative Analysis Of *In Vitro* Antifungal Activity Of Different Honey Samples

Nisha V. Warade

Assistant Professor, Department of Zoology,
Shankarlal Khandelwal Arts, Science and Commerce College, Akola (444002), Maharashtra, India.

Abstract

Fungus Aspergillus causes many human diseases like Aspergillosis, frequent among horticultural workers who inhale peat dust, which can be rich in Aspergillus spores. Aspergillus niger is also one of the most common causes of otomycosis (fungal ear infections). The problems with current chemical and artificial antifungal agents, led to the choice of honey as well as other natural products by the populace, in the treatment of fungal infections. The healing property of honey is due to the fact that it offers antimicrobial activity, maintains a moist wound condition, and its high viscosity helps to provide a protective barrier to prevent infections. Since honey has been found to possess antimicrobial property, it is therefore employed in wound managing therapy. The present study screened the antifungal spectrum and efficacy of three different honeys and compared same with a well-known standard Clotrimazole antifungal drug. In the present study, the antimycotic activity was investigated by Agar well diffusion method using 3 different unifloral honeys i.e. Arni (Clerodendrum multiflorum), Lemon (Citrus limon) and Ajwain (Trachyspermum ammi) against Aspergillus niger fungus. On comparing the zone of inhibition it can be suggested that all the honeys inhibited the growth of fungus but Ajwain honey showed maximum inhibition toward the fungus, compared to lemon and Arni honey. Further from observation, it can be concluded that Ajwain honey showed most inhibitory effect with inhibitory zone diameter of 31 mm suggesting its high antifungal activity. Arni honey showed lowest inhibitory effect with inhibitory zone diameter of 24 mm and hence it can be concluded that honey from Ajwain would be more potent in managing fungal diseases among the three samples evaluated.

Keywords: Honey, Antifungal, pharmaceutical, Apiculture by-products, medicinal value

Introduction:

Medicinal importance of honey has been documented in the world's oldest medical literatures, and since the ancient times, it has been known to possess antimicrobial property. Its high viscosity helps to provide a protective barrier to prevent infection. Most types of honey generate hydrogen peroxide when diluted because of the activation of the enzyme glucose oxidase, which oxidizes glucose to gluconic acid and hydrogen peroxide [1, 2]. Hydrogen peroxide is the major contributor to the antimicrobial activity of honey, and the different concentrations of this compound in different honeys result in their varying antimicrobial effects [3-5].

In recent years, there has been an increasing search for new antifungal compounds due to the lack of efficacy, side effects and/or resistance associated with some of the existing drugs [6]. Recently, the potential antifungal effect of honey has attracted serious attention within the scientific community [7].

The incidence of fungal infections is increasing in both the community and hospital environments, with *Aspergillus niger*. Aspergillosis is, in particular, frequent among horticultural workers who inhale peat dust, which can be rich in *Aspergillus* spores. *Aspergillus niger* is one of the most common causes of otomycosis (fungal ear infections) [8].The increase in the resistance of antifungal drugs in use has attracted the attention of the scientific community. The selection of antifungal treatment for *Aspergillus* usually depends on the severity of the infection and the parts of the body that are affected. Previous studies showed that various compounds like phenolics and flavonoids present in honey and propolis are responsible for their antifungal activity by affecting the permeability of the cytoplasmic membrane, which lead to the total leakage of the cellular constituents such as nucleic acids, proteins and inorganic ions such as phosphate and potassium, leading to complete cell death [9-12].

Material And Method :

Different types of unifloral honey [Arni (*Clerodendrum multiflorum*), *Trachyspermum ammi* (Ajwain) & *Citrus limon* (Lemon)] were collected from KVK, Buldhana. The preloaded antibiotic discs (Clotrimazole 10 µg) were obtained from HiMedia Jyoti Chemporium, Akola. The pure fungal culture (*Aspergillus niger*) was obtained from Post Graduate Department of Microbiology, Shri Shivaji College, Akola. The media and glass

wears (Petri dishes, test tubes, cotton Swabs, distilled water) needed for further use were sterilized by autoclave at 15psi at 121 °C for 20 minutes.

The honey obtained from the flowers of *Clerodendrum multiflorum*, *Trachyspermum ammi, Citrus limon* were screened for their antifungal activity by using the agar well diffusion method. 100ml Potato dextrose agar aqueous solution was made by dissolving 2.8 g of Potato dextrose agar in distilled water and solution made to 100 ml and the pH was adjusted to 7.0. The inoculation was carried out in a laminar air-flow. Nearly 25ml quantities of Potato Dextrose agar were plated into the petri dishes and allowed to cool and solidify for 40 minutes. After solidification of the media the fungal culture (*Aspergillus*) was inoculated by swabbing method. Three uniform wells of 6 mm in diameter and 4 mm depth were made in the culture media by using sterilized cork borer in each plate. A drop of molten nutrient agar was used to seal the bases of each well. These wells were filled with 50µl of honey by using micropipette and were allowed to diffuse for 40 minutes. Preloaded standard antifungal disc of Clotrimazole 10 µg was used as control. The antifungal activity was determined after 48 hours of incubation at 25°C in incubator. The Antifungal activity was measured from the diameter of the inhibition zone in mm formed by the honey around the well. The zone diameter of inhibition produced by the honey after measuring was compared with the inhibition zone produced by standard antifungal drug (Clotrimazole). Each sample was used in triplicate for the determination of antifungal activity.

Results And Discussion:

The present study evaluates the antifungal spectrum and efficacy of honey and compared same with standard Clotrimazole. Effect of honey on the growth of fungus is checked by agar well diffusion method using different types of unifloral honeys i.e. Arni (Clerodendrum multiflorum), Lemon (Citrus limon), Ajwain (Trachyspermum ammi). From the different zone of inhibition calculated Ajwain honey showed highest antifungal activity for fungus (Aspergillus).

The zone diameter of inhibition of honey sample from the flowers of Arni (*Clerodendrum multiflorum*), Lemon (*Citrus limon*), Ajwain (*Trachyspermum ammi*) plants were (29mm, 31mm and 24mm, respectively) while the zone diameter of inhibition of standard antifungal Clotrimazole was 22mm.

On comparing the zone of inhibition it can be suggested that all the honeys inhibited the growth of fungus but Ajwain honey showed maximum inhibition toward the fungus, compared to lemon and Arni honey. Further from observation, it can be concluded that Ajwain honey showed most inhibitory effect with inhibitory zone diameter of 31 mm suggesting its high antifungal activity. Arni honey showed lowest inhibitory effect with inhibitory zone diameter of 24 mm and hence it can be concluded that honey from Ajwain would be more potent in managing fungal diseases among the three samples evaluated. Data collected is given in the form of mean of three values.
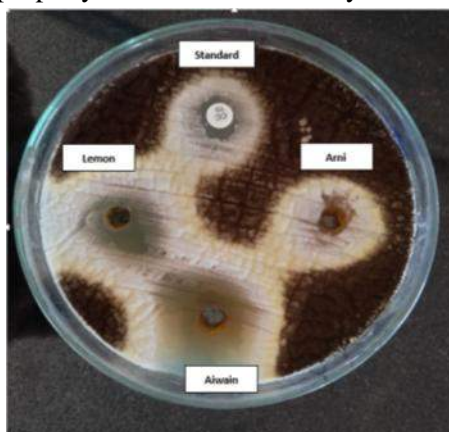
Table: Antifungal activity of Honey:

Sr.No.	Honey sample	Mean diameter of zone of inhibition(mm) of honey	Diameter of zone of inhibition(mm) of standard
1)	Lemon honey	29	22
2)	Ajwain honey	31	
3)	Arni honey	24	

Figure: The antifungal activities of the selected honey samples
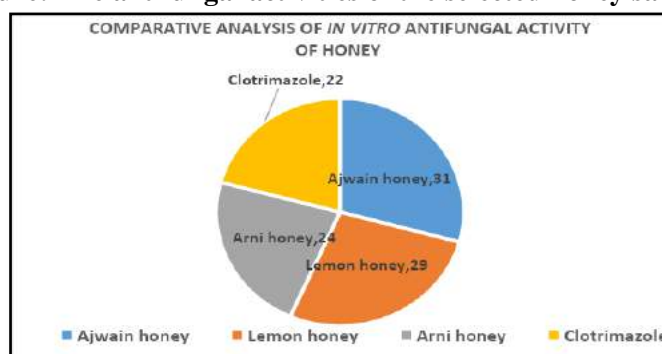
From the given experiment it was found that the Ajwain honey showed the highest inhibition zone i.e. it has the highest anti-fungal property. And Arni honey had the lowest inhibition zone. Which indicates that the Arni honey has the least anti-fungal property out of the three honeys taken as sample in the present experiment.

Conclusion:

It can be conclude that honey has effect on growth of fungus. All the sample honeys have shown the anti-fungal activity against tested fungal strain. Ajwain honey showed highest antifungal activity. It can be used as an effective natural source for the inhibition of growth of fungus. From the current investigation that the honeys samples selected for antifungal activities have medicinal values and are resistant for the diseases caused by these fungus. The present study verified the traditional use of honeys for various human ailments especially for various infectious diseases. Thus these honeys could be utilized as an alternative source of useful antimicrobial drugs. It is recommended that the above mentioned honeys are highly important on the basis of their medicinal values so, along with their further exploration for the mention strains, other strains should be also used in order to test out their significance.

References:

1) Maria LE, Afonso SE, and Xesús F. Antifungal effect of lavender honey against Candida albicans, Candida krusei and Cryptococcus neoformans. J Food Sci Technol, 2011; 48 (5): 640-643.
2) Melliou E, Stratis E, Chinou I. Volatile constituents of propolis from various regions of greece-antimicrobial activity. Food Chemistry, 2007; 103 (2): 375-380.
3) Intzar A, Farrah GK, Krishan AS, Bishan DG, Naresh KS, Prabhu D, et al. et al. In vitro antifungal activity of hydroxychavicol isolated from Piper betle L. Ann Clin Microbiol Antimicrob. 2010;9:7. [PMC free article] [PubMed] [Google Scholar]
4) Klepser ME. Candida resistance its clinical relevance. Pharmacotherapy. 2006;26:68S–75S. [PubMed] [Google Scholar]
5) Barker KS, Rogers PD. Recent insights into the mechanisms of antifungal resistance. Curr Infect Dis Rep. 2006;8:449–456. [PubMed] [Google Scholar]
6) Kourkoumpetis T, Manolakaki D, Velmahos G, Chang Y, Alam HB, De Moya M. Candida infection and colonization among non-trauma Emergency surgery patients. Virulence, 2010; 1 (5): 359–366.
7) Kujumgiev A, Tsvetkova I, Serkedjieva Y, Bankova V, Christov R, and Popov S. Antibacterial, antifungal and antiviral activity of Propolis from different geographic origins. J Ethnopharm, 1999; 64 (3): 235–240.
8) Ahmed M, Djebli N, Aissat S, Hammoudi SM, Bourabeh A, Hemida H. Additive potential of ginger starch on antifungal potency of honey against Candida albicans. Asian Pac J Trop Biomed. 2012;2(1):253–255. [PMC free article] [PubMed] [Google Scholar]
9) Irish J, Carter DA, Shokohi T, Blair S. Honey has an antifungal effect against Candida species. Med Mycol. 2006;44:289–291. [PubMed] [Google Scholar]
10) Cancliracci M, Citterio B, Piatti E. Antifungal activity of the honey flavonoid extract against Candida albicans. Food Chem. 2012;131(2):493–499. [Google Scholar]
11) Khosravi AR, Shokri H, Katiraee F, Ziglari T, Forsi M. Fungicidal potential of different Iranian honeys against some pathogenic Candida species. J Apic Res. 2008;47(8):256–260. [Google Scholar]
12) White JW, Subers MH, Schepartz AI. The identification of inhibine, the antibacterial factor in honey, as hydrogen peroxide and its origin in a honey glucose-oxidase system. Biochim Biophys Acta. 1963;73:57–70. [PubMed] [Google Scholar]

Zooplankton Population in Upper Wardha Project, Amravati (MS)

P.J. Awate

Department of Zoology,
Late R.Bharti Arts, Commerce and Smt.S.R.Bharti Science College, Arni
Dist- Yavatmal. 445103 (MS).

Abstract :

In Amravati district of Maharashtra, the Upper Wardha Project located at Simbhora, 8-K.M. away from Morshi and 56-K.M. away from District place. Zooplankton diversity was studied from this project which is one of the most ecological parameters as these are the intermediate link between phytoplankton and fish. They play a significant role in transferring energy in aquatic ecosystem as primary consumers and can be used as indicators of tropic phase of a water body. The study area was divided in to five sampling stations to cover the whole dam. Monthly sample were collected by filtering twenty liter water sample through standard plankton net of bolting silk cloth with 64µ mesh size and the concentrated sample were collected in 10 ml distilled water and were preserved in lugol solution and 4% formalin and observed during June 2013 to July 2014. Population abundance and Percentage of zooplanktons was in the order of Rotifer > Cladocera > Copepoda > Protozoa > Ostracoda > Worms & Larvae. Rotifers (27.90%), cladocera (16.76%), copepod (15.49%); protozoan (15.06%); ostracods (13.28%); worms and larvae (11.52%).

Key words :- Zooplankton, Upper Wardha Project, Indicators, Ecosystem.

Introduction : .

The water as food and raw material is strictly connected with life and describes the human cultural development throughout the centuries. Water is the most precious natural vital resource and one of the principle elements of nature, importance of which in human civilization needs no elaboration. It is a renewable resource and important factor for maintaining balance in the nature. Its physical and chemical properties support the biological cycles of the livings and control the climatic and geological conditions everywhere.

The inland water resources, on the surface of Earth such as rivers, lakes, reservoirs and ponds became the focus of special attention in the early stage of development of the science of ecology. The zooplankton occupies an intermediate position in the food web in the aquatic ecosystem. Nearly all fish depend on zooplankton for food during their larval phases, and some fish continue to eat zooplankton in their entire lives (Madin et.al.,2001). According to Murugan et.al.(1998) and Dadiuch and Saxena (1999) the zooplankton play an integral role and serves bio indicators and it is a well -suited tool for understanding water pollution status(Ahmad,1996;Contreas et.al.2009). Therefore the present study is under taken considering interrelation ship between abiotic and biotic components, monthly and seasonal impact with Zooplankton dynamics.

Material and methods:

'Upper Wardha Project'is a perennial dam, constructed by irrigation department of Maharashtra government, in Amravati District of Maharashtra, is also known as 'Nal Damayanti Sagar' situated 56 Km from the district place Amravati (M.S). The water of dam is used for drinking, fishery and irrigation purposes along with some domestic activities. It is an earthen reservoir with the height 36M and 7Km long spread area occupying the border of Amravati and Wardha district for the purpose of irrigation and drinking water supply. The dam is constructed on Wardha river, it is at 780-03'-27" E longitude and 210-16'-18" N latitude. The catchment area is 4302 Sq. Km. and located at 306 MSL.

For the investigation of various abiotic and biotic parameters five different sampling stations were selected (Fig:1). Monthly samples were taken in two liter polythene bottle at regular interval in between 9-11 am. The samples were analyzed for abiotic components at laboratory condition and the filtrate were fix in 4% formalin for the enumeration of zooplanktons. The method used for the physico-chemical analysis of water and identification of zooplankton as given by APHA(1989), Adoni (1985) and Great lake water life photo gallery.

Result and Discussion :

Upper Wardha Project exhibited heavy bulk of rotifers all through the period of investigation. The observed zooplanktons belongs to groups protozoan, rotifers, cladoceron, copepods, ostracoda and worms and larvae. Rotifers (27.90%) dominated the zooplanktons population and were followed by cladocera (16.76%); copepod (15.49%); protozoan (15.06%); ostracods (13.28%); worms and larvae (11.52%) (Table-41). Abundance in zooplanktons was in the order of rotifers > cladocera > copepoda > protozoa > ostracods > worms and Station wise enumeration of total zooplanktons exhibited highest number of total zooplanktons at station I followed by station II, station IV, and station III however, at station V, the total zooplanktons were found to be the minimum. Rotifers were found to be maximum at station I and IV. Numerical abundance is shown in table 1. Zooplankton was observed maximum (55028 org/lit.) at station I and it was found minimum (47812 org/lit.) at station V (Table-1). While Monthly variation and mean ± S.E. values of total zooplanktons were given(Ttable 2). Protozoans are represented by nine genera, rotifers by eleven genera; cladocerons by fourteen genera; copepods by twelve genera; ostracods by four genera and worms and larvae by four genera during 2013-14. Seasonal trend of zooplankton representing lower number in monsoon season. It might be due to rain water, causing diluting effects as suggested by Chapman et.al;(1985). On the other hand zooplankton might have consumed by fishes as reported by Dave et.al ;(1999). The increased turbidity in rainy season may be the cause for declining zooplankton population as suggested by Sharma and Sahai; (1988).

Conclusion:

The planktonic population varies qualitatively and quantitatively depending on the morphometry, source of water, its organic and inorganic content, climatic factors and with the season Zooplankton population belongs to six category exhibit more population of rotifers in the present investigation which is good food for the fishes therefore, the water body is advantageous for fish culture, Meshram, C.B. (2005). The presence of water insects, mollusks, macrophytes, provides food for migratory and residential birds. The pollution indicator phytoplankton and zooplankton were less in number at all the station confirms that the water is safe for drinking and also for healthy fish culture. The present status of water body is mesotrophic and nonpolluted hence; the water can be utilized for irrigation, drinking and fishery activities.

References:

A journal publication:

1) Ahemad, Masood (1990) : Hydrobiological studies of whorl reservoir Aurangabad (Maharashtra State), India. J. Environ. Biol., 11,335-343.
2) Chapman, A. M; Green, J. D and Jolly. H.(1985): Relationship between zooplankton abundance and trophic status in Newzealand lakes; Hydrobiol.,123: 119-136
3) Contreas J.J,S.S.S. Sarma,M. Merino- Ibarra and S.Nandini (2009) : Seasonal changes in the rotifer diversity from a tropical high altitude reservoir (Valle de Bravo, Mexico) J.Enviro. Biol.,30,191-195
4) Dadhick, N. and M.M. Saxena. (1999). Zooplankton as indicators of trophical status of some desert waters near BikanerJ. Environ. Pollut., 6, 251-254.
5) Murugan T (2008) : An inventory of the Algal flora of Temple tanks at Kanchipuram. Indian Hydrobiology 11(1): 99 - 102.

A Report:

6) Dave, R. K.; Prakash, M.M. and Dhakad, N.K. (1999) : Seasonal trends in abiotic factors of the lentic habitat of Kalika pond, Dhar, Limnological research of India, 157-171.
7) Madin, L.P; Bollens, S.M; Horgan, E; Butler, M and others (2001) : Voracious plank tonic hydroids : unexpected predatory impact on a coastal marine ecosystem. Deep – Sea Res II 43 : 1823 – 1829.
8) Sharma, N. and Y.N. Sahai (1988) : Primary productivity of Jari tank. Proc. Nat.Symp.Past,Present and Future of Bhopal Lakes. Pp. 97-104.

A Book :

9) Adoni, A. D.(1985): Workbook in Limnology. Pratibha Publisher,C-10 Gour Nagar,Sagar (M.P).
10) APHA (1985): Standerd Methods for the Examination of Water andwastewater,Washington,DC.

11) A Thesis :

12) Meshram, C.B. (2005) : Zooplankton biodiversity in relation to pollution of lake Wadali, Amaravati. J. Ecotoxicol. Environ.Monit., 15, 55-59.

Tables and Figures:

Table1:Numerical abundance of zooplankton(org/l)at different stations of Upper Wardha Project during 2013-2014

Sr.No.	Zooplanktons	Stations					Total	%
		I	II	III	IV	V		
1	Rotifera	14801	13917	14654	15316	14138	72826	27.90
2	Cladocera	9646	9646	10383	7879	6185	43740	16.76
3	Copepoda	8026	9205	6480	9205	7511	40426	15.49
4	Protozoa	8542	5670	9205	7437	8468	39322	15.06
5	Ostracoda	8247	8395	6185	5913	5913	34653	13.28
6	Worms&Larvae	5766	6775	4345	7585	5596	30066	11.52
	Total Zooplankton	**55028**	**53607**	**51251**	**53335**	**47812**	**261034**	**100**

Table 2: Monthly variation in zooplankton of water from sampling station I to V of Upper Wardha project 2013-14

Total Zooplankton (org/l)							
Months	**Stations**					**Average**	**± S.E.**
	I	**II**	**III**	**IV**	**V**		
APR	4934	4565	4565	5007	4271	4669	135
MAY	5375	5007	5007	5375	4492	5051	162
JUN	5817	5449	5302	5817	4860	5449	179
JUL	1730	2430	1473	1804	1583	1804	167
AUG	2194	2062	1767	2342	2047	2082	95
SEP	2504	2504	2209	2872	2577	2533	106
OCT	2945	2945	2725	2872	3019	2901	50
NOV	3093	3166	3019	3240	3019	3107	43
DEC	3535	3314	3461	2872	2798	3196	152
JAN	3976	3755	3461	3387	3240	3564	133
FEB	4124	3903	4197	3240	3461	3785	187
MAR	4492	4418	4124	4197	3608	4168	156
APR	4934	4860	4713	4713	4050	4654	157
MAY	5375	5228	5228	5596	4786	5243	133
TOTAL	**55028**	**53607**	**51251**	**53335**	**47812**		
MEAN	3931	3829	3661	3810	3415		

Fig1.:Photograph showing Sampling Station I to V of Upper Wardha Project.
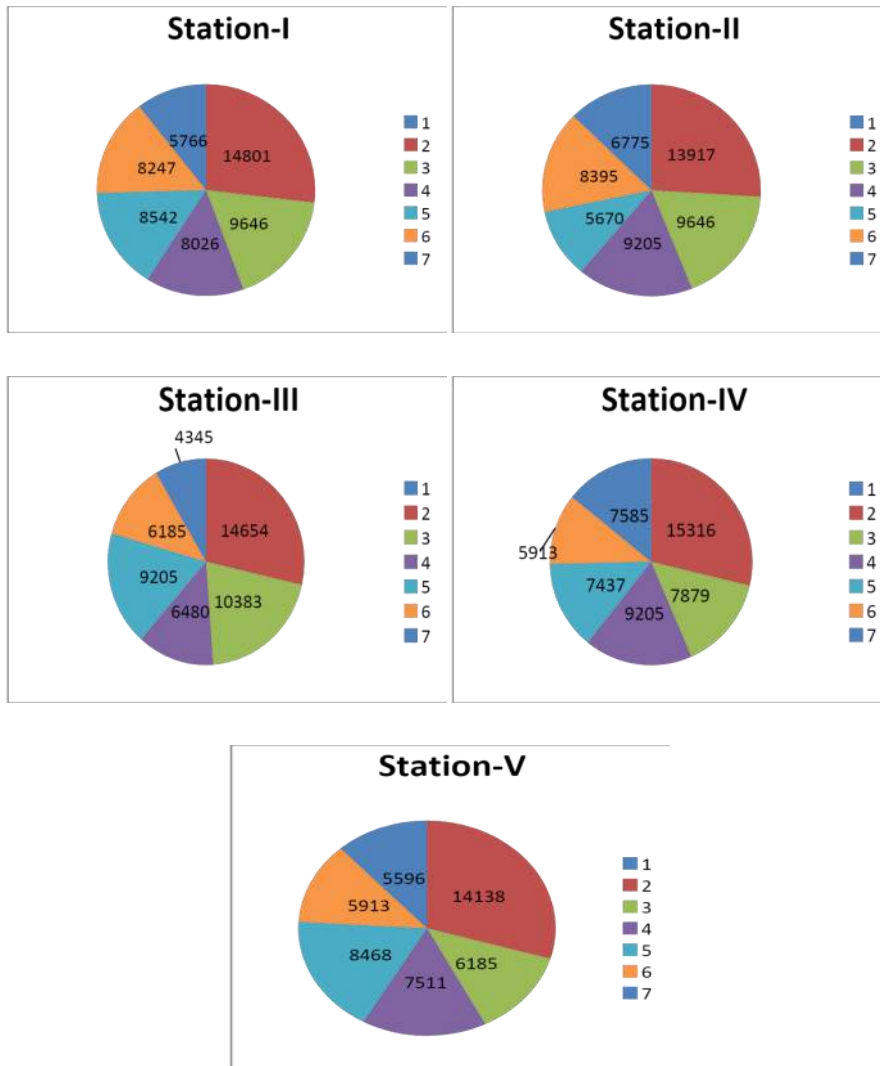
Fig2.: Graph showing numerical abundance of Zooplankton at Sampling Station I to V of Upper Wardha Project
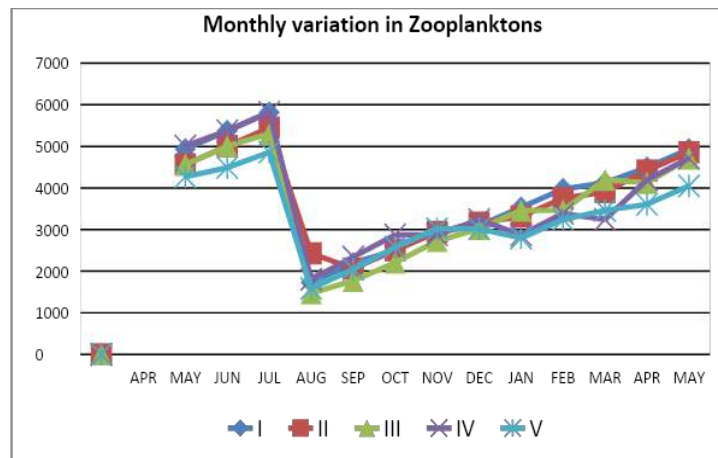

Fig 3 : Monthly variation in zooplankton at Upper Wardha Project.2013-14

Evaluation of Farmer's Potential for Adaptation of Organic Farming in Akola District

D. D. Bhokare
Associate Professor,
Department of Microbiology,
Shankarlal Khandelwal Arts, Science and Commerce College, Akola (M.S.)

Abstract

The aim of this study was to examine the potential of organic farming in Akola District. For this study data was collected through survey of farmers in Akola District. The survey revealed that 65.13% farmers have educational qualification upto 10/12th, this mainly influences the adaptation of organic farming. 70.64% farmers know about organic farming, but only 32.11% farmers were interested to adopt organic farming in practice if they get proper facility and surety of returns. While 43.11% farmers were not interested in organic farming due to no guarantee of high yield.

Key ward: Organic farming, Adaptation of organic farming.

Introduction:

Organic farming is a method of farming system, which make soil alive and increases the crop productivity by eco friendly way for good health. Due to the rising input costs involved in modern farming and its un-sustainability due to overcapitalization has made organic farming a necessity in many agriculturally grown regions (Singh, 2009). Venkatram and Mani(2006) showed through case studies that the cost of cultivation is less in organic farming when compared to chemical farming. But various studies have shown that farmers are reluctant to take up organic farming when production process does not reach adequate productive and efficiency levels(Lampkin and Padel, 1994 Offermann and Nieberg, 2000). Therefore the aim of this study was to examine the potential of farmers for adaptation of organic farming in Akola District.

Materials and Methods

Research Design:

The study was conducted using a survey to evaluate farmers potential for adaptation of organic farming with an aim of finding out the challenges and factor associated with organic farming.

Location of the study:

The survey was carried out in different villages of Akola, Balapur, Patur , Telhara & Murtizapur tahsil of Akola district.

Sampling Procedure and Sample Size:

The questionnaire was designed to collect information from farmers. The data was collected randomly from different villages of Akola, Balapur, Patur , Telhara & Murtizapur tahasils of Akola District. A total of 108 samples were collected from 5 tahasils. The age group of farmers was maximum in the range of 41- 50 years (35.77%) and 30-40 years (28.44%). It was also found that the percentage of young farmers was very less i.e. only 14.67% and old age farmers was 21.10%. (Figure - 1)

Result and Discussion

Agriculture is an important sector of our country and farmers play a key role for the implementation of any agricultural practice. The findings of the study revealed that farmer's potential of organic farming and its challenges for adaptation in Akola Dist. The maximum farmers have average land in the range of 1-5 Acre (51.37%) and in the range of 5-10 Ac.(26.60%) and very few farmers have land more than 20 Ac.(Figure - 2). 65.13% farmers have educational qualification is 10th/12th and 16.15% having graduate and only 0.91% farmers have post graduate degree. While 17.43% farmers have some other qualification such as ITI/Certificate course/Diploma etc.(Fig.3) This mainly influences the adaptation of organic farming. 70.64 % farmers know about organic farming , but only 32.11% farmers interested to prefer organic farming practice if they get facility/ surety of return (Figure - 4 and 5). 43.11% farmers are not interested in organic farming due to no guarantee of high yield and they also feel wastage of money /loss. 18.34% farmers are not interested in organic

farming due to non availability of organic input, while 14.67% have experience that they get low return on their investment due to low price (Figure - 6). Therefore it is needed to make special policy for adaptation of organic farming and provide proper facility to farmers.
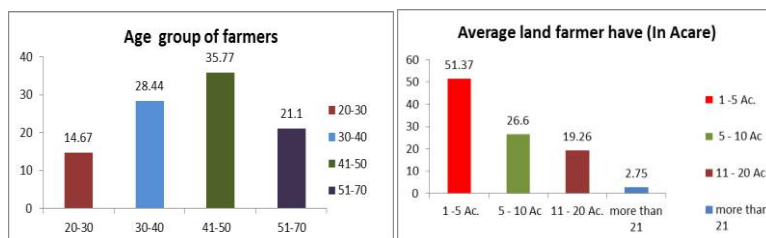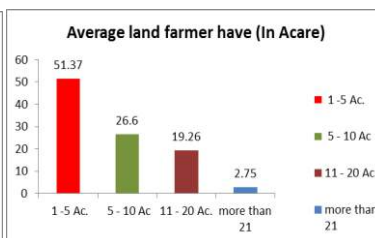

Figure -1   Figure – 2
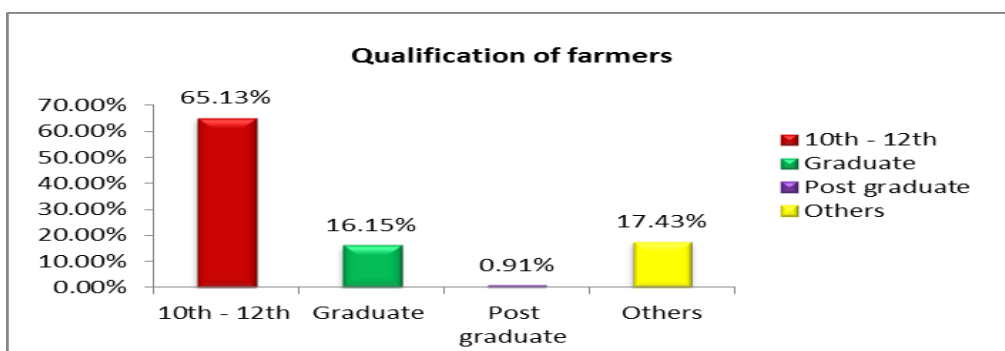
Figure -3
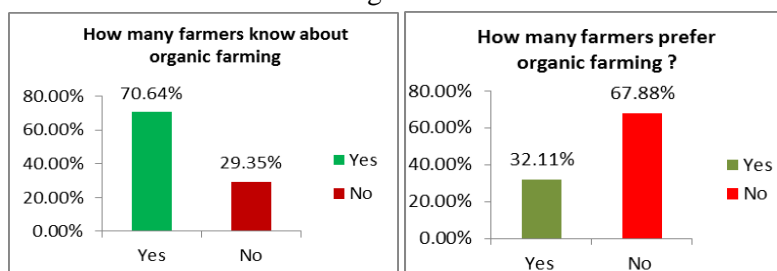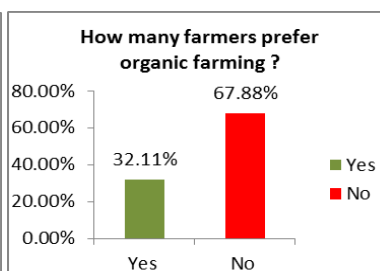
Figure - 4   Figure - 5
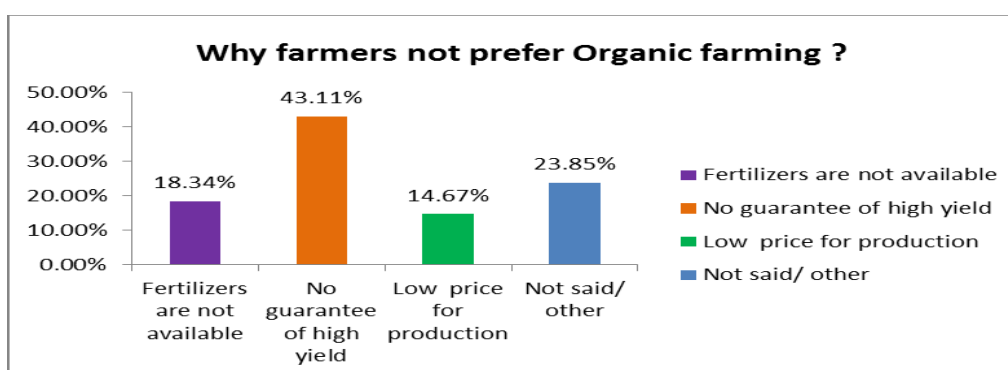
Figure – 6

Reference:

1. Ghosh N. (2004). 'Reducing dependence on chemical fertilizers and its financial implications for farmers in India', *Ecological Economics*, Vol no. 49, pp. 149-162
2. Lampkin, L.H. and Padel, S. (Eds.) (1994). 'The economics of organic farming – An international perspective'. *CAB International Publishers,*Wallingford.
3. Kiran Kumar T. M.et al.(2015). 'Economic Benefits from Adoption of Organic Farming in India'. *Economic Affairs 2015 : 60(3): 569-576*

4. Offermann, F. and Nieberg, H. (2000). 'Economic performance of organic farms in Europe. Organic farming in Europe'. *Economics and Policy5* Hohenheim, Universität Hohenheim.

5. Sing S (2009). 'Organic produce supply chains in India: Organization and Governance', *CMA publication no.222, IIM, Ahmedabad* - 380015

6. Venkatram, R. and Mani, K. (2006). 'Prospects and constraints in adoption of organic farming- A micro-level study in Tamil Nadu'. *Agricultural Economics Research Review* 19(2): 228.

7. Moses Kathuri Njeru (2015). 'Challenges and Benefits of Organic Farming among Farmers in Nembure Division, Embu County-Kenya'. *International Journal of Humanities and Social Science* Vol. 5, No. 12: 59-69

Spider Diversity Of Katepurna Sanctuary District Akola (MS) India

Shegokar M. M.   **P.P. Ade**

Department of Zoology Shri Shivaji College of Arts   Department of Zoology Shri Shivaji College of Arts
Commerce and Science, Akola   Commerce and Science, Akola

Abstract

Spider diversity was studied during July 2011 to March 2012 during investigation 37 genera and 74 species were recorded from Katepurna Sanctuary. Prominent among them salticidae (24%) Araneidae(19%) Thomisidae (14%) and Lycosidae(5%)and Oxipidae(5%)were recorded from different area of Katepurna wild life Sanctuary family, generic and species diversity were observed.

Keywords- Spider diversity Katepurna sanctuary salticidae ,Areneidae , thomisidae ,lycosidae.

Introduction

Spiders belong to order araneae of class arachnida of phylum arthropoda these are the seventh largest order of arachnids which placed in the global diversity after the order insecta. spiders are known for their predation on the front insects. spiders are very much diverse and shows different morphological variation in their size, colour, eye pattern spiders can be found easily in their different habitat such as on dry leaves, on forest floor tall grasses, underground caves bark and stones, in agricultural fields, mountain areas and inside human habitation. Spider plays an important role to balance insect populations because they are the most numerous insectivores in nature.

The current globalist of spider 120 families, 4144 genera and 48350 species have been described worldwide (world spider catalogue version 20.5 dated 20-08-2019) out of 120 families the largest family salticidae comprises 640 genera,4612 species.Spiders (order Araneae) are air-breathing arthropods that have eight legs and chelicerae with fangs able to inject venom.

Anatomically, spiders differ from other arthropods in that the usual body segments are fused into two tagmata, the cephalothorax and abdomen, and joined by a small, cylindrical pedicel. Unlike insects, spiders do not have antennae. In all except the most primitive group, the Mesothelae, spiders have the most centralized nervous systems of all arthropods, as all their ganglia are fused into one mass in the cephalothorax. Unlike most arthropods, spiders have no extensor muscles in their limbs and instead extend them by hydraulic pressure.

Material and Methods

Present study were made on preliminary spider diversity of katepurna sanctuary during July 2011 to March 2012. Katepurna Sanctuary located in Akola and Washim district of Maharashtra is an exotic sanctuary dotted with an abundance of flora and fauna. The sanctuary lies in close proximity to the catchments area of Katepurna reservoir (Mahan Dam). Its area is geographically located at - 20°25'0.54"N 77°10'50.14"E. The land vegetation at Katepurna sanctuary is southern tropical dry deciduous forest. There are over 115 species of plants at this sanctuary such as Bihada, Dhawada Moha, Tendu, Khair, Salai, Aola, Tendu, etc. Katepurna Wildlife Sanctuary is renowned for the four-horned antelope and barking deer. Other animals that can see at the sanctuary include Black buck, Leopard, Wolf, Wild boar, Hyaena, Hare,Nilgai, Jungle cat and Monkeys. Spider survey is carried out for ground spiders and spiders along slow flowing shallow streams, spiders from decaying barks of trees, from shrubs and crevices of rocks. Well established sampling protocols for spider collection are adopted in different selected sampling spots. The detailed descriptions of the collection techniques are as follows-

(i) Sweep Netting – This sampling method is applied to collect the foliage spiders from low level vegetation of shrubs (up to 2 m in height). The sweep net consists of a 90 cm handle; 40 cm ring and the collection are poured on white canvas. The net was emptied at regular intervals to avoid loss and destruction of the specimen. During sampling time sweep net was moved back and forth to cover all ground layer herbs and shrubs till all vegetation in the sampling plots were swept thoroughly.

(ii) Ground Hand Collecting – Ground Hand collection involved the collection of spider samples from ground to knee level. This method of sampling is used to collect the spiders, which are found to be visible in the ground, litter, in broken logs, rocks etc.

(iii) Aerial Hand Collecting – Aerial Hand collection involved the collection of spiders

samples from knee level to arm length level. This method accessed web-building and free-living spiders on the foliage and stems of living or dead shrubs, high herbs, tree trunks etc.

(iv) Vegetation Beating: The method is employed to accesses spiders living in the shrub, high herb vegetation, bushes, and small trees and branches. The spiders are collected by beating the vegetation with a stick and collecting the samples on a cloth (1m by 1.2 m).

(v) Litter sampling: Litter i.e. deciduas from the ground were collected by hand and was put in a big tray. Litter sampling involved sorting of spiders from the litter collection tray. With the above methods of collections the spiders were collected and observed under stereo-zoom binocular microscope (for small/tiny spiders) wherever necessary in the field itself. Later all the spiders were photographed by Canon 60 D with macro lens in their natural habitat.

Observation and results

Present study on spider diversity were made during 2011- 2012 in Katepurna wild life sanctuary vidharbha, India. Spiders representing 16 families, 37 genera and 74 species were recorded from sanctuary during the study (Tables 1, 2 and fig. 1- 82). This represents 26.66 % of the total families reported from India (Sebastian and Peter, 2009). Araneidae was the dominant family constituting 21 species from 7 genera. The Salticidae was represented by 13 species from 9 genera. On species level, *Phonognatha graeffei* and *Cyclosa insulana* was the dominant species.

Guild structure analysis revealed seven feeding guilds (Uetz et al. 1999). These are orb web weavers, stalkers, ground runners, foliage hunters, sheet web builders, scattered line weavers and ambushers (Table1).Orb web weavers constituted the dominant feeding guild representing 35 % of the total collection (Graph2). They are followed by stalkers, foliage hunters and Ambushers constituting 34 %, 12% and 12% respectively of the total catch. This study brought out the fact that Katepurna wild life sanctuary, the natural forest in Akola and Washim district which is on the verge of destruction due to rapid Agricultural industrial and development, is an abode of spiders in addition to the multitude of migratory birds nesting in this dry deciduous forest. This rich diversity of spiders is also indicative of the overall biodiversity of this sanctuary since spiders are considered to be useful indicators of the species richness and health of terrestrial ecosystems (Noss 1990) and amply emphasizes the need for preserving this forest patch intact from a biodiversity conservation perspective. Most of the spiders from Araneidae are inhabitants of shrubs and grasses. In *Neoscona* abdominal variations are noted with respect to colour patterns. The genus *Argiope*, commonly known as "Signature spider"is mostly found in orb web built in grasses and sometimes webs are built on shrubs like Lantana camera. Spiders belonging to the families, Tetragnathidae, inhabit river and stream beds in Sanctuary. Spiders from Tetragnathidae are found to feed on insect larvae. They are seen sitting on their single silk thread which extends from exposed stone to nearby stone in the river bed. During rest, they are seen hanging in a straight line with extended legs parallel to silk thread. The spiders collected in the largest numbers were *Stygodyphus sp2* (8.47%) of total collection), *Marpissa sp*2 (7.06%), *Thomisus sp* (5.64%). *Paradosa sp* 2 and *Telamonia dimidiata* (3.38%), *Hasarius adansoni*, ,and *Clubiona recluse* (2.82%), *Paradosa sp* 3 (2.54%), and *Uloborus sp* and *Plexippus paykulli,* (1.41%) Table 2.

The major component of the spider population found in this ecosystem was the family Araneidae composed mainly of *Aculepeira ceropegia*, *Argiope pulluchella, Phonognatha graeffei* and the family Salticidae mainly composed of *Marpissa sp2*, *Phintella vittata* and *Telamonia dimidiata*. Besides the above, Thombicidae and Lycosidae were found in relatively large numbers. The families Salticidae and Araneidae constituted 24% and 19%, while Thomicidae and oxiopidae constituted 14 % and 5% of the total collection (Graph1).

Functional groups: The collected spiders can be divided into six functional groups (guilds) based on their foraging behaviour in the field (Uetz et al. 1999). The dominant guild was of the orb web builders (Graph 2) and it comprised of 30 species of spiders. Spiders of the families Araneidae, Tetragnathidae and Uloboridae fall under this category. Spiders of the category ground runners formed the next dominant guild in this ecosystem comprising of 13 species of spiders. Foliage runners (12 species), ambushers (8 species), scattered line weavers (6 species) and sheet web builders (3 species) are the other functional groups. Family diversity: Out of the 60 families recorded in the Indian region, 16 families are discovered in Katepurna wild life sanctuary. This represents 26.66 % of the total families recorded in India. Araneidae was the dominant family in this biome, which is composed of 21 species of 7 genera. Salticidae was the next dominant family with 13 species of 9 genera, Lycosidae (7 species) and Thomisidae (8 species) was the order of dominance of the other major families in this ecosystem. Generic diversity: Out of the 252 genera recorded from the Indian region (Siliwal et al. 2005), 37 genera are discovered in Katepurna sanctuary. Maximum generic diversity was found in Salticidae (9), Araneidae (7), and Thomisidae (5). The number of genera recorded here is higher than that of other major Indian spider studies viz., Wan wild life sanctuaryy- 30 genera (Bhatakar 2011),Andaman and Nicobar islands – 33 genera(Tikader1977), Hingolgarh Nature Education Sanctuary, Gujarat- 34 genera Patel (2001),and lower than that of Sikkim – 41 genera and Calcutta – 47 genera (Tikader 1970,Tikader, Biswas 1981), Mannavan shoal – 57 genera (Sudhikumar et al. 2005), Mangalavanam forest Kochin -51 genera (Sebastian 2005), Madhya Pradesh and Chhattisgarh -69 genera (Gajabe 2003), Parabikulum Wildlife Sanctuary, Kerala-53 genera Patel (2003), Toranmal wildlife sanctuary -55 genera (Meshram 2011). Genera such as Araneus (Araneidae); *Marpissa, Phintella, Telamonia* (Salticidae); *Lycosa, Paradosa* (Erresidae); *Oxyopes*, *Hamataliwa*(Oxiopidae); *Runcinia, Misumenops* and *Thomisu* (Thomisidae) and *Uloborus* (Uloboridae) are frequently recorded in Katepurna wild life Sanctuary.

Species richness: A total of 74 species are discovered from a limited area of 20 square km. This number is very high compared with other regions like Andaman and Nicobar islands – 65 species, Sikkim – 55 species and Calcutta – 99 species (Tikader 1970, 1977 and Tikader, Biswas 1981). The above three studies were conducted over a period of one to two years while the present study was limited to 8 time sampling.

Affinities: The present studies conducted in Katepurna wild life sanctuary revealed that the spider fauna of this ecosystem bears affinities with Oriental and Palearctic regions. The presence of species like *Cyclosa bifida* (Araneidae); *Leucauge decorata* and *Nephila clavata* (Tetragnathidae) bears oriental affinities. A small fraction of species, namely *Araneus mitifica* (Araneidae) show Palearctic affinities. Affinities with the island fauna of Sri Lanka are also pronounced. *Argiope pulchella, Cyclosa insulana* (Araneidae) are some of the species having Srilankan affinities discovered from Katepurna sanctuary.

Faunal similarity: Faunal similarity of spiders found in Katepurna sanctuary with other regions of India is also striking. *Araneus mitificus* (Araneidae); *Telamonia dimidiate* (Salticidae) and Nephila sp (Nephilidae) are species commonly found in the spider fauna of Andaman and Nicobar islands (Tikader 1977). Species like *Cyclosa insulana* (Araneidae); *Oxyopes sp.* (Oxyopidae); *Leucauge decorata,* (Tetragnathidae). *Argiope pulchella* (Araneidae); *Leucauge decorata* (Tetragnathidae); *Phintella vittata* and *Telamonia dimidiate* (Salticidae) are also found in Calcutta (Tikader 1981).Spider fauna of katepurna shows great similarities with above mention region.

Table 1 spider families,genera and species recorded from katepurna wild life sanctuary (ms,india)2011-2012

Sr no	Family	Genera	Species	Individuals	Guild
1	Araneidae	7	21	58	Orbweb weavers
2	Clubinoidae	1	3	18	Foliage hunters
3	Eressidae	1	2	32	Orbweb weavers
4	Hersilidae	1	1	1	Foliage hunters
5	Lycosidae	2	7	41	Ground runners
6	Mimetidae	1	1	2	Foliage hunters
7	Miturrgidae	1	1	1	Foliage hunters
8	Nephillidae	1	1	5	Orbweb weavers

9	Oxyopidae	2	6	30	Stalkers
10	Phalanginidae	1	1	2	Ground runners
11	Salticidae	9	13	91	Stalkers
12	Scytodidae	1	1	2	Foliage hunters
13	Tetragnathidae	2	5	20	Orbweb weavers
14	Theredidae	1	1	2	Scattered line weavers
15	Thomicidae	5	9	43	Ambushers
16	Uloboridae	1	1	8	Orbweb weavers
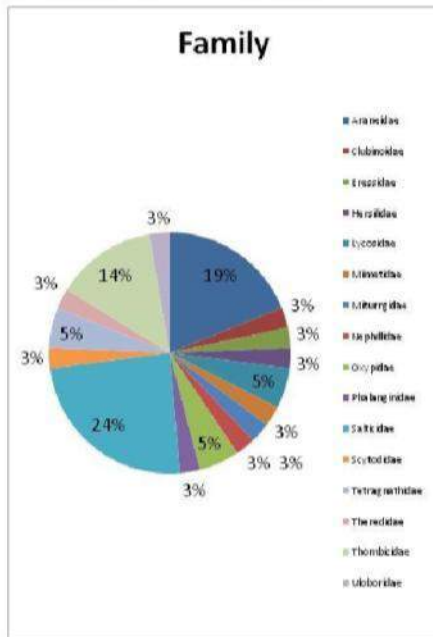
Graph:-1 Percent occurrence of spider species from Katepurna Wild life Sanctuary.
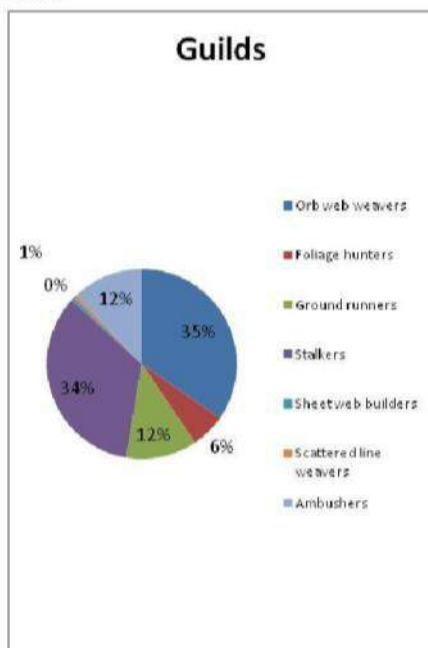
Graph :- 2 Guild structure of spiders collected from Katepurna Wildlife Sanctuary, India.

Table 2. Checklist of spiders collected from Katepurna wild life Sanctuary Sanctuary, India.

Family	Genus species	Individual	% Occurrence
	Aculepeira ceropegia Male	5	1.41%
	Agalenatea redii	1	0.28%
	Araneus marmoreus	1	0.28%
	Araneus mitificus	2	0.56%
	Araneus sp.	1	0.28%
Araneidae	Argiope pulluchella	5	1.41%
	Cyclosa sp	4	1.12%
	Cyclosa bifida	3	0.84%
	Cyclosa insulana	5	1.41%
	Cyclosa moonduensis	2	0.56%
	Cyclosa neilensis	4	1.12%
	Eriophora transmarine	2	0.56%
	Neoscona arabesca	2	0.56%
	Neoscona sp.	2	0.56%
	Phonognatha graeffei F	6	1.69%
	Phonognatha graeffei M	2	0.56%
	Phonognatha sp.	4	1.12%
	Unidetified	3	0.84%
	Zygeilla x – notate	2	0.56%
	Zygeilla sp1	1	0.28%
	Zygeilla sp2	1	0.28%
Clubinoidae			
	Clubiona sp	3	0.84%
	Clubiona recluse Female	10	2.82%
	Clubiona recluse male	5	1.41%
Eressidae			
	Stygodyphus sp 1	2	0.56%
	Stygodyphus sp2 (Male , female)	30	8.47%
Hersilidae			
	Hersilia sp	1	0.28%
Lycosidae			
	Lycosasp 1	2	0.56%
	Lycosasp 2	3	0.84%
	Lycosasp 3	4	1.12%
	Lycosasp 4	1	0.28%
	Paradosa sp 1	10	2.82%
	Paradosa sp 2	12	3.38%
	Paradosa sp 3 (female ,male)	9	2.54%

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293 (Special Issue No.70) Peer Reviewed Journal www.aiirjournal.com Mob. 8999250451

151

Mimetidae			
	Mimetus sp	2	0.56%
Miturrgidae	Cheiracanthium sp	1	0.28%
Nephillidae	Nephila sp (male female)	5	1.41%
Oxypidae			
	Hamataliwa sp	7	
	Oxyopes macilentus	4	1.12%
	Oxyopes sp1 male ,female	5	1.41%
	Oxyopes sp 2	3	0.84%
	Oxyopes sp 3	6	1.69%
	Oxyopes salticus	3	0.84%
Phalanginidae	Daddy longleg spider	2	0.56%
Salticidae			
	Hasarius adansoni Male female	10	2.82%
	Marpissa sp1	2	0.56%
	Marpissa sp2	25	7.06%
	Myrmarachne sp	7	1.97%
	Opisthoncus sp.1	2	0.56%
	Opisthoncus sp.2	2	0.56%
	Otiosus sp	3	0.84%
	Phidippus regius	3	0.84%
	Phidipus sp1		
	Phintella vittata (male Female)	12	3.38%
	Plexippus paykulli (male female)	8	1.41%
	Plexippus petersi (male female)	5	2.24%
	Telamonia dimidiata (Male female)	12	3.38%
Scytodidae	Scytodes sp	2	0.56%
Tetragnathi-dae			
	Leucauge blanda	6	1.69%
	Leucauge magnifica (male ,female)	5	1.41%
	Leucauge sp 1	4	1.12%
	Leucauge sp2 (male female)	2	0.56%
	Tetragnatha versicolor	3	0.84%
Theredidae	Achaearanea lunata	2	0.56%
Thombicidae			
	Diaea sp	2	0.56%
	Misumenops tricuspidatus	2	0.56%
	Misumessus oblongatus	4	1.12%
	Oxytate sp	5	1.41%

	Runcinia acuminate	6	1.69%
	Runcinia albostriata	2	0.56%
	Runcinia sp 1	2	0.56%
	Thomisus sp	20	5.64%
Uloboridae	Uloborus sp	8	2.24%
	Total 354		

Family Araneidae-Araneus Mareus

Family Araneidae-Argiope Pulluchella

Family Araneidae-Cyclosa Sp

Family Araneidae-Areneus Mitificus

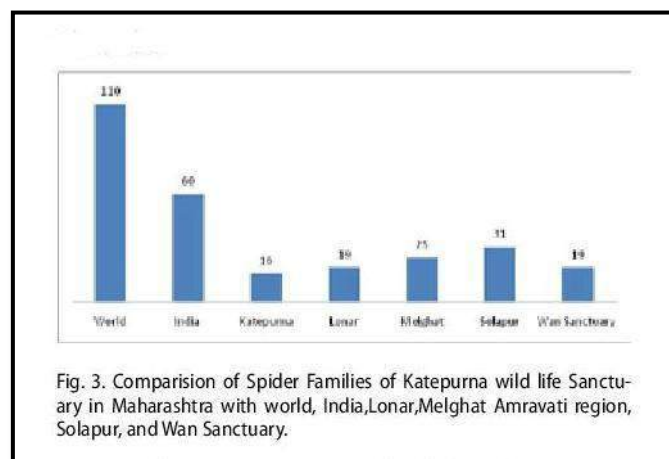Family Salticidae-Hasarius Adansoni Female

Discussion

Fig. 3. Comparision of Spider Families of Katepurna wild life Sanctuary in Maharashtra with world, India,Lonar,Melghat Amravati region, Solapur, and Wan Sanctuary.

Present study made on prelimnary spider diversity of katepurna sanctuary during July 2011 to March 2012. Spiders representing 16 families, 37 genera and 74 species were recorded from sanctuary during the study period (Tables 1, 2 and fig. 1- 82).

Comparision of Spider Families of Katepurna wild life Sanctuary in Maharashtra with world, India, Lonar, Melghat Amravati region, Solapur, and Wan Sanctuary. Present study was an attempt to record spider fauna from Katepurna wild life sanctuary in view of previous reports published by Tikader B.K. (1974) reported 14 families from different region of Maharashtra ; Hipargi et al. (2011) recorded 19 families from Lonar Crater Sanctuary, 25 from Melghat Sanctuary and 31 from Southern Tropical Thorn Forest and Meshram (2011) enlisted 20 families from Toranmal sanctuary and Bhatkar (2011) reported 19 families from Wan wild life Sanctuary. The current global list of spider fauna is approximately 42,055 belonging to 3821 genera and 110 families (Platnick, 2011). The spider fauna of India is represented by 1520 spider species belonging to 377 genera and 60 families (Sebastian and Peter, 2009).Of about 1520 species reported from India (Sebastian and Peter, 2009), 74 species have been recorded from Katepurna sanctuary. It can be assumed that a high floral diversity sustains a high faunal diversity by providing diverse microhabitat especially for invertebrates. Unlike other ecologically important zones, there is no previous work to compare the spider diversity on this sanctuary. This indicates the need for further sampling in this area. Because of the complex interaction of various climatic factors like high rainfall and humidity, with topographical features Katepurna holds many smaller but diverse environmental niches. The presence of diverse habitats like forests, bushes and grasslands in this ecosystem is further evidence to this. This makes Katepurna an important centre of speciation in Satpuda region.

References -

1. Biswas, B. and K. Biswas, 2004. Araneae: Spiders. In: Fauna of Manipur, State Fauna Series10, Zoological Survey of India: 25-46.
2. Barrion A. T., J. A. Litsinger 1995. Riceland spiders of South and Southeast Asia. CAB International, Wallingford, England, 736p.
3. Biswas, B. and K. Biswas. 1992. Fauna of West Bengal (Araneae: Spiders), State Fauna Series, 3: 357-500.
4. Gajbe, U. A.1995a. Spiders Fauna of Conservation Areas: Fauna of Kanha Tiger Reserve, Madhya Pradesh. Zooological Survey of India, Publication: 27-30.
5. Hore, U. and V.P. Uniyal, 2008. Use of Spiders (Araneae) as Indicator for Monitoring of Habitat Condition in Terai Conservation Area, India. Indian Forester Vol. 134, No. 10: 1371-1380.
6. Platnick, N.I. 2011. The world spider catalog, version 11.5. American Museum of Natural History, online at http://research.amnh.org/iz/spiders/catalog. DOI: 10.5531/db.iz.0001.
7. Quasim, S. and V.P.Uniya, 2010. Preliminary investigation of spider diversity in Kedarnath Wildlife Sanctuary, Uttarakhand, India Indian Forester Vol: 136 Issue: 10 pp:1340-1345.
8. Tikader, B.K. 1974. Gazetteer of India, Maharashtra State, General Series: Fauna, Chapter 4 – Spiders, 295- 306.
9. Tikader B. K. 1987. Handbook of Indian Spiders. Calcutta, Zoological Survey of India, 251 p.
10. Uniyal, V.P. 2006. Records of Spiders from Indian Trans-Himalayan Region. Indian Forester. Vol.132.No. 12 (a): 117-181.
11. Vairale A.B. and Vankhede G.N. 2010 Diversity and ecology of spiders in Satpuda, Ph.D. Thesis, Sant GadgeBaba, Amravati University Amravati.

Diversity Of Different Butterfly Species In Akola Region, M.S., India

Satarkar Dnyaneshwari
Shri Shivaji College of Arts, Commerce & Science, Akola

Raja I. A
B.S. Patel Arts, Commerce & Science College, Pimplegaon Kale, Buldhana

Joshi Rashmi P.
Shri R.L.T. College of Science, Akola

Abstract

   Lepidoptera is an order of insect that includes butterflies and Moth about 180,000 Species of the Lepidoptera are described, in 126 families and 46 Super families, 10% of the total described species of living organism. Among insect, butterflies are the most beautiful and colourful creatures on the earth. Butterflies are very sensitive group to environment and are directly affected by changes in the habitats, atmospheric temperature, and weather conditions. They can be good indicators of environment changes. The present study was started comparatively to examine the diversity of butterflies from Akola city and Natural habitat around Akola. Collected butterflies were photographed. Morphological characters were noted down. Further identification with the help of field guides was done. The total of 20 species of butterflies belonging to five families were recorded during the study period from both the parts of study area. Most of the species were noticeably absent in the disturbed and human impacted sites and there was no occurrence of unique species in moderately disturbed areas comparable to those of less disturbed wild areas.
Key-words: Butterflies, environment, morphological, habitat, human impacted.

Introduction

   Lepidoptera is an order of insect that includes butterflies and Moth about 180,000 Species of the Lepidoptera are described, in 126 families and 46 Super families, 10% of the total described species of living organism. The Lepidoptera show many variations of the basic body structure that have evolved to gain advantage in life style and distribution. The word Lepidoptera derives from the Latin word for "Scaly wing" and from the Ancient Greek (lepis) meaning scale and (pteron) meaning wing sometimes the term Rhopalocera is used to group the species that are butterflies. Lepidoptera are morphologically distinguished from other orders principally by the presence of scales on the external part of the body and appendages, especially the wings. The scales are modified, flattened "hairs'' and give butterflies and moths their wide variety of colours and patterns. Butterflies play an important role in the natural ecosystem as pollinators and as food in the food chain; conversely their larvae are considered very problematic to vegetation in agriculture , as their main source of food is often live plant matter.

   Among insect, butterflies are the most beautiful and colourful creatures on the earth, have a great aesthetic value and are called the flying jewels or winged jewels of nature. Butterflies are generally regarded as one of the best and most taxonomically studied groups of insects. The butterflies are a very important unit of ecosystem due to the inter-relationship with plants diversity (Kunte, 2000). Butterflies are very sensitive group to environment and are directly affected by changes in the habitats, atmospheric temperature, and weather conditions. They can be good indicators of environment changes (Tiple et al., 2006). In Central India, the butterfly diversity was reported earlier by Forsayeth (1884) and Betham (1890, 1891). The present study was started comparatively to examine the diversity of butterflies from Akola city and Natural habitat around Akola, since there was no known published checklist of butterflies in the study area.

Methodology:
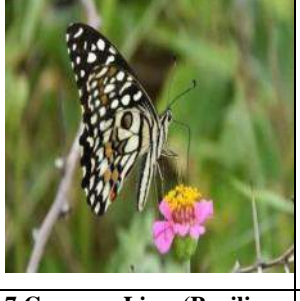
   The study area was divided into two phases as, the natural and green area with trees and flowering plants for nectar and food availability around Akola and the 2nd phase was urban area, the Akola city. The collection of specimens was done from the different habitats of the Akola city as well as natural habitat around Akola city like farms from Patur village, Katepurna Sanctuary, PDKV University and the lakes, dams and rivers during the monsoon and post monsoon seasons. During the study period January 2019 and December 2019 the collection of butterflies belonging to the different families were done. Butterflies were collected from the different Akola regions. Identification of the butterflies observed was mostly made directly in the field. Collection of butterflies will be carried out by visual search in the study area. Specimens were collected with

National Conference on Multidisciplinary Research in Science and Technology for Healthy Lifestyle Management (NCMRST- 2020) Organizer :- Shri R.L.T. College of Science, Akola

24th Jan. 2020

insect-nets. Collected butterflies were photographed and morphological characters were noted down. Further identification with the help of field guides was done.

Sampling Techniques:

The butterflies were observed in the sampling sites for a period of 1 year between January 2019 and December 2019. Each study site was visited once a month and transects ware observed from early morning 7:00 a.m. to 11:00 a.m. during good weather periods. The butterflies were observed and recorded directly in the field and photographs were taken and preserved for further identification. In critical conditions, they were captured by hand net following Tiple (2012) and were identified using suitable keys (Evans1932; Wynter-Blyth 1957; Haribal 1992; Kunte 2000; Kehimkar 2008) and released in the same habitat from where they were captured with least disturbance. Appropriate precautions were undertaken to guarantee that the scales present on the wings of the butterflies were minimally affected. Photographs of all the butterflies were taken using camera. (Nikon Inc.) during the present survey and preserved for taxonomic documentation.

Observation & Results:

1.Crimson rose (Pachliopta hector)	**2.Common mormon (Papilio polytes)**	**3. Common emigrant (Catopsilia Pomona)**	**16.Lime Swallowtail (*Papilio demoleus)***
4.White orange tip (Ixias Marianne	**5.Crimson tip (Colotis danae)**	**6.Common grass yellow (Eurema hecabe)**	**17.Common Pierrot (*Castalius rosimon)***
7.Common Lime (Papilio demoleus)	**8.Common gull (Cepora nerissa)**	**9.Pioneer (Belenois aurota)**	**18.Striped Albatross (*Appias libythea)***

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293 (Special Issue No.70) Peer Reviewed Journal   www.aiirjournal.com Mob. 8999250451

155

10. Plain tiger (Danaus chrysippus)	**11.Striped tiger (Danaus genutia)**	**12. Skipper (Hesperia comma)**	**19.Blue mormon (*Papilio polymnestor*)**
13.Blue tiger (*Tirumala limniace*)	**14.Common banded awl (*Hasora chromus*)**	**15.Tawny Coster(*Acraea terpsicore***	**20.Indian Fritilary Male (*Argynnis hyperbius*)**

Table I:

List of butterflies collected from the Natural Habitat around Akola and in Akola city:

Sr. no.	Species	Family	Number of collections from natural habitat in Akola Region	Number of Collection in Akola City
1	Crimson rose (*Pachliopta*)	Papilionidae	9	5
2	Common mormon (*Papilio*)	Papilionidae	12	3
3	Common Emigrant(*Catopsilia*)	Pieridae	16	3
4	White orange tip(*Ixias*)	Pieridae	6	___
5	Crimson tip(*Colotis*)	Pieridae	8	3
6	Common grass yellow (Eurema)	Pieridae	35	5
7	Lime butterfly(*Papilio demoleus*)	Papilionidae	6	___
8	Common gull (*Cepora*)	Pieridae	12	___
9	Pioneer (*Belenois*)	Pieridae	25	2
10	Plain tiger (*Danaus*)	Nymphalidae	30	___
11	Striped tiger(*Danaus genutia*)	Nymphalidae	18	4
12	Skipper (*Hesperia*)	Hesperiidae	3	___
13	Blue tiger (Tirumala)	Nymphalidae	8	2
14	Common banded Awl (*Hasora*)	Hesperiidae	6	4
15	Tawny Coster(*Acraea*)	Nymphalidae	3	___
16	Citrus Swallowtail(*Papilio demodocus*)	Papilionidae	12	___
17	Common pierrot(*Castalius*)	Lycaenidae	4	___
18	Striped Albatross(*Appias*)	Pieridae	5	___
19	Blue mormon (*Papilio polymnester*)	Papilionidae	10	___
20	Indian fritillary male	Nymphalidae	3	___

Summary

The butterflies are important bioindicators, which should be protected to conserve the biodiversity and environment. Different species of plants and habitats of the study area attract wide variety of butterflies reported Tiple & Khurad., (2009). They play a vital role in pollination of various flowering plants besides a key component of food chain. Butterflies Biodiversity generally refers to the variety and variability of butterflies on Earth. It defines it in terms of the variability within species, between species and between ecosystems. It is a measure of the variety of butterflies present in different ecosystems. This can refer to genetic variation, ecosystem variation, or species variation (number of species) within an area, biome, or planet. According to Tiple (2010, 2011) a preliminary attempt on the diversity of butterflies was carried out in the Akola city and its vicinity from August 2018 to Feb 2019. The Katepurna Wildlife Sanctuary Campus is surrounded by lush green

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293 (Special Issue No.70) Peer Reviewed Journal   www.aiirjournal.com Mob. 8999250451

156

hillocks, trees, Flowering plants, river and the farms. The total of 20 species of butterflies belonging to five families were recorded during the study period from both the parts of study area. It was observed that the family 7 species from family Pieridae, 5 species from Papilionidae, 5 species from Nymphalidae, 2 from Hesperiidae and 1 from Lycaenidae. According to the Table I, family Pieridae is dominant in both the areas of natural habitat surrounding Akola and Akola City followed by Papilionidae and Nymphalidae than Hesperiidae and Lycaenidae. As the area houses 20 species of butterflies distributed throughout the Akola region of Maharashtra, it can be presumed to have a good diversity of butterflies, which may be attributed to the sprawling lawns and well nurtured gardens that provide a suitable nectar source throughout the varying seasons, and especially the eco-forests that serves a breeding habitat to the butterflies. Most of the species were noticeably absent in the disturbed and human impacted sites (gardens, plantation, and grassland) and there was no occurrence of unique species in moderately disturbed areas comparable to those of less disturbed wild areas Tiple (2010, 2011). The present study area and surrounding areas, is always disturbed and impacted by humans, which may be the reason for overall reduction of the uniqueness of the species from disturbed and impacted sites as compared to the other sites.

References

1) Betham J.A., 1890. The butterflies of the Central Provinces. Journal of the Bombay Natural History Society, 5: 19–28; 151–161; 279–286.
2) Betham J.A., 1891. The butterflies of the Central Provinces. Journal of the Bombay Natural History Society, 6: 175–183; 318–331.
3) Evan WH. 1932. The identification of Indian butterflies. Bombay: Bombay Natural History Society. p. 464.
4) Forsayeth R.W., 1884. Life history of sixty species of Lepidoptera observed in Mhow, Central India. Transactions of the Entomological Society of London, 3: 377–419.
5) Gibbs, H.K.*et al.*Tropical forests were the primary sources of new agricultural land in the 1980s and 1990s. *Proc. Natl Acad. Sci. USA* **107**, 16732-16737 (2010).
6) Gupta I.J. & Mondal D.K., 2005. Red Data Book, Part II: Butterflies of India. Zoological Society of India, Kolkata, 1–535.
7) Haribal M. 1992. The butterflies of Sikkim Himalayas and their natural history. Gangtok: Sikkim Nature Conservation Foundation (SNCF). p. 217.
8) Kehimkar I. 2008. The book of Indian butterflies. Mumbai: Bombay Natural History Society and Oxford University Press.p.
9) Kunte K., 2000. Butterflies of Peninsular India. Universities Press (Hyderabad) and Indian Academy of Sciences (Bangalore), 254 pp.
10) Sharma R.M. & Radhakrishnan C., 2006. Insecta: Lepidoptera (Rhopalocera and Grypocera). Fauna of Todoba Andhari Tiger Reserve, Conservation area series. Zoological Survey of India, 25: 255–277.
11) Tiple A.D., 2011. Butterflies of Vidarbha region, Maharashtra State, central India. Journal of Threatened Taxa, 3: 1469–1477.
12) Tiple A.D. & Khurad A.M., 2009. Butterfly Species Diversity, Habitats and Seasonal Distribution in and around Nagpur City, Central India. World Journal of Zoology, 4: 153–162.
13) Tiple A.D., 2010. Butterfly Fauna of Tadoba National Park and Surroundings, Chandrapur, Maharashtra (Central India). Hislopia, 3: 1–9.
14) Witt D.O., 1909. The butterflies (Rhopalocera) of the Nimar district, Central Provinces. Journal of the Bombay Natural History Society, 19: 564–571
15) Wynter-Blyth MA. 1957. Butterflies of the Indian region. Mumbai: Bombay Natural History Society. 523 p.

Comparative Studies On Feeding And Breeding Behaviors Of Dragonflies *Orthetrum Sabina* And *Brachythemis Contaminata* At Water Bodies (*Libellulidae: Anisoptera*)

P.P. Rathod[1]*, N.A. Manwar[#], S.S. Dhande[^], I.A. Raja[$]

[1] Shri Shivaji College of Science, Akola, [#] Mahatma Fule Arts and Science College, Patur
[^] Shri Dr. R. G. Rathod Arts and Science college, Murtizapur , [$] B.S. Patel College of Arts, commerce and Science, Pimpalgaon Kale

Abstract:-

Water bodies in all seasons are babel with the number of different Odonates. They aggregate there only for feeding and breeding. In the limited suitable area all different species are struggling to get resources and suitable abjuration on particular place for breeding. They compete with each other and interact in different fashion. This assemblage of different species with their competition and interactions ultimately affects the reproduction and its behavior in species. *Brachythemis contaminata* and *Orthetrum sabina* being most abundant dragonflies species of Libellulidae family in the study area they vary in their reproductive activities in many fashions. Present study reported premating and postmating activities of these two selected species. Both species shows remarkable difference in feeding and breeding activities at water bodies. We found both were feeds on different flying insects encountered and had cannibalism behavior. They differed in copulation duration from few seconds to an hour in *Brachythemis contaminata* and *Orthetrum sabina* respectively.

Key worlds- Dragonflies, feeding, breeding, water bodies.

Introduction:

Nearly every one of us would have noticed certain striking insects with globular eyes, long slender multicolored tails and two pairs of large veined wings, frequently flying around like helicopters or at times perched near river banks, ponds, and lakes or even in our own gardens or backyards. These delightful creatures, which go by their vernacular Marathi names '*Bhingota'*, '*Chatur*, or '*Dindya*' are nothing but Dragonflies and Damselflies, scientifically known as Odonates.

To explain behaviors of any species **Altmann, (1974),** suggested focal animal sampling methods which consists of behavioral observations paying attention on the account of behavioral sequences. These methods effectively helps in behavioral studies of dragonflies.

Many researchers studied adult life and reproductive behavior in Odonates (**Fraser, 1934); (Lieftinck, 1934); (Moore, 1957); (Kumar & Prasad, 1977); (Orr, 2003).** The males of dragonflies most often defend a defined territory and males interacts with each other as a reproductive behavior. Male perching behavior is influenced by at least four factors including thermoregulation, aerodynamics, predator avoidance and territorial display (**Johnson, 1962)**.

The reproductive behavior of the order Odonata is often classified according to the existence and kind of resource defense (**Emlen & Oring, 1977); (Conrad & Pritchard, 1992); (Battin, 1993).**

An adult dragonflies feed on any insect they can clutch, including other dragonflies. They begin to feed soon after emergence, and prolong to do so throughout life. *Cordulia aenea* has been seen feeding at about midday on its first day as an adult (**Wesenberg-Lund, 1913).**

In dragonflies, aggressive interactions are often associated with territoriality. Territorial aggression between sympatric *Hetaerina* is best understood as a case of misidentification (**Murray, 1981); (Schultz & Switzer, 2001).**

The subsequent way in which male dragonflies may interact is by physical war. Unlike aggressive display, physical fighting is often interspecific as well as intraspecific, (**Mayer, 1957)** observed that *Aeshnid* flies towards another male and attacks him from below.

The aerial life activities and reproductive behavior was immensely observed by **Sharma, (2005; 2009; 2010a & b; 2011), Sharma *et al.,* (2008), Sharma and Vashistha, (2011)** of some zygopteran and anisopteran species are *Ceriagrion coromandelianum, Disparoneura quadrimaculata, Pseudageion rubriceps, Ischnura aurora, Anax parthenope, Neurobasis chinensis.*

Although the reproductive behavior of different Odonates has been studied, it is being reported mostly in zygoptera and very few attempts regarding reproductive systems and behavior have been made to explore the same in Anisopteran dragonflies from India. Hence we selected the proposed research work, to investigate this specific behavior in the *Orthetrum sabina* **and** *Brachythemis contaminata* at water bodies belongs to family, *Libellulidae*, of Anisoptera.

Materials And Methods

- **Study Area:**

It was the area selected where whole study regarding reproductive behavioral aspects of selected dragonflies was carried out during research period**.**
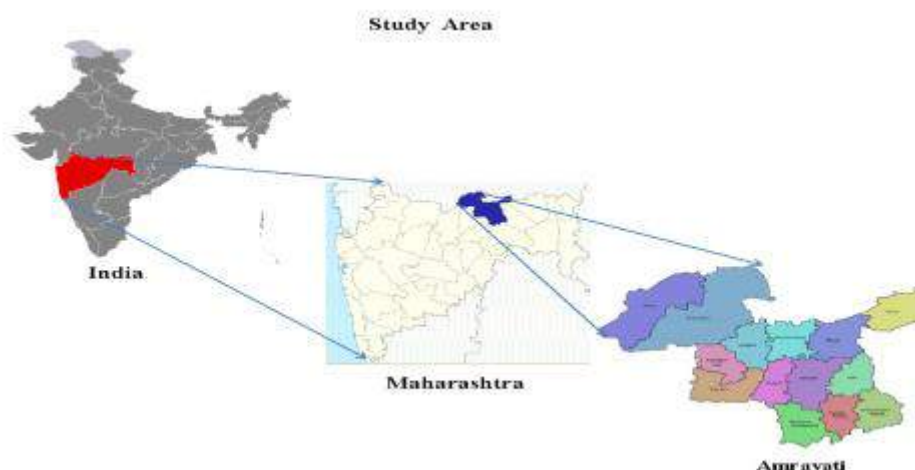

Figure no: 2.1.1 Study Area map (Source: Google images)

Amravati is a district headquarters and second largest city of Vidarbha region. Amravati district is situated between 20°32' and 21°46' North latitudes and 76°37' and 78°27' East longitudes. 75% of Amravati district area is enclosed by Deccan trap while 25% area covered by Purna alluvium. The district spread over geographical area of 12,235 km². From total geographic area of district about 29% that is 3577.22 km^2 is forest area and the 71% balance 8632.78 km2 area is under non-forest land including urban areas.

The climate of Amravati district is tropical wet and dry climate with hot, dry summers and mild to cool winters. The district can be specifically divided into two natural zones, the two tahsils Dharni and Chikhaldara dominating hilly area of the Melghat and remaining eleven tahsils region comprising and the plains. The flora and fauna of Amravati district is very rich and diverse. Most interestingly the records of Odanata species much more diverse and found to be 245 species and 24 of new records in forest area of Melghat (source: melghttiger.gov.in).

The habitat of Dragonflies is certainty related to water bodies. The district Amravati is rich with most of rivers and reservoir. Upper Wardha, Chandrabhaga, Shahanur, Sapna, Malkhed are the major water reservoir of district along with, the lakes around Amravati city are Wadali Lake, Indla Lake, Chhatri Lake, Bhivapur Lake, Pohara Lake, Sawanga Lake, Basalapur Lake, Kondeshwar Lake, Amravati University Lake and Ghatkhed Lake, also supports the wild life for water requirements.

- **Methodology-**

Considering the preferred aspects for breeding of the dragonflies the habitats were selected for required behavioral observations. It was found that dragonflies were mostly preferred the site where less interface of human and other disturbing animals were found.

o **Survey –**

As life cycle of dragonflies in both larval and adult stages is related to aquatic habitat, they at adult stage aggregate near water body mainly for their reproductive activities. With this purpose the wet lands were surveyed for the occurrence of the selected species in all seasons for the year 2018. The site for reproductive activities of selected dragonflies were found to be lakes, ponds, rivers, gutters, canal etc. The study area was divided in two main parts for observations i.e. 1. forest and 2. Non-forest Area.

o **Materials:**

The proposed study was almost based on field observations. On field some materials are important for collecting data regarding behavioral aspects. The materials used for collecting data were **Camera, Thermometer**, **Binocular**, **Measuring tape, Insect collecting net**, **Stopwatch, Field guide**- Field guides of Subramanian (2005, 2009), Handbook of Common Indian Dragonflies (Mitra, 2006) and the Handbook of Common Odonates of Central India by Andrew *et al*., 2009 was used for identification, **Field Dairy**, **Android phone** etc.

Observations And Results:

Selected species of Odonates were *Orthetrum sabina* (Drury, 1770) and *Brachythemis contaminata* (Fabricus, 1793). Each selected species of Odonata was found with different behaviors in our investigations. They performed each and every part of behaviors differently, except basic steps of mating and copulations. They divert in their assemblage at different habitats, strategies of mating, territory defendant, guarding and pattern of oviposition. The presence of vegetation and quality of water also affects their behaviors in different way. We recorded their each event and compared here in tabular or graphical mode.

- **Habitat selection-**

Both these species were observed to select same or different habitats. The shared habitats were lake, ponds, canal, river, and drainage.

- **Territory size-**

Dragonflies are known for their territorial behavior. The mating success mostly depends upon the suitable territory at breeding habitat that most of the females visit there. In our observations *Orthetrum sabina* was found with well marked territory and measured and found maximum 40 m^2 an average territorial area for breeding and feeding in non-urban area and *Brachythemis contaminata* was found satisfied with minimum 1m^2 in urban area.

- **Aggregations of males at breeding site-**

Territory is a breeding and feeding arena of dragonflies males. They aggregate there for their activities. We recorded an average number both territorial and non-territorial (satellite) males at the different breeding sites in study area. We found that at non-forest area an average number of territorial males for *Brachythemis contaminata* was maximum in number with 8 males and there was two territorial male for *Orthetrum Sabina.*

- **Foraging flight-**

Odonates are known for their flights in insect world, as the can fly with very high speed than any other insect. They use their flying capacity for capturing prey, gaining mates and defending from rivals. We investigated flight for capturing their food and named it as foraging flight. And categorized their flights in three categories as**, F**- Foraging rapid short flight outward to a point in space and then directly back to perch, often followed by mastication, **MF**- Multiple foraging like one or more than one prey before returning to the perch and **S**- Survey that is slow flight without any goal. We found both species were likely to capture their prey with **F** and least with **S** methods.

- **Copulation timing-**

The successful mating of Odonates depends upon how they mated. Time factor for copulatory wheel persistence is differing with different spesies. It may be their mating strategies. We recorded a very long duration 56 min. for *Orthetrum sabina* in tandem. They was selected a perch inside a bush and stayed there for such long duration in tandem. *Brachythemis contaminata* was recorded with very low duration an average of 10 sec. as minimum duration they mated in flight and not on the perch was recorded**.**

- **Mate guarding-**

After copulation females moved to suitable place at water body for oviposition. While oviposition they are very susceptive and in danger for being prey or harassment from other males. In many cases male guards to female for oviposition and it may ultimately be the reason to oviposite eggs he fertilized. In our investigation out of 25 times all males of both species were recorded that they mostly guard their partner female while oviposition. Among them *Brachythemis contaminata* was with maximum guarding approach for female with 25 times was seen.

- **Oviposition decision-**

After mating most of the females moved towards water body for oviposition. But some were decide to not oviposite. The reason might be insufficient sperm received. In our study we found that *Brachythemis contaminata* was a species who maximum 48 times out of 50 means near about all times went for oviposition. *Orthetrum sabina* was found for many time escaped from oviposition and recorded for 39 times with minimum went for oviposition.

- **Method of Oviposition-**

Differents species of Odonates deposit their eggs by different methods. Some Odonates may deposit their eggs We observed *Brachythemis contaminata* females always use submerged vegetations for egg deposition while *Orthetrum sabina* preferred for both way either egg deposited on the submerged vegetations or on the surface of water.

- **Number Egg batches deposition**-

Different Odonate species oviposite for different duration and different number of egg batches inside the water. In our investigation we recorded *Brachythemis contaminata* was laid highest batches of eggs in short time. It was found that 240 batches of eggs were laid in Non-forest area was maximum record for its oviposition. *Orthetrum sabina* was laid minimum number of egg batches in Non-forest area was 80 batches.

Plate No. 3.1: Breeding habitats of *Orthetrum sabina* and *Brachythemis contaminata*

Plate No. 3.2 : Cannibalism in *Orthetrum sabina* and *Brachythemis contaminata*

Plate No. 3.3 : Male-Male interactions in *Orthetrum sabina* and *Brachythemis contaminate*

National Conference on Multidisciplinary Research in Science and Technology for Healthy Lifestyle Management (NCMRST- 2020) Organizer :- Shri R.L.T. College of Science, Akola

24th Jan. 2020

Plate No. 3.4 : Tandem formation (mating) in *Orthetrum sabina* and *Brachythemis contaminata*

Plate No. 3.5 : Mate Guarding behavior in *Orthetrum sabina* and *Brachythemis contaminata*

Plate No. 3.6 : Oviposition in *Orthetrum sabina* and *Brachythemis contaminata*

Discussion:

We were gone through the different feeding and breeding behavioral aspects for each selected Odonate species from study area. We selected *Orthetrum sabina* (Drury, 1770), *Brachythemis contaminata* (Fabricius, 1793) for our observations. Kalita and Ray (2015) found that dragonflies used 24% shrub land, 23% emergent vegetation, 15% free floating emergent vegetation, 14% tall grassland and open area and 10% short grassland as their habitat. We too noticed that *Orthetrum sabina* was patrolling near almost all water bodies. Water bodies in relation with this species were water reservoir, lakes, ponds, rivers, open drainages, temporary water bodies and except at wells from irrigated and non- irrigated fields. We found selection of habitat in this species was expected to be primarily visual. *Brachythemis contaminata* was popularly seen at slightly polluted water. It was mostly studied at nala, household water drainage, polluted lake shores, in our study area. In our observations *Orthetrum sabina* was noted perching on every object in and around territory selected. It was recorded that they mostly perched on submerged aquatic weeds, vegetations around water body, stones, ground etc. *Brachythemis contaminata* observed to perch on almost every object in and around territory selected.

In our investigation we found that the selected species were found more aggressive towards territory intruder, reproductive rivals and female kidnappers. They also make expulsion of any other insect visits in their territory. We investigated that *Brachythemis contaminata* male was more aggressive toward conspecific males he made an average 11 attacks/hour was noted while territory dependence. *Orthetrum sabina* was on second number for aggression towards conspecific male but with top rank for heterospecific male.

In *Orthetrum sabina* it was found that male generally guard mated female while ovipositing. The non-contact guarding was found in *Orthetrum Sabina*. Male hovered over ovipositing female. It hovered over female in different directions showed his alertness and protected her from intruder males. Intruder was seen to be conspecific or heterospeccific male was. Male was so aggressive while female was ovipositing. Male's non-guarding decision also was observed in some cases.

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293
(Special Issue No.70)   Peer Reviewed Journal   www.aiirjournal.com Mob. 8999250451

162

In *Brachythemis contaminata* it was found that male validating to guard mated female while ovipositing. The non-contact guarding was found. Intruder conspecific males were observed. More than one male were disturbing ovipositing female were noted. Mated male was with immense aggressiveness while guarding ovipositing female. In *Brachythemis contaminata* male was seen to fertilize up to 4 females at a time and in the same territory. Male was guarding two females at a time in his territory while ovipositing was recorded.

Some Odonates may deposit their eggs Underwater like *Pseudagrion indicum* recorded by Mujumdar *et al.,* (2018). Some piercing in submerged vegetation some on submerged vegetation and more on surface of water. We observed *Brachythemis contaminata* females always use submerged vegetations for egg deposition *Orthetrum sabina* preferred for both way either egg deposited on the submerged vegetations or on the surface of water.

As we studied in *Brachythemis contamita* and other both species male usually guards ovipositing females similar report was given in *Telebasis carmesina* males for all time guarded ovipositing females with which they had mated. This is expected if other males are likely to effort to interrupt oviposition and mate with the female (Corbet, 1980), as appeared true here.

References :

1) Altmann, J. (1974). Observational study of behavior: sampling methods. Behavior 49:227–267.
2) Battin, T. J. (1993) - Revision of the *puella* group of the genus *Coenagrion*, with emphasis on morphologies contributing to reproductive isolation (*Odonata, Coenagrionidae), Hydrobiologia*, 262: 13-29
3) Conrad, K. F. and Pritchard, G. (1992). An ecological classification of odonate mating systems: the relative influence of natural, inter- and intra-sexual selection on males. *Biological Journal of the Linnean Society* 45: 255−269.
4) Emlen, S. and Oring, L. (1977). *Ecology, sexual selection, and the evolution of mating systems. Science* 197: 215−223.
5) Fraser, F. C. (1934). *The fauna of British India, including Ceylon and Burma. Odonata. Vol. II*. Taylor and Francis, London.
6) Johnson, C. (1962) A description of territorial behavior and a quantitative study of its function in males of *Hetaerina americana* (Fabricius) (*Odonata: Agriidae*). *Can Entomol* 94:178–190
7) Kumar, A. and Prasad, M. (1977). Reproductive behavior in *Neurobasis chinensis chinensis* (Linnaeus) (*Zygoptera: Calopterygidae*). *Odonatologica* 6: 163-171.
8) Lieftinck, M. A. (1934). An annotated list of the Odonata of Java, with notes on their distribution, habits and life-history. *Treubia* 14: 377-462.
9) Mayer, G. (1957). Bewegungsweisen der Odonatengattung *Aeschna. Osterreich. Arbeit. Jb. Wildtierforsch.* 1957: 1-4.
10) melghttiger.gov.in
11) Moore, N. W. (1957). Territory in dragonflies and birds. *Bird Study, Oxford* 4: 125-130.
12) Mujumdar, N.; Thakuria, D.; Halal,D. and Koparde, P. (2018). Observations on underwater oviposition in Pseudagrion indicum Fraser (*Odonata:Coenagrionidae*): an endemic species from the Western Ghats , *HALTERES, Volume* 9, 39-44.
13) Murray, B. G. (1981). The origins of adaptive interspecific territorialism. *Biol. Rev. Camb. Phil. Soc*. 56, 1–22.
14) Orr, A. G. (2003). A guide to the dragonflies of Borneo: their identification and biology. *Natural History Publications, Kota Kinabalu.*
15) Schultz, J. K. and Switzer, P. V. (2001). Pursuit of heterospecific targets by territorial amberwing dragonflies (*Perithemis tenera* Say): a case of mistaken identity. J. *Insect Behav.* 14, 607–620.
16) Sharma, G. (2005). Studies on the species diversity and reproductive behavior of some species of Odonata of Dholbaha dam (Distt. Hoshiarpur) in Punjab Shivalik (Punjab: India). Ph. D. thesis G. K. University, Haridwar. 197pp.
17) Sharma, G. (2009). Life history and Reproductive behavior of *Ceriagrion coromandelianum* (Fabricius) (Odonata: Insecta). *Annals of Forestry-An International Journal of Forest Sciences*. 17(2): 298-310.
18) Sharma, G. (2011). Studies on the reproductive behavior of *Pseudagrion rubriceps rubriceps* Selys (*Odonata: Arthropoda*) at Pichhola lake, Udaipur, Rajasthan, India. *Hexapoda.* 18(2): 150-154.
19) Sharma, G.; Sundararaj, R. and Karibasavaraja, L.R. (2008). Species diversity of odonates (Odonata: Insects) in sandal rich ecosystem of Karnataka and reproductive behavior of *Orthetrum pruinosum neglectum* (Rambur). *Fraseria-South Asian Bulletin of Odonatology*. 7(1/2): 35-40.
20) Wesenberg -Lund, C. (1913). Odonaten-Studien. *Int. Rev. Hydrobiol.* 6: 155-228 ; 373-422

Sensitive Microdetermination Of Nd(III) And Eu(III) With Pyrogallol Red In Presence Of Cetyldimethylethyl Ammonium Bromide.

Gajanan W. Belsare
Shri Shivaji College of Arts Commerce and Science, Akola.

Santosh G. Badne
Shri Shivaji College of Arts Commerce and Science, Akola.

Abstract:

The complex forming reactions of Nd(III) and Eu(III) with Pyrogallol Red(PGR) in absence and presence of Cetyldimethylethyl ammonium bromide(CDMEAB) have been studied. It has been observed that the metal ions formed intense blue coloured complex with Pyrogallol red in presence of Cetyldimethylethyl ammonium bromide with shift in λmax and increase in the absorbance value. The colour of the ternary complexes of metal ions found to be stable and instantaneous. The increase in the sensitivity and molar absorptivity of ternarty complexes facilitate the sensitive microdetermination of metal ions understudy in the given photometric range.

Key Words: Sensitive Microdetermination, Pyrogallol Red (PGR), Cetyldimethylethyl ammonium bromide (CDMEAB), absorbance etc.

Introduction:

The advent of several separation procedures viz. solvent extraction, ion exchange chromatography have offered wide prospects in the separating the mixture of metals into individual constituents before attempting their spectrophotometric determinations. It is, therefore, the sensitivity which primarily decides the usefulness and importance of the reagents developed for the spectrophotometric determination of metal ions. The determination of the metal ions with chromogenic reagent was known since last few decades.

Eriochrome azurol B is used for the determination of gallium in the range 0.1-5.0μg/ml at 530nm[1]. Spectrophotometric determination of Y(III) with eriochrome azurol B at pH 6.0 has been carried out by Pande[2]. Methyl thymol blue has been used as chromogenic reagent for the determination of many transition metal ions[3-7]. Determination of aluminium and gallium with Pyrogallol red has been carried out in the acidic pH range[8-9].

During 1970's, it was observed that the addition of surfactant to the dye solution enhances the colour intensity and sensitivity of the metal complexes.
Number of reagents has been proposed for spectrophotometric determination of rare earths[10-14]. The most widely used reagent for determination of rare earths is Xylenol orange [15-16], although many others are applicable. The colour forming reactions of thorium and uranium with Pyrogallol red (PGR), in the Presence and absence of Cetyldimethylethylammonium bromide has been studied spectrophotometrically by Upase at. al. [17].

Very little work as discussed above has been reported for microdetermination of Nd(III) and Eu(III) ternary complexes, hence present study has been planned to suggest really simple metal ion at low concentration, using reported reagent Pyrogallol Red (PGR) as a binary complex and sensitizing the reagent with CDMEAB as ternary complex using spectrophotometer.

Materials and Methods:

- **Experimental part**

All the spectral measurements have been taken on Chemline model CL 133 microcontroller based spectrophotometer with glass cuvettes of light paths 10mm. distilled water has been used as a reference solution. Chemline model CL 180 pH meter with combine electrode is used for the adjustment of pH. The scale has been standardizing every day before making the pH measurement with buffer solutions of pH 4.0, 7.0 & 9.2. The pH of the each solution has been adjusted with HCl and NaOH solution of suitable concentration.

- **Reagent solution:-**

The Pyrogallol red and cetyldimethylethylammonium bromide were used in this work was of analytical grade and supplied by Sigma chemical company, USA. The solution of the reagent has been prepared by using distilled water and ethanol. The stock solution of reagents has been prepared in the concentration 1.0×10^{-3}M.

Neodymium Nitrate and Europium Nitrate were used in this work was supplied by Indian Rare earth company. The HCl and NaOH used were supplied by SD fine chemical laboratories.

Result and Discussion

It has been considered necessary to have prior information on the nature of interaction between PGR and CDMEAB before evaluating the PGR as sensitive reagent for the microderemination of Nd(III) and Eu (III) in the presence of CDMEAB. Therefore, absorption spectra of PGR in absence and presence of CDMEAB, composition of dye-surfactant complex, absorption spectra of Nd(III) and Eu (III) in absence and presence of CDMEAB, effect of pH, composition of the chelates in absence and presence of CDMEAB, have been studied.

- **Absorption spectra of PGR in the absence and presence of CDMEAB.**

The color of PGR has been found to be different at different pH values. The addition of CDMEAB brings about a slight change in color of PGR at the same pH value. The absorption spectra of PGR, has been therefore, studied at different pH values (3.0 to 12.0) in the absence and presence of CDMEAB. The wavelength of maximum absorbance of PGR in the absence and presence of CDMEAB are summarized in Table 1.

Absorption spectra of alkaline PGR solution at pH 11.0 show a characteristics maximum at 580nm in presence of CDMEAB with the decrease in the absorbance value. This may be due to the formation of dye-detergent complex.

Table 1 : Wavelengths of maximum absorbance of PGR in the presence and absence of CDMEAB.

PGR		PGR + CDMEAB	
pH	λmax	pH	λmax
1.0-3.0	480	1.0-3.0	480
4.0-4.5	520	4.0-4.5	550
5.0-12.0	560	5.0-12.0	580

- **Composition of PGR-CDMEAB Complex**.

The effect of varying CDMEAB concentration on the absorbance of PGR has been studied in at pH 5.0 in acidic medium and pH 11.0 in basic medium have been studied. The absorbance of different concentrations of PGR is plotted against the variable concentration CDMEAB. It has been observed that the two times higher concentration of CDMEAB required for complete decolourization of PGR. Thus, the ratio of PGR: CDMEAB was found to be 1:2. The modified reagent species thus formed, may therefore, be written as [PGR (CDMEAB) $_2$].

- **Absorption Spectra of Ce (IV) and Y (III) Chelates in Presence and Absence of Surfactant**.

A series of solutions were prepared keeping the ratio of M^{n+}: PGR: CDMEAB as 1:1:5 and 4:1:5. A number of sets were prepared for each ratio and pH was adjusted to 3.0 to 10.0. The absorption Spectra were recorded in the entire visible region from 400nm to 700nm. Absorbance maxima of PGR and its complexes with Nd (III) and Eu (III) in the absence and presence of CDMEAB have been summarized at different pH values in Table 2.

Table 2: Absorbance Maxima (nm) of PGR and its Chelates in the Absence and presence of CDMEAB at different pH.

SYSTEM/ pH	4.0	5.0	6.0	7.0
PGR	520	560	560	560
PGR +CDMEAB	550	580	580	580
PGR+Nd^{3+}	520	550	550	550
PGR+CDMEAB + Nd^3	650	650	650	650
PGR+Eu^{3+}	520	550	550	550
PGR+CDMEAB + Eu^3	650	650	650	650

The absorption spectra shows that the change in λ_{max} and increase in the absorbance value in pH range 4.0 to 7.0 show complex formations in absence and presence of CDMEAB. By comparing the absorption spectra and the absorbance values of the reagent and complex in presence of CDMEAB, it has been observed that the

National Conference on Multidisciplinary Research in Science and Technology for Healthy Lifestyle Management (NCMRST- 2020) Organizer :- Shri R.L.T. College of Science, Akola

24th Jan. 2020

maximum complexation takes place at pH 6.0. Thus bathochromic shift of 80nm in the presence of CDMEAB have been observed for Nd (III) and Eu (III).

- **Composition of Chelates**

The composition of the chelates has been studied by the Mole ratio method. solutions of Nd (III) and Eu (III) and PGR have been taken in two equimolar concentrations of 2.0×10^{-5} M and, 4.0×10^{-5} M; Five times excess of CDMEAB has been then added for studying the composition in the presence of surfactant.

The stoichiometric composition between the Nd (III) and Eu (III) and PGR in the presence and absence of CDMEAB has been found to be 1:2. It has been observed that PGR reagent exists as [PGR (CDMEAB)$_2$] and therefore, the composition of complexes in the presence of CDMEAB may be written as $M^{n+}[PGR(CDMEAB)_2]_2$ where M^{n+} is Nd (III) and Eu (III) .

$$M^{n+} + 2\,[PGR\,(C\,D\,E\,A\,B)_2] \rightleftharpoons M^{n+}\,[PGR(CDMEAB)_2]_2 \quad M^{n+} = Nd\,(III) \text{ and } Eu\,(III)$$

- **Analytical applications of Ce (IV), Y (III) chelates with PGR in absence and in presence of CDMEAB.**
  - **Order of Addition of Reactants**

The sequence of addition of reactants must be followed strictly. In all the experiments, CDMEAB was first added to PGR solution. This solution was kept for at least 30 minutes for equilibration. To this solution of modified PGR, M^{n+} solution was then added which again kept for 30 minutes for complete formation of the ternary complex.

  - **Rate of Color Formation and Stability of Color at Room Temperature**.

The color formation does not depend on reaction time and is almost instantaneous. However, the mixtures were kept for 30 minutes for equilibration. The temperature was found to have no effect on color intensity of ternary complexes from 20^0 C to 60^0 C.

  - **Beer's Law and Effective Photometric Ranges**

The linearity between the absorbance of the chelates and concentration of metal ion has been tested by taking the different volumes of metal ion solution in absence in presence of CDMEAB). The final concentration of PGR taken was 2.0×10^{-5} M, of CDMEAB was 1.0×10^{-4} M. Total volume was kept constant at 50ml at pH 6.0. The absorbance values were measured in the absence of CDMEAB at 550 nm. However, in the presence of CDMEAB, all the spectral measurement was made at 650 nm. The range of Beer's law is given in Table 3 in absence and presence of CDMEAB. The effective range for photometric determination was also calculated from this data by Ringbom plot of log of metal ion concentration versus percentage transmittance. Thus, the range as derived by the slope of the curve is selected to be range of the effective photometric range for the determination of metal ion as given in table 3.

  - **Sensitivity and Molar absorptivity:**

Molar absorptivity of complexes was determined by taking constant amount of metal ion and different amount of excess of PGR. The values of molarabsorptivities and sensitivities of metal complexes in absence and presence of CDMEAB have been recorded in table 3. The increase in the molar absorptivity and sensitivity of ternary complexes show the sensitization of colour reactions in presence of CDMEAB.

Table 3: Photometric Determination of Nd(III) and Eu (III) with PGR in the Absence and Presence of CDMEAB.

Chelates PGR	pH of study	Wavelength of study, (nm)	Beer's law Range (ppm)	Effective Photometric range (ppm)	Molar Absorptivity	Sensitivity ($\mu g/cm^2$)
PGR+Nd^{3+}	6.0	550	0.28-1.15	0.15-0.70	23000	0.0060
PGR+CDMEAB + Nd^{3+}	6.0	650	0.14-1.15	0.28-1.009	45000	0.0030
PGR+Eu^{3+}	6.0	550	0.34-1.80	0.34-1.20	25000	0.0060
PGR+CDMEAB +Eu^{3+}	6.0	650	0.15-1.27	0.15-0.91	41000	0.0037

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293
(Special Issue No.70)   Peer Reviewed Journal   www.aiirjournal.com Mob. 8999250451

166

- **Microdetermination of Metal Ion:**

The pH of the solution containing 28.84 µg/50ml of Nd(III) and 30.40µg/50ml of Eu (III) has been adjusted at 6.0. The two fold excess of modified PGR reagent has been added in the metal ion solution. The solution mixture has been then kept for 30 minutes for complete equilibration. The absorbance measurement has been recorded at 650 nm against the reagent blank prepared in the same manner. The absorbance has been then compared with the calibration curve obtained under similar conditions. The results of microderemination have been recorded in table 4.

Conclusion

The spectrophotometeric determination of Nd (III) and Eu (III) with Pyrogallol red in the presence and absence of cetyldimethylethylammonium bromide has been studied. Following are the merits of modified method.

The sensitization of PGR by the addition of CDMEAB is clear from the fact that the formation of stable ternary complexes with Nd (III) and Eu (III) occurs at pH 6.0 with bathochromic shift in the λ_{max} of PGR-M^{n+} complexes in the presence of cationic surfactant. This change λ_{max} and high absorbance value is attributed due to the formation of ternary complex system in the presence of CDMEAB at pH 6.0 compared to the binary system in the absence of CDMEAB. Due to the shifted λ_{max} towards higher wavelength (From 580 nm to 650 nm) a large difference in the absorbance between the reagents blank (PGR-CDMEAB) and its ternary complex results in enhancement of the sensitivities and molar absorptivities again indicate the sensitization of color reaction.

Further, the modified method requires smaller molar concentration of PGR over the metal ion concentration for full color development and is instantaneous in the presence of CDMEAB, again indicates the stability of the color reaction.

The modified reagent i.e. [PGR (CDMEAB)$_2$] has also been found to be extremely useful in the photometric determination of the metal ions understudy in different samples(soil or water). The increase in the sensitivity and absorptivity facilitate the microdetermination of metal ion understudy in the given photometric range.

References:
1) Yampol'skii, M. Z., Okun, A. E., Orlova, L. N.; Uch. Aap. Kursk. Gosudarst. Pedagog. Inst.; 11, pp 134, (1958).
2) Pande, S. P.: Munshi, K. N.; Journal of Indian Chem. Soc..; 50, pp 649, (1973).
3) Bashirov, E. A. ; Abdulaeva, T. E.; Uchen.Zap. Aerb. Gos. Univ. Ser. Khim. Nauk.;
4) 4, 21, (1973).
5) Chenge, K. L.; Talanta; 14, 875, (1967)
6) Chenge, K. L.; Talanta; 28, 41, (1963)
7) Elison, S. V. at. al.; Zh. Anal. Khim.; 22, 34,(1967).
8) Karadakov, B.; Kancheva, D.; Nenova, P.; Talanta; 15, 525, (1968).
9) Tanaka, T. Nakagawa, Y.; Handa, H.; Jap. Anal.; 10,1448, (1961).
10) Ivanova, L. I.; Bashirov,E. A.; Akhmedli, M. K.; Uch. Zap. Azerb. Gos. Univ.Ser. Khim. Nauk.; 3, 33, (1970).
11) Young, J. P.; White, J. C.; Ball, R. G.;Anal. Chem.; 32(8):928-930; (1960).
12) Vekhande, C. N., Munshi, K. N. ; Journal of the Indian Chemical Society. 52(10): 939-941, (1975)
13) Dephe, A. S., Zade A. B.; E Journal of Chemistry; 8(3):1264-1274; (2011).
14) Mathew A, Krishnakumar A. V. , Shayamala P, Satynarayana A, Rao I. M.; Indian Journal of Chemical Technology.; 19, 331-335, (2012).
15) Zade, A. B., Gaikwad, S. V., Suroshe, R. S.; IJREAS.; 02(1):5-7, (2014)
16) Tonosaki K, Otomo M. Bull. Of chemical society of Japan.; 35, 1683-1686, (1962).
17) Dephe AS, Zade AB. Indian Chemical Society.; 90(9):1367-1378. 8, (2013)
18) Zade, A. B., Kalbende P. P., Upase, A. B., Belsare , G. W.;. J. Indian Chemical society.; 89, 1-12, (2012).

A Novel Studies of Synthesis of Nanopartical of Some Maltosyl thiobiurets and Their XRD, SEM and Microbial Studies

Ashish G. Sarap
Department of Chemistry,
Shri R. L. T. College of Science, Akola-444001 (Maharashtra)

Abstract:

The chemistry of thiourea of carbohydrate is extensively elaborated and well documented. The use of microwave irradiation in organic synthesis has become increasingly popular within the pharmaceutical and academic arenas, because it is a new enabling technology for drug discovery and development. A huge number of research papers have appeared over the last decades on the application of microwave technology in organic synthesis. By taking advantage of this efficient source of energy, These compounds arouse interest as potential biologically active substances and versatile intermediates for preparing various derivatives. They have been found useful in the treatment of hypertension, as appetite suppersant and as a potential anti oxidant cardio protective agent. Chemistry of sugar isocyanate with special reference to their utility as intermediate in the synthesis of nitrogen and sulphur containing open chain and cyclic compound. Several lactosyl thiobiurets deravaives has been prepare by condensation of hepta-O-acetyl-B-D-maltosyl isocyanate with various aryl thiocarbamides by microwave method. The identities of newly synthesis co,mpounds have been established on the basis of usual chemical transformation and IR, NMR, Mass spectral studies.

Keywords: Hepta-O-acetyl-B-D-maltosyl isocyanate, Aryl thiocarbamides , maltosyl thiobiurtes.

Introduction:-

In recent years, the electromagnetic energy in the range of microwaves have gained special attention as regards the most various fields of utilization such as the alimentary (domestic ovens), analytical (small ovens devoted to the mineralization), and that one of bio-medical applications[1]. In the field of organic synthetic chemistry, a certain delay has been suffered either in the base research for the clear improvements which can lead to higher yields of cleaner products, minor energy consumption, and environmental compatibility This delay can, however be rapidly reduced by use of electromagnetic energy caused by microwaves. Thus microwave energy can be used and is been used as an activating agent in chemistry for the synthesis of a large variety of compound. Numerous organic reaction assisted by microwave heating have been explained in various article and book[2,3]. These concern the acylation and alkylation reaction, aromatic nucleophilic substitution, condensation, cycloaddition, protection, deprotection reaction, esterification and transesterification, heterocyclisation, rearrangement, organometallic reaction, oxidation and reduction[4].

Microwave-assisted organic synthesis (MAOS) has been known since 1986[5]. This non-conventional synthetic method has shown broad applications as a very efficient way to accelerate the course of many organic reactions, producing high yields, higher selectivity and lower quantities of side products consequently easier work-up and purification of the products. MAOS is considered as a green technology, principally since many organic reactions can be carried out in solvent-free conditions[6].

However, a limited numbers of these reaction regard so for the carbohydrate chemistry, and since carbohydrate play an important role in vast array of biological processes, and particularly there are many advantages for example in carbohydrate based drug such as low toxicity and immunogenicity the interest in their preparation is very high, another example may be taken of sugar isothiocyanate and isocyanate which are among the most versatile synthetic intermediate in carbohydrate chemistry. They play a pivotal role in the preparation of a broad series of functional group such as amide, isonitrile, carbodimide and *N*-thiocarbonyl oxidation dyes[7] for printing the padding animal and vegetable fibers by standard oxidation dyeing method. Many of them have also shown antitumor and tuberculostatic activities[8]. *N*-glucosylated compound may be broadly classified into two ways. The first in which glucosyl group is attached to the nitrogen of non-cyclic compound or the exocyclic nitrogen. For example nucleic ring while the second in which glucosyl group is attached to the nitrogen of noncyclic compound or the exocyclic nitrogen. For example nucleosides represent the first category while glucosyl amines, glucosylureides, glycosylthioureides belong to second category.

In view the application of *N*-maltosylated compounds and nanoparticals in medicinal,indrustrial and in many other ways, it appeared interesting to carry out the synthesis of nanoparticals of 1-Hepta-*O*-acetyl-β-D-maltosylaryl thiobiurets.
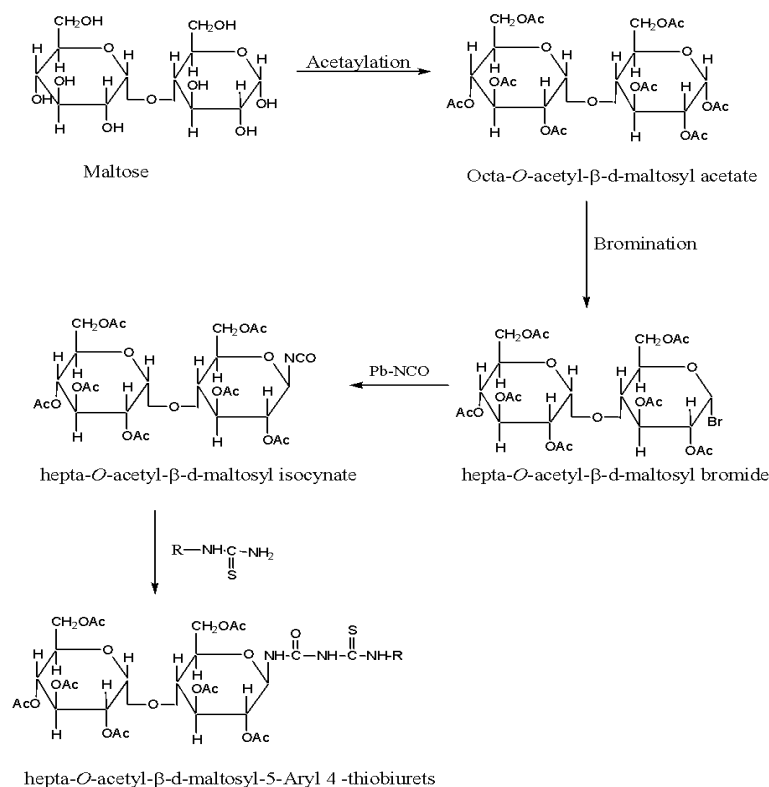
Result and Discussion:-

- **Nanoparticals**

A sub-classification of ultrafine particle with lengths in two or three dimensions greater than 0.001 micrometer (1 nanometer) and smaller than about 0.1 micrometer (100 nanometers) and which may or may not exhibit a size-related intensive property. This term is a subject of controversy regarding the size range and the presence of a size-related property. Current usage emphasizes size and not properties in the definition. The length scale may be a hydrodynamic diameter or a geometric length appropriate to the intended use of the nanoparticle.   The European community has discussed the topic and issued a document Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR) that offers a more complex approach.

Chemistry of sugar isothiocyanate with special reference to their utility as intermediate in the synthesis of nitrogen and sulphur containing open chain and cyclic compounds has been investigated by earlier workers. It appeared quite interesting to prepare nanoparticals of carbohydrate related compounds, by the extension of already known methods and to investigate the chemistry of these new related compounds with reference to their synthetic application, towards medicinal chemistry.

- **Reaction :-**

Maltose

Octa-*O*-acetyl-β-d-maltosyl acetate

hepta-*O*-acetyl-β-d-maltosyl isocynate

hepta-*O*-acetyl-β-d-maltosyl bromide

hepta-*O*-acetyl-β-d-maltosyl-5-Aryl 4 -thiobiurets

R= 1) p-amino Benzoic Acid 2) p-toludine 3) p-Cl-aniline

Several maltosyl thiobiurets deravaives has been prepare by condensation of Hepta-O-acetyl-B-D-maltosyl isocyanate with various aryl thiocarbamides by microwave method. Toluene solution of Hepta-O-acetyl- β -D-maltosyl isocyanate (0.005 M, 1 g) was added to 4amino -1-phenyl thiocarbamide (0.21 gm in 20 ml) and the reaction mixture was under microwave irradiation It was then allowed to cool and pour it in petroleum ether with vigorous stirring; a white granular solid was separated out. The characterization of products was established by IR, ^{1}HNMR, MS XRD Spectral studies.

Experimental

Melting points were recorded on electro thermal melting point apparatus are uncorrected. Specificrotations were measured on Equip-Tronic digital polarimeter model no. EQ 800 at 30^0C in $CHCl_3$.

IRspectra were recorded on a Perkin Elmer spectrometer. ^{1}H NMR were obtained on a Bruker DRX-300(300 MHz FT NMR) NMR spectrometer in CDCl$_3$ solution with TMS as an internal reference. The massspectra were recorded on a DART mass spectrometerwere recorded. Purity of the compounds was checkedby thin layer chromatography using Merck silica gel coated aluminum plates and petroleum ether: ethylacetate as eluent.

Synthesis of 1-hepta-O-acetyl-β-D-maltosyl-5-*p*-toludine-4-thiobiuret

Benzene solution of Hepta-O-acetyl- β -D-maltosyl isocyanate (0.005 M, 1.9 g) was added to *p*-toludine (0.25g in 20 ml) and the reaction mixture was under microwave irradiation. It was then allowed to cool and pour it in Petroleum Ether (60-80) with vigorous stirring; a white granular solid was separated out, crystallized from aqueous ethnaol, m.p. 122°C. [Found C, 50.56; H, 5.54; N, 2.39; S, 4.80 C$_{21}$H$_{26}$O$_{11}$N$_3$S; requires; C, 50.30; H, 5.09; N, 2.80; S, 4.40%]

It was found soluble in alcohols acetone, chloroform and benzene while insoluble in water and petroleum ether. It charred when warmed with conc. sulphuric acid. The specific rotation was found to be $[\alpha]_D^{35}$ = - 136° (c, 0.74 in chloroform). The purity was checked by TLC, and recorded Rf value 0.62 (CCl$_4$: EtOAc 3:2.1)

Analytical And Spectral Data Of Compounds:

- **Synthesis of 1-hepta-O-acetyl-β-D-maltosyl-5-*p*-aminobenzoicacid-4-dithiobiuret**

Yield 72 (%); Mp.135^{0}C;$[\alpha]_D^{32}$252.42°(0.1, in CHCl$_3$);R*f* (Hexane:EtOAC)(1:1)0.59; **IR (KBr)cm- 1**:ν 3000-3292 (Ar-H)str ,1755 (C=O)str, 1543(C=N) str, , 1425 (C-N)str, 927(char. of glucopyranosyl ring), 758 (C=S) str.. **[1]HNMR (CDCl3)ppm:** 7.46-6.32 (m,8H, Ar-H), 5.57-5.59 (m, 14H, lactosyl-H), 2.31-2.01 (m, 12H,OAc),. **MS**(m/z) : 535 (M+),511, 408, 331, 263, 261, 169, 108.(Anal.Calcd. For Found C, 50.56; H, 6.09; N, 2.39; S, 5.80 C$_{21}$H$_{24}$O$_{13}$N$_3$S; requires; C, 50.40; H, 5.20; N, 2.80; S, 5.40%]).

- **Synthesis of 1-hepta-O-acetyl-β-D-Maltosyl-5-p-toludine -4-dithiobiuret**

Yield72.8(%); Mp.84^{0}C;$[\alpha]_D^{32}$+133 (0.1, in CHCl$_3$);R*f* (Hexane:EtOAC)(1:1)0.80;**IR (KBr)cm- 1**:ν 3000-3292 (Ar-H)str ,1755 (C=O)str, 1543(C=N) str, , 1425 (C-N)str, 927(char. of glucopyranosyl ring), 758 (C=S) str. **^{1}HNMR (CDCl3)ppm:** 7.46-6.32 (m,8H, Ar-H), 5.57-3.87 (m, 7H, glucosyl-H), 2.31-2.01 (m, 12H,OAc),. **MS**(m/z) : 558 (M+),521, 408, 331, 263, 261, 169, 108.(Anal.Calcd. For Found C, 50.56; H, 5.54; N, 2.39; S, 5.27 C$_{21}$H$_{26}$O$_{11}$N$_3$S; requires; C, 50.30; H, 5.09; N, 2.80; S, 5.10%).

- **Synthesis of 1-hepta-O-acetyl-β-D-maltosyl-5-*p*-Cl-aniline-dithiobiurtes**

Yield 80 (%); Mp.145-150^{0}C;$[\alpha]_D^{32}$155.19(0.1, in CHCl$_3$);R*f* (Hexane:EtOAC)(1:1)0.87 **IR (KBr)cm- 1**:ν 3000-3292 (Ar-H)str ,1755 (C=O)str, 1543(C=N) str, , 1425 (C-N)str, 927(char. of glucopyranosyl ring), 758 (C=S) str.. **[1]HNMR (CDCl3)ppm:** 7.46-6.32 (m,8H, Ar-H), 5.57-5.59 (m, 14H, lactosyl-H), 2.31-2.01 (m, 12H,OAc),.. **MS**(m/z) : 577 (M+),521, 408, 331, 263, 261, 169, 108.(Anal.Calcd. For Found C, 51.56; H, 5.89; N, 2.64; S; 5.78, C$_{20}$H$_{23}$O$_{11}$N$_3$SCl; requires; C, 52.17; H, 5.17; N, 2.89; S,5.62%%).

Preparation of Nanoparticles of hepta-O-acetyl-β-D-maltosyl-4-amino benzoic acid-4-dithiobiurets:

Take about 1 gm of hepta-O-acetyl-β-D-maltosyl-4-amino benzoic acid-4-dithiobiurets and dissolve it completely in the 50ml of solvent in 250 ml beaker. Now put this beaker in sonicator. The highly penetrating acoustic waves are passed through mixture, which create high pressure bubbles in the beaker due to which breakdown of the bulk material is takes place and desired sized nanoparticles are formed. The size determination of nanoparticlesis done by the X-ray diffraction studies

Characterization of Nanoparticles:

1. Characterization using UV-Spectrophotometer: Single Beam UV-Spectrophotometer with software BI/CI/SP/SB-S-03 of Bio Era make. The UV-Visible Spectroscopy reveals the formation of Nanoparticles Characterization of Nanoparticles was done using visible Spectrophotometer by using model by showing different absorption those from bulk material.

2. Size determination of hepta-O-acetyl-β-D-maltosyl-4-amino benzoic acid-4-dithiobiurets. Nanoparticles by X-ray Diffraction studies: From the X-ray diffraction it comes to know that size of nano **hepta-O-acetyl-β-D-maltosyl-4-amino benzoic acid-4-dithiobiurets** is 44.2 nm.
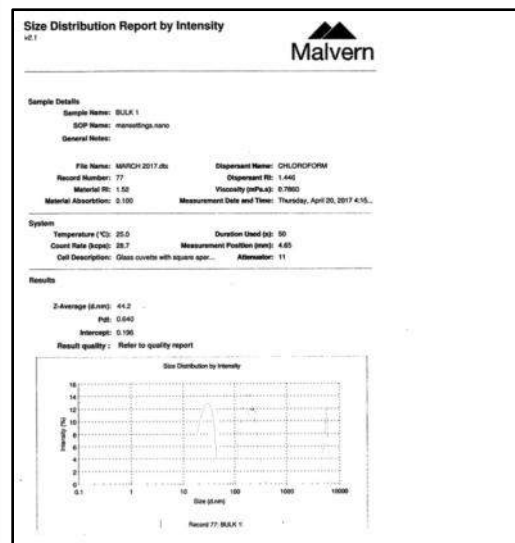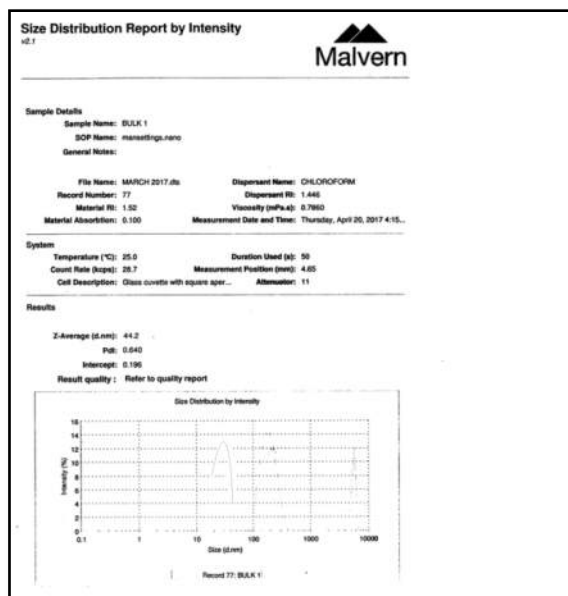
Antimicrobial activity comparison:

All the compounds have been screened for antibacterial activity using cup plate agar diffusion methodby measuring the inhibition zone in mm. The compounds were taken at a concentration of 1 mg/ ml using dimethyl sulphoxide as **solvent**.Amikacin (100ǔg/ml) was used as a standard for antibacterial activity. The compounds were screened for antibacterial activity against *Escherichia coli, Staphylococcus aureus, S. typhi, and P. vulgaris* in nutrient agar medium.
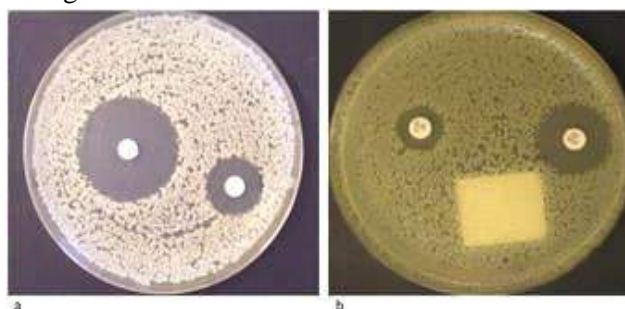

Table- 2 Antimicrobial activity of compounds

Antimicrobials	Bulk (5a)	Nanoparticles (6a)	Bulk (5b)	Nanoparticles (6b)	Bulk (5c)	Nanoparticles (6c)
E.coli	12	13	11	15	12	16
S.aureus	11	14	12	17	14	17
S.typhi	13	12	11	14	11	19
P.vulgaris	12	14	13	15	13	13
Amikacin	11	22	10	19	14	17
Clandamycine	10	15	12	13	12	14
DMSO	36	27	16	24	22	24

*including the well diameter of 8mm.**zone of inhibition in mm(15or less)resistance,(16- 20mm)moderate and (more than 20mm)sensitive.

Table No.3:- Characterization data of synthesis of 1-hepta-O-acetyl-β-D-maltosyl-5-aryl-4-dithiobiurets

Sr. No.	Aryl dithiobiurets	1-hepta-O-acetyl-β-D-lactosyl-5-aryl-4-dithiobiurets	M.P. (^{0}C)	% yield	Optical Rotation $[\alpha]_D^{32}$	R_f value
1	4-toludine	1-hepta-O-acetyl-β-D-lactosyl-5-p-toludine-4-dithiobiurtes	84	72.80	$[\alpha]_D^{32}$ = +133.94° (c, 0.373 in chloroform).	0.80
2	4-Cl-aniline	1-hepta-O-acetyl-β-D-	145 –	80.50	$[\alpha]_D^{32}$ = + 155.19°	0.87

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293
(Special Issue No.70) Peer Reviewed Journal www.aiirjournal.com Mob. 8999250451

171

		lactosyl-5-p-chloro-aniline-4-dithiobiuret	150		(c, 0.386 in chloroform).	
3	4-amino benzoic acid	1-hepta-O-acetyl-β-D-lactosyl-5-p-amino benzoic acid-4-dithiobiuret	135	71.60	$[\alpha]_D^{32} = + 242.42°$ (c, 0.333 in chloroform).	0.59

References

1) R. A. Dwek Chem. Rev. 96, 683 (1996)

2) E. V. Efimtseva, S. N. Mikhailov Biochemistry, (Moscow), 67, 1136, (2002)

3) T. S. Rao, G. R. Ravankar, R. S. Vinayak, R. K. Robin, J. Heterocyclic Chem., 28, 1779 (1991)

4) G. S. Singh, A. K. Mishra, L. Prakash, Indian J. Chem., 37B, 517 (1998)

5) P. Singh, L. L. Hingorain, G. K. Trivedi, Indian J. Chem., 27B, 498 (1988)

6) C. Tournaire Arellano, S.Y.E. Hage, P. Vsles, R. Coujale, A. Sanon, R. C. Bories, P. M. Loiseau, Carbohydr. Res., 314, 47 (1998)

7) R. Schirrmacher, U. Muhlhausen, B. Wangler, E. Schirrmacher, J. Reinhard, G. Nagle, B. Kiana, M. Piel, F. Rosch, Tetrahedron Lett., 43, 6301 (2002)

8) K. J. Yarema, C. R. Bertozzi, Curr. Opin. Chem. Bail. 2, 49 (1998)

9) Z. J. Witezak, K. A. Neiforth, Carbohydrate in drug Design, Marcel Daucer, New York, 1997

10) H. W. J. H. Meijer, U. S. Pat. 2, 596, 268 (1952) Chem. Abst., 46, 10636 (1952)

11) H. W. J. H. Meijer, U. S. Pat. 2, 612, 497 (1952) Chem. Abst., 47, 1402 (1953)

12) K. Quehl, U. S. Pat. 2, 116, 640 (1938) Chem. Abst., 32, 500 (1938)

13) J. S. Opplt, U. S. Pat. 2, 694, 719 (1954) Chem. Abst., 49, 2639 (1955)

14) I. Goodmann, Advances in carbohydrate chemistry 13, 233 (1958) (Academic press INC Publisher, New York)

15) K. Weis, O. Bayer and H. Kleiner, Ger. Pat., 1, 011, 849 (1957) Chem. Abst. 54, 9312a (1960)

16) M. Tomoya, N. Shigeru, K. Kazuo, S. Testuo, Bull. Chem. Soc. Japan, 48(12), 3763-4 (1975)

Barium Chloride Catalysed Synthesis Of Acridine/Tetrahydro Acridine Derivatives Under Microwave Heating

Pravin R. Kawle

Department of Chemistry, Shri R. L. T. College of Science, Akola-444 001

Mahendra Dhande

Department of Chemistry, HPT and RYK Science College, Nashik

Abstract

Single step syntheses of acridine derivatives have been reported under microwave heating at room temperature. The oxidative cyclization of diphenyl amine and aromatic ketone/ aromatic acid under solvent free condition leads to formation of 9-aryl-acridine using barium chloride as a catalyst. The title compounds were characterised by IR, ^{1}H-NMR and Mass spectrometry.

Keywords: Barium chloride, microwave method, acridines.

Introduction

Barium chloride is an ionic water-soluble salt mostly used inexpensive, commercially available catalysts that can be easily separated and reused[1]. The use of barium dichloride as a Lewis acid catalyst in the synthesis of substituted coumarins via Pechmanncyclocondensation proved the catalytic efficiency under thermal and solvent-free conditions[2]. The extensiveinvestigation was done by exploring one pot Biginelli reaction using barium chloride under different solvents. The high yield, mild and solvent-free reaction conditions explains the synthetic utility in accord with green chemistry criteria[3].

Microwave technique for one-pot cyclocondensationprovides a number of advantages in synthesis of a series of novel five and six member ring containing nitrogen and in cyclization 1,3 dicarbonyl compounds with compound of nucleophilic character at atmospheric pressure in open vessel[4]. High density microwave irradiation has matured into a reliable and useful methodology for accelerating time consuming reactions[5]. Acridine is widely exploited pharmacophore in synthetic chemistry having practical application in the medicinal sciences. From the extensive literature survey it has been found that acridine and their derivatives exhibit anti-inflammatory, anti-tumour, antimalarial and anticancer activities[6-8]. The use of acridine nucleus as a vector leads to numerous clinical trials for DNA-targeting drugs studies is well known application andstudies on acridine derivatives have been published recently, focusing on their therapeutics properties against cancer, parasites and bacteria[9-11].

Keeping in view of biological significance, Here-in we report an efficient MW synthesis of 9-aryl-acridines and 9-alkyl/aryl-9-aryl-tetra hydro-acridines using $BaCl_2$ as a catalyst under microwave condition.

Material And Method

All MW irradiation experiments were carried out in synthetic microwave oven with continuous irradiation of power 120W. Purity of title compounds checked by TLC till single spot is observed. Melting points were determined on a digital melting point apparatus (Veego, VMP-D) and are uncorrected. All chemicals used were of AR grade.The IR spectra were recorded on Agilent Cary 630 FTIR spectrophotometer using KBr disc. ^{1}H-NMR spectra were obtained on a Bruker-Avance-600 MHz spectrophotometer in $CDCl_3$ using tetramethyl silane as internal standard. Mass spectral measurements were carried out by EI method on a Jeol, JMC-300 spectrometer at 70 eV.
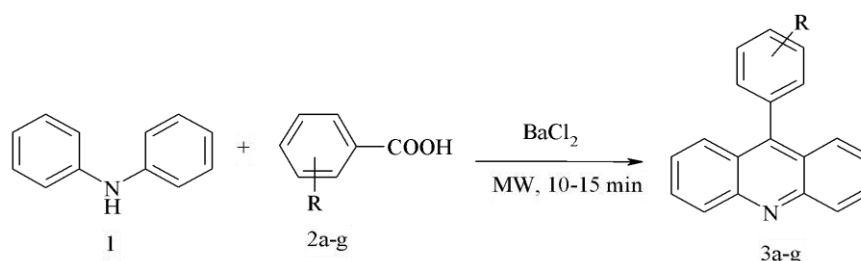
Scheme 1: *9-Substituted-aryl-acridines*, **3a-g**
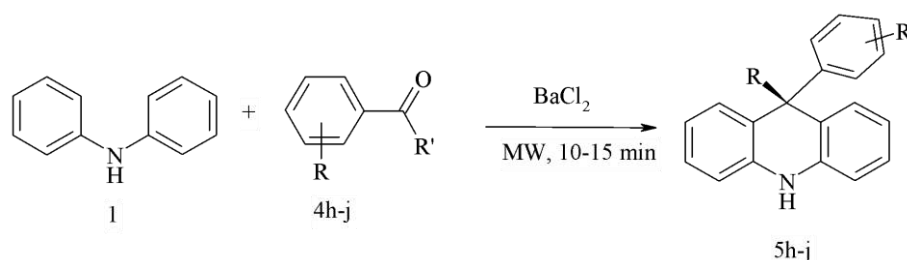
Scheme 2: *9-alkyl/aryl-9-aryl-tetra hydro-acridines*, **3h-j**

Result And Discussion

Synthesis of 9-phenyl-acridines, **3a**

9-phenyl-acridine **(3a)**was prepared by irradiating the mixture ofdiphenyl amine and benzoic acid using BaCl$_2$ as a catalyst under microwave condition for 10-15 min., progress of reactions monitored by TLC, crude solid was recrystallized form absolute alcohol in cold condition and identified as 9-phenyl-acridine **(3a)**.

Similarly 9-aryl-acridine **(3b-g)** were prepared by irradiating the mixture ofdiphenyl amine (**1**) and various aromatic acid (**2b-g**) using BaCl$_2$ as a catalyst under microwave condition.

Synthesis of 9-methyl-9-aryl-tetra hydro-acridines, **5h**

9-methyl-9-aryl-tetra hydro-acridines **(5h)** was prepared by irradiating the mixture ofdiphenyl amine and Acetophenone using BaCl$_2$ as a catalyst under microwave condition for 10-15 min., progress of reactions monitored by TLC, crude solid was recrystallized form absolute alcohol in cold condition and identified as 9-methyl-9-aryl-tetra hydro-acridines **(5h)**.

Similarly 9-substituted aryl-9-aryl-tetra hydro-acridine **(5i, 5j)** were prepared by irradiating the mixture of diphenyl amine (**1**) and substituted ketone (**4i, 4j**) using BaCl$_2$ as a catalyst under microwave condition.

Table 1: Analytical data compounds, **3a-g, 5h-j**

Entry 2a-g, 4h-j	Product 3a-g, 5h-j	Yield (%)	m.p. (^{o}C)
Benzoic acid	9-phenyl acridine	82 %	115°C
p-chloro benzoic acid	9-(4-chloro-phenyl) acridine	84.30 %	108°C
p-methoxy benzoic acid	9-(4-methoxy-phenyl) acridine	70 %	124°C
p-amino benzoic acid	9-(4-amino-phenyl) acridine	79.93 %	117°C
o-amino benzoic acid	9-(2-amino-phenyl) acridine	68 %	126°C
Pthallic acid	o-acridinyl benzoic acid	80 %	130°C
Cinnamic acid	9-styryl acridine	82.45 %	110°C
Acetophenone	9-methyl-9-phenyl-tetrahydro acridine	90 %	121°C
Benzophenone	9, 9-diphenyl-tetrahydro acridine	78 %	114°C
p-bromo Acetophenone	9-(4-bromo-phenyl)-9-phenyl-tetrahydro acridine	80 %	108°C

Conclusion

The diphenyl amine on cyclo-condensation with aromatic aldehydes/ Ketones under microwave condition using BaCl$_2$ as a catalyst resulted the title compounds 9-aryl-acridines**3a-g/** 9-alkyl/aryl-9-aryl-tetra hydro-acridines **5h-j**. The spectral analysis fully supported the formation of the structures of the compounds **3a-g** and **5h-j**. The IR spectrum of compoundsshowed characteristic peak at 1506-1530 cm^{-1}for aromatic carbon double bond group[12]. In^{1}H-NMR spectrum signal at 6.8-7.2 ppm for aromatic ring and at 7.6-8.0 ppm for acridinyl ring[13] were observed. In mass spectrum base peak observed at m/z 178.22.

On observing the results, it is concluded that title compounds9-aryl-acridines **3a-g** and 9-alkyl/aryl-9-aryl-tetra hydro-acridines **5h-j** have been prepared by using reusable BaCl$_2$ catalyst employing microwave heating method provides clean, inexpensiveprotocoland study will be of great importance to those involved in drug discovery.

Acknowledgements

References

1) Masumeh Abdoli-Senejani, M., Hasani, M. and MomeniIsfahani, T. 2016.One-Pot Synthesis of 3, 4-Dihydropyrimidin-2(1H)-Ones Catalyzed by Barium Chloride, J. Chem. and Pharma. Research, 8(9): 214-217.

2) Saeed, Khodabakhshi.2012. Barium Dichloride as a Powerful and Inexpensive Catalyst for the Pechmann Condensation without Using SolventOrganic chemistry international, 15: 1-5.

3) Ramesh, V., Shanmugam, S. and Savitha Devi, N. 2016. An efficient five-component synthesis of thioether containing dihydropyrano[2,3-c]pyrazoles: a green domino strategy, New Journal of Chemistry, 40(12) , 9993-10001.

4) Lindstrom, P. Tierney, J. Wathley, B. and Westman, J. 2001.Microwave Assisted Organic Synthesis - A Review. Tetrahedron, 57: 9225-9283.

5) Kuzemko, M., Van Arnum, S. and Niemczyk, H. 2007. A Green Chemistry Comparative Analysis of the Syntheses of (E)-4-Cyclobutyl-2-[2-(3-nitrophenyl)ethenyl] Thiazole, Ro 24-5904, Org. Process Res. Dev., 11, 3, 470-476.

6) Srivastava, A. andNizamuddin.2004. Synthesis and fungicidal activity of some acridine derivatives, Indian J. Heterocycl. Chem., 13: 261.

7) Elslager, E. F.andWorth, D. F. 1969.Antiamebic, antimalarial, and anthelmintic effects of distal hydrazine analogs of azacrine, quinacrine, and 7-([3-(octylamino)propyl]amino)benz[c]acridine, J. Med. Chem. 12: 955-957.

8) Mayer,R., Hiller, G., Nitzsckhe, M.andJentsch, J. 1963. Base-Catalysed Reactions of Ketones with Hydrogen Sulfide, AngewandteChemie, 370-373

9) Antonini, I. 2004. Intriguing Classes of Acridine Derivatives as DNA-binding Antitumour Agents: From Pyrimido[5,6,1-de]acridines to Bis(acridine-4-carboxamides), Med. Chem. Reviews., 1(3): 267-290.

10) Denny, W. A. 2004. Chemotherapeutic Effects of Acridine DerivativesMedicinal Chemistry Reviews, 1(3): 257-266.

11) Kelland, L. R. 2005. Overcoming the immortality of tumour cells by telomere and telomerase based cancer therapeutics-current status and future prospectsEur. J. Cancer, 41(7): 971-979.

12) Dudley, H. and Williams, 2004 Spectroscopic Methods in Organic Chemistry, Tata McGraw-Hill, UK.

13) Silverstein, R. M., Bassler, G. C. and Morril, T. C. 1981 Spectrometric Identification of Organic Compounds,4thed, John Wiley & Sons, New York.

Replacing Synthetic Food Preservatives with Natural Antimicrobial Food Preservatives – A Feasibility Study for Small Scale Industries.

Patil.Y.S.
Department of Microbiology, Shri. D.M.Burungale Science and Arts College, Shegaon.Dist.Buldana

Barabde R.B.
Department of Microbiology, Shri. D.M.Burungale Science and Arts College, Shegaon.Dist.Buldana

Abstract

It has been reported that the naturally occurring antimicrobial compounds could be applied as food preservatives to not only protect food quality but also extend the shelf life of foods and beverages. Since, these compounds are naturally produced and isolated from various sources, including plants, animals and microorganisms (in which they constitute part of host defence systems), they are safer. Many naturally occurring compounds, such as nisin, plant essential oils, and natamycin, have been widely studied and are reported to be effective in their potential role as antimicrobial agents against spoilage and pathogenic microorganisms. However, their utility as well as use in the food products manufactured by the small scale industries is not known. Since, this is an unorganized sector, which is not governed with stringent rules; there appears a higher risk of food borne diseases as function of consumption of these products. In view of above, a feasibility study was carried out to know the existing use of synthetic as well as natural antimicrobial preservatives by the small scale industries in the study area. The data collection was carried out by following survey methodology. Though some of these natural antimicrobials are commercially available and applied in food processing, their efficacy, consumer acceptance and regulation are not well defined with respect to the study area. The results indicate that there is very low awareness amongst the small scale industries regarding the use of natural antimicrobial preservatives.

Keywords: natural antimicrobial compounds, food preservatives, food quality, shelf life of foods

Introduction:

Food is an essential thing for human survival. Except our own garden plants, all the food used today has some preservatives. Preservatives are the substances, which are used to prevent food spoilage from microorganism. Food preservation is used from the ancient times. This will inhibit the growth of microorganisms like bacteria and fungi. Food preservatives becomes an essential thing nowadays, this plays an important role during food transportation. This will preserve the food for a long duration from the spoilage.

Food products can be subjected to microbial contamination that is mainly caused by bacteria, yeasts, and fungi. Many of these microorganisms can cause undesirable reactions that deteriorate the flavor, odor, color, and textual properties of foods Vermeiren *et al.* 2002; Devlieghere *et al.* 2004a; Han 2005; Rupika *et al.* 2005; Davidson and Taylor 2007; Gutierrez *et al.* 2008. Microbial growth in food products is a major concern because some microorganisms can potentially cause food-borne illness Natrajan and Sheldon 2000; Cha and Chinnan 2004; Davidson *et al.* 2005; de Oliveira *et al.* 2007. In packaged foods, the growth and survival of common spoilage and pathogenic microorganisms such as *Listeria monocytogenes* ,*Escherichia coli* O157, *Salmonella* ,*Staphylococcus aureus* ,*Bacillus cereus* ,*Campylobacter, Clostridium perfringens, Aspergillus niger* , and*Saccharomyces cerevisiae* are affected by a variety of intrinsic factors such as pH, water activity, and the presence of oxygen or by extrinsic factors associated with storage conditions including temperature, time, and relative humidity Singh 2003; López-Malo *et al.* 2005; Rydlo *et al.* 2006. To prevent the growth of spoilage and pathogenic microorganisms on foods, various traditional preservation techniques such as heat treatment, salting, acidification, and drying are used in the food industry Ozdemir and Floros 2004; Davidson and Taylor 2007. In recent years, a rise in consumer demand for safe, fresh, and minimally processed foods has led to the development of new preservation techniques. Active packaging (AP) technologies, for example, can provide safe food products with longer shelf lives Vermeiren *et al.* 2002; Fitzgerald *et al.* 2003; Gutierrez *et al.* 2008. In the past few decades, various synthetic AM agents have been investigated and developed into food packaging materials Weng and Hotchkiss 1992Weng and Hotchkiss 1993. Many of these agents including various organic acids and salts have been approved by regulatory agencies and have since been used for the preservation of food products Davidson and Taylor 2007. Synthetic AM agents that have demonstrated inhibitory activity against different microorganisms include sodium benzoates and propionates, potassium sorbates, sulfites, chlorides, nitrites, triclosan, fungicides (for example, benomyl, imazalil) and various metal ions including silver zeolites, quaternary ammonium salts, and copper ions Devlieghere *et al.* 2000a; Ouattara *et al.* 2000; Cooksey 2005. Other AM agents such as acetic acid from vinegar and benzoic acid from cranberries are found in nature, but are classified as synthetic AM agents when produced synthetically Davidson and Taylor 2007. In recent years, natural AM agents have attracted much attention in the food and packaging industries as a replacement for synthetic ones for food preservation. According to Davidson and Zivanovic 2003, natural AM agents are classified by their sources: AM agents derived from plant EOs (for example, basil, thyme, oregano, cinnamon, clove, and rosemary); animal sources (for example, lysozyme,

lactoferrin); microbial sources (nisin, natamycin); and naturally occurring polymers (chitosan). The EOs extracted from plant sources consist of various mixtures including terpenoids, esters, aldehydes, ketones, acids, and alcohols Dorman and Deans 2000. These plants EOs are volatile and generally possess relatively strong odors Bakkali
 et al. 2008.

Materials and methods
Organisms and growth conditions
Micro-organisms were isolate in the department while some of the organisms obtained from the culture collections center. Organisms were as follows: *Candida albicans* ATCC 10231, *Enterococcus faecalis* NCTC 8213, *Escherichia coli*, *Klebsiella pneumoniae* , *Pseudomonas aeruginosa* , *Salmonella typhimurium* and *Staphylococcus aureus* . Organisms were maintained on blood agar (BA). Overnight cultures were prepared by inoculating approximately 2 ml Mueller Hinton broth (MHB) with 2–3 colonies of each organism taken from BA. Broths were incubated overnight at 35 °C with shaking. Inocula were prepared by diluting overnight cultures in saline to approximately 10^8 cfu ml^{-1} for bacteria and 10^7 cfu ml^{-1} for *C. albicans*. These suspensions were further diluted with saline as required.

Essential oils
Plant oils and extracts were obtained from PKV lab Akola where it is extracted by distillation method. All oils were diluted v/v in both agar and broth dilution method.

Agar dilution method
The agar dilution method followed that approved by the NCCLS with the following modification: a final concentration of 0·5% (v/v) Tween-20 (Sigma) was incorporated into the agar after autoclaving to enhance oil solubility. Briefly, a series of twofold dilutions of each oil, ranging from 2% (v/v) to 0·03% (v/v), was prepared in Mueller Hinton agar with 0·5% (v/v) Tween-20. Plates were dried at 35 °C for 30 min prior to inoculation with 1–2 μl spots. Mueller Hinton agar, with 0·5% (v/v) Tween-20 but no oil, was used as a positive growth control. Inoculated plates were incubated at 35 °C for 48 h. Minimum inhibitory concentrations (MICs) were determined after 24 h for the bacteria and after 48 h for *C. albicans*. The MICs were determined as the lowest concentration of oil inhibiting the visible growth of each organism on the agar plate. The presence of one or two colonies was disregarded.

Results
By using agar dilution method minimum inhibitory concentration of selected essential oils and microbial products against 7 different microorganisms were studied and the results were noted in table 1. As, Lemongrass inhibited all organisms at ≤2·0% (v/v). Coriander inhibited all organisms except *Ps. aeruginosa* at ≤2·0% (v/v). Fixed oil pumpkin failed to inhibit any organisms at the highest concentration, which was 2·0% (v/v). While carrot inhibited Gram-positive bacteria and *C. albicans* only. None of the oils inhibited Gram-negative bacteria only. *Pseudomonas aeruginosa* was inhibited by the lowest number of extracts (two), *Candida albicans* and *Staph. aureus* were the most susceptible organisms, inhibited at ≤2·0% (v/v) by 8 and 7 extracts, respectively.

Table 1. Minimum inhibitory concentrations (MICs) of selected essential oils (%v/v), microbial products against 7 different microorganisms.

Sr. No.	Details of plant oils and extracts				Test organisms						
	Plant species	Common name	Extract type	Source	Candida albicans	Enterococcus faecalis	Escherichia coli	Klebsiella pneumoniae	Pseudomonas aeruginosa	Salmonella typhimurium	Staphylococcus aureus
1	*Citrus aurantium*	Orange	EO	PEEL	1.0	>2.0	>2.0	>2.0	>2.0	>2.0	>2.0
2	*Citrus limon*	Lemon	EO	PEEL	2.0	2.0	>2.0	>2.0	>2.0	>2.0	2.0
3	*Citrus xparadisi*	Grape fruit	EO	PEEL	2.0	2.0	2.0	>2.0	>2.0	>2.0	>2.0
4	*Coriandrum sativum*	Coriander	EO	SEED	0.25	0.25	1.0	1.0	1.0	>2.0	0.25
5	*Cucurbita pepo*	Pumpkin	FO	SEED	>2.0	>2.0	>2.0	>2.0	>2.0	>2.0	>2.0

6	*Cymbopogon citratus*	Lemongrass	EO	LEAF	0.05	0.14	>2.0	0.25	0.04	0.25	0.05
7	*Daucus carota*	Carrot seed	EO	SEED	>2.0	>2.0	1.0	>2.0	>2.0	2.0	>2.0
8	*Eucalyptus polybractea*	Eucalyptus	EO	LEAVES & TWING	1.0	2.0	1.0	2.0	2.0	2.0	2.0
9	Nisin	--	--	M.O	2.0	>2.0	>2.0	2.0	1.0	1.0	2.0
10	Natamycin	--	--	M.O	>2.0	2.0	2.0	2.0	2.0	2.0	>2.0

EO- Essential oil, FO- Fixed oil, M.O-Microorganism

Discussion

Historically, many plant oils and extracts, such as tea tree, myrrh and clove, have been used as topical antiseptics, or have been reported to have antimicrobial properties Hoffman 1987; Lawless 1995. It is important to investigate scientifically those plants which have been used in traditional medicines as potential sources of novel antimicrobial compounds Mitscher *et al*. 1987. Also, the resurgence of interest in natural therapies and increasing consumer demand for effective, safe, natural products means that quantitative data on plant oils and extracts are required. Comparison of the data obtained in this study with previously published results is problematic. First, the composition of plant oils and extracts is known to vary according to local climatic and environmental conditions Janssen *et al*. 1987; Sivropoulou *et al*. 1995. Furthermore, some oils with the same common name may be derived from different plant species Windholz *et al*. 1983; Reynolds 1996. Secondly, the method used to assess antimicrobial activity, and the choice of test organisms, varies between publications Janssen *et al*. 1987. A method frequently used to screen plant extracts for antimicrobial activity is the agar disc diffusion technique Morris *et al*. 1979 ; Smith-Palmer *et al*. 1998 . this study confirms that many essential oils and plant extracts possess *in vitro* antibacterial and antifungal activity. However, if plant oils and extracts are to be used for food preservation or medicinal purposes, issues of safety and toxicity will need to be addressed.

Conclusion

Food processing and some preservation techniques, such as heating, may alter food's nutritional or organoleptic properties. Microbial resistance to current antimicrobial compounds has increased in recent years worldwide; therefore, alternative compounds must be investigated and developed. Consumer demand for more natural products and the growing need for alternative preservatives to ensure food safety, it is imperative that plant-derived antimicrobial compounds be fully assessed for their feasibility for food application. This new field of research has great potential for more evaluation to meet regulatory requirements and to fully elucidate the possibility of employing antimicrobials from the extensive source of plants worldwide. Naturally occurring antimicrobial compounds could be applied as food preservatives to protect food quality and extend the shelf life of foods and beverages. These compounds are naturally produced and isolated from various sources, including plants, animals and microorganisms, in which they constitute part of host defense systems. Many naturally occurring compounds, such as nisin, plant essential oils, and natamycin, have been widely studied and are reported to be effective in their potential role as antimicrobial agents against spoilage and pathogenic microorganisms. Although some of these natural antimicrobials are commercially available and applied in food processing, their efficacy, consumer acceptance and regulation are not well defined.

All these natural antimicrobial agents are easily available and cheap with no side effects will increase shelf life of the products produced by small scale industries mainly in urban and rural areas.

References

1) *Bakkali F, Averbeck S, Averbeck D, Idaomar M. 2008. Biological effects of essential oils—a review. Food Chem Toxicol 46(2):446–75.*
2) *Cha DS, Chinnan MS. 2004. Biopolymer-based antimicrobial packaging: a review. Crit Rev Food Sci Nutr 44(4):223–37.*
3) *Cooksey K. 2005. Effectiveness of antimicrobial food packaging materials. Food Addit Contam 22(10):980–7.*
4) *Davidson PM, Zivanovic S. 2003. The use of natural antimicrobials. In: Zeuthen P, Bogh-Sorensen L, editors. Food preservation techniques. Boca Raton , Fla. : Woodhead Publishing Limited and CRC Press LLC. p. 5–30.*
5) *Davidson PM, Sofos JN, Branen AL. 2005. Antimicrobials in foods. Boca Raton , Fla. : CRC Press, Taylor & Francis Group. p. 706.*

National Conference on Multidisciplinary Research in Science and Technology for Healthy Lifestyle Management (NCMRST- 2020) Organizer :- Shri R.L.T. College of Science, Akola

24th Jan. 2020

6) *Davidson PM, Taylor MT. 2007. Chemical preservatives and natural antimicrobial compounds. In: Doyle P, Beuchat LR, Montville TJ, editors. Food microbiology: fundamentals and frontiers. Washington , D.C. : American Society for Microbiology Press. p. 713–34.*

7) *de Oliveira TM, de Fátima Ferreira Soares N, Magela Pereira R, de Freitas Fraga K. 2007. Development and evaluation of antimicrobial natamycin-incorporated film in gorgonzola cheese conservation. Packag Technol Sci 20(2):147–53.*

8) *Devlieghere F, Vermeiren L, Bockstal A, Debevere J. 2000a. Study on antimicrobial activity of a food packaging materials containing potassium sorbate. Acta Aliment 29(2):137–46.*

9) *Devlieghere F, Vermeiren L, Debevere J. 2004a. New preservation technologies: possibilities and limitations. Int Dairy J 14(4):273–85.*

10) *Dorman HJD, Deans SG. 2000. Antimicrobial agents from plants: antibacterial activity of plant volatile oils. J Appl Microbiol 88(2):308–16.*

11) *Fitzgerald DJ, Stratford M, Narbad A. 2003. Analysis of the inhibition of food spoilage yeasts by vanillin. Int J Food Microbiol 86(1–2):113–22.*

12) *Gutierrez J, Barry-Ryan C, Bourke P. 2008. The antimicrobial efficacy of plant essential oil combinations and interactions with food ingredients. Int J Food Microbiol 124(1):91–7.*

13) *Han J, Castell-Perez ME, Moreira RG. 2005. Antimicrobial films as a potential technology to increase pathogen radiation sensitivity. Proceedings of IFT Annual Meeting. New Orleans , La. , July 15–20.*

14) Hoffman, D.L. (1987) *The Herb User's Guide*. Wellingborough, UK: Thorsons Publishing Group.

15) Janssen, A.M., Scheffer, J.J.C. and Baerheim Svendsen, A. (1987) Antimicrobial activity of essential oils: a 1976–86 literature review. Aspects of the test methods. *Planta Medica* **53,** 395–398.

16) Lawless, J. (1995) *The Illustrated Encyclopedia of Essential Oils*. Shaftesbury, UK: Element Books Ltd.

17) *López-Malo A, Maris Alzamora S, Palou E. 2005. Aspergillus flavusgrowth in the presence of chemical preservatives and naturally occurring antimicrobial compounds . Int J Food Microbiol 99(2):119–28.*

18) Mitscher, L.A., Drake, S., Gollapudi, S.R. and Okwute, S.K. (1987) A modern look at folkloric use of anti-infective agents. *Journal of Natural Products* **50,** 1025–1040.

19) Morris, J.A., Khettry, A. and Seitz, E.W. (1979) Antimicrobial activity of aroma chemicals and essential oils. *Journal of the American Oil Chemists' Society* **56,** 595–603.

20) *Natrajan N, Sheldon BW. 2000. Efficacy of nisin-coated polymer films to inactivateSalmonella typhimuriumon fresh broiler skin . J Food Protect 63 (9):1189–96.*

21) *Ouattara B, Simard RE, Piette G, Bégin A, Holley RA. 2000. Inhibition of surface spoilage bacteria in processed meats by application of antimicrobial films prepared with chitosan. Int J Food Microbiol 62(1–2):139–48.*

22) *Ozdemir M, Floros JD. 2004. Active food packaging technologies. Crit Rev Food Sci Nutr 44(3):185–93.*

23) Reynolds, J.E.F. (1996) *Martindale – the Extra Pharmacopoeia* 31st edn. London: Royal Pharmaceutical Society of Great Britain.

24) *Rupika LAS, Sonneveld K, Miltz J, Bigger SW. 2005. Development and evaluation of low-density polyethylene-based antimicrobial food packaging polymers containing thymol and carvacrol. Proceedings of 22nd IAPRI Symposium on Packaging. Campinas , Brazil , May 22–24.*

25) *Rydlo T, Miltz J, Mor A. 2006. Eukaryotic antimicrobial peptides: promises and premises in food safety. J Food Sci 71 (9):R125-35.*

26) *Singh TK, Drake MA, Cadwallader KR. 2003. Flavour of Cheddar cheese: a chemical and sensory perspective. Comp Rev Food Sci Food Safety 2(4):139–62.*

27) Sivropoulou, A., Kokkini, S., Lanaras, T. and Arsenakis, M. (1995) Antimicrobial activity of mint essential oils. *Journal of Agricultural and Food Chemistry* **43,** 2384–2388.

28) Smith-Palmer, A., Stewart, J. and Fyfe, L. (1998) Antimicrobial properties of plant essential oils and essences against five important food-borne pathogens. *Letters in Applied Microbiology* **26,** 118–122.

29) *Vermeiren L, Devlieghere F, Debevere J. 2002. Effectiveness of some recent antimicrobial packaging concepts. Food Addit Contam 19(suppl.):163–71.*

30) *Weng Y-M, Hotchkiss JH. 1992. Inhibition of surface molds on cheese by polyethylene film containing the antimycotic imazalil. J Food Protect 58(5):367–9.*

31) *Weng Y-M, Hotchkiss JH. 1993. Anhydrides as antimycotic agents added to polyethylene films for food packaging. Packag Technol Sci 6(3):123–8.*

32) Windholz, M., Budavari, S., Blumetti, R.F. and Otterbein, E.S. (1983) *The Merck Index, an Encyclopedia of Chemicals, Drugs and Biologicals* 10th edn. Rahway, NJ: Merck and Co. Inc.

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293 (Special Issue No.70) Peer Reviewed Journal www.aiirjournal.com Mob. 8999250451

179

Antibiotic Susceptibility Pattern Of *E. Feacalis* Isolates From Uti Of Pregnant Women In Akola City

Morey S.S.	Bhalekar U.K.	Ali Y.A.
Department of Microbiology Shri. R.L.T. College of Science, Akola	Department of Microbiology Shri. R.L.T. College of Science, Akola	Department of Microbiology Shri. R.L.T. College of Science, Akola

Abstract

The Urinary tract infection accounts for the majority of infection that an average women contract at least once during her life time. The risk of UTI is even greater in the pregnant women as it my lead to termination of pregnancy if not treated properly or if the drug given for treatment is harmful for the fetus. The major cause of UTI in patients is the uropathogens and Enterococcus feacalis is one of them causes serious infection. The significant percentage of cases i.e 33.2% were found to be affected with Enterococcus feacalis. The antibiotics viz. Fosfomycin, Norfloxacin, Ciprofloxacin etc are the important drugs for the treatment of UTI. The present study has been given more emphasis on isolation of Enterococcus feacalis as uropathogens and its susceptibility / resistant pattern against various antibiotics.

Key Words: UTI, Enterococcus feacalis, Antibiotics.

Introduction

Urinary tract infection (UTI) is caused by bacteria that attach to the inside lining tissue of the urinary system or tract (1). Pregnant women have a greater risk of developing urinary tract infection. The organism *E. feacalis* account for 2% to 12% of infection (2).

A pregnant woman who develops UTI should be treated promptly to avoid premature delivery and other risks. Some antibiotics are not safe to take during pregnancy and therefore should be avoided (3).The most predominant of all uropathogens is *E. feacalis* which is a major cause of UTI.

Hence the study was undertaken to know the antibiotic resistance/ susceptibility pattern of *E. feacalis* isolates from UTI of pregnant women.

Materials And Methods

The samples of urine collected from pregnant women suffering from UTI are immediately processed for detection of uropathogens, its identification and antibiotic susceptibility pattern.

The sample is centrifuged in sterilized tubes and the pellet is inoculated on UTI agar which is highly specific for majority of bacteria causing urinary Tract Infection. Also the pellet is simultaneously inoculated on MacConkey agar and EMB agar. All plates are the incubated at 37° C for 24 hours. The *E. feacalis* is identified on the basis of the color of its colony and is accordingly separated on its specific media as well as nutrient media.

The *E. feacalis* is further identified on the basis of morphology, biochemical and specific cultural characteristics i.e growth on MacConkey agar, EMB agar.

Antibiotic susceptibility testing was done by Kirby-Bauer Technique

Media Used: The media used was Mueller Hinton agar. The antibiotics used were Ampicilin, Amoxicilin, Gentamycin, Nitrofurantoin, Ciprofloxacin, Lomefloxacin, Norfloxacin, Ofloxacin, Trimethoprim, Sulphamethoxazole, Cephalexin, Cefuroxime, Cefactor, Cefpodoxime, Cephotaxime, Ceftriaxone, Penicillin, Cefepime, Fosfomycin, Virginamycin.

Preparation of Inoculum:

UTI isolate (*E. feacalis*) was inoculated in 5ml sterile nutrient broth and incubated at 37^oC for 2 to 8 hours till moderate turbidity developed. The inoculum turbidity was compared with by mixing 0.5ml of 1.175% Barium chloride and 99.5ml of 0.36N Sulphuric acid, as recommended by W.H.O. wherever necessary the inoculum was diluted or incubated further to attain comparative turbidity.

The *E. feacalis* isolates were then tested for their antibiotic resistance / susceptibility pattern by Kirby-Bauer technique (4), using the above antibiotics. The zone of inhibition was recorded after incubation at 37^0C for 18 to 20 hours.

Result And Discussion

Total numbers of cases of Urinary Tract Infection in pregnant women were 1121.The microbial analysis showed 373 cases being affected either only by *E. feacalis* or has mixed infection including *E. feacalis*. The titre value from each sample was determined and the significant samples (124) with the titre value above 10^5 were selected for further studies (Table 1, 2, 3).The significant percentage of cases i.e. 33.2% were found to be affected with *E. feacalis*. The isolate from the UTI affected patients was confirmed as *E. feacalis* based on its morphology, biochemical and cultural characteristics (Table 4).

The antibiotic susceptibility test is done in triplicate by Kirby-Bauer technique and the readings are recorded (Table 5). Total 20 Antibiotics were selected which were considered to be safe for pregnant women. Out of 20 antibiotics, *E. feacalis* isolates were found to be resistant to viz. Virginamycin, Lomefloxacin, Cefactor. The highest frequency of Antibiotic to which the isolate was sensitive is Amikacin which was positive in all 117 cases (i.e. 100%). However Vancomycin showed lowest frequency with only 04 positive cases.

The sensitivity of the *E.feacalis* isolate was compared with the standard E.coli ATCC 25922.

The most potent antibiotics were found to be Fosfomycin, Nitrofurantoin, Trimethoprime.

Thus the drug of choice for the Urinary Tract Infection caused by *E.feacalis* specially for the pregnant women is Fosfomycin, which is correlated with the same findings as Delzell and Lefevre (2).

Table 1: Screening of a total of 1121 patients for *E. feacalis*

E. feacalis	Frequency	*Valid Percent*	Cumulative Percent
- ve	748	66.7	66.7
+ ve	373	33.3	100.0
Total no. of patients	1121	100.0	

Table 2**:** Screening of 373patients to check the percentage of patients that showed significant titre (more than 10^5)

	Titre	Frequency	Valid Percent	Cumulative Percent
E. feacalis	10^1	56	15.0	15.0
	10^2	98	26.3	41.3
	10^3	46	12.3	53.6
	10^4	49	13.1	66.8
	10^5	39	10.5	77.2
	10^6	41	11.0	88.2
	10^7	31	8.3	96.5
	10^8	13	3.5	100.0
	Total	373	100.0	

Table 3: Percentage of samples that showed non-significant and significant titres from total +ve samples

	Non- significant (Percent)	Significant (Percent)
E feacalis	66.8	33.2

Table 4: Morphology, Biochemical and Cultural Characters of *E. feacalis* Isolates

Morphology	Result
Gram Stain	Gram positive cocci
Motility	Non Motile
Biochemical Test	Result
Glucose	A+G
Lactose	A
Mannitol	A
Indole	-ve
M.R	+ve

V.P	-ve
Citrate	+ve
Urease	+ve
H2S production	-ve
Nitrate	-ve
Oxidase	-ve
Cultural Characters	**Result**
MacConkey Agar	Pink colored colonies
UTI Agar	Blue colored colonies

The above tests confirmed the isolate as *E feacalis.*.

Table 5: Antibiotic susceptibility test of *E. feacalis* isolate from UTI of pregnant women. *Enterococcus feacalis* (Total cases =124)

Antibiotics (in μg)	No. of Sensitive cases	Mean ± SD		Range	Min	Max
Ampicilin (25 μg)	39	11	± 0.81	2	10	12
Amoxicilin (10 μg)	10	10	± 0.00	0	10	10
Gentamycin (10 μg)	15	11	± 1.13	4	10	14
Nitrofurantoin (50 μg)	75	13	± 2.12	6	10	16
Ciprofloxacin (10 μg)	16	11	± 0.81	2	10	12
Lomefloxacin (10 μg)	**Resistant**					
Norfloxacin (10 μg)	15	10	± 0.46	1	10	11
Ofloxacin (5 μg)	10	11	± 0.71	2	10	12
Trimethoprim (25 μg)	75	11	± 1.15	4	10	14
Sulphamethoxazole (50 μg)	51	11	± 1.34	5	10	15
Cephalexin (30 μg)	29	11	± 0.48	1	10	11
Cefuroxime (30 μg)	6	10	± 0.00	0	10	10
Cefactor (30 μg)	**Resistant**					
Cefpodoxime (30 μg)	12	10	± 0.39	1	10	11
Cephotaxime 30 μg)	**Resistant**					
Ceftriaxone (30 μg)	18	11	± 0.92	2	10	12
Penicillin (10 unit)	12	10	± 0.79	2	10	12
Cefepime (30 μg)	12	10	± 0.45	1	10	11
Fosfomycin (200 μg)	74	12	± 1.55	6	10	16
Virginamycin (15 μg)	**Resistant**					

References

1) Annonymus, Urinary Tract Infections (UTI), "Sexually Transmitted Disease Resource", 2003.
2) John E. Delzell and Michael L. Lefevre, "Urinary Tract Infection during Pregnancy", American Academy of family physicians, February 1, 2000.
3) National Kidney and Urologic Diseases Information Clearinghouse, NIDDK, "Urinary Tract Infetions in Adults", NIH publication No. 04-2097, November 2003.
4) Bauer A. W., Kirby W. M. and Sherris J. C., Am. J. Clin. Pathol., 1966, 45:493

Catharanthus Roseus Medicinal Plant Study To Reduce Diabetic

Dr. D.B.Dupare

Shri Dr R.G.Rathod Arts and Science College. Murtizapur Di.Akola.

Abstract

Today in human being struggle to diabetic, from childhood to yielder person suffer from diabetics. Cathranthus roseus L. most important traditional medicinal plant. It is popular ornamental plant in gardens and homes in warm tropical and subtropical region. It has been used traditionally in local people for treatment of reduce diabetic. The phytochemical analysis of Cathranthus roseus L was evaluated to ascertain some of the secondary metabolites that exhibit medicinal properties. The results of phytochemical screening of ethanol crude leaves extract of Cathranthus roseus L revealed the presence of alkaloids, tannins, saponins and flavonoids. These metabolites observer by various techniques like solvent extraction ultrasonicator, rotavapour, thin layer chromatography, column separation and hptlc technique.
Keywords: Phytochemical, Medicinal plant, anticancer drugs and reduce diabetic.

Introduction

Cathranthus roseus Plants occurs indoor and outdoor gardens and homes on geographical tropical locations on account of its ability to produce flowers all-round the year, commonly known as "Sadafully." in almost all hot places of India specially Amravati region. Plant Cathranthus roseus L is extensively utilized for the treatment of pharmaceutical disorders like anti-cancer, antitumor, antidiabetic properties (1). The leaves and stems extract of the plant are full of alkaloids,vinacristine and vinblastine that are indispensable cancer drugs(2) The leaves extract of this plants have been used by diabetic patients. It is reported to reduce blood glucose in normal and alloxan diabetic (3) The extracts of Cathranthus roseus L have ability to improve blood supply to the brain resulting in enhanced oxygen and glucose supply to brain. It has been found that this plant is capable of increasing insulin production and utilization of sugar in blood. For diabetic treatment Cathranthus roseus L alkaloid has been marketed under the proprietary name Vinculin. Catharanthine is used as antidiabetic drug. Alastonin found in bark has been used to regulate blood pressure (4-5).

The present study is to review the overall information on the taxonomical classification, morphology, distribution, traditional uses, phytochemical constituents and recent scientific investigations of Cathranthus roseus L.

Kingdom : Plantae
Subkingdom : Tracheobionta (Vascular Plants)
Division : Magnoliophyta
Class : Magnoliopsida
Subclass : Asteridae
Order : Gentianales
Family : Apocynacea
Sub family : Plumeroideae
Tribe : Plumerieae
Sub Tribe : Alstonrieae
Genus : Catharanthus G.
Species :Catharanthus roseus (L.)

Fig 1.a) Cathranthus roseus L

Materials And Methods
Plant material

Cathranthus roseus L leaves were collected during the month of January 2015-October 2015, from Amravati region Maharashtra, India. The fresh leaves were separated and kept for shade drying. Dried root material was powdered using mechanical grinder and heat in microwave oven to get the powder of desired coarseness. Powdered material was preserved in an air tight container.

- **Preparation of extracts**

Dried Cathranthus roseus L leaves powder mixed with ethanol and keep in ultrasonicator for half and hour to mix all chemical constituents in ethanol solvent was subjected to successive extraction in a Soxhlet's extractor using ethanol and water. The extracts were filtered and the filtrates were concentrated under Rota vapour at room temperature to obtain the extracts as solid residues.

- **Primary Phytochemical screening**

Phyto chemical screening was performed using standard procedures is given (6)

- o **Test for Terpenoids (Salkowski test)**

The 0.5 g each of the extract was added 2 ml of chloroform. Concentrated H_2SO_4 (3 ml) was carefully added to form a layer. A reddish brown coloration of the interface indicates the presence of terpenoids.

- o **Test for Flavonoids**

Three methods were used to test for flavonoids. First, dilute ammonia (5ml) was added to a portion of an aqueous filtrate of the extract. Concentrated sulphuric acid (1 ml) was added. Second, a few drops of 1% aluminium solution were added to a portion of the filtrate. Third, a portion of the extract was heated with 10 ml of ethyl acetate over a steam bath for 3 min. The mixture was filtered and 4 ml of the filtrate was shaken with 1 ml of dilute ammonia solution. In all the cases, a yellow coloration indicating the presence of flavonoids was observed.

- o **Test for Saponins**

The 0.5 g of extract was added 5 ml of distilled water in a test tube. The solution was shaken vigorously and the mixture is observed for a stable persistent froth. The frothing was mixed with 3 drops of olive oil and shaken vigorously after which it was observed for the formation of an emulsion.

- o **Test for Tannins**

The 0.5 g of the extract was boiled in 10 ml of water in a test tube and then filtered. A few drops of 0.1% ferric chloride was added and observed for brownish green or a blue-black colouration.

- o **Test for steroids (Liebermann-Burchard's test)**

One ml of the extract was dissolved in 10ml of chloroform and equal volume of concentrated sulphuric acid was added by sides of the test tube. The upper layer turns red and sulphuric acid layer showed yellow with green fluorescence. This indicated the presence of steroids(7).

- **Thin Layer Chromatography (TLC)**

TLC analysis was carried out for the plant extracts dissolved in ethanol and water solvent. For the analysis the silica gel sheet was used, fresh leaves extracts were analyzed using TLC. The sheets are kept in TLC Chamber for one hour, depending on the polarity of the eluted fractions to be analyzed. The sheets were treated with 1% ninhydrin diluted to acetone.

- **HPTLC Technique**

HPTLC analysis was carried out for the plant extracts dissolved in ethanol. The HPTLC characterization perform at Sophisticated Instrumentation Centre For Applied Research & Testing (SICART),Sardar Patel Centre for Science & Technology, Charutar Vidya Mandal **V**allabh Vidyanagar .

Results and discussion.

- **Phytochemical investigation:**

The Phytochemical screening of Cathranthus roseus L. showed positive results as the tests like Terpenoids, Flavonoids, Saponins, Tannins and steroids. This data clear that there is presence of various phytochemical in Cathranthus roseus Plant extract diabetic treatment alkaloid has been marketed under the proprietary name Vinculin. Catharanthine is used as antidiabetic drug.

Table (3.1): Phytochemical screening of extracts of medicinal plants

Sr no	Test perform	ethanolic extract	aqueous extract
1	Terpenoids	+	+
2	Flavonoids	+	--
3	Saponins	+	+
4	Tannins	+	+
5	Steroids	-	-
6	Alkaloids	+ ++	-

Quantitative spectrophotometric analysis for phenolic content and flavonoids:

The total phenolic and flavonoids content of plant aqueous extract were determined spectrophotometrically using the tannic acid and quercetin standard calibration curves, respectively, as per Ranjana sing et al (2015)(7). Both standard curves showed linearity with R_2 value 0.962 and 0.956. The total phenolic and Alkaloids content was found as per given table 3.2. presence of various phytochemical in Cathranthus roseus Plant extract diabetic treatment alkaloid is used as antidiabetic drug.

Table (3.2): Total phenolic and flavonoids contain in Vitex negundo L plant

Sr.no	Plant name	phenolic (ug/ml)	Flavonoids (ug/ml)	Alkaloids (ug/ml)	Steroids (ug/ml)
1	Cathranthus roseus L .	14.688	2.642	32.265	1.243

- **TLC purification of the extracts**

The TLC of ethanolic extract of Cathranthus roseus L.plant is shown with their RF values. Hence, further investigations are required to isolate, purify and characterize those compounds which are responsible for the treatment of pharmaceutical disorders like anti-cancer, antitumor, antidiabetic properties.

Table 3.3. TLC purification and partition Cathranthus roseus L.plant.

Sr no	Plant name	N0. of Bands	Rf Value	Spraying Regents	Colour of Band appeared	Phytochemical Detected
1	Cathranthus roseus L	6	0.18	Vanillin-sulphuric acid reagent	blue	Saponins
			0.33	5% Ferric chloride	Dark grey	Flavonoid
			0.53	FeCl3	Intense red	Phenol
			0.58	Ethanolic sulphuric acid	brown	Alkaloids
			0. 67	Ethanolic sulphuric acid	brown	Alkaloids
			0.73	Vanillin-phosphoric acid reagent	dark blue	Terpenoids

- **High Performance Thin Layer Chromatography (HPTLC)**:

Chromatographic fingerprint profile of ethanol extracts plants were studied by HPTLC. For better resolution and maximum number of spots, and satisfactory resolution was obtained in the solvent Toluene: Ethyl acetate: Formic acid:: 8:4:2. After scanning and visualizing the plates in absorbance mode at both 254nm and 366 nm range.

The results from HPTLC finger print, The Rf values ranged from 0.07 to 0.99. It is also clear from Table 3.4 and the chromatogram as shown in (Fig. 3) that were found to be more predominant as the percentage area is more with respectively. HPTLC plate showed different colour phytoconstituents of ethanol extract. The bands revealed presence of different colour bands showing the presence of steroids, alkaloids and terpenoids etc.

Table 3.4 HPTLC Rf Value of Cathranthus roseus L
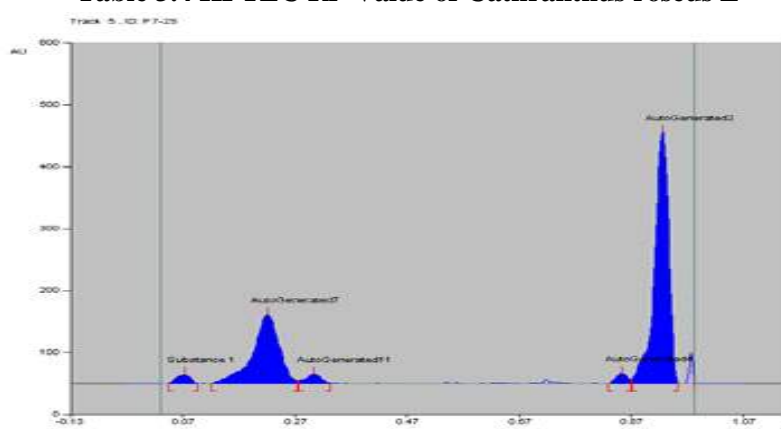
Sr no	Plant name	N0. of Bands	Rf Value
1	Cathranthus roseus L	5	0.07,0.16,0.30,0.82,0.92

Conclusion

In the present investigation, Cathranthus roseus L. Medicinal plant species which are responsible for the treatment of pharmaceutical disorders like anti-cancer, antitumor, antidiabetic properties. These demand an urgent attention to conserve such vital resources so as to optimize their use in the primary health care system. Now a day, conservation of traditional knowledge is necessary related to modernization of the region and transferring it to next generation. Further advanced spectroscopic studies are required for the structural elucidation and identification of compounds.

Acknowledgement-

References-

1) Kanika Barik, Shweta Sao and Dharmendra K. Parihar., Phytochemical and Pharmaceutical Panorama of Catharanthus roseus Indo American J.Pharamaceutical Science **2016**, 3 (3), 288-293.
2) Kulkarni RN, Baskaran K, Chandrashekara RS, Kumar S., Inheritance of morphological traits of periwinkle mutants with modified contents and yields of leaf and root alkaloid. Plant Breeding, **1999**; 18:71–74.
3) Nammi S, Boini MK, Lodagala SD, Behara RB. The juice of fresh leaves of Cathtranthus roseus Linn reduces blood glucose in normal and alloxan diabetic rabbits. BMC CoFmplement Altern Med. **2003**; 3, 4.
4) Singh SN, Vats P, Suri S. Effect of an antidiabetic extract of Catharanthus roseus on enzymic activities in streptozotocin induced diabetic rats. Journal of Ethnopharmacology, **2001**;76: 269-77.
5) Sain M, Sharma V. Catharanthus roseus (An anti-cancerous drug yielding plant) - A Review of Potential Therapeutic Properties. Int. J. Pure App. Biosci. **2013**; 1: 139-142.
6) K. Kabesh, P. Senthilkumar, R. Ragunathan and R. Raj Kumar Phytochemical Analysis of Catharanthus roseus Plant Extract and its Antimicrobial Activity Int. J. Pure App. Biosci. **2015;**3 (2): 162-172.
7) Sarkar, R.,Haque, A.; Ranjan, S; Sarker, M. Phytochemical Screening, Antioxidant and Antimirobial Effects Abutilon indicum (L.) Leaves Extracts j pharmacology Archives **2015**;vol.1,94-103.
8) Shohel H, Masum H, Ziaul-Haque and M. Moyen ,Uddin P.K. Phytochemical Screening of Catharanthus roseus and ficus racemosa leaves extract : A statistical inference. Int. J. Bioassays, **2015**; 4 (01), 3606-3610.
9) D.B.Dupare "Some common medicinal plant recurring jaundices disease as future source of drugs" is published in International Journal of Biological life science Biolife, ISSN 2320-4257 **2016;**4(1), 94-99.

Diversity And Distribution Of Tick Species Infesting Livestock (Cattles) With Two New Host Records From Akola District, Maharashtra.

Dr.Pooja S. Thakur
Yeshwant Mahavidyalaya, Nanded

Dr. Raja. I. A.
Yeshwant Mahavidyalaya, Nanded

Abstract

Indian faunal diversity included an extremely abundant group of animal, the ticks. They are highly specialized obligate haematophagous ectoparasites. We surveyed diversity of hard tick species (Acari: Ixodidae) from june 2014 to may 2016. The ticks were observed from different localities in all talukas of the district of Akola. A total of 510 (142cattle, 90 buffaloes, sheep106 and 172goats) livestock animals were observed to study diversity in ticks. Thus majority of the adult ticks were females (App 80%) and these were the ones used for identification. We found 4 genera hard ticks including Hyalomma, Rhipicephalus, Dermacentar and Haemaphysalis with sub genus Boophilus micropilus on livestock of Akola district .Hylomma anatolicum anatolicum, Hy.marginatum issaaci, Hy.hussaini, Rhipicephalus Boophilus microplus, R.sanguineus, Haemaphysalis bispinosa, Rhipicephalus Haemaphysaloid, Rhipicephalus ramchandrai . Of the eight tick species found, the two species, Ripicephalus annulatus and Dermacentor spp.were new host records from Akola (MH) were the ticks found. The talukas dominated by reserved forest areas like Akot, Telhara, Patur, Barshi-Takli reported to have two genera, R.Boophilus and Hyalomma in abundant in the study area.
KeyWord*s: Acari, Ixodidae, Akola District, Faunal Diversity, Species Richness Indicator.*

Introduction-

Akola is one of the well known districts in Maharashtra (India). Akola district is the administrative part of Amravati division. Area of the district is 5,431 km. It is bounded on the north by Amravati district, to the south by Washim and to the west by Buldhana role in economy throughout India including Maharastra. One of the most important group of ectoparasites of livestock in tropical   and subtropical area is tick.

Ticks are a group of ectoparasites arthropods causes losses amongst livestock. Ticks belong to class Archnoidea an order Acari. All arachnids have eight legs, although the front pair of legs in some species has converted to a sensory function. Arachnida are further distinguished from insets by the fact they do not have antenna or wings. Ticks are grouped under the subclass Acari, order parasitiforms suborder Ixodida, the sub order is again divided in to three families, namely Ixodidae (hard tick) and Argasidae (soft ticks).

 Ticks damage the host in two ways; directly by tick bites and indirectly by disease transmission. Failure to control tick infestations in livestock may result in reduced live weight, reduced milk production and even death in young animals (Ghosh *et al*., 2006; Rony *et al*., 2010). Knowledge on the diversity of ticks, geographic distribution, infections they carry and their zoonotic potential is important for the prevention and effective control of ticks and tick borne diseases. Wild animals can maintain and reintroduce ticks and tick borne diseases to livestock *via* alternative hosts The cattle tick *Rhipicephalus annulatus* Say, 1821 (Acari: Ixodidae) is the main tick species on cattle in Egypt

Material and Method
The Study Area

The district of Akola lies in the western parts of the Vidarbha region of Maharashtra State and is surrounded by Amravati district in the north and north-east, Yeotmal in the south-east, Washim in the south and Buldhana in the west. Akola is situated in subtropical zone (Agro climatic zone VII) at 20040/ N latitude and 77002/ E longitude at an altitude of 307.41 m above mean sea level. It has seven administrative segments: the talukas/ tehsil, namely: Akola, Akot, Telhara Balapur, Patur, Murtijapur and Barshi-Takli. . The region is classified as hot moist semi-arid climate with medium and deep clayey black soils. . The district does not have any large area under extensive hill ranges.

The northern extreme of the district in the foothills of Satpuda and the ghat country through which the land rises from the Purna plains. In relief, the district shares a similarity of topographical arrangements as found in Buldhana district. It also falls into two physical units; a narrow northern strip in the Akot and Telhara talukas in the Satpuda foot-hills, the Payanghat or Purna plains in the middle, occupying remaining part of the district area in the tehsil of Barshi Takli, Patur, Balapur, Akola and Murtijapur.. The two main rivers of the district are the Purna and the Penganga, the other less important rivers being the tributaries of these two rivers. They are the Katepurna, Shahaimr, Morna, Mun, Nand, Man and Lima, which are the tributaries of the Purna, and the Adan, the Arna and the Pus which are the tributaries of the Penganga.The district have three agro-season as Summer, Winter, and Monsoon. The specimens were transferred into a container having 70% alcohol, before being brought to the laboratory. Collected specimens were washed with water than xylene and each specimen was preserved in a separate vial in 95% ethyl alcohol with little glycerine. Identification was done on the basis of morph metric characters of various body parts, ventral plates and genital region. The help was mainly taken from the relevant literature (Walker *et al.,* (2014),).All the specimens were labelled with family, scientific name, date of collection, stratum on which found, locality and collector's name. At the completion of study, all the specimens and slides were housed in the Museum, Department of Zoology.

Result And Disscussion

In the preliminary survey for ectoparasite with special reference to Ixodid tick diversity in the Akola district, we examine 510 mixed breeds of livestock, and searched 142 cattle, 90 buffaloes, 172 goats, and 106 sheep. The median age of the animals was 2.5 years. The median age in large Livestock was 3.0 years (buffalo = 3.1 and cattle = 3.0) and 1.5 years in small livestock. The ectoparasite recorded and identified from their external morphology but the hard ticks are minutely observed for diversity study. The ticks were collected from the head, ears, neck, belly, back, legs, perineum and tail of each animal. Collected samples were placed in sample vials containing 6 % formalin mixed with 3 % glycerin and labeled. The label contained the name of the community, owner's name, animal identification code, date and month of collection.

Collected ticks were identified at species level with the help of the keys available on line as well as, given by Dhanda and Raja (1974); Ghalsasi and Dhanda (1974); Walker *et al.,* (2014), Identification was made under a stereomicroscope on the basis of shape of scutum, leg color, body, coxae one and ventral plates.
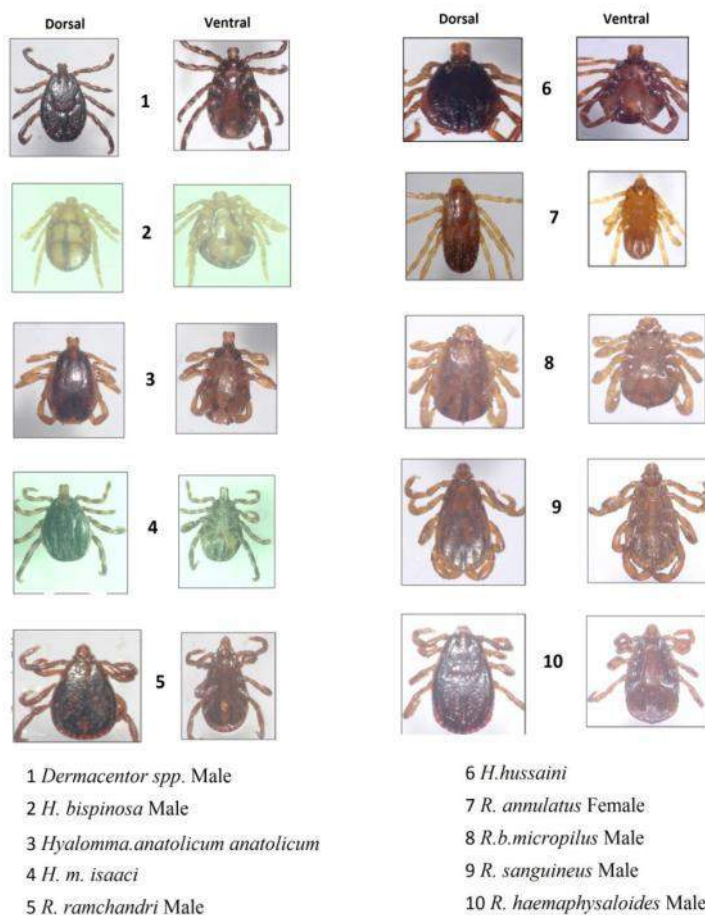
In the present study reported tick infestation in Akola district was dominated by four genera of hard ticks, i.e., *Dermacentor, Haemaphysalis, Hyalomma,* and *Rhipicephalus* with subgenus *Boophilus micropilus.* Genus *Hyalomma* is most dominant followed by genus *Rhipicephalus*, and genus *Haemaphysalis*. Genus *Dermacentor* reported to be quite rare and occasional on studied live stock from Akola district. All these four genera are represented by 10 species of the hard tick which were

1. *Dermacentor spp*.
2. *Haemaphysalis bispinosa*
3. *Hyalomma. anatolicum anatolicum*
4. *Hyalomma marginatum issaaci*
5. *Hyalomma hussaine*
6. *Rhipicephalus annulatus*
7. *Rhipicephalus boophilus microplus*
8. *Rhipicephalus sanguineus*

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293
(Special Issue No.70) Peer Reviewed Journal www.aiirjournal.com Mob. 8999250451

188

9. *Rhipicephalus haemasphlodies*
10. *Rhipicephalus ramchandri*

However the district has a very poor representation of *Rhipicephalus sanguineus* 21 collected specimens and *Ripiciephalus annulatus for the first time*. Tick *Dermacentor spp* is very rare in the district as we collected very few specimen. This is the first report of this genus from study area. Reported collection did not match with other *Dermacentor species* reported from Maharashtra India viz. *Dermacentor auratus*.

1 *Dermacentor spp.* Male
2 *H. bispinosa* Male
3 *Hyalomma.anatolicum anatolicum*
4 *H. m. isaaci*
5 *R. ramchandri* Male

6 *H.hussaini*
7 *R. annulatus* Female
8 *R.b.micropilus* Male
9 *R. sanguineus* Male
10 *R. haemaphysaloides* Male

Reference

1) Dhanda V. and Ramchandra Rao T. (1964). A report on a collection ofIxodid ticks made in the
2) North Eastern Frontier Agency, India, *Indian J. med. Res.,* **52**: 1139-53.DOI: 10.9790/3008-
3) 10630111 www.iosrjournals.org 1 | Page
4) Ghosh S., P. Azhahianambi, J. de la Fuente, (2006). Control of ticks of ruminants, with special emphasis on livestock farming system in India present and future possibilities for integrated control: A review. *Exp Appl Acarol*., **40**: 49–66.
5) Geevarghese G, Fernandes S, Kulkarni SM. (1997). A checklist of Indian ticks (Acari: Ixodoidea). *The Indian Journal of Animal Sciences*; **67**(5):566-574.
6) Kaul H.N., Dhanda V. & Mishra A.C. (1979). A survey of ixodid ticks in Orissa State, India. *Indian Journal of Animal Sciences* 49: 707 – 712
7) Rony S.A., Mondal M.M.H., Isham M.A. & Begum N. (2010). Prevalence of ectoparasites in goats at Gazipur in Bangladesh. *International Journal of Biological Research* **2**(9): 19 – 2
8) Walker A. R., Bouattour R., A., Camicas J.., Estrada-Peña L., Horak I.G., Latif A.A.,Pegram R.G and Preston P.M. (2014). Ticks of Domestic Animals in Africa: a Guide to Identification of Species. *Bioscience Reports, Edinburgh Scotland, U.K.*
9) *www.biosciencereports.pwp.blueyonder.co.uk Production.* The University of Edinburgh

Haematological Studies of Silkworm, *Bombyx Mori L.* During Grasserie Disease

S. R. Rathod

Department of Zoology, Shri Shivaji College of Arts, Commerce and Science, Akola.

P.P. Ade

Department of Zoology, Shri Shivaji College of Arts, Commerce and Science, Akola.

Abstract

Sericulture depends on rearing of silkworm Bombyx mori L. on mulberry leaves. The silkworm, Bombyx mori L. is a delicate and sensitive lepidopteron insect, which has been domesticated for silk production. Due to continuous domestication, silkworm becomes susceptible to various diseases. The present study is aiming to find out effect of Grasserie disease on the haemocyte number of fifth instar larva of Bombyx mori L. Haemolymph was collected from fifth instar larva. Haemocytes are found circulating freely in the haemolymph or adhering to internal organs such as the fat body or the digestive tract of the insects. Five types of haemocytes were found in the haemolymph of Bombyx mori L viz., prohaemocytes (PRs), plasmatocytes (PLs), granulocytes (GRs), spherulocytes (SPs) and oenocytes (ONs). The sample collected was performed for Total haemocyte count which gave idea about changes in number of haemocytes before and after infection. The result shows that there were no significant changes in THC during early infection however reduction in THC was seen during late infection. Alteration in studied parameter suggests that these parameters could be used as indicator of the health status of silkworm Bombyx mori L. as well as can be taken as target system to measure physiological and biomolecular stress induced alterations in the body during the occurence of disease.

Key words- Silkworm, Grasserie, Haemocytes, THC.

Introduction

Grasserie is one of the most serious diseases in tropical countries, though occurs throughout the year, intensity varied with seasons. It is also known as the 'hanging disease'. *Borrelina bombycis* virus, of the family Baculoviridae causes this disease. In this disease the virus multiplies and forms polyhedra in the nucleus of infected cells. Infection mainly takes place through wounds and feeding of polyhedral contaminated mulberry leaves. The high temperature, humidity and their sudden fluctuation, bad ventilation, ineffective disinfection of rearing house and rearing appliances, starvation and inadequate larval spaces as well as excessive moisture in the rearing bed affect spreading the disease. At the time of infection polyhedra are ingested by a susceptible insect and solubilized in the alkaline condition of the mid gut, releasing infectious virions. Primary infection begins in which the virions infect mid gut cell and budded virion (BV) is produced within the nucleus. The budded virions disseminate the virus within the insect host and start the secondary infection in which the pre-occluded virions (PDV) are produced. Subsequently, the PDV become embedded in the polyhedron matrix and polyhedra are formed. These polyhedra are released into the environment when the insect dies and disintegrates (Hunter-Fujita *et al.,* 1998) affecting other susceptible hosts.

During early infection, worms become slightly sluggish. Initially the skin shows oily and shining appearance. As the disease progresses, the skin becomes thin and fragile and the body becomes milky white with inter-segmental swelling. The rupture of the fragile skin liberates the liquified internal organs containing numerous polyhedra which becomes source of inoculums to the new host. The larvae become restless and crawl aimlessly along the ridges or rim of rearing trays and subsequently falling on the ground and die.

Here in the present investigation we focus on Grasserie disease with a view to find out the changes in hematology of silkworm *Bombyx mori L.* infected with *Borrelina* virus.

Materials and methods

Infected 5th instar larvae of *B. mori* were collected from rearing center located at Chandur with the help of farmers during 2018 on the basis of gross pathology in their early and late infection stage. Fresh haemolymph was collected from larve infected with Grasserie and the healthy non infected larvae of some development stages following methods of Jalal and Rasoul (2010). The haemolymph was drawn into Thoma white blood cell pipette and diluted with Toisson's solution. The Neubauer ruling Haemocytometer was filled with diluted haemolymph and counted in its four corner and one central squares under a microscope. The number of circulating haemocytes per cubic millimeter was calculated using formula of Jones (1967).

Observation and Results

Present study was made on Gasserie disease of *B. mori* during November 2018 to February 2019. Early and late infected larvae were collected from rearing center of *B.mori* from Chandur located near Akola. Sorting of early and late infected larvae were made in the laboratory on the basis of gross pathological changes. Total haemocyte counting was done on the collected sample. Quantitative analysis of THC of silkworms infected with Grasserie is mentioned in the Table 1. As depicted in the table-1, the recorded hematological investigations envisaged significant change in total haemocyte count on the second day of inoculation with Grasserie pathogen in the 5th instar silkworm larvae (335.0 THCx103/mm^3) i.e. early infection state, as compared to control healthy non infected worm (389.8 THCx103/mm^3) of the same developmental stage. Again a significant reduction of THC was recorded on day five of inoculation with Grasserie pathogen (288.0THCx103/mm3) as compared to control healthy non infected worm (465.0 THCx103/mm3) of the same developmental stage.

Comparative account on infection period of *Borrelina* virus on *B. mori* larvae shows that more reduction in haemocyte was occurred during fifth day of infection as compared to reduction in early days (2nd day).

The five morphological types of haemocyte were observed in the haemolymph of 5th instar larvae of *B. mori*. They are prohaemocyte, plasmatocyte, granulocyte, spherule cells, oenocyte (Micrograph-I)

Micrograph-I : Normal Haemocytes in silkworm

1. Prohaemocytes	2. Plasmatocyte
3.Granulocyte	4.spherule cell

5. Oenocytes
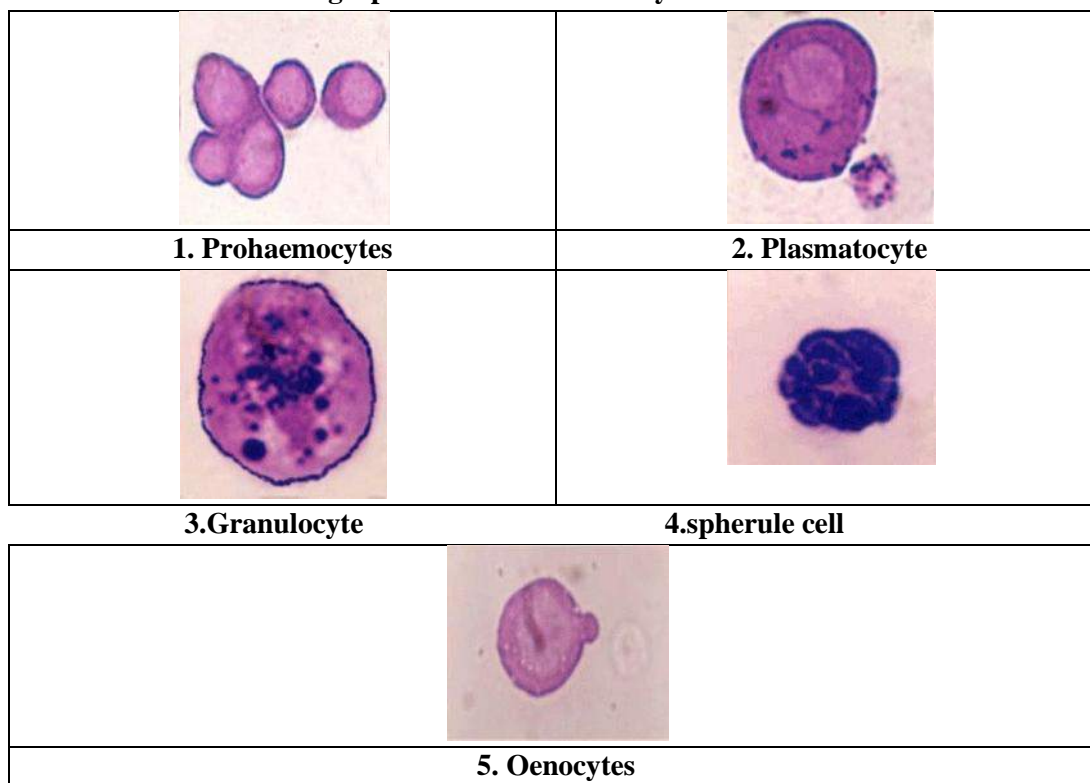
Discussion

Present study was made on haemocyte count on 5th instar larva of *B.mori*. Haemocytes are circulating cells present in haemolymph. Haemocytes performs various functions like coagulation, carbohydrate transport, phagocytosis and encapsulation (Ravindranath, 1980). They are also responsible for providing defense against invading pathogens. The total haemocyte count present in one milliliter of haemolymph pointed the number of cells available for these mechanisms. The haemocyte number is modulated by stress situation. The fluctuation in total haemocyte count is due to relocation of haemocyte between a circulating pool of cells which are likely to adhere to the haemal lining of circulatory system (Noga, 2000). Grasserie is a disease which infect silkworm through wounds and feeding of polyhedral contaminated mulberry leaves disrupting normal physiological function. The haemolymph consists of nucleated haemocytes, which are classified into granular haemocytes, spherule cells, oenocytoids, prohaemocytes and plasmocytes (Arnold & Hinks, 1975). The most

prominent haemocytes in *Bombyx mori* are prohaemocytes, progranular haemocytes, plasmocytes, oenocytoids and spherule cells (Akai, 1976).

From the experimental result, it was found that the total cell count decreased significantly when treated with *Borrelina* virus. Similar changes were reported by Witting, (1962); Rabindra, (1974); Chiang, (1988); Joshi and Raja, (2014) in *H. zea, H. armigera, Galleria mallonell, Spodoptera litura* and *B. mori* larvae respectively in response to infection with the Grasserie caused by polyhedrosis virus.

Table 1. Total Haemocyte Count in Haemolymph of Silkworm during Grasserie diseases.

Total Haemocyte Count (THC)		
Duration of infection	**Control Larva**	**Grasserie**
Early infection (2nd day of 5th instar)	389.8 ±18.44	335.0 ±18.07
Late infection (5th day of 5th instar)	465.0 ± 16.26	288.0 ±21.16*

Conclusion –

The disease Grasserie brings out changes in normal physiological functioning of diseased silkworm. Considerable variation caused by Grasserie in the hematological parameter reported here are the total number of haemocytes especially in the later part of infection.

Alteration in the studied parameter, on exposure to disease causing pathogen in the haemolymph, suggest that these parameters could be used as indicator of the health status of Silkworm B*ombyx mori,* as well as can be taken as target system to measure physiological and biomolecular stress induced alteration in the body during occurrence of disease. This can assist in better monitoring and effective health management of silkworm which is an economically important silk producing bio-machine.

Reference

1) Akai H, Sato S. (1973). Ultrastructure of the larval hemocytes of the silkworm, *Bombyx mori* L. (Lepidoptera: Bombycidae). *Int. J. Insect Morphol. Embryol*., **2** : 207-231.

2) Arnold J.W. (1979). Controversies about haemocyte types in insects, Insect hemocytes, A.Gupta (Ed)., Cambridge University Press, Cambridge, pp.231-258.

3) Arnold J. W. (1982). Larval haemocytes in *Noctuidae* (Insecta:Lepidoptera). *Int. J. Insect. Morph. Embrol.,* **11**: 173-188.

4) Chiang A. S., Gupta A. P. and Han S. S. (1988). Arthropod immune system, l Comparative light and electron microscopic account of immunocytes and other haemocytes of *Blattella germanica* (Dictyopters: Blattellidae). *J. Morphol.,* **198** : 257.

5) Jalal Jalali Sendi and Rasoul Salehi (2010). The Effect Of Methoprene On Total hemocyte counts And Histopathology Of Hemocytes In *papilio Demoleus L.* (Lepidoptera) *Mun. Ent. Zool*.,. **5**(1).

6) Jones, J. C. (1967). Changes in the hemocyte picture of *Galleria mellonella* L. *Biol. Bull. (Woods Hole),* **132** : 211–221.

7) Joshi RP and Raja IA (2014). Total haemocyte count in silkworm *Bombyx mori* (Lepidoptera: *Bombycidae)* during pathogenic disease in Akola District (Maharashtra), *Biosci. Biotech. Res. Comm.* **7**(2) : 135-139.

8) Noga E. J., (2000). Haemolymph biomarkers of crustacean health. *Recent Advances in Marine Biotechnology,* **5** : 125-163.

9) Rabindra R. J. and Subramaniam T. R. (1974). Studies on nuclear polyhedrosis of *Heliothis armigera* (Hbn) l Susceptibility and gross pathology. *Madras Agric J.,* **61** : 217.

10) Witting G. (1968). Phagocytosis by blood cells in healthy and diseased caterpillars, III Some observations concerning virus inclusion bodies. *J. Invertebr. Patho.,* **10** : 211.

11) Yaeger J. F. (1945). The blood picture of the southern armyworm (*Prodenia eridania*). *J. Agric. Res.*, **71**: 1

Podaxis Pistillaris (L.Ex Pers.) Fr (Desert Shaggy Mane):
A Potential Gastroid Mushroom From Amravati Region

G.B. Hedawoo,

P.G. Department of Botany,

Shri Shivaji Science College, Amravati (M.S.) India

Abstract

  Many periodical surveys were conducted of Amravati region in Maharashtra for mycoflorestic studies during monsoon season. A rich diversity of wild macromycetes was encountered that includes edible, non-edible and medicinal mushrooms. Identification, edibility and medicinal potential of collected mushrooms were noted by referring to standard literature.

  During survey, Podaxis pistillaris (Desert Shaggy Mane) - a gastroid mushroom within the family Agaricaceae (Sub.div.-Basidiomycotina) is collected from many sandy habitats from Amravati-Melghat region. Locally it is known as 'Khumbi'.Commonly known as 'Desert Shaggy Mane' due to its resemblance to Coprinus comatus.

  The sporophores have been used as food in many countries. Its nutraceutical value is so high. It contains proteins, amino acids, carbohydrates and low fats. Presence of secondary metabolites such as phenols, flavonoids, steroids, β-carotene and lycopene make it an important antioxidant source. It has been employed for the treatment of skin diseases, for wound-healing, anti-bacterial, against sunburn and inflammation as an efficient sunscreen. In different countries this mushroom is used as an edible (nutraceutical), medicinal, cosmoceutic resource and has potential use as a probiotic.

Key Words: Podaxis pistillaris, Amravati region, collection, identification, potentialities.

Introduction:

  Podaxis pistillaris- is a very distinguishing relative of the puffballs. In old reference it was noted as *Lycoperdon pistillare* L. Though it is considered as 'stalked puffball' by many; but it is more closely related with the shaggy mane (*Coprinus comatus*) than with puffball. *P. pistillaris* belongs to family Agaricaceae. The sporophore has an ellipsoid head, supported on a slender stipe, and resembles certain mushrooms, however the texture of the sporocarp is entirely different. The sporophores have been used as food in many countries. Its nutraceutical value is so high. The fruiting bodies contain 76% moisture, 5% total nitrogen, 22-37% total crude protein, 18.5% carbohydrates, 2.3% total lipids and 2-4 % ash. In different countries this mushroom is used as an edible (nutraceutical), medicinal, cosmoceutic resource and has potential use as a probiotic.

Review of Literature:

  The genus *Podaxis* includes ten species (Kirk et.al.,2008). *P. pistillaris,* is most common species found in India (Bilgrami et.al.,1979; Jamaluddin et. al., 2004, Hedawoo and Mohite, 2008). It is a gastroid agaric and many earlier workers has described it under a separate class Gasteromycetes (Nair and Patil,1978; Thind and Thind,1982). As per the earlier reports, *Podaxis pistillaris* (L.ex Pers.) Fr is collected by the people of rural areas in various parts of the world including India because of its nutritional and medicinal value (Arora,1986; Batra,1983).

Materials and Methods:

  The specimens were collected from sandy soil, nearby bricks factories and dry road side areas of College campus, Rampuri Camp, Wadali Road, University campus, Pohara forest, Tapovan area of Amravati. Field photographs were taken in natural habitats. Taxonomic characters were noted as per standard methodology given by Atri et.al., (2005). Color terminology used is that of Kornerup and Wanscher (1978). The specimens were preserved fresh as well as dry. The examined collection has been deposited in the museum of P.G. Department of Botany, Shri Shivaji Science College, Amravati.

Results and Discussion:

Description of studied fruiting body of *Podaxis pistillaris* (L.ex Pers.) Fr

Sporophores- growing abundantly on sandy soil. Common on road-side, near bricks factory, sandy soil, semi compost. *Peridium*- ovate-oblong, 5.0-10.0 cm. tall, 1.0-3.0 cm. in diameter, apex rounded, reaching up to 15.0-25.0 cm. in height. *Exoperidium*- thin but hard, dirty white or fawn breaking up into scales. *Endoperidium*- firm and riged, membranous, dehiscing by longitudinal fissuring, sometime exposing the powdery gleba. *Stipe*- 6.0-8.0 cm. tall, 6-12 mm. thick, woody covered with white, brittle fibrils, stipe may be provided with a bulbous rooting base. *Gleba*- dense, reddish brown to black, capillitium threads deeply coloured, aseptate, sparingly branched and coiled. *Basidiospores*- reddish brown, ellipsoid to sub-globose, thick walled, with gelatinous envelope and a well- marked germpore.

During rainy season and in spring after rainfall, the fruiting bodies of *Podaxis* appear singly were collected and examined. The fruiting bodies were collected along the road-sides where semi-composting and sandy soil was available. The most suitable habitats from where these species were collected in large scale was nearby bricks factory area and sandy habitats. *Podaxis pistillaris* earlier has been reported from various parts of India (Bilgrami et.al.,1981;91; Jamaluddin et.al.,2004, Hedawoo,2010; Patel and Tiwari,2012; Mridu and Atri,2015). It has been speculated that *Podaxis* was related to the genus *Coprinus* (Smith,1973); which recently has been confirmed through the use of DNA sequencing technique by Hopple and Vilgalys (1994).

Earlier reports showed that *Podaxis pistillaris* is collected by the people of rural areas for its nutritional and medicinal value. The edibility and nutritive values have been tested by Gupta and Singh,(1991). Medicinally this species has been used in many traditional folk treatments. In Australia, it was used by many desert tribes to darken the white hair in old man's whiskers and for body painting, also being used as a fly repellent. It is known to have antimicrobial properties (Panwar and Purohit, 2002). *Podaxis* species also used for the treatment of skin diseases (Gupta and Singh, 1991); and inflammation (Mao, 2000). It has been demonstrated that it exhibits a bioactive compounds against bacteria (Al-Fatimi et.al.,2006).

Conclusion:

Although the edibility,(nutraceutical), medicinal, dying properties, cosmoceutic resource, antimicrobial properties of *Podaxis* is known, yet not commercialized as food supplement or for other purposes. Therefore, is a need to develop better cultivation practices to fortify the demand of this potential *Podaxis* mushroom.

References:

1) Arora, D. 1986. . Berkeley, CA,
2) USA, Ten Speed Press, 725-726 pp.
3) Atri, N.S., Kaur,A. and Kour, H. 2005. Wild mushrooms
4) Arora, D. 1986. . Berkeley, CA,
5) USA, Ten Speed Press, 725-726 pp.
6) Atri, N.S., Kaur,A. and Kour, H. 2005. Wild mushrooms
7) Arora, D. 1986. . Berkeley, CA,
8) USA, Ten Speed Press, 725-726 pp.
9) Atri, N.S., Kaur,A. and Kour, H. 2005. Wild mushrooms
10) Arora, D. 1986. . Berkeley, CA,
11) USA, Ten Speed Press, 725-726 pp.
12) **Al-Fatimi, MA, Julich WD, Jansen R and Lindequist V (2006).** Bioactive components of the traditionally used mushroom *Podaxis pistillaris*. Evidence . Based Complementary and Alternative Medicine 3(1): 87 – 92.
13) **Arora, D (1986).** Mushrooms demystified. Berkeley, CA,USA, Ten Speed Press, 725-726 pp.
14) **Atri, NS, Kaur,A and Kour, H (2005).** Wild mushroom collection and identification. In: Frontiers in Mushroom Biotechnology (Eds.: Rai, R.D.,Upadhyay, R.C. and Sharma, S.R.). National Research Center for Mushroom, Chambaghat,Solan, India, 9-26.

15) **Batra , LR (1983).** Edible Discomycetes and Gasteromycetes of Afghanistan, Pakistan and North-western India. Biologia (Lahore) 29:293-304.

16) **Bilgrami, KS, Jamaluddin and Rizwi MA (1979).** Fungi of India –I, List and References. Today and Tomorrow's Printers and Publishers, New Delhi.

17) **Bilgrami, KS, Jamaluddin and Rizwi MA (1981).** Fungi of India –II, Host Index and Addenda. Today and Tomorrow's Printers and publishers, New Delhi.

18) **Bilgrami, KS, Jamaluddin and Rizwi MA (1991).** Fungi of India, Host Index and Addenda. Today and Tomorrow's Printers and publishers, New Delhi.

19) **Gupta, S and Singh SP (1991).** Nutritive value of mushroom *Podaxis pistillaris*. Indian Journal of Mycology and Plant Pathology. 21(3): 273-276.

20) **Hedawoo, GB and Mohite PU (2008).** Some wild edible mushrooms from Melghat Tiger Reserve Forest and Amravati region. *Biosci Biotech Res Comm* .1(2):163-167.

21) **Hedawoo, GB (2010).** Wild Mushroom Flora from Amravati Region, Maharashtra, India J. Mycol. Pl.Patho. 40(3): 441-444.

22) **Hopple, JS Jr and Vilgalys R (1994).** Phylogenetic relationships among   coprinoid taxa and allies based on data from restriction site mapping of nuclear rDNA. Mycologia. 86: 96-107.

23) **Jamaluddin, Goswami MG and Ojha BM (2004).** Fungi of India, 1989-2001. Scientific publishers, Jodhpur, India.

24) **Kirk, PF, Cannon, PF, Minter, DW and Stalpers, JA (2008).** Dictionary of Fungi, 10th ed, CABI Bioscience, CAB International,Wallingford.

25) **Kornerup, A and Wanscher, JH (1978).** Methuen Handbook of Colors, 3rd ed. Eyre Methuen, London.

26) **Mao, XL (2000).** The Macro Fungi of China. Zhengzau: Henan Science and Technology Press (Chinese).

27) **Mridu, Atri NS (2015)** - *Podaxis pistillaris*- A common wild edible mushroom from Haryana (India) and its sociobiology. Kavaka. 44: 34-37.

28) **Nair, LN and Patil, SD (1978).** Fleshy fungi from Western India: I : Gasteromycetes. Kavaka. 5 :19-23.

29) **Panwar, C and Purohit, DK (2002).** Antimicrobial activities of *Podaxis pistillaris* and *Phallorinia inquinans* against *Pseudomonas aeriginosa* and *Proteus mirabilis*. Mushroom Research. 11(1): 43-44.

30) **Patel, US and Tiwari, AK (2012).** *Podaxis pistillaris* reported from Madhya Pradesh, India. Indian Journal of Fundamental and Applied. (1):233-239.

31) **Smith, AH (1973)**. Agaricales and related Secotoid Gasteromycetes. In: The Fungi. Vol. IVB. GC Ainsorth, FK Sparrow, AS Sussman (Eds.),   Academic Press New York.

32) **Thind, KS and Thind, IPS (1982).** The Gasteromycetes of the Himalayas- I : Kavaka.10:35-45.

Fig: Collected fruiting bodies of *Podaxis* from different habitats

Effect Of Zinc Toxicity On Some Haematological Parameters Of Fish, *Ophiocephalus Punctatus*

A. S. Sawarkar

Department of Zoology, Shri R. L. T. College of Science, Akola 444001

Abstract

The present study aimed to evaluate some haematological changes resulting from the exposure of the freshwater fish, Ophiocephalus punctatus to the sublethal concentration of 6 mg/l of zinc sulphate in water for a period of 7, 14, 21 and 28 days. The studied haematological parameters were haemoglobin content, haematocrit percentage, erythrocyte count, total leucocyte count and mean corpuscular haemoglobin. Zinc sulphate caused reduction in haemoglobin content and increase in haematocrit values. Tremendous increase in erythrocyte count after 7 days zinc sulphate treatment was recorded in the experimental fish but later on there was significant decrease in the erythrocytes count after 28 days. Rise in leucocyte count was observed after 7 days zinc sulphate treatment but later on the number decrease. Fish also showed significant drop in mean corpuscular haemoglobin after 7 and 14 days, followed by slight increase. These haematological parameters may be used as an indicator of stress in fish induced by zinc toxicity.
Keywords: *Ophiocephalus punctatus*, *Zinc sulphate, haematological parameters, toxicity.*

Introduction

Factories discharge large amount of waste product into the river or nearest streams, lakes etc., which may join the river and thereby the ocean. Therefore, life in the water system is affected and biopurification system of water gets disturbed. Zinc is essential in small quantities for normal development of the organism but if consumed in excess amount, it may become toxic. The excessive zinc from the environment may enter into the fish body through nutrients, general body surfaces and gills. Toxic concentration of zinc compound cause adverse effect in the morphology, physiology and haematology of the fish. Srivastava and Punia (2011) studied the haematological and biochemical changes resulting from the exposure of common carp *Cyprinus carpio* to sublethal concentration of zinc in water at different time interval. Celik *et al*. (2013) investigated the changes in haematological and innate immune parameters and accumulation in the liver, gills and muscle tissues of *Oreochromis mossambicus* exposed to sublethal concentrations of zinc. Haematological alterations are used for rapid evaluation of chronic toxicity of compound. Hence, haematological investigation is important in toxicological research. Ganesan and Karuppasamy (2015) analyzed the impact of sublethal concentration of zinc on some hematological parameters of *Channa punctatus* under long term exposure. Aim of current study was to evaluate some haematological parameters like haemoglobin content, haematocrit value, erythrocyte count, total leucocyte count and mean corpuscular haemoglobin in freshwater fish *Ophiocephalus punctatus* exposed to sublethal dose at different time interval.

Material and Methods

The fish, *Ophiocephalus punctatus*, common air breathing freshwater teleost, were used in the present study. Fish weighing 20-25 gm and up to 12 cm in length were purchased from local fish market. Then they were treated with 0.1 % $KMnO_4$ solution for 2 minutes to clear dermal infection. Fish were maintained under laboratory condition in aquarium for one week. They were fed with commercial feed. The water in the aquarium was changed daily to remove detritus.

a) Water used - Aged tap water was used throughout the experiment. The physiochemical parameters of water was determined periodically as per standard method for examination of water and waste water (APHA, 1998).

Water having pH $= 7.4 \pm 0.5$; Temperature $= 25^0 C \pm 2^0 C$; Dissolved oxygen = 6.3 mg/l; and Total hardness $= 65 - 90$ mg/l was used to keep fish. The same water also served a control medium throughout the experiment.

b) Test Toxicant - Zinc sulphate, a salt of zinc was used as toxicant for present study.

c) Bio assay study - To study effect of toxicant $ZnSO_4$ on haematological parameters LC_{50} was determined for 24 hours, it was found to be 20.5 mg / l. The sublethal concentration of 6 mg of $ZnSO_4$ /l of water was selected. For haematological study fish were taken at 7 days, 14 days, 21 days and 28 days.

d) Haematological Studies -

1. Estimation of haemoglobin content: Haemoglobin content in the blood was estimated using Sahli's haemometer with permanent glass standards and expressed in gm/100 ml of blood.

2. Estimation of haematocrit: Haematocrit value of blood was estimated by centrifuging blood in heparinized haematocrit tubes at 7000 rev./min. for 30 minutes. From the volume of blood taken and packed cell volume after centrifugating, haematocrit percent was calculated.

3. Erythrocyte and leucocyte count: For enumeration of erythrocyte and leucocytes, haemocytometer with improved ruling was used. The number of erythrocytes and leucocytes was counted and represented in million cells per cubic millimetre of blood and thousand cells per cubic millimetre of blood respectively.

4. Estimation of mean corpuscular haemoglobin (MCH): The mean corpuscular hemoglobin content in μgm, was computed from the values of haemoglobin content and erythrocyte count using the formula-

$$MCH = \frac{Haemoglobin\ (gm/100ml)\ x\ 10}{Erythrocyte\ count\ (million\ cells\ per\ cubic\ mm\ of\ blood)}$$

Results and Discussion

The patterns of change in the blood parameter levels of zinc sulphate treated fish were found to be interesting (Table-1). Zinc sulphate caused an uniform reduction in haemoglobin content following all the period of exposure of the fish. The tremendous increase in erythrocyte count in the blood of 7 days zinc sulphate treated fish is noteworthy. It is 3.30 ± 0.29 million/mm^3 in control fish and after 7 days of treatment it increased to 5.39 ± 0.12, but later on there was significant decrease in the erythrocyte count after 28 days. Heavy metals might alter the properties of haemoglobin by decreasing their affinity towards oxygen binding capacity (Witeska and Kosciuk, 2003). This process could deform cell by swelling and damage to erythrocytes. In addition, the perturbation RBCs may be attributed to a defense reaction against toxicity through the stimulation of erythropoiesis (Maheswaran *et al.*, 2008). The fall in the data of haemoglobin content and erythrocyte count and occurrence of erythopenia in *Ophiocephalus punctatus* after the treatment with sublethal concentration of zinc sulphate has been in agreement with the observations of Ganesan and Karuppasamy (2015). The mean total number of leucocyte is estimated to be 8.95 ± 2.5 thousand/mm^3. A significant rise in leucocyte count was observed after 7 days of zinc sulphate treatment but later on the number decreased but could not attend the number as in control fish. Increase WBC count in fish exposed to sublethal doses indicating leucocytosis which matches with the findings of Kori-Siakpere and Ubogu (2008). Leucocytosis has been considered to be an adaptation to meet stressful condition by the animal. During the present study, increase in number of leucocytes during the exposure of fish at 6 mg/l of zinc sulphate along with reduction in number of erythrocytes and haemoglobin percentage indicates dyshaemopoiesis mostly caused by bone marrow depression. Leucocytosis as evidenced in present investigation might be due to immunological reaction to produce more antibodies to cope with the stress induced by the toxicant. Such leucocytosis has also been reported by Raina and Sachar (2014).

Significant increase in haematocrit values could be observed in the blood of fish exposed to zinc sulphate during different periods of exposure. Haematocrit and haemoglobin are directly influenced by fluctuation of RBC (Soltani *et al.,* 2016). Zinc sulfate altered the shape and size of red blood cells by effecting the structure and function of cell membrane. The fish also showed significant drop in mean corpuscular haemoglobin (MCH) content after 7 and 14 days of zinc sulphate exposure followed by slight increase in the level in blood. Ganesan and Karuppasamy (2015) observed a low increase in the mean cell haemoglobin (MCH) which clearly indicates that the concentration of haemoglobin in the red blood cells were much lower in the exposed fish than in the control fish, thereby, depicting an anaemic condition.

Table-1: Haematological observations in *Ophiocephalus punctatus* after sublethal exposure to zinc sulphate.

Sr. No.	Blood Parameter	Control	Experimental			
			7 Days	14 Days	21 Days	28 Days
1	Hb content (gm/100ml)	15.50± 0.54	14.80±0.35	14.65± 0.37	14.58±0.12	14.10± 0.18

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293
(Special Issue No.70) Peer Reviewed Journal   www.aiirjournal.com Mob. 8999250451

197

2	Erythrocyte count (million/mm^3)	3.30±0.29	5.39±0.12	2.08±0.11	2.02±0.08	1.04±0.09
3	Leucocyte count (thousand/mm^3)	8.95±2.5	15.16±3.6	12.98±1.8	10.52±0.90	9.72±2.6
4	Haematocrit (%)	6.68±0.39	11.62±1.89	11.83±0.56	13.58±0.40	15.62±0.33
5	Mean Corpuscular Haemoglobin (MCH)	34.03±2.51	8.92±0.70	23.67±2.13	36.05±5.2	42.05±2.6

Each value is the mean of 5 observations.

Conclusion

From the present result and about discussion it is clear that alterations in the haematological parameters are due to defense against toxic effect of zinc in fish *Ophiocephalus punctatus*. These haematological parameters can be used as indicators of zinc related stress in fish on exposure to elevated zinc levels in the water.

References

1) APHA (1998) American Public Health Association: Standard Method for Examination of Water and Waste Water. 20th ED

2) Çelik, E.S., Kaya, H., Yilmaz, S., Akbulut, M. and Tulgar, A. (2013) Effects of zinc exposure on the accumulation, haematology and immunology of Mozambique tilapia, *Oreochromis mossambicus. African Journal of Biotechnology*. 12(7), 744-753. DOI: 10.5897/AJB12.1408

3) Ganesan, J. and Karuppasamy R. (2015) Impact of zinc on haematological parameters of fresh water fish, *Channa punctatus* (Bloch). *Int. Jour. of Current Research.* 7 (03), 13626-13630.

4) Kori-Siakpere, O. and Ubogu, E.O. (2008) Sublethal haematological effects of zinc on the freshwater fish, *Heteroclarias* sp. (Osteichthyes: Clariidae), *African Jour. of Biotechnology.* **7**, 2068-2073.

5) Maheswaran, R., Devapaul, A., Muralidharan, S., Velmurugan, B., Ignacimuthu, S. (2008) Haematological studies of freshwater fish, *Clarias batrachus* (L.) exposed to mercuric chloride,

6) *International Jour. of Integrative Biology.* 2, 49-54.

7) Raina, S. and Sachar, A. (2014) Effect of Heavy Metal, Zinc and Carbamate Pesticide, Sevin on Haematological Parameters of Fish, *Labeo Boga*. *Inter. Jour. Innovative Research in Science,*

8) Engineering and Technology, 3(5), 12636- 12644.

9) Soltani, Z., Ghorbani, R., Hedayati,S.A., Farsani, H.G., Gerami, M.H. (2016) Comparative Destructive Effect of Waterborne Zinc Nanoparticles and Zinc sulfate on *Capoeta capoeta gracilis* Hematological Indices. *J FisheriesSciences.com*. 10(3), 17-22.

10) Srivastava R. and Punia P. (2011) Effect of heavy metal on biochemical and hematological

11) parameters in *Cyprinus carpio* and its use as a bioindicators of pollution stress. *J. Ecophysiol. Occup. Hlth.* 11, 21-28.

12) Witeska, M. and Kosciuk, B. (2003) Changes in common carp blood after short-term zinc exposure, *Environmental Science and Pollution Research*. 3, 15-24.

Effect Of Folic Acid Antagonist Methotrexate (MTX) on Testis of *Funambulus Pennanti* (Wroughton)

Dr. S.R. Kohchale

Asst. Professor, Department of Zoology,

Shri R.L.T. College of Science, Akola, Maharashtra, India.

Abstract

Methotrexate (MTX) is an effective agent in treatment of cancer, is one of the most versatile antineoplastic agents in spite of severe toxicity problems. The toxic effect of the Methotrexate on testis have been studied by intramuscularly injection of low dose of 3 mg/kg BW/per day and 6 mg/kg BW/day for 15 days to adult male squirrel (Funambulus pennanti) during breeding period. For comparing the effects the saline treated vehicle was injected same amount of saline and was maintained for the same duration. Toxic effect of MTX on the testis was their smallness in size sometimes irregularity in general contour, noticeable thickness of tunica albuginea, irregular appearance of spermatic arteries supplying blood to testis, in both the doses. Since MTX crosses the blood testis barrier, it induces significant reduction in the size of the tubules. From the foregoing it is concluded that Methotrexate has antigonadotrophic, antiandrogenic and antispermatogenic properties which are dose and duration dependent besides being toxic, therefore certainly causing reduction in the fertility rate.

Key words: Methotrexate, toxicity, antifertility

Introduction

Methotrexate is structurally related to dihydrofolate (the natural substrate for dihydrofolate reductase) that catalyzes the reduction of dihydrofolate to tetrahydrofolate and is a potent inhibitor of dihydrofolate reductase (DHFR). The inhibition of DHFR leads to an accumulation of dihydrofolate which is unable to act as substrate for any of the reaction converting tetrahydrofolate to its cofactor derivatives and, therefore, its accumulation is associated with depletion of the pool of the reduced folate cofactors. Methotrexate (Rheumatrex) is a medicine that is used to treat Rheumatoid arthritis (RA), psoriatic arthritis, Reiter's syndrome and other conditions. Aside from its antineoplastic activity, Methotrexate has also been used with benefit in the therapy of common skin disease psoriasis (Mcdonald, 1981). Additionally Methotrexate inhibits cell mediated immune reaction and is employed as an immunosuppressive agent, for example, in allogenic bone marrow and organ transplantation and for the treatment of dermatomyositis, rheumatoid arthritis, Wegener granulomatosis and Crohn's disease (Messmann and Allegra, 2001; Feagan *et al.,* 1995). Methotrexate was formerly known as amethopterin, is an antimetabolite drug used in treatment of cancer and autoimmune diseases.

Material and Method

In all three sets of experiments using low and high-doses of Methotrexate (MTX) were performed for the present study for the duration of 15 days (Tables 1& 2).

Animals were sacrificed using chloroform 24 hours after the last day of each experiment. Immediately the testis was excised and used for histological studies.

Table 1: Experimental Design for Low Dose Methotrexate treatment

Number of animals and sex	Treatment	Dose mg/kg BW	Route	Duration
3 males (Experimental)	Methotrexate	3 mg daily	I.M.	15 days
3 males (Control)	Saline	E.V.	I.M.	15 days

Table 2: Experimental Design for High Dose Methotrexate treatment

Number of animals and sex	Treatment	Dose mg/kg BW	Route	Duration
3 males (Experimental)	Methotrexate	6 mg daily	I.M.	15 days
3 males (Control)	Saline	E.V.	I.M.	15 days

Abbreviations: E. V. = Equal volume, I. M. = Intra muscular, B W = Body weight

Observation and Results

Histological and Histopathological Studies :

Testis were fixed in Bouin's fluid for 24hrs and preserved in 70% alcohol. The tissues were dehydrated by passing through graded series of alcohol, cleared in xylol and after embedding in paraffin, blocks were prepared and serial sections were cut at various thicknesses between 5μ to 8μ. For routine histological study the sections were stained with Ehrlich's haematoxylene and counter-stained with eosin. Measurements when necessary were taken with the help of an occular micrometer calibrated to a stage micrometer. The photomicrographs were taken with the help of a Carl Zeiss camera attached to the microscope and enlarged to the required size.

Sexually mature testis reaches a maximum size of 12 x 15 mm. It was covered over by a thin transparent shining tunica albuginea which showed a series of blood vessels running dorsoventrally in a spiral course in the form of distinct well marked strips.

The testis was covered by moderately thick tunica albuginea. The seminiferous tubules were perfectly circular in shape. They were separated from one another by a small amount of interstitial connective tissue (figs. 1 and 2). The fibro-muscular tunica propria, enveloping the seminiferous tubules, was formed by contractile spindle shaped peritubular smooth muscle cells or the myoid cells, collagen fibres and lamina propria was a well defined, non-cellular basal lamina.

The Sertoli cells were elongated, pyramidal, basally resting over the basal lamina with its apical end extending up to the lumen of seminiferous tubules. The nucleus was basal in position. Sertoli cells formed a sheath around the developing germ cells (spermatogenic cells) and the lumen of the seminiferous tubules. Large number of flagelar tails of spermatozoa appeared as tufts, extending from the apical end of the Sertoli cells into the lumen (fig. 2).

The cells of the spermatogenic lineage in seminiferous tubules were stacked in 4-8 layers that occupied the space between the basement membrane and the lumen of the tubules (figs.1 and 2). Germ cells in different stages of development were present including primary spermatocytes, early spermatids with round nuclei, and late spermatids with elongated and condensed nuclei.

A large number of spermatozoa with residual cytoplasm were visible at the luminal side of the tubules. The head of the sperms remain buried in apical cytoplasm of Sertoli cells while the tail hanged freely into the lumen and formed a brush-like whorl in the centre of transversely cut tubule. The space between the seminiferous tubules in control animal was filled with connective tissues, nerve fibers, blood capillaries and lymphatic vessels. The connective tissue was composed of fibroblast cells, collagen fibers, macrophages and the Leydig cells. The fibroblast cells were elongated with tapering ends and a centrally located nucleus. The Leydig cells were rounded or polygonal in shape with a central nucleus (figs. 1and 2).

Low Dose Treatment (3mg/kg BW MTX for 15 days)

The low dose treatment has resulted into partial thickness of tunica albuginea, partial shrinkage of seminiferous tubules, and partial change in the contour of tubules, noticeable increase in the intertubular spaces due to their sparse distribution. Leydig cells were occasionally affected otherwise their distribution and number appeared normal, but mesenchyme lodging the Leydig cells were highly reduced. Distortion of tunica propria appeared hanging as loops all over the tubules therefore the tubules appeared naked, (fig.3). Shrinkage and loss of spermatogonia at many places in the tubule was remarkably noticeable, depletion of germ cells was also remarkable, few spermatocytes, few round and long spermatids were visible along with the cytoplasmic masses in the periphery; lumens in some tubules appeared empty but in some flaying tails of sperms were seen. Degenerating pyknotic nuclei were seen randomly distributed all over the germinal epithelium (fig.4). The Sertoli cells appeared highly regressive and shrunken.

High Dose Treatment (6mg/kg BW/day MTX for 15 days)

The high dose treatment has resulted into severe distortion and disintegration of the seminiferous tubules. The tubules have lost their circular contour, appearing half of their original size. The overall appearance of the testis showed atrophy. Leydig cells also appeared few in number and the mesenchyme lodging them has become reduced to streak-like spaces (figs. 5 and 6). The tubule has been denuded due to loss

of lamina propria. All the germinal elements appeared disrupted and depleted and exfoliated towards the lumen. The spermatogonia were few in number and severely damaged. The Sertoli cells were also severely damaged as they appeared laterally compressed, with little of cytoplasm, nucleus undergoing degeneration, their apical or adluminal compartment lodging few elongated spermatids. The Primary and Secondary Spermatocytes along with few round spermatids appeared pyknotic, the lumen of the tubule showed fibrous elements; some may be sperms with coiled tails. The overall appearance of the seminiferous indicated tubular atrophy (fig. 6).

Discussion

In the present study, following MTX low and high dose treatment, the light microscopic results showed marked changes in the testicular cyto-architecture in the tubular and intertubular compartments and in the Sertoli cells. Regarding the general morphological appearance Shamberger *et al.,* 1981a recorded a **decrease in the size of the testis** with MTX treatment as in the present study, an insignificant with low dose but significant with high dose on the other hand Hensle *et al.,* 1984 described abnormal morphology of testis. The high dose treatment also **caused a remarkable thickening of tunica albuginea and the thickening of blood capillary walls** as well as a decrease in the volume of testis Johnson *et al.,* 1994; but Frick, 1973; observed no thickening of tunica albuginea with norethinodrone.

The seminiferous tubules showed **remarkable shrinkage in their size and also in their contour**. The tubules appeared irregular in shape and because of the remarkable shrinkage in their sizes there was an increase in the intertubular spaces (Saxena *et al.,* 2004) on the contrary Narrod and Narrod, 1977 could register moderate tubular atrophy.

The high and low dose of MTX treatment in the present work also resulted **into disruption and thickness of lamina propria** following deposition of extra-cellular matrix between the cellular compartments as described by Lendon *et al.,* 1978; Hensle *et al.,* 1984; and Saxena *et al.,* 2004. Davidoff *et al.,* 1990 have shown that the various form of hypo spermatogenesis is accompanied by different form of thickening of lamina propria. Our results are similar to Davidoff *et al.,* 1990 as noticeable thickening and disruption of lamina propria has resulted due to marked shrinkage and hypo-spermatogenesis or total arrest of spermatogenesis. The thickening of lamina propria may be due to androgen deficiency also confirmed by our results of decrease in testosterone levels.

In the present work depletion in number and size of I^{ry} and II^{ry} **spermatocytes,** vacuolization and decondensation of chromatin also changed the architecture of the cells was observed as described by Saxena *et al.,* 2004. They noticed significant alteration in the size of primary/secondary spermatocytes, vacuolization and decondensation of chromatin mass.

The **necrosis of germinal elements** has **resulted into formation of large cavities**. These vacuoles were formed either in between the germinal elements or in the basal portion of Sertoli cells. These cavities may be the result of reduction in the population of gonial cells or their extreme shrinkage or their fibrosis due to cytolysis in both the treatment groups. The appearance of these vacuoles is an indication of androgen dependent seminiferous epithelium disruption as evident by a significant fall in the levels of testosterone or antigonadotrophic property of MTX. Since in the present study we did not measure the FSH and LH, a perusal of earlier literature gives an evidence of reduction of gonadotrophins (Shamberger *et al.,* 1981 a, b and Koehler *et al.,* 1986).

Apart from the necrotic changes observed in some experiments the MTX treatment has resulted into partial **arrest of spermatogenesis** at specific stages depending upon the low and high dose (3 and 6mg/kg BW/day for 15 days respectively).

In the low dose treated group the interesting histopathological changes in the seminiferous tubule is **hydropicity or hyalinization or accumulation of watery fluid** in between the germinal epithelial cells. This may be due to accumulation of residual cytoplasm after the disintegration of different stages of

The decreased levels of testosterone was reflected by the atrophy of accessory glands as MTX has a direct effect on Leydig cells thus impairing their normal steroidogenic function (Badri *et al.,* 2000; Gaffan *et al.,* 2003 and Saxena *et al.,* 2004).

Conclusion

From our low and high dose MTX treatment it is concluded that the action of MTX was **antigonadotrophic, antispermatogenic, antispermiogenic** and **antisteroidogenic**.

References:

1. Badri, SN, G Vanithakumari, T Malini (2001) Effect of Methotrexate on testicular steroidogenesis in rats, Endo. Res. 26(2): 247-62.
2. Delahunt, J, W Hirsutism(1993) Practical therapeutic guidelines Drugs, 45(2):223-231.
3. Feagan, BG, J Rochon, RN Fedorak, EJ Irvin, G Wild, L Sutherland, AH Steinhart, AH Greenberg, R Gillies, M Hopkins, SB Hanuer and JWD McDonald (1995) Methotrexate for the treatment of crohns disease. The North American Crohns study group investigators, N Eng.J.Med.332:292-297.
4. Freeman-Narrod, M and SA Narrod (1977) chronic toxicity of Methotrexate in mice, J. Natal. Cancer Inst. 58(3): 735- 41.
5. Hensle, TW, KA Burbige, BR Shepard, CC Marboe, WA Blanc and JH Wigger (1984) Chemotherapy and its effect on testicular morphology in children, J. Urol. 131(6):1142-4.
6. Koehler, M, U Heinrich, R Ludwig, R Waldhere and WE Brandis (1986b) Effect of methotrexate on rabbit testis. Part 2 Hormonal Changes, Peditr. Hematol. Oncol. 3(4): 335-41.
7. Koehler, M,R Waldher, R Ludwig, U Heinrich and WE Brandis (1986a) Effect of Methotrexate on rabbit testes. Part 1 Morphological Changes, Peditr. Hematol. Oncol. 3(4): 325-34.
8. Lendon, M, IM Hann, M K Palmer, S M Shalet and P H Jones (1978) Testicular Histology after combination chemotherapy in childhood for acute lymphoblastic leukaemia, Lancet, 2(80-87): 493-41.
9. McDonald, CJ, (1981) the uses of systemic chemotherapeutic agentsin psoriasis, Pharmacol.Ther.14:1-24.
10. Messmann, R and CJ Allegra (2001) Antifollates in cancer chemotherapy and Biotherapy : Principles and practice, 3rd ed. (chabner,BA and Longo, Dl. eds) Lippincott Williams and wilkins, Philadelphia in press.
11. Saxena, AK, S Dhungal, S Bhattacharya, CB Jha and AK Shrivastava (2004) Effect of chronic low dose of Methotrexate on cellular proliferation during spermatogenesis in rats, Arch. Androl. 50(1): 33-5.
12. Shamberger, RC, RJ Sherins and SA Rosenberger (1981a) The effect of postoperative adjuvant chemotherapy and radiotherapy on testicular functions in man undergoing treatment for soft tissue sarcoma, Cancer 15: 47 (10): 2368-74.
13. Shamberger, RC, SA Rosenberger, CA Seipp and RJ Sherins (1981b) Effect of high dose of Methotrexate and Vincristine on ovarian and testicular function in patients, Cancer Treat. Rep. 65 (9-10): 739-46.
14. Davidoff, MS, AF Holstein, M Breuckes and K. Seidl (1990) Cellular architecture of the lamina propria of human seminiferous tubules, Cell and Tiss. Cul. 262: 253.
15. Frick, J (1973) Control of spermatogenesis in men by combined administration of progestin and androgen. Contraception, 8:191.
16. Gaffan, J, L Holden, ES Newlands, D Short, S Fuller, RH Begent, GJ Rustin and MJ Seekle (2003) Infertility rates following POMB / ACE chemotherapy for male and female germ cell tumour – a retrospective long term follow-up study, Br. J. Cancer. 17;89(10) : 1849-59.
17. Johnson, FE, M Mawad, SA Farr, M Mawad and YC WOO (1994) Testicular cytotoxity of intravenous Methotrexate in rat, J. Surg. Oncol. 55(3):175-8.

Quantification of Urea And Uric Acid in Silkworm *Bombyx Mori* During Grasserie Infection

Rashmi P. Joshi

Department of Zoology, Shri R.L.T. College of Science, Akola

I. A. Raja

B.S. Patel Arts, Commerce and Science College, Pimplegaon Kale

Abstract

Grasserie is one of the most serious diseases of silkworms, though occurs throughout the year, its intensity varied with seasons. The pathogenic infections induce biochemical alterations including nitrogenous waste like, Urea and Uric acid in larval tissues. Here we estimated urea and uric acid in non-infected, healthy silkworms and the silkworm infected with Grasserie. At early infection with Grasserie the amount of urea in silkworm midgut tissues was recorded as 6.38 mg % as compared to control healthy 7.34 mg%. While in late infection the amount of urea was 6.78 mg% as compared to non infected control 7.54 mg %. Uric acid in Midgut tissue of silkworm infected with Grasserie in early infection showed non-significant changes, (1.94 mg%) as compared to healthy control was (2.72 mg %). While in late Grasserie infection the amount of uric acids was 1.33mg% and was significant as compared to healthy control in late infection as 2.22mg %. The investigation of chemical changes in body tissues is an appropriate system for studying effects of pathogenic disease. The understanding and identifying these tissue biochemical changes will be very important for discussing many biological stresses. The biochemical responses in silkworm against pathogenic diseases could facilitate the control of agricultural pests.

Key words: Silkworm, midgut, Grasserie, biochemical, alterations.

Introduction:

Though silkworm, Bombyx *mori* is a purely domesticated insect since 4,500 years but like other domesticated animals it is a quite delicate venture and might be easily susceptible to a number of diseases, most of which develops seasonally (Govindan and Devaiah, 1998 and Prasad, 1999). Grasserie is one of the most serious diseases of silkworms, though occurs throughout the year, its intensity varied with seasons. The pathogenic infections induce biochemical alterations including nitrogenous waste like Urea and Uric acid in larval tissues. Study of changes in levels of bimolecular constituents in the body therefore is very important, to get information on the changes in physiological aspects of the quantification of major biomolecules, specifically proteins, carbohydrates, lipids, free amino acids, urea, and uric acids and of the enzymes in the haemolymph and body tissues of a diseased insect are therefore prerequisite for the understanding of the physio-molecular mechanism behind the host pathogen interaction.

Methodology:

The work involved the study of the silkworm larvae with the pathogens of Grasserie and their physiological effects with reference to quantitative changes in major biomolecules urea and uric acid in healthy and Grasserie infected midgut tissue were studied. The quantification was made in the fifth instar larvae, beginning from the newly molted stage (day one) and continued till the 6th day of the instar. The larval period was divided into two chronologically identified state as early experimental stage on day one and late experimental stage on day six of 5th instar. The midgut tissue of the all early and late experimental silkworm were then used to prepare tissue homogenates (20% w/v) in 50 M Tris-HCl buffer (pH 7.0) in a homogenizer. For quantification of major biomolecules and enzyme profile in the midgut tissue, the homogenate was centrifuged at 10,000 rpm and 4°C for 30 minutes. Supernatant was collected and used for quantification of all the major biomolecules and enzymes. So was transferred to new tubes and kept at -20°C until the commencement of experiments.

Considering the benefits of automated analyzers with their internal standards and controls in quantification of Urea and Uric acid, an ELICO Clinical chemistry analyzer Cl 162 and prescribed assay kits were used for the quantification. (Hamdah et al., 2010) (Mahesha et al., 2013),

Observations:

Table 1: Quantification of Urea (mg%) and Uric acid (mg%) in Midgut tissue of silkworms during Grasserie:

Biomolecules	Control		Grasserie infection	
	Early	Late	Early	Late
Urea mg%	7.34 ± 0.39	7.54 ± 0.3	6.38 ± 0.76	6.78 ± 0.42
Uric acids mg%	2.72 ± 0.14	2.22 ± 0.14	1.94 ± 0.13 a	1.33 ± 0.14 b

Conc.: Concentration, mean ± SE followed with the same letter (a): is not significantly different ($P > 0.05$) ,(b): significantly different ($P < 0.05$), (c): highly significantly different ($P < 0.01$), (d): very highly significantly different ($P < 0.001$).

Fig. 1 :Quantification of Urea (mg%) in Midgut tissue of silkworms during Grasserie.

Fig. 2 Quantification of Uric acids (mg%) in Midgut tissue of silkworms during Grasserie
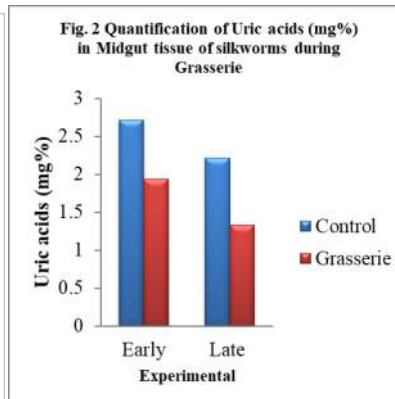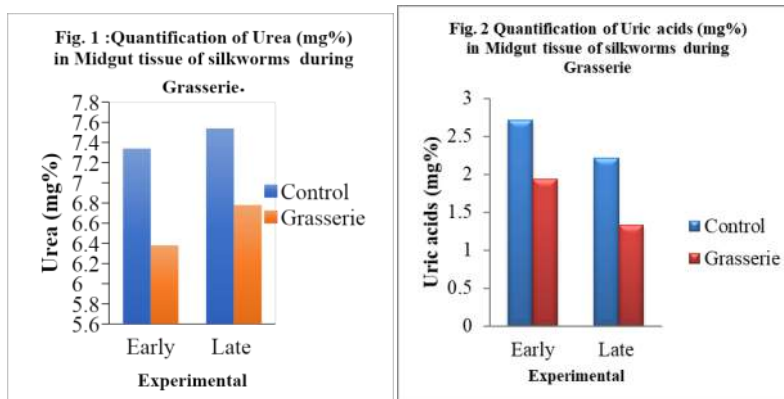
Results and Discussion:

According to Table 1 and fig. 1 the midgut tissues of the infected silkworms showed changes in urea in early and late infection of Grasserie. On the 1st day of infection the amount of urea in infected silkworm tissues was recorded as 6.38 mg % as compared to control healthy 7.34 mg%. While in late Grasserie infection on 6th day of the infected silk worm, amount of urea was 6.78 mg% as compared to non infected control 7.54 mg %.

Excretory compounds of silkworm have been investigated under many stress conditions as an appropriate marker. In the silkworm larva, the nitrogenous waste products of metabolism are mainly urea and uric acid excreted as urine, with fecal pellets. The quantity of each nitrogenous compound in urine varied according to the food conditions during the fifth larval instar and also differed between silkworm races. The excretory pattern also depends upon a number of environmental factors such as temperature and humidity (Alexandria and Stanchion, 1981; Dhinaker,1990). Once infected the progressive multiplication of a pathogen in the host system is often reflected by specific metabolic changes coupled with corresponding biochemical changes in the infected body tissues. Pathogenic infections are reported to induce biomolecular and physiological alterations in insect tissues (Martignoni, 1964: Shigematsu, 1969) leading to a new bio-metabolite profile as reported by Taha (2007).

According to table 2 and fig.2 the midgut tissue of silkworm infected with Grasserie on 1st day of infection showed non-significant changes, 1.94mg % as compared to healthy control was 2.72 mg %. While in late Grasserie infection i.e. on 6th day of 5th instar the amount of uric acids was 1.33mg% and was significant as compared to healthy control in late infection as 2.22mg %.

Silkworms and humans are similar in purine metabolism, since the end product of purine metabolism of both is uric acid (Hayashi 1960). Uric acid distributed mainly in the fat body (Tojo 1971). Renuka and Shamitha (2012) documented that, occurrence of uric acid as the main end product of nitrogen metabolism among insects is well established. Moreover, the concentration of UA in midgut tissue also declined with the progress of the diseases. In this study not only no difference was observed between infected and uninfected larvae in the amount of urea in midgut tissue but also no difference was evident in two sampling times. Similar results were reported by Etebari *et al.,* (2007) in silkworm during Grasserie infections. Our results might demonstrate that infection increased the rate of deamination of amino acids and increased the haemolymphatic concentrations of uric acid. In this circumstance, the intense depletion in the carbohydrate's reserves led the

host to use other sources than glucose for energy, such as amino acids (de Souza *et al.,* 2000; Pinheiro *et al.,* 2009).

In the present observation, the nitrogenous excretory products in the fifth instar Grasserie free and Grasserie infected silkworm, urea content is reported to be maximum. It is also reported that there was a heavy loss of worms in the fifth instar. The studies also show an decrease in the uric acid content of Grasserie infected larvae, followed by urea. It was also reported somewhere that the larval span increased in the Grasserie infected larvae without corresponding increase in the body weight and silk gland weight Causes in crop loss and reduced the prospects of silk production. During fifth instar the formation of nitrogenous products lowered due to depleted growth rate while silk synthesis in the glands takes place rapidly. From the present studies it is clear that the content of the major end products viz., uric acid and urea, in the Grasserie infected larvae has been decreased, with a Related decrease in larval and silk gland weight which may be due to poor nutrition coupled with lesser enzyme activity in the malphigian tubule and midgut which are the Major regions involved in throwing away excretory material. The comparatively higher level of nitrogenous products in the uninfected silkworms may be due to higher breakdown of the excretory products which is correlated with the growth rate. As excretion forms a major factor for the balance of nitrogen and water in the body and grasserie infection is found to be one of the major constraints in sericulture which results in heavy loss to the crops , the present study provides an avenue to explore the pathogenic effects of bn infectious diseases and mark way for production of quality silk.

References:

1) Alexandria A. and N. Stanchion (1981). Observations on the variation of amino acid content in non-diapause and diapaused chrysalides of *Phylosamia ricini* in relation to cocoon formation season. *Zootec*. **24** : 85-88.
2) De Souza R.M., Gomes E.M., Chagas G.M. and Pinheiro J., (2000). The influence of starvation and *Eurytrema coelomaticum* infection on the nitrogen products of degradation in the hemolymph of *Bradybaena similaris*. *Braz. Arch. Biol. Technol*., **43** : 365–371.
3) Dhinaker G. M., Bhasker M., Rajashekar R. and Govindappa S. (1990). Changes in the excretory pattern during winter at different stages of the larvae of silkworm, *Bombyx mori*. *Ind. J. Comp. Anim. Physiol*., **8** : 59-62.
4) Etebari K., Bizhannia A. R., Sorati R. and Matindoost L. (2007). Biochemical Changes in Hemolymph of Silkworm Larva Due to Admiral Residue. *Pesticide Biochem. Physiol*., **88**(1) : 14 - 19.
5) Fagan W. F., Siemann E., Mitter C., Denno R. F., Huberty A. F., Woods H. A. and Elser J. J. (2002). Nitrogen in insects: implications for trophic complexityand species diversification. *American Naturalist*, **160**: 784-802.
6) Gao L., Chen K., Yao Q. and Chen H. (2006). BmNPV infection enhances ubiquitin conjugating enzyme E2 expression in the midgut of BmNPV susceptible silkworm strain. *Int. J. Indust. Entomol.,* **13** : 31 – 35.
7) Govindan R, Narayanaswamy T. K. and Devaiah M. C. (1998, 2001, 2003, 2006). "Text book of Principles of Silkworm Pathology" Seri Scientific Publishers, Bangalore. pp 239.
8) Govindan R., Narayanaswamy T. K. and Devaiah M. C. (1998). Principles of silkworm pathology. Seri. scientific publishers, Bangalore, p. 420.
9) Hamadah Kh. Sh., Basiouny A. L. and Ghoneim K. S. (2010). Alterations in the lactate dehydrogenase activity of the desert locust *Schistocerca gregaria* by the wild plant Fagonia bruguieri (Zygophyllaceae). *Egypt. Acad. J. Biolog. Sci.*, **3** (2) : 1-9.
10) Hayashi Y. (1960). Xanthine dehydrogenize in the silkworm, *Bombyx mori* L. *Nature* **186** : 1053-1105.
11) Mahesha H. B., Rahamathulla G. and Thejaswini P. (2013). Studies on Induction of Tolerance against Nuclear Polyhedrosis in Silkworm *Bombyx Mori* L. And Its Biochemical Aspects. *IJBPAS*, **2**(7) : 1501 – 1512.
12) Martignoni M. E. (1964). Pathophysiology in the insect, *Ann. Rev. Entomol.,* : 179 -206.
13) Pinheiro J., Maldonado Jr., A., and Lanfredi R. M., (2009). Physiological changes in *Lymnaea columella* (Say, 1817) (Mollusca, Gastropoda) in response to Echinostoma paraensei Lie and Basch, 1967 (Trematoda: Echinostomatidae) infection. *Parasitol. Res*., **106** : 55–59.
14) Prasad, N. R. (1999). Silkworm disease management and its limitations. *Indian Silk*, **39**(4) : 7 – 9.
15) Renuka G. And G. Shamitha (2012). Studies On The Excretory Products Of Pebrine Infected Tasar Silkworm, *Antheraea Mylitta* Drury (Daba Tv). *Int. J. Pharm. Bio. Sci. Oct.,* **3**(4) : (B) 1054 – 1062.
16) Shigematsu H and Noguchi A. (1969). Biochemical studies on the multiplication of a nuclear polyhedrosis virus in the silkworm, *Bombyx mori* II. Protein synthesis in the larval tissue after infection, *J. Invertebr. Pathol.,* **14** : 301-307.
17) Taha R. H., (2007). Early Diagnosis and Genetic Mapping of Viruses Causing Flacherrie and Grasserie Diseases in Gamma Radiated and Non Irradiated Mulberry Silkworm, *Bombyx mori* L. Ph.D. Thesis, Faculty of Science, Ain Shams Univ.
18) Tojo S. (1971). Uric acid production in relation to protein metabolism in the silkworm, *Bombyx mori*, during pupal-adult development. *Insect Biochemistry,* **1**(3) : 249 – 263

One Pot Synthesis Of Substituted Derivatives Of 2-Amino Chromenes By Using L-Proline As Reusable Catalyst

Mahesh A. Pawar
Shri Shivaji college of Arts Commerce and Science, Akola

Dr.S.M. Kadu
Shri Shivaji college of Arts Commerce and Science, Akola

Abstract

2-amino 4H-chromenes synthesized by one pot synthesis method by interaction with substituted benzaldehyde,β-naphthol , and mlononitrile by using L-Proline as reusable catalyst. chromene are an important group of compound found in plants including fruit and vegetables. chromene are biologically active with wide range of activities such as antimicrobial, mutaginicitical , antviral , antiproliferative and central nervous system activities.. The yield of product is found to be very good. The synthesized compounds were recognized by IR, NMR and mass spectroscopic technique.

Keywords- 2-amino 4H-chromene, benzaldehyde, B-naphthaol, mlononitrile .L-proline

Introduction

Multi-component reactions (MCRs) are one step reaction that combines two or more reagents to form an end product [1]. Since an MCR forms product in one step it generate considerably less waste than a multistep synthesis. Multi-component reactions (MCRs) important for the achievement of high level of brevity and diversity. They allows more than two simple and flexible building blocks to be combine in practical , time saving one pot operation , giving rise to complex structure by simultaneous formation of two or more bond ,according to domino principle [2]. Consequently from the point of green chemistry, MCRs constitute a very useful class of tools for the synthesis of new chemicals. MCRs contribute to the requirements of an environmental friendly process by reducing the number of synthetic steps energy consumption and waste production. Researcher have transformed this powerful technology into one of the most efficient and economic tools for combinatorial and parallel synthesis [2,3]. Due to their inherent simple experimental procedure and their one pot character they are perfectly suited for Automated synthesis . thus MCRs attracted considerable interest owing to their exceptional synthetic efficiency [2-4].

Multicomponent reactions are of increasing importance in organic and medicinal chemistry. In times where a premium is put on speed, diversity and efficiency in the drugs discovey process MCRs stratergies offer significant advantage over conventional linear type synthesis. In such reactions three or more reactant comes together in a single reaction vessel to form new product that contain portion of all the components. MCRs providing product with the diversity needed for the discovery of new lead compound. Over The last decade industrial and academic researchers have made such powerful MCR strategies into one of the most efficient and co-effective tools for combinatorial and parallel synthesis. [6,7].

2-amino- 4H-chromenes represent an important class of compounds being the main component of many naturally occurring products. The basic structural frameworks of chromene for example is a common feature of many tannins and polyphenols [8] found in tea , fruits vegetables and red wine .

2-amino chromene and their derivatives are of considerable interest as they possess wide range of biological properties [8] such as spasmolytic, diuretic, anticoagulant anticancer and antianaphylactic activity [9].

Several protocols have been reported for the synthesis of 2-amino-4H-chromenes and their derivatives using malononitrile, resorcinol and aldehyde. Various catalysts such as piperidine,9 triethyl amine,10 aqueous K2CO3,11 cetyltrimethylammonium bromide (CTABr),12 1,8-diazabicyclo[5.4.0]undec-7-ene (DBU),13 Ca(OH)2,14 HT/MW 15 and basic ionic liquids16 have been used for these reactions. In current work mild reaction condition (Ethanol and waer) and l-proline is used as green and reusable catalyst. Because of its advantages associated with this eco-friendly catalyst ,has been explored as a powerful catalyst for MCRs. In recent years, Ceric (IV) Ammonium Nitrate (CAN) has been used for various organic transformations including Lewis acid catalyst.

Result and Discussion

At the beginning, multicomponent reaction of benzaldehyde, resorcinol and malononitrile were chosen as the model reaction. Effects of various reaction parameters such as the effect of the solvents, the effect of catalyst concentration and the effect of temperature were studied to optimize the reaction conditions

In recent times, the catalytic activity of L-proline for organic reactions has been reported in a wide range of publications. Herein we wish to report a newt and environmentally friendly procedure for the synthesis of 2-amino-4H-chromenes using L-proline as an efficient catalyst.

It was observed that L-Proline) with 10 mol% ound to be more influencing catalyst in the synthesis of 2-amino4-H chromene by three component reaction of benzaldehyde, resorcinol and malononitrile resulting into a very good yield of the desired products.

It is reported that in the absence of catalyst no formation of product was observed even in same reaction condition (Table 1, entry 1).

During the research work significant effect of solvent is observed. Solvent play major role in the catalyst activity as express in table 1. We have investigated the effect of protic and aprotic solvent on three component reaction of aromatic aldehyde , malononitrile and resorcinol. It was found that in non polar solvent like toluene the reaction never proceed forward and no product was formed. Same was observed for solvent free condition and reaction did not takes place.where as in polar aprotic solvent like DMF, Acetonitrile theof the product yield was found to be less (< 20%, Table 1).In Case of polar protic solvent like Water , ethanol yield was found to be good .(< 80% Table 1). Thus polar protic solvent found to more effective.

Use of catalyst in different mole percent found to be more effective. With 5 mol% (entry 2-7, table 1) yield of desir product was found to be less but with increase in loading of catalyst upto 10 mol% yield goes on increasing (entry 7-11, Table 1)

Table 1. Optimization of reaction conditions

Entry	Reaction condition [a]	Catalyst (mol%) [b]	Time (min)	Yield (%) [C]
1.	H_2O, 70 ^0C,	No catalyst	240	0
2.	EtOH, 70 ^0C,	L-proline (5)	60	82
3.	MeCN 7 0 ^0C,	L-proline (5)	60	48
4.	DMF 70 ^0C,	L-proline (5)	60	42
5.	Toluene 70 ^0C,	L-proline (5)	60	25
6.	EtOH,: H_2O (1:1),70 ^0C,	L-proline (5)	60	95
7.	Solvent free,70 ^0C	L-proline (5)	60	0
8.	EtOH, 70 ^0C,	L-proline (10)	60	85
9.	MeCN 70 ^0C,	L-proline (10)	40	44
10.	DMF 70 ^0C,	L-proline (10)	40	46
11.	Toluene 70 ^0C	L-proline (10)	30	0
12.	EtOH,: H_2O(1:1), 70 ^0C	L-proline (10)	60	90

[a] Reaction condition: benzaldehyde (5 mmol), resorcinol (5 mmol), malononitrile (5mmol). [b]Weight percentage of the catalyst with respect to resorcinol. [C] Isolated yield

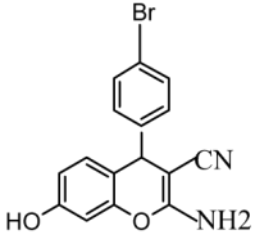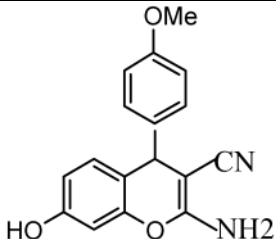### Scheme 1. L-proline catalyzed the model reaction.

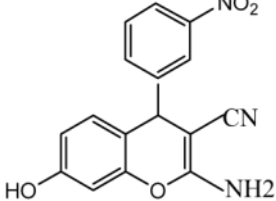1   2   3   4 a-d
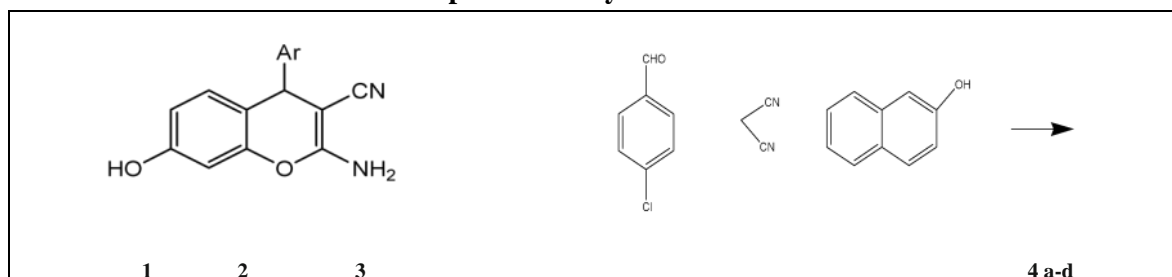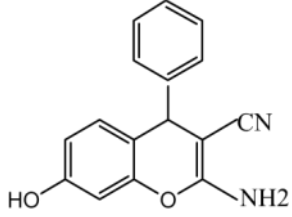
Table 2. 2-Amino-4H-chromene synthesis in Ethanol : Aqueous (1:2) mediuma

Entry	Aldehyde	Product	Code	Time (Min)	Yield	M. P. (1C)	
	R	Structure				Found	Reported
1	-H		4a	80	85	233–236	234-236[17]
2	-Br		4b	60	84	224–226	225–227[18]
3	-oMe		4c	120	80	112–114	112–114[18]
4	-NO2		4d	40	89	187–189	188–190

Experimental

Materials and Method

All melting points were taken in open capillaries and are uncorrected Infrared (IR) spectra were recorded with a Shimadzu 8400s FT-IR spectrometer using potassium bromide pellets. 500MHz ^{1}HNMR spectra were recorded on a DRX-500 Avance Bruker spectrometer. The chemical shifts are reported in ppm (δ-scale) relative to internal TMS Reagents are obtained from commercial resource. Commercially available regents were used without further purification. Products are all known compounds and were identified by comparing of their physical and spectra data with those reported in the literature.

General procedure for 2-Amino-4H-Chromenes

A mixture of resorcinol (5mmol) ,malononitrile (5mmol) ,and aromatic aldehyde (5mmol) was taken round bottom flask containing 5 mL of water and 5 ml ethanol. (10wt%) catalyst l-proline. with respect to resorcinol was then added to the reaction flask and the contents were stirred. The reaction mixture was refluxed. The progress of the reaction was monitored by thin layer chromatography (ethyl acetate/pet ether: 30%). After reaction was completed, the reaction mixture was allowed to cool at room temperature. The crude product was extracted with ethyl acetate. The organic layer was washed with water (25 mL), dried with anhydrous Na2SO4, the solvent evaporated under vacuum and the crude product recrystallized from ethanol. Characterization data for selected compounds are provided below:

Selected characterization data

4a: IR (KBr), ν (cm^{-1}): 3400, 3316 ,2180,1645,1590;^{1}H NMR (DMSO-d$_6$, 500 MHz), δ (ppm): 5.34 (s, 1H, CH), 7.12 (s, 2H, NH$_{2)}$, 7.12-7.22 (d, 2H, J=8.2, ArH), 7.30-7.37 (m, 3H, ArH), 7.40-7. 47 (m, 2H, ArH), 7.81-7.82 (d, 1H, J=8.02, ArH),7.91-7.96 (m, 2H, ArH).

Conclusion

In conclusion, 2-amino-4H-chromenes were prepared in a simple method. The procedure is very simple, efficient and environmentally friendly as the catalyst is reusable and gives the product with good yield.

Acknowledgment

Reference

1. Mirjalili, B.F.; Bamoniri, A.; Karimi Zarchi , M.,A.; Emtiazi, H.; *J. Iran Chem. Soc*. 2012, 7, 1, 95-99.
2. Zhu, J.; Bienayme, H. *Multicomponent Reactions*, Wiley, 2005.
3. Beck, B.; Hess, S.; Dömling, A. *Bioorg. Med. Chem. Lett.* 2000, *10*, 1701.
4. Nishiyama, Y.; Katahira, C.; Sonoda, N. *Tetrahedron Lett.* 2004, *45*, 8539.
5. Bienayme, H.; Hulme, C.; Oddon, G.; Schmidt, P. *Chem. Eur. J,* 2000, 6,3321.
6. Weber, L. *Drug. Disc.Today,* 2002, 7, 143.
7. Jankun, J.; Selman, S. H.; Swiercz, R.; Skrzypczak-Jankun, E. *Nature* 1997, *387*, 56
8. Green, G. R.; Evans, J. M.; Vong, A. K. In *Comprehensive Heterocyclic Chemistry II*; Katritzky, A. R., Ress, C. W., Scriven, E. F. V.; Ed.; Pergamon Press: Oxford, 1995; Vol. 5, p 469.
9. Witte, E. C.; Neubert. P.;Roesch, A. Ger. Offen DE. *Chem. Abstr.* 1986, *104*, 224915f
10. (a) H. M. Al-Matar, K. D. Khalil, H. Meter, H. Kolshorn andn M. H. Elnagdi, ARKIVOC 2008, 16, 288−301; (b) S. M.Al-Mousaw, Y. M. Elkholy, A. M. Mohammad and M. H. Elnagdi, Org. Prep. Proced. Int., 1999, 31, 305−313.
11. A. M. Shestopalov, Y. M. Emelianova and V. N. Nesterovb, Russ. Chem. Bull., 2002, 51, 2238−2243.
12. (a) R. Poddar and M. Kidwai, Catal. Lett., 2008, 124, 311−317; (b) M. Kidwai, S.Saxena, R. K. M. Khalilur and S. S. Thukral, Bioorg. Med. Chem. Lett., 2005, 15, 4292−4295
13. J. Tong-Shou, J. C. Xiao, S. J. Wang and T. S. Li, Ultrason. Sonochem., 2004, 11, 393−397.
14. D. S. Raghuwanshi and K. N. Singh, ARKIVOC, 2010, 10, 305−317.
15. S. R. Kolla and Y. R. Lee, Tetrahedron, 2011, 67, 8271−8275.
16. M. P. Surpur, S. Kshirsagar and S. D. Samant, Tetrahedron Lett., 2009, 50, 719−722. 16a Togo, H.; Iida, S. *Synlett* 2006, *2006*, 2159. 16 b Jereb, M.; Vražič, D.; Zupan, M. *Tetrahedron* 2011, *67*, 1355. 16 c Parvatkar, P. T.; Parameswaran, P. S.; Tilve, S. G. *Chem.-Eur. J.* 2012, *18*, 5460.
17. M. Kidwai, S. Saxena, R. K. M. Khalilur and S. S. Thukral, Bioorg. Med. Chem. Lett., 2005, 15, 4292−4295.K.
18. K. Gong, H. L. Wang, J. Luo and Z. L. Liu, J. Heterocycl. Chem., 2009, 46, 1145−1150.

Studies On Spider Fauna Of Family Oxyopidae Thorell, 1870
Near Malrajura Forest Of Patur, India

Amrita Shirbhate

Head, Department of Zoology, Mahatma Phule Arts and Science College, Patur, Dist Akola (MS)

Milind Shirbhate

Department of Zoology, Shankarlal Khandelwal Arts, Science and Commerce College, Akola, (MS)

Abstract:

Lynx spider (Oxyopidae) is a family of araneomorph spiders first described by Tamerlan Thorell in 1870. Most species make little use of webs, instead spending their lives as hunting spiders on plants. Many species frequent flowers in particular, ambushing pollinators, much as crab spiders do. They tend to tolerate members of their own species more than most spiders do, and at least one species has been identified as exhibiting social behaviour. There are several genera of Oxyopidae and they differ in their habits and adaptations. Most of them have large spiny bristles on their legs and in many species the bristles form almost a basket-like structure that may assist in confining the prey that they grasp, and protect the spider from its struggles. Most Oxyopes and Hamataliwa species are small to medium in size; they tend to be drab ambush hunters; depending to some extent on the season, some occupy flowers, ambushing pollinating insects. This is the first reporting checklist from this protected area under territorial forest of Akola subdivision. The spiders were observed in the field itself, photographed and identified. In this survey we recorded the genus entitled Hamadruas, Hamataliwa, Oxyopes, Peucetia, Tapinillus and from the study area.

Keywords- Spider, Oxyopidae, Conservation.

Introduction-

Oxyopidae in general rely on keen eyesight in stalking, chasing, or ambushing prey, and also in avoiding enemies. As with many other families of spiders, the arrangement of their eyes is typical of the family and is an important aid in identifying them as members of the family. Six of the eight eyes of Oxyopid spiders are arranged in a hexagon-like pattern, more or less on a prominent hump on the front upper corner of the prosoma. The other two eyes are smaller, less conspicuous, and generally are situated in front of and below the other six. The basal parts of the chelicerae of most species are large, vertical and parallel, which combine with the bluff front end, a "high forehead" to the prosoma, to give most species a peculiar "flat-faced" appearance. Some oxyopids are abundant enough to be important in agricultural systems as biological control agents. This is especially true of the striped lynx spider. Their net value in agriculture has been disputed however, on the grounds of their predation of pollinators.

Materials and Methods-
Study area:

The Malrajura forest is covered under the territorial forest area of Akola division near Patur tehsil in Akola district India. This is an exotic forest dotted with an abundance of flora and fauna. The protected forest area lies in close proximity to the catchments area of Patur reservoir and spillway. Its area is geographically located at – 20°23'36.8"N 76°55'28.1"E. The land vegetation at Malrajura forest is southern tropical dry deciduous forest. There are over 112 species of plants at this sanctuary such as Bihada, Dhawada, Moha, Tendu, Khair, Salai, Aola, Tendu, etc. Four-horned antelope, Nilgai and barking deer and Leopard is the attraction for tourists in the area. Other animals that can see at Wolf, Wild boar, Hare, Jungle cat and Monkeys. Oxyopid spiders are easily seen in this area during the month from august to april.

Methods-

Well established sampling protocols for spider collection and identification are adopted in different selected sampling spots. The detailed descriptions of the collection techniques are as follows- i) Sweep Netting, ii) Ground Hand Collecting (iii) Aerial Hand Collecting, (iv) Vegetation Beating, (v) Litter sampling. With the above methods of collections the spiders were collected and observed under stereo-zoom binocular microscope (for small/tiny spiders) wherever necessary in the field itself. Later all the spiders were photographed by Canon 60 D with macro lens in their natural habitat (Specimens were not collected during this study).

| Oxyopes Sp. (Female) | Oxyopes Sp. (Male) |
| Oxyopes Sp. (Male) | *Peucetia* Sp. (Female) |
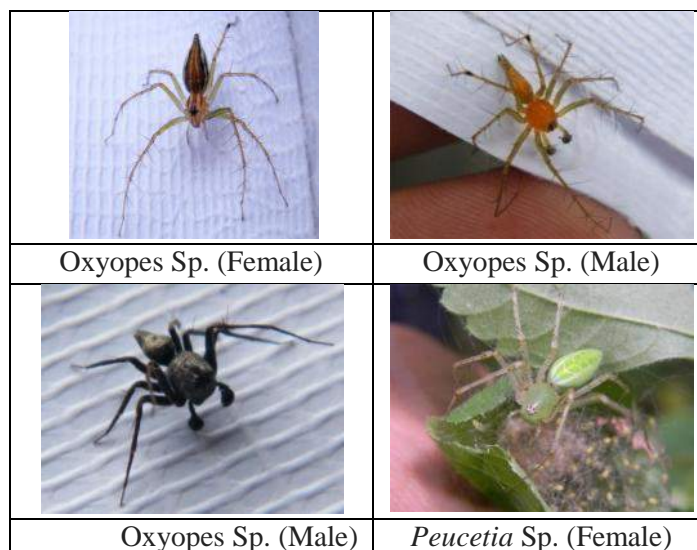
Results and Discussion-

During the present study A total Five genus namely Hamadruas, Hamataliwa, Oxyopes, Peucetia, Tapinillus species of family Oxyopidae (Arachnida: Araneae) were recorded from the study area during August 2019 to 2015 to January 2020. Earlier no work has been carried out in Malrajura forestfor spider diversity especially on family Oxyopidae and this is the first report.

Acknowledgements-

Authors are very much thankful to the forest office Patur circle and the help from the forest guards during field surveys.

References-

1) Brignoli, P. M. (1983): A catalogue of the Araneae described between 1940 and 1981. *Manchester Univ. Press*. 755 pp.
2) Cambridge, O. P. (1876a): On a new order and some new genera of Arachnida from Kerguelen's Land. *Proc. Zool. Soc. Lond.* 1876: 258-265.
3) Cambridge, O. P. (1876b): Catalogue of a collection of spiders made in Egypt, with descriptions of new species and characters of a new genus. *Proc. Zool. Soc. Lond.* 1876: 541-630.
4) Cambridge, F. O. P. (1892): On a new spider from Calcutta. *Annals and Magazine of Natural History* (6) 10: 417-419.
5) Cambridge, F. O. P. (1897): On the cteniform spiders of Ceylon, Burma and the Indian archipelago west and north of Wallace's line; with bibliography and list of these from Australia, South and east of Wallace's line. *Annals and Magazine of Natural history* (6) 20: 329-356.
6) Cambridge, O. P. (1885): Araneida. In scientific results of the second Yarkand mission. Calcutta: 1-115.
7) Clarke, K. R., (1993): Nonparametric multivariate analyses of changes in community structure. *Australian Journal of Ecology* 18, 117-143.
8) Dippenaar-Schoeman, A. S. and Jocque R. (1997): African Spiders : An identification Manual. Plant Protection Research Handbook no. 9. *Agricultural Research Council*, *Pretoria*. 392 pp.
9) Gajbe, U. A. 1(999): Studies on some spiders of the family Oxyopidae (Araneae: Arachnida) from India: *Records of Zoological Survey of India,* 97(3): 31-79.
10) Gajbe, U.A. (1992h): A new species of *Oxyopes* Latreille and one *Peucetia* Thorell from Uttar Pradesh, India (Araneae: Oxyopidae). *Rec. Zool. Surv. India*. 91(3-4): 389-393.
11) Gajbe, U.A and Gajbe P. U. (1999f): Two new species of *Oxyopes* Latreille (Araneae: Oxyopidae) from Jabalpur, M. P., India. *Geobios* 18(1): 13-16.
12) Gajbe, U. A. (1995a): Spiders Fauna of Conservation Areas: Fauna of Kanha Tiger Reserve, Madhya Pradesh. *Zooological Survey of India*, Publication: 27-30.
13) Gajbe, U. A. (1995b): Spiders, Fauna of Conservation Areas: Fauna of Indravati Tiger Reserve, Madhya Pradesh. *Zoological Survey of India*, Publication: 53-56.

14) Gajbe, U. A. (1999): Studies on some spiders of the family Oxyopidae (Araneae: Arachnida) from India: *Records of Zoological Survey of India,* 97(3): 31-79.

15) Hore, U. and V.P. Uniyal (2008b): Diversity and composition of spider assemblages in five vegetation types of the Terai Conservation Area, India. *J.Arachnol*. 36: 251-258.

16) Hore, U. and V.P. Uniyal (2008a): Effect of prescribed fire on spider assemblage in Terai grasslands, India. *Turkish Journal of Arachnology*, Vol.1 (1): 15-36.

Some Therapeutic Plant In Patalkot, Tamia, Chhindwara District Madhya-Pradesh

Omkar Bawistale
Department of Botany; Govt. College Sausar,
District Chhindwara, M.P.

Brajesh Shau
Range officer of Chhindi (Patalkot) Tamia,
District Chhindwara

Abstract

   Extensive ethnomedicinal survey was carried out to document the precious indigenous healthcare practices prevalent among the different ethnic groups of Patalkot, Tamia, Chhindwara District, Madhya Pradesh, India. These people belonging to primitive or aboriginal culture possess a good deal of information about medicinal utility of plant species. During the survey, it was noted that plant parts, used by the tribals to cure various diseases and disorders. Indigenous healthcare practices, provide low cost alternatives, where western healthcare services are not available or are too expensive. A list of plant species along with their parts used and the mode of administration for effective control in different ailments are given.

Keywords: Ttherapeutic Plant, Patalkot, Chhindwara District, M.P

Introduction

   "Patalkot" situated in the hilly block 'Tamia' of Chhindwara district, has acquired great importance because of its Geographical and Scenic beauty. Patalkot is a lovely land scape located at a depth of 1200-1500 feet in a valley. Because of the great depth at which it is located this place is christened as 'Patalkot' (Patal means very deep, in Sanskrit). When one looks down the place sitting at the top of the valley, the placed looks like a horse shoe in shape. People belive it as the entrance to 'Patal'. There is one more belief that after worshipping 'Lord Shiva' Prince 'Meghnath' had gone to Patal-lok through this place only. People say that this place was ruled by in 18th and 19th century and that there was a long tunnel connecting this place to 'Pachmarhi' in Hoshngabad District. The place is spread over an area from 22.24˚ to 22.29˚ North. 78.43˚ to 78.50˚ East. The place is located at a distance of 62 Km. from the district headquarters in the North-West direction, and 23 km. from Tamia in North-East direction.

Methodology

   Ethnomedicinal surveys were conducted repeatedly in different seasons and areas for 2 yrs. Before actually launching into the field work; rapport was established with one or two persons preferably the chief, guidance sought and contact was then established with other tribals of the locality. The linguistic fluency, personality and social standing are crucial to establishing rapport between the participants involved. The local informants were the medicine men, men and women working in the field, village headman, priests and other community leaders. Field sites were visited with the local medicine man. During the survey, some interesting folk uses of plants have come to light which are not mentioned in literature related to medicinal plants. The collected medicinal plants were identified up to species level with the help of floras The information about the medicinal properties of plants is given by mentioning their local name, parts used, mode of their administration and uses.
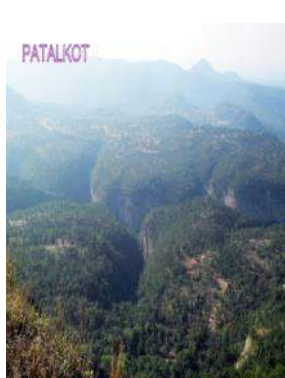
Patalkot, Tamia Chhindwara   District Map of Patalkot
Table — Plants used to cure various ailments

	Plant name	Local names	Uses
1.	*Achyranthes aspera* Linn. (Amaranthaceae)	*Ulta kata*	Root extract is taken orally by the tribals as an antidote in scorpion bite.
2.	*Aloe vera* Linn. (Liliaceae)	*Gawarpatha*	Leaf is cut laterally and *Curcuma aromatica* powder is sprinkled on the cut portion, warmed and tied locally, on both sides of fractured bone.
3.	*Aristolochia indica* Linn. (Aristolochiaceae)	*Gorisal*	Root paste is massaged locally in eczema. Herbal bath of *Azadirachta indica* leaves is considered beneficial.
4.	*Asparagus racemosus* Willd. (Liliaceae)	*Satawari,*	Tubers are lactogogues. Tuber powder is given orally to nursing mothers for seven days early in the morning for lactation.
5.	*Barleria prionitis* Linn. (Acanthaceae)	*Bajradanti, Kanta sulio*	Root extract is applied locally on skin to expel out spine from the skin.
6.	*Biophytum sensitivum* (Linn.) DC. (Oxalidaceae)	*Lajwanti*	Whole plant extract is given to children orally in dysentery.
7.	*Boerhavia diffusa* Linn. (Nyctaginaceae)	*Punarnava*	Leaves are chewed by the tribals in scorpion bite.
8.	*Butea monosperma* (Lam.) Taub. (Fabaceae)	*Dhauk, Palas*	Seed paste is taken orally along with fresh cow milk early in the morning for 20 days to cure asthma.
9.	*Calotropis procera* (Ait) R. Br. (Asclepiadaceae)	*Akdo, Aak, Aakro*	Latex of *Calotropis procera* and *Mangifera indica* mixed with one drop of concentrated HCL is applied locally as an antidote in scorpion bite.
10.	*Cayratia trifolia* (Linn.) Domin (Vitaceae)	*Amarchotioo*	Leaf paste of *Gymnema sylvestris* and *Carytia trifolia* is applied locally in eczema. Plant paste of *Carytia trifolia* is applied locally by the tribals for early cure of purulent wound.
11.	*Cayratia auriculata* Gamble (Vitaceae)	*Amarchotioo*	Plant paste of *Carytia auriculata* is applied locally for early cure of purulent wound.
12.	*Cocculus hirsutus* (L.) Diels (Menispermaceae)	*Jal jamni*	One teaspoon leaf powder is taken orally once in a day for 8 days to cure night blindness.
13.	*Commelina benghalensis* Linn. (Commelinaceae)	*Bokhania, Bukana*	Roots along with *Piper betel* leaves are chewed in malarial fever (alternate fever). Leaf juice is also poured in the ear for the same.
14.	*Commelina forskalaei* Valh(Commelinaceae)	*Mirja*	Plant extract is massaged locally/ taken orally twice a day for 15 days to cure rheumatism and body swelling.
15.	*Corallocarpus epigaeus* (Rottl. & Willd.) Hook. f. (Cucurbitaceae)	*Marsikand*	One tea spoonful root powder mixed with three teaspoon refined butter is taken orally as an antidote in snakebite.
16.	*Curculigo orchioides* Gaertn. (Hypoxidaceae	*Kali musli*	Tuber powder is taken with one cup refined butter in snakebite; taken orally for 7-10 days to cure leucorrhoea and menorrhagia; given orally to children in rickets.
17.	*Curcuma amada* Roxb. (Zingiberaceae)	*Jangli haldi*	Tuber powder mixed with equal quantity of *Trachyspermum ammi* seed powder is given orally once a day for 3 days to cure rickets.
18.	*Cynodon dactylon* (Linn.) Pers. (Poaceae)	*Doob*	Half cup extract of whole plant is taken orally by the tribals in dysuria.
19.	*Dalbergia latifolia* Roxb. (Fabaceae)	*Kala sisam*	Leaf extract is taken orally by the tribals in dysentery.
20.	*Dioscorea bulbifera* Linn. (Dioscoreaceae)	*Vadarikand, Jangli aritha*	Tablet prepared by mixing one crushed *Dioscorea bulbifera* bulbil, a pinch of common salt, *Curcuma aromatica* powder and jaggery is given once in a day for three days to child patient suffering from typhoid.
21.	*Ehretia laevis* Roxb. (Ehertiaceae)	*Tamboliya*	Leaves are chewed orally to cure mouth blisters.
22.	*Euphorbia hirta* Linn. (Euphorbiaceae)	*Dudhi, Choti dudhi*	Plant paste is taken with water to cure dysentery. Plant extract is also given orally to children as febrifuge.
23.	*Girardinia zeylanica* Decne. (Urticaceae)	*Dugio*	Tribal ladies of *Hadoti* region take root paste orally for inducing sterility.
24.	*Holarrhena antidysenterica* Walls. (Apocynaceae)	*Kadu*	Stem bark decoction of *Holarrhena antidysenterica* and *Curcuma aromatica* tuber is taken once in a day for 3 days in rheumatism.
25.	*Holoptelea integrifolia* Planch. (Ulmaceae)	*Bander bati, Churil*	Leaf paste is applied locally to cure eczema
26.	*Jatropha curcus* Linn. (Euphorbiaceae)	*Ratanjot*	Latex mixed with water is taken orally by the *Gujars* of Jhalawar and Baran districts to cure leukemia. Salt, spices and acidic food is prohibited during treatment.
27.	*Kickxia ramosissima* (Wall.) Janchen (Scrophulariaceae)	*Kaskatali*	Whole plant extract is taken orally in rheumatism. Leaf extract is taken orally for first 3 days during menses in dysmenorrhoea. During treatment, oil and acidic diet is strictly prohibited.
28.	*Leucas aspera* (Willd.) Link. (Lamiaceae)		The smoke of whole plant is inhaled by the tribals to cure small pox.
29.	*Melia azedarach* Linn. (Meliaceae)	*Bakain*	Leaf paste is massaged on the body of children to cure rickets.
30.	*Merremia emarginata* (Burm. f.) Hall. f. (Convolvulaceae)	*Popli*	Extract of 10-12 seeds is taken orally by the tribal men for 10-12 days to cure sexual debility.

31.	*Momordica dioica* Roxb. ex Willd. (Cucurbitaceae)	*Kikora*	Seed paste is applied on the lower abdomen in dysuria and also to cure constipation.
32.	*Phyllanthus emblica* Linn. (Euphorbiaceae)	*Amla*	Powder of *Carissa congesta* fruits, *Phyllanthus emblica* fruits, *Tamarindus indicus* pods and unripe fruits *of Mangifera indica* is taken for constipation.
33.	*Phyllanthus fraternus* Webst. (Euphorbiaceae)	*Bhui – amla*	Powder prepared by mixing *Phyllanthus fraternus* whole plant, *Trachyspermum ammi* seeds and common salt is taken orally after meal to cure constipation. Plant extract is given orally once or twice in a day to children as febrifuge.
34.	*Phyllanthus simplex* Retz. (Euphorbiaceae)	*Bhui – amla*	Plant extract is given orally once or twice in a day to children as febrifuge.
35.	*Piper betel* Linn. (Piperaceae)	*Nagarbel, Paan*	Paste prepared by mixing the fresh *Paan* leaves with inner bark of *Acacia catchu* (*Katha*) is massaged on the skin of children in maggots.
36.	*Solanum nigrum* Linn. (Solanaceae)	*Bhutta kateli*	Fruit cut in lengthwise, filled with purified butter is eaten in cough and cold.
37.	*Sterculia urens* Roxb. (Solanaceae)	*Kadaya*	Gum paste is applied locally in eczema and taken orally to cure dysentery.
38.	*Trichosanthes cucumerina* Linn. (Cucurbitaceae)	*Kechan*	Tuber powder is taken orally once in a day for 3 days in colic. Leaf decoction is taken as an antidote in snakebite.
39.	*Tubiflora acaulis* (L.f.) Kuntze (Acanthaceae)	*Pattar chatta*	Leaf extract is taken orally during first 2-3 days of menses in dysmenorhoea. During treatment, oil and acidic diet is strictly prohibited. Leaf powder is taken with water to remove kidney stone.
40.	*Urginea indica* (Roxb.) Kunth (Liliaceae)	*Jangli – kanda*	Poultice of crushed tuber is tied locally by the *Gurjars* to cure abscesses.

Angulus sp./ *Cyprae a* sp.	Sea shell	*Shankh*	Micro fine powder of shell of either *Angulus sp.* or *Cypraea sp.* is given orally to pregnant ladies in calcium deficiency and also as antacid.
Bos bubalus	Buffalo	*Bhens*	Mixture of buffalo dung and curd is applied locally to cure severe itching.
Bos indicus	Cow	*Gai*	Seed paste of *Cassia tora* in curd and cow urine is massaged over the body to cure itching.
Cervus unicolour	Sambhar	*Sambhar*	Paste of *Sambhar* horn is applied in eyes as eye liner in cataract.
Equus asinus (female)	She donkey	*Gadhi*	Milk is given once in a day for one month to the patient of tuberculosis. During the course of treatment fish is consumed in diet in adequate quantity.
Equus asinus (male)	Donkey	*Gadha*	Paste of *Curcuma amada* tuber and *Trachypermum ammi* seeds in donkey urine is given twice a day for three days to cure amebiosis. *Trachyspermum ammi* seeds soaked in donkey urine for about 12–16 hrs are dried and powdered. Paste prepared from the powder with jaggery or sesamum oil is given daily to save abortions.
Gallus gallus domesticus	Hen	*Murgi*	Decoction of *Cassia fistula* pods, *Allium sativum* bulb lets, *Piper nigrum* seed powder, *Curcuma aromatica* rhizome and jaggery is given thrice a day for three days to cure typhoid. During the course of treatment, intake of hen eggs is prescribed in adequate quantity for speedy recovery.
Labeo rohita/ Catla catla	Fish	*Machali*	Paste of *Holarrhena pubescens* bark and *Adathoda zeylanica* leaves mixed in fish oil is massaged locally to cure paralysis. Small fishes molded in *Themeda quadrivalvis* grass are fed to cattle by the tribals of southern Rajasthan to cure flatulence.
Maccacca sp	Monkey	*Bander, Daal bokaroo*	Monkey liver is offered by the men of *Kathodia* tribe to their pregnant wives as a nutritive diet. The tribe is also known as monkey eating tribe.
Moschus moschiferus	Musk deer	*Hiran*	*Kasturi* obtained from the naval potion of *Moschus moschiferus* is used to stimulate the internal organs of the body, in low blood pressure and to increase vitality.
Palamneaus sp.	Scorpion	*Bichoo*	Live black scorpion poured in boiled *Brassica campestris* oil is applied locally in scorpion bite as antidote.
Pavo cristatus	Peacock	*Mor*	*Zea mays* (silk), *Tagetes erecta* (whole plant), *Chenopodium murale* (whole plant) and peacock feather mixed together & inserted in *chilam* (cigar) is inhaled to cure hiccup (*Hichki*).
Pteropus sps	Bat	*Chimgadar*	*Pteropus* sp is hunted and washed in water and $KMnO_4$ solution. Decoction of bat is given orally to the patient suffering from rheumatoid arthritis.

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293
(Special Issue No.70)   Peer Reviewed Journal   www.aiirjournal.com Mob. 8999250451

215

Results and discussion

The traditional knowledge system in India is fast eroding. There is an urgent need to prepare inventories and record all ethnobiological information available among the diverse ethnic communities before the traditional culture is completely lost. Ethnomedicinal uses of 45 plant species belonging to 29 families (Table 1) and of 13 different animal byproducts (Table 2) have been documented for their therapeutic properties for curing various ailments such as sexual diseases, blood cancer, rickets, urinary diseases, skin diseases and ailments related to digestive system, respiratory system and liver complaints. Out of 45 plant species, ethnomedicinal uses of 7 plants species, viz. *Aristolochia indica, Biophtyum sensitivum, Cayratia auriculata, Commelina forskalaei, Girardinia zeylanica, Kickxia ramosissima* and *Merremia emarginata* are hitherto not reported (Figs 1-8). Most of the remedies reported here are not reported earlier. *Balanites aegyptica* seed kernel is used to get relief from sciatica pain; *Aristolochia indica* roots are used to cure eczema; tubers of *Curculigo orchioides* and *Curcuma amada* are used to cure rickets; *Dioscorea bulbifera*bulbils are used to cure typhoid of children; *Jatropha curcas* latex is used to cure leukemia while *Girardinia zeylanica* root extract is used by the tribals to develop complete sterility among tribal women. Hence, the role of ethnomedicinal surveys and field work is of crucial importance as much acquired knowledge through the ages is passed on from generation to generation as a guarded secret of certain families. Therefore, it is necessary to popularize the identity and utility of these medicinal plants.

During the survey it was noted that tribals categories the human ailment in two broad categories, *Shatriya* and *Khatriya*. *Shatriya* are those ailments, which are cured by remedies derived from plant or plant parts. *Khatriya* ailments are cured only by animal based remedies. To cure rheumatoid arthritis, decoction prepared from *Pteropus* sp. is used and in scorpion bite, remedies prepared from highly poisonous scorpion are used as an antidote. So in addition to plants, there has been increasing attention paid to animals and their byproducts (shell, feather, curd, egg, urine, horn, milk and curd), both vertebrates and invertebrates as source of curative, protective and preventive medicine. Majority of animal substances used in traditional medicine are readily available while some are derived from rare such as, *Pavo cristatus,Cervus unicolour, Moschus moschiferus* animals (Table 2). In traditional medicine, some animal products as food are used as remedy, e.g. in tuberculosis, along with herbal remedy, the medicine men prescribe large quantity of fish in diet for speedy recovery and in typhoid, egg of hen is prescribed. Liver of monkey is offered by tribal man of *Kathodia* tribe as nutritive diet. Because of this common practice, this tribe is also called as *Monkey eating* tribe.

Economic activities have been putting severe constraints on the availability and accessibility of specific types of plant and animal species used for medicinal purposes[5]. For centuries, healers and indigenous people have been collecting medicines from local plants and animals without threatening the population dynamics of the species because of the low level of harvesting. Loss of traditional knowledge has impact on the development of modern medicine. A great number of these natural products have come from the scientific study of remedies traditionally employed by various cultures[30]. In addition to plants, there has been increasing attention paid to animals, both vertebrates and invertebrates, as sources for new medicines. Animals have been methodically tested as sources of drugs for modern medical science and the current percentage of animal sources for producing essential medicines is quite significant[31]. As of the 150 prescription drugs currently in use in the United States of America, 27 have animal origin. The list of folk medicinal plants and animals from the tribal area of Rajasthan and their utilization will provide basic data for further studies aimed at conservation, cultivation, traditional medicine and economic welfare of rural and tribal population of the region.

Acknowledgement

References

1) Marques JGW, *Fauna medicinal: Recurso do ambiente ou ameaça à biodiversidade*? Mutum, 1(1997) 4.
2) Unnikrishnan PM, Animals in Ayurveda, *Amruth*, 1998, 1-15.

National Conference on Multidisciplinary Research in Science and Technology for Healthy Lifestyle Management (NCMRST- 2020) Organizer :- Shri R.L.T. College of Science, Akola

24th Jan. 2020

3) Adeola MO, Importance of wild Animals and their parts in the culture, religious festivals, and traditional medicine of Nigeria, *Environ Conserv,* 19 (1992) 125134.

4) Anageletti LR, Agrimi U, Curia C, French D & Mariani-Costantini R, Healing rituals and sacred serpents, *Lancet*, 340 (1992) 223-225.

5) Anyinam C, Ecology and Ethnomedicine: Exploring Links between Current Environmental Crisis and Indigenous Medical Practices, *Soc Sci Med*, 40(1995) 321-329.

6) Singh V & Pandey RP, *Ethnobotany of Rajasthan, India*, (Scientific Publishers, Jodhpur), 1998.

7) Joshi P, *Ethnobotany of the Primitive Tribes in Rajasthan*, (Printwell, Jaipur), 1995.

8) Sebastian MK & Bhandari MM, Medico-ethnobotany of Mt Abu, Rajasthan, *J Ethnopharmacol*, 12(1984) 223-230.

9) Katewa SS & Arora A, Some plants in folk medicine of Udaipur district (Rajasthan), *Ethnobotany,* 9 (1997) 48-51.

10) Sharma KC & Asawa JS, Ethnomedicinal plants of central Aravallis of Rajasthan, *Hum Ecol,* 7(1999) 167-174.

11) Katewa SS, Choudhary BL, Jain A & Takhar HK, Some plants in folk medicine of Rajsamand district (Rajasthan), *Ethnobotany,* 13 (2001) 129-134.

12) Katewa SS, Guria BD & Jain A, Ethnomedicinal and obnoxious grasses of Rajasthan, India, *J Ethnopharmacol*, 76 (3) (2001) 293-297.

13) Katewa SS, Chaudhary BL, Jain A & Galav PK, Traditional uses of plant biodiversity from Aravalli hills of Rajasthan, *IndianJ Traditional Knowledge,* 2 (1) (2003) 27-39.

14) Katewa SS, Chaudahry BL, Jain A, Folk herbal medicines from tribal area of Rajasthan, India, *J Ethnopharmacol,* 92 (2004) 41-46.

15) Katewa SS, Jain A, Chaudhary BL & Galav PK, Some unreported medicinal uses of plants from the tribal area of Southern Rajasthan, *Bull Bot surv India*, 47 (2004) 121-130.

16) Jain A, Katewa SS, Choudhary BL & Galav P, Folk herbal medicines used in birth control and sexual diseases by tribals of Southern Rajasthan, India, *J Ethnopharmacol,* 90 (1) (2003) 171-177.

17) Jain A, Katewa SS, Galav PK & Sharma P, Medicinal plant diversity from the Sitamata wild life sanctuary, Chittorgarh district India, *J Ethnopharmacol,* 102 (3) (2005) 543-557.

18) Jain A, Katewa SS & Galav PK, Some interesting phytotheraputic claims by the tribals of Southern Rajasthan, India, *Indian J Traditional knowledge,* 4 (3) (2005) 291-297.

19) Katewa SS & Galav PK, Traditional folk herbal medicines from Shekhawati region of Rajasthan, *Indian J Traditional knowledge,* 4 (3) (2005) 237-245.

20) Hooker JD, *Flora of British India*, Vol 1-7, (L Reeve &Co, NR Ash food, Kent), 1872-1897.

21) Singh V & Shetty BV, *Flora of Rajasthan,* Vol I-III, (BSI, Kolkata), 1987-1993.

22) Bhandari MM, *Flora of Indian Desert,* (Scientific Publishers, Jodhpur), 1990.

23) Robinson JG & Bennett EL, Carrying capacity limits to sustainable hunting in tropical forests, In: *Hunting for Sustainability in Tropical Forests*, edited by Robinson JG, Bennett EL, (Columbia University Press, New York) 2000,13-30.

24) Robinson JG & Bennett EL, *Will alleviating poverty solve the bush meat crisis*? http://dx.doi.org/10.1017/S0030605302000662 Oryx. 36 (2002) 332.

25) Bennett EL, Milner-Gulland EJ, Bakarr M, Eves HE, Robinson JG & Wilkie DS,, Hunting the world's wildlife to extinction*, Oryx*, 36 (2002) 328-329.

26) Boehlert GW, Biodiversity and the sustainability of marine fisheries*, Oceanography*, 9 (1996) 28-35.

27) Steneck RS, Human influences on coastal ecosystems; does over fishing create tropic cascades? *Trends Ecol Evol*, 13(1998) 429–430.

28) Jennings S & Kaiser MJ, The effects of fishing on marine ecosystems, *Adv Mar Biol,* 34 (1998) 203-351.

29) Jennings S, Kaiser MJ & Reynolds JD, *Marine Fisheries Ecology,* (Blackwell Science, Oxford), 2001.

30) Holmstedt B & Bruhn JG, Ethnopharmacology — a challenge, *J Ethnopharmacol,* 8 (1983) 251-256.

31) Kunin WE & Lawton JH, Does biodiversity matter? Evaluating the case for conserving species. In: *Biodiversity: a biology of numbers and differences,* edited by Gaston KJ, (Blackwell Science,Oxford), 283-308, 1996.

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293 (Special Issue No.70) Peer Reviewed Journal www.aiirjournal.com Mob. 8999250451

217

Role of Carbohyadrates, Proteins, Lipids And Nucleic Acid In Living Organisms: A Study

Dr. Y.G.Thakre, Prof.Archana A.Dupare

Assistant professor, Department of Home Science, Yeshwant Mahavidyalaya, Wardha, Maharashtra

Abstract:

Carbohydrates, proteins, lipids and nucleic acid are four main categories of molecules found in living things. They are vital for live on earth and perform range of functions such as providing energy, structural support and cellular communication. Cell in human body require many compounds to survive. The main substances found in every cell are a combination of lipids, carbohydrates, nucleic acid and proteins. Each of these substances plays a different role in the body, and all of them must either come from the diet or to be manufactured from the diet or to be manufactured using other chemicals in the body. In this article, I have explained all these biomolecules as they are essential for living organisms.

Keyword: Carbohydrates, proteins, lipids and nucleic acid.

Introduction:

The large molecules necessary for life that are built from smaller organic molecules are called biological macromolecules. There are four major classes of biological macromolecules (carbohydrates, lipids, proteins, and nucleic acids), and each is an important component of the cell and performs a wide array of functions. Combined, these molecules make up the majority of a cell's mass. The macromolecules (carbohydrates, lipids, proteins, and nucleic acids) form membrane which in turn organizes into organelles, cells, tissues, organs and finally the whole organism. Life is composed of lifeless chemical molecule .A single cell of the bacterium, Escherichia coli contains about 6000 different organic compounds. It is believed that man may contain about 100, 00 different types of molecules although only a few of them have been characterized [1].

Carbohydrates:

Carbohydrates perform a various role in living organisms. They are the important source of energy. The body uses carbohydrates to make glucose which is the fuel that gives it energy and helps keep everything going. However, excess carbohydrate consumption has negative health effects [2].Carbohydrates are the main source of energy that is ingested by the human body [3].Brain mainly utilizes the glucose. Red blood cells also use glucose only. Fiber in the diet is not digested by human body due to lack of cellulose enzyme. Glucose is the major energy source in the body. Glycogen is the storage form of glucose and glycogen is stored in skeletal muscles and liver. If glucose intake exceeds than it is utilized in the body it is converted into fat. Ribose's are utilized in formation of deoxyribonucleic acid [4] .Carbohydrates are a major source of energy in the human diet with intakes ranging from 40 to 80% of total energy requirements. Carbohydrates constitute the main source of energy for all body functions, particularly brain functions, and are necessary for the metabolism of other nutrients [5]. Carbohydrates are synthesized by all green plants and in the body are either absorbed immediately or stored in the form of glycogen. They can also be manufactured in the body from some amino acids and the glycerol component of fats. Moreover, sugars can be added to foods during processing or preparation, mainly to enhance food sensorial [6] Cereals, vegetables, fruits, rice, potatoes, legumes, and flour products are the major sources of carbohydrates. Thus, naturally occurring sugars are consumed as part of a healthy diet. Monosaccharide's, sucrose, and polysaccharides are present in all vegetables [7].

Functions of carbohydrates:

Carbohydrates participate in a wide range of functions. They are most abundant dietary source of energy (4 cal/g) for all organisms. Carbohydrates are precursors for many organic compounds (fats and amino acids).Carbohydrates as glycoprotein's and glycolipids participate in the structure of cell membrane and cellular functions such as cell growth, adhesion and fertilization. They are structural components of many organisms.

These include the fiber of plants, exoskeleton of some insect and cell wall of microorganisms .Carbohydrates also serve as the storage form of energy to meet the intermediate energy demands of the body.

Classification of carbohydrates:

Carbohydrates are polyhydroxy alcohol with potentially active carbonyl group which may be aldehyde or keto group. Carbohydrates can be classified on the basis of carbon atom present in the carbohydrates. Carbohydrates are classified into four type's monosaccharides, disaccharides, oligosaccharides, polysaccharides.

Proteins:

Proteins are made up of hundreds or thousands of smaller units known as amino acids. There are 20 different kinds of amino acids that are linked together by peptide bond to make a protein molecule. The sequence of amino acids determines each proteins unique 3-dimensional structure and its specific function such as catalysis of biochemical reactions, mechanical support and immune protection, movement, transport of ligand, transmit nerve impulses and control growth and differentiation [8].With the genome sequence of many organisms now complete research is turning to the study protein function. Hair, nails are mostly made of protein. Your body uses protein to build tissues. You also use protein to make enzymes, harmones, and other body chemicals .Protein is an important building block of bones, muscles, cartilage, skin and blood.

The English word protein originated from Greek "proteios" meaning prime or primary .This term is very appropriate in nutrition because protein is most fundamental component of tissue in animal and humans. Amino acid provides nitrogen, hydrocarbon, skeletons, and sulfur (essential components of organisms), and cannot be replaced by any other nutrients (including carbohydrates and lipids) because neither nitrogen nor sulfur is made in the body. Amino acid essential precursors for the synthesis of proteins, peptides, are low molecular weight substances [9, 10].

Functions of proteins:

Proteins perform a great variety of specialized and essential functions in living cells. These functions may be broadly grouped as structural and dynamic. Structural functions: Certain proteins perform brick and mortar roles and are primarily responsible for structure and strength of body .These include collagen and elastin found in bone matrix ,vascular system and other organs and alpha-keratin present in epidermal tissues. Dynamic function: The dynamics functions of proteins are more diversified in nature. These include proteins acting as enzymes, hormones, blood clotting factors, immunoglobulin's, membrane receptors, storage proteins, besides their function in genetic control, muscle contraction ,respiration etc. Proteins performing dynamic functions are appropriately regarded as the working horses of cell.

Classification of proteins:

Proteins can be classified as:

(a) Simple proteins. On hydrolysis they yield only the amino acids and occasional small carbohydrate compounds. Examples are: albumins, globulins, glutelins, albuminoids, histones and protamines.

(b) Conjugated proteins. These are simple proteins combined with some non-protein material in the body. Examples are: nucleoproteins, glycoproteins, phosphoproteins, haemoglobins and lecithoproteins.

(c) Derived proteins. These are proteins derived from simple or conjugated proteins by physical or chemical means. Examples are: denatured proteins and peptides.

Lipids:

Lipids play several roles in organisms. Lipids make up protective barriers. They comprise cell membranes and some structure of cell wall in plants.Lipids provides energy storage to plants and animals. Quite often, lipids function alongside proteins. Lipid functions can be affected by changes to terry polar head groups as well as their side chains.

Phospholipids form the foundation for lipid bilayers ,with their amphipathic nature, that make up cell membrane .The outer layer interacts with water while the inner layer exists as flexible only substance. The liquid nature of cell membrane aids in their function. Lipids make up not only plasma membrane, but also cellular compartments such as the nuclear envelop, endoplasmic reticulum (ER), Golgi apparatus and vesicles. Lipids also participate in cell division.Dividing cell regulate lipid content depending on cell cycle. At least eleven lipids are involved in cell cycle activity .Sphingolipids play a role in cytokinesis during interphase. Because cell division results in plasma membrane tension ,lipids appear to help with mechanical aspects of division such membrane stiffness. Lipids provide protective barriers for specialized tissue such as nerves. The protective myelin sheath surrounding nerves contains lipids [11].

Functions of lipids:

Lipids perform several important functions-They are concentrated fuel reserve of the body. Lipids are the constituents of membrane structure and regulate the membrane permeability .They serve as a source of fat soluble vitamins(A,D,E and K).Lipids are important as cellular metabolic regulators .Lipids protect the internal organs ,serve as insulating materials and give the shape and smooth appearance to the body.

Classification of Lipids:

Lipids are broadly classified into simple, complex, derived and miscellaneous lipids, which are further subdivided into different groups.

Nucleic acid:

Nucleic acid received their name because they were originally isolated from cell nuclei. They contain carbon; hydrogen, oxygen; nitrogen and phosphorus have acidic character and are found in all living beings. They are linear macromolecule formed by the polymerization of units called nucleotide. Nucleic acid play important functions in the cell: they are the repository of the genetic information responsible for the transmission of inherited characteristics from parents to children and from one cell to another; they guide cell protein synthesis and are responsible for correct assembly amino acid is defined sequences. The particles in nucleus of the cell, responsible for heredity, are called chromosomes which are made up of proteins and another type of biomolecules called nucleic acids. These are mainly of two types, the deoxyribonucleic acid (DNA) and ribonucleic acid (RNA). Since nucleic acids are long chain polymers of nucleotides, so they are also called polynucleotides.Nucleic acid contain the genetic information and play key role in protein biosynthesis. They are formed by the polymerization of units called nucleotides, which consist of a nitrogenous base, an aldopentose and phosphoric acid. The base can be a pyrimidine: thymine, cytosine and uracil or purine: adenine and guanine [12].

Functions of nucleic acid:

DNA is the chemical basis of heredity and may be regarded as the reserve bank of genetic information.DNA is exclusively responsible for maintaining the identity of different species of organisms over millions of years. The cellular function is under the control of DNA. The genes control the protein synthesis through the mediation of RNA.

Classification of Nucleic acid:

Nucleic acids are divided into classes on the basis of the sugar used to form the nucleotides. Ribonucleic acid (RNA) is built on a b-D-ribofuranose ring. Deoxyribonucleic acid (DNA)

Conclusion:

From the above study it is concluded that food provides the body with the nutrients it needs to survive. Many of these critical nutrients are biological macromolecules, or large molecules, necessary for life. These four essential molecules are classified as proteins, nucleic acids, carbohydrates and lipids. They provide structure and energy to the cell of living organisms. In addition, these molecules are necessary for the various

functions in cells, therefore, they are referred as fundamental molecules of life. Therefore there is need to study in details above biological macromolecule

References:

1) U.Satyanarayan, U.Chakrapani, Biochemistry, books and allied (p) limited (2008), 3-4

2) Nicoleta a. Neacşu1, Effects of carbohydrate consumption. Case study: carbohydrates in bread, Bulletin of the Transilvania University of Braşov Series V: Economic Sciences • Vol. 7 (56) No. 2 – 2014

3) Caffall KH, Mohnen D (2009). The structure, function, and biosynthesis of plant cell wall pectic polysaccharides. Carbohydrate Res. 344(14):1879-1900

4) Hou D, Lowary TL (2009). Recent advances in the synthesis of 2- deoxy-glycosides, Review Article. Carbohydrate Res. 344(15):1911- 194.

5) Muir, J. G., Rose, R., Rosella, O. et al. 2009. Measurement of short-chain carbohydrates in common Australian vegetables and fruits by high-performance liquid chromatography (HPLC). J. Agric. Food Chem. 57:554-565.

6) Murphy, S. P., Johnson, R. 2003. The scientific basis of recent US guidance on sugars intake. Am. J. Clin. Nutr. 78:827S-833S.

7) Hounsome, N., Hounsome, B., Tomos, D., Edwards-Jones, G. 2008. Plant metabolites and nutritional quality of vegetables. J. Food Sci. 73:R48-R65.

8) Rizwan Hasan Khan , M.khusheed siddi, Parveen salahuddin, 2017,Basic Biochemistry, www.austinpublishinggroup.com / eBook.

9) D.Tome Food Nutr.Bull.2013,34,272-274.

10) A, San Gabriel and H.Uneyama,Amino Acids,2013,45,451-461

11) William Dowhan, Mikhail Bogdanov, Euugenia Mileykovskya, Functional role of lipids in membranes, chapter - 1, 2015 https:www.researchgate.netpublication/316998196.

12) Antonio Blanco.,Gustavo Blanco,Medical Biochemistry,chapter-6 ,Nucleic Acid 2017,121-140

Study Acoustical Parameters of Ternary Liquid Mixtures of Alcohol + Trietyhylamine + Acetic Acid Through Adiabatic Compressibility and Excess Compressibility

P. J. Thakare

Shri Shivaji Arts Commerce and Science College, Akola

Abstract-

Ultrasonic velocities, Densities and Viscosities are measured for ternary liquid mixture of Acetic acid and triethylamine (TEA) with ethanol. From this experimental data adiabatic compressibity and excess adiabatic compressibility have been calculated. The behaviour of mixture has been investigated at three different temperatures 303K, 308K and 313K for frequency 2Mz..

Keywords- molecular interactions, hydrogen bonding, adiabatic compressibility, Excess adiabatic compressibility, ternary liquid mixtures.

Introduction

The study of molecular interaction in binary and ternary liquid mixtures plays an important role in the study of development of molecular science. Since long, thermodynamic and transport properties of liquid mixtures have been used to study the departure of real liquid mixture behaviour from ideal one[1-4]. Acoustical parameters are important to understand different kinds of association, the molecular packing, molecular motion and various types of intermolecular interactions and their strength. Excess properties of liquid systems, such as adiabatic compressibility are very useful for testing the theories of solutions, development of separation techniques and equipment and for other industrial applications[5].

Theory

Thermodynamic and acoustical parameters such as adiabatic compressibility can be determined using the observed values of velocity, density and viscosity using respective equations. Excess values of this parameter can be evaluated from their experimental and ideal value.

$\beta_a = 1/(U^2 \rho)$ Where, β_a – Adiabatic Compressibilty

U – Ultrasonic Velocity, ρ - Density

Excess Adiabatic Compressibilty can be determined using following equation,

$$\beta_a^E = \beta_{a\,mix} - (\beta_{a1}f_1 + \beta_{a2}f_2 + \beta_{a3}f_3)$$

Experimental Work

In the present work density was measured by using density bottle (corning made certified 10 ml). For the measurement of viscosity Ostwald viscometer was used. The liquids used for the work were of BDH AR grade. Samples of different concentration were prepared by mixing the component liquids in volume proportion. A crystal controlled interferometer, model No. M8 15 supplied by Mittal enterprises, New Delhi, was used for determination of ultrasonic velocity. Measurements are made at frequency 2 MHz.

Observations
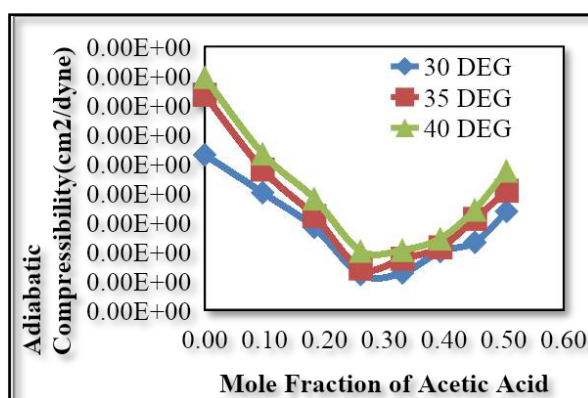
Fig: a
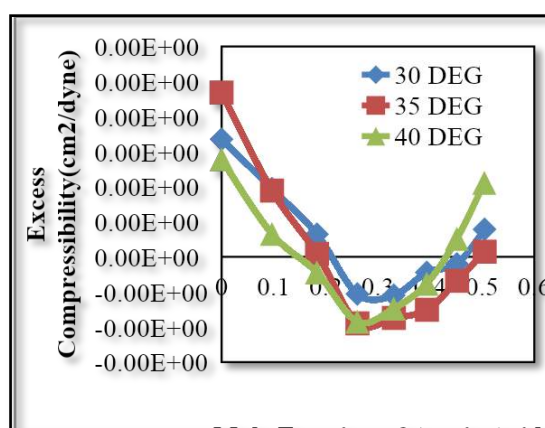
Fig:b

Results And Discussion

Adiabatic compressibility (β) is a helpful in order to explain the intermolecular association, dissociation and repulsion. The values of adiabatic compressibility have been used to explain the molecular interactions in the ternary system. In the present investigation. decrease in adiabatic compressibility(Fig a) indicates that the component molecules are held close to each other. Similar results in some liquid mixtures were also reported by researchers Whiba Kerboub et al[6] and Arvinthraj M et al[7]. The minimum of compressibility shows that at this mole fraction the mixture is less compressible indicating hydrogen bond formation between acid and amine. The compressibility increases with increase in temperature. This is anticipated because, rise of temperature is accompanied by molecular agitation disrupting the molecular ordering and alignment and affecting the complex species of molecules adversely.

Excess compressibility β_a^E values are affected by specific forces between molecules such as hydrogen bonds, charge transfer complexes, breaking of hydrogen bonds and complexes bringing negative excess value. In present study (Fig: b) it is observed that at intermediate concentrations the acids being more polar succeed in forming hydrogen bonds with amine. The acids play the role of hydrogen bond donor and amines as hydrogen bond acceptor. The positive values of β_a^E suggest the rupture of the associated structure at a smaller mole fraction of acid or amine molecules[8].

Conclusion

From the behaviour of adiabatic compressibility, it is confirmed that molecular interactions are present in the component of the mixture. The negative values of excess adiabatic compressibility at intermediate concentration predict the strong interactions present among the component molecules. Donor acceptor type of interaction is majorly present in the present ternary system. The dipole-dipole interaction and dispersion forces are also present but the hydrogen bonding complexation between acetic acid and tri-ethylamine dominates the other two.

References

1) Z T Fidkowaski, M F Doherty and M F Malone, (1993), *AICHE Journal*, vol.39,no.8,pp.1303.
2) R Tiyagaranjan , L Palaniappan,(2008), *Indian J. Pure and Appl. Phys.* Vol.46, pp.852-856
3) G Thomas,(1996), *Chem for Pharma and Life Sci, Prentice Hall, London,* Chap:2,pp.15-24.
4) V D Bhandakkar et al.,(2003) *Indian J. Pure and App. Phy.,* vol.41, pp 849-854.
5) Harsh Kumar, Deepika, (2012), Thermodynamic study of binary liquid mixture of water and DMSO at T=308.15K, *International Journal of Chemical Science and technology,* 2(1), pp 1-8.
6) Wahiba Kerboub and Zadjia Atik, A. (2010). *J Chem Thermodynamics,* 42, 1330.
7) Aravinthraj, M. Venkateshan, S. and Kamraj, M. (2011*). Indian J Chem Envr and Pharm* Res, 2,5.
8) Vasantharani, P. kalaimagal, P and Kannappan, A N. (2009). Molecular interaction studies on some organic liquid mixtures at different temperatures using ultrasonic technique, *Asian Journal of Applied Sciences* 2(1), 96.

A Study on Alternative Reagent for the Detection of Alcoholic Functional Group

P. S. Pande

Department of Chemistry, Shankarlal Khandelwal College, Akola. Maharashtra, India

Vicky Sahu

Department of Chemistry, Shankarlal Khandelwal College, Akola. Maharashtra, India

Abstract

An alternative reagent for the detection of alcoholic functional group has been studied. A mixture of Ceric Ammonium Nitrate with sulphuric acid is used as the reagent for the detection of alcoholic functional group. Six different alcohols have been screened against this reagent and all the alcohols gave positive results.

Keywords : Ceric Ammonium Nitrate

Introduction

Lucas' reagent is used to classify alcohols of low molecular weights. It is a solution of anhydrous zinc chloride in concentrated hydrochloric acid. The reaction is a substitution in which the chloride replaces a hydroxyl group. A positive test is indicated by a change from clear and colourless to turbid, signalling formation of a chloroalkane.[1] Also, the best results for this test are observed in tertiary alcohols, as they form the respective alkyl halides fastest due to higher stability of the intermediate tertiary carbocation. The test was reported in 1930 and became a standard method in qualitative organic chemistry.[2,3] Aqueous solution of Ceric Ammonium Nitrate is also used for the detection of alcoholic functional group. This reagent give red color with methyl alcohol but in case of colored alcohols like α napthol and β napthol, the color is not distinct. Hence we tried alternative reagent which gave clear tests for colored alcohols too.

Materials & Method
Method for Preparation of reagent:

10g Ceric Ammonium Nitrate was dissolved in 85 ml Distilled water and 15ml concentrated H_2SO_4 was added slowly with constant stirring. The clear orange colored solution so obtain was preserved and used as a reagent.

Experimental

Six different alcohols viz. methanol, ethanol, 2-Propanol , Phenol,   α-napthol and β-napthol where taken for the test. Following method was adopted for sample preparation.

S.N.	Alcohol used	Method for preparation of solution
1	Methanol	2 ml was taken directly
2	Ethanol	2 ml was taken directly
3	2-propanol	2 ml was taken directly
4	Phenol	2 ml was taken directly
5	α- napthol	Saturated solution was prepared in water and filtered. Clear solution so obtained was taken
6	β- napthol	Saturated solution was prepared in water and filtered. Clear solution so obtained was taken

Procedure for test

In 2 ml test sample, 2 drops of reagent was added slowly. A colored precipitate is formed in each case which indicated the presence of alcoholic functional group as OH group is the only common factor.

Result and Discussion:

In every case, after the addition of the reagent, the precipitate was obtained and when the same test was carried out with the substrates not containing alcohol functional group does not formed such precipitate.

The photograph 1 shows the formation of precipitate with the reagent after reaction with substrate containing alcoholic functional group , whereas photograph 2 shows no precipitate formation with the reagent

after reaction with the substrate which do not have alcoholic group viz. ethyl acetate, benzaldehyde, acetophenone, aniline and acetone.

Conclusion

A mixture of Ceric Ammonium Nitrate and sulphuric acid can be the alternative reagent for the detection of alcoholic functional group. This reagent gave colored precipitate with the substrate having alcoholic functional group.

Photograph 1 : Reaction with substrate containing alcoholic functional group

Photograph 2 : Reaction with substrate not containing alcoholic group

Acknowledgement

References

1) Shriner, R. L.; Fuson, R. C. (1956). The Systematic Identification of Organic Compounds (5th ed.). New York: John Wiley. pp. 117–119.
2) Lucas, H. J. (1930). "A New Test for Distinguishing the Primary, Secondary and Tertiary Saturated Alcohols". Journal of the American Chemical Society. **52** (2): 802–804.
3) Kjonaas, R. A.; Riedford, B. A. (1991). "A Study of the Lucas Test". Journal of Chemical Education. **68** (8): 704.

Seed Coat Study And Preliminary Phytochemical Analysis Of *Trachyspermum Ammi* (L.)Seeds Of Apiaceae (Umbelliferae)

P.P. Ulhe

Department of Botany, Narayanrao Kale Smruti Model College (Art, Commerce and Science) Karanja (gh.) Dist:-Wardha .

Abstract

From the ancient period of time medicinal plant have great value because it gives remedies on different human diseases. The Trachyspermum ammi (L.) plant is highly medicinal. It is also known as ' Ajwain'. Ajwain seeds are important for preparation of various drugs. It's fruit like seeds. It contains useful phytochemical which is use in pharmaceutical industry. The seed also shows morphological and anatomical variations which is very helpful for identification of seed .The scanning electron microscope (SEM) view of seed shows micromorphological characters while seed coat study shows structural cellular variations. The qualitative analysis helps for detection of various chemical constituents which are helpful for drug preparation. The preliminary phytochemical analysis, protein test, carbohydrate test and lipid test, detection of amino acid through TLC method ,detection of various secondary metabolites use for drug preparations. Seed contain various chemical constituents having high medicinal value. The study essential for the identification of seeds, detection of various components in it for theruptic efficacy of seeds. So taxonomic identification, detection & analysis are most important for better research for drug preparation in pharmaceutical industry, various purposes and economic use also.

Keywords :- Seed morphology, Scanning electron microscopy (SEM), Seed anatomy, biochemical, phytochemical analysis, Apiaceae (Umbelliferae)

Introduction

Apiaceae is a large family with about 300 genera and more than 3000 species. The earlier name Umbelliferae derives from the inflorescence being in the form of a compound "Umbell". The Apiaceae or Umbelliferae is a family usually aromatic plants with hollow stems. The Umbelliferae family is named after the shape of its flowers which are called umbells. These distinctive umbrella shaped blooms are attractive in arrangements & loved by numerous beneficial insects. Members of this family are loaded with it, minerals & antioxidants.(www.organics for all.org/vegerables& html) (www.nutrition and you.com).It is commonly known as 'Ajwain'. The biochemical and phytochemical tests are essential for the detection of various components inside the seeds of Apiaceae because it determined nutritive & pharmaceutical importance. Thin layer chromatography is an essential process for the detection of amino acids & carbohydrate. Various seed workers provided information about identification of seed. Seed recognition is an important diagnostic feature and have great applied value in various scientific disciplines. Seeds have acquired diversification in both external and internal characteristics so much that each can be specified independently with definite set of characters. Seed coat surface show structural marking of great diversity. The plant is grown widely all over the world for seed, as a spice, or for essential oil production (Bhuiyan *et al*., 2009).

Materials And Methods

Sample collection:- Seeds of family Apiaceae like *Trachyspermum ammi* (L.) were collected from local area. For seed coat study, all the seeds parameters were studied using discecting and binocular microscope. Digital weighing balance was used for weighing the seeds in mg. The morphological observations of seeds were done followed by their photography, using 1 cm. scale.

Seed coat morphology (SEM):-To study the seed coat morphology scanning electron microscopy is most important. For this purpose, the individual seeds were dipped in alcohol for 5-10 min. to remove the dust from them. The seed mounted on pin type stubs using double sided adhesive tape or conductive silver paint to prevent charging of the surface during scanning and then coated with a very thin layer of gold in a polaron sputter coating unit. For spermoderm study of seed photomicrograph were taken in the scanning electron microscope (SEM) (LEO 430) at Birbal Sahani Institute of paleobotany, Lucknow.

Seed coat anatomy:- For the anatomical observation of seed coat study take the transverse sections of seed coat. Using permanent slide preparation method or double staining method place the section on various alcohol grades like 30%, 50%,70%,90% absolute alcohol, xylene, DPX etc. The staining like safranine and light green stain used for staining.

For Protein test :- The *Trachyspermum ammi* (L.) seed sample were used for detection of proteins. Biuret test and xanthoproteic test were done. In Biuret test seed powder treated with chemicals turns violet and xanthoproteic test gives yellow colouration which indicated the presence of protein. The concentration of protein in seeds were given in symbols (+, ++, +++, ++++)

Precipitation reactions of proteins:- Precipitation by heavy metal ions, precipitation by alkaloidal reagents, precipitation by concentrated salt solutions, precipitation by organic solvents

Qulitative Test For Carbohydrates:-
  1. Molisch's test
  2. Fehling's test
  3. Benedict's test.
  4. Bial's test
  5. Seliwanoff's test
  6. Iodine test

 Reagents like Molisch's reagents ,Benedict's reagent,Fehling's reagent,Bial's reagent
 Seliwanoff's reagent use for the method.

Qualitative Tests For Lipids:-
    Solubility test, Formation of a translucent spot on paper ,Litmus test, Saponification, Test for unsaturation

Materials and reagents:-
    1) Alcoholic KOH: Dissolve 10g KOH in 100 ml alcohol, 2) Bromine water: Add a few drops of bromine to 100 ml of water and shake. 3) Acetone. 4) Absolute alcohol. 5) Benzene. 6) Conc. HCl 7) Litmus paper. 8) Filter paper.

Preliminary phytochemical tests :-
    The preliminary phytochemical analysis is most important for detection of various chemical constituents. Trease and Evans (1989) test were done. Qualitative phytochemical analysis of the crude powder of the seeds of the plant for the identification of phytochemicals like alkaloids, carbohydrates, reducing sugars, steroids, glycosides, flavonoides, terpenoides, saponine, protein, tannins, amino acids, volatile oil or essential oil. Preliminary phytochemical test were done using different extract.

Thin Layer Chromatography:-
    Using BAW (Butanol 80ml : Acetic acid 20ml: Water 20ml) solvent, aqueous extract with seed powder, TLC plate (MERCK) silica with aluminium sheet, capillary tube, chromatography chamber, lid, wax for sealing, spray, etc. use for chromatography. All the above biochemical and phytochemical methods were done by using Trease and Evans (1989), Sadashivam and Manikam (2005), Thimmaiah S.R.(1999), Harborne J.B., (1994) method.

Observations
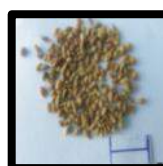
| Fig:-01 | Fig:-02 | Fig:-03 |

Fig:01- Habit , **Fig:02**- Umbell inflorescence, **Fig:03**- Seed sample of *Trachyspermum ammi* (L.) Morphologically seed shows 0.21 cm. - 0.10 cm.,oval or obovate, reddish brown,0.60 mg, bilateral**,** hilum apical, acute, cap like seed minute, shows 4-5 ridges on surface. It's a fruit like seed.

Fig:-04   **Fig:-05**

Fig:-04- 99X-Seed obovate with two halves, whole view ,**Fig:-05**- 296X magnified view shows globular hilar region, granular deposition with two equal halves.

The scanning electron microscopy (SEM) seed surface shows obovate shape with number of ridges on surface with granular deposition .It's a fruit like seed. The mericarp or seed coat shows whitish deposition present all over the surface. In between two halves of seed shows glandular deposition. The glands small globular head. The base shows long protruded structure arise between two halves. The hilar region globular cap like with cellular, granular thick deposition at one end and other end stalked. The collar like region present below hilum. The seed surface shows number of ridges with linear folded structure. The two halves present in between number of granulated deposition and swollen stunted, mounded glandular deposition present. The halves arises from hilar region. It divides the hilar region into two equal halves. Whitish cellular, folded waxy deposition on hilar region present on surface.
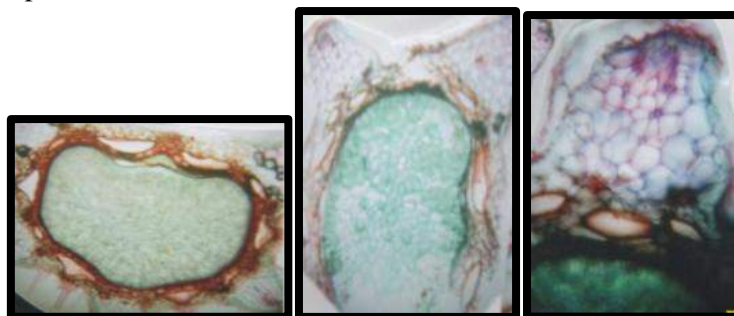
Fig:-06   **Fig:-07**   **Fig:-08**

Fig:-06-160X- T.S.of seed coat showing ornamented internal structure with trichome, epidermis, vitta, endodermis, **Fig:-07-160X**- T.S. of seed coat shows half halve with epidermis,vittas, endosperm, **Fig:-08**-**640X-**T.S. of seed coat with magnified view vascular tissue

Fig:-09   **Fig:-10**

Fig-11   **Fig:- 12**

Fig:-09- 400X- T.S.Seed coat shows outer one layer epidermis, wavy, vitta present below it & cotyledon developed .**Fig:-10**- Cuticularised epidermis.**Fig:-11**- Vitta present between epidermis and endosperm. **Fig:-12**- Endosperm parenchymatous cells elongated compact with oily cell deposition.

The transverse section of seed shows well ornamented region. The outer epidermis wavy. At outerside five mounded regions formed. The outermost epidermal layer shows outgrowth of thick, broad hairy deposition. At middle portion well ornamented number of vittae deposited which is larger and smaller in size. At the center endosperm region present which is parenchymatous in nature. Anatomically large vitta measures 92.30µm in length and 30.18µm in breadth. The small vitta measures 70.12µm in length and 18.20µm in breadth. The endosperm cell measures 48.25µm in length and 16.20µm in breadth.

Fig:- 13- Thin layer chromatography detect presence of amino acids.

The qualitative analysis through TLC is considered to be most effective, and useful method for the separation and identification of complex mixtures of herbal drugs (Wagner and Bladt, 1996).Presence of L-Cysteine hydrochloride, L- Leucine, Isoleucine and some unknown compound present in it.

Medicinal uses: Ajwain seeds contain about 50% thymol, a well known and antibacterial essential oil and along with thyme can be used to enhance the immune system toward off colds and flu and other viral infections. (WWW.nutrition-and-you.com)

Table -01   Study of concentration of protein in seed sample

Sr. no	Botanical Name	Biuret test	Xanthopro-teic test
01	*Trachyspermum ammi* (L.)	++	++

Table-02   Qualitative tests- *(seed powder)*

Sr no.	Name of test	Observation	Coloration
01	Molisch's test	----	Orange
02	Fehling's test	++++	Rusty brown
03	Bial's test	----	Brown
04	Seliwanoff's test -- For Fructose	----	Brown
05	For Sucrose	+	Red
06	Test for Iodine	+	Faint brown
07	Benedict's test	----	Red
08	For lipids-- Solubility test	+	----
09	Formation of a translucent spot on paper	+	Faint yellow
10	Litmus test	-------	----
11	Test for Saponification	++(Oily layer)	----
12	Test for Unsaturation	+	Decolorised

Qulitative Test For Protein

TABLE:- 03 - Precipitation reactions of proteins:-

(i) Precipitation by heavy metal ions:-

Sr no.	Name of plant material	AgNO3	CuSO4	HgCl2	Lead acetate
01	*Trachyspermum ammi (seed powder)*	brown	greenish	----	Milky white

TABLE:- 04   (ii) Precipitation by alkaloidal reagents:- With picric acid:-

Sr no.	Name of Plant material	Picric acid	NaOH
01	*Trachyspermum ammi (seed powder)*	Yellowish	Reddish brown

TABLE:- 05 (iii) Precipitation by concentrated salt solutions:-With NaCl:-

Sr no.	Name of Plant material	Coloration
01	*Trachyspermum ammi (seed powder)*	Brown

TABLE:- 06   (iv) Precipitation by Organic Solvents:-

Sr no.	Name of Plant material	Ethanol	Acetone
01	*Trachyspermum ammi (seed powder)*	+	-

TABLE:- 07   Priliminary phytochemical observation of various extracts of seeds/ fruits of *Trachyspermum ammi* (L.)

Sr no.	Test for active constituents	Petroleum extracts	Chloroform extracts	Ethylacetate extracts	Methanol extracts	Aqeous extracts	Acetone	Hexane
01	Alkaloids	----	----	----	+	----	+	+
02	Carbohydrates	----	+	----	+	----	+	----
03	Reducing sugars	----	----	----	+	----	+	----
04	Steroids	----	+	----	+	----	----	+
05	Glycosides	----	----	----	+	----	+	----
06	Flavonoids	----	+	----	+	----	+	+
07	Terpinoids	----	+	----	+	----	----	+
08	Saponine	----	----	----	----	----	----	----
09	Protein	----	----	----	----	+	----	----
10	Tannins	+	----	+	+	+	+	+
11	Amino acids	----	----	----	----	+	----	----
12	Volatile oil or essential oil	+	----	+	+	+	+	+

Present (+), Absent (-)

Discussion

From the above observation it is seen that the seed of *Trachyspermum ammi*(L.) is fruit like seed. The seeds are highly useful for medicine preparation. It contain various chemical constituents. The morphological variations help to determine micromorphological characters. The scanning electron microscopy magnify the seed surface view. The mericarp shows two equal halves. Globular hilar region, protruded bodies with cellular variations in them. The anatomical variations shows well ornamented deposition with epidermis, vitta, vascular tissue and endosperm region. The preliminary phytochemical analysis shows various extract like petroleum ether, chloroform, ethyl acetate, methanol, aqueous, acetone and hexane. Various extract detected alkaloids, carbohydrates, reducing sugars, steroids, glycosides, flavonoids, terpenoids, saponine, protein, tannins, amino acids, volatile oil or essential oil etc. Tannins and volatile oil or essential oil found in largest quantity in different extract. Saponine absent. Others are present in some extract.   Detection of protein, carbohydrate and lipids done by qualitative test. Medicinally seed are very important. Seed contain various chemical constituents having high medicinal value.   Ajwain with its characteristic aromatic smell and pungent taste is widely used as a spice in curries. Its seeds are used in small quantities for flavoring numerous foods, as preservatives, in medicine and for the manufacture of essential oil in perfumery. (Pruthi JS.1992) Above study essential for the identification of seeds, detection of various components in it for theruptic efficacy of seeds. So identification, detection & analysis are most important for better research and various purposes, economic use also. Medicinal uses of a seeds were tested in using different formulations in research laboretories, pharmaceutical industries for their scientific, economic and beneficial use. It gives great contribution in society.

Acknowledgement:-

References

1) Bairwa R.Sodha R.S.Rajawat B.S.2012.Trachyspermum ammi.Pharmacognosy Review. Jan-Jun; 6(11): 56–60

2) Bhuiyan NI, Begum J, Sultana M .2009. Chemical composition of leaf and seed essential oil of Coriandrum sativum L. from Bangladesh. Bangladesh J. Pharmacol. 4:150-153.

3) Harborne J.B.,1994.Phytochemical methods: A guide to modern techniques of plant analysis, Chapmann and Hall pub. New York.

4) Pruthi JS.1992. Spices and Condiments. 4th ed. New Delhi: National Book Trust;. [Google Scholar]

5) Sadasivam, S. and Manickam, A. 2005. Separation procedures. Biochemical methods. New age international publishers. 220-228

6) Thimmaiah S.R.1999. Standard methods of biochemical analysis.Kalyani publishers. 472-482.

7) Trease. GE and Evans. E.Pharmacognosy.1989;13th edition, Baillier Tindall.,282-396.

8) Treses G.E. Evans W.C.1989. Pharmacogonosy 11th edition.Brailliar Tridel and Macmillan publishers, London

9) Wagner, H. and Bladt, S.1996. IInd edtn.Plant drug analysis. A thin layer chromatography atlas. Springer

10) WWW.nutrition-and-you.com

11) WWW.organics for all.org/vegerables& html

Phytochemical Screening and Evaluation of Anti-Arthritic Activity of Leaf Extracts of Delonix Regia

Ashwini A Balode, Ozasvi Zadokar, Minal Kolhe
Department of Biochemistry
Shri Shivaji College, Akola

Abstract:

Arthritis is a characteristic chronic disease of the joints, cartilages and bones. It is a systemic autoimmune disorder in which there is an inflammation of synovial joint due to cellular response. Denaturation of protein is one of the well documented causes of inflammation and arthritis. The present study was undertaken to evaluate the phytochemical constituents and in vitro anti-arthritic activity of leaf extracts of Delonix regia. The crude powder of the leaves of the above plant was subjected to extraction with three different solvents in soxhlet extractor and further utilized for the study. The phytochemical analysis showed the presence of carbohydrates, tannin, saponins, alkaloids, flavonoids, phenols, glycosides and terpenoids.The ethyl acetate extract of Delonix regia maximally inhibited heat induced protein denaturation and may be one of the reasons of possessing anti-arthritic activity. The results indicate that the plant material may become an important source of natural drug compounds with health protective potential of significant impact on the status of human health.

Keywords: Delonix regia, Phytochemical Screening, Anti-Arthritic

Introduction

Arthritis is a characteristic chronic disease of the joints, cartilages and bones. It is a systemic autoimmune disorder in which there is an inflammation of synovial joint due to cellular response. It is characterized by redness, swelling and pain, stiffness of joint and loss of joint function. Denaturation of protein is one of the well documented causes of inflammation and arthritis.

The management of arthritis and other inflammatory disorders involves the use of different classes of drugs such as non-steroidal anti-inflammatory drugs (NSAIDs), corticosteroids and disease modifying anti-rheumatic drugs (DMARDs). The use of NSAIDs has gastrointestinal side effects, which includes irritation of the gastric mucosa, belching, gastric ulceration and bleeding. Long-term use of NSAIDs may impair renal and hepatic functions, predisposing the patient to cardiovascular diseases [1]. Hence, there is a continuous search for alternative drugs from plants and other natural sources. Traditional medicines play an important role in health services around the globe. Generally, drugs synthesized from herbal medicinal plants are easily available, safe, less expensive and efficient. These drugs also have seldom side effects to the patient. According to World Health Organization, medicinal plants are the best source for the production of drugs [2].

Medicinal plants have been of age long remedies since they contain valuable components. The medicinal values of these plants lie in some chemical substances that produce a definite physiologic action on human body. The most important bioactive components of these plants are tannins, alkaloids, flavonoids, phenolic compounds. Biologically active compoundsfrom natural sources have been of great interest to scientists working on infectious diseases. Delonix regia commonly known as "Gulmohar" in Hindi and "Royal Poinciana" or Flamboyant, belongs to the family (Fabaceae) and subfamily (Caesalponioideae). It's widely planted as ornamental trees in tropical areas, such as Taiwan, India, Vietnam, Malaysia, and the central region of South America. It is a tree (10-15 m high, girth of upto 2 m) with many branches and umbrella shaped crown. It has bipinnate, alternate, light green, feathery leaves, 10-25 pairs of pinnae, each having 12-40 pairs of small leaflets. Near the end of the twig are present 15-30 cm long corymbs, which are borne laterally, each having loosely arranged slightly fragrant orange-red flowers, which literally cover the tree from May to June. Petals (5-6.5 cm, 2-3 cm wide) are broadly spoon shaped. The decoction of the leaves is traditionally used in treating gastric problems, diabetes, hemiplagia, diarrhoea and rheumatic pains of joints ([3] [4]).

The enormous significance of the phytoconstituents in Delonix regia cannot be ignored and comprehensive insight into their function in various fields and the mechanisms operating behind them is essential. The present study was undertaken to evaluate the phytochemical constituents and in vitro anti-arthritic activity of leaf extract of Delonix regia.

Materials And Methods

A.Plant Material

Delonix regia leaves were collected from the Akola region and authenticated by Shri Shivaji College, Akola (Department of Botany).

B.Drug and chemicals

All organic solvents and other reagents were procured from SD fine chemical Ltd. Mumbai and were of analytical grade. Diclofenac is Non-Steroidal Anti-inflammatory Drugs (NSAID), a common pain killer with market brand name VOVERAN TABLET, VOLTRAN TABLET.

C.Extraction of Plant Material

The leaves were air dried at room temperature and ground into a coarse powder to use for the study. The coarse powder (15 g) was extracted with three different solvents ethyl acetate, ethanol and aqueous based on their increasing polarity using a Soxhlet apparatus separately for 5 hours. The extract was dried using a rotary vacuum evaporator. The pulverized plant material was subjected to cold maceration method. The drug was macerated with distilled water for 24 hours and then filtered and evaporated to dryness. The extract was kept in desiccator and further used for in vitro anti-arthritic activity.

D.Preliminary Phytochemical Screening

A preliminary phytochemical screening of Delonix regia was carried out using ethyl acetate, ethanol, and aqueous extract to detect the presence of phytoconstituents like carbohydrates, alkaloids, glycosides, terpenoids, tannins, flavonoids and saponins.

1.Test for carbohydrate: - 1 ml of extract was added to 1ml of equal volume of Fehling A and Fehling B reagent and gently boiled. A brick red precipitation at the bottom was observed for the presence of carbohydrate.

2.Test for tannin: 1mL of 5% ferric chloride was added to 1mL of flower extract in a test tube, than the Formation of greenish black colour was taken as indicators for the presence of tannin.

3.Test for saponin: 2mL of distilled water was added to 1mL of flower extract in a test tube, then after the solution was shaken for 15minutes the formation of about 0.5 to 1cm layer of stable mass of bubbles observed as an indication for the presence of saponin.

4. Test for flavonoid: 1mL of 2N NaOH was added to 1mL of flower extract, than the result of yellow colour was taken as indicator for the presence of flavonoids.

5. Test for glycoside (Kellerkilani test): To 1mL of flower extract, 2mL of glacial acetic acid and 0.5mL of 5% ferric chloride was added, and then 1.5mL of concentrated sulfuric acid was added and observed for the formation of brown colour.

6. Test for terpenoid (Salkowski test): 1mL of chloroform was added to 1mL of flower extract and 1.5mL of concentrated sulfuric acid is added to it. Formation of reddish brown colour indicates the presence of Terpenoids.

7.Test for phenol: To 1mL of flowers extract, 1mL of sodium carbonate was added. To that 1mL of folin was added. Formation of blue or green colour indicates the presence of Phenols.

8.Test for alkaloid: To 1mL of leaf extract, 1mL of concentrated sulfuric acid was added. To that 1mL of Mayer's reagent is added. The formation of green or white precipitate was regarded as positive for the presence of alkaloids.

E. In Vitro Anti-Arthritic Activity

This In Vitro Anti-Arthritic Activity activity was evaluated using albumin denaturation test [5].

Method-

The reaction mixture (5 mL) consisted of 0.2 mL of Bovine egg albumin, 2.8 mL of phosphate-buffered saline (PBS, pH 6.4) and 2 mL of test drug in 100 μg/mL of concentration. A similar volume of double-distilled water served as the control. Diclofenac sodium in the concentration of 100μg/mL was used as the reference drug. Next, the mixtures were incubated at $37 \pm 2°C$ in a BOD incubator for 15minutes and then heated at 70°C for five minutes. After cooling, their absorbance was measured at 660 nm. Each experiment was done in triplicate and the average was taken.. The percentage inhibition of protein denaturation can be calculated as-

% inhibition of Protein denaturation = [(A1– A2)/ A1]*100

Where,

A1= Absorbance of Control

A2= Absorbance of test/ standard sample with albumin solution

Results and Discussion

The study of the active principles of the medicinal plants has acquired a lot of importance all over the world. The present study carried out on the plant sample revealed the presence of medically active constituents. The leaf extract of Delonix regia was found to contain different phytoconstituents like tannin, saponin, alkaloids, flavonoids, and glycosides. Table 1 represented the qualitative phytochemical screening of the leaf extract.

Table I: Qualitative phytochemical screening of three different extracts of the leaf of Delonix regia

S.no	Phytochemical test	Ethyl acetate extract	Ethanol extract	Aqueous extract
1.	Carbohydrate	+	+	-
2.	Tannin	+	-	-
3.	Saponin	-	-	+
4.	Flavonoids	-	+	-
5.	Glycosides	-	-	+
6.	Terpenoids	+	+	-
7.	Phenols	-	+	-
8.	Alkaloids	-	+	+

+ = Presence   - = Absence

In vitro anti-arthritic activity-

The extract was found to be effective as an anti-arthritic agent and showed significant activity as compared to the standard drug. Table II revealed that Ethyl acetate extract was found to be more effective than the other extracts and showed 75.5% inhibition of protein denaturation while ethanol and aqueous extracts showed 41.3% and 25.4% inhibition of protein denaturation respectively. In our present study, ethyl acetate extract of Delonix regia maximally inhibited heat induced protein denaturation and may be one of the reasons of possessing anti-arthritic activity. Production of auto-antigens in certain rheumatic diseases may be due to in vivo denaturation of proteins. Mechanism of denaturation probably involves alteration in electrostatic, hydrogen, hydrophobic and disulphide bonding. Delonix regia showed significant in-vitro anti-arthritic activity. The results indicate that the plant material may become an important source of natural drug compounds with health protective potential of significant impact on the status of human health.

Table II: Anti- arthritic activity of Delonix regia by protein denaturation method.

% inhibition (Bovine egg albumin)			Standard drug
Concentration (μg/mL)	Ethyl acetate	Ethanol	Aqueous	Diclofenac sodium
100	75.5 %	41.3 %	25.4 %	99.7 %

Conclusion

The knowledge of the chemical constituents of plants helps to screen for biological activities. Thus, the preliminary screening test is mandatory to determine the bioactive principles which subsequently lead to the discovery and development of drugs. The phytochemical tests with the different extracts of the dried Delonix regia leaves manifest the presence of various phytoconstituents like carbohydrates, tannin, saponins, alkaloids, flavonoids, phenols, glycosides and terpenoids. The results further supported the view that the leaves of Delonix elata are promising source of naturally useful therapeutic agents. Finally, it can be concluded that Delonix regia posses good in-vitro anti-inflammatory and anti-arthritic activities. By further extensive research, we can explore the medicinal value of Delonix regia and make reasons why this is used traditionally for various diseases.

References

1) VJS Reddy, PGD Rao, GR Lakshmi, "A review on antiarthritic activity of some medicinal plants," J Glob Trends Pharm Sci, 2014; 5:2061–2073.

2) PL Wolf, "Biochemical diagnosis of liver disease," Indian J Clin Biochem, 14(1): 59-90.

3) J. A. Parrota, Healing of Plants of Peninsular India, CABI Publication, New York, NY, USA, 2000.

4) Modi A, Mishra V, Bhatt A, Jain A, Mansoori MH, Gurnany E, " Delonix regia: historic perspectives and modern phytochemical and pharmacological researches," Chin J Nat Med. 2016;14(1):31–9.

5) Sakat SS, Juvekar AR, Gambhire MN. In vitro antioxidant and inflammatory activity of methanol extract of Oxalis corniculata Linn, Int J Pharm Pharmacol Sci 2010; 2(1):146-55.

Xanes Study Of Some Cobalt (Ii) Complexes Of Aldehydes

1 Jaishree Bhalea, Mona Guptab, Pradeep Sharmac, A.Mishrad

1 Shri Shivaji College of Arts,Commerce and Science,Akola(M.S), India.

2 Maharaja Bhoj Govt.P.G. College,Dhar(M.P),India

3 Govt. Holkar Science College, Indore(M.P), India.

4 School of Physics, DAVV, Indore(M.P),India

Abstract:

Two cobalt (II) complexes of Schiff base ligands, L1 =(P-methoxy anilino)-P- methoxy phenyl acetonitrile, and L2 = (P- methoxy anilino) –P– chloro phenyl acetonitrile have been prepared by the condensation of P-methoxybenzaldehyde and P-chloro-benzaldehyde with P-anisidine respectively. The mentioned ligands were used to prepare three cobalt(II) complexes [Co2(p-Methoxy ben)(p-Ani)](NO3)2 and [Co2(p-Chloro ben) (p-Ani)](NO3)2 respectively. X-ray k-Absorption Near Edge (XANES) spectra of these two complexes have been recorded at RRCAT(Raja Ramanna Center for Advance Technology), Indore, M.P, India by using Synchrotron radiation source . Various X-ray absorption parameters e.g., chemical shift, edge-width and shift of the principal absorption maximum have been obtained with the help of XANES spectra. Data analysis program Athena and the computer software Origin 6.0 professional have been used to processed the obtained data. The results of the study have been reported in this paper.

Keywords: Schiff base, XANES, RRCAT, Athena, Origin 6.0

Introduction

Because of their application as potential ligands for a large number of metal ions [1-5] nitrile and α-aminonitrile compounds and their derivatives has received special attention. By its microbial metabolism in some organisms, nitriles and α-aminonitrile derivatives had biological activities [6-7] as herbicides [8], pharmacological agents [9] and biological synthesis of chemical compounds. In addition to their catalytic and biological activities [10-13], the synthetic models of ferromagnetic interaction between the metal centers which can explain oxidation- reduction processes in biological systems are represented by some complexes containing more than a metal centre. Besides that, some aminonitriles were also used to prepare racemic compounds [14]. α-Amino nitriles were first prepared by Strecker by treating aldehydes or ketones with alkaline cyanide and salts of amines [15].

XANES and EXAFS studies of some of the Cu(II) complexes of P-methoxybenzaldehyde, benzaldehyde, P-chloro-benzaldehyde with P-anisidine and P-toluidine have been already discussed in previous literature [16]-[22]. A search through literature reveals that no work has been done on the XANES of cobalt (II) complexes of P-methoxybenzaldehyde, benzaldehyde, P-chloro-benzaldehyde with P-anisidine . Keeping this in view, we have studied X-ray K absorption spectra of cobalt in the cobalt complexes. The results of the study have been reported in this paper.

Experimental Details

The two complexes studied in the present investigations are [Co2(p-Methoxy ben)(p-Ani)](NO3)2 and [Co2(p-Chloro ben) (p-Ani)](NO3)2.. The ligand L1 =(P-methoxy anilino)-P- methoxy phenyl

acetonitrile and L2 = (P- methoxy anilino) –P– chloro phenyl acetonitrile have been prepared by the condensation of P-methoxybenzaldehyde and P-chloro-benzaldehyde with P-anisidine respectively. All the two complexes were synthesized according modified Strecker's procedure [23-24] and their purity was checked. The X-ray absorption spectra at the K-edge of cobalt of these complexes have been recorded at BL-8 Dispersive EXAFS beamline at the 2.5-GeV INDUS-2 Synchrotron Source, Raja Ramanna Centre[25]-[27]. The experimental data have been analyzed using the available computer software packages Origin 6.0 professional and Athena [28].
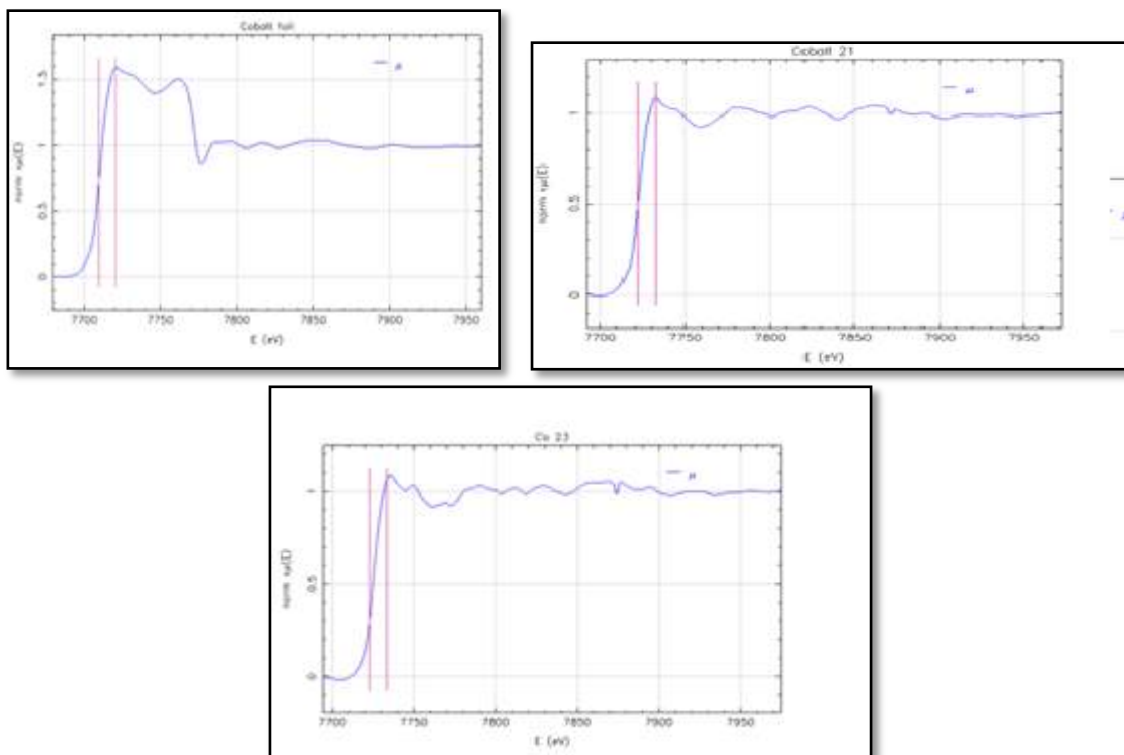
National Conference on Multidisciplinary Research in Science and Technology for Healthy Lifestyle Management (NCMRST- 2020) Organizer :- Shri R.L.T. College of Science, Akola

24th Jan. 2020

Figure 1. Metal K-edge XANES E(eV) Vs normalized μ(E) spectra for the metal complexes
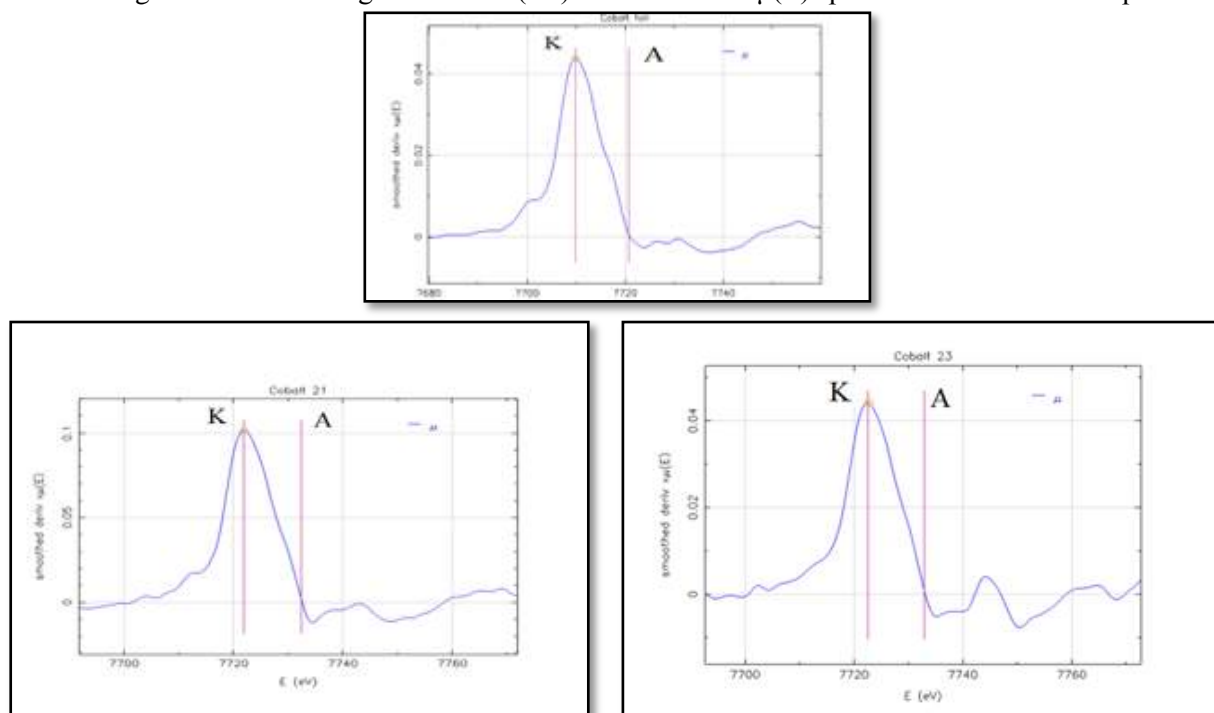

Figure 2. Derivative of the XANES region of the absorption spectrum at the K- edge of metal in the complexes indicating positions of the absorption edge K and the principal absorption indicating maxima A.

Table 1. XANES data for the K absorption edge of metal in the complexes

Complexes		E_K (eV)	E_A (eV)	Chemical shift (eV)	Shift of principal absorption maxima (eV)	Edge-width (E_A-E_K) (eV)	ENC Electron/ atom	% Co-valency
[Co foil]	Metal	7709.8	7720.7	-	-	10.9	0.0	-

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293
(Special Issue No.70) Peer Reviewed Journal www.aiirjournal.com Mob. 8999250451

237

[Co21]	[Co$_2$(p-Methoxy ben) (p-Ani)](NO$_3$)$_2$	7721.9	7732.4	12.0	11.7	10.5	1.09	39.0
[Co23]	[Co$_2$(p-Chloro ben) (p-Ani)] (NO$_3$)$_2$	7722.7	7732.9	12.9	12.2	10.2	1.15	37.8

Results and Discussion

The normalized K absorption spectra for cobalt metal and both the complexes are shown in Fig 1. The first derivative of the spectra, indicating positions of the absorption edge K and principal absorption maximum A are shown in Fig. 2.The energies of the cobalt K-edge(E$_K$)and the principal absorption maximum (E$_A$) along with the values of the edge-width (E$_A$-E$_K$) ,effective nuclear charge Z$_{eff}$ and the chemical shift ΔE$_K$ are given in Table 1. It can be readily seen from the table that cobalt K-edge is found to be shifted towards the high-energy side in all the complexes, as compared with the cobalt metal k- absorption edge.

A. Chemical Shift

The shift of the X-ray absorption edge of an element in a
complex with respect to that of the pure element is written as:

$$\Delta E_K = E_{K(complex)} - E_{K(metal)}$$

The k-absorption edge of cobalt metal is taken as 7709.8 Ev for computing the chemical shift.. In Table 1, the complexes have the values of chemical shifts 12.0 and 12.9 eV. The value of the chemical shifts in both the complexes is more than 5 Ev.Hence, on the basis of values of the chemical shifts, the complexes are found to have cobalt in oxidation state +2 [29]. The order for these complexes is as follows:

[Co23]>[Co21]
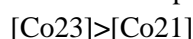
As is well known, an ionic bonding enhances the chemical shift, whereas a covalent bonding suppresses it. Hence, the above order may also be taken as representative of the relative ionic character of the bonding in these complexes.

B. Principal absorption maximum

The shift of principal absorption maximum of an element in a complex with respect to that of the pure element is written as:

$$\Delta E_A = E_{A(complex)} - E_{A(metal)}$$

The principal absorption maximum E$_A$ of copper metal has been taken as 7720.7 eV for computing the shift .It has been observed that for both the complexes, the value of E$_A$ is shifted towards the higher energy side [30].

C. Edge-width

The edge-width is computed by (E$_A$-E$_K$). In Table 1, we have reported the values of the edge-width . The edge-width values are 10.5 and 10.2 eV, respectively for Co21 and Co23.

D. Effective nuclear charge [Z$_{eff}$]

Various methods have been proposed for the estimation of effective nuclear charge [31]- [32]. By employing the procedure which was suggested by Nigam and Gupta [33], Z$_{eff}$ has been obtained from the measured chemical shift by using the semi-experimental method The effective nuclear charge on the cobalt in the complexes under present study is 1.09 and 1.15 rspectively for Co21 and Co23 electrons/atom. The order for Z$_{eff}$ in the complexes is as follows:

[Co23]>[Co21]
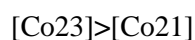
The results show that chemical shift increases with ENC . A parabolic co–relation is observed between them.

E. Percentage covalency

Percentage covalency of studied two cobalt complexes is 39.0 and 37.8 respectively for Co21 and Co The order for percentage convalency in the complexes is as follows:

[Co21]>[Co23]
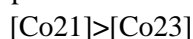
Inverse relation is observed between percentage covalency and chemical shift, i.e percentage covalency decreases as chemical shift increases. . A parabolic co–relation is observed between them.

Similar relation is observed between percentage covalency and effective charge i.e percentage covalency decreases as effective charge increases. . A parabolic co–relation is observed between them. A.Mishra [34] also observed similar type of correlation.

Conclusions

X-ray absorption spectra of schiff base cobalt complexes at the K-edge of cobalt have been recorded at the EXAFS beamline setup at the Indus-2 synchrotron source at RRCAT, Indore. The energy of K-edge (E_K), and principal absorption maxima (E_A) along with the allied parameters have been reported. From these, the shift of the K-edge (chemical shift), shift of the principal absorption maximum and edge-width has been obtained. The order of the chemical shift may also be taken as representative of the relative ionic character of the bonding in these complexes. The chemical shift has been used to determine the effective nuclear charge on the absorbing atom. Reported chemical shifts suggest that copper is in oxidation state +2 in all of the complexes.

Acknowledgement

References

1) Nlbertin , G.A.; Antoniutti, S.; Lanfrnchi, M.; Pelizzi, G. and Bordignon, E. (1986) Inorg. Chem, 25,950-957.
2) Clarke , R.E. and Ford , P.C. (1970) . Inorganic chemistry 9,2, 227-233.
3) Bancroft ,G.M.; Mays, M.J.; Prater , B.E. and Stefanini, F.P. (1970), J. Chem. Soc. (A), 2146-2149.
4) Tranchier , J.P.; Chavignon , R.; Prim , D.; Auffrant , A.; Plyta , Z.; Ros e Munch F. and Rose ,E. (2000) , Tetrahedron Letters , 41 , Issue 19 , 3607-3610 .
5) Enders D.; and Shilvock, J.P. (2000),Chem. Soc Rev, 29, 359-373.
6) Kh. A. Al-Timeemey, M.Sc. thesis, Baghdad University, 2000, and References cited therein.
7) Weeb ,L.J. and Boxer, S. G.; (2008) , Biochemistry, 47,1588-1598.
8) Liu,G.; (2003), Nuclear Medicine and Biology, 29, lssue1, 107-113; b) Cameron, L.M.; Lafrance, R.J.; Hemens ,C.M. and Rajaraman, K.; (1985) , Anti-cancer Drug 1,1, 27-36 (Eng). C.F. C.A. 104 (1986) 102055e.
9) Helga, S.; woldemer,W.; Juergen, H.; Kramer and wilfried, (1985) , Ger. (East). DD 223,624 (Cl.101N57/20), 19 Jun (1985) appl, 256,649, 14 Nov (1983); 8pp.C.F. C.A. 104(1986) P16541d.
10) .a) Meyer , F.; H-krys pin , I.; Kaifer , E. and Kircher , P.; (2000) , European Journal of Inorganic Chemistry ,Issue 6, 771-781 . b) Incarvito , C.; AL. Rheingold , AL. Gavrilova , Qin ,C. and and Bosnich ,B. (2001) , Inorg. Chem., 40 , 17 , 4101-8 .
11) Patel, K.V.; Bhattacharya, P.K.; (1986), Polyhedron,   5,3,731-736.
12) M. Shakir , A. Mohamed , S.P. Varleey and O.S. Nasman , (1996) , Indian Journal of Chemistry , 35A,935-939 .
13) Saha , M.K.; Dey , D.K.; Choudhury , C.R.; Dey ,S.K.; Mitra , S. and Lehmann , C.W.; (2003) , Chemistry Letters , 32 , 12 , 1136 .
14) Beaufort – Droal ,V.; Pereira , E.; Thery V. and Aitken , D.J.; (2006) , Tetrahedron , 62 , Issue 51 , 11498-11956.
15) Harusawa,S.; Hamada 'Y. and Saioiri,T. (1979) Tetrahedron Letters, 48,4663-4666.; b)ogata ,Y. and Kawasaki, A. (1971) ,J.Chem. Soc. (B), 4, 325-329.
16) Jaishree Bhale, Pradeep Sharma, A.Mishra, "*EXAFS Study of Copper (II) Complexes of Aeromatic Aldehydes*", IJSRD, *Vol. 5, Issue 02, 2017.*
17) Jaishree Bhale, Pradeep Sharma, A.Mishra , "*XAFS Study of Copper (II) Complexes of P Anisidine*", IJIRST, *Vol 3, Issue 12, May 2017.*
18) Jaishree Bhale, Pradeep Sharma, A.Mishra, "*XANES Study of Copper (II) Complexes of Aeromatic Amines*", IJSRD, *Vol. 5, Issue 02, 2017.*
19) Jaishree Bhale, Pradeep Sharma, A.Mishra,S.Ninama, "*X-ray Spectral Study by EXAFS of Some Copper (II) Complexes using Synchrotron Radiation Source*", IJCPS, *Vol. 5, Issue 2, 2016.*
20) Jaishree Bhale, Pradeep Sharma, A.Mishra, "*XANES Study of Copper (II) Mixed Ligand Complexes of alpha-Aminonitrile*", Neetu Parsai. , IJMPSR, *Vol. 2, Issue 2, 2015.*

21) Jaishree Bhale, Pradeep Sharma, A. Mishra and Neetu Parsai , *"XANES Study of New Copper (II) Complexes of α-aminonitrile Derived from p- methoxybenzaldehyde with p-anisidine"*, ISROSET- Int. J. Sci. Res. Physics and Applied Sciences, *Vol-3, Issue-1, 2015.*

22) Jaishree Bhale, Pradeep Sharma, A. Mishra, Neetu Parsai, *"Determination of bond length from EXAFS spectra of some copper(II) mixed ligand complexes"*, ISROSET, *Vol-3, Issue-3,2015.*

23) Kalir,A.; Ederey, H.; Pelah,Z.; Baldormon D. and Porath,G.; (1969), med., J. .,12,474-478.

24) Wyatt J.M and Linton, E.A.; (2007), John wiely, Inter science online Book.

25) N. C. Das, S. N. Jha, D. Bhattacharya, A. K. Poswal, A. K. Sinha, V. K. Mishra, *"Design, Fabrication and Testing of Elliptical Crystal Bender for the EXAFS Beam Line at INDUS-II Synchrotron Source"*, Sadhana ,vol 29(5), pp 545, 2004.

26) D. Bhattacharya, A. K. Poswal, S. N. Jha, Sangeeta, S. C. Sabharwal, *"X-ray absorption spectroscopy of PbMoO4 single crystals"* ,Bull. Mater. Sci., vol 32,pp 1-5,2009.

27) D. Bhattacharya, A. K. Poswal, S. N. Jha, Sangeeta, S. C. Sabharwal, *"First Results From a Dispersive EXAFS beamline developed at INDUS-2 Synchrotron Source at RRCAT, Indore, India"*, Nuclear Instruments and Methods in Physics Research A, vol 609, pp 286 , 2009.

28) Ravel B and Newville M, *"Athena, Artemis, Hephaestus: data analysis for X-ray absorption spectroscopy using IFEFFIT"*, J Synchrotron Rad, vol.12, no.4, pp.537-541 ,July 2005.

29) L. S. Kau, D. J. Spira-Solomon, J. E. Penner-Hahn, K. O. Hodgson, E. I. Solomon. , ,J. *Am. Chem. Soc*., Vol 109, pp.6433, 1987.

30) B.K Teo,), *"EXAFS: Basic Principles and data analysis," Springer- Verlag, Berlin,* 1986 .

31) Gianturco and C.A.Coulson, *"Inner-electron binding energy and chemical binding in S"*, Mol Phys, vol.14,no.3, pp.223- 232 ,1968.

32) H.-U. Chun, *"Determination of atomic charges in compounds of the 3rd period elements by means of X-ray spectroscopy",* Physics Letters A, vol.31, no.3, pp.118-119,Feb 1970.

33) Nigam A K and Gupta M K , J. Phys. F: Metal Physics , vol 4, pp 1084, 1974.

34) A.Mishra and P.Sharma , *"K-NEXAFS investigation on some copper(II) complexes"*, Indian J Chem, Vol. 44A, no.2, pp.307- 311, Feb 2011

Insect Word: Diversity Of Insects Thrips

S. M. Nagrale

Department of Zoology, Shri R.L.T.College of Science, Akola (M.S.)

Abstract

   Thrips are minute insects which are usually a few millimeters long. It has fringed, banded wings as well as asymmetrical sucking and piercing mouthparts in which only the left-hand side mandible is developed. They enjoy a wide range of distribution, habits and ecological habitat most of them are phytophagous, very few are predaceous feeding on mites, scales, pscoids and ericoccids respectively. While mycophagous or fungus feeding thrips are more common. Order Thysanoptera divided into two suborders i.e. Terebrantia and Tubulifera. The thrips shows many peculiarities in their behavior and life history.
Key words: Thrips, fringed wings, mycophagous, phytophagous

Introduction:

   Thrips are minute insects which are usually a few millimeters long. In spite of their small size, unattractive colouration and obscure habit, thrips are endowed with remarkable structural peculiarities unobserved among the other insects. The majority of the species has fringed, banded wings as well as asymmetrical sucking and piercing mouthparts in which only the left-hand side mandible is developed

   They are distributed worldwide predominating in tropical, subtropical, and temperate regions. They enjoy a wide range of distribution, habits and ecological habitat. They occur on the tender, succulent parts of the plants, or under the barks of dead and drying twigs or among decaying leaves of grass, feeding on fungus spores and hypae. Some of them produce and inhibit plant galls, while others are inquilines living inside galls of thrips or other insects. Though most of them are phytophagous, very few are predaceous feeding on mites, scales, pscoids and ericoccids respectively. While mycophagous or fungus feeding thrips are more common. They feed on the spore of wheat rust and coffee leaf rust and little other plant infected fungus. A large number of species are considered pest, because they feed on plant with commercial value, while some acts as a vectors of plants virus and bacterial diseases. While some act as predators of crop pests and also serve as weed control agents.

   In **1744 De Geer** first described these insects as Physapus, based on their several unique and striking features, such as the nature of wing with long, fine fringes along their margins, possessing characteristic feeding apparatus, with a striking asymmetry of the component mouth parts, the vestigial right mandible, the protrusible bladder like structure at the end of tarsus or physopoda, and the occurrence of a prepupal stage during metamorphosis.

    In **1836 Haliday** ranked these insects to the Order Thysanoptera, and Linnaeus placed the species in a genus called as Thrips. The species, however, posses some common characteristics such as fringed wings and bladder feet, which have made them inclusion in the order Thysanoptera, derived from the Greek word meaning *thysanos* (fringe) and *pterons (*wing). The common name thrips is also derived from the Greek, meaning wood louse. Other common names for thrips include thunderflies, thunderbugs, storm flies, thunderblight and corn lice.

Classification Diversity:

   Order Thysanoptera divided into two suborders i.e. **Terebrantia and Tubulifera**. Thrips belonging to Terebrantia posses a distinct saw like ovipositor, fore wings with a system of veins and sometime cross veins, a distinct chaetotaxi and 2 to 8 segmented maxillary palp and the maxillary stylate confined to the mouth cone. Tubulifera are so called because the 10th abdominal segment is drawn into a tube and in the species of this suborder the ovipositor is internal and flexible structure. The four wings without a system of veins, cross veins and setae, the fringes nearly straight, never wavy, maxillary palp always two segmented and maxillary stylate always retracted far back into head. Sigmoid setae are also present on the abdominal tergites to hold the wings while at rest.

   The current list of the thrips in the world contains about 7400 species and 1200 types are placed in a single **order Thysanoptera** with nine families, eight of these belonging to **Terebrantia** (**Uzelothripidae, Merothripidae, Aeothripidae, Melanthripidae, Adiheterothripiade, Faurillidae, Heterothripidae, Thripidae.**) and **Tubulifera** includes only a single family the **Phlaeothripidae.** From India, more than 400 species of Thrips belonging to about 200 genera have so far been described by various authors

   The **suborder Tubulifera** comprises a single family, the **Phlaeothripidae** with about 3500 described species, whereas the **suborder Terebrantia** comprises about 2400 species in eight families

Phlaeothripidae comprise two subfamilies. The smaller subfamily, **Idolothripinae,** includes fungal feeding species which commonly exhibit remarkable structural polymorphisms, both within and between sexes, presumably monophyletic, whereas **Phlaeothripinae** is presumably paraphyletic with respect to the larger group Species of Phlaeothripidae are particularly diverse in their biologies. In the Phlaeothripinae, are essentially fungus feeders, presumably on fungal hyphae. Whereas Idolothripinae are all considered to feed on fungal spores having a specialized spore-crushing device in the foregut

The morphosystematics of sub family Idolothripinae comprise about 700 species in 160 genera, which have been examined extensively. In contrast, the relationships amongst the 2800 species and 370 genera of sub family Phlaeothripinae remain unclear. Phlaeothripidae thrips shows various stages of wing polymorphism. Macropterous forms have long, fully developed wings whereas micropterous forms, which are rare, have shorter but fully developed wings and brachypterous forms always have wing pads representing the fore wings but there may be no trace left of the hind wings.

Morphological Diversity

In Thysanoptera, particularly in Tubuliferan thrips oedymerism and gynaecoidism types of structural variation occur. Males tend to have a wider range of atypical developmental variation than do the females. Perhaps the female is less subject to extraordinary body development; in order that she may be better able in disseminate eggs for the assured continuance of the species. Regardless of the reasons, females are more often normal and winged. Individuals are said to be minor forms if they are no more developed than is the minimum for the species. This is the normal form, the gynaecoid form. A heavier, stouter-bodied individual can be termed major form. In particular the head, fore legs and prothorax are greatly enlarged and appendages or stout spines may develop on various parts of the body including the abdomen. These are the bizarre forms, the oedymerous forms.

Fig : life history of Elaphrothrips procer (Schmutz) A-Eggs, B-Larva –I, C- Larva-II, D-Prepupa, E-Pupa-I, F-Pupa-II, G-Adult Female, H-Adult Male

Behavioral And Life History

The thrips shows many peculiarities in their behaviour and life history. These thrips are found in leaf litter, on dead branches, and on dead hanging leaves, and the species on dead branches and in bunches of dead leaves sometimes produce colonies of hundreds of individuals. Thrips are most diverse in tropical areas, particularly the wet tropics, and only a few species occur in temperate parts of the world, and very few in arid areas. Some of the larger species exhibit sub-social behaviour, with males competing with each other to protect particular egg masses, and ovoviviparity occurs in some species.

A) Elaphrothrips procer colony on fungus infected dry leaf of Butea monosperma, B) Female along with eggs

Most of the fungivorous thrips live in aggregations. Eggs, young and adults may be observed together, yet there does not seem to be any social organization. Perhaps in some of these groups communication may be made by sounds undetectable by the human ear. They are very susceptible to environmental changes and can survive only particular climatic or microclimatic situation and requiring proper conditions of the temperature and humidity. Their

Mating behavior of Elaphrothrips procer (Schmutz). A-H shows different position of male and female during mating

abundance could be correlated with the types of plant formation and food viability. Some time they undergo hibernation or aestivation during their developmental stages. Some species of thrips also occurs on dead, decaying vegetation and on the leaf litter surface.

Some species of thrips express a specific matting behavior. In mating the male grasps the female around the pterothorax and mounts her. He then trails his abdomen to one side. When in this position both twist the terminal segments of the abdomen sideways for copulation. Except for a limited number of genera in the Megathripinae (Idolothripinae), the larvae hatch from deposited eggs. Few genera related to Idolothripinae do not lay eggs but give birth to active young.
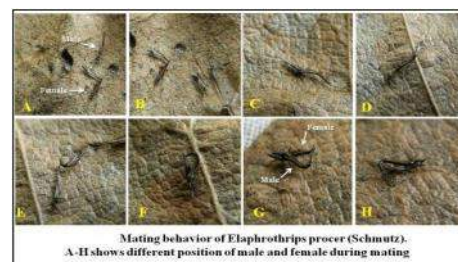
References

1) **Ananthakrishnan, T.N. 1964.** A contribution to our knowledge of the Tubulifera (Thysanoptera) from India. *Opusc. Entomol. Suppl.* 25: 1-20
2) **Anathakrishnan, T.N. 1968.** Thysanopterologica Indica-V. *Oriental Ins.,* 2 (1): 41-58.
3) **Anathakrishnan, T.N. 1969.** Indian Thysanoptera. CSIR Zoological Monograph No.1.
4) **Ananthakrishnan T. N. 1973a.** *Mycophagous Tubulifera of India* (Thysanoptera: Insecta). *Occl. Publ. No.2, Entomol. Res. Unit. Loyola college, Madr*as. 144.
5) **Ananthakrishnan, T.N. 1984.** Bioecology of Thrips. Indira Publishing House, Oak Park, Michigan.
6) **Anathakrishnan, T.N. and Sen, S. 1980.** Taxonomy of Indian Thysanoptera. *Zoological Survey of India* (Handbook Series). 1: 1-234.
7) **Chapman, R.F. 1998.** *The Insects, Structure and Function*. University Press, Cambride.
8) **Kumm, S. 2002.** Reproduction, progenesis, and embryogenesis of thrips (Thysanoptera, Insecta), Developmental Biology, University of Halle-Wittenbreg, Halle.
9) **Lewis, T. 1997.** Thrips as crop pests. CAB International Owon, New York.
10) **Mound, L.A. 1997.** Biological Diversity. In: Lewis, T. Thrips as Crop Pests. CAB International Oxon, New York.
11) **Mound, L.A. 2005.** Thysanoptera: Diversity and Interactions. *Annu. Rev. Entomol.* 50: 247-269.
12) **Mound, L.A. 2007a.** New Australian spore feeding Thysanoptera (Phlaeothripidae: Idolothripinae) *Zootaxa,* 1604: 53-68
13) **Mound, L.A. 2007b.** Thysanoptera (Thrips) of the World-checklist.
    http:// www.ento.csiro.au/thysanoptera/worldthrips.html.

Study of Morphology and Phytochemical Screening of *Ipomoea Carnea* Jacq. of Convolvulaceae Growing in West-Vidarbha.

Mrs. Vaishali N. Badgujar,
Asst. Prof.Dept. of Botany,Shri R.L.T. College of Science,Akola

Dr.S.P.Rothe,
Professor Dept. of Botany Shri Shivaji Science College ,Akola

In West- Vidarbha, Ipomoea carnea is a well known alien invasive species belonging to Convolvulaceae or bindweed family. It has a unique potential to servive in terrestrial as well as aquatic habitat. It has rich floristic diversity.The plant is harvested from the wild for the local use and possesses medicinal values due to presence of phytochemicals.Phytochemicals are non –nuritive plant chemicals that have protective digestive enzyme that break down glycoside bonds in chitin.

Keywords: Alien, Convolvulaceae, phytochemicals, Medicinal value.

Introduction

West Vidarbha comprises districts Akola, Amaravati, Buldhana, Washim and Yeotmal.Plants are critical to other life on this planet because they form the basis of all food webs. They have always played an important role in people's lives providing us with food, Shelter ,medicine arts and a connection to the natural world plants can be used as a tool to empower and improve individuals communities and societis. In the past all the medicinal used were from the plants being man's only chemist for ages. Today a vast knowledge concerning therapeutic properties of different plants has accumulated (Kokate et al, 2005).

Phytochemicals are non nutritive plant chemicals that have protective or disease preventive properties. They are non essential nutrients meaning that they are not required by thuman being for sustaining life. There are more than thousand known phytochemicals. The non alkaloidal and non saponifible fraction isolated from the leaves of I. carnea shows the depresser activity on Central Nervous system (Bhattacharya and Ray 1975) from the leaves of this species, agroclavin and dihydrolyserol were obtained. (Umar et. al. 1980) From latex of Ipomoea carnea was found a new Chinase, a digestive enzyme that break down glycoside bonds in Chitin (Patel et, al 2009; 2010) Ipomoea carnea , the pink morning glory is a species of family Convolvulaceae and is a unique plant which was introduced as an invasive plant from tropical America.

In India it has become a naturalised species invading the wetlands , cannnals, darins, banks, waste lands.The important character of the plant is that it can regenerate very fast from its part in dry as well as the moist surfaces. Due to this unique characters this plant is also from as beshram or Thetbar. Another property of the plant is that it can servive well in terrestrial surface as well as can withstand in waterlogged region or even water bodies the plant can propagate both vegetatively by stems which show roofing within a few days and sexually by seeds and has rapid growth rate (Bhalerao 1985).The hairs or trichomes are found to be very prominent which is one of the important Characteristic of the family Convolvulaceae.The present paper deals with the morphological and phytochemical screening.

Botanical Classification of (Ipomoea carnea) Jacq

Kingdom – Plantae

Subkingdom - Tracheophyta

Division – Spermatophyta

Sub-Division- Magnoliophyta

Class –   Magnoliopsida Dicotyledons

Subclass -   Astridae

Order-   Solanales

Family-   Convolvulaceae

Genus-   Ipomoea

Species-   Ipomoea carnea Jacq.

Material and Methods –

Collection of plant material will be carried out from West Vidarbha region Identification will be made with the help of standard floras (Cook 1967, kamble and Pradhan 1988 and Naik 1998) and confirmed by the Plant Taxonomist Dr. S.P.Rothe (Prof. and Head Department of Botany Shri Shivaji College, Akola)

The plants were collected from aquatic as well as terristirial condition for the morphological study of Ipomoea carnea. Morphological observations was various a qualitative characters consider were root , stem, leaves, flower , capsule and seed.

Similaraly for phytochemical screening the collected plant material were chopped into pieces shade dried and coarsely powdered by using puverizer then the plant powder samples (seed leaf and stem) was subjected to successive solvants extraction with organic solvent of increasing polarity such as petroleum ether acetone chloroform Benzene 7 distilled water the extract of each sample was prepared by soaking 10 gram dried powder samples , filter paper and used for phytochemical study. (Kokate ,1980, Harbone,1998).

Test for Alkaloids:-To the 2-3 ml filtrate,1ml of dilute HCL and 1 larger reagent was added and shake well. Yellow precipitate showed the presence of flavonoids.

Test for Steriods :- To 2 ml of extract of chloroform and 2ml of conc. H_2SO_4 was added . The solutuion was taken well. As a result, chloroform layer turned red acid layer showed greenish yellow fluroscence.

Test for Tanin :- On addition of 5% $FeCl_3$ solution to the extract blue colour appeared.

Test for Saponin :- To 1ml extract 20 ml distilled water has added and shake well in measuring cylinder. Then 1 cm layer of foam was formed.

Test for Quinones:- To 2ml of extract conc. H_2SO_4 was added and shake well for 5 min. Shows the red colour. Biologically active compounds were also reported by using high performance thin layer chromatography (HPTLC), (Swaroop,A.A.2005)

In Ipomoea carnea various phytochemical constituents in different parts are obtained

Result and Discussion

Morphological of features of Ipomoea carnea

Large shrubby erect up to 3 m in hight, fistular stems, glaucous having latex. Leaves broad ovate, 14-22 x 10-13 cm, base truncate, entire margin, acuminate. Flowers pink, funnel form in dichotomous, axillary and

terminal cymes. Calyx lobes 5, unequal brodly ovate. Corolla unnel form, lobes 5. Stamens 5, hairy below. Bicarpellary Ovary, tetralocular, 1 ovule per locule, placentation, axile. Capsules globose or ovoid, seeds hairy.

Macroscopical Features of leaf of Ipomoea carnea

The Size of the leaf is 10- 24cm Length and 4.0-9.0 cm in Width, Heart Shaped, green in colour Apex Cordate, Margin Entire, Base Symmetric, Venation Reticulate pinnate, Surface are Hairy on both side, Prominent Midrib on lower surface.

Macroscopic Features of Flower Ipomoea carnea

The flowers are axial, solitary or arranged in monochasium scropioid cymose inflorescence. The pedicel is green in colour, erect, cylindrical, solitary slightly pubescent, measures 1.5-2.2 cm long and 0.14-0.20 cm diameter. The calyx is persistent, consisting of 5 free quinqiicinal sepals, ovate in shape, with entire margin, symmetric base and acute apex, green in colour, nearly glabrous, measure 0.40.7 cm long and 0.6-0.7 cm width. The corolla is formed of 5 united petals (sympetalous), delicate, pinkish white in colour, with 5 pink to violet coloured strands in the regions of cohesion with each other. The mouth of the corolla has an entire margin. .The androecium is 5 free, epipetalous stamens, which are unequal in length; two of them being longer than the others. They are united to the base of the petals. The basal part of the filament is hairy, pinkish red and swollen, while the upper part is filiform in shape and white in colour. The filament measures 1.6-2.1 cm long and 0.20-0.25 cm width at its swollen base. The anthers are whitish yellow, oblong, basifixed and bilobed opened laterally, and contain yellow pollen grains. The anther attains 0.5-0.7 cm long and 0.200.25 cm width. The gynoecium, shows a superior ovary which is bicarpellary, and bilocular. Each locule contains one or two small anatropous basally placented ovules. The ovary is conical in shape, whitish yellow in color and carried on yellowish green hypogenous disc. The ovary measures 0.3-0.4 cm long and 0.15-0.20 cm width. The style is cylindrical, yellowish white in color, measures 1.4 – 1.6 cm long and 1-2 mm width and ending with a bilobed stigma, each attains 0.7-1.0 mm long, and 0.3-0.6 mm width.

The fruit of Ipomoea carnea

The fruit is a simple dry dehiscent capsule, and is derived from a superior gynoecium. It is pedicellate, subglobular in shape, with pointed apex and spherical base, greyish green in color when unripe, turning greyish brown on ripening. The fruit shows five persistent sepals and remains of the style at the apex. It measures 1.0-1.5 cm in height, 0.8-1.3 cm in width and usually contains four dark brown colored seeds densely covered with hairs. The pericarp is thin, measuring about 0.1 cm thick, smooth and glabrous with yellowish grey inner surface.

The seed of Ipomoea carnea

The seed measures 0.4-0.6 cm in length and 0.2-0.3 cm in diameter, dark brown to black and derived from an anatropous ovule. It is covered with an easy removable dense pale brown to greyish brown trichomes, which attain 0.7-1.0 cm in length. The seed is three-sided, with two flat ventral surfaces that may have a central depression and one convex dorsal surface. The micropyle is represented by a polar scar near the hilum. . The raphe is represented by a raised ridge which extends from the hilum at the base to the chalaza at the apex. The

seeds are covered by a dense, cottony, furry indumentums. . Hairs are much longer on the edge of the rounded abaxial surface of the seeds (at the top and at the base of the elliptically complanate cross-section). The seeds have a black, 0.3 mm thick, very hard, bilayered testa.

Phytochemistry

Various phytochemical constituents in different parts of Ipomoea carnea is given below.

Root :The roots are reported to contain 2-Ethyl-1,3-dimethylbenzene, 2-(12-Pentadecynyloxy) tetrahydro- 2H-pyran, 3-Furanyl[2-hydroxy-4-methyl-2- -(2-methylpropyl) cyclopentyl]- methanone, 2,2Dideuterooctadecanal , Hexadecanoic acid , Linoleic acid (Sahayaraj et al., 2014).

Stem: The stem of the plant contains 2-(12-Pentadecynyloxy) tetrahydro- 2H-pyran, 1-Octadecanol, Hexadecanoic acid , Epiglobulol, , 1-Octadecanol (Sahayaraj et al., 2014).

Leaves :The leaves of the plant showed the presence of thirteen compounds which include hexa decanoic acid, stearic acid, 1, 2 diethyl phthalate, n-octadecanol, octacosane, hexatriacontane, tetracontane, 3diethylamino-1-propanol (Tirkey et al.,1988; Vaishali et al., 2009). Also the presence of swainsonine and calystegines B1, B2, B3, and C1 were detected in the aqueous ethanolic extract of leaf (Balogh et. al., 1999).

Flowers :The flowers of the plant are reported to contain flavonoids, tannins, glycosides, alkaloids, carbohydrates and phenolic compound (Gupta et al., 2010). The presence of swainsonine and calystegines B1, B2, B3, and C1 confirmed in the aqueous ethanolic extract of flowers (Balogh et al., 1999).

Seeds: Presence of swainsonine and calystegines B1, B2, B3, and C1 are found in seeds of the plant Ipomoea carnea (Balogh et al., 1999).

Conclusion

Ipomoea carnea propagate vegetatively, it spread soon and covers vast area in land as well as water. The morphological characters like hollow stem, root proliferating from nodal region of stem and some other anatomical characters like Spongy parenchyma presence of parenchymatous cells between upper and lower surface of petiole and stem, flexible fracture, of root tangentially elongated Cambium radially arranged cambiform cells helps it to survive both in land and water.

References:

1) Austin DF. "Ipomoea carnea jacq. vs. Ipomoea fistulosa Mart. ex Choisy." Taxon (1977):235-238.
2) Austin DF and Huáman, Z. "A synopsis of Ipomoea (Convolvulaceae) in the Americas." Taxon, (1996):338.
3) Balogh, De., Dimande, K.K.I.M., Van der Lugt, A.P., Molyneux, J.J., Naude, R.J., Welman, T.W., 1999. lysosomal storage disease induced by Ipomoea carnea in goats in Mozambique. J. Vet. Diagn. In Vest. 11, 266-273.

4) Bhalerao, S. A., 1985. Role of Ipomoea carnea Jacq. in disturbed habitats. Ph.D. thesis to the University of Mumbai.

5) Bhattacharyya, P.K., 1976. A note on two species of Ipomoea, namely Ipomoea carnea Jacq. and I. fistulosa Mart. Ex Choisy in Eastern Asia. J. Bombay Nat. Hist. Soc. 73, 317-320.

6) Cook, C. D. K., 1987. Ipomoea fistulosa: A new problem for India. Aquaphyte J. 7(1), 12

7) Sahayaraj, K., Ravi, C., 2008. Preliminary phytochemistry of Ipomea carnea Jacq. and Vitex negundo Linn. leaves. Int. J. Chem. Sci. 6(1), 1-6.

8) Sahayaraj, K., Kombiah, P., Dikshit, A. K., Rathi, M., 2015. Chemical constituents of the essential oils of Tephrosia purpurea and Ipomoea carnea and their repellent activity against Odoiporus longicollis. J. Serb. Chem. Soc. 80(4), 465-473.

9) Sengupta S. "On the pollen morphology of Convolvulaceae with special reference to taxonomy." Review of Palaeobotany and Palynology 13.3-4 (1972):157-212.

10) Sinha S and SN Sharma. "Taxonomic significance of karyomorphology in Ipomoea spp." Cytologia 57.3 (1992) 289-293.

11) Tirkey, K., Yadava, R.P., Mandal, T.K., Banerjee, N.L., 1988. The pharmacology of Ipomoea carnea. Ind. Vetn. J. 65, 206-210.

"Circuit Building Blocks (CBBs)" – Innovative Method Of Teaching & Learning In Theory & Practical Electricity, Electronics & Embedded Systems

Dattaraj Vidyasagar,
Teacher, Department of Electronics,
Shri RLT College of Science, Akola

Yash Vidyasagar,
M.Sc. I Year,
Department of Electronics, Fergusson College, Pune

Abstract

To develop positive attitudes in students towards applied and basic electronics, embedded circuits and basic electronics course and improve their academic achievement, teachers need to have positive attitude and a sound information background, and have to use technology along with modern instruction methods. Studies have revealed that the teaching and learning of these subjects at +2 level and above is characterized with the use of traditional method which does not give room for active participation and improvement in the academic achievement of students in the subject. The need to employ modern and technological-based instructional approach is thereby essential. This study examines the effect of blended learning approach on students' achievement in the applied and basic electronics, embedded circuits and basic electronics subjects.

The **"Circuit Building Blocks (CBBs)"** are the systematically designed fundamental building blocks in the learning and teaching process of basic electrical, basic & applied electronics and embedded circuits. The **"CBBs"** give powerful ability to the teacher to explain the topics in **Real Time Environment** (RTE). Since it is based on real time environment teaching and learning, the student can easily correlate theory topics with its relevant practical applications simultaneously. Use of CBBs in real theory or practical teaching helps the student understand the concept of the topic vividly, as he/she can work on different circuits by using CBBs. As electronics is nothing but "Learning by Doing".

Keywords: Blended learning, Circuit Building Blocks, Real Time Environment Teaching and Learning, RTE, CBB, Modern instructional Approach

Introduction

The **"Circuit Building Blocks (CBBs)"** are the systematically designed fundamental building blocks in the learning and teaching process of basic electrical, basic & applied electronics and embedded circuits.

The **"CBBs"** give powerful ability to the teacher to explain the topics in **Real Time Environment (RTE)**. Since it is based on real time environment teaching and learning, the student can easily correlate the theory topics with its relevant practical applications simultaneously. The CBBs can be implemented very effectively in teaching sessions, with different Circuit Building Blocks and a magnetic whiteboard, in theory and practical sessions. This is the need for today's teaching in order to generate technical skill in student.

Necessity of CBBs in Teaching

We actually observed following problems during different teaching sessions:

1. The student can't draw a circuit properly in his notebook, even by looking at that circuit on the white board, which is already neatly drawn by the teacher.
2. Almost 90% of the students can't draw the symbols, to the scale, i.e. with correct proportion, even while using ruler.
3. The student can't recall the symbols of particular components correctly, while drawing the circuit in examination.
4. The student can't grasp direction of current flow in the circuit, when battery is connected in it.
5. For even the passive electrical devices, the students sometimes ask naively that whether a switch or resistor or fuse has the polarity i.e. does it have positive negative signs...!
6. The student can't recall the labels of electrodes in semiconductor devices – like anode-cathode of diode & LED, collector-base-emitter of transistor, drain-gate-source of a MOSFET, and large number of other such components which have specific arrangement of electrodes.
7. We were shocked to witness that some of the students who have passed 10th standard with flying colours, could not identify the +ve/-ve signs of a PP3 9V battery or even a pencil cell.
8. Some students have never "played" with electricity, even with their electrical/electronic toys.

9. Not even the students, but we have witnessed that some of the well-qualified teachers with long experience in teaching ask that if two resistors R1 & R2 are connected in series with each other and parallel with the battery, how same current will flow through both the resistors R1 and R2?? Because they propose that, when the current will come out of the battery the first resistor R1 will drop it and so less current should flow through the second resistor R2...!!!

As explained above, we have witnessed many problems, hence we were working on some effective teaching/learning tool, which will provide a thorough understanding and enlighten the student on different topics in electronics. The necessity of CBBs in real practical or even theoretical teachings session, is particularly because of the effective practical skill achieved by the students when they actually use CBBs.

Features of CBBs

Requires less expertise: The construction of **CBBs** is extremely simple. Anyone with basic skill of soldering, identification of different electronic components, can easily construct CBBs.

Maintenance free: We had constructed number of CBBs of basic electricity devices, Semiconductor devices, and integrated circuits related devices in 2016. And till today (year 2019). We are still using same CBBs with virtually no maintenance.

Real visualisation of components: When we use the CBBs to build a particular circuit in front of the students, on magnetic whiteboard, students can actually see each and every component. Their curiosity starts arising! *When we make the necessary connections using crocodile clips, we have witnessed the joy on the faces of the students*. They really understand the arrangement of different components within the circuit as well as the entire working very effectively!

Long life working: Unless any circuit connection goes wrong while constructing the circuit or connecting power supply to it, the CBBs are long-lasting.

Cost effective: The Circuit Building Blocks can be constructed on cheap insulating board, like wooden board, plastic board, hardboard or even on zero PCB, etc. The boards must be lightweight to hold properly by small magnets fitted on its backside. Thus the overall cost of each CBB is quite less, excluding the cost of different components mounted on it.

Very easy to carry: CBBs are lightweight and smaller in size. So they are easy to carry in a small box.

Anatomy of CBBs

The **"CBBs"** are made up of small square *(or rectangle)* pieces of thin wooden, plastic or hardboard sheets. On each of these sheets, number of different components are fitted like 9V PP3 battery, small transformer, on/off switch, incandescent lamp, fuse, small motor, fixed resistor, variable resistor, capacitor, LDR, speaker, diode, LED, transistor, thermister, MOSFET, FET, JFET, Triac, Diac, SCR, small ICs *(like IC 555, IC 741)*, etc.

All these **"CBBs"** have two or more connecting terminals created with the help of small nut bolts fitted on it. So the Circuit Building Blocks can be wired together in the form of a circuit by using connecting wires & crocodile clips.

The circuit can be directly built on the *(magnetic-type)* white board *(or on a table surface directly)* on which you can draw the symbolic circuit first and then place the required **"CBBs"** at their respective positions. Each **"CBB"** has four powerful Neodymium magnets fitted on the back side.

Methodology used in the implementation of CBBs in teaching

We developed **"CBBs"** and started teaching the topics of basic electricity, basic & applied electronics and embedded systems to the students in "real time environment" and found magical results! All the above mentioned problems of students *(and even many more...)* just got vanished after teaching with "CBBs"...!
Initially when we start teaching the student, we give him/her a chart of symbols and just ask him/her to draw these symbols on a white paper sheet. We ask them to use ruler while drawing the symbols. We believe that if a student can draw the arrangement of apparatus in circuit form, he will surely understand it's working.

Now when actual circuit building using CBBs starts, he knows which apparatus is to be connected where and so he can recall positions of each of the apparatus in the experiment anytime after learning it.

Now here comes the main role of our **"CBBs"**. We have magnetic white board in my classroom on which we draw the circuit first related to the current topic. Then we explain the basic idea of each of the component, device, apparatus used in it with brief idea of the circuit working. Next we stick the relevant "CBBs" on the specific positions of each of the components and devices given in that circuit.

After that we join each of the "CBBs" with connecting wires and crocodile clips. Finally we connect the battery supply to the circuit. And the circuit actually works there in "real time environment"...!

After the demo we discard the connections of the circuit on board and call number of students on the stage to build the circuit by connecting crocodile clips with wires. <u>Here we found that not a single student makes even a single mistake to construct the circuit successfully...!</u>

Comparative Analysis of with and without "CBBs"

We did a comparative analysis of our teaching results with and without the use of **"CBBs"** and found great improvement in the ability to grasp the topic, its practical applications.

Improvement in student's understanding after using "CBBs" in learning	Improvement in student's understanding without using "CBBs" in learning
Student can identify the labels of electrodes like anode-cathode, etc. correctly.	Student is not sure about the labels of electrodes of semiconductor components like diode, transistor, etc.
Student remembers the position of each component in the circuit perfectly.	Student gets confused about the positioning of components in the circuit.
So student can draw the circuit correctly.	Can draw the circuit correctly.
Student can describe the working of the circuit by making sections in the circuit like input section, processing section, output section, etc.	It is a tricky part. The student can describe the circuit working only after mugging it.
The student, who has already studied a circuit on **"CBBs"**, can easily build it on breadboard also.	Can't build the circuit on breadboard.
Student can easily draw PCB layout of the circuit after learning through and experimenting with CBBs	Cannot draw proper PCB layout of given circuit.
And the most important thing is that the student can TROUBLESHOOT the faults in the circuit if something goes wrong during the its working.	Altogether impossible to find faults since the circuit is not clearly understood by the student.

Result Analysis

Since 2018we have been collecting the data related to the performance of different standard students, viz. Std. 9, 10 and 12 and are analysing the results obtained.

This analysis is based on **pre & post performance**. The pre-performance includes taking the test exam of the students after teaching them a particular topic in electronics, theoretically on the blackboard only. This involves in the drawing of relevant electronic circuits on the blackboard and explaining their working to the students.

In post-performance analysis, we used CBBs to explain the working of the circuits and then conducted the test.

Pre & Post Performance Survey: 2018 on 9th Standard Students
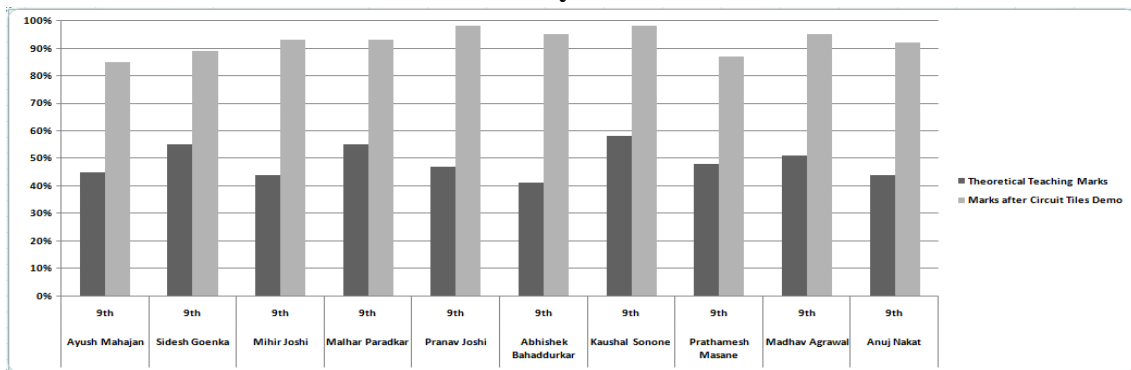
Performance Index of 9th Standard Students
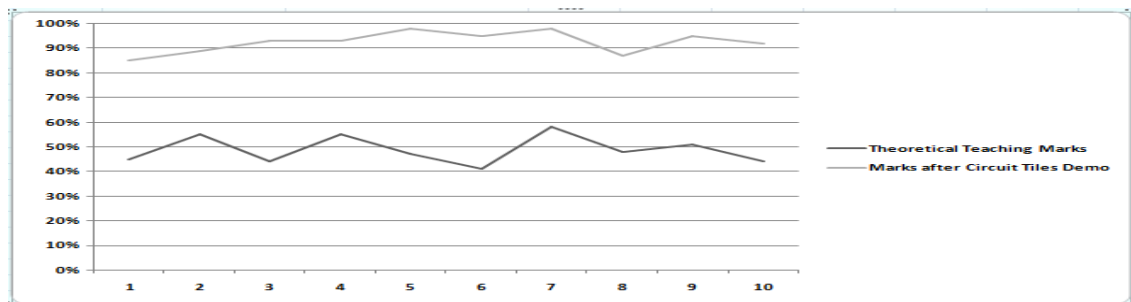
In above comparative analysis of 9th standard students you can see that only with the theoretical teaching the students can grasp the idea of the electronic circuits ranges between 40 to 60%. But when the same topic is taught with the help of **innovative CBBs teaching methodology**, the percentage of understanding the topic of the students ranges from 85 to 100%.**So it is an improvement of more than 40% in overall students.**

Pre & Post Performance Survey: 2018 on 10th Standard Students
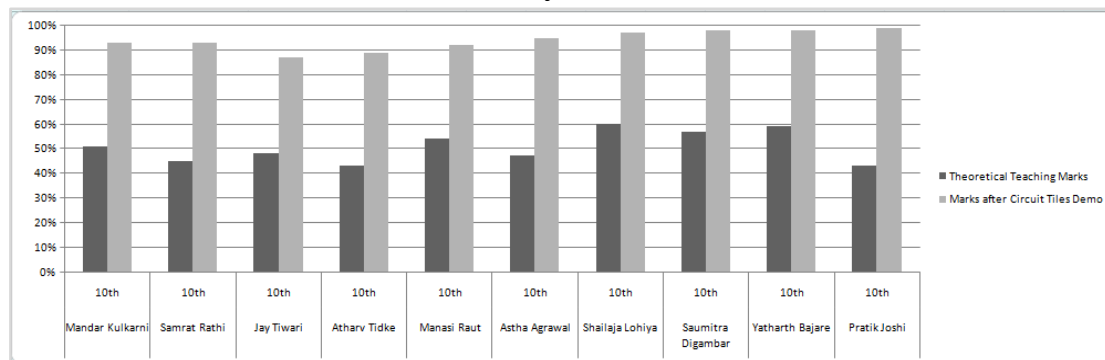
Performance Index of 10th Standard Students
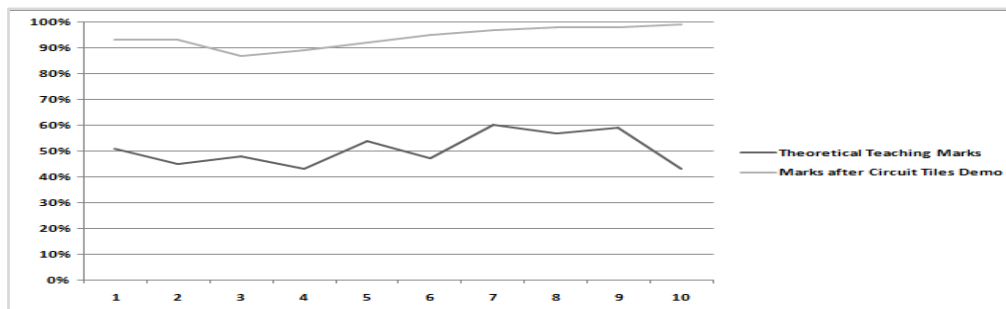
In this result also, as shown in the above graph, the improvement of understanding in 10th standard students is quite high. Only with the help of theoretical teaching the performance ranges from 80 to 60%. But when the same topic is taught **CBBs**, performance of the students greatly increases between 90 and 100%.

Pre & Post Performance Survey: 2018 on 12th Standard Students
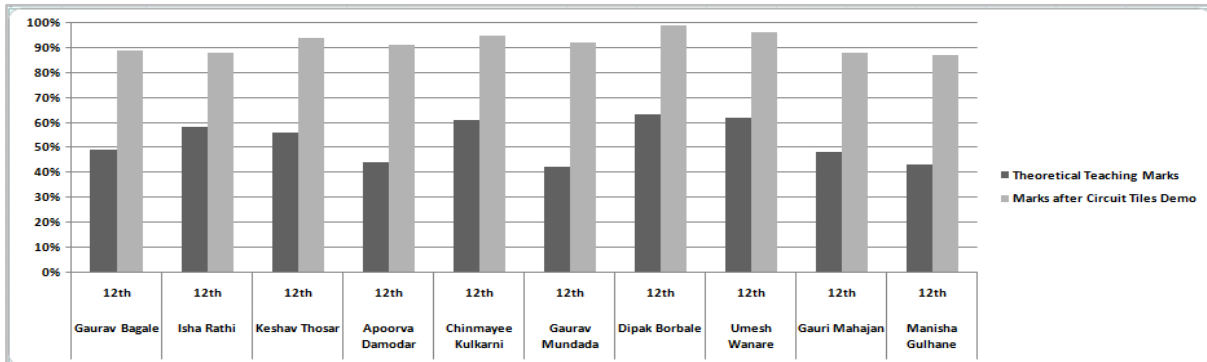
Performance Index of 12th Standard Students
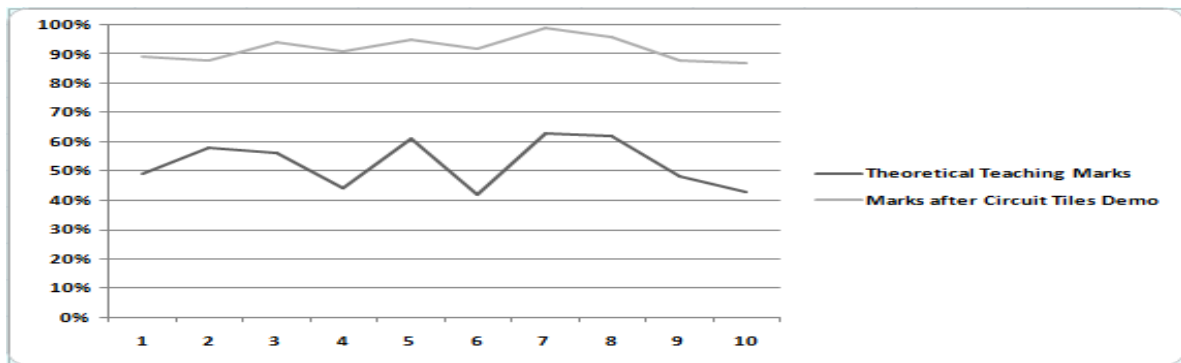
The above comparison was carried out with the students of 12th standard. Here we found that, since the students are quite matured *(being in 12th standard)* their theoretical understanding is already high up to 64%. But here also when the same topic was taught with the help of **innovative CBBs teaching methodology**, the understanding performance is increased considerably.

Improvement Index in Students Overall Performance
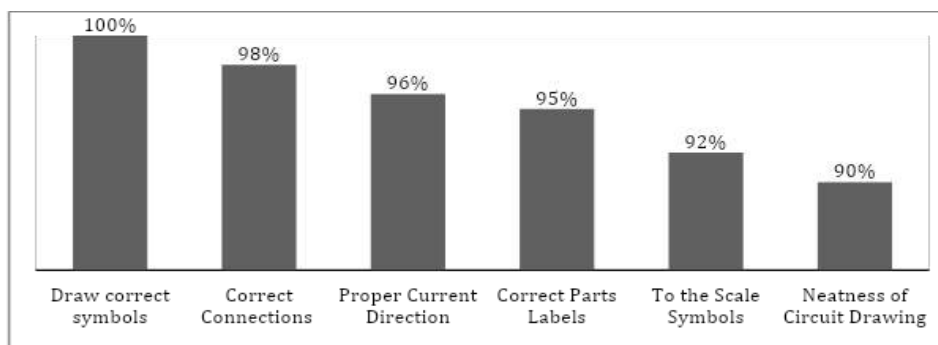
We have observed all these improvements in our students, factually, during different teaching sessions, conducting practical sessions, workshops, for the students from 7th standard to P.G. Level students. We must further add that this improvement is found for all types of topics in basic electricity, basic & applied electronics and embedded systems designing.

Photo Gallery CBBs

Some photographs of CBBs are given here. We used these CBBs to analyse students' performance in theory and practical topics of basic electricity and applied electronics.

3"x3" "CBBs" of fixed/variable resistors   **3"x3" "CBBs" of basic semiconductor devices**
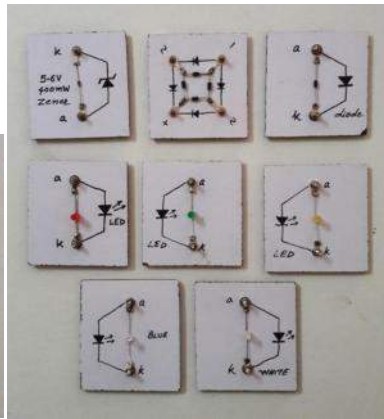
Summery

It is important to give basic training to the concerned teacher, who will be using the CBBs. For this the teacher must practically work on CBBs, try constructing different circuits using the blocks. The training sessions are easy to grasp by all levels of teachers. We also observed that the students start using their logic to modify the basic approach of a circuit and concept of topic by implementing their number of different ideas and suggestions. When we actually started teaching the relevant topics using these CBBs, we were surprised with the interesting improvement in the students' understanding level of particular topic. And sometimes we were impressed to see a parallel working circuit or approach for a complicated digital circuit, demonstrated practically by number of students.

We have been constantly improving with the aid of "CBBs" in our teaching methodologies and we helped many teachers also to implement our "CBBs" in their teaching. We have received positive results from number of such teachers from different institutions.

Implementation of ICT (Information Communication Technology) in teaching & learning curriculum at +2 level

Hemant Yashwant Satpute

Teacher, Department of Electronic Science,

Fergusson College, Junior Wing, Pune

Abstract

The introduction of information and communications technologies (ICT) in education reflects and responds to present and future needs of people functioning in an intensely changing and challenging intellectual environment. If ICT based education is a gateway to participation in future culture, society and economy, what should be the nature and form of educational infrastructures? Human, pedagogical, physical, technological and organizational aspects must be considered. ICT, when appropriately used, can serve as a vehicle and a platform for meaningful educational reform geared towards a shift from educational "instructionism" to constructivism. Access to ICT by students and teachers has begun, yet its use supports traditional teaching rather than the shift to new roles and pedagogical practices. Policy implications include the need to develop expertise within the nation, provide training opportunities, and encourage initiative and innovation on the part of teachers.

Keywords: ICT, Information Communication Technology, ICT in education, Implementation of ICT in science and technology

Introduction

Information and communication technologies (ICT) are simply technologies arising from scientific and technological progress in computer sciences, electronics and telecommunications. They enable us to process, store, retrieve and broadcast valuable information in text, sound and video form. In an increasing interconnected world, brought about by the application of technological advances to all sectors of society, quality education necessitates active and innovative exploration to maximize the benefits of ICT and develop and maintain the partnerships that use of ICT in education requires. This calls for re-conceptualizing and restructuring the educational enterprise, so as to confront the technological challenges of this millennium. With rapid changes within society and radical transformations in the way people acquire knowledge, new teaching paradigms are required, that tune educational systems to modern times and ensure quality training for large numbers of persons.

This training is concerned with how ICT such as computers and internet are being integrated into classrooms at the outset of the 21st century.

It is interesting to note that while the integration of ICT in education has lead to changes in pedagogical approaches in formal education in several different states in our country. Technology-supported curricular change had occurred. It was because teachers provided a more in-depth coverage of a single subject, or schools gave students more responsibility for determining their own learning, or they emphasized a certain curricular theme.

The ministry of education recently developed a strategy for the implementation of the national ICT policy in basic education. The strategy includes mention of training in ICT for teachers and school directors and integration of ICT into the curriculum. It also drafted national guidelines for teaching ICT in pre-school and primary schools, with six different modules adapted to each level, from discovery and presentation skills to applying skills to knowledge construction and finally learning health and safety issues related to the use of ICT. The teacher modules include productivity and research, applying ICT to teaching and learning, evaluation, and lastly, social, moral, and human questions related to ethics and equality.

Though these efforts are still in an experimental stage, they have nonetheless lead to some moves from traditional pedagogical and administrative culture, moves from teacher-centered pedagogies and memorization as a learning technique to a more constructivist, pupil-centered approach, with pupils assuming more responsibility because of increased development of research and problem solving skills through the use of ICT. They reminded us that achievement gains are only one of a number of criteria from

which we should determine the advantages of any educational intervention. They recommended the consideration of other issues such as time savings for students and teachers; cost effectiveness; the presentation of realistic situations which require inquiry and collaborative problem solving; and forms of evaluation.

It is thus apparent that research results about the use of ICT in schools and their impact are equivocal. What is generally recognized is that ICT are an important part of our lives today, but there are divergent views about the role that schools should play in promoting use and fluency of the tools, and their primacy as resources in classrooms.

Generally, the arguments against computers tend to focus on the fact that at a time when financial resources are limited, policy makers should not be spending money on machines, but rather on people and books and other supplies for teaching and learning. At the other end of the spectrum, supporters of the use of ICT in schools say that they need to be integrated into education so that children can learn in new and dynamic ways and be prepared for the challenges of life in the 21st century. In view of the integration of computers in education and the divergent views of researchers as to their contribution, as educational researchers, we sought to investigate the role of computers in schools and their pertinence for teaching and learning at pre-university levels.

Implementation of ICT in schools

The schools are referred to as ICT "pioneer schools." They were characterized by the following:

Teachers trained in ICT.

Pupil access to computers for at least two hours per week during coursework and two hours for autonomous use

Use of ICT as a pedagogical tool (in teaching, learning, auto-learning and research)

Intranet connected with internet 24 hours a day.

Access to information related to the establishment (school results, training needs of school teachers, calendar, etc.)

Commitment to making achievements in ICT durable.

Computers are kept in a computer laboratory commonly called the multimedia center, with up to 50 computers connected to internet. These computers are often networked to printers and scanners. Teachers as well as students have daily access to the centers. A multimedia center is managed by a head of center that draws up a timetable for teachers and students to take turns using its resources. The multimedia center heads are selected amongst teachers of science subjects and given special training. They in turn train other teachers besides the students. It is because of this extra ICT teaching that such teachers claim that they need extra financial motivation.

Necessity of ICT

What came clear from the study is that access made both teachers and students potential participants in the great enterprise of knowledge construction because of the availability of information. Teachers in all schools indicated that the ICT is useful to students because it enables them to obtain information, do research, learn and understand better, and communicate. The teachers use ICT for documentation, to access teaching and learning material for their classroom use. In most cases, computer lab monitors download information for teachers who make such requests. In addition to using ICT to prepare lessons, many teachers also use it to calculate marks. One Head of the Computer Unit said, "science and math teachers particularly those teaching geometry make abundant use of the multimedia center to search for information." The internet is exploited in teaching such subjects as accounting and management. With ICT we observe some shift from textbook-based schooling to web-supported community of inquiry. Though a culture of inquiry in schools has been a pedagogical ideal, it has not been an enduring reality. Knowledge resources available in content-thin textbooks and limited libraries could not sustain inquiry oriented pedagogy. A major concern of ICT should be programs for training specialist teachers in using ICT as a pedagogical tool.

The integration of ICT can be effective in the teaching-learning process if the following conditions are fulfilled.

Effective leadership: The school administrator must facilitate access to ICT by teachers, students, and the administrative staff. Money allocated for the equipment should be used judiciously. School administrators should be committed people.

Building renovation: Most of the classrooms were built without the idea that ICT would be used. Most classrooms do not have electrical installations, air conditioners, window protectors and solid doors. It is therefore difficult to use electrical installations in such spaces.

Teacher training: Once teachers have access to ICT they are more likely to learn on their own and to put into practice knowledge and skills gained through formal training or informal inquiries from colleagues. Students get more benefits from ICT when teachers use them for pedagogical purposes and such practice thrives best in an environment conducive to learning and innovation.

Equipment maintenance: Some equipment is supposed to be changed at specific times and the cleaning of the multimedia centers is very necessary for the functioning of the machines. The school should train their personnel to do the maintenance rather than depend on commercial technicians.

Effective multimedia center supervision: The school administrators should make an inventory of the equipment in the centers and make sure they inspect the state of the center and the equipment on a regular basis. They should provide optimum access to the center and its resources through careful scheduling, including of training opportunities for teachers.

Implementation of ICT:

The literature review and research findings have implications for education actors. For schools, leadership and teacher training are as paramount as infrastructure and equipment issues. For teachers, they must take the initiative to learn about ICT and its potential for enhancing their teaching. This will take place formally and informally. Examples and practice will be required. Training should be a compulsory and compensated policy for all personnel in all organizations. This will facilitate access to information flow and reduce unnecessary physical movement of files and personnel.

Teachers use technology to access information, model problem solving, and develop simulations that provide greater understanding of how technology is used in the work world.
Teachers should continue to use technology to guide and engage students in self-directed and group learning activities.

There has to be an appropriate matching of teachers' knowledge of content, appropriate uses of technology, and the desired learning objectives.
Teachers should increase the number of hours they go to the internet to search for information to update their teaching. Through their internet connections, they will have access to resources that even a few years ago would have been impossible even for university researchers.

Teachers' active participation in seminars and workshops is highly recommended. Professional development may also include just-in-time study groups, online seminars, action research, and collaboration with colleagues. The teacher is also an administrator at a lower level in the classroom. ICT can be used to increase administrative efficiency.

For this reason, classroom teachers should improve their skills in simple programs like Excel, for calculating marks and storing important data for the school. Electronic messaging can be used to encourage sharing and collaboration among students. It has been noted that a teacher may have the best computer, the most sophisticated curriculum software, and the fastest internet connection, but if that teacher does not know how to use any of that, it is not going to improve the teaching/learning process.

Teachers must have opportunities to familiarize themselves with hardware and software and to learn through example and practice how to use ICT to deepen their teaching and the learning of their students.

Conclusion

The experimenting or "pioneer" schools are responding timidly to the information age and the knowledge economy through the use of ICT which today permeates many aspects of urban life. Yet it seems that action plans related to the use of ICT in schools or colleges are not clearly articulated. The use of ICT in educational settings is marginal and in many instances perceived as an "add on" to regular classwork. ICT is used to perpetuate and reinforce the curriculum taught in the traditional way.

ICT is taught as a discipline rather than as a set of tools that can be used for more in depth and interactive teaching and learning. Integration of ICT into schools or colleges is an important value component of government style to modernize the country and open future citizens up to the world fast becoming more and more a global village. Similar perspectives were voiced by teachers and students in focus group discussions who addressed the value that access to computer and internet has brought to learning and to school administration. Challenges relate to policy, explosive school demographics, teacher numbers and quality, access to equipment and training opportunities, and moral concerns. From all indications it was clear that there is absence of clear policies guiding core issues such as program design, teacher training and sustainability

Search Engine Optimisation (SEO) & Effective Customisation Techniques using Rank Math Plugin

Dattaraj Vidyasagar
Department of Electronics, Lecturer,
Shri R.L.T. College of Science, Akola

Hemant Yashwant Satpute,
Teacher, Department of Electronic Science,
Fergusson College, Pune

Abstract

Information and communication technologies (ICT) are simply technologies arising from scientific and technological progress in computer sciences, electronics and telecommunications. They enable us to process, store, retrieve and broadcast valuable information in text, sound and video form. In an increasingly interconnected world, brought about by the application of technological advances to all sectors of society, quality education necessitates active and innovative exploration to maximize the benefits of ICT and develop and maintain the partnerships that use of ICT in education requires.

*In this era of ICT and digital student generation "**Google it**" has now become a keyword for everything. Anybody need to have an information or need to know something "**how to do**", then immediately the answer comes to him/her is "**Google it**!" That means in other words search engine has become an inherent part of our life for searching resources, persons, remedies, knowledge, etc. On search engine, many links are available in the form of websites. Many web developers develop different websites with variety of design tricks to attract the people towards them and their product or business. Hence every developer wishes that his / her webpage or site should be listed with topmost priority by the search engine. So Search Engine Optimisation (SEO) has becomethe key to the success of the website. In this regard "Rank Math" plugin available with Word Press Content Development System (CDS) or web developer tool plays a vital role. It helps the developer to display the links available on one's web page quickly, readily with topmost priority on the first page of result produced by any search engine.*

Owing to these reasons, it has become the necessity of time to make students aware of these techniques while developing the web sites for variety of purposes and while learning various tools and techniques for the same purpose. In this paper an attempt is made to demonstrate the Search Engine Optimization (SEO) and effective customization techniques using Rank Math Plugin.

Keywords: Rank Math Plugin, SEO, Search Engine Optimization, WordPress SEO plugin, free Rank Math, Optimizing Google Search

Introduction

Search Engine Optimisation is the key to the success of your website, but it's not without its quirks. Optimum tweaking of all content of the web pages in your website, portal, blog, etc. with the help of the best WordPress plugin, "Rank Math" helps you to display the links of your web pages on the first page of any search engine, Google in particular. The constant process of optimizing your web pages can sometimes take more time than actually writing the content. If you always feel that you can do more on the SEO tweaking for your website but don't have the time, then Rank Math is comparatively the best plugin.

The "Rank Math" plugin helps every website owner to get access to the SEO tools they need to improve their SEO and attract more traffic to their website. There are intelligent features in Rank Math plugin that brings SEO capabilities in your hands, which wasn't possible before the "birth" of this plugin. Number of smart automation features available in Rank Math, provide you the ability to handle the SEO jargon, just with few clicks, which would perhaps require the entire SEO team, otherwise. The plugin was developed by the "MyThemeShop" squad.

To use Rank Math plugin, we suggest the #1 Content Management Systems - the WordPress. You will also need to check if your server is compatible with Rank Math or not. While most websites will never have a compatibility issue with Rank Math, it's better to be safe than sorry.

Rank Math requires modern version of PHP to its smooth working. Practically we found that the PHP 5.6 and older are not compatible with Rank Math. So, if you're running PHP 5.6 or older, you'll see an error screen.

If you're on PHP 5.6 or below, then the best solution is to update to a newer version. If you don't know how to update, the easiest way to achieve that is to ask your hosting company.

Since we are recommending the use of Rank Math plugin particularly on WordPress platform, the WordPress itself will ask for updating of PHP version to the latest possible version, for the current update of WordPress to 5.3.2.

The Rank Math also requires the PHP modules. Just like WordPress gives additional functionality through its plugins, even the PHP can have additional functionality using PHP modules. In modern servers, these modules are already installed but we suggest checking it out first before going for Rank Math. And the final step before actually using the Rank Math plugin is to connect it with www.rankmath.com website in order to get optimum results out of it.

The Installation & Setup of Rank Math Plugin

There are two methods of installing the plugin on your WordPress platform. The first one is to download the .zip file of the plugin from following link and then upload it on your WordPress website and after that activate the plugin.**Download link:**https://downloads.wordpress.org/plugin/seo-by-rank-math.1.0.36.3.zip. The second method of installing the plugin is to search for "Rank Math" in WordPress by clicking on "New Plugin" menu, as shown below:
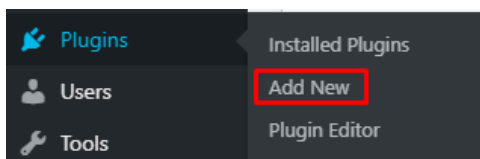

Click on "Add New" to go to the plugin search page
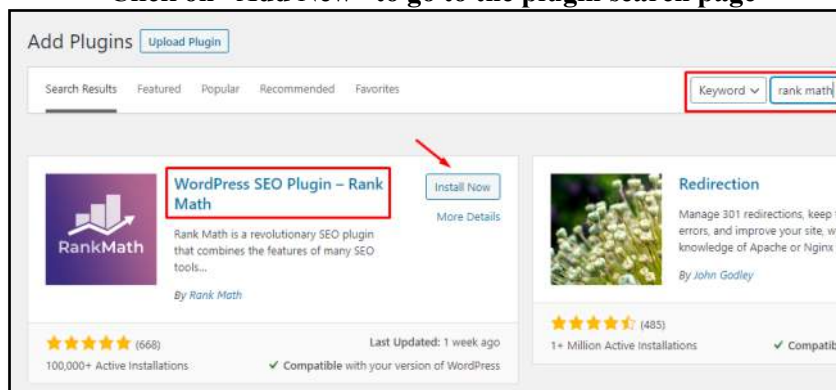
Search for "Rank Math" in search field to get the plugin

Once you see the **WordPress SEO Plugin – Rank Math**, as given in above screenshot, just click on "Install Now" button *(shown with arrow)* to install the plugin. The installation will quickly start, the button indicate that the installation is in progress. Now wait for a minute or two and then the button indicate to activate the plugin.
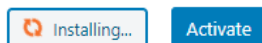
After activating the plugin it will display the "Connect Free Account" page as shown below:

Connect Free Account page of the plugin

We recommend to the students checking the Checkbox indicated with red arrow in above screenshot. This will help the "MyThemeShop" team to learn your problems and provide more effective updates of the plugin in future. You can connect Rank Math plugin either through your email or through your Google account or even through Facebook account also.

Once connected, you will see this thanks page.However, it is necessary to login before using the Rank Math plugin. Now you can start the Setup Wizard, as you will be redirected to wizard page.

If there is still any problem particularly regarding the PHP version and any conflicting plugins *(remember, Yoast plugin is the true enemy of Rank Math plugin)*, you will be prompted accordingly during the Setup Wizard, as shown below.
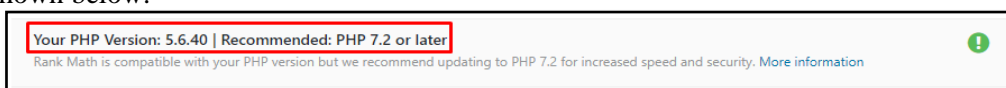
During the steps of the Setup Wizard, fill up the information very carefully. You will have to fill up the following details:

1. Title of website
2. Upload logo – we recommend to use circular logo in particular
3. Default social share image – this image is displayed when someone shares your web page link on his/her social profile like Facebook, Twitter, etc.
4. Google search console – you will have to authorise your website with Google search engine console. For that you can visit to the given link in setup wizard.
5. Search console profile – once you authorise your Google search console, you can select the option that which profile you want to include here.
6. Sitemaps – We recommend to the students you to turn on this feature. This will help you gain full control over SEO when you submit the sitemap.xml file in domain property in your Google Webmaster Account. Remember, XML Sitemaps help search engines index your website's content more effectively.
7. Include images – Include reference to images from the post content in sitemaps. This helps search engines index your images better.
8. Public post types – We recommend to the students to select both posts and pages options. Select post types to enable SEO options for them and include them in the sitemap.
9. Public taxonomies – Select taxonomies to enable SEO options for them and include them in the sitemap.
10. SEO tweaks – Automate some of your SEO tasks like making external links nofollow, redirecting attachment pages, etc.
11. Noindex Empty Category and Tag Archives – always keep this option on. Setting empty archives to noindex is useful for avoiding indexation of thin content pages and dilution of page rank. As soon as a post is added, the page is updated to index.
12. Nofollow external links – always keep this off. We don't want to give higher rank to other website links in search engines. Automatically add rel="nofollow" attribute for external links appearing in your posts, pages, and other post types. The attribute is dynamically applied when the content is displayed, and the stored content is not changed.
13. Open external links in new window – this is very important. When you write a post and put an external website link into it, it will be automatically open the content in new page. Automatically add a target="_blank" attribute to external links appearing in your posts, pages, and other post types. The attributes are applied when the content is displayed, which does not change the stored content.

Once all these things are done in setup wizard and everything is smoothly exercised, you will see the last page of Rank Math plugin concluding the setup wizard.You can further setup the advanced options, given in Rank Math plugin within this setup wizard or you can setup them later on also. These options are as follows: **404 monitor, Redirection, Rich snippet type, Article type**. In article type, if your website is a personal blog, just link http://yashvidyasagar.com, we recommend to the students to use the option as blog post. This is because Google does not allow Person as the Publisher for articles. Organization will be used instead.
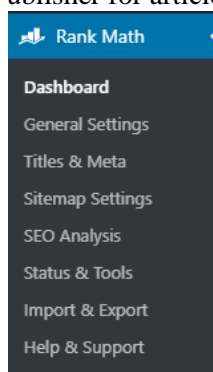
Finally the setup wizard will close and you will be returned to the dashboard of you WordPress site. Now click on the different menu options to check and customise them as per your requirement.

How to Write SEO Friendly Posts & Web Pages?

Rank Math plugin gives you the great power of writing neat and clean posts and web pages which will help rank your website at #1 in all search engines like Google in particular! And this is today's need, to rank #1 on the internet! So we shall see how to write neat and clean post or web page with highest ranking.The Rank Math suggests you with some aspects while writing a web page. You should not ignore these suggestions:

Basic SEO Suggestions

1. **Focus Keyword in SEO title –** the Rank Math plugin suggests to write focus keyword in the title of your post or web page. This is most important suggestion. You must use a focus keyword.

2. **Focus Keyword in SEO Meta Description –** the Rank Math plugin also suggest writing the focus keyword in the Meta description. Here note that this focus keyword must appear within first 100 words. Otherwise it will not reflect in search engine ranking.

3. **Focus Keyword in URL –** when you start writing title of the post in WordPress, the permalink is automatically created by WordPress. But you must rewrite the URL of the web page before publishing it in such a way that the keyword will appear in URL. This helps the web-bots to detect the correct relevance of the keyword, with title, URL and Meta description, to provide good ranking.

4. **Focus Keyword at the beginning of your content –** this is recommended, but sometimes it is not possible. It depends on the type of content and the flow of language you are using so you can try for it but it's not mandatory.

5. **Focus Keyword in content –**We recommend to the students to repeat the focus keyword as many times as possibly in the content relevantly, of course! It is just like hammering a particular thing constantly to get better results – just saying, it's not literally applicable when it comes to technological aspects.

6. **Content Word Length –** the recommended word length is minimum 600 words. If your content is short, then there will be drastic impact on SEO of the web page. There is no maximum limit for the content *(however, it doesn't mean to write a whole book on a single web page or post)*.

Additional SEO Suggestions

1. **Use Focus Keyword in subheading(s) like H2, H3, H4, etc. –** when you write a post, you should systematically create relevant sections of the content in heading 2, heading 3, heading 4, etc. **Remember, all search engines just love!**

2. **Add an image with your Focus Keyword as alt text –** the alt text plays very important role in finding your image on the net connected to your post. We recommend to the students writing relevant alt text for each of the images embedded in the post.

3. **Keyword Density –** as said earlier, the more is the keyword density, the higher will be the chances of ranking in search engine.

4. **URL Length –** this is crucial part in the post or web page. If the title of the web page is short i.e. with 50 characters, it's ok! But if you are writing a research paper in the form of a web page, the length of the title will be very large. Naturally the URL will also be quite long. Here the problem is, the search engine shows your post or web page title entry only in 50 characters, sometimes 60 characters at the most. So the title will be truncated, hence the first 50 characters of the title must give enough meaning to understand the actual title of the post or web page.

5. **Outbound links –** there should be interlinking of your content with the previously published posts and we also recommend to the students to insert some relevant external website links as curtsey.

The Readability

We always recommend to the students while writing content for the post or web page that the content should be easy to read, without jargon of clumsy words, heavy meaning words or terms. The following type of recommendations is given to the students, to achieve best results in readability of the content.

1. Use the Focus Keyword near the beginning of SEO title.
2. Your title should contain a positive or a negative sentiment word. However this is optional. Headlines with a strong emotional sentiment (positive or negative) tend to receive more clicks.
3. Your title should contain a power word. Power Words are tried-and-true words that copywriters use to attract more clicks.Add at least one power word in content.
4. It is good to add a number in the SEO title. Headlines with numbers are 36% more likely to generate clicks, according to research by Conductor Magazine.

Content Readability

Following points are helpful for better content readability of your post or web page.

1. Use Table of Content to break-down your text.
2. Use of short paragraphs helps increase the readability and take grip of the reader.
3. Your content contains images and/or video(s).

Experimental Findings

One of our students wrote a post on website www.vsa.edu.in as per the given recommendations. And to our surprise the SEO ranking was 82%. The title of the post is **IC 555 FAQs**. Though the title is very short, but the screenshots of the analysis done by Rank Math plugin for this post are given below.
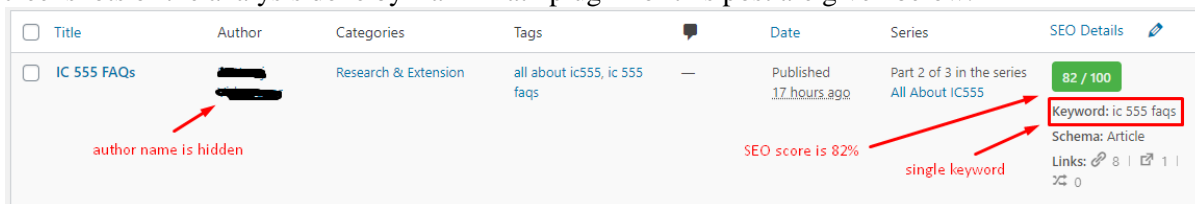
Here you can see that in SEO details the search engine ranking is 82% with a single keyword "ic 555 faqs" which is also in relevance with the title of the post.
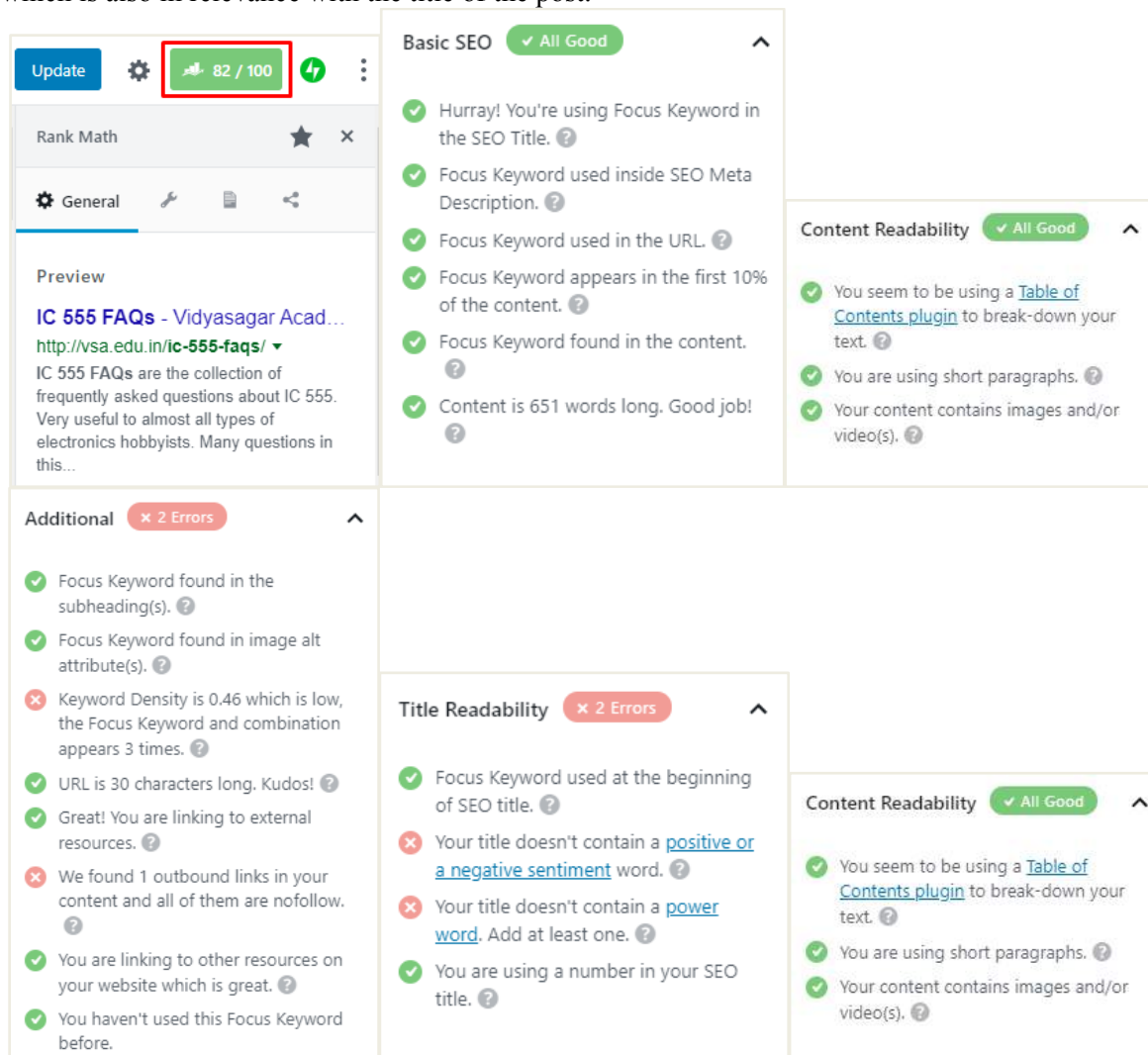
References

1. **Rank Math** – Best SEO WordPress plugin; https://rankmath.com/
2. **Backlinko** – Free Exclusive Traffic Tips;https://backlinko.com/hub/content/viral
3. **Yash Vidyasagar Website** – personal blog; http://yashvidyasagar.com/

Data Logging System of Real Time Ambient Temperature & Diffused Sunlight Intensity Measurement during Solar Eclipse

Hemant Yashwant Satpute
Department of Electronics, Teacher,
Fergusson College, Jr. Wing, Pune

Yash Vidyasagar,
M.Sc. I Year, Department of Electronics,
Fergusson College, Pune

Abstract

चिन्तनीया हि विपदां आदावेव प्रतिक्रिया ।
न कूपखननं युक्तं प्रदीप्ते वन्हिना गृहे ॥

It is improper to start digging the well after the house has caught fire! We should be pro-active i.e. we should have the solutions ready even before some problem comes to us.

Studies have revealed that the teaching and learning of any subject at +2 or at higher level is characterized with the use of traditional method which does not give room for active participation and improvement in the academic achievement of the students in the subject. The need to employ modern and technological-based instructional approach is thereby essential.

Keeping these things in mind, being teacher of Fergusson College since past 20 years, me and my Student Yash Vidyasagar, pursuing his M.Sc. Degree in Electronic Science Department we decided to conduct certain activities at the college level. In Fergusson Junior college, during the Solar Eclipse span of 26 December 2019, we conducted two important measurements and the analysis of effect of Annular Solar Eclipse on environment temperature and light intensity. This paper narrates the detailed story about it.

Keywords: Annular Solar Eclipse 2019, Steinhart-Hart empirical equation, Arduino UNO, NTC thermister, LDR responses, intensity-temperature comparative analysis

Aim of the Experiment

To demonstrate the fact that today's internet technologies helps a lot for the self-development of a person. To learn the fact that today's available technology help students in the study of their own subjects of interests. To demonstrate the fact that education, studies and entertainment are not separate quantities but they are supportive to each other. To understand the fact that computer's internet technology is really useful for the students and it helps to boost the performance of the students during the exams. To develop a group culture in the students so that using the platform of the internet *(which is easily available today for every one)* students can interact with each other and also with the teachers comfortably. To develop the ability of expressing own thoughts precisely and with the help of correct words and with few lines. To develop an ethical culture and also to teach and develop the good manners to be followed while using and practicing internet technology for official works.

The Experiment

We developed two systems for this measurement and data logging, using Arduino UNO microcontroller. The first one is "Ambient temperature measurement" and the second is "Ambient diffused sunlight intensity measurement". In former system, we used Steinhart-Hart Empirical Equation with NTC thermister, to get high accuracy in temperature measurement. In second system, we used Modular Equation to measure diffused sunlight intensity using high efficiency LDR. Both systems were coded independently with Arduino UNO platform, to measure the relevant data at a fixed time interval of 30 seconds slightly before and after the event of solar eclipse of December 2019. The real time data was logged, in two independent data logger systems, for further graphical analyses.

Setup of Temperature Measurement

In this system, we used the thermistor of 10kΩ/25°C and a resistor of 10kΩ to form a potential divider circuit. The center point of this circuit is connected to analog input pin A0, of Arduino Uno Microcontroller. Refer to Figure 1.
The voltage across 10kΩ resistor, which is connected to pin A0 of Arduino is given by:

$$V = \left(\frac{10k\Omega}{10k\Omega + R_{Th}}\right) \times 5V \therefore \quad 10k\Omega + R_{Th} = \frac{10k\Omega \times 5V}{V}$$

$$\therefore \quad R_{Th} = \frac{10k\Omega \times 5V}{V} - 10k\Omega$$

This voltage is analog voltage. It is converted into digital by using the ADC process. Its formula is given by:

$ADC = analogRead(V)$

The **analogRead()** function reads the value from A0 (the analog input pin of Arduino Uno microcontroller). It's a 10-bit analog to digital converter in Arduino UNO microcontroller. This means that it will map input voltages between 0 and the operating voltage of 5V into integer values between 0 and 1023. For example, 5V/ 1024 units = 4.9 mV per unit.

$$Vo = \frac{5V \times ADC}{1023}$$

Finally the standard **Steinhart-Hart Formula** for thermistor is given by:

$$Temperature\ in\ Kelvin = \frac{1}{\left(A + (B.log\ log\ R_{Th}) + (C.(log\ log\ R_{Th})^3)\right)}$$

The Constants used: $A = 0.001129148 \quad B = 0.000234125 \quad C = 8.76741 \times 10^{-8}$

Setup for Light Intensity Measurement

The circuit of Lux meter consists of a potential divider built around LDR and a 5kΩ resistor. The middle terminal of the potential divider is connected to analogue terminal A0 of Arduino UNO development board. The actual connection diagram is shown in Figure 2.

Graphical Analysis: Temperature Measurement

Solar Eclipse Time Vs Temperature Graph (26 Dec. 2019) Fergusson College Pune Temperature
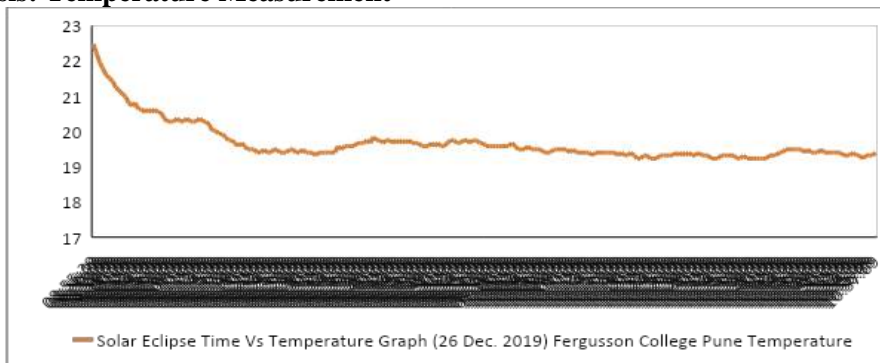
Graphical Analysis: Ambient Sunlight Intensity

Solar Eclipse Time Vs Ambient Light Intensity Graph (26 Dec. 2019) Fergusson College Pune Ambient Light Intensity
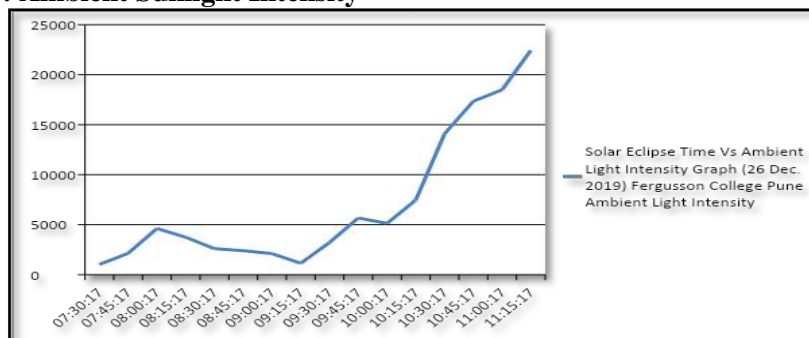
Measurement Techniques

Figure 1 Temperature Measurement SET UP   Figure 2 Light Intensity MEASUREMENT Set up the Code
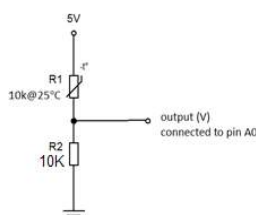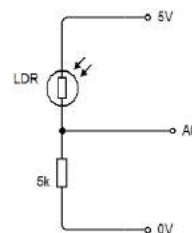
The code for this project is fairly simple. A modular empirical equation is used to calculate the intensity of light in terms of Lux.

The relevant comments for each of the statements in the code are given below:

#define LDR_pin 0 ☐the middle terminal of above circuit is connected to A0 of Arduino UNO

#define ADC_Max_Value 1023 ☐as per conversion factor in Arduino, maximum ADC value is 1023

#define ADC_Ref_Voltage 5.0 ☐the reference voltage is equal to the supply voltage of Arduino

#define LDR_Ref_Resistance 5031☐standard value, DO NOT CHANGE IT!

#defineLux_Scalar_Standard_Value 30518931 ☐It is a scaling value. The original value of big size LDR is "12518931". Since I used small LDR, accordingly I adjusted this value as given above.

#defineLux_Cal_Exponent_Value -1.405 ☐It is just an exponent value used in the equation.

In this way the actual modular empirical equation for converting the LDR voltage value into Lux value is given below.

LDR_Lux_Value=(Lux_Scalar_Standard_Value)*pow(LDR_Resistance, Lux_Cal_Exponent_Value);

Conclusion

The graphical analysis of light intensity and temperature graphs with time shows that the temperature is continuously decreasing during the span of solar eclipse. The light intensity initially was maximum, shows a minimum peak when the actual annual solar eclipse takes place and then after starts increasing again and becomes maximum when the eclipse ends. These readings are obtained using electronically and measured with Arduino Microcontroller. These graphs when compared with the manual readings *(Refer to Figure 4)* taken by Fergusson Junior College, students, shows that the two approaches are in excellent agreement with each other.

This approach was appreciated by the Principal Fergusson College, Dr. R. G. Pardeshi Sir, Vice Principal Mr. N. A. Kulkarni, Professor in Physics Dr. S. G. Kulkarni, Faculty member DOES FCP Dr. Mrs. Kalpana Kulkarni and many other teachers of senior and junior wing of Fergusson College. During the span of solar eclipse, students of Junior College also demonstrated different myths about Solar eclipse in the minds of people and they tried to given scientific explanations of some of them. Students also demonstrated the view of Solar Eclipse as a reflection of Sun in water. The photograph of it is attached along with this paper. Refer to *Figure 3*. Along with this activity, Fergusson College students also measured the growth / decay of Bio organisms during the period of solar eclipse. All the allied schools and colleges under Deccan Education Society were participated in this activity, by sharing the live telecast of solar eclipse from Tirupur, in Tamilnadu using Skype.

Figure 3 Reflection of Sun in WATER Figure 4 Graph of Intensity Vs Time

References

1. Darmawan, Aan & Ratnadewi, Ratnadewi & Sartika, Erwani & Pasaribu, Novie & Arlando, Riko. (2017). Basic Arduino Programming Training For High School Students. THE SPIRIT OF SOCIETY JOURNAL. 1. 10.29138/scj.v1i1.456.
2. Vidyasagar, Dattaraj. (2019). Design of Arduino UNO based Teaching Pendant 4 DOF Robotic Arm in less Jitter Environment of Servos.
3. Godase, Sagar & Todkari, S M. (2017). "2 D.O.F Robotic Arm for PV Panels". 10.13140/RG.2.2.21725.41446.
4. Vidyasagar, Dattaraj. (2019). On the Direct Port Register Addressing Technique in Arduino UNO to Simplify the Programming.

A Study of Zonal based, Hu's method and Zernik Moment Feature Extraction Techniques for Character Recognition

Mrs. Dewashri V. Mane

Dept. of Computer Science,
Shri. Shivaji College of Science Akola-444002

Dr.D.N.Besekar

Dept. of Computer Science,
Shri. Shivaji College of Science Akola-444002

Abstract:

The Character recognition is a process of converting the text into machine encoded text. In this process the feature extraction plays a vital role for more accurately recognized character. Feature extraction is a process of finding the features or characteristic of character or numerals. There are many techniques used for feature extraction. This paper provide some feature extraction techniques such as zonal ,zernik and Hu's method which gives the best result.

Keywords: OCR, zonal based method ,zernik momen, Hu's seven method, offline , online recognition

Introduction

OCR abbreviated as Optical Character Recognition. It is a process of conversion of text whether it is printed typed or handwritten into machine encoded text. There are two typed of recognition online and offline recognition system[1].

A. Online recognition system: Handwritten recognition in online mode is represented as function of time and order of stroke of specialized pen on the digital surface such as electrostatic or electromagnetic tablet.

B. Offline recognition system: In offline handwritten recognition mode the input has taken as image captured through digital camera or some other optical devices or scanned image and loaded in the frame buffer.

Recognition Process

The recognition process goes on several stages including preprocessing, feature extraction ,classification and post processing. Following diagram shows the character recognition process[2].
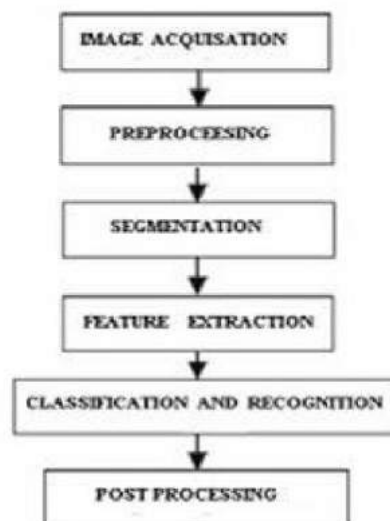
Fig. 1 Character Recognition Process

The first step of character recognition process is collection of data/sample and scanned data and stored in digital format. Preprocessing is most important step after collection and scanning the data. Which is very essential for obtaining the better features set. There are several steps comes under preprocessing like noice removing, skewing, binarization of an image, segmentation of an image, normalization, applying morphological operation etc. After preprocessing the image is ready for further process[2].

Feature Extraction

The proposed data set send for feature extraction process. Where various extraction techniques are apply for finding characteristics of images. There are various techniques such as Zonal base method, Hu's seven moment and Zernik moments.

A. Zonal Base method : Zonal base method is most popular method. In this method the first calculate the numerals centrod of an image and than it divided into predefined number of equal zones. In this method pixel values are converted into polar coordinate system as well as pixel values of an all zones convert into polar coordinate system. After that calculate the centroid of subimage lies on each zone. This process is repeated for all subimage and their respective zone. These values are considered as feature values of that image[2][3].

For example: The number 3 is divided into 16 equal zones as shown in figure1 and figure 2 shows the z1 to z16 equals zones.
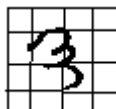
Fig.2: zoning of number 3

Z1	Z2	Z3	Z4
Z5	Z6	Z7	Z8
Z9	Z1 0	Z1 1	Z1 2
Z1 3	Z1 4	Z1 5	Z1 6

Fig. 3: zones name from z1 to z16

B. Hu's Seven Method: Invariant features of an image means feature values remains unchanged even if image translated, scaled, rotated, skewed or noise affected. In this method the moments from ϕ_1 to ϕ_{67} are describing. Where $\phi_1 - \phi_6$ are defined as absolute orthogonal invariants moments. These moments are independent of position, size and orientation and the last moment ϕ_7 is skew orthogonal invariant. These features are able to recognized the properties or characteristic of characters and numbers. The seven moment invariants are defined as[4][5].

$\phi_1 = n_{20} + n_{02}$

$\phi_2 = (n_{20} + n_{02})^2 + 4n_{11}^2$

$\phi_3 = (n_{30} - 3n_{12})^2 + (3n_{21} - \mu_{03})^2$

$\phi_4 = (n_{30} - 3n_{12})^2 + (n_{21} - \mu_{03})^2$

$\phi_5 = (n_{30} - 3n_{12})(n_{30} + n_{12})[(n_{30} + n_{12})^2 - 3(n_{21} + n_{03})^2] + (3n_{21} - n_{03})(n_{21} + n_{03})[3n_{30} + n_{12})^2 - (n_{21} + n_{03})^2]$

$\phi_6 = (n_{20} - 3n_{02})[(n_{30} + n_{12})^2 - (n_{21} + n_{03})^2 + 4n_{11}(n_{30} + n_{12})(n_{21} - n_{03})$

$\phi_7 = (3n_{21} - n_{03})(n_{30} + n_{12})[(n_{30} + n_{12})^2] - (n_{30} - 3n_{12})(n_{21} + n_{03})[3(n_{30} + n_{12})^2 - (n_{21} + n_{03})^2]$

Hu's introduced above seven functions that are invariant to the rotation ,scaled, translation. After calculating these seven moments for character or number the features values are stored in database can be said "training feature set" and values will be used to match with the test feature values[5].

C Zernik Moments: Zernik moment are the pure statistical measure of pixel distribution around center of gravity of characters. Global and geometric information about image can be capture by using the zernik moment.[4][5][6].

Zernik introduced a set of complex polynomials $V_{mn}(x,y)$ which form a complete orthogonal set on the unit disk with $(x^2 + y^2) = 1$ in polar coordinate and the zernik polynomial is [7]

$V_{mn}(r, \Theta) = R_{mn}(r) e^{-jn\Theta}$

r is radial coordinate which is always nonnegative Θ is the angular coordinate can be specified by 0 to 360 degree. R_{mn} is called orthogonal redial polynomial.

$$R_{mn}(r) = \sum_{s=0}^{\frac{m-n}{2}} (-1)^s \frac{(m-s)!}{s!\left[\frac{m+|n|}{2}-s\right]!\left[\frac{m-|n|}{2}-s\right]!} r^{m-2s}$$

Where m>=0, |n|<=m, m-|n|= even.The zernik moment of order n with repetition m for function f(x,y) is defined as

$$Z_{mn} = \frac{m+1}{\pi} \iint_{x\ y} I(x,y)[V_{mn}(x,y)]dxdy$$

Where m and n define as the order of moment and $I(x,y)$ it shows the gray level of pixel of image I. and on this level of pixel moment is calculated.

Conclusion

This paper focus on various feature ext raction techniques zonal, hu's seven moment and zernik moment method for recognition of character. From survey it is found that all techniques are frequently use and all the methods are reliable and gives the accurate features which help to recognized the individual character as well as number.

Acknowledgement

Author thankful to Dr D N Besekar sir Associate Professor Department of Computer Science, Shri Shivaji Science College Akola, for their cooperation and guidance.

References

1) R.R.Herekar and S.R.Dhotre"Handwritten Character Recognition Based on Zoning Using Euler Number for English Alphabates and Numerals",IOSR Journals of Computer Engineering, vol. 16,pp 75-88, Jul-Aug. 2014
2) D.N. Besekar and R.J. Ramteke,"Feature Extraction Algoritham for Handwritten Numerals Recognition of MODI Script using Zoning based Approach" , International Journal of System, Algorithm and Application. Vol.2, November2012.
3) P.Vithlani and C. K. Kumbharana," Structural and Statistical Feature Extraction Methods for Chracter and Digit Recognition", International Journal of Computer Applications ,vol.120-No.24,June 2015.
4) S. A. Kulkarni, P. L. Borde, R. R. Manza and P. L. Yannawar, "Impact of Zoning and Zernik moments for Handwritten MODI Character Recognition", IEEE International Conference on Computer, Communication and Control, 2015.
5) S. A. Kulkarni, P. L. Borde, R. R. Manza and P. L. Yannawar,"Recognition of Handwritten MODI Numerals using Hu and Zernik Moment"
6) P. Bhaskara Rao, D. Vara Prasad, Ch.Pavan Kumar,"Feature Extraction using Zernik Moment",International Journal of Latest Trends in Engineeing and Technology, Vol 2,March 2013.
7) S. S. Devi and Dr. T. Amitha ," Invariant and Zernik Based Offline Handwritten Character Recognition", International Journal of Advanced Research in Computer Engineering and Technology,Vol. 3, May 2014.

MATH-EXCEL – Teaching, learning and Evaluation AID for the CURRICULUM AT +2 level

Hemant Yashwant Satpute
Assistant Teacher, Department of Electronic Science, Fergusson College, Junior Wing, Pune 4

Mrs. Aradhana Arvind Ambre
Assistant Teacher, Department of Mathematics, Fergusson College, Junior Wing, Pune 4

Abstract

In today's era of Information Communication Technology (ICT) it has become essential for teachers as well as students to make use of readily & easily available technology to enhance teaching and learning process. Also it has become a part of life to inculcate good manners and healthy ethical culture. Students need to become familiar with the proper use of technologies available to them.

Technology assisted learning can be viewed as computer assisted learning, and as pedagogy for student-cantered and collaborative learning. Early developments in this focused-on computer assisted learning, where part or all the learning content is delivered digitally. More recently the pedagogical dimension of learning has become prominent. Technological revolution supports all forms of electronically supported learning and teaching. The information and communication systems, whether networked learning or not, serve as specific media to implement the learning process.

Being a teacher, our aim is to always encourage students and other colleague teachers to make optimum use of PC machine which one has purchased and full functionality of the softwares available with that machine.

Present student generation is a "Digital Generation". Technology and related tools are available to preschoolers immediately and without any struggle. So teachers teaching to this generation needs also to be an expert in using and applying this available technology to the present model of teaching curriculum.

This paper also presents an idea of how one can develop teaching, learning & evaluation aids useful for teachers of Junior College (+2 level) (Science Stream) using readily and most commonly available softwares on PCs.

Keywords: Virtual laboratory, open source learning material, digital electronics, Crossword Puzzle story, Analog Electronics, Using EXCEL for learning, Teachers Aid, Energy Booster for a Teacher

Introduction

We don't wait for things to happen. We make them happen.
It is not about ideas. It is about making ideas happen.

According to our experience of about 20+ years in teaching field, we found that the use of computer in education is limited. After purchasing a PC, one must make an optimum use of its capacity as well as the full functionality of the software available with purchased machine. One can afford to buy a latest PC but after that forget to make an optimum use of that machine. Also, many times the powers of the software installed with the PC are also underutilized or many times not used at all. MICROSOFT's EXCEL is one of such software which is learnt just for the sake of data entry or plotting graphs or creating data base and that's all. So, an idea came to our mind to educate the people with the help of EXCEL to learn Mathematics at +2 level. Many of the topics in Mathematics are such that they have a specific relationship between input and output or if not, at least the outputs follow a sequence with respect to time. So, with the help of EXCEL it is very easy to make a teaching aid. Hence here is an attempt to illustrate the use of EXCEL to learn Mathematics. The project known as "**MATH-EXCEL**".

"Learning by Doing" is the way all of us have learnt even as a child to – talk, walk, ride a bicycle, etc. Many arts and special skills like dancing, singing, swimming and martial arts are all learnt by going to an expert or a teacher who makes us learn by doing rather than by listening to lectures or reading books. "Learning By Doing" is important, Because, while doing we tend to fail, and failures are very important in the learning process. Once we fail, we start analysing what went wrong. Thus, at the point of failure, profound learning takes place. That's why people say: "Failures are steppingstones to success!" Many students hesitate to move ahead in learning the subject, particularly in Mathematics, because of the fear of failures. So here we present an excellent way to remove the fear of failures and make each one to practice the necessary and required skills. This is useful for teachers as well as students.

System Requirement

We have been using Windows 7 professional N operating system. Pentium (R) Dual Core Processor CPU with 4 GB RAM, 32-bit OS without pen or Touch Display. Though here we have used Microsoft Office 2007, but really speaking this project can run in any version of office. The functions / commands or techniques

used in this project are as follows. (1) Logical functions available in EXCEL viz. AND, OR, NOT (2) IF function (3) Conditional Formatting of cells (4) Data validation for cells (5) Insertion of Image (6) Hyper linking the cell contents to a particular worksheet sheet in a single workbook (7) Renaming a worksheet (8) Format painter tool to keep uniformity in the complete project through various worksheets (9) Nesting of IF functions along with all the logical functions (10) Protection of worksheets and protection of cells so that the choice is given for the user to select only a few cells and then depending upon the choice of the user the outputs are to be calculated. (11) Uses of smart graphics and their alignments, formatting etc.

As an example, here we are illustrating USE OF EXCEL to achieve the following tasks.

To complete day to day tasks of the teacher

In the regular schedule, teacher must carry out so many repetitive and routine tasks. Teacher must prepare the presentee and absentee record of every student for each month. Teacher must report his/her presentee or absentee of a student to the authorities and to the parents. Teacher has to also calculate the percentage presentee of a student for a months period, and has to declare a student as a defaulter if his/her presentee falls below 75% (criterion decided by HSC board authorities) and accordingly inform the student and his/her parents accordingly, before taking necessary action. As the number of students in a single division is around 120, and a teacher may be assigned to teach multiple divisions. This job many times becomes very tedious and time consuming for a teacher. The excel sheet designed here in this project helps a teacher to make this task little easier and quicker. Also, if defaulter's criterion is changed, then also just by changing the formula, teacher can easily generate a new list within a short period of time. Teacher needs to just fill in the names of the students along with their roll numbers in first two columns. And then change the dates of next columns as per the actual dates on which lectures have conducted. Enter "P" for presentee and "A" for absentee against each name and date. That's all. Rest job the EXCEL will do and will give the results.

To set an objective question paper of true /false type and evaluate it automatically

Here in the first column of excel sheet, enter the question whose answer must be of TRUE or FALSE. Then keep next column against each row for students reply. Student must type in TRUE or FALSE in this column. In the next column, the evaluation of each question will be displayed by comparing the student's response with the correct response. The correct response should already be recorded for each question in next column and that column is kept hidden (not visible to the student). Finally, the number of questions in a single excel sheet to be decided (either 25 or 50 or 10 etc.), and the total number of correct responses are to be calculated (using function available in EXCEL) and displayed in the last row.

To set an objective question paper of Fill in the Blanks type and its automatic evaluation

Here in the first column of excel sheet, enter the fill in the blanks type question. Then keep next column against each row for students reply. Student must type in the correct answer word in this column, for each question. In the next column, the evaluation of each question will be displayed by comparing the student's response with the correct response. The correct response should already be recorded for each question in next column and that column is kept hidden (not visible to the student). Finally, the number of questions in a single excel sheet to be decided (either 25 or 50 or 10 etc.), and the total number of correct responses are to be calculated (using function available in EXCEL) and displayed in the last row.

To create a tool for checking an MCQ type question paper and its automatic evaluation

Here in the first column of excel sheet, enter the MCQ (Multiple Choice, Single Correct Answer) type question. Then keep next column against each row for students reply. Student must type in the correct answer word in this column, for each question. In the next column, the evaluation of each question will be displayed by comparing the student's response with the correct response. The correct response should already be recorded for each question in next column and that column is kept hidden (not visible to the student). Finally, the number of questions in a single excel sheet to be decided (either 25 or 50 or 10 etc.), and the total number of correct responses are to be calculated (using function available in EXCEL) and displayed in the last row.

To create practice sheets for the students based on some formulae

Here first decide the formula or type of the numerical. Then frame a general question of that type and general outline for the answer. Decide the input variables and the output variables. Ask the student to fill in the values of input variables. Then as per the formulae assigned to the corresponding output variables, the outputs will get generated and displayed in the corresponding cells. Teacher may use this excel sheet to generate a number of questions of the same type just by changing the values of the input variable during teaching process in the class and then ask students to solve the numerical as per the given formula and check whether their answer tallies with the correct answer displayed by the excel sheet. Teacher can take a competition of the same in the class among the present students and give reward to the one answering maximum number of correct answers in a period.

To create a question bank in a subject to prepare a set of question papers according to predefined format of question paper.

As described in the previous section, for a specific formula, teacher decides input and output variables for a formula. Generate various values for input variables automatically, for the inputs and corresponding outputs. Using various formulae available in excel teacher can easily generate data for required number of time (10, 20, 50,100 or even more) and prepare a table. Then integrate this data with "Mail Merge" tool available in "Microsoft Word" and can generate a question bank in the form of word document for student to practice at home.

Results and Conclusion

The Project is very easy to handle and too simple to experiment with. Technical expertise is not essential to understand the working. This Project was demonstrated to the group of teachers. Teachers found this highly useful for classroom teaching as well as learning the basic concepts in digital electronics. This Project can be demonstrated with the power point presentation on the subject by clipping the outputs for various input combinations with the help of Microsoft Office One Note software. This can also be used by individual students to study the preliminary digital electronics concepts virtually.

Conclusion

These tools were demonstrated to teachers and students. This idea helps teachers to make subject more illustrative and interesting. It has been proved to be an excellent teaching & evaluation aid for innovative classroom teaching. It has also been accepted by all teachers as this tool saves their energy and allows more time to concentrate on the progress of the students. The classroom attendance of students has also been boosted by 40% due to application of this tool. This idea can be used as a learning material for open source learning and distance learning.

Future Development

This project can further be modified with verbal instructions and with addition of some exercises based on the concepts learned by the students through this project. Also, True /False type questions, fill in the blank type questions, Multiple choice with single / multiple correct answer questions can be designed and student's knowledge acquired can be judged. This idea can further be extended to any subject and any topic.

Screen shots: Use of EXCEL as a teaching AID and to assist teachers to complete day to day tasks

National Conference on Multidisciplinary Research in Science and Technology for Healthy Lifestyle Management (NCMRST- 2020) Organizer :- Shri R.L.T. College of Science, Akola

24th Jan. 2020

Attendance Record (Roll No. 15044–15071)

Roll No.	Name
15044	ANBHULE SANKET SHIVAJI
15045	ANGANE GREESHMA SHARAD
15046	ASHTE AMIT AJIT
15047	ATHAWALE SANDESH DEVIDAS
15048	AVAGHADE UMA VASANT
15049	BAPAT PRAJAKTA NIRANJAN
15050	DARADE KRUSHNA KESHAV
15051	BARVE RUJUTA RAJEEV
15052	BHAPKAR DHANASHREE BALASAHEB
15053	BHATEWARA ANIKET ISHWAR
15054	BISURE PRASHIL AVINASH
15055	CHABUKSWAR RUCHIKA AVINASH
15056	CHAUDHARI GUNJAN DILIP
15057	CHAVAN PRATIK PRAKASH
15058	CHUMBALKAR NEHA YOUVRAJ
15059	DESHMUKH PRADNYA SHANKARRAO
15060	DHURI MANAN PRAMOD
15061	GANDHI FIROZ MUKESHRAJ
15062	JADHAV PRASANNA YESHWANT
15063	JADHAV SAURABH SANJAY
15064	JADHAV SHIVRAJ SATISH
15065	JADHAWAR RAMESH SHANKAR
15066	JAGTAP AATISH ADITEE
15067	JAIN SHRENIK SANJAY
15068	JOSHI HARSHAVARDHAN RAVINDRA
15069	JOSHI JAY UDAYAN
15070	KADAM SHANKAR MANOJ
15071	KALE VIRENDRA DADASAHEB

Attendance Record (Roll No. 17001–17026)

Roll No.	Name	TotalPresents	TotalLectures	% Presenty
17001	ADKAR NIKITA DATTATRAYA	8	10	80
17002	APHALE MOULI YOGESH	8	10	80
17003	AVHAD MAYUR MAHENDRA	6	10	60
17004	BADVE SUMEDH SHRIKANT	8	10	80
17005	BAJARE SHRUTI MADAN	8	10	80
17006	BHATEWARA NIKET ISHWAR	8	10	80
17007	BHOSALE SHANTANU MADHUKAR	8	10	80
17008	BORASE TUSHAR UTTAMRAO	8	10	80
17009	CHAPKE GAURAV MAHESH	8	10	80
17010	CHINEY VARAD SHAILESH	2	10	20
17011	DHAVALE AMEYA RAJENDRA	8	10	80
17012	GAIKWAD AKSHAY CHANDRAKANT	0	10	0
17013	GARCHA GURPREET SINGH DALJEET	4	10	40
17014	GHODEKAR SHREYA RAJENDRA	8	10	80
17015	GHODKE SOMESH SUBHASH	2	10	20
17016	GHOSE DIVIJ TIRTHANKAR	8	10	80
17017	GUGALE YASH SUNIL	6	10	60
17018	HARALE KUNAL RAJENDRA	6	10	60
17019	JAGTAP ABHISHEK ANIL	8	10	80
17020	KHAMBAYATE SHREYAS SANTOSH	6	10	60
17021	LALA RISHABH ROSHAN	8	10	80
17022	MANGLE PARSHWA JITENDRA	8	10	80
17023	MHATRE RHYTHEM RAJESH	2	10	20
17024	NIMHAN SHRIKANT HARISHCHANDRA	6	10	60
17025	PACHKAWADE ISHA BABAN	8	10	80
17026	PATIL OM VYANKATRAO	8	10	80

Write S for Statement (S) , Q for Question (Q) & C for Command against each sentence.

Sentence		Result
Tea is hot.	s	Correct
Keep quiet.	c	Correct
Walk slowly.	c	Correct
This is my shirt.	s	Correct
The milk is pure.		
Go and sit there.		
Open the window.		
Judy lives near us.		
Who met you there?	q	Correct
What is your father?	q	Correct
When is your birthday?	q	Correct
Is it a rainy day today?	q	Correct
The cow is useful animal.		
Show me your birthday gift.		
Why did you buy this pen?		
The sun rises in the east.		
Speak the truth.		
Why do you shout?		
Call the doctor at once.		
Leave the room at once.		
Do not tell a lie.		
Where are your books?		

Sr. No.	Type	Link
1	To find the equation of a line passing through (a, b) and PARALLEL to the line Ax + By+ C = 0	1
2	To find equation of a line whose y-intercept is e and which is PERPENDICULAR to the line passing through points A(a,b) and B(c,d)	2
3	To find equation of a line whose y-intercept is e and which is PARALLEL to the line passing through points A(a,b) and B(c,d)	3
4	To find equation of a line whose X-intercept is e and which is PERPENDICULAR to the line : lx + my +n =0	4
5	To find equation of a line whose X-intercept is e and which is PARALLEL to the line : lx + my +n =0	5
6	To find equation of a line whose X-intercept is e and which is PARALLEL to the line passing through points A= (a, b) & B = (c, d)	6
7	To find equation of a line whose X-intercept is e and which is PERPENDICULAR to the line passing through points A= (a, b) & B = (c, d)	7
8	To find the equation of a line passing through (a, b) and PERPENDICULAR to the line Ax + By+ C = 0	8
9	To find the equation of a line passing through the midpoint of the line joining two points (p, q) and (r, s) and PERPENDICULAR to the line Ax + By+ C = 0	9
10	To find the equation of a line passing through the midpoint of the line joining two points (p, q) and (r, s) and PARALLEL to the line Ax + By+ C = 0	10
11	To find the equation of a line PERPENDICULAR to line segment joining two points A=(a, b) & B=(c, d) & dividing it in the ratio l : m	11

INDEX 2

"EXCEL": MAGIC, BOON & ENERGY BOOSTER FOR TEACHERS

No.		
1	Creating Attendance Record	Show Me
2	Calculating Percentage Presentee and /or Absentee	Show Me
3	Sorting out Defaulter's List	Show Me
4	Objective QP of True / False Type & its automatic Evaluation	Show Me
5	Objective QP of Fill in the Blanks Type & its automatic Evaluation	Show Me
6	Tool for Checking MCQ QP & its automatic Evaluation	Show Me
7	Practics Sheets for students based on Formulae in Physics	Show Me
8	Practics Sheets for students based on Formulae in Maths	Show Me
9	Practics Sheets for students based on Formulae in Computer Science	Show Me
10	Practics Sheets for students based on Formulae in IT	Show Me
11	Practics Sheets for students based on Formulae in Electronics	Show Me
12	Prepare a QB in Physics	Show Me
13	Prepare a QB in Electronics	Show Me
14	Prepare a QB in Maths	Show Me
15	Prepare a QB in Computer Science	Show Me
16	Prepare a QB in IT	Show Me
17	Enhance Learning of English Grammar	Show Me

INDEX

Fill in the blanks in the following Interrogative sentences.

A	B	C
_____ I a student?	am	Correct
_____ she a nurse?	is	Correct
_____ she a dancer?	is	Correct
_____ she write well?		
_____ you a teacher?		
_____ you play hockey?		
Why _____ you crying?		
_____ you have a pen?		
Where _____ you born?		
_____ you go to school daily?		

**Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293
(Special Issue No.70)   Peer Reviewed Journal   www.aiirjournal.com Mob. 8999250451**

273

References

1) *Microsoft Excel 2010 Plain & Simple*, *Microsoft Access 2010 Plain & Simple*, and *Excel 2007 Pocket Guide by* Curtis Frye

2) Excel Programming Tutorial 1, Macros and Functions by Dr. Tom Co, Department of Chemical Engineering, Michigan Technological University,(8/31/07, 11/11/07)

3) VBA and Macros: Microsoft® Excel® 2010, Copyright © 2010 by Que Publishing by Bill Jelen & Tracy Syrstad

4) Engineering Systems Modelling with Excel / VBA by Matthew E. Moran, PE

5) Excel Charts by John Walkenbach

6) Larsen, R. W. (2009). Engineering with Excel, Pearson Prentice Hall, New Jersey. ISBN 0-13-601775-4

7) Engineering with Excel companion website: http://www.chbe.montana.edu/excel/EngExcel3.htm. Visited 25OCT2009

8) Excel Tutorial 8, Developing an Excel Application

Study Of Compact Fluorescence Lamp Phosphors

K.A. Koparkar

M.S.P. Arts, Science & K.P.T. Commerce College Manora, Dist: Washim (M.S.)

Abstract

The five CFLs powder sample of various company (Bajaj, Philips, Usha lexues, khaitan, and HPL) were used to characterized by photoluminescence (PL) spectra. The PL emission spectra were measured in the range between 380-780 nm. The PL spectra show out of five CFLs, philips is best CFL due to optimum emission intensity.
Keywords*: CFL, PL spectra, SEM.*

Introduction

A fluorescent lamp (FL) is a light weight mercury vapour lamp and required very much less amount of energy as compared to tungsten bulb. Humphrey Davy created the first incandescent bulb in 1802 [1]. Thomas Edison is credited with inventing the incandescent light bulb, he was the first one to pursue fluorescent bulbs for commercial purposes. In 1934, Arthur Compton from General Electric reported successful experiments conducted with fluorescent bulbs which were later pursued further by the company. Humphrey Davy created the first incandescent bulb in 1802. In 1934, Arthur Compton from General Electric reported successful experiments conducted with fluorescent bulbs which were later pursued further by the company [2]. FL is a long tube consists of inert gas and mercury vapor by applying electric discharge to then this combination emits ultraviolet radiation (254 nm) causes coating of fluorescence material inside surface of tube of lamp then it emits visible light [3, 4].A mercury in the bulb is in the form of an invisible vapor or as part of the phosphor coating on the inside of the glass. In the electric discharge mercury atoms are excited to higher energy levels when they returns to ground state it emit 85% at 254 nm wavelength in visible radiation [5, 6]. FL is properly designed and made Compact fluorescent lamps (CFL). CFL is small size household lamp. The same strategy of FL used in CFL. Generally, FLs or CFLs are replaced by the tungsten bulbs (incandescent lamp). Standard CFLs are required 80% less energy than incandescent lamp. Incandescent light heat a wire due to wire resistivity called filament in vacuum. It glows because of heating of tungsten but most of the energy used in heat emission [7, 8]. This drawback overcome by CFLs. Thickness of phosphor materials is coated inside the tube is in the order of 20-40 micro meter. Phosphors are direct contact with mercury. Oxides are used as hosts for fluorescent lamps [9].

There are three types of fluorescent lamps.

1. Halo phosphate lamp
2. Tricolor lamp
3. Special deluxe lamp

Tricolor lamp phosphors are;

- $Y_2O3:Eu^{2+}$ Red phosphor
- $CeMgAl_{11}O_{19}:Tb^{3+}$ Green phosphor
- $BaMgAl_{10}O_{17}:Eu^{2+}$ Blue phosphor

Results and discussions

There are five companies CFLs are given following

1. BAJAJ
2. PHILIPS
3. USHA LEXUES
4. KHAITAN
5. HPL

All the CFLs are contains modern rare earth doped phosphors, where white light is made by mixing red, green- and blue-emitting phosphors. There are three rare earth-activated phosphors (the blends are popularly known as tricolor or triphosphors blends): Eu^{3+} activated Y_2O_3 (red emitting), Tb^{3+-}activated $CeMgAl_{11}O_{19}$ (green emitting) and Eu^{2+-}activated $BaMgAl_{10}O_{17}$ (blue emitting).

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293
(Special Issue No.70) Peer Reviewed Journal www.aiirjournal.com Mob. 8999250451

275

Photoluminescence studies

The photoluminescence spectra of the five companies CFLs excited at 254nm excitation given and get three emissions at 450nm, 543nm and 613nm. The commercially phosphors are

- $Y_2O_3:Eu^{2+}$ Red phosphor
- $CeMgAl_{11}O_{19}:Tb^{3+}$ Green phosphor
- $BaMgAl_{10}O_{17}:Eu^{2+}$ Blue phosphor

After the breaking of CFL and collected fluorescence powder were characterized and below given details regarding detail study optical analysis.

Comparative study of 5 companies CFL [5 watt]

Fig. 1 shows that, spectra of red luminescence materials or phosphor consists of a dominant peak at 613 nm which corresponds to the electric dipole transition $^5D_0 \rightarrow ^7F_2$ [10]. The green compound $CeMgAl_{11}O_{19}$ is an efficient ultraviolet emitter when excited by 254nm radiation. The emission arises from allowed transitions between the ground and excited states of the Ce^{3+} ion which are derived from the $4f^1$ and $5d^1$ electronic configurations. The blue phosphors $BaMgAl_{10}O_{17}:Eu^{2+}$ strong absorption in the UV region is due to the allowed $4f^7 5d \rightarrow 4f^6 5d^1$ transitions.
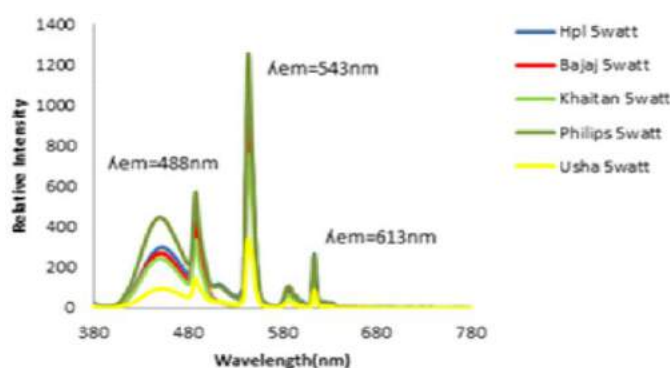
Fig. 1: Comparative study of five companies 5watt CFLs

Acknowledgement

Conclusions

Five companies CFL were used for PL Emission. The PL spectra show the emission of characterizations of five CFL between the range 488nm, 543nm, 613nm. there are three color phosphors. $Y_2O_3:Eu^{3+}$ (Red phosphor), $CeMgAl_{11}O_{19}:Tb^{3+}$ (Green phosphor), $BaMgAl_{11}O_{17}:Eu^{2+}$ (Blue phosphor). The PL intensity of Philips CFL is best because the intensity of Philips company CFL is high. On the other hand, the intensity of Usha CFL light is low as compared to other four CFL light.

References

1) H. Davy, Phil. Trans. Roy. Soc. 1073 (1817) 77.
2) T. J. Marshall, J. the Franklin Institute 160 (1905) 21.
3) Efficient Lighting Systems, air and radiation, Unitet state environmental protection, 1997.
4) https://www.electrical4u.com/fluorescent-lamp-its-working-principle/
5) A.M. Srivastava, T. J. Sommerer, Fluorescent Lamp phosphor, The Electrochemical Society, Interface, Summer 1998.
6) R. Chena Dav, J. Lockwood, J. The Electrochemical Society, 149 (2002) S69.
7) R.H.Butler, Fluorescent Lamp Phosphors, The Pennsylvania State University Press (1980).
8) L. P. Singh, G. Katal, Goldy Katal, Int. Journal of Engineering Research and Applications, 3 (2013) 401.
9) T. Welker, J. Alloys Compd.192 (1991) 49.
10) K.A. Koparkar, N.S. Bajaj, S.K. Omanwar, J. Rare Earths, 5 (2015) 486.

Carbon Monoxide (CO) ppm Density Measurement with High & Low Heating Cycles using MQ7 Discrete Semiconductor Sensor

Yash Vidyasagar

Student, M.Sc. I year,

Department of Electronics, Fergusson College Pune

S.M. Nagrale,

Department of Zoology,

Shri R.L.T. College of Science, Akola

Abstract

The CO equally affects healthy and unhealthy people. The breathing of CO can cause headache, vomiting, nausea and dizziness. If the level of CO is high enough, it a person may become unconscious or die. Exposure to moderate and high levels of CO over long periods of time has also been linked with increased risk of heart disease. If more amount of CO is taken in breathing, it may reduce the amount of oxygen carried by haemoglobin around the body in RBC. Due to this vital organs, such as brain, nervous tissues and the heart, do not receive enough oxygen for proper working of bodily functions. So to measure the density of CO in surrounding atmosphere we have used the reliable MQ7 sensor for precise measurements. The sensitive material of MQ-7 gas sensor is SnO2, which with lower conductivity in clean air. It make detection by method of cycle high and low temperature, and detect CO when low temperature (heated by 1.5V). We have designed simple Arduino UNO based system, to convert change of conductivity to correspond output signal of gas concentration. MQ-7 gas sensor has high sensitivity to Carbon Monoxide. The sensor could be used to detect different gases contains CO, it is with low cost and suitable for different application.

Nomenclature

R_s	Surface resistance of MQ7	s	surface
R_L	Series wound load resistance	L	load
V_c	Transistor collector voltage	c	collector
V_{RL}	Load voltage measured	RL	load resistor

Introduction

The system of CO density measurement uses the most reliable CO sensor, MQ7 for getting precise measurements. As per the data sheet of MQ7 carbon monoxide sensor, it is necessary that the MQ7 sensor must be activated through high and low heating cycles in order to get proper measurements. During low temperature phase, CO is absorbed on the plate of the sensor, producing accessible data. During high temperature phase of the sensor, the absorbed CO and other compounds by the sensor, evaporate from the sensor plate, cleaning it up for the next measurement, as give in the code of this project. *This project uses Arduino Nano ATMega328p microcontroller module with discrete MQ7, carbon monoxide sensor module with few other accessories.*

Mathematical Analysis

The surface resistance of the sensor Rs is obtained through effected voltage signal output of the load resistance RL which series-wound. The relationship between them is described:

$$\frac{R_s}{R_L} = \frac{(V_c - V_{RL})}{V_{RL}}$$

The output signal when the sensor is shifted from clean air to carbon monoxide (CO), is found to have abrupt changes. The output signal measurement is made within one or two complete heating period *(90 seconds from high voltage to 60 seconds for low voltage).*

Sensitive layer of MQ7 gas sensitive components is made of SnO2 with stability, so it has excellent long term stability. Its service life can reach 5 years under using condition. The processed result is displayed on the Serial Monitor in Arduino software. There are three values under monitoring: Raw value, Heating time of MQ7 Sensor, CO ppm value. The circuit can be modified to display the results of 16x2 LCD display. The values measured in this circuit are compared with the Indian PUC standard values.

Block Diagram
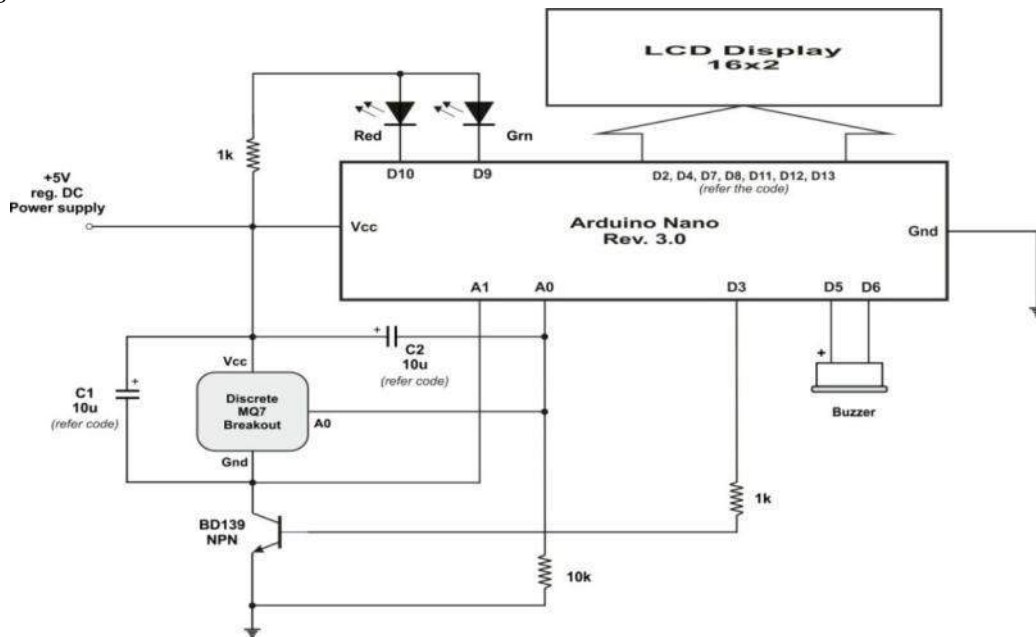
Principle of Working

According to MQ-7 datasheets, this sensor has to run through high and low heating cycles in order to get proper measurements. During low temperature phase, CO is absorbed on the plate, producing meaningful data. During high temperature phase, absorbed CO and other compounds evaporate from the sensor plate, cleaning it for the next measurement. In general its operation can be understood step by step:

1. Apply 5V for 60 seconds; don't use these readings for CO measurement.
2. Apply 1.4V for 90 seconds; use these readings for CO measurement.
3. Go to step 1 again in the form of a loop i.e. **void loop()**

But Arduino can't provide enough power to run this sensor from its pins - sensor's heater requires 150 mA, while Arduino pin can provide only 40 mA, so if we attach it directly, Arduino will burn and sensor will not work.

The Arduino code is available on the 1st author's profile on www.github.com on request.

So we must use some kind of current amplifier that takes small input current to control large output current. Another problem is getting 1.4V. The only way to reliably get this value without introducing a lot of analog components is to use PWM *(Pulse Width Modulation)* approach with feedback that will control output voltage.

NPN transistor solves both problems: when it is constantly turned on, voltage across the sensor is 5V and it is heating for high-temperature phase. When we apply PWM to its input, current is pulsing, then it is smoothed by the capacitor, and the average voltage is kept constant. If we use high frequency PWM *(in the sketch it has frequency of 62.5 KHz)* and average a lot of analog readings *(in the sketch we average over ~1000 readings)*, then the result is quite reliable. We found that it is critical to connect capacitors. Images here illustrate difference in signal with and without C2 capacitor: without it, PWM ripple is clearly visible and it significantly distorts the readings, as shown below.
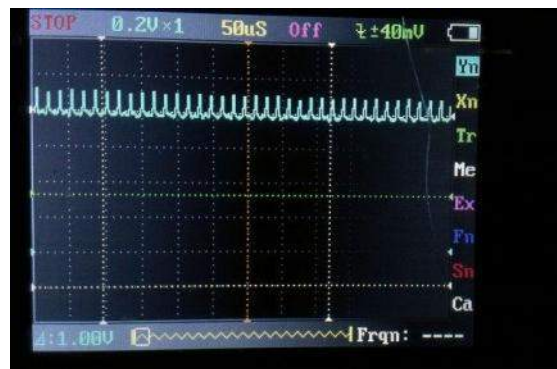
Practical Experimentation

We practical tested density of CO present in surrounding air at various places in Pune & Akola Ozone Day, 16 September 2019. We applied analytical and statistical methods for the measurement of CO in ppm, neglecting for other traces like nitrogen oxides *(NOx)*, sulphur dioxide *(SO2)* and suspended particulate matters *(SPM)*. The graphs of these readings will be explained in presentation. As per a case study done of *Assessment of Traffic Related Air Pollution and Ambient Air Quality of Metropolitan Cities, in Pune*, the air quality correlation also analyzed with the fuel types and it was observed that petrol vehicles contribute more pollution than diesel.

NAASQ Standardisation

The U.S. National Ambient Air Quality Standards (NAAQS) are standards for harmful pollutants. Established by the United States Environmental Protection Agency (EPA) under authority of the Clean Air Act (42 U.S.C. 7401 et seq.), NAAQS is applied for outdoor air throughout the country. The seven criteria of air pollution are: The criteria pollutants are carbon monoxide, lead, nitrogen dioxide, ozone, particulate matter, and sulphur dioxide. Criteria pollutants are the only air pollutants with national air quality standards that define allowable concentrations of these substances in ambient air.

References

1. Vidyasagar, Dattaraj. (2019). On the Direct Port Register Addressing Technique in Arduino UNO to Simplify the Programming.
2. *Assessment of Traffic Related Air Pollution and Ambient Air Quality of Metropolitan Cities (Case Study of Pune City):* Milind R. Gidd, Pravin P.Sonawane, Department of Civil Engineering, Bharati Vidyapeeth University College of Engineering, Pune 43; Institute of Environmental Education and Research, Bharati Vidyapeeth, Katraj Dhankawadi Pune
3. Reference of a working project of CO density measurement: http://www.instructable.com/ the_3d6 from Ultimate Robotics: reference for Arduino coding

Implementation Of Multisim – A Circuit Simulation Software For Effective Teaching And Learning In Electronics At +2 Level

Hemant Yashwant Satpute
Department of Electronics, Teacher, Fergusson College, Jr. Wing, Pune

Dattaraj Vidyasagar,
Teacher, Department of Electronics, Shri RLT College of Science, Akola

Yash Vidyasagar,
M.Sc. I Year, Department of Electronics, Fergusson College, Pune

Abstract

The present paper narrates an idea of how one can include the use of Circuit Simulation Software in the teaching schedule / curriculum to enhance teaching and learning electronics subject at +2 Level. There are many such simulation software / tools available for this purpose. As an example, we are presenting here the use of Multisim 11.0 software used for teaching FYJC and SYJC Vocational Electronics students of Maharashtra State Board. Multisim is the schematic capture and simulation application of National Instruments Circuit Design Suite, a suite of EDA (Electronics Design Automation) tools that assists you in carrying out the major steps in the circuit design flow. It is designed for schematic entry, simulation, and feeding to downstage steps, such as PCB layout. We have been using this since last 5 years for demonstrating the working of various electronic circuits. A brief review of all the activities conducted is presented here. In fact, once we have used the software to conduct HSC practical exam in vocational electronics subject in a college where none of the experiments were conducted during the year, but we have projected the simulated circuit on screen with the help of a projector and then asked students to note down the readings and do further processing necessary for the board exam.

Keywords: Multisim, Electronic Circuit Simulation, Electronic Circuit Design, Virtual Laboratory, Open source learning material, Effective tool for classroom teaching

Introduction

अनेकशास्त्रंबहुवेदितव्यम्, अल्पश्चकालोबहवश्चविघ्ना:।

यत्सारभूतंतदुपासितव्यं, हंसोयथाक्षीरमिवाम्भुमध्यात्॥

There are many scriptures, lot to know but time is limited and there are many obstacles. So we should practice the essence as a swan extracts only milk from the combination of milk and water.

We are living in an age of information technology. Electronics is at the very foundation of information and computer age. The giant strides we have made in the areas of communications and computers are possible only because of the great successes that we have achieved in the field of electronics. It sometimes unbelievable, how many gadgets that we carry these days for our personal use. *viz.* Digital Wristwatch, Calculator, Cell phone, Digital Diary, PDA, Digital Camera or Video Camera, *etc.*

Electronics has made deep impact in several vital areas such as health care, medical diagnosis and treatment, Air and space travels, automobiles, etc. In short, the technological developments of several countries of the globe are directly related to their strengths in electronic design, manufacture, products and services. It appears as though we have to add inevitably an 'E' to the three "R"s, namely Reading, wRiting and aRithmetic, to declare a man or woman to be "literate". Needless to add that here "E" means "Electronics"! Thus, Electronics has become a "Basic Science". It is no more an "Applied Science". Just as we teach Physics, Chemistry, Biology and Mathematics in our schools, it is high time we start teaching our children at school, Electronics as a special subject itself.

This brings us face to face to an important question: How to teach the basic concepts of such an important subject like "Electronics" most effectively? If one wants to gain a good understanding of electronics, he or she should build circuits and test them independently. For this one should acquire a practical knowledge of the characteristics of different devices and their use in constructing various circuits. To learn and develop this skill on such proven scheme is "Learning By Doing".

This is the way all of us have learnt even as a child to – talk, walk, ride a bicycle, etc. Many arts and special skills like dancing, singing, swimming sand martial arts are all learnt by going to an expert or a teacher who makes us learn by doing rather than by listening to lectures or reading books.

Why "Learning By Doing" is so important? Because, while doing we tend to fail, and failures are very important in the learning process. Once we fail, we start analysing what went wrong. Thus, at the point of failure, profound learning takes place. That's why people say: "Failures are steppingstones to success!"

Many students hesitate to move ahead in learning Electronics because of the fear of failures. Also to build actual circuits after buying all the components by spending sufficient amount of money and getting failure as a reward discourages many students or to even researchers and developers. That's exactly where the simulation software for electronic circuits comes into picture and plays a vital role in relieving the students from the fear of failures and also encourage them towards new investigations. Also, simulation software also makes the learner expert in fault finding and analysis of the electronics circuits and components.

System Requirement

We have been using Windows 7 professional N operating system. Pentium (R) Dual Core Processor CPU with 4 GB RAM, 32-bit OS without pen or Touch Display. We have been working on NI Multisim Power Pro Edition, Application Version 11.0.1 (11.0.691), Database Version 11.0.a, Build Date 14 September 2010.

Basic Circuits for FYJC& SYJC Vocational Electronics

Initially we started training students by explaining them how to place the components on NI interface. Once showing students symbols of different components on screen, we took their evaluation test. In that we checked whether the student has really understood the symbol of each component or not? Whether he/she is able to distinguish between symbols for AC and DC sources, active and passive components or not? After getting excellent results, then we took the next step.

We started building logically simple circuits with Multisim. We started with Simple Ohm's law verification circuit, Diode forward biasing and reverse biasing, Potential divider circuits, Resistor series and parallel combination circuits, etc. Here we introduced students to the various virtual instruments available to the students while using Multisim. We also experimented with various settings of these instruments.

Then we started with their regular Practicals prescribed by HSC board. We ourselves showed them the circuits for these Practicals on Multisim and demonstrated to them as how to take the readings using virtual instruments available in Multisim. Then we ask students to take the components from lab assistant in lab, build circuits on breadboard, make the circuit connections and take the readings. Then asked them to verify the results obtained in lab are in excellent agreement with the results obtained virtually using Multisim. Then we encourage students to do few modifications to the regular practical circuits and again repeat the above procedure.

List of Circuits Experimented with NI Multisim Simulation Tool

Ohm's law verification (1 to 5), Diode characteristics (1 to 12), Capacitor charging and discharging, Half wave rectifier and full wave rectifier circuit, Laws of resistances in series and parallel, Potential Divider circuit, Maximum power transfer circuit, Verification of KVL, Common cathode and common anode 7 segment display working, Schmitt trigger circuit using IC7414, Clocked RS Flip-Flop using NAND gates, Clocked D Flip-Flop, Edge triggered D Flip-Flop, Decade counter, DeMux, Decimal to BCD Encoder using IC 74147, Negative Edge triggered D Flip-Flop, Multiplexer using gates, Nibble adder using IC 7483, OPAMP Comparator – zero reference, OPAMP comparator – Non zero reference, OPAMP inverting Adder, OPAMP Buffer, OPAMP Subtractor, OPAMP inverting Amplifier AC as well as DC, OPAMP non-inverting Amplifier AC as well as DC, OPAMP Differentiator, OPAMP offset nulling, RS Flip-Flop using NAND gate and NOR gate, RC circuit and All circuits described in chapters 1 to 12 of the reference book "Introductory Circuit Analysis", 12th Edition, By Robert Boylestad, Pearson Education Inc

Evaluation

We evaluated students' performance during their regular unit tests, terminal and annual examinations and during practical examination and oral examinations. We found an excellent increase in the percentage marks of the students with the aid of this simulation technique. Also, during the practical orals, we found that students were happily answering the questions asked and were enjoying the examination, rather than previously

taking tension of the examination and thereby lowering their performance in the exam. Due to this the self confidence of the students was also increased and interest in the subject increased to such a level that we found that students were designing their own circuits and able to explain them to others to their satisfaction. Due to this confidently our students started taking part in various competitions and getting excellent success in those and bringing laurel to our colleges.

Results

Factors Improved in Students Performance					
Draw correct symbols	Correct Connections	Proper Current Direction	Correct Parts Labels	To the Scale Symbols	Neatness of Circuit Drawing
100%	98%	96%	95%	92%	90%
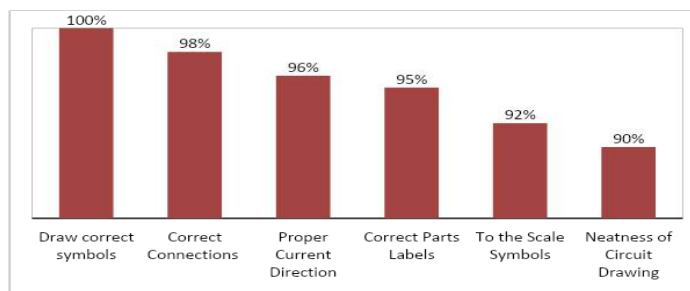
Figure 1 Graphical Analysis

Important Note

The Multisim software is used for experimental findings in this paper and for the demo purpose. The software copy we used was the evaluation copy of the software. It is downloaded from the website of National Instruments from following link:

https://www.ni.com/en-in/support/downloads/software-products/download.multisim.html#312060

Comparative Analysis of with and without "NI Multisim Simulation Tool"

We did a comparative analysis of our teaching results with and without the use of **NI Multisim Simulation Tool** and found great improvement in the ability to grasp the topic, its practical applications.

Improvement in student's understanding after using Simulation tool in learning	Improvement in student's understanding without using Simulation tool in learning
Student can identify the labels of electrodes like anode-cathode, etc. correctly.	Overall performance is less.
Student remembers the position of each component in the circuit perfectly.	Student gets confused about the positioning of components in the circuit.
So student can draw the circuit correctly.	Can draw the circuit correctly.
Student can describe the working of the circuit by making sections in the circuit like input section, processing section, output section, etc.	Some students do have problems in this case.
The student, who has already studied a circuit on **Simulation tool** can easily build it on breadboard also.	It becomes rather hard to build the circuit on breadboard.
Student can easily draw PCB layout of the circuit after learning through and experimenting with CBBs	Cannot draw proper PCB layout of given circuit.
And the most important thing is that the student can TROUBLESHOOT the faults in the circuit if something goes wrong during the its working.	Rather hard to find faults since the circuit is not clearly understood by the student.

Pre & Post Performance Survey: 2018 on 12th Standard Students
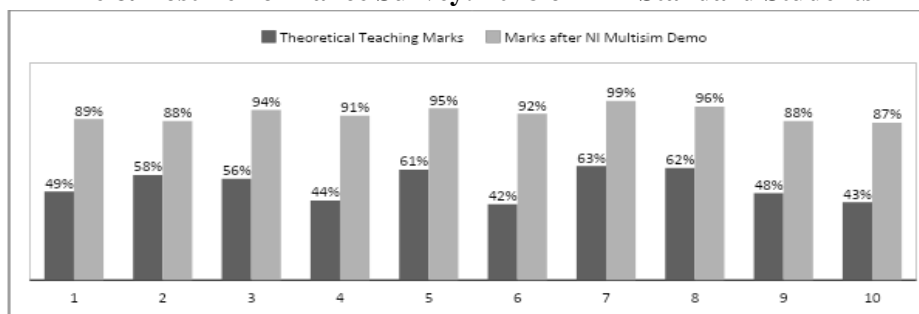
The above comparison was carried out with the students of 12th standard. Here we found that, since the students are quite matured *(being in 12th standard)* their theoretical understanding is already high up to 65%. But here also when the same topic was taught with the help of **innovative NI Multisim Simulation Tool**, the understanding performance is increased considerably.

Results

It is important to give basic training to the concerned teacher, who will be using the NI Multisim Simulation Tool. For this the teacher must practically work on the NI Multisim Simulation Tool, try constructing different circuits using the NI Multisim Simulation Tool. The training sessions are easy to grasp by all levels of teachers. We also observed that the students start using their logic to modify the basic approach of a circuit and concept of topic by implementing their number of different ideas and suggestions. When we started teaching the relevant topics using this NI Multisim Simulation Tool, we were surprised with the interesting improvement in the students' understanding level of particular topic. And sometimes we were impressed to see a parallel working circuit or approach for a complicated digital circuit, demonstrated practically by number of students.

We have been constantly improving with the aid of NI Multisim Simulation Toolin our teaching methodologies and we helped many teachers also to implement the *NI Multisim Simulation* Tool*in their teaching. We have received positive reports from number of such teachers from different institutions.*

Acknowledgement

1. We are grateful to the principals of all those institutions, where we carried out these experiments on the selected students.

Disclaimer

1. We propose that the teaching methodology presented here will be very helpful to the students and be implemented as a supporting tool, within the regular practical sessions of curriculum coaching.
2. While conducting these experimental sessions, necessary care has been taken not to affect, the regular curriculum coaching of the students.
3. The teaching methodology proposed here is only as a supporting tool to boost the performance of some students and their interest in practical sessions of experiments. We respect the curriculum designed by the HSSC board of +2 pattern.

References

1) Vidyasagar, Dattaraj. (2019). Pre & Post Performance Survey: 2018 on School/College Students.
2) Applied & Digital Electronics: P. K. Patil, M. M. Chitnis; Phadke Prakashan, 12th Edition *(2008)*
3) An Introduction to Digital Electronics by Jamieson Rowe, B.P.B. Publications
4) T.P.S. Electronics II by Kinnary Prakashan, 3rd Revised Edition
5) Digital Electronics by H. R. Arvind , Vision Publications for FYBSc (Computer Science), 2nd Revised Edition
6) Introductory Circuit Analysis, 12th Edition, By Robert Boylestad, Pearson Education Inc.

Tricky Situation in Maximum Power Transfer Theorem in Special Case of an Amplifier

Yash Vidyasagar

Student, M.Sc. I Year, Fergusson College, Pune

R. D. Chaudhari

Assistant Professor, Department of Electronics, Shri R.L.T. College of Science, Akola

Abstract

The maximum power transfer theorem is a very useful tool in applied electronics and electronic engineering. It has wide range of applications in amplifier. Its concept is as follows:

When a load is connected across a voltage source or across output of an amplifier, particular amount of power is transferred to the load. The amount of power being transferred depends on the value of the load resistance (RL). Its value is always unique, for that particular source. To adjust the maximum transfer of power from source to the load, the value of the load resistance and the value of internal resistance (Ri) of the source must be equal.

Introduction

In electrical engineering, the maximum power transfer theorem states that, to obtain maximum external power from a source with a finite internal resistance, the resistance of the load must equal the resistance of the source as viewed from its output terminals.
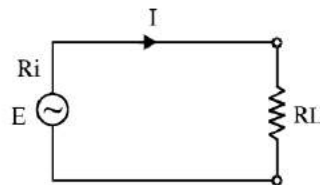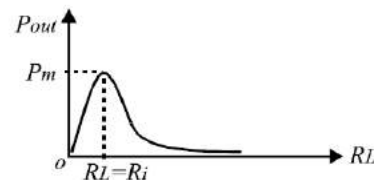
Fig:1.3 a   Fig:1.3 b

Suppose a voltage source *(E)* having internal resistance *(Ri)* and a load resistor *(RL)* are connected in parallel, as shown in *Fig:1.3a*. The current flowing through the circuit can be given as –

$$I = \frac{E}{R_L + R_i}$$

Power delivered to the load is given by –

$$P = I.R_L = \left(\frac{E}{R_L + R_i}\right)^2 . R_L \quad ……… (1)$$

Tricky Conditions

This theorem gives the impedance conditions in AC circuit for maximum power transfer to a load. It states that in an active AC network consisting of source with internal impedance Z_S which is connected to a load Z_L, the maximum power transfer occurs from source to load when the load impedance is equal to the complex conjugate of source impedance Z_S.

Consider the below circuit consisting of Thevenin's voltage source with series Thevenin's equivalent resistance *(which are actually replacing the complex part of the circuit)* connected across the complex load.

From the above figure, Let $Z_L = R_L + jX_L$ and $Z_{TH} = R_{TH} + jX_{TH}$ then the current through the circuit is given as:

$$I = \frac{V_{TH}}{Z_{TH} + Z_L}$$

By substituting for given impedance

$$I = \frac{V_{TH}}{R_{TH} + jX_{TH} + R_L + jX_L}$$

$$I = \frac{V_{TH}}{(R_L + R_{TH}) + j.(X_L + X_{TH})}$$

Power delivered to the load is $P_L = I^2 . R_L$

$$P_L = \frac{(V_{TH})^2 \times R_L}{(R_L + R_{TH})^2 + (Z_L + Z_{TH})^2}$$

For power to be maximized, the above equation must be differentiated with respect to XL and equates it to zero.

$$X_L + X_{TH} = 0$$
$$X_L = -X_{TH}$$
$$P_L = \frac{(V_{TH})^2 \times R_L}{(R_L + R_{TH})^2}$$
$$R_L + R_{TH} = 2R_L$$

i.e. $R_L = R_{TH}$

Again taking derivative of the above equation and equating it to zero:

$$R_L + R_{TH} = 2R_L$$

Therefore, in AC circuits, if $X_L = -X_{TH}$ and $R_L = R_{TH}$, maximum power transfer takes place from source to load. This implies that maximum power transfer occurs when the impedance of the load is complex conjugate of the source impedance, i.e. $Z_L = Z_{TH}$

$$P_{max} = \frac{(V_{TH})^2}{4.R_{TH}} = \frac{(V_{TH})^2}{4.R_L}$$

Suppose we have a source having constant voltage and internal resistance. So the power delivered to the load will be directly proportional to the value of load resistance R_L. Now to find the value of R_L when maximum power is delivered to the load, we shall differentiate equation (1) w.r.t. R_L as follows –

$$\frac{dP}{dR_L} = E^2 \left(\frac{(R_L + R_i)^2 - 2R_L.(R_L + R_i)}{(R_L + R_i)^4} \right) = 0$$

It means that –

$$(R_L + R_i)^2 - 2R_L.(R_L + R_i) = 0$$

Or

$$(R_L + R_i) + (R_L + R_i - 2R_L) = 0$$

Or

$$(R_L + R_i).(R_i - R_L) = 0$$

Since $(R_L + R_i) \neq 0$ therefore $(R_i - R_L)$ must be equal to zero.

Thus finally we can show that –

$$R_L = R_i$$

It means that load resistance must be equal to the internal resistance of the source.

Thus in Maximum Power Transfer Theorem, the load resistance R_L must match with the internal resistance of the source R_i. The above figure shows this condition in details. When $R_L = R_i$ the power delivered to the load will be equal to P_{max} .

The Tricky Situation

When we try to adjust the condition of Maximum Power Transfer Theorem in an amplifier, a very tricky situation arises.

For example, consider an amplifier system, in which we want to deliver maximum power output to the load connected at the output of the amplifier.

So when we try to satisfy the condition $R_L = R_i$, the efficiency of the amplifier system is sacrificed at the cost of delivering maximum power to the load.

Mathematically this can be explained as follows –

$$efficiency = \frac{output\ power}{input\ power} = \frac{I^2.R_L}{I^2.(R_L + R_i)} = \frac{R_L}{2.R_L} = \frac{1}{2} = 50\% \qquad becasue\ R_L = R_i$$

Conclusion

Hence we cannot always stick to satisfy the condition of Maximum Power Transfer Theorem. However this is applicable only when -

$$P_{max} = \frac{(V_{TH})^2}{4.R_{TH}} = \frac{(V_{TH})^2}{4.R_L}$$

References

1) Harihar, Narayanan. (1978). On the Maximum Power Transfer Theorem. International Journal of Electrical Engineering Education. 15. 161-167. 10.1177/002072097801500211.

2) Baudrand, Henri. (1970). On the Generalizations of the Maximum Power Transfer Theorem. Proceedings of the IEEE. 58. 1780 - 1781. 10.1109/PROC.1970.8011

The Initial Invesrion Density Is Constant Through Out The Laser Medium For Calculating Radial Variation Of Peak Power Across The Laser Beam

A. P. Pachkawade

Rajarshee Shahu Science College, Chandur Rly Dist. Amravati,

Abstracts :-

    The most important characteristics of any laser is the divergence of its output radiation which plays very important role in the determination of photon flux. The angle of divergence of output beam are different for Copper Vapour Laser and pulsed laser. The angle of divergence determine the photon flux when the beam is focused using focusing optics. Further the output beam is focused the diverging beam converges and get focused at the same point. In the present work, the analytical expressions are obtained for the peak power output of the CVL without mirror, the intensity of the laser radiation across the laser beam and peak power angle of divergence along the diameter of the discharge tube. The angle of divergence is determined by the absorption coefficients, initial inversion density and the dimensions of the laser plasma column in a direction perpendicular to the direction of propagation of the beam. The angle of divergence also increase with the dimensions of the plasma column in a direction perpendicular to the direction of propagation of the beam. From the calculation of peak power across the laser beam desired angle of divergence may be obtained. The half peak power angle of divergence for initial inversion density 0.2 and 0.4 are 20mrad and 30mrad respectively in Copper Vapour Laser.

Keywords:- Copper Vapour Laser, laser radiation, inversion density, dimensions of the laser plasma.

Introduction

    Especially in the copper vapour laser the vapours of the chemical elements are extensively used as the active medium [1]. In some designs the bids of copper metal are used as the source of copper. The laser beam is characterized by spectral band-width, the wavelength, output power, polarization and angle of divergence. The most important characteristics of any laser is the divergence of its output radiation which plays very important role in the determination of photon flux. The angles of divergence of output beams are different for CV lasers and pulsed lasers. In case of pulsed lasers the divergence may vary during the formation of the output pulse. The angle of divergence determines the photon flux when the beam is focused using focusing optics. Further when the output beam is focused the diverging beam converges and gets focused at some point. The variation of photon flux in the neighbor hood of focal point is determined by the angle of divergence. Therefore, it would be very interesting to study the evolution of the angle of divergence of laser radiation during the formation of output pulse and inversion time. There are many methods for measuring the angle of divergence, such as the methods of sections, recording of the angular distribution and of intensity methods of focal spot [2]. A method for on line analysis by line scanning of a focal spot is suggested in work of A.P.Anerovov et al [3]. However, all these methods are not sufficient to give the idea about the evolution of the divergence during the formation of output pulse. O. Burihinskir [4] describe a method for recording changes in the divergence during the formation of output pulse.

    The stimulating action in the laser medium starts with the signal produced by spontaneous emission and subsequent amplification of the radiation by the laser medium. In case of cyclic lasers, X-ray laser and high power solid state lasers the gain of the amplifying medium is relatively high and the amplification rate is also high and the intensity builds up immediately after the production of spontaneous emission. In case of copper vapour laser [5,6], nitrogen laser [7,8], lead vapour laser [9] the gain of the media is high and the production of population inversion is transient phenomenon, the single pass of the radiation is sufficient for building up of the laser intensity. On the other hand the laser like He-Sell [10], He-Cdll [11] and He-Znll [12], the optical gain of the medium is small and multiple pass of the radiation is essential for building up of the laser intensity. In case of multiple pass laser the radiation having less angle of divergence gets amplified. However, in transient laser the spontaneous radiation gets amplified and comes out of the cavity in a very short interval of time consequently the radiation having large angle of divergence gets amplified. Thus, the pulsed laser having narrow pulse width, have large angle of divergence and the CW lasers have low angle of divergence[13]. Being high gain lasers the X-ray lasers and high power solid state lasers have large angle of divergence.

The theoretical and experimental study has not been extensively done as far as the angle of divergence is concerned. But few computations in the branch of angle of divergence of pulsed laser are carried out by Pawar and his co-workers[14].

In the present wor the analytical expressions are obtained for the peak power output of the CVL without mirror, the intensity of the laser radiation across the laser beam and half peak power angle of divergence of the copper vapour laser beam. The angle of divergence is obtained by graphical method. The peak output power of the laser beam at various inversion density and at various radial points across the laser beam is studied.

Laser Pulse Formation:-

The population inversion produced on the transitions 2P3/2   2D5/2 and 2P1/2   2D3/2 when the discharge pulse is passed through the CVL active medium. The upper laser state decays spontaneously and the radiation at laser wavelength is produced. The radiation may travel in all directions making an angle 4 steradians. The rays parallel to the laser axis undergoes amplification by the process of stimulated emission. The angle of divergence of the stimulated emission is restricted by the geometry of the laser active medium and the laser cavity. The angle of divergence is maximum for the radiation which comes out of the cavity in the beginning of the formation of the laser pulse. If we keep the mirror at the end of the cavity which reflects the radiation and the beam having less angle of divergence would be amplified. As the radiation makes more and more round trips in the medium the angle of divergence goes on decreasing. In case of CVL the leading part of the laser beam has large angle of divergence and after some time means in the lagging part of the laser beam has low angle of divergence. For obtaining the angle of divergence of the leading part of the beam, the pulsed laser without mirror is to be studied.

Working of CVL Without Mirror:-

For the development to the theory we assume that the discharge tube is excited by the current pulse and no mirror is placed at the either end of the laser cavity to feed the photon flux. Moreover, it is also assumed that the pulse width of the discharge current is shorter as compared to laser pulse width and the loss of inversion due to the stimulated emission to be the dominant deexcitation process. In other words, the rate of excitation of the laser states is negligible during the process of the formation of the laser pulse.

With these assumptions the rate equations governing the population densities of the laser states and the photon flux are written as

$$(1) \quad \frac{d\phi_+(z,t)}{dt} = C \frac{d\phi_+(z,t)}{dz} + \phi_+(z,t)\alpha_0 C_n(z,t)$$

$$(2) \quad \frac{d\phi_-(z,t)}{dt} = C \frac{d\phi_-(z,t)}{dz} + \phi_-(z,t)\alpha_0 C_n(z,t)$$

Neglecting the effect of spontaneous emission the rate of change of inversion density may be expressed as

$$(3) \quad \frac{dn(z,t)}{dt} = -2\alpha_, C_,(z,t)[\phi_,(z,t) + \phi_-(z,t)]$$

where,

$$(4) \quad n = \frac{N_2 - N_1}{N_2 + N_1}$$

is the normalized inversion density,

N1 – is the population density of the lower laser level,

N2 – is the population density of the upper laser level, and

N0 = N1+N2

$$(5) \quad \phi_, = \frac{\phi}{N_,} = \frac{\phi_, + \phi_-}{N_,}$$

National Conference on Multidisciplinary Research in Science and Technology for Healthy Lifestyle Management (NCMRST- 2020) Organizer :- Shri R.L.T. College of Science, Akola

24th Jan. 2020

is the normalized photon flux

φ0 – is the photon density,

φ+ - is the photon density traveling in positive direction,

φ- - is the photon density traveling in negative direction.

$$\alpha = \alpha_0\, \eta \qquad (6)$$

where, α0 is the absorption coefficient of laser medium at laser wavelength.

The rate equations developed in present work are same as the rate equation of W.G.Warner and B.A. Lengyl [15] and P. Richer et al [16], but the boundary conditions are different because there is no mirror at any end of the discharge tube, photon fluxes entering into the two ends of the discharge cavity are zero.

i.e. $\varphi+(0,t) = \varphi-(l,t) = 0$

where, l is the length of the laser medium. if the laser plasma tube is uniformly wide initial inversion along the laser tube may be assumed to be uniform across and along the discharge tube. The laser pulse emerging from two ends have identical photon fluxes i.e.

$\varphi+(l,t) = \varphi-(0,t) = \varphi\,(t) = \varphi+(z,t) + \varphi-(z,l)$

Here, we assume that photon density increases linearly with laser length, using these boundary conditions, if equation 1 and 2 are added and the resulting equation is divided by equation 3, we get,

$$\frac{d\phi}{dn} = \frac{n_r}{2n} - \frac{1}{2}$$

where nT = 2/α0l is the threshold inversion density and n(ti) is the initial inversion density.

The integration of the equation leads to the result

$$\phi(t) - \phi(i) = \frac{1}{2}\left\{ \frac{n_T \log[n(t_i)]}{n(t_i)} - [n(t) - n(t_i)] \right\} \qquad (7)$$

where, φi is the initial photon flux which may be assumed to be negligible. It is to be noted that the resulting equation for the photon flux is similar to the corresponding equations obtained by W.G.Wanger and B.A.Lengyl [15] and P. Richter et al [16] except the threshold inversion density nT. The threshold inversion is equal to the loss per pass divided by α0l. It is implied that in the present work loss per pass is 2. It is obvious that there is no mirror at either end of the laser tube, the photon fluxes are completely lost from both the ends. From equation 7 the expression for the peak power of the laser pulse may be calculated by putting

$$n(t) = n_T = \frac{2}{\alpha_0 l}$$

The equation for the peak power of the laser output beam may be written as

$$\phi_P = \frac{1}{2}\left\{ n(t_i) - \frac{2}{\alpha_0 l}[1 + \log\frac{n(t)\alpha_0 l}{2}] \right\} \qquad (8)$$

the peak power of the laser output is a function of the initial inversion density, the length of the passage of the radiation through the laser medium, the gain of the medium. If one measures the above mentioned parameters, the peak power of the laser output pulse may be obtained. Unless there is influence of the traveling wave on the excitation of the laser medium, the two pulses generated by the discharge tube have identical properties.

When the laser pulse leaves the medium, the inversion density left behind is practically very much less than the initial inversion density. The total energy stored by the laser medium is equally shared by two simultaneously generated laser pulses traveling in opposite directions. Hence, the energy of each laser pulse coming out may be expressed as

$$E = \frac{n(t_i)}{4} N.V.h\nu \qquad (9)$$

where,

N – is the density of laser active particles,

V – is the volume of the excited laser medium,

hν – is energy of a photon.

The factor 4 comes into picture because energy stored is divided into two pulses of equal intensity and after decay of the half of the molecules in the upper state the population inversion is exhausted.

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293
(Special Issue No.70) Peer Reviewed Journal   www.aiirjournal.com Mob. 8999250451

289

National Conference on Multidisciplinary Research in Science and Technology for Healthy Lifestyle Management (NCMRST- 2020) Organizer :- Shri R.L.T. College of Science, Akola

24th Jan. 2020

Angle of divergence of pulsed laser :-

The half peak power angle of divergence may be defined as the angle between the edge of the cavity and the direction of the laser beam emerging parallel to the axis of the laser plasma tube.

$$l = \frac{Ld}{x_{1/2}} = \frac{d}{\theta_{1/2}}$$

$$\frac{n(t_i) - \frac{2}{\alpha_o L}\left\{1 + \log\frac{n(t_i)\alpha_o L}{2}\right\}}{n(t_i) - \frac{2\theta_{1/2}}{\alpha_o d}\left\{1 + \log\frac{n(t_i)\alpha_o d}{2\theta_{1/2}}\right\}} = 2$$

Substituting n(ti) = n, αo = α and θ1/2 = θ

$$\frac{n - \frac{2}{\alpha L}\left\{1 + \log\frac{n\alpha L}{2}\right\}}{n - \frac{2\theta}{\alpha d}\left\{1 + \log\frac{n\alpha d}{2\theta}\right\}} = 2$$

$$n - \frac{2}{\alpha L}\left\{1 + \log\frac{n\alpha L}{2}\right\} = 2n - \frac{4\theta}{\alpha d}\left\{1 + \log\frac{n\alpha d}{2\theta}\right\}$$

$$n + \frac{2}{\alpha L}\left\{1 + \log\frac{n\alpha L}{2}\right\} = \frac{4\theta}{\alpha d}\left\{1 + \log\frac{n\alpha d}{2\theta}\right\} \qquad (10)$$

We study the variation of a factor F = nαd/2θ in different designs of copper vapour laser. The initial inversion density n may change in different systems in different ways.

Applying this approximation to the equation 20 we get

$$n + \frac{2}{\alpha L}\left\{1 + \log\frac{n\alpha L}{2}\right\} = \frac{4\theta}{\alpha d}\left\{1 + \left[-\frac{n^2\alpha^2 d^2}{8\theta^2} + \frac{n\alpha d}{\theta} - \frac{3}{2}\right]\right\} \qquad (11)$$

Let us denote $n + \frac{2}{\alpha L}\left\{1 + \log\frac{n\alpha L}{2}\right\}$ = by K

$$K = \frac{4\theta}{\alpha d}\left\{-\frac{n^2\alpha^2 d^2}{8\theta^2} + \frac{n\alpha d}{\theta} - \frac{1}{2}\right\}$$

$$K = \frac{4}{\alpha d}\left\{-\frac{n^2\alpha^2 d^2}{8\theta} + n\alpha d - \frac{\theta}{2}\right\}$$

$$K = \left\{-\frac{n^2\alpha d}{2\theta} + 4n - \frac{2\theta}{\alpha d}\right\}$$

2Kθαd = - n2α2d2 + 8nαθd - 4θ2

4θ2 + 2Kθαd - 8nαθd + n2α2d2 = 0

4θ2 + (2Kαd - 8nαd) θ + n2α2d2 = 0

4θ2 + 2αd (K - 4n) θ + n2α2d2 = 0

This is quadratic equation in θ. Therefore the solution of the equation is

$$\theta = \frac{-2\alpha d(K-4n) \pm \sqrt{4\alpha^2 d^2 (K-4n)^2 - 16n^2\alpha^2 d^2}}{8} \qquad \theta = \frac{-2\alpha d(K-4n) \pm \sqrt{4\alpha^2 d^2 (K^2 - 8Kn + 16n^2) - 16n^2\alpha^2 d^2}}{8}$$

$$\theta = \frac{\alpha d}{4}(4n - K) \pm \frac{\sqrt{4\alpha^2 d^2 K^2 - 32\alpha^2 d^2 Kn + 64n^2\alpha^2 d^2 - 16n^2\alpha^2 d^2}}{4}$$

$$\theta = \frac{\alpha d}{4}(4n - K) \pm \frac{\alpha d}{4}\sqrt{K^2 - 8Kn + 12n^2}$$

$$\theta = \frac{\alpha d}{4}\left\{(4n - K) \pm \sqrt{K^2 - 8Kn + 12n^2}\right\} \qquad (12)$$

The parameters of most of the laser systems working in various laboratories have the values which are shown in the figures.

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293 (Special Issue No.70) Peer Reviewed Journal www.aiirjournal.com Mob. 8999250451

290

The absorption coefficient of the transition of 3371A pulsed nitrogen laser is about 0.4 per cm. The dimension of laser plasma lies between 0.1 to 1 cm. Therefore the operating parameters of the pulsed ultraviolet nitrogen laser are very much similar to the copper vapour laser. Hence the behavior of the angle of divergence in nitrogen and X-ray lasers are very much similar to that in the copper vapour laser.
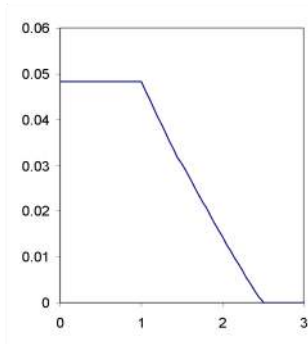
Distance edge of the plasma column X
Fig 1: The laser power across the laser beam
[Horizantal div for Nti=0.2]
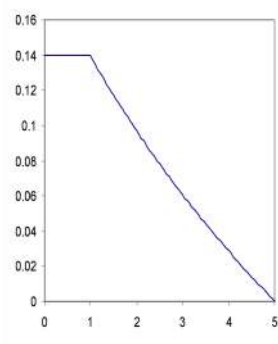
Distance edge of the plasma column X
Fig 2: The laser power across the laser beam
[Horizantal div for Nti=0.2]

The figures 1 and 2 show that the power across the laser beam is nearly constant between B and C in if the inversion density is uniform across the laser medium. If the point P on the observation plane shifts from B' to D' i.e. from x = 0 to x = L'D/L. The beam intensity increases very slowly. For the points beyond D the beam power goes on decreasing as x increases and it becomes zero for $x = x0 = L\ d\ \alpha 0\ n(ti)/2$ or for a beam traveling in the direction making an angle $\theta 0 = d\alpha 0 n(ti)/2$ with the plane of the nearest edge of the laser tube. It may be clearly stated that, if $\theta 0$, d and $\alpha 0$ are known, n(ti) may be calculated using above relation. Hence, the value of initial inversion density may be obtained by measuring $\theta 0$. The inversion experienced by photon flux traveling parallel to laser axis and the photon flux traveling in oblique direction is the same. The energy stored in terms of inversion density is shared by two fluxes. Hence, the inversion density obtained by this method may be slightly lower than the actual value of the inversion density.

We also calculated peak power for different values of x along the diameter of the discharge tube at different diameters and results are plotted in figures 3 and figure 4 for the initial inversion density 0.1, and 0.3 respectively. The results clearly indicate that as the initial inversion density goes on increasing, the peak power goes on increasing. The magnitude of the peak power is unchanged as the diameter of the laser tube is changed. Thus, we may conclude that the output peak power depends on initial inversion density rather than the diameter of the discharge tube.

From the calculations of peak power[21,22] across the laser beam desired angle of divergence may be obtained. The half peak power angle of divergence for n(ti) = 0.2 and 0.4 are 20 mrad and 30
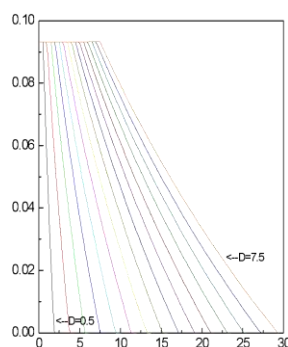
Distance edge of the plasma column X
Fig 3: The peak power for the different values for the diameter of the discharge tube at different diameter at initial inversion density is 0.1
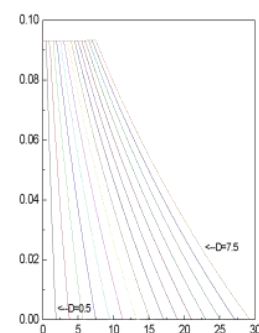
Distance edge of the plasma column X
Fig 4: The peak power for the different values for the diameter of the discharge tube at different diameter at initial inversion density is 0.1

mrad respectively in T.E. field pumped CVL. In this we may say that also the leading part of the output laser beam has large angle of divergence and that of lagging part has less angle of divergence. In case of the A.E. field pumped CVL the angle of divergence is much less than the above mentioned figures. This is because reason that the laser beam makes many passes before coming out of the laser cavity and the rate of production of population inversion is relatively low compared T. E. field pumped laser as the current density is low in case of A. E field pumped laser. The results of the experimental measurements of the angle of divergence may be compared with the computation carried out in the present work. The comparison shows good agreement between the theoretical calculations and the experimental results.

While obtaining the results in the present work, it is assumed that the initial inversion density in the laser medium is constant across the discharge tube. But it has been shown that the electron temperature is not constant across the discharge tube and the population density of the upper and lower laser states are different. This leads to the variation in the inversion density across the discharge tube. The study of the angle of divergence now becomes crucial and the calculation of angle of divergence becomes complicated if the beam becomes annular in shape while it is easy when beam is not annular. The laser discharge consists of thin hallow, cylindrical shells of constant inversion densities. This indicates that a part of the cylindrical shell parallel to the laser axis treated as segment of discharge and the angle of divergence may be calculated. The divergence of the laser beam emitted by this segment would have less angle of divergence because the plasma has less thickness.

Results and discussion:-

We assume that the initial inversion density is constant through out the laser medium for calculating radial variation of peak power across the laser beam of copper vapour laser operating at 5106A or 5782A. The length of the laser discharge tube is taken to be about 100cm and the diameter is to be 1 cm (specification of these values due to our laser parameters). The plane of observation is assumed to be located at a distance of 100cm from the exit end of the laser. The absorption cross section for the copper atoms at wavelengths 5106A or 5782A is about 0.393 cm-1. The initial inversion density is about 0.25 when the laser discharge conditions are optimized. We have calculated peak power for different values of x along the diameter of the discharge tube by using equation 17 and the results are plotted in figures 1 and 2 for the initial inversion densities of 0.2 and 0.4 respectively. The figures show that if the value of x is increased, the peak power also increases till the point comes to a position for which x = L'd/L for the values of x more than Ld/L the peak power of the laser radiation go on decreasing as the value of x is increased. Finally the peak power goes to zero for a certain value of x.

References :-

1) A.M.Prokaorov,Laser Hand book (in Russian),Vol., Sover Skoe Rads, Mascow (1978).
2) E.P.VysokorovKubarev,N.Morozov and V.R.Provin Izmer Proc.No.5, PP. 32, (1973).
3) V.P.An dronov etal Prib. Tel. RKSS, (1978).
4) O.I.Buzhinskir, S.A.Kuznetsova, I.A.Slivitskaya and A.A.Shivitskir. ov.J.Quantum electron, Vol.10, No.2, (1950).
5) S.Gabay, I.Smilansky and 2, Karny IEEE J. Quantum electronics, QE14 PP.427, (1978).
6) J.J.Kim and K.Im J. Opt. Soc. Amer. A – 1, PP.1242, (1984).
7) W.A.Citzsimmons, L.W.Anderson, C.E.Reidhauser and J.M.Vertilek JEEEJ. Quantum Electronics, PP. 624 – 633, (1976).
8) T. Kasuya and D.R.Lide Appl. Optics,Vol.6, No.1, PP. 69 – 80, (1967).
9) G.R.Fowels and A.W.T.Silfvast Appl. Phys.lett, Vol.6,PP.236–237 (1966) 10. K.G.Hernquvist and D.C.Pultorak Rev. Sci. Instrum., Vol. 43 No.2, PP. 290 – 292, (1971).
10) M.Mori, M.Murayana, T.Goto and S.Hattori JEEE J. Quantum Electronic, QE – 14, PP. 427, (1978).
11) P.Gill and C.E.Webb J.Phys. D:Appl. Phys, Vol.11,PP.245–254, (1978).
12) S.N.Thakur Presented in Work shop, I.A.T., March (1988).
13) B.H.Pawar, S.P.Bhandari and L.V.Thakare M. U. Jouranal, (1992).
14) W. G. Wanger and B. A. Lengyl J. Appl. Phys.,Vol.34,PP. 2040, (1963)
15) P.Richter,J.D.Kimal andG.C.Motton.Appl.Optics,Vol.15,PP.756, (1976)
16) D.W. Coutts and D.J. W.Brown Appl. Opt. 34, PP. 1502-1512,(1995)
17) R.Riva, J.T. Watanuki, B.Christ,C.Schwab and N.A.S. Rodrigues Revista de Fisica Aplicada,Vol.12,No.4,(1997)

18) B Singh, S. R. Daultabad, V.V.Subramaniam and A. Chakraborty Proc. Sixth DAE-BRNS National Laser Symposium,(2006)

19) I.I. Balchev, N.I. Minkovski, I.K. Kostadinov and N.V. Sabotinov Bulg. J. Phys. 33 PP.39-47 (2006)

20) F.Pedaci, Y. Wang, M. Berrill, B.Luther,E. Granados and J.J. Rocca Optics Letters, Vol.33, Issue5, PP. 491- 493 (2008)

21) J. hao, Q.L. Dong and J. Zhang Optics Letters, Vol.32,Issue5,PP.491-493 (2007)

22) Y.Liu,Y.Wang,M.A.Larotonda,B.M.Luther,J.J.Rocca and D.T. Attwood Optics Letters, Vol.14, Issue26, PP. 12872-12879 (2006)   113, ISSN 1549-3636 (2006)

Study Of Glow Discharge Of Various Elements, At Different Wavelengths

A.P.Pachkawade

Department of Physics, Rajarshee Shahu Science College, Chandur Rly. Dist. Amravati

S. K. Devade

Department of Physics, Shankarlal Khandelwal College, Akola

Abstract:

The dc glow discharge spectrometry is the most essential part of the electrical and spectral emission studies of the molecules, atoms and ions in the interface of solid and liquid. We measured the intensity of radiation emitted by dc glow discharge as a function of discharge current for the different electrolytes along with V-I characteristics. The voltage-ampere characteristics during a glow discharge in the atmospheric pressure gas using an electrolytic solution as the anode and metal electrode like tungsten as a cathode were carried out. Under the study of glow discharges of various elements, a monochromatic light at various wavelengths generated. Few species shows a change in the color of the glow when discharge current increased.

Keywords: interface, radiation intensity, tunneling. glow discharge,

Introduction:

Electrical and spectral characterization of the glow discharge [1-7] of the material helps in studying the chemical composition of the material. The elements in the material may be excited in the plasma [8] produced between liquid and solid interface. The neutral atoms, ionized atoms and molecules are excited and they emit characteristic spectrum and hence atomic, ionic or molecular species may be identified. Spectral study of the glow discharge [3,4,7,9] of the material helps in studying the chemical composition of the material. The solid liquid junction is formed when current is passed through the junction; a plasma film is generated along the interfaces between solid and liquid. The plasma pressure is very near to the atmospheric pressure [10,11,12]. [The plasma parameters in DC glow discharge may be generated by a current source [13].] The method is very low cost and quick results may be obtained and therefore has wide applications.

When electric discharge is passed to a conducting solution from an electrode, which is placed in the gas space above the liquid surface, reactions take place in the liquid phase and the process is referred to as "Glow Discharge Electrolysis (GDE)". The dc glow discharge continues to be the subject of spectroscopic research [15] and analytical method development. Glow discharges [14] are used for a variety of technological, physical and analytical applications, ranging from plasma etching and deposition systems in the micro-electronics industry, to lasers or even plasma monitors. Traditionally [14] dc-glow discharge optical emission spectroscopy is mainly applied in the materials sciences where it is used for bulk and surface analysis, pellets containing the adsorbed liquid and direct analysis of the liquid samples by use of adequate sample introduction techniques. Liquids can be analyzed directly at atmospheric pressures, when applying the atmospheric electrolyte cathode glow discharge cell approach with detection by emission spectroscopy as described by Cserfalvi and Mezei [3].

Material and Methods:

The experimental arrangement used for the investigation of dc glow discharge is simple and. It is inexpensive arrangement and it is very much cost effective. It consists of tungsten electrode of length 40 mm and diameter 3mm fused in glass capillary tube and suspended axially in a hollow slotted stainless steel cylinder, of length 6 cm and internal diameter 2.54 cm. The stainless steel cylinder served as another electrode i.e. anode in the glow discharge. The suspended end of tungsten rod was carefully rounded. The tungsten electrode can be used as cathode by connecting it to the dc power supply of 700 V capacity having 1.5 A current capacity. In this arrangement the hallow cylinder was dipped in a electrolytic aqueous solution taken in a glass beaker. The depth of immersion of the tungsten electrode in electrolyte solution could be adjusted with the help of micrometer adjustable stand. By using this arrangement the tip of tungsten electrode could be just brought in touch with the upper surface of the solution or the distance between the solution surface and the electrode may be adjusted. In this way the solution itself acts as another electrode.

The different 28 electrolytic solutions have been taken for investigation using the glow discharge system. With the help of the above-mentioned experimental arrangement the following properties may be studied.

Result and Discussions:

Variation of electrolytic current with the applied dc-voltage during glow discharge in atmospheric pressure gas using 28 electrolytic solutions as the anode and cathode were carried out. The colors emitted on the glow are observed and listed in table 1. As an example we consider the electrolytic aqueous solution of 0.5N $Cd(NO_3)_2.4H_2O$ as the anode, the electrolytic process leading to a luminescent glow is best depicted by the standard voltage-current curve as shown in figure 1. The curve may be divided in to several regions and its behavior may be studied.

In the region AB the curve is almost linear, the Ohms law is satisfied and conventional electrolysis found with tiny bubbles of gas around both material electrodes-tungsten electrode and stainless steel electrode. At the voltage corresponding to point B in curve, a smooth evolution of gas bubbles is disturbed and layer of steam is seen at the tungsten cathode. In the region between B and C, the pointer of voltmeter and ammeter widely fluctuates. In this region the characteristics like current passing through the electrode and voltage applied found as unstable.

The behavior of region BC, CD and DE can be explained as follows. Because of increase in the applied dc voltage, the rate of gas evolution is increased with the formation of large size gas bubbles at a fast rate. This decreases the rate of migration of the ions and charge transfer process at the electrodes. When voltage is further increased more fluctuations are obtained in both voltage and current readings with fall in current. This unstable decreased current is shown by line BC. In the neighborhood of point C it is found that fluctuation rate decreases and now hissing sound occurs.
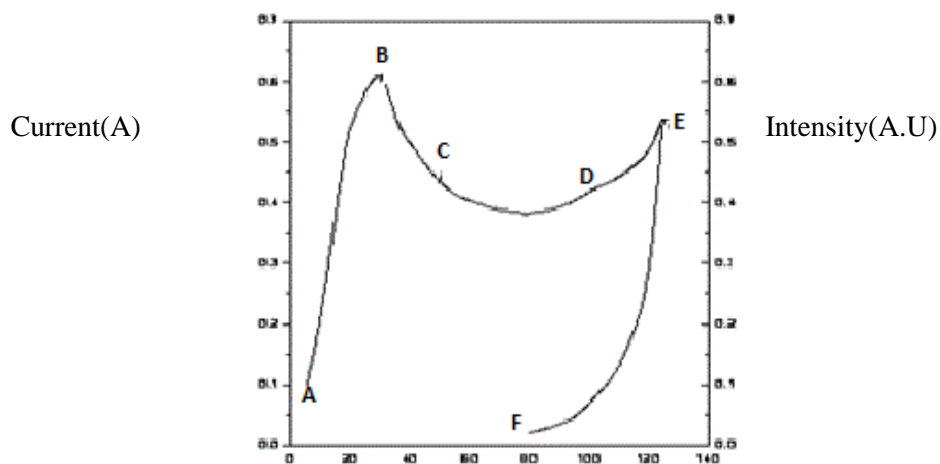
Fig 1: V-I Characteristics of 0.5 Electrolytic solution of cd(NO3) 2.4H$_2$ 0

When the applied dc voltage reaches to the point C, there is intermittent sparking. The formation of gas bubbles around the tungsten electrode has now stopped. After increasing the applied dc-voltage to a still higher value the formation of movable thin vapor film around the tungsten cathode takes place, which at times produces the vortex motion and visible glow spark of greenish-blue color is found in the gap between cathode and solution phase.

Sr. No	Electrolytic Solution	Colour of glow when solution used as	
		Anode	Cathode
1	0.5N NaOH	Yellow	Yellow
2	0.5N KOH	Lavender	Lavender
3	0.25 N LiNO3	Reddish	Reddish
4	0.1N Pb(NO3)2	Bluish	Bluish
5	0.5N MgSO4	Green	Orange
6	0.5N CuCl2.2H2O	Green	White

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293 (Special Issue No.70) Peer Reviewed Journal www.aiirjournal.com Mob. 8999250451

295

7	0.05N AgNO3	Pale Green	Yellow
8	0.5N NaCl	Yellow	Yellow
9	0.5N KNO3	Lavendor	Lavender
10	0.5N CaCl2	Orange	Pink

Table 1: Colour of Discharge Glow

Due to vortex motion, electrolyte periodically touches to the tungsten cathode surface. This produces local heating at the tungsten cathode surface and visible glow spark of bluish-green color. Due to the local heating process there produces the vapor jet and nearby liquid molecules tried to take its place. The region CD of V- I characteristics shows this situation. Thus the region B to C represents the negative slope as seen in the curve. When the electrolyte current decreases to the corresponding point D, the violent gas evolution stops and slope of the curve changes sign from negative to positive. After the point D, with the applied dc voltages the current starts increasing and thereby producing a stable superheated insulating layer around the cathode (tungsten electrode). At this situation a continuous bluish-green glow is developed at the cathode surface. For a further increase in applied dc voltage, the intensity of the glow increases continuously with the increase in current also as shown in figure 1. Thus the region beyond D i.e. along DE appears to be true glow discharge. This happens due to the discharge of accumulated ions through the insulating layer. This situation produces intense glow of bluish-green color and it sometimes can be pictured as corona discharge. Thus under the observation, it is quite obvious that the superheated insulating layer around the cathode is the governing factor responsible for the bluish-green glow.

Conclusion:

DC Glow discharge using a solution as the anode and the metallic electrode as the cathode for the investigation of phenomenon of spectrometry shows that, a sensitive and inexpensive technique and very much cost for the elemental analysis of electrolytic solutions.

References:

1) T. Cserfalvi and P. Mezei (1996), Operating Mechanism of the Electrolytic Cathode Atmospheric Glow Discharge, *Fresenius Journal of Analytical Chemistry(Springer Link)*, pp: 83-89

2) Michael R.Webb,Francisco J.Andrade,Gerardo Gamez, Robert McCrindle and Gray M. Hieftje,(2005), Spectroscopic and Electrical Studies of a Solution Cathode Glow Discharge,*J.Anal.At.Spectrom,20*,pp:1218- 1225

3) T Cserfalvi, P Mezei and P Apai,(1993), Emission Studies on a Glow Discharge in Atomic Pressure Air using Water as a Cathode, *J. Phys. D*, , 26, 2184-2188

4) Stephane Baude, Jose A.C.Broekaert, Daniel Delfosse, Norbert Jakubowski, Lars Fuechtjohann, Nestor G. Orellana-Velado, Rosario Pereiro and Alfredo Sanz- Medel (2000), Glow discharge atomic spectrometry for the analysis of environmental samples-a review, *J.Anal.At.Spectrom.2000,Vol.15,pp:1516-1525*

5) John Marshal, Simon Chenery,E. Hywel Evans and Andrew Fisher(1998), Atomic   Spectrometry Update- Atomic Emission Spectrometry, *Journal of Analytical Atomic Spectrometry, June 1998, Vol. 13,pp: 107R- 130R*

6) A A Garamoon, A Samir, F F Elakshar and E F Kotp (2003),Electrical Characteristics of a DC glow discharge, *Plasma Sources Science Technol.12(2003), pp: 417-420*

7) Tamas Cserfalvi and P. Mezei, J. Anal. At. Spectrom (1994), Direct solution analysis by glow discharge: electrolyte cathode discharge spectrometry, *J. Anal.   At. Spectrom.1994, 9, pp: 345-349*

8) Z. Machalaa, M. Jandaa, K. Hensela, I. Jedlovsky, L. Leatinska, V.Foltinc, V.Martiaovita and M. Morvova(2007), Emission spectroscopy of atmospheric pressure plasmas for biomedical and environmental applications, *J. of Molecular Spectroscopy, Vol. 243, Issue 2, pp:194-201*

9) Michael R.Webb, George C.-Y.Chan, Francisco J.Andrade, Gerardo Gamez, and Gary M. Hieftje (2006), Spectroscopic characterization of ion and electron population in a solution – Cathode Glow discharge, *J.Anal.At. Spectrom, 2006, 21,pp 525- 530.*

10) David Staack, Bakhtier Farouk, Alexander Gutsol and Alexander Fridman (2005), Characterization of a DC atmospheric pressure normal Glow Discharge*, Plasma sources Sci. Technol. 14, 2005, pp. 700-711*

11) Christoph Gerhard, Tobiasweins, Daniel Tasche (2013), Atmospheric Pressure plasma treatment of fused silica related surface and near surface effects and applications, *Plasma Chemistry and Plasma Processing, 2013, 33(5), pp. 895 – 905.*

National Conference on Multidisciplinary Research in Science and Technology for Healthy Lifestyle Management (NCMRST- 2020) Organizer :- Shri R.L.T. College of Science, Akola

24th Jan. 2020

12) Santak V, Zaplotnik R, Tarle Z, Milosevic S (2015), Optical Emission spectroscopy of an atmospheric pressure plasma jet during tooth bleaching Gel Treatment, *Appl. Spectrosc., 2015, pp. 1327 – 1333.*

13) Mohammed Khalaf, Osday A Hammadi Firas J. Kahim (2016), Current Voltage Characteristics of DC plasma Discharges Employed in Sputtering Techniques, *IJAP, 2016, 12(3), pp.11 – 16.*

14) Norbert Jakubowaski,Volkar Hoffmann, Annemie Bogaerts(2003), Foreword: Glow discharge spectrometry, *J.Anal.At.Spectrom,2003,20,pp.19N-22N*

15) John Marshall, Simon Chenery, E. Hywel Evans, Andrew Fisher (1998), Atomic Spectrometry Update–Atomic emission spectrometry, *J. Anal. At. Spectrom., 1998,13, 107R-130R.*

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293 (Special Issue No.70)   Peer Reviewed Journal   www.aiirjournal.com Mob. 8999250451

297

Comparative Analysis of Silicon over Germanium in the Manufacturing of LSI & VLSI Technology Semiconductor

Yash Vidyasagar

Student, (M.Sc. I), Dept. of Electronics Science, Fergusson College, Pune

Abstract

There are several reasons Silicon has become the preferred semiconductor in the present, over Germanium. Easy formation of SiO_2 layer in silicon than germanium, during the manufacturing of advanced electronic devices like MOSFETs, etc. Silicon is largely found in sand and so it is very cheap as compared to germanium. Germanium is generally found in the form of different compounds due to its high reactivity. Silicon has large band gap (1.12eV) than germanium (0.7eV). So, at same temperature, the thermal pair generation in silicon is less than germanium. However, the germanium diode has one major advantage over Si.

Ge has higher electron and hole mobility and because of this Ge devices can function up to a higher frequency than Si devices. The germanium diode is also superior to silicon diode in terms of energy loss, current loss, etc. The Ge diode loses only 0.3-0.4 a volt while a silicon diode loses about 0.6-0.7 volts. But, the cost of production and non-versatility of germanium diode, makes it poor than silicon diode.

First reason

The Si forms on its surface very easily a thin layer of SiO_2 which is a very good insulator and which technologically can be very easily processed. This layer of oxide is very useful to form gate of MOSFET transistors *(it is situated between gate of MOSFET and either the n-channel or the p-channel).*

Also this layer is very useful when one wants to form the junctions in a transistor because it acts as a masking layer that prevents the diffusion of the dopants in the regions it protects. On the other hand, Ge DOES NOT form this oxide layer on its surface so easily and the technology to obtain the germanium devices is more complicated.

Second reason

Si has a larger band-gap *(0.7 eV) than Ge (0.2 eV)* and because of this, the phenomenon of thermal pair generation is smaller in Si than in Ge. This means that at the same temperature the noise of the Si devices is smaller than the noise of Ge devices and also that the reverse current of a p-n junction is smaller for Si than for Ge.

Third reason

The Si is largely found in nature in the form of sand, from which it is extracted by reduction with carbon. In contrast Ge is NOT so easily found in nature, and when found is only in chemical compounds that it forms because of its high reactivity.

However, Ge has one major advantage over Si. Ge has higher electron and hole mobility and because of this Ge devices can function up to a higher frequency than Si devices.
The silicone diode is cheaper and easier to manufacture. It also handles larger currents better with less temperature drift and can withstand much higher working temperature.

The germanium diode works well for small jobs, but most devices need something that can handle more power. Silicon is also much more easily available for commercial purposes compared to germanium.
Hence Ge diodes are becoming almost obsolete these days and are used only for small currents in analog systems, and in some radio receivers.

The germanium diode does have many advantages over silicon diodes in terms of energy loss, current loss, etc. The Ge diode loses about 0.3-0.4 volts while a Si diode loses about 0.7-0.9 volts. Yet, the cost of production and its non-versatility overrides all other advantages.

References

1) Shenai, Krishna & McShane, Erik. (2003). VLSI Technology. 10.1201/9780203011508.ch1.
2) Bartolf, Holger & Rahimo, M. & Knoll, Lars & Mihaila, Andrei & Minamiswa, Renato. (2016). Method for Manufacturing a Semiconductor Device

Investigation of Visible Quantum Cutting In $KCaF_3$:Gd^{3+}, Eu^{3+} Phosphor

S. R. Jaiswal

Department of Physics, Shri R.L.T. College of Science, Akola

V. B. Bhatkar

Department of Physics, Shri Shivaji Science College, Amravati

P.A. Nagpure

Department of Physics, Shri Shivaji Science College, Amravati

S. K. Omanwar

Department of Physics, Sant Gadge Baba Amravati University, Amravati

Abstract

In this work we prepared $KCaF_3$ Co-doped with Gd^{3+}, Eu^{3+} phosphor synthesis via reactive atmosphere process. Powder X-ray diffraction analysis shows structural purity of as-synthesized phosphor. The emission and excitation spectra of $KCaF_3$:Gd^{3+}, Eu^{3+} were investigated using the VUV beam line of the Beijing Synchrotron Radiation Facility (BSRF). Hear we investigate the mechanism of Energy transfer in Gd^{3+} ions to Eu^{3+} through cross relaxation process. In this phosphor we got negative results. The excitation peak of 273 nm was very much greater than that of the excitation peak of 147 nm at emission wavelength 593 nm. Hence there was no energy transfer in between the ions Gd^{3+} and Eu^{3+}. The results was no quantum cutting in the given phosphor material.

Keywords: Reactive Atmosphere Process (RAP), Quantum cutting (QC), Vacuum Ultraviolet (VUV)

Introduction

For the development of mercury free florescent lamps and plasma display panels (PDPs), we require phosphor having quantum efficiency is greater than unity under VUV excitation. The phosphors having quantum efficiency is greater than unity are called quantum cutting phosphors. Quantum cutting provides a means to obtain two or more low energy photons for each high energy absorbed photon. Therefore it serves as a down converting (DC) mechanism with quantum efficiency greater than unity and it offers the prospect of providing enhanced energy effectiveness in lighting devices [1]. Calcium fluoride with rare earth doped phosphor has conventional attention for numerous research works [2]. B. Herden *et al.* reported photon cascade emission in Pr^{3+} doped fluorides with CaF_2 structure [3]. W. Binder *et al.* reported CaF_2:Sm^{3+} Phosphor was used for the application of solid state laser materials [4]. R. Wegh *et al.* explain detail about visible quantum cutting through down-conversion in rare-earth compounds [5]. B. Liu *et al.* also explain visible quantum cutting in BaF_2: Gd; Eu via down-conversion in which one VUV photon absorbed by Gd^{3+} can be split into two visible photons emitting by Eu^{3+} through cross relaxation between Gd^{3+} and Eu^{3+}[6].

Experimental

$KCaF_3$: Gd^{3+}, Eu^{3+} phosphor was synthesis via reactive atmospheric process. In this method we used metal nitrate like Ca $(NO_3)_2$ (99.99% A.R.) and potassium nitrate KNO_3 as a precursor. The above both inorganic precursors were taken in Teflon beaker. A little amount of double distilled water was added in beaker and stired it, then hydrofluoric acid (HF) added in it to get slurry. The slurry was dried by blowing air or heating on hot plate (80°C). A freshly prepared $KCaF_3$ host was obtained. Gd_2O_3 (AR 99.9%) and Eu_2O_3 (AR 99.9%) were boiled in HNO_3 and evaporated to dryness, so as to convert them into relevant nitrates. The aqueous solution of these nitrates where use as a dopants. The 1 mol% of gadolinium nitrate and 1mol% of europium nitrate where assorted in the host material and dehydrated completely.

The dried powder was transferred to a glass tube and about 1.0 wt. % RAP agent was added. In this process we used ammonium fluoride as a RAP agent. The tube was closed with a tight stopper and slowly heated to 500°C for 3 h. The stopper was removed and the powders were transferred to a graphite crucible pre-heated to a suitable temperature. After heating in the graphite crucible for 1 h the resulting phosphor was rapidly quenched to room temperature. Belsare *et al.* well discussed about RAP in their literature [7]. The complete process involved in the reaction was represented as a flow chart in Fig. 1.
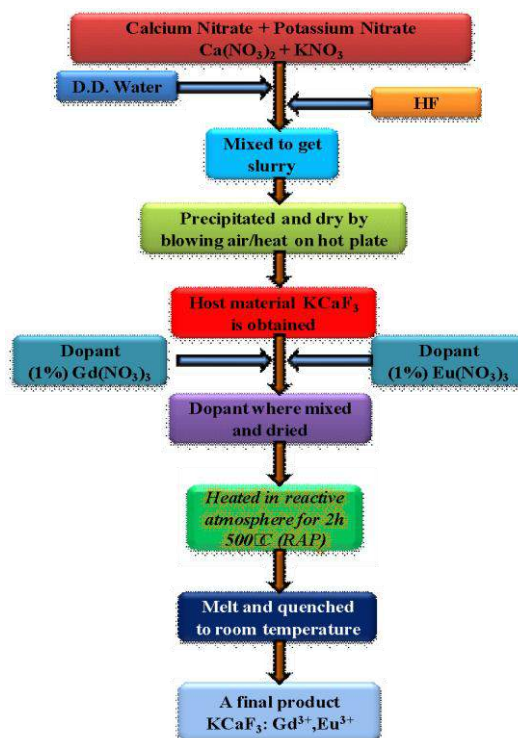
Fig.1. Flow chart of KCaF$_3$: Gd^{3+}, Eu^{3+} prepared via RAP.

Results And Discussion

XRD Analysis

The formation of the KCaF$_3$: Gd^{3+}, Eu^{3+} sample in the crystalline phase synthesized by RAP was confirmed by XRD pattern as shown in Fig.2. The XRD pattern for KCaF$_3$:Gd^{3+}, Eu^{3+} agreed well with the standard data from ICDD file (01-074-9130). Also the XRD pattern show that KCaF$_3$ lattice possesses Orthorhombic structure with a space group Pnma(62) with lattice parameters a= 6.2288 b= 8.7003 c= 6.1121and interfacial angles Alpha= 90.000 Beta= 90.000 Gamma= 90.000 . XRD pattern of CaF$_2$:Gd^{3+}, Eu^{3+} phosphor as shown in fig.2.
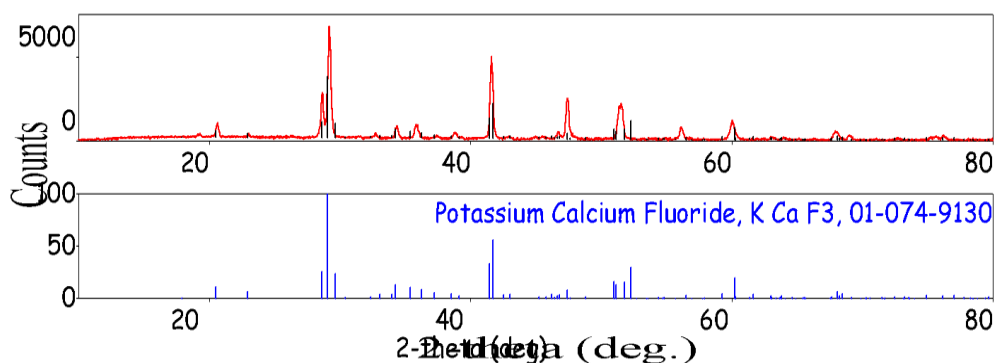
Fig.2. XRD patterns of KCaF$_3$: Gd^{3+}, Eu^{3+} synthesized by RAP.

VUV-UV PL Analysis

The process transfer of energy and quantum splitting can happen by the combination of Gd^{3+} and Eu^{3+} in which Gd^{3+} absorbing a VUV photon corresponding to $^8S_{7/2}{\rightarrow}^6G_J$. The incident high energy photon is cut into two visible photons emitted by Eu^{3+} ions. The whole process is called as quantum cutting [5]. But in the KCaF$_3$:Gd^{3+}, Eu^{3+} sample, the absorption peaks of a VUV photon corresponding to $^8S_{7/2}{\rightarrow}^6G_J$ and $^8S_{7/2}{\rightarrow}^6D_J$ does not observed under the excitation wavelength of 593nm and 612 nm in excitation spectrum as shown in fig. 3.
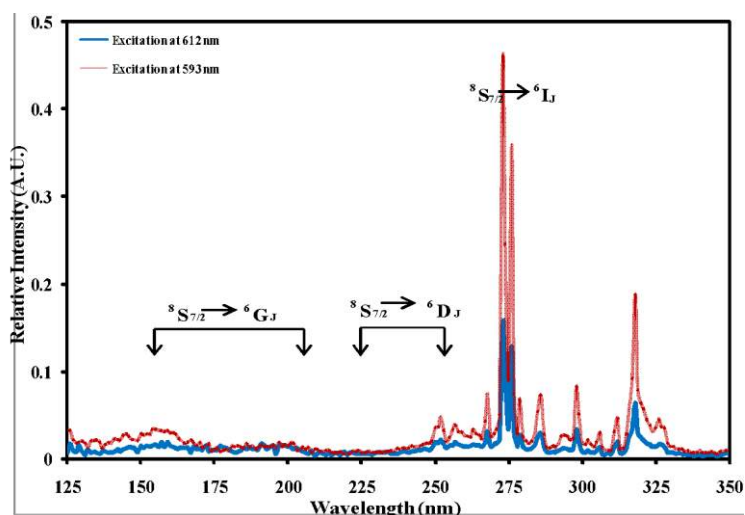
Fig.3. Excitation spectrum of $KCaF_3:Gd^{3+}$, Eu^{3+} monitored at 593 nm and 612 nm.

Upon excitation in ^6I_J level with 273 nm, the quantum cutting never occurs because no cross-relaxation exists, so the $^5D_J \rightarrow {}^7F_J$ transitions emission of Eu^{3+} has a normal branching ratio between $^5D_0$ and $^5D_{1, 2, 3.}$ Upon 147 nm and 172 nm excitation in ^6G_J level with, the quantum cutting can occur via two-step energy transfer, but there were no excitation peaks observed in between 140 nm to 200 nm wavelengths. It means that the synthesized phosphor material does not absorbed high energy VUV photons. The emission spectra under excitation of 273 nm, 172 nm and 147 nm are shown in Fig 4. The intensity peak under the excitation of wavelength 273 nm is much greater than that of excitation wavelength of 147 nm and 172 nm under the emission of wavelength 593 nm.
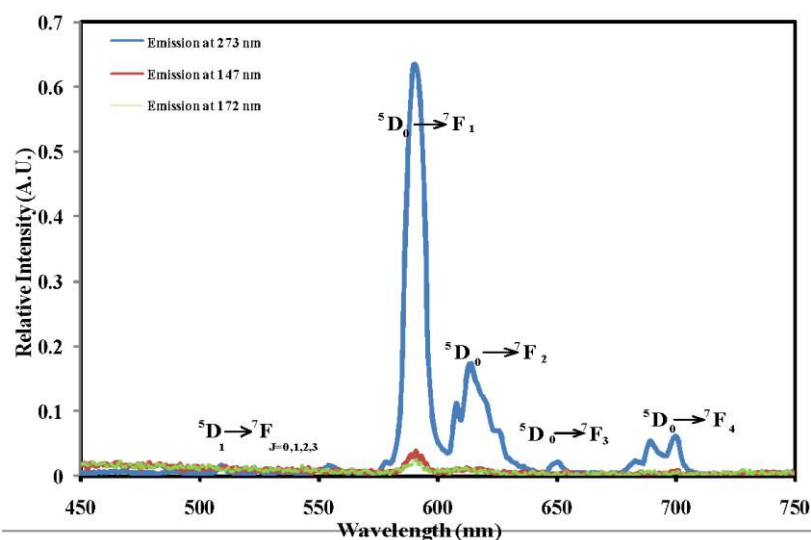
Fig.4. Emission spectra of $KCaF_3:Gd^{3+}$, Eu^{3+} at excitation wavelength 147 nm, 172 nm and 273 nm.

Conclusions

The inorganic material $KCaF_3$: Gd^{3+}, Eu^{3+} was successfully prepared through reactive atmosphere process. The XRD pattern confirmed its orthorhombic structure. The excitation peak of 273 nm was very much greater than that of the excitation peaks of 147 nm and 172 nm at emission wavelengths 593 nm. Hence there were no energy transfer in between the ions Gd^{3+} and Eu^{3+}. The results were no quantum cutting in the synthesized phosphor material.

Acknowledgements

mode using remote access mode. One of the authors S.R. Jaiswal thankful to Prof. S.K.Omanwar, Department of Physics Sant Gadge Baba Amravati University, Amravati for providing necessary facilities.

References

1) C.R. Ronda, J. Alloys Compd. 225 (1993) 534.
2) S. Pote, C. Joshi, S. Moharil, P. Muthal, S. Dhopte. ISSN 1061-3862, International Journal of Self Propogating High-Temperature Synthesis. 22 (2013) 37-40
3) B. Herden, A. García-Fuente, H. Ramanantoanina, T. Jüstel, C. Daul, W. Urland, Chemical physics letter. 620 (2015) 29-34.
4) W. Binder, S. Dislerhoff, J. Cameron, Dosim etric Properties of CaF2: Dy, (a) Proc. II Int. Conf. on Lumin. Dosim., Gatlinberg, 1968, pp. 45–53; (b) Health Phys., 1969, vol. 17, no. 4, pp. 613–618.
5) R.T. Wegh, E.V.D. van Loef, A. Meijerink , J. Lumin., 90 (2000) 111.
6) B. Liua, Y. Chena, C. Shia, H. Tanga, Y. Tao, Journal of Luminescence 101 (2003) 155–159.
7) P. Belsare, C. Joshi, S. Moharil, V. Kondawar, P. Muthal, S. Dhopte, J. Alloys Compd. 450 (2008) 468–472.

Design and Development of Microcontroller Based System Using Commonly Available Sensors and its Possible Applications In Agriculture

Nagnath Bhusnar
Research Scholar, Department of Electronic Science, Modern College Research Center Pune-05

Pravin Bhadane
Head, Department of Electronic Science, Nowrosjee Wadia College, Pune-01

A.D. Shaligram
Head, Department of Electronic Science, SPPU, Pune-07

Abstract

Design and development of microcontroller based system has been carried out in the present work. The main purpose of the work is to use commonly available sensor in the field of agriculture. The sensors used in the present work are for the detection of motion, sound, pressure, temperature, humidity and altitude. The microcontroller based automatic system give direct digital value of measured parameters. Some possible applications of the designed system in the field of agriculture are discussed in the present work. The work done has a scope for extension of including some more sensors and actuators. The work can be further extended by employing inbuilt wireless communication protocol for the designing of wireless sensor system.

Keywords—agriculture, available sensors, microcontroller.

Introduction

Agriculture plays significant role in the economic development of country. It is difficult to find the country on this earth without agriculture. On an average 70% of the rural and 10% of the urban population is dependent on agriculture [1]. To maintain sustainable agriculture soil health is important. Healthy growing crops requires appropriate soil condition parameters. Improper soil condition parameters make the soil infertile and not suitable for agricultural purpose. To reduce the infertility, biological, chemical and physical parameters of soil fertility should be maintained. Soil fertility depends on pH, moisture, conductivity, nutrient level, salinity, alkalinity, compaction, water holding capacity, soil texture, porosity, etc. [2].

To measure these soil parameters electronic sensors are required. The sensors required for direct measurement of parameters are expensive and not commonly available. For example, sensor required for pH measurement is glass electrode which is not readily available and also its cost is not affordable. Other sensors like conductivity, turbidity, moisture are also not very common and their working life is limited due to their use in complex soil samples. Sensors specifically designed for the agricultural use are uncommon, so there is need to use commonly available sensors in agriculture. It is revealed from the literature that many researchers have used such sensors in their work. For instance, Shining Li, Jin Cui, Zhigang Li reported that the importance of WSN arises in this context, due to their capacity to automatize certain tasks in agriculture, especially monitor systems. WSN has capability to monitor those systems by controlling physical parameters like humidity, temperature and others. Present work deals with use of commonly available sensors, there signal conditioning and interfacing with microcontroller. The work is divided in to following sections: methods is discussed in section II, experimental work in section III, conclusion in section IV and future scope in V.

Methods

Farmers use various types of tools and machinery in the agriculture for various purpose. The tools are manually operated or semiautomatic [3,4]. The agriculture machinery uses mechanical and electronic parts. In recent days, electronic sensors are also used along with machinery for automation and precision agriculture [5,6]. Sensors help for optimum use of water, fertilizers, pesticides, etc. Sensors used in agriculture are classified into following types [7].

1. Sensors for control of agricultural of machinery
2. Soil testing Sensors
3. Water testing Sensors
4. Environmental monitoring Sensors
5. Crop growth monitoring sensors
6. Sensors for testing the maturity of fruits, grains, seeds, etc.
7. Sensors required for automation of water management system [8].

Above Sensors are expensive and not commonly available. However, in recent days, due to the advancement in internet and e-commerce, some sensors are commonly available to the researchers. In the present work, we have used some of them due to following reasons: availability, affordable cost, Inbuilt signal conditioning, supports standard communication protocols like I2C, SPI. Methodology adapted in the present work uses commonly available sensor, signal conditioning, mixed signal microcontroller and display device. The functional block diagram of the method used in the present work is shown in figure 1.
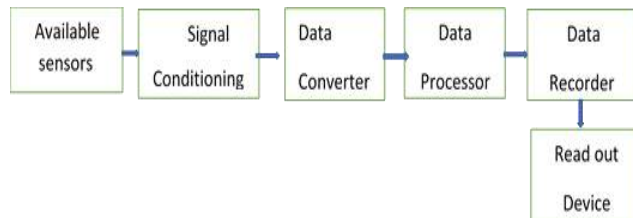
Fig.1 functional block diagram of the method used in the present work is shown in figure 1.

Microcontroller system required for agricultural applications is similar to the general purpose system with some additional demands like sample preparation and three phase power supply. Microcontroller based system is used in agriculture for various purposes. Some researchers have reported agricultural applications of microcontroller: For instance, R Ghodake and Mulani have reported time, volume and sensor based water requirement system. According to them microcontroller performs various actions based on the feedback given by sensors [9]. Daniel K. Fisher, Hirut Kebede Reported that microcontroller-based measurement for monitoring air, canopy-temperature level. In summary, methods based on use of microcontroller and sensors have wide scope in the field for agriculture [10].

Experimental work

Experimental work includes design and construction of following units of the system.

A. Microcontroller development board

The board is designed using available microcontroller which is suitable for the present work. Table. I shows the comparative study of some commonly available Microcontroller [11]

TABLE I. Comparative study of commonly available microcontrollers

Chip (Module)	ESP32 (ESP-WROOM-32)	ESP8266 (ESP8266-12E)	CC32
CPU	Tensilica Xtensa LX6 32 bit Dual-Core at 160/240 MHz	Tensilica LX106 32 bit at 80 MHz (up to 160 MHz)	ARM Cortex-M4 at 80 MHz
SRAM	520 KB	36 KB	256 KB
FLASH	2MB (max. 64MB)	4MB (max. 16MB)	1MB (max. 32MB)
Voltage	2.2V to 3.6V	3.0V to 3.6V	2.3V to 3.6V
Programmable	Free (C, C++, Lua, etc.)	Free (C, C++, Lua, etc.)	C (Simple Link SDK)
Open source	Yes	Yes	NO
Wi-Fi	802.11 b/g/n	802.11 b/g/n	802.11 b/g/n
Bluetooth	4.2 BR/EDR + BLE	-	-
UART	3	2	2
GPIO	32	17	21
SPI	4	2	1
I2C	2	1	1
PWM	8	-	6
ADC	18 (12-bit)	1 (10-bit)	4 (12-bit)

It is revealed from table. I that any microcontroller can be used for agriculture applications. However, modern mixed signal microcontroller like ESP32 is more suitable due to following reasons:
- Wide data bus width: it has 32bit bus width which can handle numbers like double float and integers.
- High speed: Clock speed is upto 240 MHz
- More number of peripheral devices: ADC, DAC, PWM, Touch Sensor etc.
- Supports many communication methods: SPI, I2C, etc.

● Wireless technology: Bluetooth, Wi-Fi.

B. Sensor

It is another necessary part of the electronic instrument system. Sensors are required in agriculture are shown in Table II. It also shows the agricultural use of sensors. It is revealed from table II that some sensors can be directly used, whereas others can be indirectly used in agricultural applications. Directly used sensor are expensive, their working conditions are critical. For instance, glass electrode requires soil sample in liquid phase. Similarly, electrode plates used in dielectric sensor require frequent cleaning [12,13].

TABLE II. Agricultural use of Sensors

Sr. No	Name of Sensor	Use in Agriculture
1	Conductivity Cell	Measure conductivity of soil
2	Capacitive Cell	Measure dielectric constant of soil
3	Inductive coil	Measure magnetic properties of soil
4	Glass Electrode	Measure concentration of hydrogen ions
5	Ion selective Electrode	Measure concentration of sodium ions
6	Thermistor	Measure temperature of soil
7	Load cell	Measure compaction of soil
8	Pressure Sensor	Measure atmospheric pressure and wind speed
9	Altitude Sensor	Measure altitude of farm
10	Moisture Sensor	Measure moisture of soil
11	Motion Sensor	Detection of animals
12	Sound Sensor	Detection of insects
13	Humidity Sensor	To measure humidity

Nowadays, many sensors are available in modular form. A particular module includes sensor, signal conditioning circuit and data converter. They can be directly interfaced to the microcontroller unit. In the present work we have used following five such sensors modules and tested them successfully for the agricultural purpose.

● **Motion sensor**

Traditional method of detection of motion uses optical device that includes light source and detector. This method has limited angle of detection. In recent days, use of PIR motion sensor is very common because of its larger angle of detection. Its working principle is simpler than other methods i.e it generates electric potential when heated by infrared radiation emitted by warm objects, like human beings and animals. Important feature of PIR motion sensor are given in table III.

TABLE III. Features of PIR Sensor

Sr. No	Parameters	Specifications
1	Input power source	AAA alkaline cell battery (1.5-V nominal voltage)
3	Average current consumption with ADCs in Operating Mode	835 µA
4	Motion sensing range	30 ft (9 m) nominal
5	Rate of Detection	340 m/s
6	Wavelength Range	8-10 um
7	Operating temperature	−18°C to 55°C
8	Working environment	Indoor and outdoor

Fundamentally, it works on the generation of pyroelectricity due to infrared radiations and hence it is known as pyroelectric infrared (PIR) sensor. It is passive type of sensor, because it generates potential when infrared radiations fall on it. Its working is analogues to another similar sensor like photovoltaic cell. PIR

motion sensor is popular in security system particularly in the burglar alarm. In the present work we have used it to detect the presence of animals in the agricultural farm. Each animal emits different levels of infrared radiations with varying strength of warmness and wavelength [14].

● **Pressure Sensor**

With the advancement in the technology, field of agriculture is more optimistic due to appropriate use of required things. Precision agriculture is an outcome of such optimistic farming. In this type of farming many parameters are measured, which also includes barometric pressure i.e the pressure on the soil as well as growing crops due to the weight of air. The information of pressure is required in the precision agriculture for optimising some requirements, like water, weed control, pesticides. In the present work we have used BMP280 pressure sensor [15]. Some of its importance specifications are given table IV.

TABLE IV. Specification of BMP280

Sr. No.	Specification	Range
1	Accuracy of Pressure	+/- 1
2	Measurement range of pressure	300 to 1100 hPa
3	Accuracy of Temperature	+/- 1
5	Pressure Resolution	0.01 hPa
6	Temperature Resolution	0.01 0C
7	Interface	I2C, SPI
8	Operating Voltage	1.71 v to 3.6 v

● **Temperature Sensor**

Although measurement of temperature is very common, but it plays important role in the field of agriculture. Measurement of temperature is required for understanding the period of plucking, water requirement, etc. The measurement of atmospheric temperature has significant role in the growth of crop. For example, maturity of crop is better at particular temperature for a specific crop [16].

● **Sound Sensor**

Commonly used sound sensor is a microphone and its main use is in the field of acoustics, particularly, in public address system. Among various types of microphones, condenser and electromagnetic are more common. For instance, condenser microphone is used in mobile handsets. We preferred its use for the detection of particular type of insects in the agricultural farm. It is again part of precision agriculture for deciding the type of insecticides to be used for the control of specific insects [17].

● **Force sensor**

The quality of food grains mainly depends on fertility of soil. Many parameters of soil are measured for the study of fertility of soil. The fertility is mainly affected due to mainly manual by errors. For example, compaction is caused tillage done by tractor. Compacted soil has less water holding capacity as well as its pore particles are tightly bounding to each other. Such condition of soil degrades the fertility and also makes the soil infertile for majority of crops. Moreover, the quality of food grains obtained from such soil is poor and contains less nutrients. So, there is need to measure compaction for deciding suitable method for the reduction of compaction. In the present work we have used strain gauge based load cell for the measurement of compaction of soil [18]. The circuit diagram shown in fig. 2 presents use of above mentioned sensors and there required DC power supply and necessary display device. The circuit board for circuit shown fig.2 is indigenously constructed in the laboratory, and successfully tested for the agriculture use.
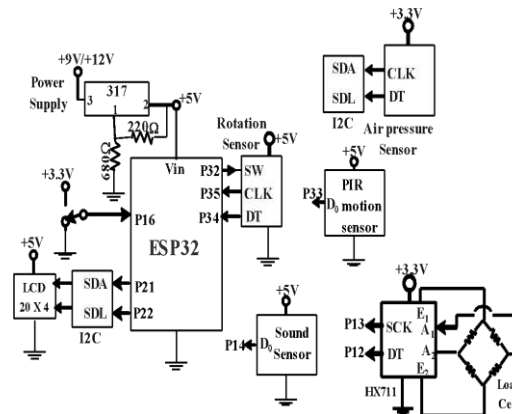
Fig.2. Circuit diagram of microcontroller based system

interfacing with microcontroller.

It also shows the layout of the constructed circuit is shown in fig 3.
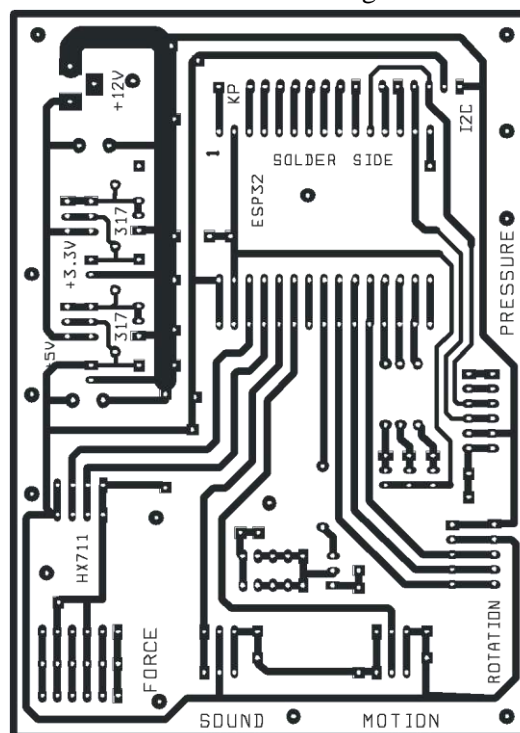
Fig.3. Layout of circuit diagram

The supporting software program is developed in open source Arduino programming language. One of microcontroller based sensor system section of software program is shown in Fig.4

```
/********MOTION AND SOUND**********/////////////////
int pin = 33;//pir
 const int buzzPin = 25;//buzzer
int ledPin=23;
int sensorPin=14; //sound sensor
int val =0;
void setup(){
 pinMode(ledPin, OUTPUT);
 pinMode(sensorPin, INPUT);
 Serial.begin (9600);
 // sound sensor
 pinMode(pin,INPUT);
 // Serial.begin(115200);
pinMode(buzzPin, OUTPUT);
```

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293
(Special Issue No.70) Peer Reviewed Journal   www.aiirjournal.com Mob. 8999250451

308

```
}
void loop (){
 val =digitalRead(sensorPin);
 Serial.println (val);
 // when the sensor detects a signal above the threshold value, LED flashes
 if (val==1) {
  digitalWrite(ledPin, HIGH);
 }
 else {
  digitalWrite(ledPin, LOW);
 }
  bool isDetected = digitalRead(pin);
 if(isDetected){
  Serial.println("Presence detected");
  digitalWrite(buzzPin, HIGH);   // turn the buzzer on
    }
 else digitalWrite(buzzPin, LOW);   // turn the buzzer off
 delay(50);
}
```

Fig.4 section of software program for the measurement of sound and motion sensor

The required software program is written in simple programming language. The necessary variables are declared in the declaration section. Pinmode of used pins of microcontroller are defined in the setup section. The continuous measurement of sound and motion is carried out in the loop section. The program shown in fig.3 for the detection of motion and sound. Similar programs are developed for other sensors and successfully tested for agricultural use.

Conclusion

Microcontroller and sensors are necessary electronic necessary parts required in the agricultural applications. We have developed system using modern mixed signal microcontroller and commonly available five types of sensor. The system is successfully used for agricultural applications and the result obtained from by it are accurate and precise. Although, developed system is in prototype stage, very soon the finished system will be prepared and it will be available for general purpose use.

Future scope

The system can be expanded at various levels which are given below.

1. Inclusion of some more sensors like glass electrode, moisture sensor and conductivity cell. For direct measurement of soil parameters.
2. Inclusion of some more sensors for controlling the water management system like drip irrigation system.
3. Inclusion of some actuators like relay and stepper motor for water flow control.
4. Inclusion of wireless communication protocol like Wi-Fi or Bluetooth for remote monitoring of field parameters.
5. Inclusion of all above and integrating them into one system and writing supporting software for measurement of fertility of soil.

References

1) Jorge Granda-Cantuna, Carlos Molina-Colcha, Sergio-Enrique, Hidalgo-Lupera, Christian-David, Valarezo-Varela, "Design and Implementation of a Wireless Sensor Network for Precision Agriculture Operating in API Mode", 978-1-5386-2521-7/18/$31.00 © 2018 IEEE.
2) Swati Narsing, Nandagawali, "Parameters of Soil Fertility (As a Part of Project on Soil Parameters Monitoring With Automatic Irrigation System)", International Journal of Electrical and Electronics Research, Vol. 3, Issue 4, pp. 219-222.

National Conference on Multidisciplinary Research in Science and Technology for Healthy Lifestyle Management (NCMRST- 2020) Organizer :- Shri R.L.T. College of Science, Akola

24th Jan. 2020

3) Saurabh R, Thakre, Dr.V.B. Vaidya, Mrs. S.G. Bawane, "Design and fabrication of mutipurpose manually operated system for agriculture purpose," International Research Journal of Engineering and Technology (IRJET), Volume: 06 e-ISSN: 2395-0056, p-ISSN: 2395-0072, June 2019.

4) Mr.Sagar B.S , Prakash Hullur , Sangappa Ankush, , Vikramraj Kannolli, Vinayak Rayakar, "Design and Fabrication of Semi-Automatic Seed Sowing Vehicle," IJARIIE-ISSN(O)-2395-4396, Vol-5, Issue-2 2019.

5) Uferah Shafi, Rafia Mumtaz, José García-Nieto, Syed Ali Hassan, Syed Ali Raza Zaidi and Naveed Iqbal, "Precision Agriculture Techniques and Practices: From Considerations to Applications," Sensors 2019, 19.

6) Kirtan Jha, Aalap Doshi, Poojan Patel, Manan Shah, "A comprehensive review on automation in agriculture using artificial intelligence," Artificial Intelligence in Agriculture, vol.2 pp. 1–12, (2019).

7) Ahsan Abdullah, Ahmed Barnawi, "Identification of the type of agriculture suited for application of wireless sensor networks," Russian Journal of Agricultural and Socio-Economic Sciences, No. 12 (12) / 2012.

8) Tamoghna Ojha,Sudip Misra, Narendra Singh Raghuwanshi,"Wireless sensor networks for agriculture: The state-of-the-art in practice and future challenges," Review, ELSEVIER, Computers and Electronics in Agriculture), PP. 66–84, 118 (2015.

9) RahulG.GhodakeandAltafO.Mulani,"MicrocontrollerBasedAutomaticDrip Irrigation System", https://www.researchgate.net/publication/318176172, Researchgate.

10) Daniel K. Fisher a, Hirut Kebede b, "A low-cost microcontroller-based system to monitor crop temperature and water status, computers and Agriculture,"ELESVIER , PP.168-173, 74(2010).

11) Alexander Maier, Andrew Sharp, Yuriy Vagapov, "Comparative Analysis and Practical Implementation of the ESP32 Microcontroller Module for the Internet of Things," 978-1-5090-4815-1/17/$31.00 ©2017 IEEE.

12) Suporn Pongnumkul, Pimwadee Chaovalit, and Navaporn Surasvadi, "Applications of Smartphone-Based Sensors in Agriculture: A Systematic Review of Research," Journal of Sensors, Volume 2015, 18 pages.

13) Shining Li, Jin Cui, Zhigang Li, "Wireless Sensor Network for Precise Agriculture Monitoring," Fourth International Conference on Intelligent Computation Technology and Automation, , 978-0-7695-4353-6/11 $26.00 © 2011 IEEE, 2011.

14) Advanced Motion Detector Using PIR Sensors Reference Design For False Trigger Avoidance, TI Designs: TIDA-01069, TIDUCV3B–February, TEXAS INSTRUMENT, 2017.

15) Gokul L. Patil, Prashant S. Gawande, R. V. Bag, "Smart Agriculture System based on IoT and its Social Impact," International Journal of Computer Applications (0975 – 8887), Volume 176 – No.1, October 2017.

16) Almaw Ayele Aniley, Naveen Kumar S.K. and Akshaya Kumar A, "Soil temperature Sensors in Agriculture and the role of Nanomaterials in Temperature Sensors Preparation," International Journal of Engineering and Manufacturing Science, Volume 7, pp. 363-372, Number 2 (2017).

17) S.Azfar, K.Ahsan, N. Mehmood, A.Nadeem, A.B. Alkhodre, T.Alghmdi, Y.Alsaawy, "Monitoring, Detection and Control Techniques of Agriculture Pests and Diseases using Wireless Sensor Network: A Review," (IJACSA) International Journal of Advanced Computer Science and Applications, Vol. 9, No. 12, 2018.

18) Ivan Muller, Renato Machado de Brito, Carlos Eduardo Pereira, and Valner Brusamarello, "Load Cells in Force Sensing Analysis – Theory and a Novel Application," IEEE Instrumentation & Measurement Magazine, Research Gate. February 2010.

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293 (Special Issue No.70)   Peer Reviewed Journal   www.aiirjournal.com Mob. 8999250451

310

Comparative Analysis of Ambient Temperature using Steinhart-Hart Empirical Equation & Digital Thermometer

Trupti R. Ugale
Student, M.Sc. II year,
Department of Mathematics,
RLT College of Science, Akola
truptiugale2018@gmail.co

Snehal D. Pophali
Student, M.Sc. II year,
Department of Mathematics,
RLT College of Science, Akola
snehal.pophali24198@gma

Pooja G.Rathod
Student, M.Sc. II year,
Department of Mathematics,
RLT College of Science, Akola
prathod4373@gmail.com

Pritee D. Thakare
Student, M.Sc. II year,
Department of Mathematics,
RLT College of Science, Akola
pritee141096@gmail.com

Dattaraj Vidyasagar
Teacher, Department of Electronics,
RLT College of Science, Akola
dsvakola@gmail.com

Abstract

"Mathematics is like the ocean – rough, boisterous and fearful on the surface, but having precious pearls and gems of the purest ray serene at the bottom. From the finite, mathematics leads us to the region of the infinite!"

The Steinhart and Hart equation is the focus of this research paper. It is an empirical expression that has been determined to be the best mathematical expression for the resistance – temperature relationship of a negative temperature coefficient thermistor. It is usually found explicit in T where T is expressed in degrees Kelvin.

The equation is often used to derive a precise temperature of a thermistor, since it provides a closer approximation to actual temperature than simpler equations, and is useful over the entire working temperature range of the sensor. Steinhart–Hart coefficients are usually published by thermistor manufacturers.

We have used the Arduino microcontroller platform for technical part of this research. The Arduino executes the code and converts the relational value of change in thermister resistance into corresponding precise value of real time ambient temperature. However, the empirical equation in the research derives the value of temperature in degree Kelvin. So using simple conversion technique we have obtained the temperature value in degree Celsius.

This value of temperature obtained from the equation process, is then compared with real time temperature value of standard digital thermometer in our experimental findings. This comparative analysis manifests that the Steinhart-Hart empirical equation measurement beats the standard digital thermometer readings not just in terms of precision, but in poor sampling rate of a typical digital thermometer and its inability not to sample the real time temperature changes in number of fast events viz. "washing soda + water" exothermic reaction, to obtain the complete log of all temperature variations throughout the reaction.

KEYWORDS: *data logging, measurement sampling, spontaneous reaction temperature, log constants, Steinhart-hart, Arduino, NTC thermister, Steinhart-hart constants.*

Introduction

The use of Steinhart-Hart empirical equation in this project particularly focuses on the temperature measurement process of any type of spontaneous event. The equation uses three constant values A, B & C i.e. A = 0.001129148, B = 0.000234125 and C = 0.0000000876741.

These values are actually found out experimentally, by taking the log of number of possible measurements during the analysis of variation in resistance of NTC thermister with respect to change in temperature.

The Steinhart-Hart empirical equation is used in the Arduino nano code to actually process the real time change in resistance of NTC thermometer and convert it into ADC to get the value in terms of temperature.

The main advantage of using Arduino platform is that we get the complete time-stamped log of spontaneous variations in real time temperature values for any log span of time, during which the event occurs.

About Steinhart & Hart Empirical Equation

The Steinhart and Hart Equation is an empirical expression that has been determined to be the best mathematical expression for resistance temperature relationship of NTC thermistor & NTC probe assemblies. The equation is:

$$T = \frac{1}{A + B \ln(R) + C[\ln(R)]^3}$$

Where,

"T" is in degrees Kelvin and "A", "B", and "C" are coefficients derived as follows:

First, measure the thermistor at three different temperatures. The temperatures should be evenly spaced and at least 10 degrees apart. Use the three temperatures to solve three simultaneous equations using these steps:

$$\frac{1}{T_1} = A + B \ln(R_1) + C[\ln(R_1)]^3$$

$$\frac{1}{T_2} = A + B \ln(R_2) + C[\ln(R_2)]^3$$

$$\frac{1}{T_3} = A + B \ln(R_3) + C[\ln(R_3)]^3$$

Solving the Steinhart and Hart Equation for Coefficients, we get the following. After that knowing A, B and C for a thermistor allow you to use the Steinhart and Hart equation in two ways.

1. If resistance is known and temperature desired then use Equation 1 above.
2. If temperature is known and expected resistance is desired, use Equation 5 below:

$$L_1 = \ln(R_1), L_2 = \ln(R_2), L_3 = \ln(R_3)$$

$$Y_1 = \frac{1}{T_1}, Y_2 = \frac{1}{T_2}, Y_3 = \frac{1}{T_3}$$

$$Y_2 = \frac{Y_2 - Y_1}{L_2 - L_1}, Y_3 = \frac{Y_3 - Y_1}{L_3 - L_1}$$

$$\Rightarrow C = \left(\frac{Y_3 - Y_2}{L_3 - L_2}\right)(L_1 + L_2 + L_3)^{-1}$$

$$\Rightarrow B = Y_2 - C(L_1{}^2 + L_1 L_2 + L_2{}^2)$$

$$\Rightarrow A = Y_1 - L_1(B + CL_1{}^2)$$

$$R = exp\left(\sqrt[3]{\left(y - \frac{x}{2}\right)} - \sqrt[3]{\left(y + \frac{x}{2}\right)}\right)$$

Where:

$$x = \frac{1}{C}\left(A - \frac{1}{T}\right)$$

and

$$y = \sqrt{\left(\frac{B}{3C}\right)^3 + \left(\frac{x}{2}\right)^2}$$

In the code of Arduino nano, we have used the values of the constants as: A = 0.001129148, B = 0.000234125 and C = 0.0000000876741

The Setup

The following diagram shows the complete setup of our experimental setup. The Arduino nano is fitted on a zero PCB or a breadboard with an NTC thermister (10k) and a fixed carbon resistor (10k), forming a potential divider across 5V supply of Arduino nano.

The thermister is exposed to the surrounding to sense the ambient temperature along with the standard digital thermometer with its separate sensing probe.
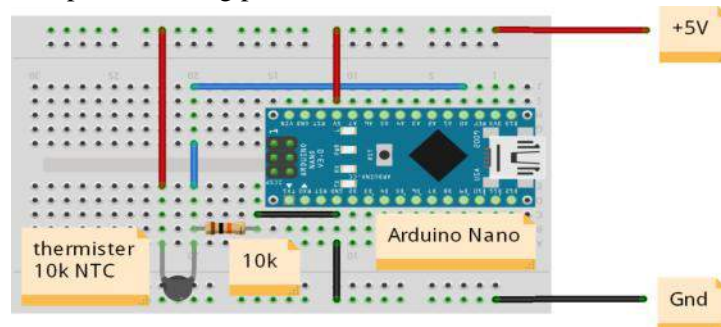
Experimental setup of Arduino nano with NTC thermister

Real time temperature measurement photograph of the prototype

The Code

To avoid inflation in costing of the experimental setup, we have used serial monitor, instead of LCD display. For that we used 9600 baud rate of PC & Arduino communication:

Serial.begin(9600);

The ADC *(analog to digital conversion)* process is done with the help of following code:

int ADCvalue;

double Vo, RTh, Log_RTh, Temp;

ADCvalue=analogRead(A2); // Thermister connected to Pin A2

Vo=((ADCvalue*5.0)/1024.0); // it is the voltage measured by ADC

RTh=((5*(10750.0/Vo))-10750.0); // 10k thermister value is corrected with error correction of 750ohms to match with DTM value

Log_RTh=log(RTh); // taking logarithm of RTh value

The code for processing and to print the time stamped temperature values is as follows:

Temp=1/(0.001129148+(0.000234125*Log_RTh)+(0.0000000876741*Log_RTh*Log_RTh*Log_RTh));

// Converting Temperature value into Degree Celsius as follows:

Temp=(Temp-273.15);

// Printing the calculated output

Serial.println(Temp);

delay(1000); // for 1 second. We can reduce it to 1mS also.

The LED indicator uses conditional statement as follows:

if(Temp>27) // we can change this temperature value as required.

{

digitalWrite(LED,HIGH);

}

else

digitalWrite(LED,LOW);

delay(1000);

} // the code ends here.

Experimental Findings

Comparative Analysis of Ambient Temperature using Steinhart-Hart Model & DTM		
Time	**Thermister Temperature °C**	**DTM Temperature °C**
07:48:02	22.48	22.4
07:48:03	22.21	22.4
07:48:04	21.95	21.2
07:48:05	21.77	21.6
07:48:06	21.6	21.6
07:48:07	21.51	21.6
07:48:08	21.42	21.4

07:48:09	21.24	21.2		07:48:40	20.02	21.1
07:48:10	21.16	21.1		07:48:41	19.93	20.8
07:48:11	21.07	21.1		07:48:42	19.93	20.8
07:48:12	20.98	21.1		07:48:43	19.84	20.8
07:48:13	20.81	21.1		07:48:44	19.75	20.8
07:48:14	20.72	21.1		07:48:45	19.75	20.8
07:48:15	20.81	21.1		07:48:46	19.67	20.8
07:48:16	20.63	21.1		07:48:47	19.58	20.8
07:48:17	20.63	21.1		07:48:48	19.67	20.8
07:48:18	20.54	21.1		07:48:49	19.58	20.8
07:48:19	20.63	21.1		07:48:50	19.49	20.8
07:48:20	20.54	21.1		07:48:51	19.49	20.8
07:48:21	20.63	21.1		07:48:52	19.49	20.8
07:48:22	20.54	21.1		07:48:53	19.4	20.8
07:48:23	20.54	21.1		07:48:54	19.4	20.8
07:48:24	20.37	21.1		07:48:55	19.49	20.8
07:48:25	20.28	21.1		07:48:56	19.4	20.8
07:48:26	20.28	21.1		07:48:57	19.4	20.8
07:48:27	20.28	21.1		07:48:58	19.49	20.8
07:48:28	20.37	21.1		07:48:59	19.49	20.8
07:48:29	20.28	21.1		07:49:00	19.4	20.8
07:48:30	20.28	21.1		07:49:01	19.4	20.8
07:48:31	20.37	21.1		07:49:02	19.4	20.8
07:48:32	20.28	21.1		07:49:03	19.49	20.8
07:48:33	20.28	21.1		07:49:04	19.49	20.8
07:48:34	20.28	21.1		07:49:05	19.4	20.8
07:48:35	20.37	21.1		07:49:06	19.4	20.8
07:48:36	20.28	21.1		07:49:07	19.49	20.8
07:48:37	20.28	21.1		07:49:08	19.4	20.8
07:48:38	20.19	21.1		07:49:09	19.4	20.8
07:48:39	20.02	21.1				

The Comparative Graph

Comparative Graph of Ambient Temperature using Steinhart-Hart Model & DTM
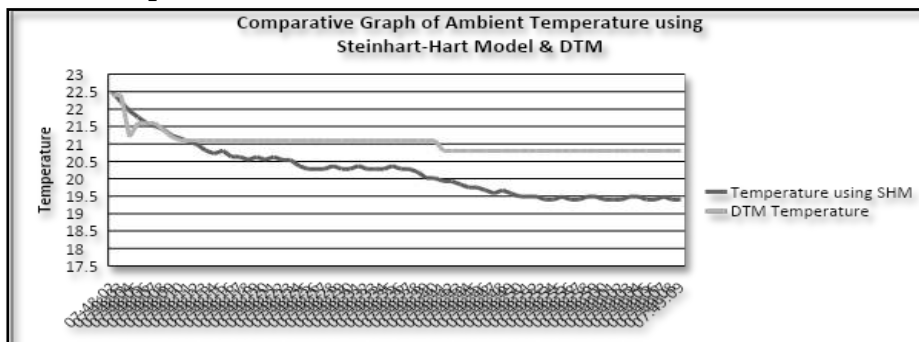
The graph clearly shows that the DTM is unable to record spontaneous change in temperature over a small time span

Acknowledgement

References

1) Vidyasagar, Yash. (2020). Data Logging System of Real Time Ambient Temperature & Diffused Sunlight Intensity Measurement during Solar Eclipse. Experimental findings during Solar Eclipse 2019, Researchgate.net.
2) Singh, Maharana. (2018). GPS & IMU Data Logger with Arduino Nano. 10.13140/RG.2.2.16372.19845.
3) Vidyasagar, Dattaraj & Vidyasagar, Yash. (2019). On the Direct Port Register Addressing Technique in Arduino UNO to Simplify the Programming, Researchgate.net.

**Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293
(Special Issue No.70) Peer Reviewed Journal   www.aiirjournal.com Mob. 8999250451**

315

Role of Electronics in Automation

Niteen Shridhar Mohod
Asst. Prof in Electronics
Shri Shivaji College of Arts, Comm. And Science, Akola, Maharashtra, India

Abstract:

Automation becomes the significant word of this era and automation could not be possible without intervention of electronics. It basically means the technology used to perform the process with minimal human assistance. Starting from home (microwave, washing machine, dryer, TV, AC, etc.) to space aviation industry, there is literally NO INDUSTRY that doesn't rely on electronics. Even most of the analog systems are also converted to digital one. Without Electronics nothing will move in this world. Electronics control the electrons in an effective way. So demand for Electronics will grow in future. Every equipment have much more electronics within it. With electronics application in almost all the automation the advantages like accuracy, efficiency, time saving, compactness and user friendliness has gone up resulting in reducing human dependency.

Keywords: Automation, minimal human assistance, space aviation industry, analog systems, accuracy, efficiency, time saving, compactness, user friendliness and human dependency.

Introduction:

Since so many years engineers and technicians are working hard in every field to automate the systems in order to make it accurate, efficient, time saver, compact and easy to handle through electronic devices and circuits and constantly the efforts are taken to update them rectifying the discrepancies if any. Integrated circuits, PCBs, Microprocessors, Microcontrollers, Embedded systems, Arduino and Robotics have added their own flavors to upgrade the systems further. Still, constantly the efforts are going on to develop multitasking automated machines further.

Electronic automation and varied sectors:

[i] Electronic Industry:

Emerged in 20th century and Is a fast growing global industry designing the systems and products helping automation.

Having started journey from metal oxide semiconductor [MOS] and integrated circuits [ICs] and later by **photolithography process** and mostly on **Printed Circuit Boards** [PCBs]. Size of electronic industry and use of toxic material and the major issue of recycling is not sorted out yet and still the attempts are going on constantly towards e-waste management. [1]

[ii] Manufacturing Industry:

Huge domestic market and rapidly increasing demands from a constantly increasing population are the key factors boosting this area. Recently keeping India on the world map in the field of manufacturing **'Make In India'** program is launched by the PM of India and to meet these requirements with improved quality, efficiency, accuracy electronic plays a vital role in every manufacturing unit.[2]

[iii] Entertainment Industry:

Is a drastically fast growing industry and the content delivery is improved to very high level through the electronic based technologies like Artificial Intelligence [AI], Augmented Reality and Virtual Reality [AR and VR], Block Chain and other technologies which is leading to the tremendous growth of streaming services. [3]

[iv] Food Industry:

Instrumentation and sensors are the major role players in electronics, encroaching the food industry in modern times. Every food industry requires processors with automation which cannot be served without electronics. [4]

[v] Pharmaceutical and Biomedical Industry:

The pharma industries discovers,develops,produces and markets drugs for medication to patient keeping in mind to cure them or vaccinate them.

Manufacturing various drugs and making further research in it and the variety of diagnosis to be done in varied diseases requires highly sophisticated and accurate machineries and biomedical instruments which are all electronically controlled since accuracy plays a major role.[5]

[vi] Aerospace Industry:

Here in this sector various designing, building, testing, selling, and maintaining aircrafts, missiles and rockets or space crafts is highly technical industry wherein the highest precision technology is being used having base as an Electronics. [6]

Conclusion:

It can be concluded from the discussion that the electronics plays a vital role in automation of the things in almost all the sectors and its intervention is increasing in day to day life. The intention is to minimize the human intervention, boosting the accuracy, saving time and speeding up the processes. Electronics in short proving itself as a backbone of automation.

References:

1) https://en.wikipedia.org/wiki/Electronics_industry
2) https://www.ibef.org/industry/manufacturing-sector-india.aspx
3) https://electronicsforu.com/technology-trends/technology-trends-transforming-media-entertainment-industry
4) https://www.sciencedirect.com/book/9781855735606/instrumentation-and-sensors-for-the-food-industry
5) https://en.wikipedia.org/wiki/Pharmaceutical_industry
6) https://en.wikipedia.org/wiki/Aerospace_manufacturer

Shri P. R. Sarkar's Concept Of Origin Of The Universe

Dr. Gajanan S. Wajire

Associate Professor, Department of Electronics,

Shri Shivaji College of Arts, Commerce & Science Akola

Abstract:

One of the human wont is that whatever we know regarding any subject or any object, we say that it exists. But if we do not know its characteristics or other parameters, we either say that it does not exists or it is mysterious; or in a more intelligent style, we will say it is an abstract. That means, we try to conceal our limitations or hide our imperfections. In this universe, whatever comes within the scope of our senses or within the periphery of our perception, we say, "It is", and whatever is beyond the arena of the senses or the jurisdiction of perception, we cannot say anything. Hence, as per our general logic, our world functions within the limitations of our senses and perceptions. In view of human beings, we know two phases of cosmic realms as introvert or extrovert. In its first phase, in the phase of extrovert, "subtle" is transmuted into "crude"; and in the returning phase of introvert, "crude" is metamorphosed into "subtle". In this progress, rather in this semicircular approach, there may be subtler objects in the scope of matter. Many more objects are subtler than protons, neutrons or electrons, but we find no alternative to say that they are either electron or proton or neutron or any other. And similarly, in the psychic sphere there may be entities subtler than ectoplasm or its extra-psychic coverage, endoplasm.

Many entities which come within the realm of both physicality and psychic expressions which are subtler than sub-atomic and elementary particles like electrons, quarks, leptons, higgs-bosons and so on. Some of the entities in the psychic realm may be subtler than the ectoplasm. As per the Standard Model of particle physics, prior to the Higgs-bosons, 'God particles' are predicted to be the most subtle and root particles in this universe. That means, beyond the imaginations and perceptions of science, the scientists are also referring the unknown particles as 'God particles'. For such particles or for such entities, Shri P. R. Sarkar used the term "Microvitum", which is the "mysterious emanation of cosmic factor".

It is one of the human wont that whatever we know regarding any subject or any object, we say that it exists. But if we do not know its characteristics or other parameters, we either say that it does not exists or it is mysterious; or in a more intelligent style, we will say it is an abstract. That means, we try to conceal our limitations or hide our imperfections. In this universe, whatever comes within the scope of our senses or within the periphery of our perception, we say, "It is", and whatever is beyond the arena of the senses or the jurisdiction of perception, we cannot say anything. Hence, as per our general logic, our world functions within the limitations of our senses and perceptions. In view of human beings, we know two phases of cosmic realms as introvert or extrovert. In its first phase, in the phase of extrovert, "subtle" is transmuted into "crude"; and in the returning phase of introvert, "crude" is metamorphosed into "subtle". Many more objects are subtler than protons, neutrons or electrons, but we find no alternative to say that they are either electron or proton or neutron or any other. And similarly, in the psychic sphere there may be entities subtler than ectoplasm or its extra-psychic coverage, endoplasm.

There are entities which come within the realm of both physicality and psychic expressions which are subtler than sub-atomic and elementary particles like electrons, quarks, leptons, higgs-bosons and so on. Some of the entities in the psychic realm may be subtler than the ectoplasm. As per the Standard Model of particle physics, prior to the Higgs-bosons, 'God particles' are predicted to be the most subtle and root particles in this universe. That means, beyond the imaginations and perceptions of science, the scientists are also referring the unknown particles as 'God particles'. For such particles or for such entities, Shri P. R. Sarkar used the term "Microvitum". This microvitum, or in plural microvita, are not of protoplasmic order, and as such they have got little to do with carbon atoms, which are treated as the initial points or initial stages of life in this universe. So far as physicality is concerned, the position of these microvita is just between ectoplasm and electron, but they are neither ectoplasm nor electron.
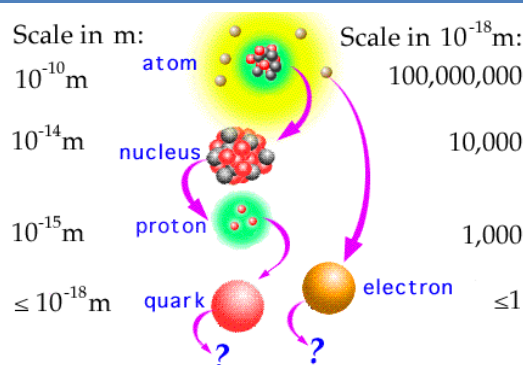
Figure : Few sub-atomic particles

"Microvitum is the mysterious emanation of cosmic factor". These microvita are not of the same density or the same subtlety. Some of them may come within the range of a highly developed microscope; and some of them may not come within the range of a microscope or even electron microscope. But by their actional expression or through their actional faculty or as a result of their actional vibrations, they may come within the scope of our perception. They are of subtler order. There may be still more subtle forms of microvita which may not come directly within the scope of our perception but may come within the scope of a special type of perception which is actually the reflection of conception within the range of perception in a limited sphere.

These microvita may be broadly divided into three categories. First, those coming within the scope of a microscope; secondly, those not coming within the scope of a microscope but coming within the scope of perception as a result of their expression, as a result of their actional vibration; and thirdly, those not coming within the scope of common perception but coming within the scope of a special type of perception which is actually the reflection of conception within the periphery of perception. Such type of special perceptions may be felt or realized by persons having highly developed minds, or having spiritually oriented or vibrated minds.

Regarding these microvita of crude order, which may come within the scope of a microscope, people gave them the name "virus". They say, "This disease is of virus origin". But the virus is a indistinct or unclear term. The better suitable term will be "microvitum", and not virus. Now, these microvita moves throughout the entire universe, from one celestial body to another. They move everywhere, crossing the boundaries of planets and meteors, satellites, stars, nebulae, piercing through milky ways and even galaxies. They move unbarred, without caring for the atmospheric conditions or barometric readings. These microvita also move through several media. They can move through sound. The so-called virus of a diseased person may move through his or her sound. They may move through tactuality. They may move through forms or figures. In the case of some of the diseases, the disease spreads through the smell of the disease, and in the case of subtler microvita, they may move through ideas. A particular idea may get accelerated speed in a particular planet with the help of a few conceptually developed minds. That is, a great man with a great conceptually developed mind may spread his ideas with the help of these microvita throughout that planet, or even throughout this universe in different celestial bodies.

Now, what is the root cause of this universe? Which is the starting point of life or vitality? These microvita are the carriers of life in different stars, planets and satellites - not carbon atoms or carbon molecules. These living creatures with their mysterious movement create minds and bodies, living bodies in different celestial bodies, and they also destroy minds and physical bodies, or developed or undeveloped corpor, in any corner of this universe. So the root cause of life is not the unicellular protozoa or unit protoplasmic cell, but it is this unit microvitum.

Now, there should be extensive research work regarding this microvitum or these microvita. Our task is gigantic and we are to start our research work regarding these microvita immediately without any further delay, otherwise many problems in modern society will not be solved in a nice way. Here, we should again remember the fact that these microvita are a creation in the internal phase, rather in the returning phase of cosmic expression. About the futuristic research, Sarkar said, "I think, rather I hope, rather I am sure that the day is sure to come when human beings will have proper control over these microvita".

In ancient times, regarding the singular or collective structures of these microvita, the ancient sages said that they are of seven types, of seven species. Sages gave them the names as: Yaks´a, Gandharva, Vidya´dhara, Kinnara, Siddha, Prakrtiliina and Videhaliina according to the nature of their subtlety or crudeness. Shri Sarkar told, "I think, by dint of our spiritual sadhana´ (or meditation), rather our physico-psycho-spiritual sadhana´, our minds will develop in all strata, and the power of conception, the power of conceiving, will also develop; and with that developed conceiving power, we will know all the secrets of these microvita".

Microvitum and Energy:

Now, the entity or entities coming within the conception of the mind are pure abstract, and those coming within the perceptions or feelings of the sensory or motor organs are matter, pure matter. But the position of energy and microvita is on this silver line of demarcation between matter and abstract. Energy generally comes within the range of perception, but not always. Energy in its subtle form does not come within the range of perception. Subtle microvita also do not come within the range of perception, but they come within the range of conception. You know, both microvita and energy are active in different planes of expressions, that is, in different physical or psycho- spiritual planes of the unit or collective propensities, and in the physical planes of inferences. But microvita are more active in the physico-psycho-spiritual strata, and energy is more active in the physical planes of inferences. Regarding the strength or influence of energy and microvita, this much can be said - energy is stronger in the physical planes of inferences than in the physico-psycho-spiritual planes of the unit and collective propensities. And microvita are stronger in the physico-psycho-spiritual realm of the unit mind.

Shri Sarkar divided microvita into two types: positive and negative microvita. Regarding positive and negative microvita, negative microvita function in a better way in the physical and physico-psychic strata, whereas positive microvita in the psychic and psycho-spiritual strata. Microvita influence human intellect and also a portion of human intuition. So there should be maximum utilization of the potentialities of the expressed and emanated energy as well as of the expressed and emanated microvita, both positive and negative. There is also use of negative microvita for the all-round and integrated development of this living world.

Energy is a blind force. It has got no conscience; what is to be done or what should not be done. But microvita are not like that; they are not blind forces. They have the support of conscience behind them. This is another fundamental difference between energy and microvita. The effect of energy on different material bodies comes within the periphery of human knowledge if the wavelength is of medium standard - not extremely long or not extremely short. But the effect of microvita is to be felt - it cannot be expressed through language, it cannot be shown in the physical level.

Microvita, like energy, passes through various planes of inferences, and also through various planes of propensities. In the inference of say touch, microvita increases the temperature in the external sphere and decreases it in the internal sphere. In the case of odour, they decrease the temperature in the external sphere and increase the same in the internal sphere. But generally, regarding other inferences, such as sound and others, sometimes they may increase externally and sometimes they may decrease externally, according to the medium through which these microvita pass.

Energy, if it comes in direct contact with this world of physicality, is converted into so many energies like magnetic, electrical, and mechanical and much other energy. And when that very energy functions through the cosmic "known" world, then it creates different psychic faculties, different psychic worlds. And if after passing through the cosmic "known" entity it comes down towards the plane of cosmic or individual propensities; its movement is towards the crudification. But if it moves towards the cosmic cognitive faculty it is converted into psycho-spiritual movement, and finally spiritual movement or into the spiritual entity.

Microvita, when passing through different planes of inferences and also planes of propensities, can not only change the bodily temperature or temperatures of the mass, they can also create a radical change in the psychic wave, a change in wavelengths, a change in hormone secretion, and metamorphosis and transmutation in the mass and movement of hormones. This should also be carefully remembered and noted they can do abnormal changes.

It is the duty of the intellectuals and peer scientists of the world to continue doing research work regarding the movements of energy and of microvita when passing through the "done" world of the cosmic or individual propensities, or through the "known" world of cosmic inferences, or passing through both types of planes; and also regarding the movement of energy passing through the plane of the "known" world and also through the world of individual propensities and different planes of individual inferences.

Shri Sarkar also told, "I would like intellectuals in the future to conduct experiments in their external physical laboratories and also in their internal psycho-spiritual laboratories. And the young generation should help them in accelerating the speed of their research work".

Microvita come from outer space, from the extended universe and the universal planes, through sound and other inferences. Sound and other inferences have various planes, stages and phases. Microvita pass through the different phases of these inferences. Positive microvita are concerned with energy or the psychic realm and negative microvita are concerned with the physical body because the physical body contains inferences, that is, matter. Matter is clearly associated with inferences - the original planes of inferences or the reflected or refracted planes of inferences. For example, mind receives the odour of a rose flower, but in the microcosmic plane of odour. This odour encourages certain propensities and discourages others. The mind certainly runs towards propensities, but one cannot achieve success by suppressing the propensities because more energy will be consumed in this effort.

Positive microvita equal negative microvita - that is, the sum total of positive microvita equals the sum total of negative microvita. This is so in the entire macrocosm and in individual microcosmic structures. If there is over-utilization of positive microvita during psychic and psycho-spiritual practices, then there will be a shortage of positive microvita for balancing the negative microvita in the physical and physico-psychic strata, because the sum total of positive and negative microvita must balance each other. Thus, human beings should utilize their strength in all the strata. In the physical strata, utilize the immense power of negative microvita, otherwise the surplus of the negative microvita will become very strong due to accumulation. Good people should not go to the Himalayan caves. Rather, remaining in society, they should serve the society in the physical and physico-psychic strata with the help of negative microvita, and in the psychic and psycho-spiritual strata with the help of positive microvita. If good people neglect the use of negative microvita in the physical stratum, catastrophes are sure to come. Everything will be in pell-mell order.

Positive and negative microvita maintains equilibrium in the subjective chamber of the 'Supreme attributional principle'. That is why during the bifurcation, the unitary strength remains the same - the subjective and objective having equal value in strength during the phase of reduction. There should not be negative use of negative microvita and there must not be negative use of positive microvita. You should always be positive. In the physical sciences, there are immense possibilities for the positive use of negative microvita. Positive and negative microvita, both are necessary for the balance. Due to the excessive use of positive microvita, it will become difficult to control and balance the negative microvita in the physical and physico-psychic strata because there will be a shortage of positive microvita.

By splitting up the atom, immense energy is released. This is due to the fact that the energy which is packaged up in matter comes out. To claim that energy is obtained due to the destruction of matter is theoretical and not physically proven. In fact, the energy comes out from within the store of the atom. Energy always requires a material shelter - a container. After the destruction of the container, the immense released energy moves very fast with tremendous speed in all directions in search of some or other material shelter. Finally, it finds a way in some country, in some human physical body, in structures and other material objects scattered around, or in the ocean, etc. Matter needs a shelter, and the shelter of matter is the earth. This is the secret.

Microvita and Science:

People have often noticed that minerals with the same chemical composition sometimes vary according to where they are mined and where they were refined. Food preparations made in one kitchen may not taste the same when prepared with the same exact recipe in another kitchen. In the munitions industry it is observed that a firecracker manufactured in one plant may be louder than one made in another plant using the same formula. In the future, microvita theory may be able to explain these anomalies. Chemical formulas will be rewritten

National Conference on Multidisciplinary Research in Science and Technology for Healthy Lifestyle Management (NCMRST- 2020) Organizer :- Shri R.L.T. College of Science, Akola

24ᵗʰ Jan. 2020

with the names of the atoms, like H2O but also with an indication of the quantity and quality of microvita present in the substance.

Shri Sarkar (nick named as 'Anandamurti') also predicted that scientists of the future, equipped with knowledge of microvita, will be able to produce more effective medicines, fuels and fertilizers. As microvita is intimately connected with life and protoplasm future scientists will also be able to make advances in the medical and biological sciences based on their knowledge of microvita. The already astounding advances in genetics and related fields will be greatly accelerated when microvita are better understood.

Conclusion:

A great scientist, philosopher and reformer Shri P. R. Sarkar told that 'Microvitum' is the inner secret of life, and the origin of universe! Therefore, it must be properly propagate and establish through its theory, denomination and emanation. Many chemical formulae are to be changed; many structures in the universe are to undergo metamorphosis. Up till now, the concept of physical science is, "Carbon atoms are indispensible for the origin of life". According to the modern microbiologists, protoplasmic cells are made of carbon atoms. But in the age of microvita, they will say that the protoplasmic cells are made of solidified forms of microvita. By controlling the microvita of protoplasmic cells, big changes can be effect within the human body. Ordinary people can be made extraordinary and common man can be made superman! In the age of microvita, the appearance of physical body of human being will change. Human beings will become more psychic than physical; and in the next phase they will become more spiritual than psychic!

References:

1) Shrii Prabhat Ranjan Sarkar; "Microvitum in a nutshell", Third Impression: January 2012, ISBN: 817-252-279-7.
2) Ramashray Prajapati; "Anujivat (Microvitum) Parichay : Part - 2", First Edition – 2000.
3) Shrii Prabhat Ranjan Sarkar; "Beyond the superconcious mind", Third Edition – 2012.
4) "Knowledge Encyclopedia", DK Publication : London, 2018; ISBN – 978-0143-42864-0.
5) Shrii Prabhat Ranjan Sarkar; "The Liberation of Intellect: Neohumanism", Third Reprint – 2015.
6) Acharya Ratnesh (Richard Gauthier); "Microvita: Cosmic Seed of Life", Mainz: AMPS, ISBN: 3-921769-22-1.
7) Shrii Prabhat Ranjan Sarkar; "Idea and Ideology" – The creation of universe, E. Edition – 2009.

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293 (Special Issue No.70) Peer Reviewed Journal www.aiirjournal.com Mob. 8999250451

322

Growth And Characterizations Of Tin Sulfide Thin Films

Syed Ghause Ibrahim

Nanostructured Thin Film Materials Laboratory, Department of Engineering Physics,
Prof. Ram Meghe College of Engineering & Management, Badnera-444701,Maharashtra, India

Abstract:

Nanostructured p-type tin sulfide thin films were obtained by using chemical spray deposition technique onto glass substrates at 623 K. The films were characterized to study the optical and electrical properties. The optical band gap of the tin sulfide film was determined from optical transmittance data, in the spectral range 380–1100 nm and the direct band gap energy (E_g) was found to be 1.28 eV. Electrical resistivity measurements were carried out using two point d.c probe method and thermo-emf voltage developed across the film was measured to find the type of conductivity of tin sulfide thin film.

Key words: Nanostructured; Spray pyrolysis; Optical properties; Electrical properties.

Introduction:

Tin sulfide is an IV-VI compound semiconductor with layered orthorhombic structure. It is a promising material for low-cost photovoltaic conversion of solar energy because it usually exhibits P-type conductivity and room temperature band gap reported to be 1.30 eV [1]. Both Sn and S are cheap, abundant and nontoxic in nature. Thus it has potential use in the fabrication of various devices such as holographic recording systems, solar collectors and solar photovoltaic cells. Different deposition methods were used to deposit tin sulfide films, such as successive ionic layer adsorption and reaction [2], chemical bath deposition [3], electrochemical deposition [4], Atomic layer deposition [5], electron beam evaporation [6], d.c magnetron sputtering [7], thermal evaporation [8], chemical spray pyrolysis [9] etc. Each preparation technique has its own advantages and drawbacks, but the development of simple, rapid and economical methods for preparing materials with good reproducibility and with controllable deposition parameters is still a great challenge. In the present research work, chemical spray pyrolysis method was utilized for the deposition of nanocrystalline tin sulfide thin films onto glass substrates since it is inexpensive, swift, vacuum less, and simple preparation. The composition dependent optical and electrical properties were studied by using optical absorption, electrical resistivity and thermo-emf measurement techniques.

Experimental Details

Due to the simplicity of apparatus and good productivity the chemical spray paralysis technique (SPT), is one of the major and fascinating techniques to deposit a wide variety of materials in thin film form. This technique on a large scale offered a most attractive way for the preparation of thin films of noble metals, metal oxides, spinal oxides, chalcogenides and superconducting compounds, etc. To deposit SnS thin films onto glass substrates by spray pyrolysis technique (0.1M) tin chlorides ($SnCl_2.2H_2O$) and (0.1M) thiourea (CH_4N_2S) supplied by Sd-fine Chemicals, Mumbai were used. The spray solution of stable phase was prepared by mixing 20 ml of 0.1M tin chloride, 20 ml of 0.1M thiourea in a measuring cylinder.

This solution was sprayed using compressed air as a carrier gas onto hot glass substrates kept at 623 ±5K temperature. Several trials were conducted to optimize the different deposition parameters such as substrate temperature, spray rate, concentrations of cationic and anionic sources etc. The optical characteristics were studied using Lambda 25 UV-VIS spectrophotometer to find band gap energy of SnS thin films. To study the electrical characterization of the films, the dark electrical resistivity measurements were carried out using two point d.c probe method in the temperature range 303-393K.The thermo-emf voltage developed across the film was measured to find the type of conductivity of tin sulfide thin film.

Results and discussion

- *Optical studies*

Optical transmittance of the films was used to estimate the band gap energy. The absorption coefficient can be calculated using the relation,

$$(\alpha h\upsilon)^n = A(h\upsilon - E_g) \qquad (1)$$

where A is a constant (slope), Eg is the band gap energy and n characterizes the transition process (n takes the values 2 and 1/2 for direct allowed and indirect allowed transitions, respectively).
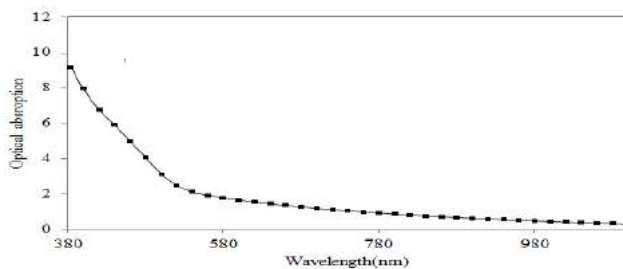
Figure 1: Variation of optical absorption vs. wavelength for spray deposited tin sulfide thin film.

From the calculated values of the absorption coefficients a plot has been drawn with $(\alpha h\nu)^2$ and $h\nu$. α is the optical absorption coefficient of the material and "hν" is the photon energy. The direct band gap of SnS calculated is 1.28 eV, which compares well with the reported value of 1.30 eV [10].
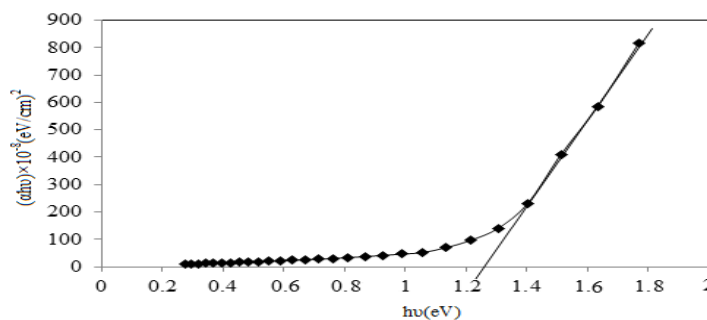
Figure 2: Plot of $(\alpha h\upsilon)^2$ versus hυ for spray deposited tin sulfide thin film.

- *Electrical studies*

The electrical properties are dependent on various film and growth parameters such as film composition, thickness and substrate temperature and deposition rate. In the present work silver paste was used to make ohmic contacts to tin sulfide thin films. The nature of SnS/Ag contacts were checked up to 30 V using two-probe method by plotting I-V characteristics (Figure3). The variation of dc-electrical resistivity with temperature was studied for tin sulfide thin films in the temperature range 303K to 393 K. The electrical resistivity decreases from the order of 10^5 Ω.cm at 303 K to the order of 10^4 Ω.cm, as the measurement temperature increases to 393 K. The decrease of resistivity with temperature increase may be as a result of thermal excitation of carriers from the boundary of the grains to the grain regions. The electrical conductivity of tin sulfide thin films increases with increasing temperature, showing semiconductor-like behavior in the whole temperature range investigated.
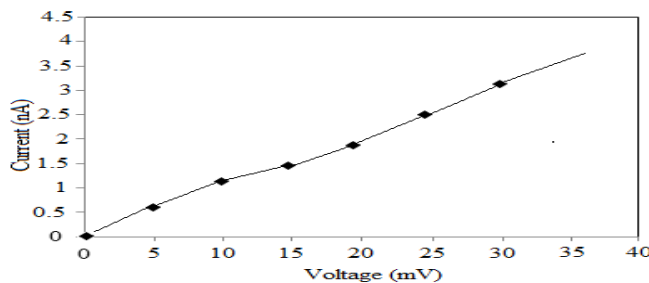
Figure 3: I-V characteristic of tin sulfide thin films

The variation of log (ρ) with reciprocal of temperature (1/T) for tin sulfide films is shown in figure 4.
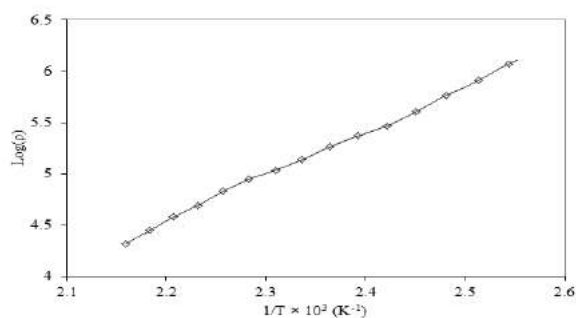
Figure 4: Variation of Log of resistivity with 1/T for tin sulfide thin films

The thermal activation energy was calculated using the relation,

$$\rho = \rho_0 \exp^{(E_0/KT)} \quad\quad (2)$$

where, ρ is resistivity at temperature T, ρ_0 is a constant; K is Boltzmann constant. The activation energy (E_0) was calculated from the resistivity plots any its value is found to be ≈0.61eV.

- *Thermo-emf measurement:*

The type of conductivity exhibited by chemically spray deposited tin sulfide thin films was determined by thermoelectric power (TEP) measurement. The thermoelectric power depends on the location of fermi energy level in the material and the type of scattering mechanism. From the sign of the terminal connected towards hot end it can be deduced the sign of the predominant charge carriers. The thermo-emf developed across hot-cold junction of tin sulphide thin film in dark was measured as a function of temperature difference (Figure 5). The polarity of the generated thermo-emf was positive at the cold end with respect to the hot end, which confirms that tin sulphide thin films are of p-type.
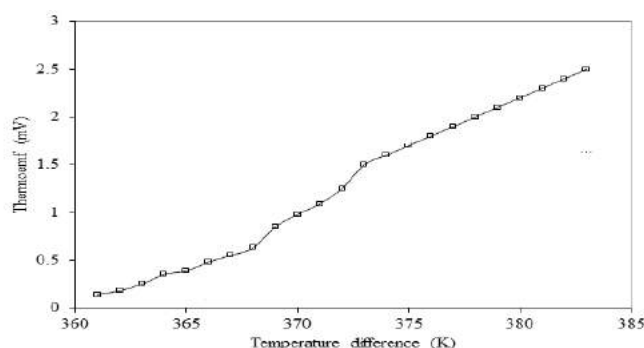
Figure 5: Variation of thermo emf (mV) with temperature difference for tin sulfide thin films

Conclusion

In the present research work, tin sulfide thin films were successfully deposited onto glass substrates by using chemical spray pyrolysis deposition technique at 623K. The as deposited thin films exhibits band gap of the order of 1.28eV. The electrical resistivity of tin sulfide thin films is of the order of 10^4 Ωcm. The thermo-emf measurement confirms p-type conductivity of tin sulfide thin films.

References:

1) N. R. Mathews, Hiran B. M. Anaya, M. A. Cortes-Jacome, C. Angeles-Chavez, J. A. Toledo-Antonio (2010) " Tin Sulfide Thin Films by Pulse Electrodeposition: Structural, Morphological, and Optical Properties" , J. Electrochem. Soc. 157, H337-H341
2) C. Gao, H. L. Shen, L. Sun, H. B. Huang, L. F. Lu, H. Cai (2010) "Preparation of SnS films with zinc blende structure by successive ionic layer adsorption and reaction method", Mater. Lett, 64(20), 2177-2179

3) D. Avellaneda, M. T. S. Nair, and P. K. Nair (2008) "Polymorphic Tin Sulfide Thin Films of Zinc Blende and Orthorhombic Structures by Chemical Deposition" J. Electrochem. Soc, 155, D517-D525

4) J. R. S. Brownson, C. Georges, and C. Levy-Clement (2007) "Synthesis of a δ-SnS Polymorph by Electrodeposition" Chem. Mater, 19, 3080

5) A.Tanuševski, D.Poelman (2003) "Optical and photoconductive properties of SnS thin films prepared by electron beam evaporation" Sol. Energy Mater. Sol. Cells 80(3), 297-303

6) V. An, M. Dronova, A. Zakharov (2015) "Optical and AFM studies on p-SnS thin films deposited by magnetron sputtering" Chal. Lett. 12(9), 483 - 487

7) K.T. Ramakrishna Reddy, P. Purandhara Reddy, P.K. Datta, R.W. Miles (2002) " Formation of polycrystalline SnS layers by a two-step process" Thin Solid Films 404-404, 116-119

8) O.E. Ogah, G. Zoppi, I.Forbes, R.W. Miles (2009) " Thin films of tin sulphide for use in thin film solar cell devices" Thin Solid Films 517(7), 2485-2488

9) A M S Arulanantham, S Valanarasu, K. Jeyadheepan, A. Kathalingam (2019) "Effect of carrier gas pressure on structural, optical and photovoltaic properties of tin sulphide thin films prepared by nebulizer spray pyrolysis method" Bull. Mater. Sci.42, 100

10) K.T. Ramakrishna Reddy, N.K. Reddy, R.W. Miles (2006) " Photovoltaic properties of SnS based solar cells" Sol. Energy Mater. Sol. Cells 90(18–19), 3041–3046

Humidity Sensing Properties of ZnO/SnO₂ Doped BaTiO₃ Screen Printed Thick Film Sensor

R. M. Agrawal

Department of Physics,
Shri RLT College of Science, Civil Line Road, Akola 444001(M.S.)

Abstract

In this paper ZnO and BaTiO₃ nanoparticles was synthesized by a chemical precipitation method. Structural and compositional characterizations have been done by X-ray powder diffraction (XRD). Sensing material was made in the form of thick film. Surface morphologies of the samples were analyzed using Field Emission Scanning electron microscopy (FE-SEM) for thick film of different molecular weight ratio annealed at 600°C. Further, Water vapour or humidity sensing investigations of these sensing materials were done. Our result indicate that ZnO/SnO₂ doped BaTiO₃ in form of thick film for different molecular weight ratio was most sensitive for humidity in comparison to pristine material under same conditions. The hysteresis plot between increasing and decreasing the RH range of 30–90% Rh and voice versa. The samples resistance of sample BZ-2 decreases 10^{10} Ω to 10^{6} Ω in comparison with the pristine materials. The similar change was also observed in sensitivity. The results were re- producible up to ± 77% after 2 months of observations.
Key words: ZnO,SnO₂, BaTiO₃ nanocomposites, Humidity sensor.

Introduction

Humidity, the concentration of water molecules in air, affects various materials used in daily life and industrial processing of drugs, beverages, food, electronic goods etc. High and low humidity affects human beings adversely. Excessive high humidity causes corrosion in metallic components and failure of electronic as well as optical devices [1,2].Semiconducting oxides based humidity sensors has various advantages when compared to other types of humidity sensors, such as low cost, simple construction, small size etc in operating the environment. The metal oxide such as SnO₂ , ZnO, WO₃, TiO₂, BaTiO₃ etc the change in electrical conductivity depends upon the composition of the gas/humidity surrounding them. Therefore, they are used as popular and useful sensing materials for making inexpensive gas/humidity sensing devices [3].

In present study, nanocomposites of ZnO , and BaTiO₃based thick films were prepared by screen printing method and the humidity sensitive properties of the nanocomposites films were investigated and compared with those of the pure films. The variation of resistance was studied as a function of relative humidity.

Experimental

- **Synthesis of zinc oxide (ZnO)**

ZnO Nanoparticle were synthesized by solid state reaction method, using Zinc acetate dehydrate Zn(O₂CCH₃)₂(H₂O)₂, sodium hydroxide as starting materials . In preparation Zinc Oxide (ZnO) 0.2M Zinc Acetate dehydrates was dissolved in 100 ml deionised water was ground for 15 min and then mixed with 0.02 M solution of NaOH with the help of glass rod. The mixed and the solution were kept under constant magnetic stirring for 15 min. and then again it was ground for 30 min. The white precipitate product was formed at the bottom. Then abundant liquid was removed and the product was washed several times with the deionized water and methanol to remove by products. The final products was then filtered and it was kept in a vacuum oven at 80 °C for 4 hrs. so the moisture will removed from the final product. Then this dry product was calcinated at temperature 800 °C for 6 hrs. in the auto controlled muffle furnace (*Gayatri Scientific, Mumbai, India.*) so that the impurities from product will be completely removed and get a final product of ZnO nanoparticles.

- **Synthesis of tin oxide (SnO₂)**

In preparation of SnO₂, 2 g (0.1 M) of stannous chloride dehydrate (SnCl₂.2H₂O) is dissolved in 100 ml water. After complete dissolution, about 4 ml ammonia solution is added to above aqueous solution with magnetic stirring. Stirring is continued for 20 minutes. White gel precipitate is immediately formed. It is allowed to settle for 12 hrs. Then it is filtered and washed with water 2-3 times by using deionized water. The obtain precipitate were mixed with 0.27 g carbon black powder (charcoal activated). The obtained mixer is kept in vacuum oven at 70 ºC for 24 hours so that the mixer gets completely in to dried powder. Then this dry product was crushed

into a find powder by grinder. Now obtained product of fine nanopowder of SnO_2 was calcinated at 700^oC up to 6 hours in the auto controlled muffle furnace (*Gayatri Scientific, Mumbai, India.*) so that the impurities from product will be completely removed.

• Preparation of $BaTiO_3$

In preparation of barium titanate ($BaTiO_3$) 0.25 M $Ba(NO_3)_2$ solution and 0.25 M $TiO(NO_3)_2$ solution were dissolved in 2 N nitric acid solution in a beaker. About 0.6 M tartaric acid solution was then added to under constant magnetic string. The solution heated under continuous string to its boiling point until all the liquid evaporated. About 7 gm of ammonium nitrate was added towards the ends to avoid slurry formation. Brown fumes evolution takes places and fluffy mass were settled at the base of the beaker. The product is then dried in vacuum oven at 96^oC for 2 hrs. so that moisture will removed from the final product and we will get dry product. Then this dry product was crushed into fine powder and finally this fine nanopowder of $BaTiO_3$ was calcinated at temperature 800^oC for 5 hrs. in the auto controlled muffle furnace to remove the impurity form the product will be completely removed and get a final product of $BaTiO_3$ nanoparticle.

• Preparation of thick films

The thick film were prepared by screen printing technique on a glass substrate. Initially, for the screen printing the thixotropic paste was formulated by mixing the sintered fine powder of pure and composite nano powder of ZnO and SnO_2 in different molecular weight ratios, a with a solution of ethyl cellulose (as 10% temporary binder) in a mixture of organic solvent such as butyl cellulose, butyl carbitol acetate and turpineol. The ratio of inorganic to organic part was kept as 75:25 in formulating the paste. The paste of pure and composite materials of ZnO and SnO_2 and it was screen printed on a glass substrate in the form of thick films. The prepared films were dried at $80-110^oC$ in oven for 1hrs then the dried films are kept for fired at 500^oC for 25 min in muffle furnace (Kumar make Mumbai), so that all the organic materials (in the form of binders) and organic impurities can be evaporated form the sensor material. For the surface conductance measurement the electrodes of silver paint were formed on adjacent sides of the films and again, the films were subjected to heating at 80^oC for 15 min for drying the silver paint.

• Characterization

The XRD pattern of nanocomposites of samples SZB-2 (20 SnO_2 - 70 ZnO -10 $BaTiO_3$), SZB-4 (40 SnO_2 - 50 ZnO -10 $BaTiO_3$), and SZB-6 (60 SnO_2 - 30 ZnO -10 $BaTiO_3$).

In this it is observed that from XRD pattern for the sample SZB-2 (20 SnO_2 - 70 ZnO -10 $BaTiO_3$) shows the fig.: 1 crystalline nature with 2θ peaks lying at (110), (100), (101), (101), (200), (210), (002), (310) and (201) planes. The observed peaks are the combination of SnO_2, ZnO and $BaTiO_3$ metal oxide. By using crystalline quantization plot, these more peaks about

(45%) corresponds to SnO_2, (33%) corresponds to the ZnO and about (22%) peaks corresponds to the $BaTiO_3$ nanomaterials. It is observed from crystalline quantization plot, mostly peaks about 45% corresponds to the ZnO, about 33% corresponds to the SnO_2 and about 22% corresponds to the $BaTiO_3$ nanomaterials. For the other XRD pattern of sample such as SZB-4 and ZSB-6 also shows the crystalline nature and crystalline planes are obtained from SnO_2, ZnO and $BaTiO_3$. The peaks intensity of $BaTiO_3$ peaks is found to be very less because of constant mole% of $BaTiO_3$ and it is very less as compared to the other onces. The average crystalline size is obtained by using Scherrer formula and it has been found to be 92.88 nm, 63.75nm, and 56.64 nm for the sample SZB-2, SZB-4 and SZB-6 respectively. Hence, all the nonmaterials are found to be in the purely crystalline form.
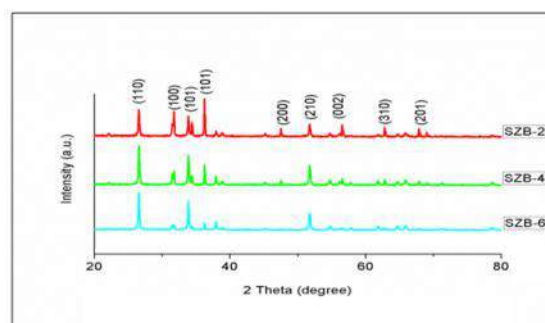
Result and Discursion

• Hysteresis Plot

Hysteresis plot shows the variation between resistances of sample with respect to the relative humidity in increasing and decreasing order from 30 to 90 % RH as shown in the fig. 2. A very small hysteresis present during forward and reverse cycle of relative humidity, where as a very significant average change observed in

the value of resistance of sample SBZ 2 (20 SnO_2- 70 ZnO-10 $BaTiO_3$) the change in value of resistance is from 10^{10} Ω to 10^6 Ω, these is a very remarkable change in the observed in the value of resistance. In all the prepared sample the hysteresis is present which shows processes of regeneration is quite slower as compare to the other samples. Apart from these a sample shows comparable decrease in resistance with an increase in % RH which indicates that the conduction occurred at the grain surface by release of electron from the water molecule. However, the sample SBZ 2 shows the remarkable change in the resistance values in between the humidity range 30-90 % RH and possessed a high sensitivity factor due to large surface area and porosity in the form of thick films.
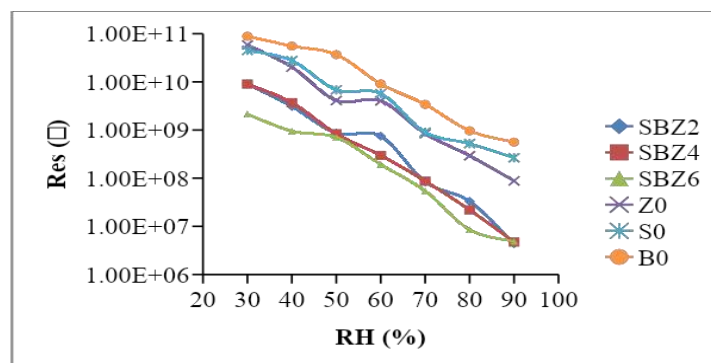
Fig.: 2

- **Sensitivity**

In the above samples the sensitivity is found to be increasing with the RH for all the samples of thick films and it is increasing up to some particular RH and then afterward it remains constant as shown in fig. 3. For higher RH the sensitivity is found to be higher in case of all samples of thick films. The sensitivity of SBZ-2 (20 SnO_2- 70 ZnO-10 $BaTiO_3$) is more than SBZ-4, SBZ-6, and samples and also from the pristine samples S-0, Z-0 and B-0. By addition of $BaTiO_3$ to ZnO-SnO_2 nano-composites which shows that the sensitivity remains constant. As previously stated that the change in conductivity is more in $BaTiO_3$ based ZnO-SnO_2nano composite samples the similar change is observed in sensitivity also. Hence, by the addition of $BaTiO_3$ to the pristine ZnO and SnO_2 stabilized the sensitivity of all the samples. The (ZnO-SnO2-$BaTiO_3$) composite sensors exhibits significantly higher sensitivity than sensor constructed specially from ZnO, SnO_2 and $BaTiO_3$ nanoparticles itself due to the formation of heterogeneous interface between them and more adsorption site was created to absorbed more water vapuors [4-5]. The fall in resistance is mainly due to the increased amount of conduction electron or charge carrier upon adsorption of water vapours by the surface layer of the thick films.
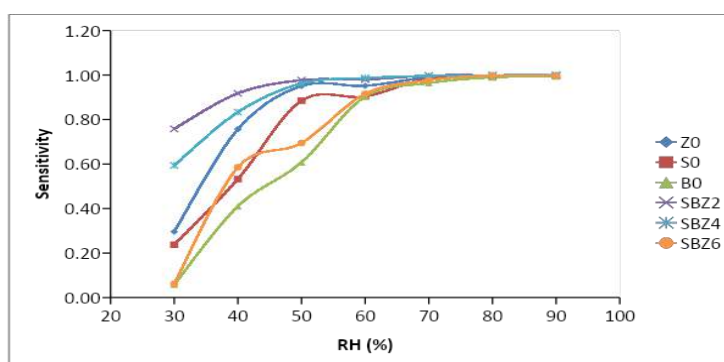
Fig.: 3

Conclusion

Nanostructured ZnO, SnO_2 and $BaTiO_3$ was successfully prepared via chemical precipitation method. Minimum crystallite size was found to be for ZnO is 37.32 nm, SnO2 it is 23.19 nm and for BaTiO3is . Surface morphology of SBZ-2 shows that most particles are spherical in shape leaving more space as pores and hence it was most sensitive among all the prepared samples. The Hysteresis plot shows very significant average change in the value of the resistance from 10^{10} Ω to 10^6 Ω during forward and reversed cycles of sample SBZ-2. The sensitivity is found to be increasing with the RH for all the samples of thick films and it is increasing up to some particular RH and then afterward it remains constant. Amongst all the prepared samples SBZ-2 is more

sensitivity than other prepared samples.. This nano composites carries a good scope for the development of moisture sensor in the range of relative humidity 30% to 90% RH.

References

1) R. Lindström, Lars-Gunnar Johansson, G. E.Thompson, P. Skeldon and Jan-Erik Svensson, Corrosion of Magnesium in Humid Air, Corrosion Science, 46, 5, 2004, p. 1141–1158.
2) H. Ishidaand, and R. Johnson, The inhibition ofcopper corrosion by azole compounds in humid environments, Corrosion Science, 26, 9, 1986,pp. 657-667.
3) Xiaofeng Song, Qi. Qi, Tong Zhang, Ce. Wang, Sens. Actuators, B, Chem. 138, 368, (2009).
4) Wagh M S, Patil L A, Seth T, Amalnerkar D P, Mater. Chem. Phys. 84, 228-233, (2004)
5) Ansari Z A, Ko T G, and Oh J H, Surf. Coat. Technol., 179, 182- 187, (2004).

Study of DC Conductivity of Polyaniline Doped Zinc Oxide Nanocomposites

B. S. Agrawal
Department of Physics, Vidya Bharati Mahavidyalaya, C. K. Naidu Road, Camp, Amravati,

R. M. Agrawal
Department of Physics, Shri R.L.T. College of Science, Civil lines, Akola, M.S.,

G. T. Lamdhade
Department of Physics, Vidya Bharati Mahavidyalaya, C. K. Naidu Road, Camp, Amravati,

Abstract

Polyaniline doped Zinc Oxide (PANI-ZnO) Nanocomposites were synthesized by chemical route method. PANI-ZnO Nanocomposites were found crystalline in nature, confirmed by X-Ray Diffraction (XRD). The DC conductivity of PANI-ZnO Nanocomposites were found to be increasing with respect to the temperature and with compared to the individual conductivity of PANI and ZnO

Keywords: PANI-ZnO, DC Conductivity, XRD.

Introduction

PANI, a conducting polymer, has increasing scientific and technological interests in the synthesis of a broad variety of promising materials due to its unique electrical and optical properties [1, 2]. PANI is widely used in the area of electrochemical materials, light-emitting diodes, biosensors, chemical sensors, and battery electrodes [3–5]. Recently, extensive research has been focused on the synthesis and potential applications in electronic devices to enhance the electrical properties of PANI [6]. PANI is one of the mostly studied conducting polymer because of its ease of polymerization, environmental stability and electrical conductivity. Recent studies are focused on the study of composites based on conducting PANI/metal nanoparticles for increased mechanical and electrical properties [7].

In this paper, PANI and its nanocomposites with ZnO nanorods were fabricated by in situ oxidative polymerization of aniline monomer with ammonium peroxydisulphate. All these composites have been analyzed using X-ray diffraction (XRD). The variation in *dc* conductivity of these composites was studied as a function of temperature and concentration.

Experimental

- **Preparation of PANI**

To prepare PANI, 0.2 M aniline hydrochloride and 0.25 M ammonium peroxydisulphate (APS) solutions were prepared in distilled water. Both solutions were left to cool for 1-2 h in refrigerator. Pre-cooled APS is added drop wise in aniline hydrochloride solution, maintained at a temperature in the range 0-4°C in an ice bath, stirred for 2 h for oxidization and left for 24 h at rest to polymerize in refrigerator. Next day PANI precipitate was collected on a filter paper and washed with the 200 ml of 1M HCl and acetone till the filtrate became colorless. PANI (emeraldine) hydrochloride powder was dried in air and then in vacuum at 45°C. Polyaniline prepared under these conditions was taken as standard sample.[8]

- **Preparation of PANI/ZnO composites**

The sample of PANI and zinc oxide composite was prepared by adding 0.1 M solution of 20 wt % of zinc oxide (dopant) to 0.2 M aniline hydrochloride (monomer) solution in distilled water. The solution was vigorously stirred for 1 h in order to keep the zinc oxide suspended in the solution. Also 0.25 M ammonium peroxydisulphate (APS) solution was prepared in distilled water. All the solutions were pre-cooled before mixing. The aqueous solution of APS (0.25 M) was added drop wise in the beaker containing the mixed solution of monomer and dopant, maintained at temperature in the range 0-4°C in an ice bath. Then this solution was stirred for 2 h for oxidization and left for 24 h at rest to polymerize in refrigerator. Next day precipitate of the composite of PANI/zinc oxide was collected on a filter paper and washed with the 200 ml of 1M HCl and acetone till the filtrate became colorless. Precipitate of the sample was dried in air and then in vacuum at 45°C. Following this procedure, five different samples of PANI/zinc oxide composites with 20, 40, 60 wt% of zinc oxide were prepared and named as PZ1, PZ2 and PZ3.

- **Preparation of sample:**

Sample code	Composition	Thickness(mm)
PZ1	80 % PANI+10 % ZnO	1.245
PZ2	60 % PANI+40%ZnO	1.379
PZ3	40 % PANI + 60% ZnO	1.441

Result and Discussion

- **XRD analysis**
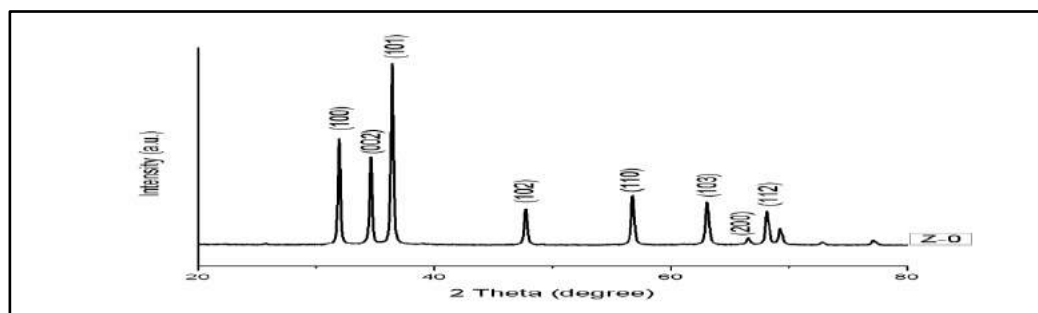
Figure 1. XRD of pristine ZnO

Figure 3.1. shows XRD pattern of pristine material ZnO, The XRD pattern of pristine zinc oxide (ZnO) nanostructure synthesized by liquid phase method via solid state method calcinated at 800°C as shown in figure 1.The crystalline nature with 2θ peak lying at (100), (002), (101), (102), (110) and (103) planes. All the peaks match well the standard hexagonal wurtize structure of zinc oxide (ZnO) with lattice constants a = b = 0.3249 nm and c = 0.5206 nm [JCPDS card no. 36-1451]. All the peaks are perfectly match with pure ZnO structure, which indicates the high purity of the obtained ZnO nanoparticle. The average crystalline size was found to be 37.32 nm calculated by Deye-Scherrer formula.

- **dc conductivity**

The powder of PANI/zinc oxide composites are crushed finely in agate pestle-mortar. This powder is pressed to form pellets of thickness is nearly 1.5 mm by applying pressure of 10 tons and coated with silver paint on both sides of the surfaces to obtain better contacts.

The log of current (I) – log of voltage (V) characteristics of PANI/ZnO composite with 20 wt% of ZnO at various temperatures is shown in fig.2. It was observed that, ln(I) increases with increase on ln(V). It was also manifested, the nature of graph is nearly straight line with constant slope i.e. it obey Ohm's law (linear ohmic material) on logarithmic scale.
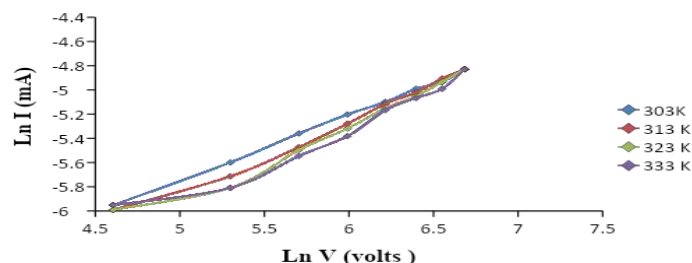
Fig. 2 – I-V characteristics of PANI/ZnO composites (20 wt%) at various temperatures

From fig 3, it was observed that as temperature increases, ln(σ)increases. This variation is maximum for PZ1 sample. Due to increase of temperature, more and more charges in PZ1 samples become free and contribute to the conductivity and electrical conductivity increases. Slope of the PZ1 sample curve is maximum among the samples. As doping of ZnO in PANI increases, electrical conductivity increases and becomes maximum for 80% PANI +20% ZnO sample (PZ1 sample) and further increase in doping of ZnO in PANI, conductivity decreases. This decrease may be due to collisions of more free charges with the vibrating local atoms in the sample as collision increases the obstacle to the motion of free charges. Values of electrical conductivity for different compositions of PANI and ZnO are exhibited.
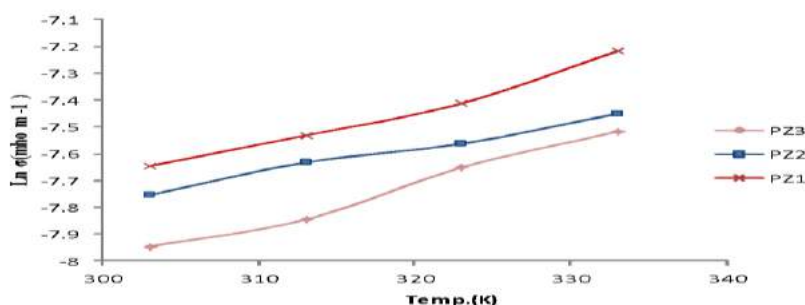
Fig. 3 – ln conductivity of PANI/ZnO composites verses temperature

Conclusions

In summary, the composites of polyaniline with ZnO via oxidative polymerization of aniline hydrochloride in the presence of different wt% of ZnO with ammonium persulphate as an oxidant have been synthesized. Detailed characterizations of the composites were carried out using XRD.

The study on electrical properties of conducting polymer PANI is carried out as a comparison to PANI/ZnO composites measured under low and high temperature dependence. The electrical properties of the conducting polymer (PANI/ZnO) composites show strong dependence on the reaction method and ZnO percentages. PANI/ZnO composites show lower dc electrical conductivity as compared to PANI and it decreases regularly with increasing content of ZnO.

References

1) Y. Dong, Y. Ma, T. Zhai, Y. Zeng, H. Fu, and J. Yao, "A novel approach to the construction of core-shell gold-polyaniline nanoparticles," *Nanotechnology*, vol. 18, no. 45, Article ID 455603, 6 pages, 2007.

2) A. R. B. M. Yusoff and S. A. Shuib, "Metal-base transistor based on simple polyaniline electropolymerization," *Electrochimica Acta*, vol. 58, no. 1, pp. 417–421, 2011.

3) L. Geng, Y. Zhao, X. Huang, S. Wang, S. Zhang, and S. Wu, "Characterization and gas sensitivity study of polyaniline/SnO2 hybrid material prepared by hydrothermal route," *Sensors and Actuators B*, vol. 120, no. 2, pp. 568–572, 2007.

4) S. Yu, M. Xi, X. Jin, K. Han, Z.Wang, and H. Zhu, "Preparation and photoelectrocatalytic properties of polyaniline-intercalated layered manganese oxide film," *Catalysis Communications*, vol. 11, no. 14, pp. 1125–1128, 2010.

5) C. C. Buron, B. Lakard, A. F. Monnin, V. Moutarlier, and S. Lakard, "Elaboration and characterization of polyaniline films electrodeposited on tin oxides," *Synthetic Metals*, vol. 161, no. 19- 20, pp. 2162–2169, 2011.

6) M. Deepa, S. Ahmad, K. N. Sood, J. Alam, S. Ahmad, and A. K. Srivastava, "Electrochromic properties of polyaniline thin film nanostructures derived from solutions of ionic liquid/ polyethylene glycol", *Electrochimica Acta*, vol. 52,no. 26, pp. 7453–7463, 2007.

7) L. N. Shubha, Dr. P. MadhusudanaRao, "In situ chemical synthesis and electrical properties of polyaniline/titanium di-oxide nano composites", *International Journal of Scientific & Eng. Research*, Vol. 6, Issue 11 ,pp. 855-861,2015

8) Sneh Lata Goyal, Smriti Sharma, Dipika Jain, N Kishor, " Study of structural,electrical and thermal properties of polyaniline/ZnO composites synthesized by in-situ polymerization", *International Journal of Pure & Applied Physics*, vol. 53,pp. 456-463, 2015.

Exploitation of Zinc Oxide nanoparticles as a Humidity Sensors

S. R. Samrutwar

Department of Physics, Vidya Bharati Mahavidyalaya, C. K. Naidu Road, Camp, Amravati

G. T. Lamdhade

Department of Physics, Vidya Bharati Mahavidyalaya, C. K. Naidu Road, Camp, Amravati

R. M. Agrawal

Department of Physics, Shri R.L.T. College of Science, Civil lines, Akola

Abstract

Zinc oxide nanoparticles were readily synthesized through Co- Precipitation method and dipped in Aluminium chloride (AlCl₂) for 1 & 2 min. Zinc Acetate used as a precursor for preparation. In this present work, samples were prepared by spin coating technique in the form of thin films. The ZnO Nanoparticles were characterized by using X-Ray diffraction and humidity sensing, hysteresis characteristic, electrical dc conductivity, Arrhenius plot and activation energy of nanoparticles material studied.

Keywords : ZnO, nanoparticles, co-precipitation, humidity sensors, electrical dc conductivity.

Introduction

Nanotechnology has quite high impact in developing new classes of materials with enhanced functionality and a wide range of applications [1]. The properties of ZnO include it's wide band gap (3.37eV), high exciton binding energy (60meV) [2,4]. Other favourable aspects of ZnO are that it is non-toxic, cheap, relative abundant source materials and chemically stable. [3-6]. ZnO probably has the richest family of nanostructures, 1-D ZnO nanorods are potentially useful for various nano devices such as light emitting diode (LEDs), chemical sensors, solar cells, and piezoelectric devices, because of their high aspect ratio and large surface area to volume ratio ensure high efficiency and sensitivity in this applications.Furthermore, ZnO is bio-safe and biocompatible and may be used for biomedical applications without coating [4-8]. In the present work, ZnO Nano-material dipped under Aluminum chloride (AlCl₂) solution at different time, samples were tested for humidity sensing properties.

Experimental

In the present work, synthesis and structural characterization of ZnO nanoparticles by using liquid phase method with large surface area in short reaction time at room temperature and this method is the simplest, cost effective, eco-friendly method. It is also probed for its effect on nanocrystalline size structure via XRD studies of ZnO nanoparticles. [6]

- **Method of Preparation**

Zinc Oxide nanostructure was synthesized by using co-precipitation method. In order to prepare, 2 g of Zinc Acetate Dihydrate and 8 g of Sodium Hydroxide were weighted using a weighting balance. Then, 10 ml and 15 ml of distilled water were measured by a measuring cylinder. After that, 2 g of zinc acetate dihydrate was dissolved with a 15 ml of distilled water and 8 g of sodium hydroxide was dissolved in a 10 ml of distilled water. The solutions were stirred with a constant stirring for about five minutes each. After well mixed, sodium hydroxide solution was poured to the solution containing zinc acetate with a constant stirring by magnetic stirrer for about five minutes. Then, a burette was filled with 100 ml of ethanol and titrate drop wise to the solution containing both sodium hydroxide solution and zinc acetate. After the reaction, white precipitate was formed. [5]

- **Dipping Method:**

Aluminium chloride (AlCl₂) is the main compound of Aluminium and chlorine. The compound is often cited as a Lewis acid. In the dipping method, we have used Aluminium chloride for the dipping method. We first prepare 0.01 M solution of Aluminium chloride making up 100 ml by pouring 0.013 mg.

As we prepared the 0.01M solution of AlCl₂ then we dipped the thick film of Zinc Oxide for different time parameters. We take 1, 2 minutes dipping and after firing these slides for 1 hour at 500°C finally the two thick films slides for different dipping time is prepared and one thick film taken for pure [7,8]. Series of a sample in which ZnO nanomaterial films were dipped in Aluminium Chloride for different dipping time for 0, 1, 2 minutes samples namely ZS-0, ZS-1, ZS-2 respectively.

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293
(Special Issue No.70) Peer Reviewed Journal www.aiirjournal.com Mob. 8999250451

334

Results And Discussion

- ### X-ray diffraction (XRD)
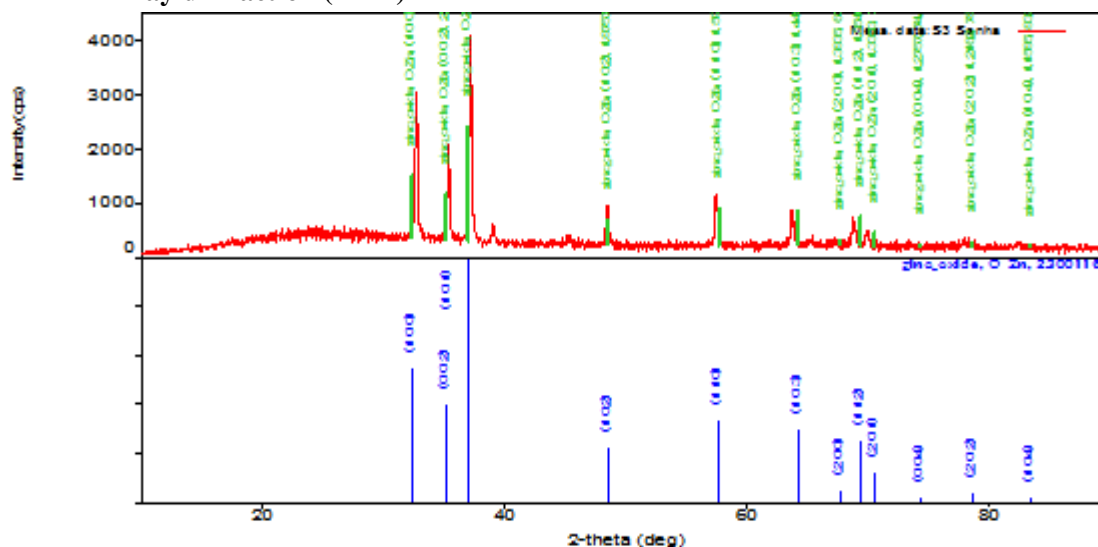
Figure 3.1 – XRD of pristine ZnO nanomaterial

Figure 3.1 shows XRD pattern of pristine ZnO nanocrystalline material respectively. The XRD pattern of pristine Zinc Oxide (ZnO) nanostructure synthesized by liquid phase method via co-precipitation method calcinated at 500 ^{o}C. The crystalline nature with 2θ peak lying at (100),(002),(101),(102),(110),(103) and (112) planes. All the peak match well the standard hexagonal wurtize structure of Zinc Oxide (ZnO). All the peaks are perfectly matched with pure ZnO structure, which indicates the purity of the obtained ZnO particle. The average crystalline size was found to be 48.86 nm calculated by Debye-Scherrer formula. [5,9]

- ### Hysteresis characteristics:

In our present work, humidity sensing with ZnO nanomaterial thick films of pure sample ZS-0 of ZnO nanoparticles and series of a samples which is ZnO nanomaterial film ZS-1, ZS-2 dipped in Aluminium Chloride for different dipping time i.e for 1&2 minutes as shown in figure 3.2.1 respectively. Hysteresis plot shows variation between resistance of sample with respect to relative humidity in increasing order of 40 to 80 % RH. The resistance measurement was done with Keithley 2400 source meter. From this hysteresis plot it is clearly seen that there is very small hysteresis is present during forward (increasing) %RH. It is observed that there is very significant average change in value of resistance of sample in the range of 10^{4} to 10^{1} MΩ . From 40 to 80 % RH except in the sample ZS-2 (2 minutes) change in value of resistance from 10^{4} to 10^{0} MΩ. There is noticeable change in the value of resistance of sample ZS-2 at constant temperature 40°C to 80°C.
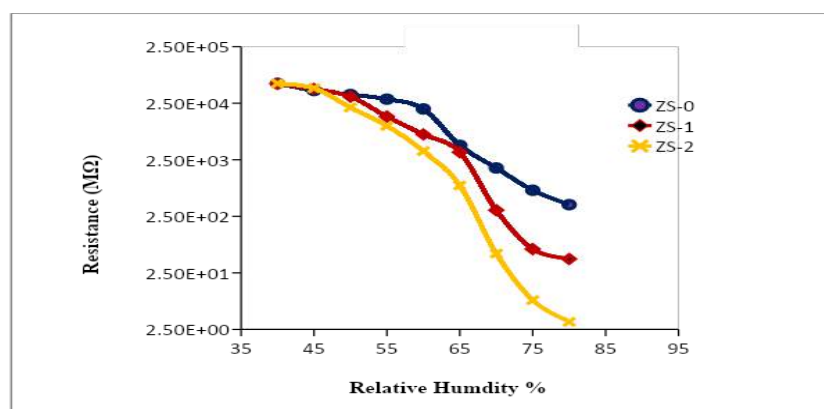
Fig 3.2.1 Hysteresis plot of samples

- **Activation Energy**

Figure (3.3.1) shows the Arrhenius plot of conductivity with (1000/T) at 50, 60, 70 % RH for the sample ZS-2. However, the Arrhenius plot for all the samples found to be linear and by using the equation ($\Delta E = K \times$ Slope/e) the activation energy ΔE is calculated and tabulated in the table (3.1)

RH %	50%	60%	70%
Sample Code	ΔE eV	ΔE eV	ΔE eV
ZS-0	8.63E-04	8.17E-04	1.23E-03
ZS-1	9.98E-04	9.53E-04	1.13E-03
ZS-2	5.40E-04	7.20E-04	1.36E-03

Table 3.1: Activation energy
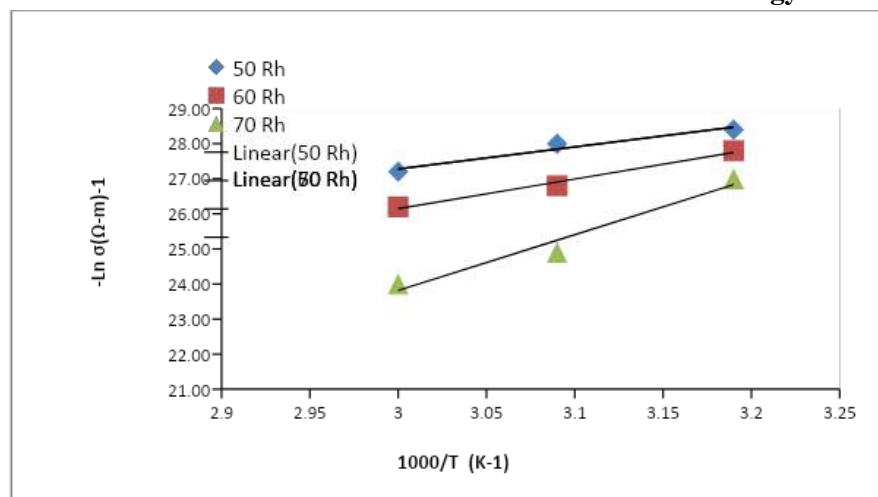
Fig 3.3.3: Arrhenius plot of sample ZS-2

For all samples the activation energy is found to be quite reasonable for the electrical conduction the values of activation energy for the pristine ZnO which is more smaller at constant different RH. This shows that the smaller amount of energy is required for the conduction of electrons due to absorption of water molecules there by increasing the number of donor electrons.

Conclusions

It is observed that the XRD analysis of samples shows that all the peaks are perfectly match with pristine ZnO nanostructure, which indicates that Pristine ZnO nanoparticles obtained. No other peaks were detected in spectrum within detection limit of XRD instrument, indicating the pure pristine ZnO Nanomaterial is synthesized.

The hysteresis plot of all samples were observed that there is very significant average change in value of resistance of samples in the range of 10^4 to 10^1 MΩ. There is noticeable change in the value of resistance of sample ZS-2 in the range of 10^4 to 10^0 MΩ at constant temperature 40^0C to 80^0C.

The Arrhenius plot for all the samples was found to be linear and activation energy ΔE was calculated for all the samples and is found to be quite reasonable for the electrical conduction. The smaller amount of energy is required for the conduction of electron due to the adsorption of water molecules.

References

1) T.Jannane, M.Manoua,A.Liba & N.Fazouan, "Sol-Gel Aluminium –doped ZnO thin films:Synthesis and characterization",Journal Material Environment Science ; Vol.8 ; 160-168,(2017)
2) Wasi Khan*, Z.A.Khan, A.A.Shad, S.Shervani, A.Saleem, "Sythesis & Characterization of Al Doped ZnO Nanoparticles",India International Journal of Modern Physics: Conference Series Vol. 22, page: 630–636, World Scientific Publishing Company,(2013)
3) T.Jannane, M.Manoua,A.Liba & N.Fazouan,"Sol-Gel Aluminium doped ZnO thin films:Synthesisandcharacterization",JournalMaterial Environment Science;Vol.8;160-168,(2017)

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293
(Special Issue No.70) Peer Reviewed Journal www.aiirjournal.com Mob. 8999250451

336

National Conference on Multidisciplinary Research in Science and Technology for Healthy Lifestyle Management (NCMRST- 2020) Organizer :- Shri R.L.T. College of Science, Akola

24th Jan. 2020

4) Yangyang Zhang,Manoj K. Ram, Elias K. Stefanakos, and D. Yogi Goswami, "Synthesis, Characterization, and Applications of ZnO Nanowires" Hindawi Publishing Corporation Journal of Nanomaterials; 22 pg,(2012)

5) J.N.Hasnidawani,H.N.Azlina,H.Norita,N.N.Bonnia & S.Ratim,"Synthesis of ZnO Nanostructure using Sol-Gel Method",Journal Procedia chemistry;Vol. 19;211-216,(2016)

6) A. Erola, S. Okurb, B. Combaa, Ö. Mermerc, M.C¸ . Arıkana, " Humidity sensing properties of ZnO nanoparticles synthesized by sol–gel process", journal: Elsevier,174-180,(2010)

7) Alaa J. Ghazaia, Emad A. Salmanb , Zahraa A. Jabbarc, "Effect of Aluminum Doping on Zinc Oxide Thin Film Properties Synthesis by Spin Coating Method" American Scientific Research Journal for Engineering, Technology, and Sciences (ASRJETS), Volume 26, pg 202-211(2016)

8) S. Ilican, Y. Caglar, M. Caglar, Preparation and characterization of ZnO thin films deposited by sol–gel spin coating method, J. Optoelectron. Adv. Mater. 10 1(2008) 2578–2583.

9) B.D.Cullity,"Elements of X-ray diffraction (Addison- Wesley)",Vol.102;(1970)

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293 (Special Issue No.70) Peer Reviewed Journal   www.aiirjournal.com Mob. 8999250451

337

Study of SnO$_2$ doped Polypyrrole Nanocomposites for AC Conductivity and Dielectric properties

T S Wasnik

Department of Physics,Vidya Bharati Mahavidyalaya, Camp, C.K.Naidu Road, Amravati, M.S.

R M Agrawal

Department of Physics, Shri RLT College of Science, Civil Line Road, Akola, M.S.

Abstract

Nanocomposites of Polypyrrole and Stannic Oxide (SnO$_2$-PPy) were synthesized by in-situ polymerization in different weight percentages using oxidation method. The structural properties of prepared sample was studied by using X-ray diffraction. The surface Morphology of prepared sample were studied by field emission scanning electron micrograph (FE-SEM).The AC conductivity and Dielectric properties of SnO$_2$-PPy nanocomposite of various compositions were investigated at different temperatures and frequencies(100Hz–1MHz). It shows that the dielectric constant decreased with increase in frequency and temperature. As the concentration SnO$_2$ nano particles increases in PPy the AC conductivity increased with frequency. Activation energy for conduction has been also determined. Activation energy of PS3 (60 % ppy + 40 % SnO$_2$) was maximum among the samples and it is 0.1062 eV, it has increased with increase in frequency and SnO$_2$ nanoparticles concentration.

Keywords: Polypyrrole, Stannic Oxide; Dielectric constant, AC conductivity

Introduction

Recently, the conducting polymers shows the great importance as this exhibit unique properties such as optical, electrical, thermal and chemical etc. Among these polymers, polythiohene, Polypyrrole (Ppy) received more attention due to its high conductivity and thermal stability [1-3]. Polypyrrole (Ppy) is one of the most striking polymers due to its special transport properties, facile synthesis, higher conductivity and good environmental stability. Polypyrrole has various advantages and applications in batteries, electronic devices, optical switching devices, functional electrodes, sensors etc.[4]. Tin oxide (SnO$_2$) has become the important functional material due to its large band gap and excellent optical and electrical properties. It can be used as transparent electrode in thin-film solar cells, liquid crystal displays, smart windows and anodes for lithium batteries [5-7]. The composite of SnO$_2$/polyaniline (PANI) by chemical deposition technique and found that the AC conductivity and dielectric properties was studied

Experimental

All the chemicals used in this study were of GR grade purchased from Sd-fine, India (purity 99.99%). In preparation of SnO$_2$, 2g (0.1 M) of stannous chloride dehydrate (SnCl$_2$.2H$_2$O) is dissolved in 100 ml water. After complete dissolution, about 4 ml ammonia solution is added to above aqueous solution with magnetic stirring. Stirring is continued for 20 minutes. White gel precipitate is immediately formed. It is allowed to settle for 12 h. Then it is filtered and washed with water 2-3 times by using de-ionized water. The obtained precipitate were mixed with 0.27g carbon black powder (charcoal activated). The obtained mixer is kept in vacuum oven at 70°C for 24 h to obtain a dried powder. Then this dry product was crushed into a fine powder by grinder. Now the obtained product of fine nanopowder of SnO$_2$ was calcinated at 700°C up to 6 h in the auto-controlled muffle furnace (Gayatri Scientific, Mumbai, India.) so that the impurities from products will be completely removed.

- **Synthesis of Polypyrole (PPy)**

The Py monomer, anhydrous iron (III) chloride (FeCl$_3$) and methanol were used as received for synthesis of PPy. The solution of 7 ml methanol and 1.892 g FeCl$_3$ was first prepared in round bottom flask. Then 8.4 ml Py monomer was added to (FeCl$_3$ + methanol) solution with constant stirring in absence of light. The amount of Py monomer added to the solution (1/2.33 times of FeCl$_3$)was in such a way to get maximum yield. The resulting black precipitates are filtered and washed with copious amount of distilled water until the washings are clear. PPy so obtained is dried by keeping in oven at 600°C for 3 h. The synthesized material was characterized by using XRD, SEM.

- **Preparations of films**

The thick films were prepared by using screen printing techniques. Initially, for the screen printing the thixotropic paste was formulated by mixing the sintered fine powder of pure and composite nano powder of SnO_2 and PPy in different weight percentage with a solution of ethyl cellulose (as 10% temporary binder) in a mixture of organic solvent such as butyl cellulose, butyl carbitol acetate and turpineol. The ratio of inorganic to organic part was kept as 75:25 in formulating the paste. The paste was then used to prepare thick films of pure and composite materials of SnO_2 and PPy and it was screen printed on a glass substrate. The prepared films were dried at 90-100°C in oven for 1 h, so that all the organic materials (in the form of binders) and organic impurities can be evaporated from prepared films. For the surface conductance measurement, the electrodes of silver paint were formed on adjacent sides of the films and again, the films were subjected to heating at 70°C for 15 minutes for drying the silver paint. The series of samples are as shown in table 1.

Table 1

S.N.	Nano composites	Sample Code
1.	Pure Polypyrrole	P
2.	80 % PPy + 20 % SnO_2	PS1
3.	70 % PPy + 30 % SnO_2	PS2
4.	60 % PPy + 40 % SnO_2	PS3
5.	50 % PPy + 50 % SnO_2	PS4
6.	40 % PPy + 60 % SnO_2	PS5
7.	30 % PPy + 70 % SnO_2	PS6
8.	20 % PPy + 80 % SnO_2	PS7
9.	Pure SnO_2	S

Characterization

- **XRD (X-ray Diffraction)**
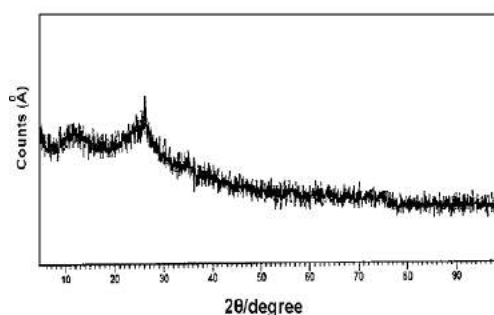
Figure. 1. XRD of pure PPy
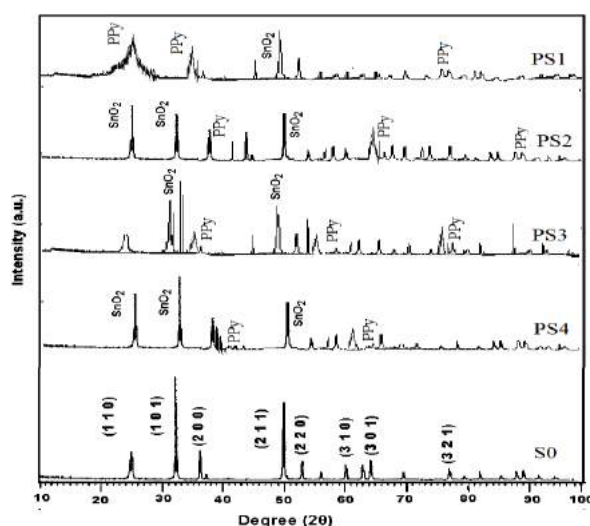
Figure.2.XRD of all composites sample

X-Ray diffraction pattern of pure polypyrrole (PPy) and their composites are as shown in figure (1 and 2). The pure PPy exhibited that, it was amorphous in nature. The broad peak occurred at 24^0 and it is characteristics of amorphous nature of polypyrrole. The broad peak occurs due to the scattering of X-rays from polymer chains at the interplaner spacing. The maximum intensity position of amorphous also depends on monomer to oxidant ratio. The X-ray diffraction patterns of composites of PPy, SnO_2 and pure SnO_2, calcinated at 200^oC. Main peak, in case of pure SnO_2, is observed at 26.6^o and this peak corresponds to the plane (1 1 0) of SnO_2 in tetragonal structure (JCPDS Card No.3-1114) with 100% intensity and the average crystalline size by using Scherer's formula was found to be 147.31 nm [9,10]. All the peaks are for the composites materials for molar weight percentage of various samples that are perfectly matched.

- **Scanning Electron Microscope (SEM)**

Figure. 1.SEM of Pure PPy   **Figure. 2**. SEM of PS3   **Figure. 3.**SEM of Pure SnO_2
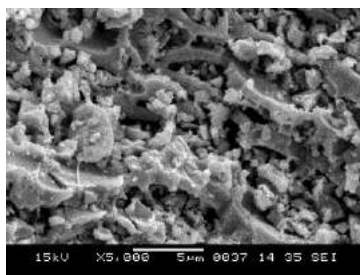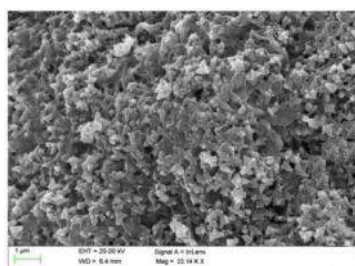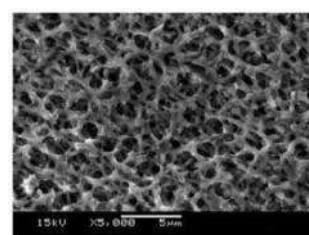
From the SEM photos, it is observed that in every inch of the region, number of pores was different and an average number of pores was taken for comparative study. From every photo, porosity was calculated for one inch region and listed in the tabular form. From above figures, it is found that number of porosity of (60PPy:40SnO_2) PS3 composition is more among the prepared and pure samples. Due to high porosity, available area for the flow of ions and charges is more and conductivity enhances. High porosity reduces the obstacle to the flow of charges and ions as collisions reduce (relaxation time increases) and charges mobility increases. This tends to high electrical conductivity.

Result and Discussion

- **Schottky Plots**

In the given setting of applied sample holder assembly, area of cross section is fixed and thickness of the different fabricated pellets is different. Then by using different potential differences, current is measured and that current per unit area of cross section gives current density (J). Applied voltage per unit thickness of the sample gives electric field intensity (E). Then graphs are plotted between ln(J) and E1/2 at different temperatures viz ; 300 K, From graphs, it is observed that as electric field increases, current density increases more in the beginning and then shows saturation. Also ln(J) is maximum for PS3 sample, at constant temperature ln(J) increases and becomes maximum for PS3 sample and then decreases and remains minimum for pure SnO2 (S sample). This shows that with increase in doping of SnO_2 in PPy, ln(J) increases and maximum for PS3 (60% PPy + 40% SnO2). It is, also observed that as temperature increases, ln (J) increases [9-10] and becomes maximum for PS3 sample.
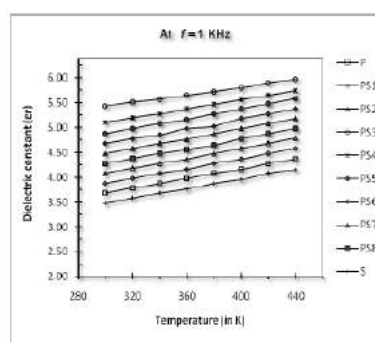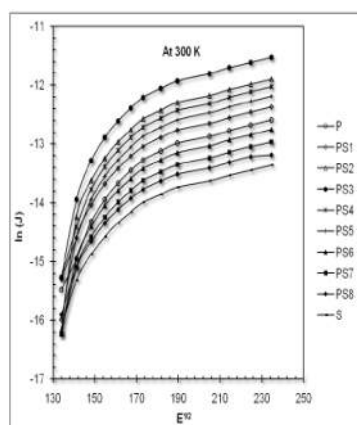
Dielctric constant

Dielectric constant was measured as a function of temperature at constant frequency and sketches are drawn between dielectric constant and different temperatures such as 300 K, . The graphs show variation of dielectric constant with temperature at constant different frequencies and variation of dielectric constant with frequency at different constant temperatures. As temperature increases, dielectric constant increases for all compositions of PPy and SnO2. As the temperature rises, the interfacial polarization increases due to creation of crystal defects [54-58], where the increase in dielectric constant with increase in temperature is thus expected. Also due to increase in temperature, free charges collide with atoms vibrating with large amplitude and thus refractive index (μ) increases as it is inversely proportional to temperature and hence according to relation, , dielectric constant increases. With increase in temperature and increase in doping percentage of SnO2 in PPY, dielectric constant increases and becomes maximum for 60 % PPy + 40 % SnO2 sample (PS3 sample). With further increase in doping of SnO2 in PPy, dielectric constant decreases and becomes minimum for pure SnO2 i.e. for S sample. This is because PS3 sample may have large number of free charges as compared to other compositions and their more collisions with vibrating atoms results in increase of refractive index of the PS3 sample and hence dielectric constant is high among the other compositions.

Conclusion

XRD pattern showed that the sample PS3 has smallest average crystalline size which is 96.01 nm. SEM study exhibited that the number of pores per inch for PS3 samples is more as compared to other compositions. Due to high porosity, available area for the flow of ions and charges is more and as such conductivity enhances (ac conductivity). High porosity reduces the obstacle to the flow of charges and ions as collisions reduce (relaxation time increases) and mobility of charges increases. This tends to high electrical conductivity. From dielectric constant study it is concluded that with the increase in temperature and increase in doping percentage of SnO_2 in PPy, dielectric constant increases and becomes maximum for PS3 sample. With further increase in doping of SnO_2 in PPy, dielectric constant decreases. This is because PS3 sample may have large number of free charges as compared to other compositions and their more collisions with vibrating atoms results in increase of refractive index of the PS3 sample and hence dielectric constant is high among the other compositions. From ac conductivity graphs, it is clear that with increase in frequency and temperature, ac conductivity (ac σ) increases continuously. With increase in doping of SnO_2 in PPy, ac σ increases and becomes maximum for PS3 sample (ac $\sigma = 1.072 \times 10^{-4}$ S/cm). Also it is recorded that ac activation energy of PS3 sample is more among the compositions of PPy and SnO_2 and this maximum value is 0.290 eV.

References

1) Tiwari D.C, Vikas Sen and Rishi Sharma, Temperaturedependent studies of electrical and dielectric properties of Polythiophene based nano composite, Indian Journal of Pure and Applied Physics,50, 49-56 (2012)
2) Rashmi Saxena, Vinodini Shaktawat, Kananbala Sharma, Narendra S Saxena and Thaneshwar Sharma P., Measurement of Thermal Transport Properties in Metal Doped Polypyrrole, Iranian Polymer Journal,17(9), 659-668 (2008)
3) Guanghao Lu, Haowei Tang, Yunpeng Qu, Ligui Li and Xiaoniu Yang., Enhanced Electrical Conductivity of Highly Crystalline Polythiophene/Insulating-PolymerComposite, Macromolecules,40, 6579-6584 (2007).
4) Ritu P. Mahare, Devendra K. Burghate, Subhash B. Kondawar,Development of nanocomposites based on polypyrrole and carbon nanoyubes for supercapacitors,Adv.Mat.Lett.,.5(7) 400-405. (2014)
5) S. Chappel, S. Chen, A. Zaban, "TiO2orous SnO2 Electrodes for Dye-Sensitized Solar Cells" Langmuir 18, pp.3336-33402.
6) S. Wang, J. Huang, Y. Zhao, S. Wang, X. Wang, T. Zhang, S. Wu, S. Zhang, W. Huang, "Preparation, characterization and catalytic behavior of SnO2supported Au catalysts for low-temperature CO oxidation" J. Mol. Catal. A: Chem. 259, pp. 245-252, 2006.

7) D. Leem, J. Song, H. Hong, J.S. Kwak, Y. Park, T. Seong, "Low Resistance and Highly Reflective Sb-Doped SnO2/Ag Ohmic Contacts to p-Type GaN for Flip-Chip LEDs" Electrochem. Solid-State Lett. 7, pp. G219-G221, 2004.

8) N. Chand and D. Jain, "Evaluation of A.C. Conductivity Behaviour of Graphite Filled Polysulphide Modified Ep-oxy Composites," Bulletin of Materials Science,Vol. 27, 2004, p. 227.

9) C. A. Angell, "Mobile Ions in Amorphous Solids," An-nual Review of Physical Chemistry, Vol. 43, 1992, p. 693.

10) A. E. Wahhab, A. E. Bekheet and H. E. Atyia, "Effect of Annealing on the AC Conductivity and the Di-electric Properties of In2Te3 Thin Films," Acta Phys Polon A, Vol. 28, 2000, p. 403

Performance Enhancement of Potentiometric Instrumentation by Employing Wireless Communication Protocol

Suchita Bhangale
Department of Electronic Science,
Nowrosjee Wadia College, Pune-411001, India

Abstract

Enhancement in some performance parameters of potentiometric instrumentation has been carried out with the help of wireless communication protocols. Some performance parameters of modern instrumentation like wireless user interface, digitization and smartness are enhanced in the present work. This is achieved with the help of digital wireless communication techniques. It includes short range low energy Bluetooth protocol. This protocol establishes half duplex communication between sensing unit of potentiometric instrumentation and handheld smart device for modernizing the instrumentation by enhancing parameters like remote access, digitization, smartness and sophistication. The presented work is useful to the new learners as well as to the electronic engineers working in the field of wireless communication. In future, authors would like to expand the work by enhancing some more parameters of potentiometric instruments used in process control industry.

Keywords—potentiometry, performance parameters, Bluetooth.

Introduction

Potentiometry [1] is the electrochemical method which measures the potential of an electrochemical system in the absence of external current. It is useful for the ionic concentration measurement in electrolyte. Generally it involves ion-exchange process between membranes of electrode and electrolyte. The electromotive force (EMF) is the potential generated by the source such as electrochemical cell used in the construction of the battery. Measurement of EMF is the basic need in battery manufacturing industry as well as battery maintenance workshops. EMF is measured by any voltmeter technique under no load current condition. But the voltmeter always introduces loading error in the measurement. Among various potential measurement techniques, potentiometry measures the potential with acceptable accuracy and precision. The potentiometric instrumentation is a complex process and requires frequent calibration. There is always scope in the enhancement of performance of potentiometric instrumentation [2]. The instrumentation parameters like accuracy, precision, reliability are limited due to several reasons and they never reach to their acceptable values.

Performance parameters of potentiometry are limited due to several reasons and among them the working principle itself is the major limiting factor. Advancement in the membrane technology and microelectronics are continuously improving the performance of potentiometry. Wireless technology is one such outcome of advancement in the field of electronics and telecommunication. It is revealed from literature that many applications are developed by use of wireless technology. For example IoT, GPS, Wi-Fi, Bluetooth, Zigbee, Wi-Max [3, 4] etc.

In the present work author attempted to apply the wireless communication protocol, Bluetooth [5] for enhancing the parameters of potentiometry. The presented work is divided into following sections: experimental work in section II, enhancement of performance parameters in section III, and conclusions in section IV.

Experimental work

Experiment is performed for enhancing the performance parameters by use of wireless communication protocol. Bluetooth is one such protocol which is commonly used for performance enhancement due to several advantages. Bluetooth device is an electronic circuit similar to the AM/FM radio receiver and transmitter. The only difference is that AM is broadcast whereas Bluetooth is unicast type of RF communication. The self-explanatory functional block diagram of Bluetooth is shown in table I. It also shows the electrical waveforms shaped by the various units of Bluetooth circuit.

TABLE I. block diagram of Bluetooth circuit and corresponding waveforms

Name of Block	Function of Block	Waveform

PCB Type	Antenna	
HF band pass	Filter	
RF Amplifier	Amplifier	
Down converter	Mixer	
LPF	Filter	
AGC	Gain stabilizer	
ADC	Data Converter	
FSK	Demodulator	
LPF	Filter	
Serial -parallel converter	Baseband	-
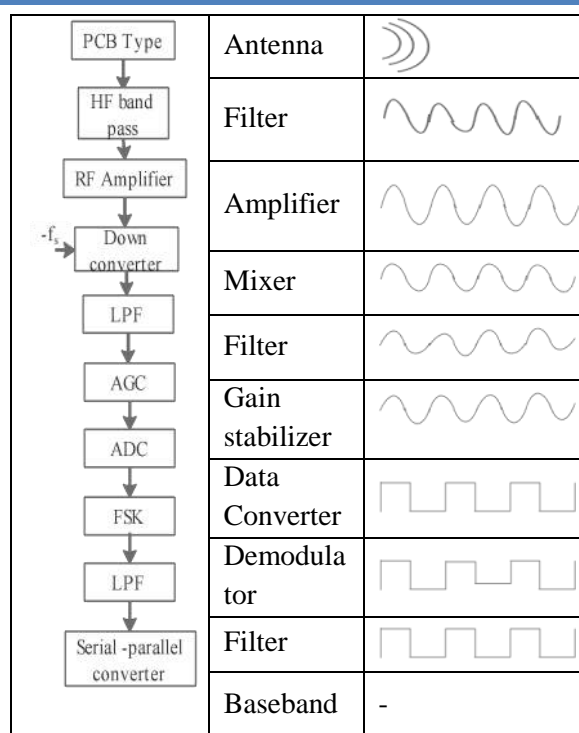
Performance parameters of potentiometry are generally enhanced at following three levels:

A. **Sensor level**

- Sensor parameters like response time, accuracy and precision are responsible for the quality of measurement. These parameters varied with aging and due to many other effects like sodium and acid error. The main symptoms of it is a sluggishness that also affects the other parameters.
- Precision: In process control application, precision is one of the important parameter. Variation in it causes effect on the quality of the process.

B. **Interface level**

The interface between sensor and electronic pre-amplifier affects following parameters:

- Accuracy: In the process control applications, the measured value by potentiometric instrumentation is never equal to the expected value due to changes in the electrochemical cells as well as environmental parameters like temperature and air pressure.
- Sensitivity: The interface should be passive to satisfy the principle of potentiometry. But such interface utilises the potential sensed by sensor for its own operation which limits the sensitivity.

C. **Communication level**

Communication is essential part of potentiometric applications in process control. It works like a medium for carrying measured potential from amplifier to the control unit of recording / read out unit. Some error is introduced by the medium in the measured value due to different types of noise, and medium resistance. Noise and resistance are present in all mediums but their strenght is less in wireless methods. Table I shows noise and resistance in different types of communication mediums.

TABLE I. Types of communication

Sr. No.	Medium Name	Medium Resistance/ Attenuation	Noise
1	Twisted Wire	Significant	EMI, Humming
2	Coaxial cable	Less significant	Humming
3	Fiber optic cable	Significant Attenuation	Thermal, dark current, dispersive
4	Air or wireless	Very less attenuation	Environmental

Wireless communication introduces minimum noise and loss of data due to less air resistance for short distance travel of wave. At present three types of wireless communication methods are popular in the industrial domain. Among them Bluetooth is easier to use because of available hardware and software tools. In the present

work, I have used inbuilt Bluetooth facility of ESP32 microcontroller. The procedure for using this facility is as follows:

- Include "BluetoothSerial.h" header file in the beginning of the sketch.
- Write the necessary Bluetooth related commands as shown in table II wherever necessary in the program.

TABLE II. Some important Bluetooth commands

Sr. No.	Bluetooth Command	Use	Place in the Sketch
1	BluetoothSerial ESP_BT	Object for Bluetooth	Above setup()
2	ESP_BT.begin("Name BT")	Name of Bluetooth Signal	Inside setup()
3	ESP_BT.available()	Check Bluetooth is ready or not	Inside loop()
4	ESP_BT.read()	Read from Bluetooth	Inside loop()

- Compile the program and debug the errors.
- Up-load the object file into the flash memory of microcontroller which has preloaded bootloader.
- Pair ESP32 with the given terminal and also check its availability.
- Establish the connection between two devices by detecting and pairing process. e.g. use SerialTerminal App of Android OS device.

After successful pairing send and receive data between two devices.

Enhancement of performance parameters

The Bluetooth communication enhances the parameters of potentiometry due to its following features:

D. **High speed communication**

Communication takes place at carrier frequency of 2.4 GHz, which results data transmission speed approximately 1Mbps.

E. **Less inetrference as well as merging of data due to non-broadcast type communication.**

F. **Less possibility of data corruption due to more security objects.**

G. **Minimun data attenuation due to phase modulated method of transmission.**

Table III summarizes the typical parameters of Bluetooth and their effect on the enhancement of performance parameters.

TABLE III. Typical features of Bluetooth

Parameter	Details	Effect on the Enhancement of Performance
Standard	IEEE 802.15.1	Universally recognizes the enhancement
Medium	wireless	Minimum EMI and static charge
Distance	Short	Low noise
Band	Industrial, scientific and medical (ISM)	Mostly used in these domain
Speed	1, 3, 24, 24, 48 Mbps for v1, v2, v3, v4, v5 respectively	Minimum delay between measurement and it's display
Power	Low, 2.5 mW	More efficiency
Strength	100 times weaker than cell phone waves	Less hazardous
Unpaid	Unpaid, unlicensed 2.4 GHz band	Economical
Topology	star	Line of site measurement
Configuration	Master-slave	One to one data access
Hopping	Less possibility of data merging	Minimum attenuation
Availability	Easily available locally and online	Enhances maintainability
Technology	Non customized, substitutes are available	Enhances corrective maintenance

Bluetooth enhances parameters mainly due to its features, particularly short range and modulation method.

Conclusions

Potentiometry is one such important instrumental method of analysis whose performance parameters are not very perfect. The parameters like accuracy, sensitivity and precision never reached to their expected values. Advancement in the electronics introduced many new parameters like digitization, sophistication,

smartness and remote access. These parameters improve the quality of potentiometric measurement and also they support in improvement of above mentioned basic parameters.

References
1) Eric Bakker, Erno Pretsch, "Modern Potentiometry," Angew. Chem. Int. Ed., vol. 46, pp. 5660 – 5668, 2007.
2) Hao Jin, Yiheng Qin, Si Pan, Arif U. Alam, Shurong Dong, Raja. Ghosh, and M.Jamal Deen, "Open-Source Low-Cost Wireless Potentiometric Instrument for pH Determination Experiments," Journal of Chemical Education., pp.A-E, 2017.
3) Mrs. Pratibha Singh, Mr. Dipesh Sharma,Mr. Sonu Agrawal, "A Modern Study of Bluetooth Wireless Technology", International Journal of Computer Science, Engineering and Information Technology (IJCSEIT), vol.1,pp.55-63, August 2011.
4) José Jair Alves Mendes Jr. Mário Elias Marinho Vieira, Marcelo Bissi Pires and Sergio Luiz Stevan Jr**.,** "Sensor Fusion and Smart Sensor in Sports and Biomedical Applications,**"** Sensors, vol.16, 1569, pp.1-31,2016.
5) Sherali Zeadally, Farhan Siddiqui and Zubair Baig, "25 Years of Bluetooth Technology," Future Internet, vol. 11, 194, pp. 1-24, 2019

Study AC and DC Electrical Conductivity of Al$_2$O$_3$ Doped Polyaniline

A. B. More, T. S. Wasnik, G. T. Lamdhade, Abdul Haq Tantray

Department of Physics, Vidya Bharati Mahavidyalaya, C. K. Naidu Road, Camp, Amravati, M.S. India 444602

Abstract

  Polyaniline doped Aluminium Oxide (PANI-Al$_2$O$_3$) were synthesized by International union of pure applied chemistry method (IUPAC). The AC and DC conductivity of PANI- Al$_2$O$_3$ were studied and found to be increasing with respect to the temperature and frequency with compared to the individual conductivity of pristine samples and dielectric constant also studied.

Keywords: PANI- Al$_2$O$_3$, AC and DC Conductivity, dielectric constant

Introduction :-

  Polyaniline (PANI) is a very well-known conducting polymer which has attracted a lot of attention due to its promising applications in active components in LEDs, electrodes in secondary batteries etc[1,2].family of conducting polymers and organic semiconductors, polyaniline has many processing properties. The present work reported the study of AC and DC electrical conductivity of PANI and PANI doped with Al$_2$O$_3$ have been investigated. Dielectric behaviour by LCR meter have been studied.

Experimental Technique

Preparation of Polyaniline :- In present project we use international union of pure applied chemistry (IUPAC) method to prepare polyaniline in which aniline hydrochloride (2.59 gm) is dissolved in 100 ml distilled water in volumetric flask. Ammonium peroxydisulphate (5.71 gm) is dissolved in 100 ml distilled water in volumetric flask . the solutions are kept for 1 h at room temperature . the above solutions are mixed together in equal proportion with constant stirring and kept for 12 hour at room temperature . the precipitated is collected by filtration and washed with 0.2 ml HCl , to remove all the residual monomers , oxidant and it's decomposing products . finally it is washed with acetone to removes low molecular weight organic intermediates and Oligomors . it also prevent the aggregation of PANI precipitated (ppt) during drying . the precipitated is dried at 60°C for 12 hour. Then sample in insert n KBR press machine add some binder and and apply 40 ton pressure on material and make a pallet similarly for doped pallet will be made the 20% Al$_2$O$_3$ add to polyanilne and make a doped pallet [6,7]

Graph related to AC conductivity for Pure PANI
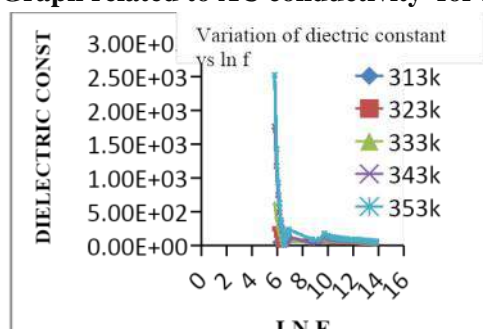
Fig 1.1 Variation of dietric constant vs ln f
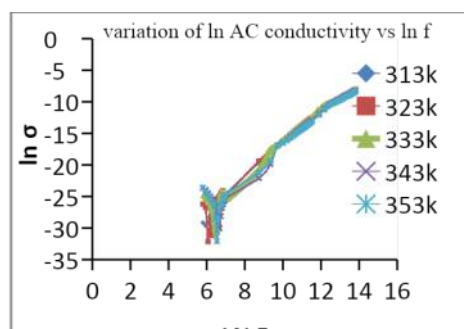
Fig 1.2 variation of ln AC conductivity vs ln f

Graph related to AC conductivity for PANI+Al$_2$O$_3$
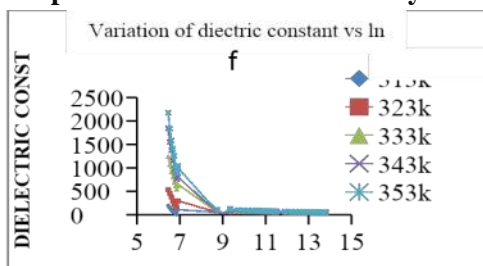
Fig1.1(a) Variation of dietric constant vs ln f
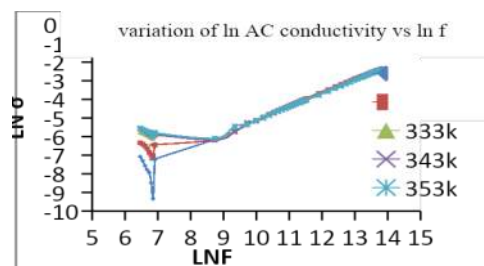
Fig1.2(b) Variation of ln AC Conductivity vs ln f

DC conductivity For Pure PANI
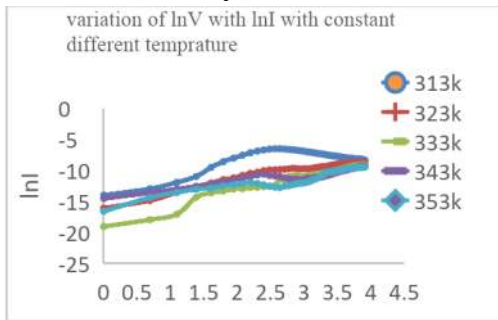
Fig1.1 variation of ln V with constant different temp.
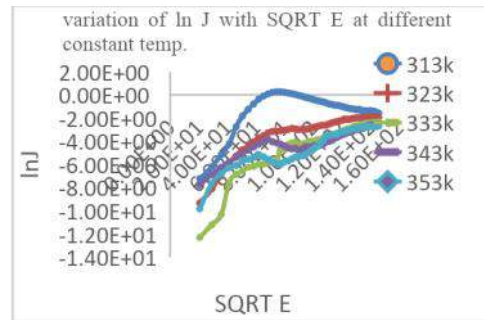
Fig 1.2 variation of ln J with $E^{1/2}$ at diff. const temp
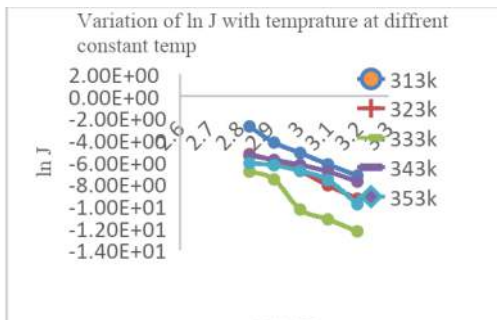
Fig1.3 Variation of ln J with temp. at Fig diffrent constant temp
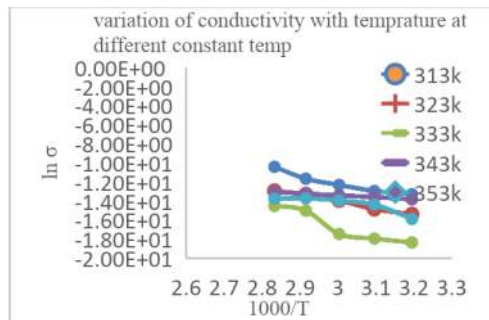
1.4 Variation of conductivity with temp. at different const. temp

DC Conductivity For PANI+ Al_2O_3
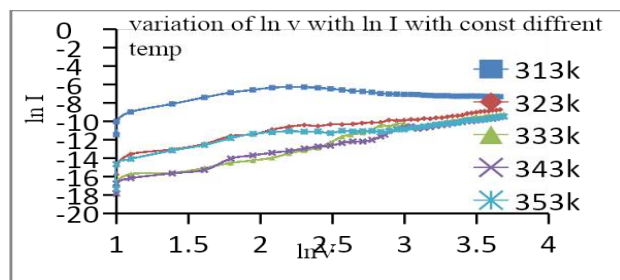
Fig 2.1 variation of ln v with ln I with const diffrent temp
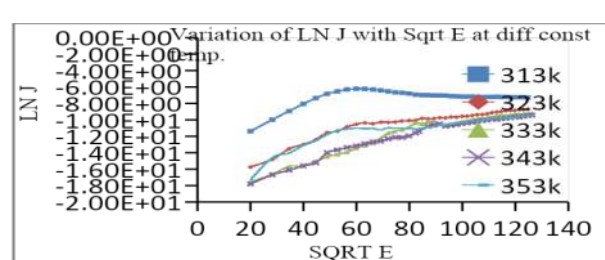
Fig 2.2   Variation of LN J with Sqrt E at diff const temp.
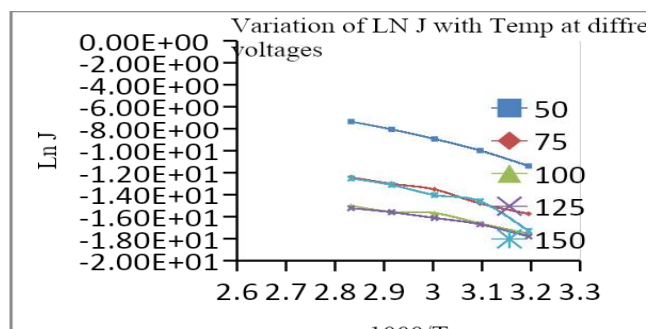
Fig 2.3 Variation of LN J with Temp at differ. const voltages
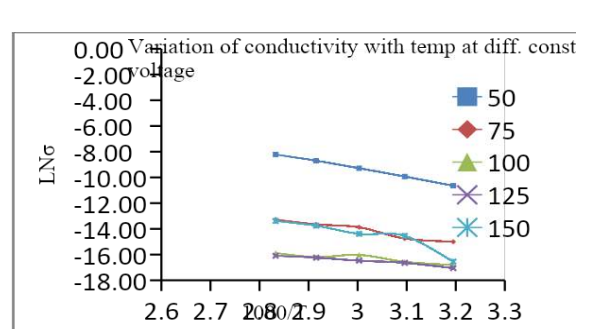
Fig 2.4 Variation of conductivity with temp at diff. const voltage

Results And Discussions :-

Result for AC Conductivity Study :-The pallets sample was loaded in to the sample holder in an oven. The AC frequency were applied (in the range 1KHz to1MHz) across the sample by using the 4284 A precision LCR meter (20 Hz to1MHz) supplied by Agilent technology, Singapore. The corresponding dielectric constants were measured by using LCR meter. From the dielectric data, the AC conductivity of the pallets was calculated by using the relation-

$$\sigma_{ac} = f * \varepsilon_r * \tan\delta / 1.8 * 10^{10} \text{-----------(1)}$$

National Conference on Multidisciplinary Research in Science and Technology for Healthy Lifestyle Management (NCMRST- 2020) Organizer :- Shri R.L.T. College of Science, Akola

24th Jan. 2020

We have seen from graph

At constant frequency, Dielectric Constant (ϵ_r) increases with the increase of temperature.

At constant temperature, Dielectric Constant (ϵ_r) decreases with the increase of frequency.

At constant temperature, A C Conductivity (σ_{ac}) increases with the increase of frequency.

At constant frequency, A C Conductivity (σ_{ac}) very marginally increases with the increase of temperature.

Discussion of Results for DC conductivity:- The present study is D.C. electrical conductivity of undoped and doped Al_2O_3 pallet."

For the determination of electrical conductivity of undoped and doped pallet , the current voltage (I-V) measurements have been earned ot in the voltage range 10V-200V at various temperatures 313K, 323K, 333K, 343K, 353K.

The prominent results may be summarized as follow

1) Variation of conductivity with
   a) Temperature at different voltages.
   b) The increase in electric field at different temperatures.
2) Variation of sample pallet has been found from 313K to 353K.
3) The non-ohmic behaviours due to ionic conduction.
4) Variation of current density with:
   a) The electric field at different temperatures
   b) The temperatures at different constant voltages.

Discussion Of results:-

Fig 1.1 It is the graph between ln(I) and ln(V) for pure PANI i.e. PANI showing the variation of current with respect to increase in voltage is almost linear indicative of ohmic conduction. There is an increase in current with applied voltages more sharply than in the high voltage region

Fig 1.2 It is the graph between current density (J) and electric field (E)½ at constant temperatures for the pure PANI showing that current density rises linearly with electric field.

Fig 1.3 It is the graph between current density and temperature for pure PANI . The rise in the current density with respect to temperature is slightly more significant than the previous case and rise with respect to voltage is highly significant.

.Fig 1.4 It is the graph between the conductivity i.e. ln(σ) and temperature at diff. constant temp. for the pure PANI. The conductivity increases with increase in temperature, showing that it is predominantly insulators.

Fig 2.1) It is the graph between ln(I) and ln(V) for doped i.e. PANI doped with Al_2O_3 showing the variation of current with respect to increase in voltage is almost linear indicative of ohmic conduction. There is an increase in current with applied   voltages more sharply than in the high voltage region

Fig 2.2) It is the graph between current density (J) and electric field (E)½ at constant temperatures for the doped Al_2O_3 showing that current density rises linearly with electric field.

Fig 2.3) It is the graph between current density and temperature for doped Al_2O_3 . The rise in the current density with respect to temperature is slightly more significant than the previous case and rise with respect to voltage is highly significant..

Fig 2.4) It is the graph between the conductivity i.e. ln(σ) and temperature at constant voltages for the doped Al_2O_3. The conductivity increases with increase in temperature, showing that it is predominantly insulators.

Conclusions

The variation of AC conductivity with temperature and frequency in sample preparation that is KBR press machine AC conductivity very marginally increases with temperature and frequency .Variation of dielectric constant with temperature and frequency in sample preparation that is KBR press machine. At constant temperature, dielectric constant decreases with the increase of frequency. From a structural point of view the

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293
(Special Issue No.70) Peer Reviewed Journal   www.aiirjournal.com Mob. 8999250451

349

dielectric relaxation involves the orientation polarization, which in turn depends upon the molecular arrangement in to the dielectric. As a result, dielectric constant decreases with frequency and increase with temperature. As we doped Al_2O_3 in PANI the electrical conductivity greater as compare to undoped

In the polyaniline doped with Al_2O_3, the electrical conductivity increases with, increase of temperature.

Range of variation of electrical conductivity(σ) suggests that they are predominantly insulators.

It demonstrates semiconducting properties in a sense that the electrical conductivity Increases, through very poorly with temperature

Aluminium Oxide is added in polyaniline the electrical conductivity greater as compare to undoped

References

1) Kang E T,Neoh K G and Tan K L 1998 Prog. Polym. Sci.

2) Wessling B 1994 Adv. Mate

3) Journal of the Chemical Society (1862) "XXIX.-On the production of a blue substance by the electrolysis of sulphate of aniline". Letheby, H.

4) "'Polyaniline': Protonic Acid Doping of the Emeraldine Form to the Metallic Regime". Synthetic Metals. (1986). Chiang, J.C.; MacDiarmid, A. G

5) "Nobel Lecture: Reviews of Modern Physics(2001).. The fourth generation of polymeric materials".Semiconducting and metallic polymers:Heeger, Alan

6) INTERNATIONAL UNION OF PURE AND APPLIED CHEMISTRY Preparation of a conducting polymer Pure Appl. Chem., Vol. 74, No. 5, pp. 857–867, 2002. © 2002 IUPA 857 j.stejskal

7) Polyaniline. European Journal of Scientific Research ISSN 1450-216X Vol.52 No.2 (2011), pp.236-242© EuroJournals Publishing, Inc. 2011Bahaa Hussien

8) Physical Review (2003). "Applicability of the localization-interaction model to magneto conductivity studies of polyaniline films at the metal-insulator boundary". Tzamalis, G.; Zaidi, N.; Monkman, A.

9) "Crucial role of decoherence for electronic transport in molecular wires: Polyaniline as a case study". (2010). Cattena, Carlos J.; Bustos-Marún, Raúl A.; Pastawski, Horacio M

10) International Journal of Scientific & Engineering Research, Volume 7, Issue 6, June-2016 "Dielectric Properties and AC Conductivity of Doped Poly Furfuryl alcohol with Crystal Violet"sSamah Hussein Kadhim1, Ali H. Al Mowali2, Anis A. Al Najar3

11) Journal of Power Sources 123 (2003) 222–229 "Complexation of poly(vinylidene fluoride):LiPF6 solid polymer electrolyte with enhanced ion conduction in 'wet' form Chin-Yeh Chiang, Y.J. Shen, M. Jaipal Reddy, Peter P. Chu

12) International Journal of Science Research Volume 01, Issue 02, September 2012, pp. 102-"Studies on Polyaniline-Polyvinyl Alcohol (PANIPVA) Interpenetrating Polymer Network (IPN) Thin Films" Sindhu Honmute, Sharanabasava V. Ganachari, Ravishankar Bhat, HMP Naveen Kumar Do Sung Huh and Abba raju Venkataraman

13) "Electrical behavior of polymer hydrogel composed of poly(vinyl alcohol)–hyaluronic acid in solution" Biosensors and Bioelectronics 19 (2004) SeonJeongKima, Seoung Gil Yoona, Young Moo Leeb, Hee Chan Kimc, Sun I. Kima,

14) "AC and DC Percolative Conductivity of Single Wall Carbon Nanotube Polymer Composites "David s. mclachlan, cosmaschiteme, cheol park, Kristopher E.wise, Sharon E.lowther, peter T. lilleheei Emilie J. sochi, joycelyn s. harrison

15) Temperature Dependence of AC Electrical Conductivity of PVA-PPy-FeCl3 Composite Polymer Films (Malaysian Polymer Journal (MPJ) Vol 3, No. 2, p 24-31, 2008) Mohd. HamzahHarun, Elias Saion, Anuar Kassim, Mohd Yousuf Hussain, Iskandar Shahrim Mustafa and Muhd Ahmad Ali Omer.et.al

16) "Corrosion Protection of Carbon Steel Using Polyaniline Composite with Aluminum Oxide", Pertanika J. Sci. & Technol. 19 (2): 329 – 337 (2011).Ahmed A. Ahmed Al-Dulaimi, Shahrir Hashim and Mohammed Ilyas Khan

17) International Journal of Innovative Research in Science, Engineering and Technology ,Vol. 4, Special Issue 13, December 2015. "Synthesis and Characterization of Polyaniline / Al2sO3 Nano Composite I.JeenaRajathy ,

18) Open Journal of Polymer Chemistry, 2016, 6, 1-7. "Preparation of Polyaniline/ZnO Films by Electrochemical Polymerization" Yuki Kaitsuka, HiromasaGoto

19) ''Polyaniline/TiO2 Nanocomposite: Enzymatic Synthesis and Electrochemical Properties'',Int. J. Electrochem. Sci., 3 (2008)1117 – 1126 Reza Nabid1Maryam 1Golbabaee, Abdol majid Bayandori Moghaddam ,Rassoul Dinarvand, Roya Sedghi.

Development Of Microcontroller Based Fully Robust Fire Sensing And Protection System

Mr. Siddharth K. Ganvir

Research scholar, Department of Electronics.
Mahatma Fule Arts Commerce and Sitaramji
Choudhary Science Mahavidhyalay Warud,

Dr. G.K.Reddy

Assistant Professor, Department of Electronics.
Mahatma Fule Arts Commerce and Sitaramji
Choudhary Science Mahavidhyalay Warud

Abstract

Sensing and controlling system is having very vast applications in various fields. It used advanced technology such as embedded or Microcontroller based instruments. Now-a-days the cases of fire catching have been increased a lot. The places like Colleges, Hospitals, Marriage halls, go-downs are usually got prone to such fire incidences as per statistics. This paper proposed a model for fire sensing as well as to control that fire through a completely robust electronic system. This is able to detect the fire & take the preventive actions accordingly. This microcontroller based model consist of a temperature sensor, wireless trans-receiver module, automatic water pump system, GPS with GSM module for sending location and a help message to nearby fire brigade agencies and a physical rescuing outlets system.. This "Fully robust fire detection & protection electronic system" has been designed in such a manner referencing recent fire catch incidences in mind.

Keywords: Microcontroller, Embedded technology, sensors, GPS etc.

Introduction

Fully Robust Fire Detection & Protection Electronic System" is simple in nature, a temperature sensor system is continuously keep sensing the temperature of the place, whenever the output of the sensor exceeds the threshold(referenced) value set then the connected GPS & GSM Modules gets activated sending the location & help message to the nearby fire brigade agencies. At the same time the temperature sensor gives a triggering command to the pump connected to the water tank, which in response circulates water flow from the pipe to the sprinklers attached (in rectangular fashion)) to the sealing of each room on each flour. Also the system has been provided with a uniquely fabricated ladders at each windows outfacing the surrounding. These ladders are usually remain attached to the windows in folded fashion & will automatically get released on triggering command through microcontroller.

Literature Survey

The safety of life at any public places are in the prime objectives of place owner. The incidences of fire catching has increased due to the rapid industrialization. Due to this,the traditional solutions to acquire the control on fire are not enough. So a Fully Robust electronic system with Fire Detection & complete Protection is very much needed. This proposed model is designed in such a way that after sensing the fire, it is able to take all the right actions to control the situations in an automated fashion by switching the power supply within the place completely OFF(cut),sending & help message with positioning details to the nearby fire brigade agencies, sprinkling water on the fire & providing a ladder for rescue at the outlets.

Modules Used

1. Microcontroller 8051

The 8051 microcontroller is an 8 bit microcontroller, in which there are four 8 bit bi-directional I/O ports available. Among the four ports available port 1 purely act as I/O port without any dual functions. Port 3 is used for serial communication through which the GPS & GSM Modules can functionalize. It's address bus is of 16 bit wide & can be operated through port 0 & port 2.

2. Temperature Sensor

A temperature sensor is a device, normally a thermocouple or a RTD, that sense the temperature from a particular source and converts the data into appropriate form for a device(Microcontroller). The RTD is a temperature sensing device whose resistance changes with temperature. Typically built from platinum, nickel & copper, RTDs are available in different shapes like wire wound, thin film. To measure the resistance across an RTD, provide a constant current, calculate the resulting voltage, and measure the RTD resistance. RTDs exhibit

linear resistance to temperature curves over their operating regions, and any nonlinearity are highly predictable and repeatable. The RTDs are biased with a constant current source. So as to reduce self-heat due to power dissipation, the current magnitude is moderately low.

3. GSM Module

GSM Module is used to connect microcontroller to the GSM network. A GSM module is an chip that connects to the GSM Network using a SIM (Subscriber Identity Module) and Radio Waves. The well known radio frequencies in which a typical GSM Module operates are 850 Mega Hertz, 900 Mega Hertz, 1800 Mega Hertz and 1900 Mega Hertz. A serial communication can be setup between the microcontroller & the other devices wirelessly.

4. GPS Module

A GPS module is a device that uses Global Positioning System to calculate the location of a object. GPS receivers provides reliable positioning, navigation and timing services to the users at any incident of time at anywhere on the earth. It uses 23 to 33 satellites to pass the data to the receivers.

5. Wireless Transceiver Module

This wireless module is responsible for radio frequency communication using the serial port of the microcontroller The data pin goes to the serial port of the microcontroller where the received byte is saved and processed. The transmitter has three pins, Gnd for Ground, Vcc for Power & the receiver, on the other hand, is a 5v device which also has power, data and GROUND.

6. Relay

An electromagnetic relay is nothing but a switch which is used to switch High Voltage or Current using Low power circuits. It magnetically isolates low power circuits from high power circuits. It is activated by energizing a electromagnet, coil wounded on a soft iron core A microcontroller will not able to supply current required for the proper working of a relay. The maximum current that A89C51 microcontroller can sink is 15mA while a relay needs about 50 to 100mA current. A relay is activated by energizing its coil. Microcontroller may stop working by the negative voltages produced in the relay due to its back emf. Therefore ULN2003 relay driver IC is used to connect relay to the microcontroller.ULN2003 is a monolithic IC consists of High Voltage High Current Darlington transistor arrays.

Conclusion

The proposed Microcontroller based fully robust fire sensing and protection system will be a finest solution for any place where there are the often exposure of fire through any means. The robustness of the proposed model will surely contribute not only to the safety of mankind but also in saving the lives.

References

1) X. Hu, T. H. S. Chu, H. C. B. Chan, and V. C. M. Leung, "Vita: a crowdsensing-oriented mobile cyber-physical system," *IEEE Transactions on Emerging Topics in Computing*, vol. 1, no. 1, pp. 148–165, 2013.View at: Publisher Site | Google Scholar

2) Osterlind, F.; Pramsten, E.; Roberthson, D.; Eriksson, J.; Finne, N.; Voigt, T. Integrating building automation systems and wireless sensor networks. Proceedings of Emerging Technologies and Factory Automation, 2007. 1376-1379.

Comparative Study Of Electrical Conductivity Of Proton Polymer Electrolyte With Different Nanofiller

B.H.Bhatti, R.V.Joat , K.B.Raulkar , G.T.Lamdhade , Abdul Haq Tantray

Department of Physics, Vidya Bharati Mahavidyalaya, C. K. Naidu Road, Camp, Amravati, M.S. India 444602

Abstract

Polyvinyl alcohol doped with Ammonium nitrate and aluminum oxide ($PVA+CH_3COONH_4+Al_2O_3$) synthesized by solution casting method. The comparatively study of AC, DC conductivity of ($PVA+CH_3COONH_4+Al_2O_3$) and $PVA+CH_3COONH_4+SiO_2$) were studied. The AC and DC conductivities were increasing with respect to the temperature and frequency as compares to the individual conductivity of pristine materials. The dielectric study also reported.
Keywords: $PVA+CH_3COONH_4+Al_2O_3$, AC and DC Conductivity, dielectric constant

Introduction

A polymer is a large molecule which is composed of many repeated subunits. Both synthetic and natural polymers play an important role in everyday life because of their wide range. Polymers, both natural and synthetic, are created via polymerization of many small molecules, known as monomers [1-5]. Poly (vinyl-alcohol) (PVOH, PVA, or PVA) is a water-soluble synthetic polymer. It has the idealized formula $[CH_2CH(OH)]_n$. It is used as an emulsion polymerization aid, as protective colloid, to make polyvinyl acetate dispersions. Examples of ammonium salts are ammonium chloride, NH_4Cl, ammonium nitrate , NH_4NO_3, and ammonium carbonate, $(NH_4)_2CO_3$. The chemical compound formula of ammonium acetate is $[NH_4CH_3CO_2]$. It is a white, hygroscopic solid and can be derived from the reaction of ammonia and acetic acid [6-8]. The present work devoted to study of AC and DC conductivity of Poly (vinyl-alcohol) and Ammonium nitrate doped with Aluminum Oxide (Al_2O_3) and Silicon dioxide as Nanofillers.

Experimental Technique
Method of preparation of PVA: Ammonium acetate Films

In the present work, isothermal evaporation technique has been used for the preparations of samples. Polymers PVA and ammonium salts were taken in pure form by mole percent and dissolved separately in double distilled water by mole percent. These solutions are mixed together by magnetic stirrer in the ratio 80:20. The solution mixture was then heated for 1 hour at 70^0C to get completely homogeneous solution. A glass plate (15 cm x 15 cm) thoroughly cleaned with water and later with acetone was used as a substrate[9-10]. To achieve perfect leveling (and uniformity in thickness of the films), a pool of mercury was used in a plastic tray. The solution was poured on the glass plate and was allowed to spread uniformly in all directions on the substrate .The whole assembly was placed in a dust free chamber at room temperature. The solvent in the solution was thus allowed to evaporate completely and get air-dried. The film on the glass substrate was then removed and cut into small pieces of suitable sizes. Further it was dried for 3 days to remove any traces of solvent [10-14].
Method of preparation of PVA Ammonium acetate Films using Nanofiller
The nanofiller were dissolved in PVA with ammonium nitrate by different mole percent.

Equipment Used For Material Preparation
Sonicator

Sonication is the act of applying sound energy to agitate particles in a sample, for various purposes. Ultrasonic frequencies (>20 kHz) are usually used, leading to process also being known as ultra sonication. In the laboratory, it is usually applied using an ultrasonic bath or ultra sonic probe, colloquially known as sonicator.


Fig (a).Sonicator

Electrode Coatinng

In thin a highly conducting, quick drying silver paint is applied on both side of the film by using a fine brush. It develops excellent adhesion & conductivity after 3-4 hours at room temperature. They have a current carrying capacity of 1.5 A.

Lcr Meter

AC Conductivity and Dielectric Constant will be measured by using 4284 A Precision LCR meter (20 Hz-1 MHz) supplied by Agilent Technology, Singapore.
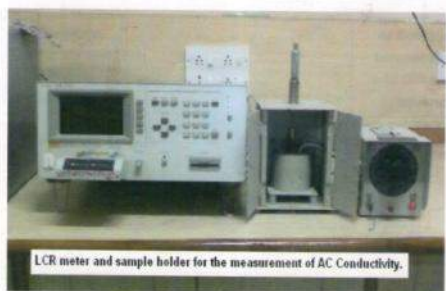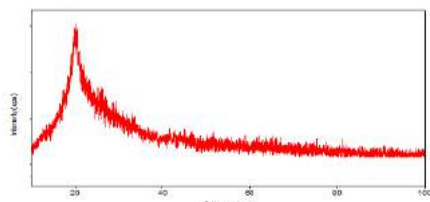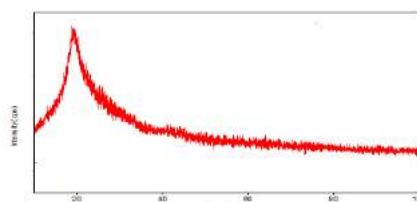

Xrd Of Sample

Fig.(a) XRD for pure PVA   **Fig.(b) XRD for PVA+AAC (80:20)**

Interpretation Of Xrd Graphs

The X-ray Diffraction Pattern of pure PVA and Complex with 20 mole % of Ammonium Acetate as shown in Fig (a) & Fig (b). Fig (a) & Fig (b) exhibits the Broad peak in the 2Θ range from $18\text{-}22^0$, which matched well with (110) reflection due to pure PVA reported in the Literature. According to literature, there is a correlation between the intensity of the peak and the degree of crystallinity .The absence of peaks corresponding to ammonium acetate confirms the complete dissociation of it in the polymer matrix. The concentration of ammonium acetate increases then the crystallinity decreases and amorphosity increases.

Results And Discussion
Dc Conductivity

- **I/V Characteristics**
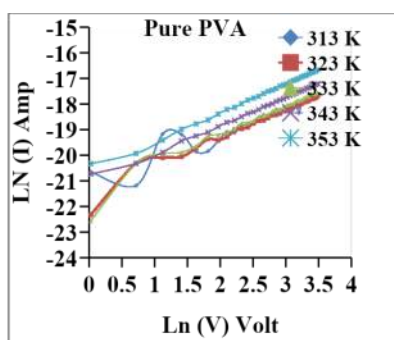
Fig 3.1. (a)   **Fig 3.1. (b)**   **Fig 3.1. (c)**

Fig 3.1. (d)   **Fig 3.1. (e)**   **Fig 3.1. (f)**
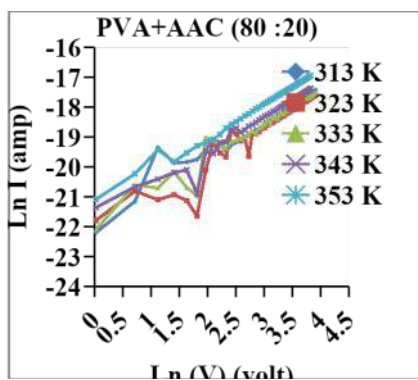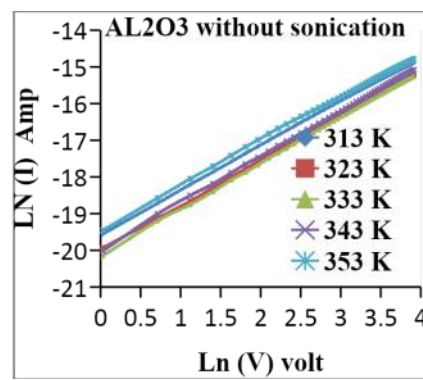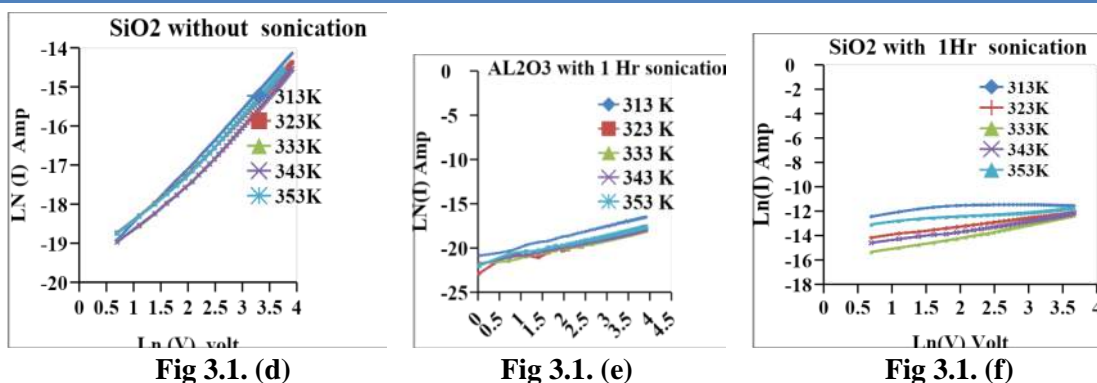
From the above graphs Fig 3.1(a,b,c,d,e & f) it is observed that for pure PVA and PVA+AAC when the voltage is increases there is also increase in the current so that it nearly obeys the ohm's law. But, when nanofillers are doped to the sample there was also observed that the voltage is increasing with the increasing current and it perfectly obeys the ohm's law.

- **Arrhenius Plot (1000/T V/S Ln Σ) :**

Fig 3.1.2 (a)   **Fig 3.1.2 (b)**   **Fig 3.1.2 (c)**

Fig 3.1.2 (d)   **Fig 3.1.2 (e)**   **Fig 3.1.2 (e)**
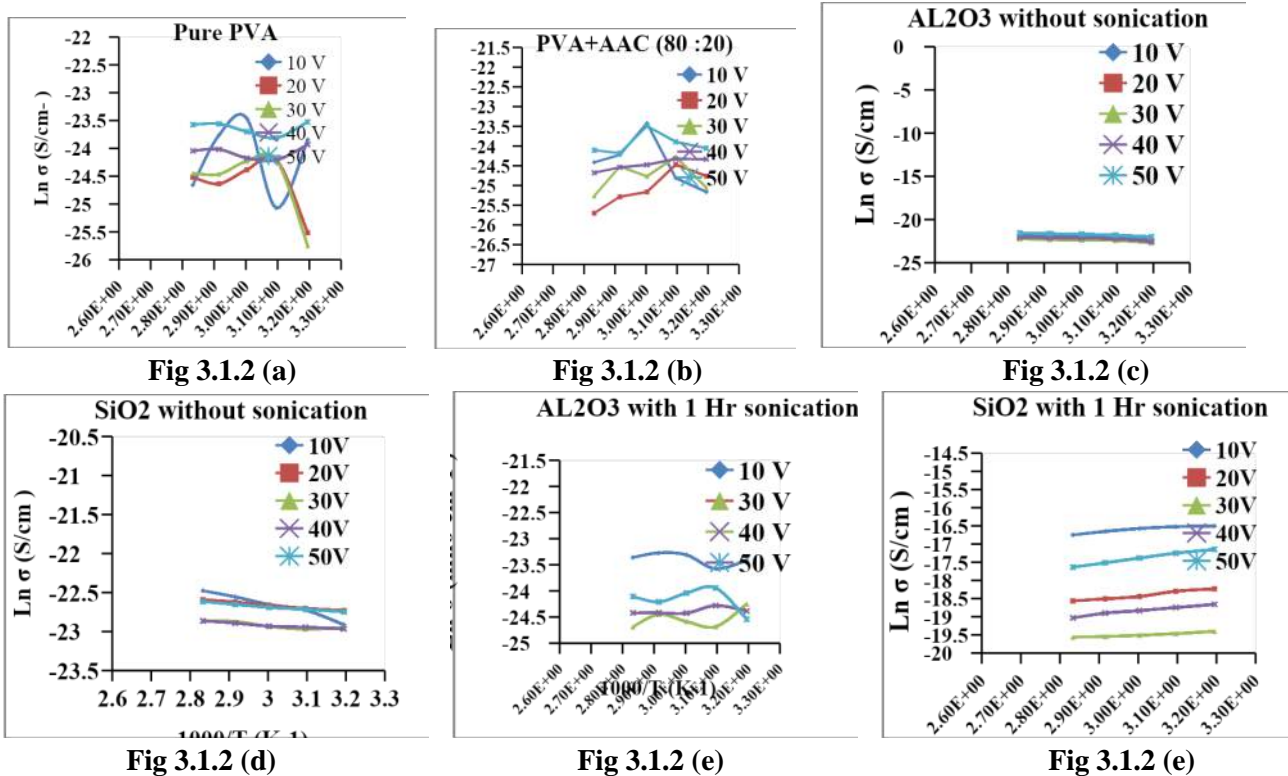
The temperature dependence of proton conductivity for all the prepared doped blend polymer electrolyte over the temperature range 313-K 353-K as shown in fig 3.1.2(a, b, c, d, e & f). It is seen that the conductivity increases linearly with an increase of temperature for PVA: NH_4COOCH_3 (80:20). This is favorable to high conductivity of high temperature. The polymer complex PVA: NH_4COOCH_3 (80:20) exhibits the highest ionic conductivity. The DC conductivity values follow the Arrhenius type thermally activated process given by the following relation

$$\sigma = \sigma_0 \exp(-E_a/kT) \qquad (1)$$

Where σ_0 is the pre-exponential factor, E_a is the activation energy and k is the Boltzmann constant. The temperature dependence of ionic conductivity for the composition PVA : NH_4COOCH_3 (80 : 20) polymer electrolyte, it has been observed that the proton conductivity of electrolyte increases with increasing in temperature for all complexes. The linear variation of ionic conductivity with inverse of absolute temperature reveals the Arrhenius type thermally activated process given by the relation

$$\sigma T = \sigma_0 e^{(-E_a/kT)} \qquad (2)$$

Where σ_0 is the pre-exponential factor, E_a is the activation energy, T is the absolute temperature and k is the Boltzmann constant. Drudger et al. have attributed the increasing conductivity with temperature in solid

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293
(Special Issue No.70) Peer Reviewed Journal   www.aiirjournal.com Mob. 8999250451

356

polymer electrolyte to segmental motion, which results in an increasing in the free volume of system. Thus the segmental motion either permits the ions to hop from one site to another or provides a pathway for ions to move. As the amorphous region increases, the polymer chain acquires faster internal modes in which bond rotation produces segmental motion to favor inter and interchange ion hopping , thus the conductivity become high.
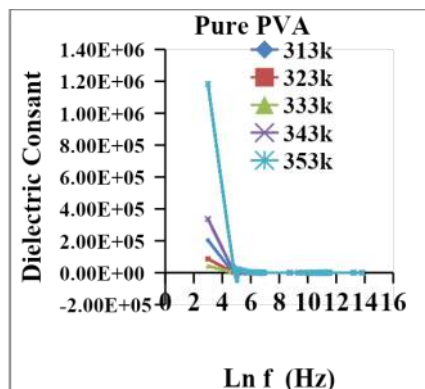
Ac Conductivity

- **Dielectric Constant V/S Frequency**

Fig 3.2.1(a)
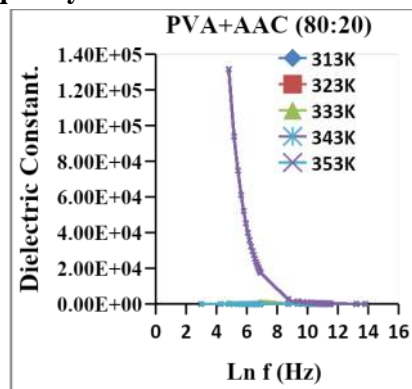
Fig 3.2.1(b)
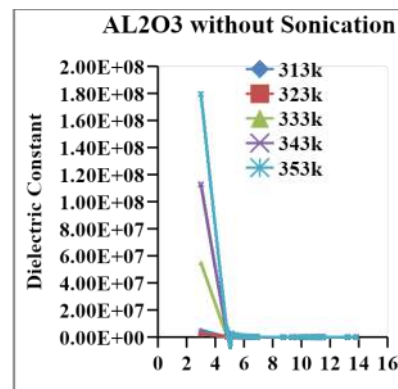
Fig 3.2.1(c)
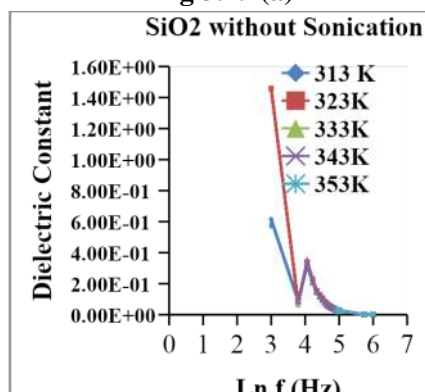
FIG 3.2.1(d)
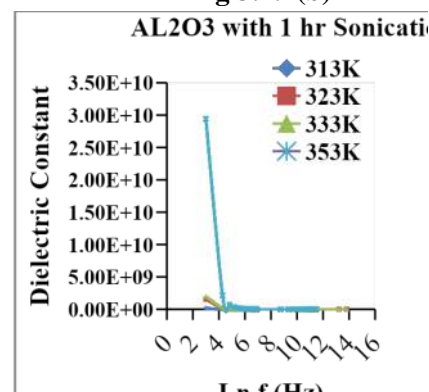
Fig 3.2.1(e)
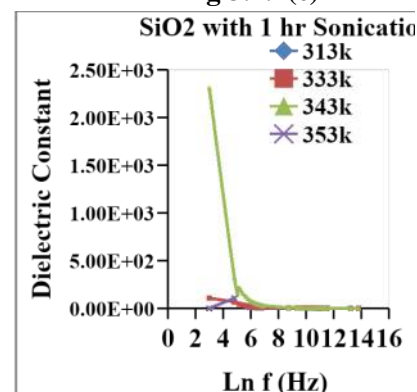
Fig 3.2.1(f)

From the above graphs fig 3.2.1 (a, b, c, d, e & f) it is observed that dielectric constant decreases with increase in the frequency and attain a constant value at higher frequency range similar to that for the polar material. The initial value of permivity is high but with the increase in the frequency, this value begins to decrease. This is expected behavior in most dielectric materials. We have also noticed that there is increase of dielectric constant with the increase in temperature.

Figure 3.2.1 (a, b, c, d, e, f, g & h) represents frequency dependence of dielectric constant for room temperature and 20 mol% of NH_4COOCH_3 doped with PVA. In the above figure the observed variation in dielectric constant with frequency could be attributed to the formation of space charge region at the electrode and electrolyte interface, which is familiarly known as the non-Debye type of behavior, where the space charge region with respect to frequency are explain in terms of ion diffusion. The increase in the dielectric constant represents a fractional increase in charge within the polymer electrolyte. It is clear that the value of dielectric constant is very high at very low frequency region. It is due to the presence of space charge effects which is contributed by the accumulation of charge carriers near the electrode. At high frequency, dielectric constant has been found to be relatively constant with frequency. This is because periodic reversal of the field takes place so rapidly that the charge carries will be able to orient themselves in the field direction resulting in a decrease of dielectric constant. An increase in value of dielectric constant has been observed at higher temperature and is attributed to the higher charge carrier density. Same result occurs in composite polymer electrolyte.
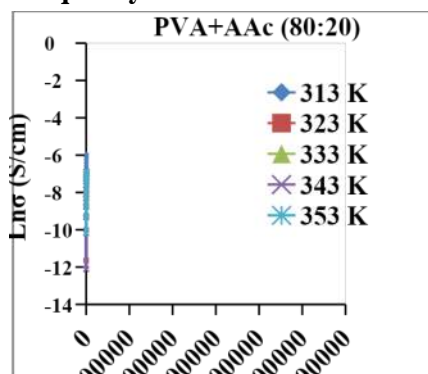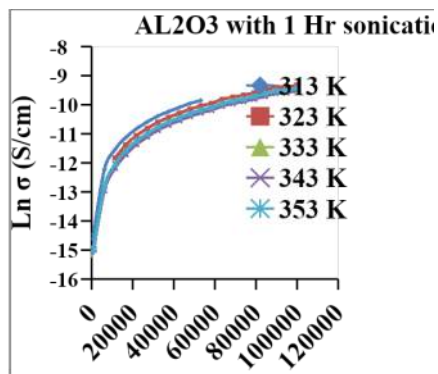
- **Arrhenius Plot**

Frequency V/S Ln Σ
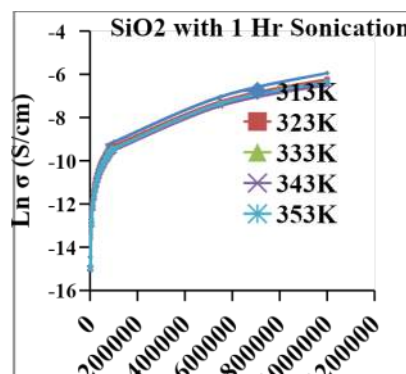

Fig 3.2.2(a)	Fig 3.2.2(b)	Fig 3.2.2(c)

From the above graphs, fig 3.2.2(a), fig 3.2.2(b) and fig 3.2.2(c) it is conclude that the AC conductivity of pure PVA is increases when it is doped with 20 mole% of ammonium acetate concentration. As shown in graph the conductivity of pure PVA at room temperature is increases with addition of ammonium acetate. The conductivity increases with increase of ammonium acetate up to 20 mole%, because the number of mobile charges increases which is useful for the purpose of conduction. After adding nanofiller such as Al_2O_3 & SiO_2 there observed a gradual increase in the conductivity of the polymer electrolyte. The Frequency dependence conductivity of polymer electrolyte obeys jonscher's power law. The conductance spectra consist of three distinct regions. The low frequency dispersion region can be ascribed to the space charge polarization at the blocking electrode. The final high frequency region conductivity dispersion has been observed, and it is predominant at low temperature. The high frequency region for different temperature has been explained through Jonscher's universal power law.

$$\sigma(\omega) = \sigma_{dc} + A\,\omega^{\alpha}$$

σ_{dc} is the frequency independent conductivity of the prepared polymer electrolyte. A is the temperature-dependent dispersion parameter, and α is the power law exponent ($0 < \alpha < 1$) that has been fitted to experimental data at medium and high frequency region using non-linear least square fitting procedure. From the result, it has been found that the DC conductivity values are in good agreement with this obtained from Cole-Cole plot. It has been found that the DC conductivity increases with an increase of temperature which suggests that the free volume around the polymer chain causes the increase in mobility of ions and polymer segments, and hence the conductivity increases.

Conclusions

PVA based polymer electrolyte with concentration of ammonium acetate and doped with Al_2O_3 & SiO_2 have been prepare by solution cast technique. The XRD spectrum confirms the amorphous nature of the polymer electrolyte with the addition on NH_4COOCH_3 salt of solid polymer electrolyte. The highest ionic conductivity has been found to be PVA: NH_4COOCH_3 (80:20) polymer electrolyte from the Cole-Cole plot and also confirms the conduction spectrum. The increase in conductivity may be due to increase in amorphous nature and complex formation confirm by XRD spectrum. The temperature dependence conductivity of proton conductor polymer electrolyte PVA: NH_4COOCH_3 and composite polymer electrolyte PVA: NH_4COOCH_3: Al_2O_3 and PVA: NH_4COOCH_3 SiO_2 obeys the Arrhenius behavior. The temperature dependence conductivity of PVA: NH_4COOCH_3: Al_2O_3 (1.60×10^{-1}) is greater than electrolyte PVA: NH_4COOCH_3: SiO_2 . Frequency dependence conductivity of proton conductor polymer electrolyte PVA: NH_4COOCH_3 and composite polymer electrolyte PVA: NH_4COOCH_3: Al_2O_3 and PVA: NH_4COOCH_3: SiO_2 obeys jonscher's power law. The low value of n (n=exponent value) shows less columbic interaction between ions which enhances the ionic conductivity. The proton conductor polymer electrolyte PVA: NH_4COOCH_3 and composite polymer electrolyte PVA: NH_4COOCH_3: Al_2O_3 has the highest dielectric constant indicating highest storage capacity.

References

1) Painter, Paul C.; Coleman, Michael M.. Fundamentals of polymer science : an introductory text. Lancaster, Pa.: Technomic Pub. Co. p. 1 (1997).

2) McCrum, N. G.; Buckley, C. P.; Bucknall, C. B.. Principles of polymer engineering. Oxford; New York: Oxford University Press. p. 1(1997).

3) IUPAC, Compendium of Chemical Terminology, 2nd ed. (the "Gold Book") (1997). Online corrected version: (2006–) "macromolecule (polymer molecule)".

4) Hema M, Selvase karapandian S, Nithya H, Shakunthala A % Arun Kumar D, Ionic, 15 487 (2009).

5) Hasoon Salah Abdula, Abdullah Ibrahim Abbo , Int.J ElectroChem. Sci. , Vol. 7, p.p 10666-10678, (2012).

6) Kareema .M. Ziadan, Hussein. F. Hussein, K. I. Ajecl, Energy procedia, vol 18, pp. 157-164 (2012).

7) Selvase karapandian S, Hiran kumar G, Kawamura J, Kuwata N, & Hattori T, mater Lett, 60 1724(2006).

8) Mishra R, Baskaran N, Ramkrishnan P A, Rao KJ Lithium ion conduction in extreme polymer in salt regime , solid state Ionics 112:261-273(1998).

9) Drudger SD, Nitzam A, Ratner MA J Chem Phys 79:3133-3142(1983).

10) Ramesh, S. and Chai, M.F. Conductivity, Dielectric Behavior and FTIR Studies of High Molecular Weight (Polyvinylchloride)—Lithium Triflate Polymer Electrolytes. Materials Science and Engineering: B, 139, 240-245(2007).

11) Ramya, C.S., Savitha, T., Selvase kharapandian, S. and Hiran Kumar, G. Transport Mechanism of Cu-Ion Conducting PVA Based Solid-Polymer Electrolyte. Ionics, 11, 436-441(2005).

12) Macdonald JR Impedance spectroscopy (ed). Wiley New York, USA(1987).

13) Armstrong RD, Dickinson T, Wills PM J Electronal Chem 53(3): 389-405(1974).

14) Jonscher AK Nature 267:673-679(1977).

Potentiodynamically Synthesis And Characterization Of Polyaniline Thin Films.

Prashant P. Gedam

Shri R.L.T.College of Science, Akola

RUSA – Centre For Advanced Sensor Technology,
Aurangabad

Mahendra D. Shirsat

RUSA – Centre For Advanced Sensor Technology,
Aurangabad

Dept. of Physics Dr. BAMU, Aurangabad

Abstract :

In the present investigation, we study the electrochemical behavior of polyaniline thin films (PANITFs) which is synthesized by cyclic voltametry on platinum working electrode in three electrode system. During deposition of PANITFs various process parameter viz. concentration of monomer, dopant and scan rate of the cycle were optimized. The surface morphology was characterized by scanning probe technique viz. Atomic Force Microscopy (AFM) shows the thin films of PANI were grown on platinum working electrode.

Keywords : polyaniline thin film, cyclic voltametry, Atomic Force Microscopy.

Introduction:

World is going to developed tremendously due to liberalization, privatization and globalization but at the same time we have to face the some adverse effect of environment on living being. Therefore the researchers from various fields are tryig to developed new materials which is helpful to nurture our nature for our future. Therefore scientist fascinated towards the conducting polymers i.e. polypyrrole [1 - 2], polyaniline [3 - 4] and polythiophene [5] due to its tunable conductivity, low power consumption and ease of synthesis [6 - 9]. Conducting polymer films is synthesize by chemical oxidative polymerization technique [10] with the necessity of good oxidizing agent which can produced a thick films and required very large reaction time to carry out the process. Thin films of conducting polymer is synthesized by electrochemical route [11] which provide short duration of time to carry out the process without oxidizing agents.

Therefore in present investigation keeping the idea of electrochemical polymerization technique PANI thin films were synthesized potentiostatically and deposited on platinum working electrode (vs Ag/AgCl reference electrode). The topographical image of PANI thin film is recorded by Atomic Force Microscopy (Park XE 7). The electrochemical characterization performed by utilizing CH 600C electrochemical work station. A three electrode cell containing platinum plates of dimensions 20 * 5 *0.5 mm^3 were used as working & counter electrodes and saturated Ag/AgCl used as reference electrode. In the preparation of electrolyte, aniline monomer distilled twice prior to used and stored in cold environment were purchase from Sigma Aldrich. The reagent used as hydrochloric acid (HCl) of laboratory grade. . In the electrolyte preparation 1 M of HCL is added drop wise with continuous stirring in 0.5 M of aniline for half an hour. This solution was used for electrochemical deposition of PANI thin films on platinum working electrode at room temperature.

Result And Discussion:

PANI thin films were synthesis by cyclic voltametry by sweeping the potential between -1.0 to + 1.0 V for a 10 successive cycles at a scan rate of 50 mV/s. electrochemical polymerization of PANI involves two stage. In first stage PANI grown on the bare electrode shows a compact granular layer. In second stage PANI further grown on the form of granular layer and finaly form loosely bound open structure. It is seen that the first oxidation peak is at a potential of 0.3 V can attributed to the formation of emeraldine from lucoemeraldine, wheras the oxidation peak 0.9 V is related to the formation of pernigraniline from emeraldine. Beside, the oxidation process of other impurities was also found at the potential of 0.6 V. reverse reduction process occurs with a peak potential beyond 0.8 V and with a formation of lucoemeraldine from emeraldine and at a potential of 0.2 V is the formation of emeraldine from pernigraniline [12]. The modification in the topographic surface of the substrate after deposition of PANI thin film on working electrode is confirmed by Atomic Force Microscopy (AFM). The AFM topographical image shows the deposition of PANI on the electrode due to the increase surface area of sample.
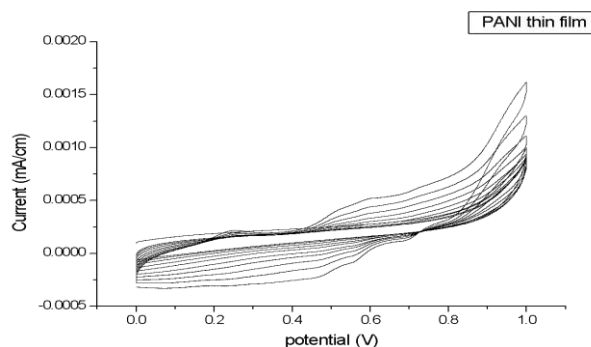
Fig. 1.: Cyclic voltamogram of PANI thin film recorded for sweeping rate 50 mV/s in 1M HCL aqueous solution
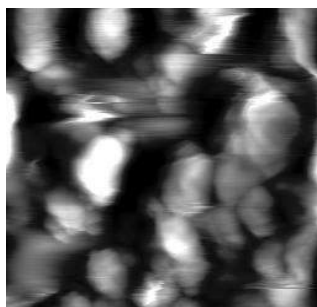

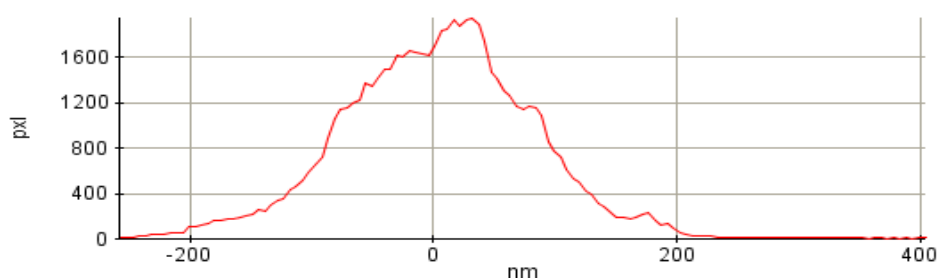Fig 2.; Surface morphology of PANI thin film by AFM.

Fig. 3. Histogram of PANI thin films.

Conclusion :

electrochemical polymerization technique is utilized to synthesis and characterization of PANI thin film on platinum working electrode at room temperature. A voltamogram is recorded which required less reaction time with lower sweeping voltage with a scan rate of 50 mV/s as well as do not require any oxidant compare to the chemical oxidative polymerization technique. The oxidation peak nearly at 3 V confirmed the synthesis of PANI thin films. Surface morphology of deposited PANI thin film was studied by Atomic Force Microscopy, which confirms the deposition of PANI thin film on the working electrode due to roughness of topographic image

Acknowledgement

References:

1. P. Pawar, A.B. Gaikawad, P.P. Patil, Electrochemical synthesis of corrosion protective coating on mild steel from aqueous salicylate medium, Sci. Technol. Adv. Mat. 7 (2006) 732–744.
2. A.H. El- Shazly, H.A. Al-Turaif, Improving the corrosion resistance of buried steel by using polyaniline coating, Int. J. Electrochem. Sci. 7 (2012) 211–221.

3. P. Herrasti, P. Ocon, Polypyrrole layers for steel protection, Appl. Surf. Sci. 172 (2001) 276–284.

4. J.I. Martins, T.C. Reis, M. Bazzaoui, E.A. Bazzaoui, L.I. Martins, Polypyrrole coatings as a treatment for zinc-coated steel surfaces against corrosion, Corros. Sci. 46 (2004) 2361–2381

5. Stelian Lupu, In situ electrochemical preparation and characterization of PEDOT–Prussian blue composite materials Synthetic Metals 161 (2011) 384–390

6. Heeger Alan J. " Semiconducting and polymers: the fourth generation of polymeric materials " *Synth. Met.* **125** 23, 2002.

7. MacDiarmid G " Synthetic metals : a novel role for organic polymers"2002 *Synth. Met.* **125** 11

8. R.K. Paul, C.K.S. Pillai, B.R. Mattes.(2000) Melt/solution processable conducting polyaniline with novel sulpfonic acid dopants and its thermoplastics blends. Synth. Met. 114 , pp 27- 35.

9. M.T. Nguyen, P. Kasai, J.L. Miller, A.F. Diaz, (1994). Synthesis and properties of novel water soluble conducting polyaniline copolymers. ACS, Macromolecules. volume 27 pp 3625 – 3631.

10. S. Adhikari, P. Banerjee (2010). Enhanced conductivity in iodine doped polyaniline thin film form by thermal evaporation, Thin films volume 518, issue 19,pp 5421 – 5425.

11. O.Kazume , M Bobby Kannan (2013). Galvanostatic polymerization of aniline on steel : improving the coating performance in choride – containing environment. Synthetic metal Vol. 180, pp 54 – 58.

12. Chu Van Tuan , Mai Anh Tuan, Nguyen Van Hieu , Tran Trung. Electrochemical synthesis of polyaniline nanowires on Pt interdigitated microelectrode for room temperature NH3 gas sensor application

Development of Automatic Dipper Mechanism system

C.R.Chaudhari

Research scholar, Department of Electronics Mahatma Fule Arts Commerce and Sitaramji Choudhary Science Mahavidhyalay Warud, Dist Amravati

Dr.G.K.Reddy

Assistant Professor Department of Electronics Mahatma Fule Arts Commerce and Sitaramji Choudhary Science Mahavidhyalay Warud, Dist. Amravati

Abstract:

In our country percentage of accidents increases day by day. A major accident happens due to reflection of light on the eyes of the driver. Human eyes are very sensitive to the light. If eyes suddenly come in contact with the light, after darkness vision gets blank and requires some time to recover the vision. Many times the situation comes when suddenly vehicle approaches from front or from side (L/R) with headlight in upper mode causes blindness to the eyes of the driver. During that time vehicle covers a blind distance and hence it leads to accident. This temporary blindness of eyes is called as glaring effect. Safety factor is always needed to be considered. One of the essential safety features is that need to be installed an automatic upper-dipper control system. This paper presents Automatic mechanism of Dipper in the Bike/Car. This paper presents Automatic mechanism of Dipper in the Bike/Car. While driving a Bike/Car in the night many drivers do not use dipper the lamps of their vehicles in night. To overcome this manual upper dipper problem, an mechanism has made for dipper the headlight automatically whenever situation occurs.

Keywords: Photo sensor, dipper, sensitivity, etc.

Introduction

In twenty-first century security system, people are looking for their security systems to make sure their families, staff, or possessions are protected. Rapid and continuing advances in technology have made traditional security systems outdated and ineffective at properly protecting your family. One of the ways that technology has transformed security features by means of smart security systems. Similarly the number of vehicles on roads is increasing day by day and all the vehicle manufactures are thinking about the extra safety instruments and smart electronic controls to attach with these products for giving the user safety. While diving at night the headlight of oncoming vehicle is directly affects the driver's eye and eye gets blur and this takes several time to recover to its normal vision. This temporary blindness of eyes is called as glaring effect. Safety factor is always needed to be considered. One of the essential safety features is that need to be installed an automatic upper-dipper control system. This proposed system can mainly use during night time while driving bike/car. This paper presents Automatic mechanism of Dipper in the Bike/Car. While driving a Bike/Car in the night many drivers do not use dipper the lamps of their vehicles in night. The rest of the research is organized into three different sections, namely Literature survey, implementation of hardware and conclusion as below.

Literature Survey

Most of the accidents are happened in night due to glaring effect to eyes due to upper mode of headlight of upcoming vehicle. To overcome this glaring effect an average human eye needs 3 to 8 sec which may be one of reason for accidents [1]. The driver has the control mechanism of the headlight which can be switched from upper light to dipper. The headlight of bike/car has to be adjusted according to the light requirement by the driver. Headlight beam needs to be lowered, which dip the headlight from which beam to a dipped beam. As the dipper unit is well connected to the lighting system of the vehicle [2]. most of the drivers are still not use the dipper light due to many reasons because the operation of dipper control switch is hundreds of times at night driving. Other reason is that the driver wants to pay more attention to the steering/handle instead of to dipper the head light. Another major cause is 'ego problem', which makes each one wait till the other person initiates dipping [3]. Other reason is that the driver wants to pay more attention to the steering/handle instead of to dipper the head light. Another major cause is 'ego problem', which makes each one wait till the other person initiates dipping, which may not happen [4]. In some cases the IR technology is used to overcome the problem of upper and dipper mechanism, but in this case the IR technology is used to detect an object. So opposite

object must have to carry an IR-Tx so that IR-Rx of receiving device will detect the opposite object [5]. The proposed system is made to overcome all of these problems with the low cost and efficient technology.

Implementation Of Hardware

The foremost working consists of the front end components i.e. the LDR (Light Dependent Resistor) which is also known as photocell, photoconductor. LDR is a one type of resistor whose resistance changes depending on the light falling on its surface. When the light falls on the resistor then the resistance changes its value. Here the LDR is used to change the output of IC555 ie. used to change the high output to the low one. This phenomenon is used in this application of Upper and Dipper control mechanism where it is used to change the dipper mode from the upper mode automatically when the light falls on the Light Dependent Resistor.

A. *Architecture*

This Proposed system uses LDR which senses the light of coming vehicle, as a result the resistance of LDR changes as per light intensity. LDR sense the light and change its internal resistance according to the light fall on it, which is further mounted over the Headlight of bike/car, the light falls on the LDR only when vehicles is approaching and is distance of 1M to 9M. When light of the coming vehicle falls on the bike/car, due to LDR the resistance decreases and makes output of IC555 low. When the distance between two approaching vehicles is more than 9 meter the circuit is not operated. Due to change in intensity given to 555 timer control, the output of IC555 becomes high or low. On this basis of triggering condition, the result of headlight control from upper to dipper occurs. Once the Front vehicle passed away and the light is not falling on the LDR, LDR goes in dark and output of 555 IC changes from low to high. It changes headlight beam from dipper to upper.

B. *Module*

Every system can be divided into number of modules for better understanding. In this proposed mechanism different modules are used are mentioned below. The key factor of this system is LDR (Light dependent Register) which mainly used to make the headlight low or high. Second key term is used in this mechanism is IC555 which helps the headlight to turn the dipper and upper according to the LDR operations.

C. *Components used*

LDR:

An LDR ie. Light dependent resistor which also called as photocell, photoconductor, is a one type of resistor whose resistance varies depending on the amount of light falling on its surface. When the light falls on the resistor, the resistance changes its value. Light dependent resistors are often used in many circuits where it can sense the presence of light. These resistors have a variety of functions in the resistors. When the LDR is in darkness, it can be used to turn the light of bike/car in the upper mode and turn dipper when it is in the light. A typical light dependent resistor has a resistance in the darkness of 1 MΩ, and in the brightness a resistance of a couple of KΩ.

IC555:

it is a timing circuit which gives accurate and highly stable delays of time or oscillation. These types of ICs are very cheap in cost and reliable. These IC's are used for astable, monostable as well as bistable multivibrators as flip flops in digital logic circuits, analog frequency meters, voltage regulators, temperature controlled and measurement devices. The IC555 is used in the temperature ranges from – 55°C to 125°C and the IC555 is used for where the temperature ranges from 0° to 70°C
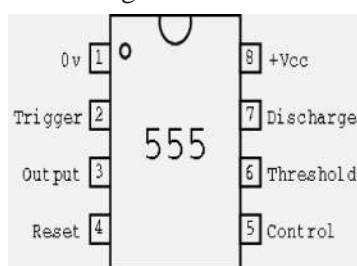

Fig.3. Pin out of IC555 Timer.

National Conference on Multidisciplinary Research in Science and Technology for Healthy Lifestyle Management
(NCMRST- 2020) Organizer :- Shri R.L.T. College of Science, Akola

24th Jan. 2020

Capacitor:

Capacitors are used to Store electrical energy by separating positive and negative charges. They stores electrons by attracting them to a positive terminal and photons to the negative terminal. When the voltage is reduced or removed the electrons move off as well. When the capacitor removes or adds electrons to the circuit it can work to smoothly. Capacitor passes AC signal and blocks DC signal.

Resistor:

Resistors are used to block or limit the amount of current flow. In some circuits different voltages need to be supplied to different parts of a circuit and this is to be done by means of the resistors.

Conclusion

The result contains the working of Development of Automatic Dipper Mechanism system, The proposed mechanism works properly and can be used as automatic upper-dipper. The efficiency, accuracy is highly reliable and the costing of the proposed system is very low.

Reference

1) G.M. Pushpanjali, P.S. Mali, R.R. Naman, "Automatic Headlight Dipper with Respect to Upcoming Vehicles Response". International Journal on Emerging Technologies (Special Issue on ICRIET-2016) 7(2): 169-172(2016) ISSN No. (Print) : 0975-8364 ISSN No. (Online) : 2249-3255

2) Udaya Sharma, Deepak Rasaily , Tashi Rapden Wangchuk, Ankita Pradhan, Kiratti Upashna, "Automatic Dipper Circuit for Vechicle using AT89S52 Microcontroller". International Journal of Engineering Trends and Technology (IJETT) – Volume 33 Number 8- March 2016 ISSN: 2231-5381 Page 373

3) Tejas Vijay Narkar," AUTOMATIC DIPPER LIGHT CONTROL FOR VEHICLES". International Journal of Research in Engineering and Technology eISSN: 2319-1163, pISSN: 2321-7308 Volume: 05 Issue: 03, Mar-2016

4) Mohit Sovale, Sijeth RS, Shishir Arse, Sonu kumar Sahu, Ramu Goyal, Madhvi Sharma, "Design and Analysis of IR based Upper Dipper Light Control for Vehicles". IJO-Science International Journal Online Of Science ISSN-2455-0108, Impact Factor-2015-3.462, Volume 4, Issue 4 April

5) A.S.M Asaduzzaman, Mohammad Mahmudul Islam, Shuva Paul, Md Farhat Alam, Md Mashuker Rahman, "Automatic High Beam Controller for Vehicles". International Journal of Scientific & Engineering Research Volume 4, Issue3, March-2013, ISSN 2229-5518

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293
(Special Issue No.70) Peer Reviewed Journal www.aiirjournal.com Mob. 8999250451

365

Smart Robotic Arm with Raspbery Pi

Nilanjan Chakraborty
(Department of electronics science M.SC Final),
Fergusson College, Pune

Angkan Gayen
(Department of electronics science M.SC Final),
Fergusson College, Pune

Abstract—

   Automation and artificial intelligence have become one of the major areas of Research & Development which has made a drastic improvement in electronic science and computer science. This system is self-governed. Here in this paper we put forward the overview and mathematical aspects of robotic arm. The aim of this project is to allow the robot to grip and hold objects. Raspberry pi and other electronic circuits can be used to drive arm actuators by coding. This gadget has wide range of applications. Some are stated here- pick and drop, limiting human arm, drawing objects with programmed intelligence, throwing light-weight objects based on mathematically governed functions after designing and implanting, we can mount it to the mobile base so that it can get complete plane of locomotion. The human arm is considered to have rational ability mainly at shoulder, elbow and wrist. The actuators have to carry the load of the entire arm. In short, the robot redo analyzing errors from its previous attempts and improve in every successive attempt. The algorithms decide complexity of operation.

Index Terms, theoretical backgrounds, introduction to servo motor, open-cv platform, colour detection, Detection of objects.

Introduction

The application of robotics is broadly used in the field of research, industries and laboratories to automate process and reduce human efforts and errors. Here we have described the design of mechanical structure of a robotic arm. This often move objects from one place to another. In industries, this application is made in use to move weighable objects from one place to another as required. Its advantage is faster completion with lower errors.

Theoretical Backgrounds

- **Introduction to raspberry pi 3**

   The **Raspberry Pi** is a series of small single-board computers developed in the United Kingdom by the Raspberry Pi Foundation to promote teaching of basic computer science in schools and in developing countries. The original model became far more popular than anticipated, selling outside its target market for uses such as robotics. It does not include peripherals (such as keyboards and mice) or cases. However, some accessories have been included in several official and unofficial bundles.

   The organisation behind the Raspberry Pi consists of two arms. The first two models were developed by the Raspberry Pi Foundation. After the Pi Model B was released, the Foundation set up Raspberry Pi Trading, with Eben Upton as CEO, to develop the third model, the B+. Raspberry Pi Trading is responsible for developing the technology while the Foundation is an educational charity to promote the teaching of basic computer science in schools and in developing countries.

   According to the Raspberry Pi Foundation, more than 5 million Raspberry Pis were sold by February 2015, making it the best-selling British computer. By November 2016 they had sold 11 million units, and 12.5m by March 2017, making it the third best-selling "general purpose computer". In July 2017, sales reached nearly 15 million. In March 2018, sales reached 19 million.
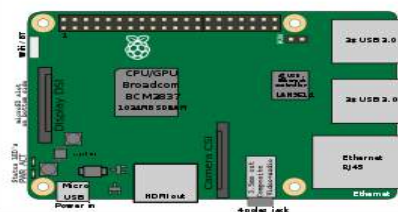
- **General purpose input-output (GPIO) connector :** Raspberry Pi 1 Models A+ and B+, Pi 2 Model B, Pi 3 Models A+, B and B+, Pi 4, and Pi Zero, Zero W, and Zero WH GPIO J8 have a 40-pin pinout.[113][114] Raspberry Pi 1 Models A and B have only the first 26 pins.

In the Pi Zero and Zero W the 40 GPIO pins are unpopulated, having the through-holes exposed for soldering instead. The Zero WH (Wireless + Header) has the header pins preinstalled.

- **Processor:**

The Broadcom BCM2835 SoC used in the first generation Raspberry Pi includes a 700 MHz ARM1176JZF-S processor, Video Core IV graphics processing unit (GPU), and RAM. It has a level 1 (L1) cache of 16 KB and a level 2 (L2) cache of 128 KB. The level 2 cache is used primarily by the GPU. The SoC is stacked underneath the RAM chip, so only its edge is visible. The ARM1176JZ(F)-S is the same CPU used in the original iPhone,] although at a higher clock rate, and mated with a much faster GPU.

- **Operating systems:**

The Raspberry Pi Foundation provides Raspbian, a Debian-based Linux distribution for download, as well as third-party Ubuntu, Windows 10 IoT Core, RISC OS, and specialised media centre distributions.] It promotes Python and Scratch as the main programming languages, with support for many other languages. The default firmware is closed source, while an unofficial open source is available. Many other operating systems can also run on the Raspberry Pi, including the formally verified microkernel, seL4. Other third-party operating systems available via the official website include Ubuntu MATE, Windows 10 IoT Core, RISC OS and specialised distributions for the Kodi media centre and classroom management.

- **Raspberry Pi camera module**

The Raspberry Pi camera module can be used to take high-definition video, as well as stills photographs. It's easy to use for beginners, but has plenty to offer advanced users if you're looking to expand your knowledge. There are lots of examples online of people using it for time-lapse, slow-motion and other video cleverness. You can also use the libraries we bundle with the camera to create effects.

Introduction To Servo Motor(Sg90)

Servo implies an error sensing feedback control which is utilized to correct the performance of a system. It also requires a generally sophisticated controller, often a dedicated module designed particularly for use with servomotors. Servo motors are DC motors that allows for precise control of angular position. They are actually DC motors whose speed is slowly lowered by the gears. The servo motors usually have a revolution cut-off from 90° to 180°. A few servo motors also have revolution cut-off of 360° or more. But servo motors do not rotate constantly. Their rotation is limited in between the fixed angles.

Working of a Servo Motor:

The Servo Motor basically consists of a DC Motor, a Gear system, a position sensor and a control circuit. The DC motors get powered from a battery and run at high speed and low torque. The Gear and shaft assembly connected to the DC motors lower this speed into sufficient speed and higher torque. The position sensor senses the position of the shaft from its definite position and feeds the information to the control circuit. The control circuit accordingly decodes the signals from the position sensor and compares the actual position of the motors with the desired position and accordingly controls the direction of rotation of the DC motor to get the required position. The Servo Motor generally requires DC supply of 4.8V to 6 V.

Mechanism:

A servomotor is a closed-loop servomechanism that uses position feedback to control its motion and final position. The input to its control is a signal (either analogue or digital) representing the position commanded for the output shaft.

The motor is paired with some type of encoder to provide position and speed feedback. In the simplest case, only the position is measured. The measured position of the output is compared to the command position, the external input to the controller. If the output position differs from that required, an error signal is generated which then causes the motor to rotate in either direction, as needed to bring the output shaft to the appropriate position. As the positions approach, the error signal reduces to zero and the motor stops.

Introduction to python

Python is an interpreted, object-oriented, high-level programming language with dynamic semantics. Its high-level built in data structures, combined with dynamic typing and dynamic binding, make it very attractive for Rapid Application Development, as well as for use as a scripting or glue language to connect existing components together. Python's simple, easy to learn syntax emphasizes readability and therefore reduces the

cost of program maintenance. Python supports modules and packages, which encourages program modularity and code reuse. The Python interpreter and the extensive standard library are available in source or binary form without charge for all major platforms, and can be freely distributed.

Often, programmers fall in love with Python because of the increased productivity it provides. Since there is no compilation step, the edit-test-debug cycle is incredibly fast. Debugging Python programs is easy: a bug or bad input will never cause a segmentation fault. Instead, when the interpreter discovers an error, it raises an exception. When the program doesn't catch the exception, the interpreter prints a stack trace. A source level debugger allows inspection of local and global variables, evaluation of arbitrary expressions, setting breakpoints, stepping through the code a line at a time, and so on. The debugger is written in Python itself, testifying to Python's introspective power. On the other hand, often the quickest way to debug a program is to add a few print statements to the source: the fast edit-test-debug cycle makes this simple approach very

Development environments:

Most Python implementations (including C Python) include a read–eval–print loop (REPL), permitting them to function as a command line interpreter for which the user enters statements sequentially and receives results immediately.

Other shells, including IDLE and I Python, add further abilities such as auto-completion, session state retention and syntax highlighting.

As well as standard desktop integrated development environments, there are Web browser-based IDEs; Sage Math (intended for developing science and math-related Python programs); PythonAnywhere, a browser-based IDE and hosting environment; and Canopy IDE, a commercial Python IDE emphasizing scientific computing.

Introduction to OpenCV-Python

OpenCV

OpenCV was started at Intel in 1999 by Gary Bradsky and the first release came out in 2000. Vadim Pisarevsky joined Gary Bradsky to manage Intel's Russian software OpenCV team. In 2005, OpenCV was used on Stanley, the vehicle who won 2005 DARPA Grand Challenge. Later its active development continued under the support of Willow Garage, with Gary Bradsky and Vadim Pisarevsky leading the project. Right now, OpenCV supports a lot of algorithms related to Computer Vision and Machine Learning and it is expanding day-by-day.

Currently OpenCV supports a wide variety of programming languages like C++, Python, Java etc and is available on different platforms including Windows, Linux, OS X, Android, iOS etc. Also, interfaces based on CUDA and OpenCL are also under active development for high-speed GPU operations.

OpenCV-Python is the Python API of OpenCV. It combines the best qualities of OpenCV C++ API and Python language.

OpenCV-Python

Python is a general purpose programming language started by Guido van Rossum, which became very popular in short time mainly because of its simplicity and code readability. It enables the programmer to express his ideas in fewer lines of code without reducing any readability.

Compared to other languages like C/C++, Python is slower. But another important feature of Python is that it can be easily extended with C/C++. This feature helps us to write computationally intensive codes in C/C++ and create a Python wrapper for it so that we can use these wrappers as Python modules. This gives us two advantages: first, our code is as fast as original C/C++ code (since it is the actual C++ code working in background) and second, it is very easy to code in Python. This is how OpenCV-Python works; it is a Python wrapper around original C++ implementation.

And the support of Numpy makes the task easier. Numpy is a highly optimized library for numerical operations. It gives MATLAB-style syntax. All the OpenCV array structures are converted to-and-from Numpy arrays. So whatever operations you can do in Numpy, you can combine it with OpenCV, which increases number of weapons in your arsenal. Besides that, several other libraries like SciPy, Matplotlib which supports Numpy can be used with this.

So OpenCV-Python is an appropriate tool for fast prototyping of computer vision problems.

RGB

Stands for "Red Green Blue." RGB refers to three hues of light that can be mixed together to create different colours. Combining red, green, and blue light is the standard method of producing colour images on screens, such as TVs, computer monitors, and smartphone screens.

The RGB colour model is an "additive" model. When 100% of each colour is mixed together, it creates white light. When 0% of each colour is combined, no light is generated, creating black. It is sometimes contrasted with CMYK (cyan, yellow, magenta, and black), the standard colour palette used to create printed images. CMYK is a "subtractive" colour model since the colours get darker as they are combined. Blending 100% of each colour in the CMYK colour model produces black, while 0% of each colour results in white.

Introduction to Robotic Arm

A robotic arm is a mechanical manipulator with similar functions of human arm with the rotation of wrist and moving hand with appropriate gripper. Robotic arm can have two joints with an appropriate mechanism and can have various directions like forward, backward, upward, and downward. The parts can be connected with DC Motors and are interfaced with Motor driver IC i.e., L293D. IC can be connected to Raspberry pi GPio Pins and can be operated with programming languages like Python C. The complete Arm setup can be controlled through webpage according to user choice and that can improve the mechanical feasibility to operate these devices.

Raspberry Pi Servo Motor Interface:

In order to control a Servo Motor, you need to use a technique called Pulse Width Modulation or PWM. In PWM technique, you will be sending a pulse of variable width and the position of the Servo Motor's shaft will be set by the width or length of the Pulse. The frequency of the PWM Signal is a fixed value and is dependent on the type of the Servo Motor. In our case, both SG90 and MG90S Servo Motors have a PWM Frequency of 50Hz. At 50Hz i.e. a period of 20ms, the minimum pulse width is 1ms and the maximum pulse width is 2ms. Most servo motors can have a sweep area of 180 degrees i.e. 90 degrees on either side of the neutral position.

When the pulse width of the PWM Signal is 1ms, the position of the servo is all the way to the LEFT. The Duty Cycle of this position is (1ms/20ms) x 100 = 5%.Similarly, for pulse widths of 1.5ms and 2ms, the position of the servo is MIDDLE (with duty cycle of 7.5%) and far RIGHT (with duty cycle of 10%).

Raspberry Pi Servo Motor (SG90) Interface

1.Components Required

- Raspberry Pi
- Tower Pro SG90 Servo Motor (any Servo Motor can be used)
- Connecting Wires
- Power Supply
- Computer

2.Circuit Design

Connect the VCC and GND of the Tower Pro SG90 Servo Motor to +5V and GND pins of the power supply. Then connect the PWM Pin of the Servo Motor to Physical Pin 22 of Raspberry Pi i.e. GPIO25.Make the ground common between Raspberry Pi and the Power Supply of the Servo Motor.The Raspberry Pi has many accessories and modules, and the camera module is one of the most commonly used. It can be used to take pictures or videos for a variety of different applications and projects.

The Pi NoIR is one of the many camera modules you can use to integrate with the Raspberry Pi R3. This camera is not the same as your typical daylight photography camera. The Pi NoIR has functions that a regular camera module has, but has one big difference: it does not have an infrared filter. This is where the NoIR name came from (No Infrared).Since this camera has no infrared filter it won't have the same quality as an IR camera during the daytime. When it comes to low light environments, however, the NoIR camera sees much better, making it a good camera for applications like night surveillance systems.

Robo Arm Working

The robotic arm is controlled by 4 servo motors. It has a 360º movement freedom. The raspberry pi camera module is used for live video capture. The live video feed is feed to raspberry pi, then using openCV library in python the frames are captured from live video stream and image-processed to get the RGB values from the frame and find the specific range of RGB values in the frame thus detecting the particular colour. After detecting the colour, according to the detected colour a user defined function is called to pick and place the box in separate location assigned to the specific colour. The servo motors are controlled by the PWM pins of raspberry pi, the GPIO pin 2, GPIO pin 3, GPIO pin 4, and GPIO pin 14 is used to control 4 servo motors. A PWM signal is given to the PWM pins to rotate the servo motor to a fixed angle. The PWM signal to be sent for a particular angle is calculated by the formula Duty cycle = (angle/18)+2.

Block Diagram:
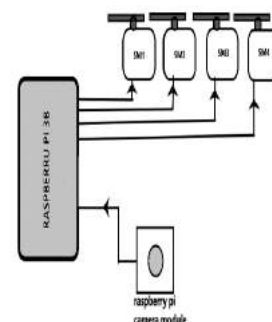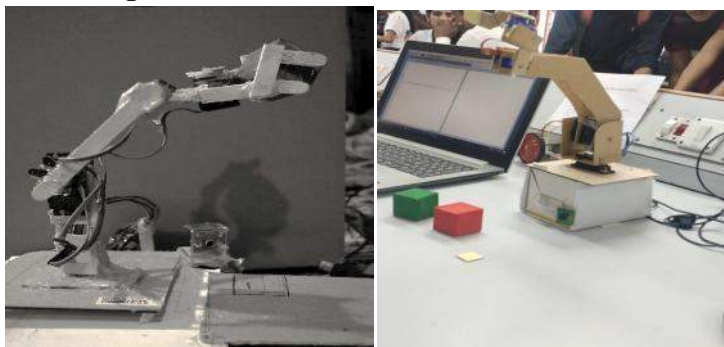
Smart Robotic Arm

Conclusion:

Robotics is fast entering into the industrial space, and many other utilities application it is but natural that a lot of employment and entrepreneurship opportunities are opening up for people who wish to enter this growing and exciting field. It is evident from the above provided details that the robots have proved time and again that they can do the impossible. Man's short stay in this planet is influenced by these machines created by the human brain. Hopefully in a few years these manmade machines or the so called "Brain child of mankind" will find its path along every walks of human life.

This project has been effectively designed to handle the required task. It can identify the specific color of the object and grab it and place it in a required area as the user wants with the help of RGB color sensor by sensing the color of the object.

The two main tasks performed by the sensing section.

- Detection of objects.
- Recognition of colour.

This system is fully controlled by the control unit and capable of picking objects and places it to the respective area. This cost effective device was designed by using simple concept to achieve the constant and reliable tasks without the error from humans. This sorting device is very much.

Results And Conclusions :

The generation of the human-like manipulation motions has been implemented and also tested successfully for the 3 degrees of freedom arm of the robot. The presented approach does not consider the dynamics of the robot arm. This would be necessary to generate realistic velocity distribution for the manipulation motions. In this paper has reviewed the characteristics of the main mechanical structure and construction of a humanoid robotic arm. From this arm the exploration of afterwards will be a full body which is controlled by body switch. The final step of this robot is auto learner, in this stage this robot can learn automatically. The real/exact position and orientation of the arm can be obtained significantly large modifications of the joints $\theta 1$, $\theta 2$ and $\theta 3$. The assistive robotic arm will must be able to contribute most of the challenges in our daily life. However, the resulting configuration is not guaranteed to be human-like.

Future Of Robotics Arm:

The study of the advances in the area is the first step to direct the future work. The authors want to evaluate the capacity and feasibility of industrial robot arms and collaborative robot arms for their use in

National Conference on Multidisciplinary Research in Science and Technology for Healthy Lifestyle Management (NCMRST- 2020) Organizer :- Shri R.L.T. College of Science, Akola

24th Jan. 2020

machining operations with soft materials by proposing modifications in their control to convert it into an adaptive control and improve its behaviour in machining operations. The objective of our work will be (16) Characterize the machining processes with industrial and collaborative robot arm, (17) Study the dynamics and control of robot arms and propose the appropriate modifications to convert them into an adaptive control and (18) Evaluate technically and economically the application of sensor elements and control methods to be integrated into machining processes with robotic arms.

The other promising sectors are defence and education. World had come across PC revolution and mobile revolution in the recent past now it is the time for inevitable robotics. Considering that the global players, like Google, FESTO and Tesla are investing in Robotics along with substantial increase in amateur robotic enthusiasts, Open source tools and platforms available for robotics, It is assured that significant development in this field will occur in another 5-10 years.

Acknowledgment

References

1) S. M. Metev and V. P. Veiko, *Laser Assisted Microtechnology*, 2nd ed., R. M. Osgood, Jr., Ed. Berlin, Germany: Springer-Verlag, 1998.

2) J. Breckling, Ed., *The Analysis of Directional Time Series: Applications to Wind Speed and Direction*, ser. Lecture Notes in Statistics. Berlin, Germany: Springer, 1989, vol. 61.

3) S. Zhang, C. Zhu, J. K. O. Sin, and P. K. T. Mok, "A novel ultrathin elevated channel low-temperature poly-Si TFT," *IEEE Electron Device Lett.*, vol. 20, pp. 569–571, Nov. 1999.

4) (2002) The IEEE website. [Online]. Available: http://www.ieee.org/

5) M. Shell. (2002) IEEEtran homepage on CTAN. [Online]. Available: http://www.ctan.org/tex-archive/macros/latex/contrib/supported/IEEEtran/

6) *FLEXChip Signal Processor (MC68175/D)*, Motorola, 1996.

7) "PDCA12-70 data sheet," Opto Speed SA, Mezzovico, Switzerland.

8) A. Karnik, "Performance of TCP congestion control with rate feedback: TCP/ABR and rate adaptive TCP/IP," M. Eng. thesis, Indian Institute of Science, Bangalore, India, Jan. 1999.

9) J. Padhye, V. Firoiu, and D. Towsley, "A stochastic model of TCP Reno congestion avoidance and control," Univ. of Massachusetts, Amherst, MA, CMPSCI Tech. Rep. 99-02, 1999.

10) *Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specification*, IEEE Std. 802.11, 1997.

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293 (Special Issue No.70) Peer Reviewed Journal www.aiirjournal.com Mob. 8999250451

371

Arduino Based Charging System With Controlled Timing Span

Nilay Sen
Student (M.Sc. I) Department of Electronic Science, Fergusson College, Pune

Yash D. Vidyasagar
Student (M.Sc. I) Department of Electronic Science, Fergusson College, Pune

Abstract

Technology is the way through which we can achieve more than anything in recent times. With the advancement of time, technology is also on the race of rapid progress gradually.

So, following the trend or more precisely technical trend, it is important to develop solutions to electronic or electrical drawbacks of our daily life.

Coming to the device, as the name suggests this particular equipment will limit the supply up to a certain time which will reduce overflow and also protects the internal circuits of other devices connected to the supply.

Keyword *Arduino NANO, Relay, Switch.*

Introduction

The charging overflow is quite a natural problem of our daily life which is being overlooked. However, this may lead to some vital problems to the internal circuits and battery life of the device. For example, one of the mostly used electronic gadgets in our daily lives is mobile phones and most of the people especially the younger ones have the tendency to connect the phone to the charger during night time. And after spending some time with the phone, majority population tends to get asleep leaving behind the phone to be charged till morning. This leads to severe problems which gradually damages the device.

But, what if after getting fully charged, the charging process stops automatically without any manual work? Here, thus the application of technology comes into the picture. We all are very much fond of automation systems right from the very beginning. And so, with the help of some basic electrical components and a microcontroller, we can set up a power supply kit which will stop the electrical operation at a certain point of time.

Objectives

- To avoid overcharging of the particular device connected to the system.
- To avoid damage caused to the battery and the internal circuits by overcharging.
- We had to design some external power-supply instrument, for the same.
- The instrument must work for long time and efficiently to the fullest possible utility.
- An economical and easy to handle instrument for the user.
- Modifications can always be done in any system. We tried to overcome each and every, smallest of smallest possible problem that we could think of while making this system and will continue to do so in future.

Implementation

Basically, the device works as a safeguard agent between your appliance and your main power supply. It contains an Arduino NANO Dev. Board, a relay switch, and some minor essential circuit elements. Here the Arduino NANO plays the major role in passing and cutting the power from the mains applied to the appliance or charging device like your cell-phone.

One can just plug your cell-phone to the system and simply forget to switch it off but your system does take care of your phone. The system goes to sleep by cutting its power on its own and prevent your cell-phone from over charging issue which will ultimately lead to the degradation of your battery life.

Taking another example of your home appliance, for instant, is water heater coil. You can just set the time of the system for which you want your water to get sufficiently hot for you to take a nice and fresh bath. The system will automatically turn of the water heater and will also save electricity.

Working

The Arduino NANO, which plays an important role in the overall system produces accurate and precise time delays for which the system should remain in the "ON" state.

The power signal is provided through a relay to the plug of the system. Relay switch only changes its state as directed by the time delay produced by the Nano board.

The timing delays can be adjusted or changed by programming the Nano board with respective program for particular time delay for which you want your system to be in "ON" state.

Circuitry Assembly

The following two pictures represent the circuitry assembly of the model. Figure 1 is the basic circuit diagram whereas Figure 2 shows the bread-board or the circuitry hardware representation of the model.
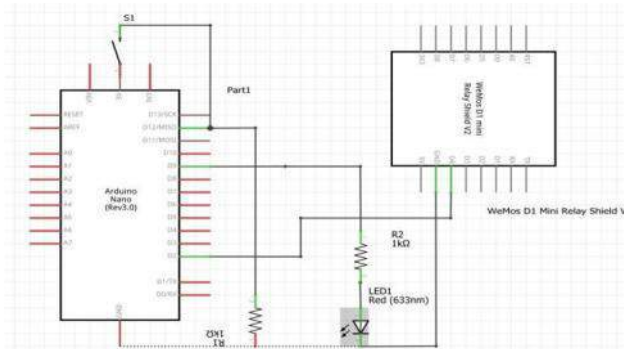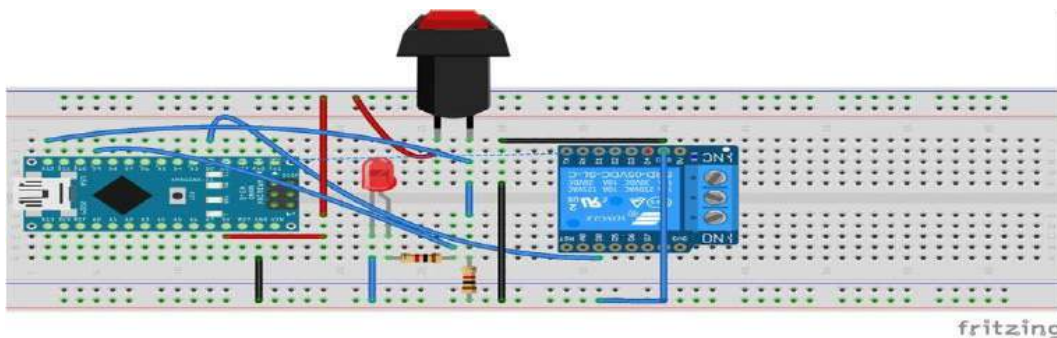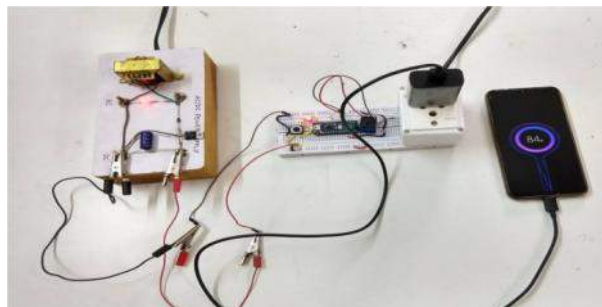

Figure 1

Figure 2

Working Model of the system

Current Progress

Currently we are working on one modification of our circuit. Currently if we need to change the delay of the circuit, we need to program it, through computer which is sometimes not possible for everyone. Thus, we need to find some solution for this problem. We actually did, we installed an interactive parameter in which user can actually set the time on our own.

Future Aspects

Modifications can always be done in any sort of system. The future scope of this system is brilliant!

If one plugs in the phone for charging in the modified version of this system, the system will calculate the time on itself in which the battery will get charged 100%, i.e. the user do not needs to enter time or any sort of parameter, but the system will be intelligent enough!

References

1) Circuit Digest, https://circuitdigest.com/
2) Instructible.com, https://instructible.com/
3) Vidyasagar, Dattaraj. (2019). On the Direct Port Register Addressing Technique in Arduino NANO to simplify the programming.

Home Automation Via Mobile Phone Connectivity Network Using DTMF Sensor And Arduino Uno

Paras Ukhalkar
Student (M.Sc. I) Department of Electronic Science, Fergusson College, Pune

Aarif Sheikh
Student (M.Sc. I) Department of Electronic Science, Fergusson College, Pune

Yash D. Vidyasagar
Student (M.Sc. I) Department of Electronic Science, Fergusson College, Pune

Abstract

'Where there is need there is search, and where there is necessity there is invention'.

Science is such a field of research that always serves to help of the mankind to make life easier. Electronics is one of the most important branches of the science that always plays a vital role in the research. But we know need is such a limitless concept. In these days, Home automation is used for convenient monitoring of real time parameters and for the same the wireless communication technique is necessary.

The scope of this paper includes the design and development of a low cost, efficient and reliable system for home automation using the DTMF sensor and microcontroller. To control the electronic gadgets using mobile phones, this system is very simple and easy to use i.e. user-friendly. The noteworthy feature of such system is that it can be used not only for authorized user but also the unauthorized one in specific conditions. In residential area there is a huge problem of electric energy wastage. To avoid this, approach of easy controlling of devices or home appliances through the use of wireless technology is quite an appropriate solution. Any mobile phone, not only smart-phones but also basic cell phone can be used to access and control the home appliances far away from the controller or the user.

Keyword DTMF signaling, mt8870 DTMF decoder, 4x4 matrix, fl & fh tones, sampling frequency, pwdn-inhibit mode, delayed steering output, arduino, telegraphy, telephony, piezo element.

Introduction

The system consists of an Arduino Uno Dev. Board and some relays according to the number of channels that the system is designed for. The most important component of the overall system is the DTMF sensor.

DTMF stands for Duel Tone Multi-Frequency. It generates different frequencies.

The HT9170 series are Dual Tone Multi Frequency (DTMF) receivers integrated with digital decoder and bandsplit filter functions. The HT9170B has power-down mode and inhibit mode operations. All types of the HT9170 series use digital counting techniques to detect and decode all the 16 DTMF tone pairs into a 4-bit code output.

Features

- Operating voltage: 2.5V-5.5V.
- Minimal external components.
- No external filter is required.
- Low standby current (on power down mode).
- Excellent performance.
- Tristate data output for MCU interface.
- 3.58MHz crystal or ceramic resonator.
- 1633Hz can be inhibited by the INH pin.

This system uses Arduino UNO to control overall process. The UNO is the most robust board. Arduino Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP

header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.


A piezo buzzer is a sound producing device. The main working principle is based on the theory that, whenever an electric potential is applied across a piezoelectric material, a pressure variation is generated. A piezo buzzer consists of piezo crystals in between two conductors. It used to produce sound Beep.
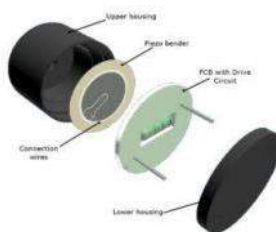

Piezo Buzzer Construction

This paper introduces Home automation via mobile phone connectivity network using DTMF sensor and Arduino Uno.
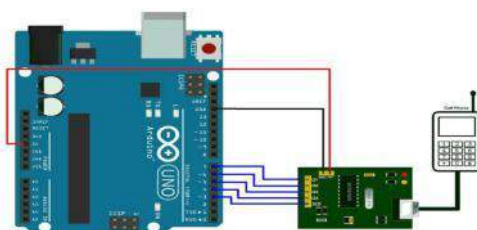
A relay is an electromagnetic switch. The basic function of relay is to allow low power control voltage to operate a high power switch. Relays are switch that open and close circuits either electromechanically or electronically. Although it takes relatively small amount of power to turn ON, the relays can control much more power device. They are available in different configurations of operating voltage like 6v, 9v, 12v & 24v etc.
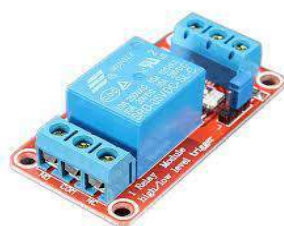
Power-down and Inhibit Mode (PWDN & INH)

A logic high applied to pin 6 (PWDN) will power down the device to minimize the power consumption in a standby mode. It stops the oscillator and the functions of the filters.

Inhibit mode is enabled by a logic high input to the pin 5 (INH). It inhibits the detection of tones representing characters A, B, C and D. The output code will remain the same as the previous detected code.

Delayed Steering Output (StD)

StD output presents high whenever there is new tone pair registered and updated on output latch. This pin is used as signal for new tone receive.

Procedure

When the call received on the attached phone via auto call receiver, after the call is connected when the user will press one on the keypad from his phone the channel one of the system will be set to ON condition.

And when the user will press two the channel 1 will be set to OFF condition. Similarly channel 2 will be operated by pressing keys three and four. To activate both the channels simultaneously user needs to press one and three and to kill the circuit at once zero key should be pressed.

In this, buzzer is quite interesting part, which is used by the system to fulfill feedback Providence for user. Buzzer is programmed in such a way that, if the instruction or command is for the channel one "ON/OFF" instead of channel two or three, then it will beep only once and if it's for channel two "ON/OFF" then it will beep specifically two times. Alsoit will beep thrice if it's about killing the circuit. Due to this specific and unique feedback's user can get confirmations about given commands easily.

Implementation

Taking the example of a farmer who has installed the system in his farm. He will be able to access all the heavy-duty appliances connected to the system wirelessly through mobile phones.

- DTMF Controlled Garage Door Opening Based on Cell phone.
- Dual Tone Multi Frequency based Switching System for Power Efficiency.
- Dual Tone Multi Frequency based pick and place Robot.
- Controlling of Water Pump based on Dual Tone Multi Frequency.
- Stepper motor Control using DTMF.
- Home Appliances Control System using Dual Tone Multi Frequency.

Conclusion

Advanced home automation Using Arduino and DTMF sensor is highly accurate system for flexibility and useful to reduce waste of electricity at small as well as high scale. Compare to other technologies like GSM, the manufacturing cost of this system will be very low, as it consistently Arduino and DTMF sensors. This system will help to save time in future.

With this technology we can control everything from anywhere so we will not have any trouble even we forget to turn off any harmful or heavy electricity consuming appliances like oven, washing machine or anything. Such facility is useful to avoid the device malfunctioning or any bad accidental experience, if we forgot to turn off any device. As we can turn off it from anywhere and anytime, no matter if we leave home to go somewhere or how far we are from it.

"*Our team demonstrating our project*"

References

1) Circuit Digest, https://circuitdigest.com/
2) Instructible.com, https://instructible.com/
3) Vidyasagar, Dattaraj. (2019). On the Direct Port Register Addressing Technique in Arduino UNO to Simplify the Programming.

Plane Symmetric Space Time in Scalar Tensor Theory With Wet Dark Fluid and Cosmological Constant

V.D.Elkar

Department of Mathematics,J.D.Patil Sangludkar Mahavidyalaya, Daryapur, Dist. Amravati

V.G.Mete

Department of Mathematics, R.D.I.K. & K.D. College, Badnera, Dist. Amravati

Poonam P. Kadu

Department of Mathematics, J.D.Patil Sangludkar Mahavidyalaya, Daryapur,Dist.Amravati

Abstract:

In the present paper we have investigated plane symmetric space time for wet dark fluid with time dependent cosmological constant term-Λ within the frame work of Saez-Ballester scalar tensor theory of gravitation. In order to obtain determinate solution of Einstein's field equations, we assume the equation of sta;;;;;;te $p_{WDF} = \gamma \rho_{WDF}$. The nature of the model is discussed in the presence of cosmological term- Λ. Some physical and geometrical aspects of the model are also discussed.

Keywords: Cosmological Constant Term - Λ, Wet Dark Fluid, Plane Symmetric Space Time

Intrduction:

Einstein theory of gravitation describes how space and time are affected by the gravitational field of matter. The theory predicts that gravitational field changes the geometry of space and time causing it to become a curved. Einstein's field equations relate the distribution of matter and energy with the curvature of space time. He proposed the static universe solution by introducing a cosmological constant term Λ. The presence of cosmological constant Λ in a given cosmology prolongs the age of the universe. The cosmological constant problem is very interesting. Some of the authors [1-3] have proposed a cosmological model with a cosmological constant of the $\Lambda = B \dfrac{\ddot{R}}{R},$ where B is constant. Following the same decay law, recently [4-5] has investigated cosmic acceleration with positive cosmological constant and suggested for introducing Λ-term to reconcile the age parameter and the density parameter of the universe with recent observational data.

However, not all vacuum decaying cosmological models can predict acceleration. Some of the researchers [6-8] have proposed the cosmological model with cosmological constant of the term $\Lambda \propto \dfrac{\ddot{a}}{a}$ and $\Lambda \propto a^{-m}$, where a is the scale factor of the universe and m is constant.

Also in view of its important in explaining the observational cosmology, many authors have considered cosmological models with dark energy. As per A.G. Riess at al. (1988), the nature of the dark energy component of the universe remains as one of the deepest mysteries of cosmology. Here, the wet dark fluid (WDF) is used as a source for dark energy. To the study Chaplygin gas, V.Gorini et al.(2004) has used a physically motivated equation of state with properties relevant for the dark energy problem. We are motivated by an empirical equation of state proposed by P.G.Tait (1988) and A.T.J.Hayward (1967) to treat water aqueous solution.

We consider the equation of state for WDF as

$$p_{WDF} = \alpha(\rho_{WDF} - \rho_*), \tag{1}$$

where the parameters α and ρ_* is taken to be positive and we restrict ourselves to $0 \leq \alpha \leq 1$.

We have energy conservation equation as

$$\dot{\rho}_{WDF} + 3H(p_{WDF} + \rho_{WDF}) = 0 \tag{2}$$

with

$$3H = \dfrac{\dot{V}}{V}, \tag{3}$$

where V is volume expansion.

From equations (1), (2) and (3), the energy density of WDF will be

$$\rho_{WDF} = \frac{\alpha}{1+\alpha}\rho_* + \frac{c}{V^{(1+\alpha)}},$$

(4)

where c is constant of integration ,

WDF naturally includes two components, a piece that behaves as a cosmological constant as well as a piece that red shifts as a standard fluid with an equation of state

$$p_{WDF} = \alpha\rho_{WDF}.$$

If we take $c > 0$, then this fluid will not violate the strong energy condition $p_{WDF} + \rho_{WDF} \geq 0$.

Thus ,we get

$$(p_{WDF} + \rho_{WDF}) = (1+\alpha)\rho_{WDF} - \alpha\rho_*$$

$$= (1+\alpha)\frac{c}{V^{(1+\alpha)}} \geq 0.$$

Recently R.Holman and S. Naidu (2005) studied the homogeneous isotropic FRW case by using WDF as dark energy. A. Pradhan et al. (2007) studied plane symmetric inhomogeneous model in presence of perfect fluid. T. Singh and R. Chaubey (2008) have presented Bianchi Type-I universe with WDF. Einstein-Rosen universe with WDF in general relativity has been studied by K.S.Adhav et.al (2011). S.D.Tade et.al(2011) constructed Kaluza-Klein universe with WDF in general relativity. A.S.Nimkar (2012) investigated axially symmetric non-static WDF in Brans-Dicke (1961) theory of gravitation. Recently bulk viscous Kantowski-Sachs cosmological model with time dependent Λ - term in general theory of relativity has been presented by V.G.Mete et.al (2014).

The purpose of the present work is to study inhomogeneous WDF cosmological model with time dependent Λ - term. Our paper is organized as follows: in section 2, we have discussed the metric and field equations in general theory of relativity. Section 3 contains solution of the field equations with different cases. The last section contains the concluding remarks.

Cosmological scenarios with time varying Λ were proposed by several researchers. A number of models with different decay law for the variation of cosmological term were investigated during the last two decades: Chen and Wu [19], Pavan [20], Carvalho et al. [21], Lima and Maia [22], Lima and Trodden [23], Arbab and Abdel- Rahman [24], Cunha and Santos [25], Carneiro and Lima [26]. A lot of work has been done by Saha [27-30] in studying the anisotropic Bianchi Type-I cosmological model in general relativity with varying G and Λ. Recently the present author studied Bianchi type-I cosmological model with time dependent G and Λ [31].

In this paper we study plane symmetric Bianchi type –I cosmological model in presence of domain wall with time varying Λ term. We obtain solution of the Einstein's field equations by assuming the cosmological term proportional to R^{-m} (where R is scale factor and m is constant). The paper is organized as follows. Basic equations of the model and their solution are given in section 2 ,some physical properties are in section 3.We discuss the conclusion in section 4.

Metric and Field Equations

We consider the plane symmetric space-time,

$$ds^2 = dt^2 - A^2(dx^2 + dy^2) - B^2 dz^2,$$

(5)

Where the metric potential $A \& B$ are functions of cosmic time t only.

The Einstein's field equations (in gravitational units, $8\pi c = 1$) in the scalar-tensor theory proposed by (Saez and Ballester 1985) with time dependent Λ -term may be written as

National Conference on Multidisciplinary Research in Science and Technology for Healthy Lifestyle Management (NCMRST- 2020) Organizer :- Shri R.L.T. College of Science, Akola

24th Jan. 2020

$$R_{ij} - \frac{1}{2}Rg_{ij} - \omega\phi^n\left(\phi_{,i}\phi_{,j} - \frac{1}{2}g_{ij}\phi_{,k}\phi^{,k}\right) = -T_{ij} + \Lambda(t)g_{ij} \quad , \tag{6}$$

where R_{ij} is the Ricci tensor, T_{ij} is the energy momentum tensor of matter and ϕ is the scalar field satisfying the equation

$$2\phi^n\phi^i_{;i} + n\phi^{n-1}\phi_{,k}\phi^{,k} = 0 \quad . \tag{7}$$

Here n is the arbitrary constant ω is the dimensionless coupling constant. Comma $(,)$ and semi-colon $(;)$ respectively denote partial and covariant derivative with respective to t.

The energy momentum tensor of the source (Holman and Naidu (2005)) is given by

$$T_{ij} = (\rho_{WDF} + p_{WDF})u_i u_j - p_{WDF}g_{ij} \quad . \tag{8}$$

Here ρ_{WDF}, p_{WDF} and Λ are energy density of WDF, isotropic pressure of WDF and time dependent cosmological constant respectively and u_i is the four velocity vector satisfying the relation

with $$g^{ij}u_i u_j = 1 \tag{9}$$

The field equations of the space time (5) in the commoving co-ordinate system choosing gravitational units such as $c = 1 \& 8\pi G = 1$

$$\frac{\ddot{A}}{A} + \frac{\ddot{B}}{B} + \frac{\dot{A}\dot{B}}{AB} - \frac{\omega}{2}\phi^n\dot{\phi}^2 = -p_{WDF} - \Lambda \tag{10}$$

$$2\frac{\ddot{A}}{A} + \frac{\dot{A}^2}{A^2} - \frac{\omega}{2}\phi^n\dot{\phi}^2 = -p_{WDF} - \Lambda \tag{11}$$

$$2\frac{\dot{A}\dot{B}}{AB} + \frac{\dot{A}^2}{A^2} + \frac{\omega}{2}\phi^n\dot{\phi}^2 = \rho_{WDF} - \Lambda \tag{12}$$

$$\ddot{\phi} + \dot{\phi}\left(\frac{2\dot{A}}{A} + \frac{\dot{B}}{B}\right) + \frac{n}{2}\left(\frac{\dot{\phi}^2}{\phi}\right) = 0 \quad , \tag{13}$$

The average scale factor $R(t)$ is defined as

$$R = \left(A^2 B\right)^{\frac{1}{3}} \tag{14}$$

The Hubble parameter and deceleration parameter are respectively defined as

$$H = \frac{\dot{R}}{R}, \qquad q = -\frac{R\ddot{R}}{\dot{R}^2} \tag{15}$$

The geometrical quantities spatial volume V and average scale factor $a(t)$ for plane symmetric space time are define by

$$V = a^4(t) = A^2 B \quad . \tag{16}$$

The expansion scalar θ and shear scalar σ^2 are given by

$$\theta = 3H \quad , \tag{17}$$

$$\sigma^2 = \frac{1}{2}\sigma^{ij}\sigma_{ij} \quad , \tag{18}$$

where,

$$\sigma_{ij} = \frac{1}{2}\left[u_{i,j} - u_{j,i}\right] + \frac{1}{2}\left[u_{i,k}u^k u_j - u_i u_{j,k}u^k\right] - \frac{1}{3}\theta\left[g_{ij} - u_i u_j\right] \quad . \tag{19}$$

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293
(Special Issue No.70)   Peer Reviewed Journal   www.aiirjournal.com Mob. 8999250451

380

The anisotropic parameter A_m is define as

$$A_m = \frac{1}{4}\sum_{i=1}^{4}\left(\frac{H_i - H}{H}\right)^2.$$ (20)

Solution Of The Field Equations:

The set of field equations (10) – (13) are the system of f0ur independent equations with six unknowns A, B, p_{WDF}, ρ_{WDF}, ϕ and Λ.

Combining the equations (10) and (11), we get

$$\frac{\ddot{A}}{A}+\frac{\ddot{B}}{B}+\frac{\dot{A}\dot{B}}{A\,B}-\frac{\dot{A}^2}{A^2}-2\frac{\ddot{A}}{A}=0.$$ (21)

Firstly we assume a relation in metric potential as

$$A = B^m$$ (22)

where m is real number.

The above equation gives

$$B\ddot{B}+2m\dot{B}^2 = 0$$

Which can be rewritten as

$$\frac{d}{dB}(f^2)+\frac{4m}{B}(f^2)=0$$

Where $\dot{B}= f(B)$

Solving the above differential equation we get the metric potential as

$$A = (2m+1)^{\frac{m}{2m+1}}(k_1 t + k_2)^{\frac{m}{2m+1}}$$ (23)

and

$$B = (2m+1)^{\frac{1}{2m+1}}(k_1 t + k_2)^{\frac{1}{2m+1}}$$ (24)

Therefore the above investigated metric can be written in the form

$$ds^2 = dt^2 - (2m+1)^{\frac{2m}{2m+1}}(k_1 t + k_2)^{\frac{2m}{2m+1}}(dx^2 + dy^2) - (2m+1)^{\frac{2}{2m+1}}(k_1 t + k_2)^{\frac{2}{2m+1}}dz^2,$$

Furthere more, to obtain the expression for Saez-Ballester scalar field ϕ, we rewrite the equation (13) as

$$\frac{\ddot{\phi}}{\dot{\phi}}+\frac{2\dot{A}}{A}+\frac{\dot{B}}{B}+\frac{n}{2}\frac{\dot{\phi}}{\phi}=0$$ (25)

after simplifying, we obtain

$$A^2 B\phi^{\frac{n}{2}}d\phi = c_3 dt$$ (26)

We now substitute the value of A and B, we obtain

$$\phi^{\frac{n+2}{2}} = \frac{\phi_0}{2k_1}\left(\frac{n+2}{2m+1}\right)\log(k_1 t + k_2)+\psi_0$$ (27)

where ϕ_0 and ψ_0 are integrating constant

Some Physical And Kinematical Properties:

Using the relation between pressure and density of wet dark fluid i.e.

$$p_{WDF} = \gamma \rho_{WDF} \qquad (28)$$

Using this relation one can obtain the following expressions for energy density, pressure of wet dark fluid and cosmological constant term - Λ as

$$\rho_{WDF} = \left(\frac{(2n + 4mn - 4m)k_1^2 + \omega\psi_0^2}{(1+\gamma)(2m+1)^2} \right) \left(\frac{1}{k_1 t + k_2} \right), \qquad (29)$$

$$p_{WDF} = \left(\frac{(2n + 4mn - 4m)k_1^2 + \omega\psi_0^2}{(1+\gamma)(2m+1)^2} \right) \left(\frac{\gamma}{k_1 t + k_2} \right), \qquad (30)$$

and

$$\Lambda = -\frac{3(1+2\gamma)}{(1+\gamma)t^2} + \frac{(1-\gamma)\omega\phi_0^2}{2(1+\gamma)t^8}. \qquad (31)$$

From equation ()-(), the spatial volume V, Hubble parameter H, expansion scalar θ, shear scalar σ^2 and anisotropic parameter A_m are respectively given by

$$V = \left[(2m+1)^{\frac{1}{2m+1}} (k_1 t + k_2) \frac{1}{2m+1} \right]^{2n+1} \qquad (32)$$

$$H = \frac{(2n+1)k_1}{3[(2m+1)(k_1 t + k_2)]} \qquad (33)$$

$$\theta = 3H = \frac{(2n+1)k_1}{[(2m+1)(k_1 t + k_2)]} \qquad (34)$$

$$\sigma^2 = \frac{32}{9t^2} \qquad (35)$$

and

The deceleration parameter (q), is given by

$$q = \frac{2(3m - n + 1)}{2m+1}$$

In order to investigate the physical behavior of the fluid parameters we consider three types of physical relevant models.

Conclusion:

In this paper we have studied and obtained exact solution of Plane Symmetric Wet Dark Fluid Space Time With Time Dependent Λ-Term In Seaz-Ballester Scalar Tensor Theory of Gravitation. The field equations have been solved exactly by using the equation of state $p_{WDF} = \gamma\rho_{WDF}$. We observe that the energy density diverges at the initial singularity. The scale factor and volume increases as t increases and tends to zero as t tends to zero. While expansion scalar θ decreases as t increases. The cosmological constant Λ is a decreasing function of time as t increases i.e. it is very small in present epoch. Therefore the universe begins with decelerating expansion changes and expansion changes from a decelerating phase to an accelerating one.

We have studied three types of physical relevant models corresponding to the values of $\gamma = 0, \frac{1}{3}, 1$, in all these models the cosmological term Λ are negative.

We observe that the spatial volume V is zero at $t=0$. At this epoch, the physical parameters H, θ, σ, ρ and p are all infinite. Therefore the model has a point singularity at $t=0$. As time increases, the spatial volume increases and the physical parameters decreases and ultimately tends to zero as $t \to \infty$. The vanishing of the deceleration parameter indicates that the model expands with uniform expansion. Since $A_m = 0$ the model is isotropic for all times. Therefore the ratio $\dfrac{\sigma}{\theta}$ does not tends to zero as $t \to \infty$. Therefore the shear scalar does not tends to zero faster than the expansion at late time.

References:

1) A. Al-Rawaft,M.Taha,Gen Relativ.Gravit., **28**, (1996), 935.
2) A. Al-Rawaft, Gen Relativ.Gravit., **28**, (1996), 935.
3) J. Overduin, F. Cooperstock, Phys. Rev. D, **58** (1998), 043506.
4) A. Arbab, J. Cosml. Astropart. Phys., **05**, (2003a), 008.
5) A. Arbab, J. Class. Quantum Gravit., **20**, (2003b), 93.
6) R.C.Tolman ; Proc. Nat. Acad. Sci **20,** 169 (1934).
7) H.Bondi ; Mon. Not. R. Astro. Soc **107**, 410 (1947).
8) A.H.Taub; Ann. Math. **53**, 472 (1951); ,A.H.Taub, Phy. Rev.**103**, 454 (1956).
9) N.Tomimura; II Nuovo Cimento B **44**, 372 (1978).
10) P.Szekeres ;Commun. Math. Phys, **41,** 55 (1975).
11) C.B.Collins, D.A.Szafron; J. Math. Phy. **20**, 2347 (1979).
12) A.Pradhan, A.Raj and S.K. Singh; Astrophys. Space Sci. **312**,261 (2007).
13) A.G.Reiss et al. ; Astron. J. **116**, 1009, (1998).
14) V.Gorini, A. Kamenshchik,U. Moschella and V.Pasquier; gr-qc/0403062.(2004)
15) P.G.Tait; The Voyage of HMS Challenger (H. M. S. O., London, 1988).
16) A.T.J.Hayward ; J. Brit ,Appl. Phys. **18**, 965, (1967)
17) R.Holman, S.Naidu ; ar xiv: Astrophy/0408102 (preprint) (2005).
18) T.Singh, R.Chaubey; Pramana Journal of Physics, Vol. **71**, No. 3 (2008)
19) K.S.Adhav,V.G.Mete,R.S.Thakare and A.M.Pund; Int.J.Theor.Phys.; **50** ,164-170   (2011)
20) S.D.Tade, M.M. Sambhe; Prespacetime Journal,**Vol.2**, Issue 2, 1978-1992 (2011)
21) A.S.Nimkar; Multilogic in science, **Vol.II**, Issue.II, 93-99 (2012)
22) V.G.Mete,V.D. Elkar ,V.S.Bawane; Multilogic in science, **Vol.II**, Issue.II, 93-99 (2012)
23) R.C.Sahu; Res.Astron. Astro. phys. **10** No. 7, 663-671, (2010).

Avoid Duplicated Space For Same Files Specially On Social Media

Mr. Ram B. Ghayalkar

Assistant Professor

Shri R. L. T. College of Science Akola

Abstract:

Now a days everyone smart phone holder using with whtsapp like social apps so plenty of images/ videos/documents are stores every day in our mobile phones ultimately space gets reducestime to time and that is the biggest problem to manage these files. In this paper presents proposed solution to avoid this duplication of data for storing of memory space in mobile phones. Here presents a framework that will work on to avoid duplication of data.

Key Words: Social Apps, image/video processing, memory management, mobile computing.

Introduction:

Now we may say that the place of desktop computer is taken by mobiles, people are more familiar with smart phone than computer systems. And now there are various application i.e apps are also available for variety of functions and services on mobile phones. Some Social media site/apps(whatsapp) provide manual mechanism to select or download media file.

For avoiding duplicated files i.e images, videos, documents pdf etc. Basically there are two technologies comes:

 i) Identification of duplicated files:

  For identification of any files, different feature extraction and classification techniques as well as some meta-data used to identify identical files.

 ii) Technique used to avoid duplication.

  For reducing duplicated memory space, file compression techniques used.

Literature Review:

Nowadays WhatsApp became very popular for sending messages, chatting sharing picture of videos etc. News or any post that spread very quickly whether it is constructive or destructive.[1]

As per the survey, the maximum percentage of WhatsApp users are from age group from 26 to 35 and the minimumpercentages are from senior citizen. WhatsApp provides a facility to send different types of messages like text, images, video, audio, and others. Author reported that text messages are used more as compared to other types of messages [2].

The very fast and rapid increasing use of mobile devices encourages the information system community to design efficient and easy communication solutions. Rather than just messaging applications IMAs, specially WhatsApp, provide users with new and simple communicationexperience. However, the limited space for storing of mobile devices might negatively impact the user experience of these services.[3]

Low storage space is the most important issue. In this paper author solved the issue of low space due to image duplication of file by the used hash function (MD5), Huffman code is use to generating unique code for each and every image and save this huffman code in image in the index file and use it to avoid of a duplicate from device's storage. [4]

the notion of authorized data de-duplication was proposed to protect the data security by including differential privileges of users in the duplicate check, presented several new de-duplication constructions supporting authorized duplicate check in hybrid cloud architecture, in which the duplicate-check tokens of files are generated by the private cloud server with private keys. Security analysis demonstrates that our schemes are secure in terms of insider and outsider attacks specified in the proposed security model.[5]

In this paper, Author presented a novel approach to realize cipher text policy attribute-based storage system support secure de-duplication. Storage system is built under a hybrid cloud architecture, where a private cloud manipulates the computation and a public cloud manages the storage. If the proof is valid, the private cloud runs a tag matching algorithm to see whether the same data underlying the cipher text has been stored. If

National Conference on Multidisciplinary Research in Science and Technology for Healthy Lifestyle Management (NCMRST- 2020) Organizer :- Shri R.L.T. College of Science, Akola

24th Jan. 2020

so, whenever it is necessary, it regenerates the cipher text into a cipher text of the same plaintext over an access policy which is the union set of both access policies[6]

Challenges:

As far as mobile computing concern memory plays important role for:

Storing various files on phone on limited space.

Vast data cannot be easily access on mobiles.

It also decreases the speed of cell phones.

Processor having less power than computers processor although mobiles trying to get place of computers.

Existing Techniques:

For Images:

When it comes to reducing the size of your images for the web there are different types of compression you can choose from. In today's post we will look at **lossy vs lossless compression.[7]**

Lossy Advantages and Disadvantages

Advantages: Very small file sizes and lots of tools, plugins, and software support it.

Disadvantages: Quality degrades with higher ratio of compression. Can't get original back after compressing.

Lossless Advantages and Disadvantages

Advantages: No loss of quality, slight decreases in image file sizes.

Disadvantages: Larger files than if you were to use lossy compression.

WebP Advantages and Disadvantages

Advantages: No loss of quality, large decreases in file size.

Disadvantages: Less browser support, slightly larger file sizes than lossy.

Proposed framework:

Here specifically taken picture files to reduce space in memory:

Media file stored in memory of mobile phone.

When later same file posted and storing at memory.

It compared to the previously stored files.

If new file is match to the previous file then there stores only its reference rather than actual file.

Here reference of actual file is so small in size than the actual that media file.

As compare to picture file: Its actual file size in few Kilo Bytes and its reference file size is few Bytes, so multiple size of memory is saved.

Drawbacks:

The first file should not be delete otherwise reference files will not displayed.

Reference keeping mechanism will be work there.

To identifying/ comparing new files to the previous files is much tedious task. There complete image/ video processing mechanism(i.e extracting features of existing file and compare to the new arrived every file is so complex task) will work that may decrease the speed of mobile/computer.

Further Scope:

Shifting the actual file to reference file should be provide.

To develop simple and less time consuming algorithm for feature extraction and identification of media files.

Conclusion:

For identifying files and reducing the memory space for duplicated files, there are n numbers of traditional techniques used. Here in this paper introduced referencing file technique to reduce the memory space

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293 (Special Issue No.70) Peer Reviewed Journal www.aiirjournal.com Mob. 8999250451

385

especially for social media application that generally used on mobiles, there are some pros and cons of this referencing file technique so there is scope for further research on memory management.

References:

1) Sunil Joshi, "Sentiment Analysis on WhatsApp Group Chat Using R", Springer Nature Singapore Pte Ltd. 2019

2) Deshmukh, S.: Analysis of WhatsApp users and its usage worldwide. Int. J. Sci. Res. Publ. 5(8) (2015).

3) Mashael M. Alsulami, Arwa Y. Al-Aama, "Exploring User's Perception of Storage Management Features in Instant Messaging Applications: A Case on WhatsApp Messenger", IEEE, 2019.

4) AmmarAsaad, Ali AdilYassinAlamri, " A New Scheme for Removing Duplicate Files from Smart Mobile Devices: Images as a Case Study", journals.cihanuniversity.edu.iq /index.php /cuesj, CUESJ 2019, 3 (2): 5-13.

5) K. Keerthika, G.Manikandan, J. Sagayaraja, S. Vinoth," Avoid Duplicate Entries of Repeating Data in Hybrid Cloud Storage Using Convergent Encryption Techniques", International Journal of Engineering Research & Technology (IJERT), Volume 6, Issue 08, RTICCT - 2018 Conference Proceedings, ISSN: 2278-0181

6) Kandasamy.V1, Siva Alagesh.S2, Pradeepraj.C, "Data Protection with De-duplication in Cloud Computing", International Journal of Science, Engineering and Technology Research (IJSETR) Volume 7, Issue 4, April 2018, ISSN: 2278 -7798.

7) R. Vijay Kumar Reddy*, K. PrudviRaju, M. Jogendra Kumar. "Review on Image Compression Techniques", IJSRSET | Volume 2 | Issue 4 | Print ISSN : 2395-1990 | Online ISSN : 2394-4099 page no. 95-99., 2016

Synthesis And Photoluminescence Investigations On Sm^{3+} Ions Doped Sodium Alumino-Borate Phosphor

R. S. Palaspagar[1,a] , S. R. Khandekar[2], Y. P. Manwar[3], R. P. Sonekar[4], S. K. Omanwar[5]

[1]Department of Physics, Shivramji Moghe Mahavidyalaya, Kelapur (Pkd) Dist. Yavatmal- 445001(M.S.),

[2]Department of Chemistry, Indira Mahavidyalaya, Kalamb, Dist. Yavatmal - 445401(M.S.), INDIA.

[3]Department of Physics, RLT Science college, Akola- 444001(M.S.), INDIA.

[4]Department of Physics, G.S. College, Khamgaon, Dist: Buldhana (M.S.), INDIA.

[5]Department of Physics, SGB Amravati University, Amravati-444602(M.S.), INDIA.

Abstract

In the present work we describes mainly the optical absorption, photoluminescence (PL) characteristics of Sm^{3+} ions doped sodium alumino-borate phosphors (NABO). The fine polycrystalline powder samples of NABO:Sm^{3+} has been prepared by a solution combustion technique. Powder X-ray diffraction and scanning electron microscopy studies were used to characterize the prepared combustion powder. Photoluminescence spectra revealed that samarium ions are present in trivalent oxidation states. The PL excitation spectra of NABO:Sm^{3+} consists of several bands peaking at 305 nm, 330 nm, 344 nm, 361 nm, 374 nm, 403 nm, 462 nm and 473 nm. The excitation spectrum monitored at 403 nm emission consists of green emission band peaking at 565 nm, orange emission band peaking at 603 nm and red emission band peaking at 651 nm. Since the prominent excitation peaks are above 350 nm, the phosphor may useful for solid state lighting application.

Keywords: Alumino-Borates, Combustion Synthesis, XRD, Photoluminescence, LED.

Introduction

Solid state inorganic borates have become a focus of technological interest due to a variety of physical and chemical properties. Inorganic Borates intrinsically possess characteristics that are advantageous for optical materials which include wide transparency range, large electronic band gap, good thermal and chemical stability, low preparative temperature, optical stability with good nonlinear characteristics and exceptionally high optical damage threshold. Several mixed metal borates (alumino-borates) are promising host materials for various dopant (activators and sensitizers) due to its stability [ ]. Generally, RE doped glasses are better than the crystalline materials because of their broad inhomogeneous bandwidths, cheap production cost, good thermal stability, simple manufacturing process and high doping capability [-].

Among the RE ions Sm^{3+} ions display reddish orange emission in the visible region and having applications in the undersea communication, high density optical storage, color displays and visible solid-state lasers [ ]. Further, Sm^{3+} ions doped glasses exhibit peculiar optical properties due to its 4G5/2 → 6HJ (J = 5/2, 7/2, 9/2 and 11/2) transitions in all host matrices. The spectroscopic study of Sm^{3+} ions doped borate phosphors have been reported by many researchers [ ] but still the PL properties of Sm^{3+} ions doped alumino-borate phosphors need to be improved for the design and development of new luminescent devices.

In this paper, a novel intense tri-chromatic green/orange/red emitting phosphor, NABO:Sm^{3+} was synthesized and reported. Their photoluminescence properties under the near-UV excitation were evaluated in detail. Furthermore, critical distance of NABO:Sm^{3+} phosphors were discussed.

Experimental

Sample preparation

The powder samples NABO:Sm^{3+} were prepared by using solution combustion synthesis. In our previous work, many borate host materials were successfully synthesized using this method [-]. The stoichiometric amounts of high purity starting materials, Na(NO$_3$) (A.R.), Al(NO$_3$)$_3$.9H$_2$O (A.R.), (high purity 99.9%), Sm(NO$_3$)$_3$.6H$_2$O (high purity 99.9%), H$_3$BO$_3$ (A.R.), CO(NH$_2$)$_2$ (A.R.) have been used for phosphors preparation. The detail of molar ratio of constituent used for phosphor synthesis is given in Table 1. The stoichiometric amounts of the ingredients were thoroughly mixed in an Agate Mortar with adding little amount of double distilled water. The materials then transferred into china basin and heated on heating menthol at about 70°C so as to obtained clear solution. The solution was then introduced into a pre-heated muffle furnace maintained at temperature 550 °C for combustion. The solution boils; foams and ignites to burn with flame which gave a voluminous, foamy powder. Following the combustion, the resulting foamy samples were

crushed to obtain fine particles and then annealed in a slightly reducing atmosphere provided by burning charcoal at temperature 750°C for 2 hr and suddenly cooled to room temperature.

Material characterizations

The phase and surface morphology of as prepared phosphors were characterized by X-ray diffraction measurements using Rigaku Miniflex II X-ray Diffractometer with Cu Kα radiation (λ=1.54059 Å) with scan speed 2^0/min and Field emission - scanning electron microscopy (FE-SEM) (Hitachi, Model-S4800 type II). The PL & PLE measurements at room temperature were performed on Hitachi F-7000 Spectroflurometer with spectral resolution of 2.5 nm.

Table 1. Molar ratio of ingredients used for material preparation and corresponding chemical reaction.

Compound	Molar Ratio
$Na_{2(1-x)}Al_2B_2O_7{:}_xSm^{3+}$	$Na(NO_3){:} Al(NO_3)_3.9H_2O{:} Sm(NO_3)_3.6H_2O{:} H_3BO_3{:}CO(NH_2)_2$ $2(1-x) : 2 : x : 2 : 6.5$ (x=0.005,0.01,0.02,0.03,0.04)
$2(1-x)Na(NO_3) + 2Al(NO_3)_3.9H_2O + x\,Sm(NO_3)_3.6H_2O + 2H_3BO_3 + 6.5CO(NH_2)_2 \xrightarrow[\Delta]{550\,°C}$ $\mathbf{Na_2Al_2B_2O_7{:}Sm^{3+}}$ + (Gaseous product like NO_3, NO_y, H_2O)	

Result and Discussion

X-ray Diffraction Pattern

The XRD pattern of the host lattice of $Na_{2(0.97)}Al_2B_2O_7{:}_{0.03}Sm^{3+}$ is as shown in Fig. 1 and it was found to be in good agreement with the standard ICDD file No. 01-070-7606, the crystallographic data are given in Table 2. There are no observable differences between these diffraction patterns, indicating that a little amount of doped RE ions has almost no effect on the NABO crystalline structure. The ionic size of Sm^{3+} (0.958 Å) ion is smaller than that of Na^+ (1.02 Å) and Al^{3+} (0.54 Å) so the incorporation of the dopant may takes place in Na^+ lattice site in the crystal lattice.
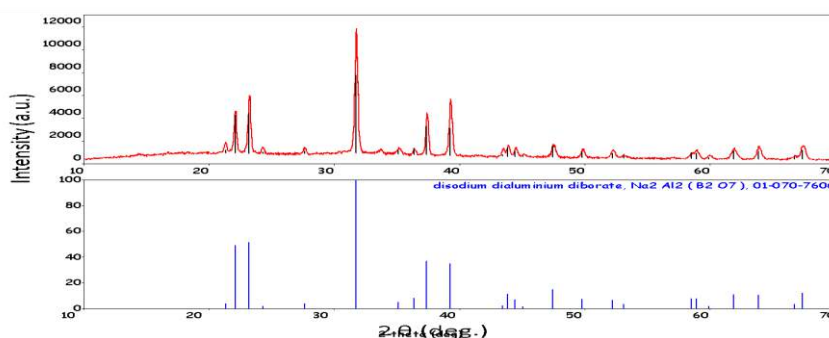

Fig 1. Powder XRD pattern of $Na_{2(0.97)}Al_2B_2O_7{:}_{0.03}Sm^{3+}$ phosphor.

Table 2. Crystallographic data of $Na_2Al_2B_2O_7$

Chemical Formula	$Na_2Al_2B_2O_7$
Crystal Structure	Hexagonal
Space Group	P-31c (163)
a (Å)	4.810
b (Å)	4.810
c (Å)	15.277
α (°)	90.00
β (°)	90.00
γ (°)	120.00
V (Å^3)	306.12
Z	2

FE-SEM micrographs of phosphor powders

The FE-SEM photographs of $Na_{2(0.97)}Al_2B_2O_7:_{0.03}Sm^{3+}$ powders prepared by solution combustion method is shown in Fig. 2. The shapes of the particles were observed to be random in nature with agglomeration for both the phosphors. The crystalline size of both the phosphors was observed to be varied in the range 0.3-2 μm.
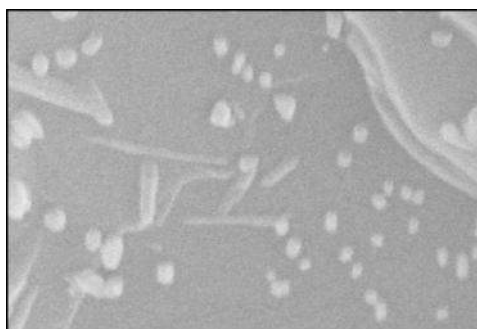

Fig 2. FE-SEM images of $Na_{2(0.97)}Al_2B_2O_7:_{0.03}Sm^{3+}$.

Photoluminescence Analysis

Photoluminescence properties of $Na_2Al_2B_2O_7: Sm^{3+}$ phosphor

Fig. 3 depict the spectral characteristics of $Na_{2(0.97)}Al_2B_2O_7:_{0.03}Sm^{3+}$ phosphor. For 603 nm emission peak, the excitation spectra consist of several excitation peaks located at 305 ($^6H_{5/2}\rightarrow^4P_{5/2}$), 330($^6H_{5/2}\rightarrow^2L_{15/2}$), 344 ($^6H_{5/2}\rightarrow^4H_{9/2}$), 361 ($^6H_{5/2}\rightarrow^4D_{3/2}$), 374 ($^6H_{5/2}\rightarrow^4D$), 403 ($^6H_{5/2}\rightarrow^4F_{7/2}$), 462 ($^6H_{5/2}\rightarrow^4I_{13/2}$), and 473 nm ($^6H_{5/2}\rightarrow^4I_{11/2}$), which are attributed to the f–f forbidden transitions of Sm^{3+} ions, are observed within the wavelength region of 300 nm to 500 nm. It is noticed that the intensity of the f–f transition at 403 nm is higher than that of the other transitions. Thus, this transition is chosen for the measurement of the emission spectra of $Na_{2(1-x)}Al_2B_2O_7:_xSm^{3+}$ (x=0.005,0.01,0.02,0.03,0.04) phosphors. This finding also indicates that the as-prepared phosphor can be efficiently excited by NUV (~400 nm) LED chips. The emission spectra of $Na_{2(0.97)}Al_2B_2O_7:_{0.03}Sm^{3+}$ phosphor are shown in Fig. 4 (a). Four prominent groups of emission lines approximately ranging from 550 nm to700 nm can be attributed to the intra-4f orbital transition from the $^4G_{5/2}$ level to the ^6H_J (J = 5/2, 7/2, and 9/2) level because of their consistent luminescence behaviors with the Sm^{3+} emission characteristics [-]. Among these transitions, the first one at 565 nm ($^4G_{5/2}\rightarrow^6H_{5/2}$) is a magnetic-dipole (MD) transition, the second at 603 nm ($^4G_{5/2}\rightarrow^6H_{7/2}$) is a partly magnetic and partly forced electric-dipole (ED) transition, and the third at 651 nm ($^4G_{5/2}\rightarrow^6H_{9/2}$) is purely ED transition sensitive to the crystal field [-]. Notably, the $^4G_{5/2}\rightarrow^6H_{7/2}$ (603 nm) transition has the strongest intensity and can be applied to orange-red emitting display materials. Generally, the intensity ratio of ED and MD transitions can be used to understand the symmetry of the local environment of trivalent 4f ions in the host matrix [ ]. The asymmetric nature is more prominent when the intensity of the ED transition is higher. The present study shows that the $^4G_{5/2}\rightarrow^6H_{9/2}$ transition (651 nm) of the Sm^{3+} ions has relatively lower emission intensity than the $^4G_{5/2}\rightarrow^6H_{5/2}$ transition (565 nm), which describes the symmetric nature of the host matrix investigated.

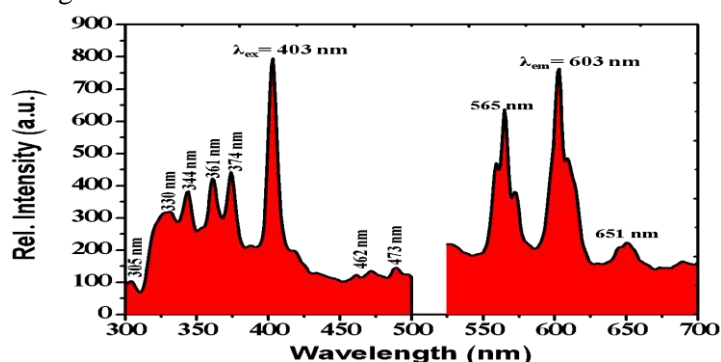**Fig 3.** Excitation and emission spectra of $Na_{2(0.97)}Al_2B_2O_7:_{0.03}Sm^{3+}$ phosphor.
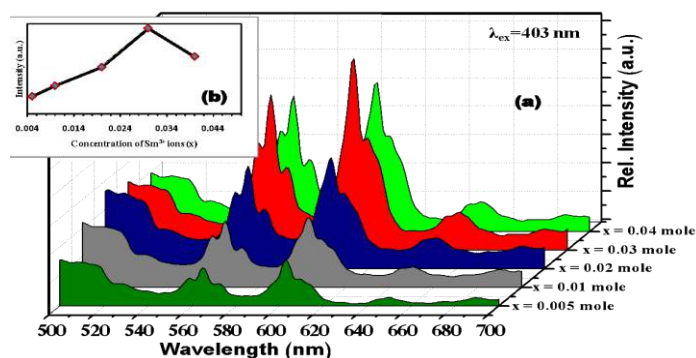
Fig 4. (a) Dependence of the PL intensities of $Na_{2(1-x)}Al_2B_2O_7$: $_xSm^{3+}$ at λ_{ex}=403 nm at different Sm^{3+} concentrations. (b) The top inset shows the influence of the concentration on the emission intensity of $Na_{2(1-x)}Al_2B_2O_7$: $_xSm^{3+}$ phosphor (x=0.005,0.01, 0.02, 0.03, and 0.04).
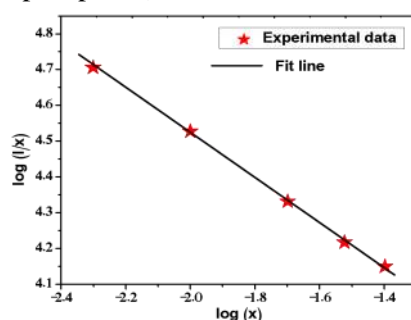
Fig 5. Plot of log(I/x) as function of log(x) in $Na_2Al_2B_2O_7$:Sm^{3+} phosphor (λ_{ex}=403 nm).
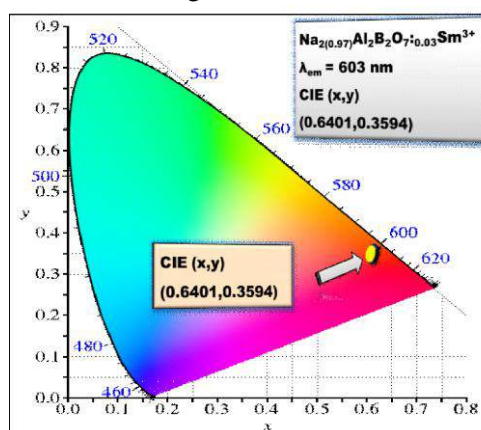
Fig 6. Chromaticity coordinates of $Na_{2(0.97)}Al_2B_2O_7$: $_{0.03}Sm^{3+}$ phosphor in the CIE 1931 chromaticity diagram.

Concentration quenching mechanism of $Na_2Al_2B_2O_7$:Sm^{3+} phosphor

To study the effect of Sm^{3+} ion concentrations on the PL emission intensity of NABO:Sm^{3+} phosphor, a series of samples with different Sm^{3+} ion concentrations ranging from 0.5 mol% to 4 mol% were prepared. Fig. 4 (b) shows the variation in emission intensity with Sm^{3+} ion concentrations under 403 nm excitation. The emission intensity initially increases, reached the maximum at 3 mol% Sm^{3+}, and then decreases above 3 mol% with increased Sm^{3+} ion concentration. The decrease in PL emission intensity can be attributed to concentration quenching processes. The energy transfer from one activator to another generates the concentration quenching of luminescence. Blasse has pointed out that if the activator is introduced solely on Z ion sites, χc is the critical concentration, N is the number of Z ions in the unit cell and V is the volume of the unit cell, then there is on the average one activator ion per V/ χcN [ ]. The critical transfer distance (Rc) is approximately equal to twice the radius of a sphere with this volume:

$$R_c \approx 2 \left(\frac{3V}{4\pi \chi_c N}\right)^{\frac{1}{3}} \qquad (1)$$

The critical transfer distance of the center Sm^{3+} in NABO phosphor by taking the appropriate values of V, N, and χc (535.62 Å, 6, and 0.03, respectively) is 18 Å. Generally, the resonant energy-transfer mechanism is

governed by exchange and multipolar interactions. Previous studies have indicated that the critical distance between the sensitizer and the activator should be shorter than 3 Å to 4 Å when the energy transfer results from exchange interaction [ ], which is far less than that of the above calculation result of Sm^{3+} doped NABO. This finding suggests that the energy transfer among Sm^{3+} ions in NABO:Sm^{3+} phosphor does not occur in this case. Therefore, the process of energy transfer should be electric multipole interaction. The emission intensity (I) per activator ion follows the equation:

$$\frac{I}{x} = K[1 + \beta(x)^{\frac{Q}{3}}]^{-1} \qquad (2)$$

where χ is the activator concentration; Q is a constant of multipolar interaction and equals 6, 8, or 10 for dipole–dipole; dipole–quadrupole or quadrupole–quadrupole interaction, respectively; and K and β are constants under the same excitation condition for the given host crystal. The curve of log(I/x) vs. log(x) in NABO:Sm^{3+} phosphor is shown in Fig. 5. The figure clearly shows that the relation between log(I/x) and log(x) is approximately linear and the slope is about -1.824. The Q value calculated based on the linear fitting using Eq. (2) is 5.472, which is close to 6. This finding indicates that the dipole–dipole interaction is the major mechanism for the concentration quenching of the fluorescence emission of Sm^{3+} ions in NABO phosphor. The CIE chromaticity coordinates for $Na_{2(0.97)}Al_2B_2O_7: {}_{0.03}Sm^{3+}$ were calculated from the PL spectra under 403 nm excitation and marked with a white circular symbol in the CIE 1931 chromaticity diagram in Fig. 6. The chromaticity coordinates (x,y) of this phosphor are calculated to be (0.64, 0.35), respectively, which indicates that the emission color of the as prepared phosphors is located in the reddish-orange region.

Conclusions

Rare earth Sm^{3+} activated NABO phosphors were successfully synthesized by using solution combustion technique. The XRD patterns confirmed their tetragonal structure and the FE-SEM images showed the closely packed particles with agglomerate phenomenon. Based on the theoretical calculations, it is found that the electric multipolar interaction is the major mechanism for concentration quenching of NABO:Sm^{3+} phosphor and the critical transfer distance was found to be 21.51 Å. The PL emission spectra of Sm^{3+} ions gives emission spectrum with a maximum intensity at 601 nm under 403 nm excitation which may be useful for solid state lighting applications.

Acknowledgments

References

1) Peters T E, Baglio J. Luminescence and structural properties of alkaline earth chloroborates activated with divalent europium. J. Inorg Nucl Chem. 1970; 32(4): 1089.
2) Jyothi L, Upender G, Kuladeep R, Rao D N. Structural, thermal, optical properties and simulation of white light of titanium-tungstate-tellurite glasses doped with dysprosium. Mater. Res. Bull. 2014; 50: 424.
3) Mahamuda S K, Swapna K, Packiyaraj P, Rao A S, Vijaya Prakash G. Lasing potentialities and white light generation capabilities of Dy3+ doped oxy-fluoroborate glasses. J. Lumin. 2014; 153: 382.
4) Arunkumar S, Marimuthu K. Concentration effect of Sm3+ ions in B2O3–PbO–PbF2–Bi2O3–ZnO glasses – Structural and luminescence investigations. J. Alloys Compd. 2013; 565: 104.
5) Bedyal A K, Vinay Kumar, Ntwaeaborwa O M, Swart H. C. A promising orange-red emitting nanocrystalline NaCaBO3:Sm3+ phosphor for solid state lightning. mat. res. exp. 2014; 1(1): 015006
6) Palaspagar R S, Gawande A B, Sonekar R P, Omanwar S K. Combustion synthesis and photoluminescence properties of a novel Eu3+ doped lithium alumino-borate phosphor. J. Lumin. 2014; 154: 58.
7) Palaspagar R S, Sonekar R P, Omanwar S K. NUV excited luminescence of Eu3+ doped inorganic NaCa0.5Al2B2O7 phosphor via slow evaporation technique. J. Mater. Sci. Mater. Electron. 2016; 27(9): 9335.

8) Sheng T, Fu Z, Wang X, Zhou S, Zhang S, Dai Z. Solvothermal Synthesis and Luminescence Properties of BaCeF5, and BaCeF5: Tb3+, Sm3+ Nanocrystals: An Approach for White Light Emission. J. Phys. Chem. C. 2012; 116(36): 19597.

9) Park S, Luminescent properties of Sr2.5−3x/2Ba0.5SmxAlO4F oxyfluorides. J. Lumin. 2012; 132(4): 875.

10) Raju G S R, Buddhudu S. Emission analysis of Sm3+ and Dy3+: MgLaLiSi2O7 powder phosphors. Spectrochim. Acta, Part A. 2008; 70(3): 601.

11) Singh V, Watanabe S, Rao T K G, Chubaci J F D, Kwak H Y. Luminescence and defect centres in MgSrAl10O17:Sm3+ phosphor. J. Non-cryst. Solids. 2010; 356(23-24): 1185.

12) Xia Z, Chen D. Synthesis and Luminescence Properties of BaMoO4:Sm3+ Phosphors. J. Am. Ceram. Soc. 2010; 93(5): 1397.

13) G. Blasse, B.C. Grabmaier, Energy Transfer. Springer Verlag, Berlin. 1994; 91.

14) Antipeuko BM, Bataev I M, Ermolaev V L, Lyubimov E I, Privalova T A. Radiationless transfer of electron excitation energy between rare earth ions in POCl3-SnCl4. Opt. Spectrosc. 1970; 29(2): 335.

Compatible Uniformities On Pseudometric Spaces

Dr. S. M. Padhye
Associate Professor, HOD, Department Of Mathematics, Shri R.L.T. College Of Science, Akola, Maharashtra

Priti. P. Umarkar
Research student, Department Of Mathematics, Shri R.L.T. College Of Science, Akola, Maharashtra

Abstract:-
    In this paper we construct different uniformities on a pseudo metric space which are compatible with the topology of the pseudo metric space.
    It is proved that on a pseudo metric space there may be unequal uniformities compatible with the topology out of which one is uniformly continuous uniformity while the other need not be.
Key Words:- Pseudometric spaces, Completely regular space, Uniformity.

Introduction:-
        Let (X,d) be a pseudometric space. Then the product topology on $X \times X$ may be obtained by a pseudometric on $X \times X$ defined d((x,y),(p,q)) = d(x,p) + d(y,q).
Definition:- Compatible uniformity on a topological space.
A uniformity on a topological space X is said to be compatible with the topology of X if the later coincides with the topology induced by the uniformity.
Main Result:- We had already constructed different uniformities U and U_1 compatible with the topology of X [3] where U is the uniformity generated by continues real valued functions on a topological space X and U_1 is the uniformity generated by continues bounded real valued functions on X. Here we construct a uniformity on a pseudometric space (X,d) which is also uniformly continuous uniformity compatible with the topology of (X,d). Here (X,U) is called uniformly continuous uniform space if every T_U - continuous real valued function is U-uniformly continuous.
Theorem 01:-If (X,d) is a pseudo metric space and U is the set of all neighborhoods of Δ in the product topology of $X \times X$ then U is a uniformity on X. Here Δ is diagonal in $X \times X$.
Proof:- Let U = {U/U is neighborhood of each point of Δ in $X \times X$ }.We show that U is uniformity on X.

01) If $U \in U$ and $V \supset U$ then for every $x \in X$,U being a neighborhood of (x,x) so is V.
Thus every subset of $X \times X$ containing a set from U is in U.

02) The intersection of two sets of U contains a set of U.;
Let U and V be neighborhoods of Δ in $X \times X$ and let $\in X$. Then there are $r_x > 0$ and $s_x > 0$
Such that $S_{r_x}^{(x,x)} \subset U$ and $S_{s_x}^{(x,x)} \subset V$.
Here $S_{r_x}^{(x,x)} = \{(p,q) \in X \times X \ / \ d((x,x),(p,q)) < r_x \}$.
If $t_x = \min(r_x, s_x)$, $S_{t_x}^{(x,x)} \subset U \cap V$ i.e $U \cap V \in U$

03) Every set of U contains the diagonal;
It is obvious that every $V \in U$ contains the diagonal.

04) If $V \in U$ then there exists $V' \in U$ such that $V' \subset V^{-1}$;
Suppose $\in U$. Then for every $\in X$, there is $r_x > 0$
such that $S_{r_x}^{(x,x)} \subset V$.
Take $V' = \bigcup_{x \in X} S_{r_x}^{(x,x)}$. Thus obviously V' is neighborhood of each point $(x,x) \in X \times X$.
Hence $V' \in U$.
Further if $(u,v) \in V'$, $(u,v) \in S_{r_x}^{(x,x)}$ for some $x \in X$.
Since $S_{r_x}^{(x,x)} \subset V$ and $(v,u) \in S_{r_x}^{(x,x)}$,
$(v,u) \in V$ $i.e.(u,v) \in V^{-1} \Rightarrow V' \subset V^{-1}$.

05) If $V \in U$ then there exists $W \in U$ such that $W \circ W \subset V$.
Let $V \in U$. Then for every $\in X$. there is $r_x > 0$ such that $S_{r_x}^{(x,x)} \subset V$

Let $W = \bigcup_{x \in X} S^{(x,x)}_{r_{x/2}}$ Then $W \in U$. We show that $W \circ W \subset V$.

Suppose $(p,q) \in W \circ W$. Then there is $z \in X$ is such that

$(p, z) \in S^{(u,u)}_{\frac{r_u}{2}}$ for some $u \in X$ i.e. $d(p,u) + d(z,u) < \frac{r_u}{2}$ -------(1)

and $(z, q) \in S^{(v,v)}_{\frac{r_v}{2}}$ for some $v \in X$ i.e. $d(z,v) + d(q,v) < \frac{r_v}{2}$ -------(2)

Adding (1) and (2) ,

$d(p,u) + d(z,u) + d(z,v) + d(q,v) < \frac{r_u}{2} + \frac{r_v}{2}$ ------- (3)

If $r_v \le r_u$ then $d(p,u) + d(q,u)$

$\qquad\qquad < d(p,u) + d(q,v) + d(v,z) + d(z,u)$

$\qquad\qquad < \frac{r_u}{2} + \frac{r_v}{2} \le r_u \Rightarrow (p,q) \in S^{(u,u)}_{r_u}$

But $S^{(u,u)}_{r_u} \subset V$.

$\therefore (p,q) \in V$

Similarly if $r_u \le r_v$ then $(p,q) \in S^{(v,v)}_{r_v} \subset V$,

$\therefore (p,q) \in V$. Thus $W \circ W \subset V$.

Theorem 02:- If (X,T) be a topological space such that neighborhoods of Δ form a uniformity U on X then $T_U \subset T$.

    Proof: - Let $A \in T_U$. Then we show that $A \in T$.

    Let $\in A$. Choose symmetric $U \in U$ such that $x \in U[x] \subset A$.

    Since U is neighborhood of Δ , U is neighborhood of (y,y) for each $y \in X$.

    Hence U is neighborhood of (x,x). Choose open sets $G_1, G_2 \in T$ such that

    $(x,x) \in G_1 \times G_2 \subset U$

    Now we show that $x \in G_1 \subset U[x]$. Let $y \in G_1$.

    Then $(y,x) \in G_1 \times G_2 \subset U$ i,e. $y \in U[x]$

    i,e. $G_1 \subset U[x] \subset A$.

    i.e A is neighborhood of each point of Δ.

    Thus $A \in T$. This proves that $T_U \subset T$.

Theorem 03:- Let (X,T) be a completely regular space such that neighborhoods of Δ form a uniformity U on X .Then $T \subset T_U$.

    Proof :- Suppose $G \in T$ and $x \in G$. Since X is completely regular there exists a T-continuous function $f : X \to [0,1]$ such that $f(x) = 1$ and $f(X - G) = 0$.

    Take $U = (G \times G) \cup (G_1 \times G_2)$ where $G_1 = f^{-1}(\frac{-1}{2}, \frac{1}{2}) \in T$.

    We show that $U \in U$ and $U[x] \subset G$. If $y \in G$

    then $(x,y) \in G \times G \subset U$.

    If $y \notin G$ then $f(y) = 0 \therefore y \in G_1$.

    $\therefore (y,y) \in G_1 \times G_1 \subset U$.

    Thus U is neighborhood of each point of Δ .

    Now we show that $U[x] \subset G$. For $y \in U[x]$

    $(x,y) \in U \Rightarrow (x,y) \in G \times G$ or $(x,y) \in G_1 \times G_1$.

    If $(x,y) \in G \times G$,then $x \in G$ and $y \in G$. i.e. $y \in G$.

    If $(x,y) \in G_1 \times G_1$ then $x \in G_1$ and $y \in G_1$.

    Since $G_1 = f^{-1}(\frac{-1}{2}, \frac{1}{2})$ and $f(x) = 1$, $x \notin G_1$.

    Thus $(x,y) \in G_1 \times G_1$ is not possible.

    $\therefore (x,y) \in G \times G$ and $U[x] \subset G$ i.e. $G \in T_U$.

    Thus $T \subset T_U$.

Theorem 04:- If (X, d) is a pseudo metric space and U is the set of all neighborhoods of Δ in the product topology of $X \times X$ then topology of uniformity U coincides with the original topology of (X,d).

National Conference on Multidisciplinary Research in Science and Technology for Healthy Lifestyle Management (NCMRST- 2020) Organizer :- Shri R.L.T. College of Science, Akola

24th Jan. 2020

Proof: By Theorem 1 U becomes a uniformity on X.

By Theorem 2 topology generated by U is coarser than original topology of (X, d).

Since X is a pseudo metric space it is completely regular. Hence by theorem 4.1.4,

$T \subset T_U$. Thus $T_U = T$.

Theorem05: Suppose (X, d) is a pseudo metric space. U_d is uniformity generated by d whose base is given by $\{(x, y) / d(x, y) < r\}, r > 0$ and U is a uniformity on X consisting of all neighborhoods of Δ. Then $U_d \subset U$, but in general $U_d \neq U$.

Proof : Let $V \in U_d$. Then there is $r > 0$ Such that $V \supset \{(x, y) / d(x, y) < r\}$.

Put $U = \{(p, q) / d(p, q) < r\}$.

We show that U is neighborhood of (x, x) for each $x \in X$.

Suppose $x \in X$. We show that $S_r^{(x,x)}$ which is a neighborhood of (x, x) is contained in U.

Suppose $(u, v) \in S_r^{(x,x)}$. Then $d(u, x) + d(v, x) < r$

i.e. $d(u, v) \leq d(u, x) + d(x, v) < r$ i.e $d(u, v) < r$. i.e $(u, v) \in U$. Thus $S_r^{(x,x)} \subset U$ i.e U is neighborhood of each point of Δ i.e, $U \in U$.

Since $U \subset V$ and U is uniformity $\therefore V \in U$. Thus $U_d \subset U$.

Now to show that in general $U_d \neq U$,

we construct a pseudo metric space (X, d) where $U \not\subset U d$.

Take $X = R$ and $d(x, y) = |x - y| \, x, y \in R$.

Take $U = \{(x, y) / |x^2 - y^2| \leq 1\}$.

Then we show that U is neighborhood of each point of Δ. So that $U \in U$.

Suppose $x \in R$. Take $r = \frac{1}{2(1+2|x|)}$. We claim that $S_r^{(x,x)} \subset U$

Suppose $(u, v) \in S_r^{(x,x)}$. Then $|u - x| + |v - x| < r$

$\Rightarrow |u - x| < r$ and $|v - x| < r$

Consider $|u^2 - v^2| = |u^2 - x^2 + x^2 - v^2|$

$\leq |u^2 - x^2| + |v^2 - x^2|$

$\leq |u - x| |u + x| + |v - x| |v + x|$

Now $|u + x| = |u - x + 2x|$

$\leq |u - x| + 2|x|$

$< r + 2|x|$

Since $r < 1, |u + x| < 1 + 2|x|$

Similarly $|v + x| \leq 1 + 2|x|$

Thus $|u^2 - v^2| < \frac{1}{2(1+2|x|)} (1 + 2|x|) + \frac{1}{2(1+2|x|)} (1 + 2|x|) \leq \frac{1}{2} + \frac{1}{2} \leq 1$

i.e $(u, v) \in U$ $\therefore U$ is neighborhood of each point of Δ.

Now we show that $U \notin U_d$

i.e There does not exist $s > 0$ such that $\{(x, y) / |x - y| < s\} \subset U$.

Thus we have to show that for every $s > 0$

there exists (x_s, y_s) such that $|x_s - y_s| < s$

But $(x_s, y_s) \notin U$. For any $s > 0$,

take $x_s = \frac{1}{s}$ and $y_s = \frac{1}{s} + \frac{s}{2}$.

Then $|x_s - y_s| = \left|\frac{1}{s} - (\frac{1}{s} + \frac{s}{2})\right| < \left|\frac{s}{2}\right| < s$.

Also $|x_s^2 - y_s^2| = |(x_s + y_s)(x_s - y_s)|$

$= |x_s + y_s| |x_s - y_s|$

$= \left|\frac{1}{s} + (\frac{1}{s} + \frac{s}{2})\right| \left|\frac{1}{s} - (\frac{1}{s} + \frac{s}{2})\right|$

$= (\frac{2}{s} + \frac{s}{2})(\frac{s}{2}) = 1 + \frac{s^2}{4} > 1$

$\therefore |x_s^2 - y_s^2| > 1$ i.e $(x_s, y_s) \notin U$.

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293
(Special Issue No.70) Peer Reviewed Journal www.aiirjournal.com Mob. 8999250451

395

This proves that $U \nsubseteq U_d$.

Theorem 06: Let (X, T) be a completely regular space, such that neighborhoods of Δ form a uniformity U. Then U is compatible with T and (X, U) is a uniformly continuous space.

Proof:- By Theorem 4, U is compatible with T. To prove that f is U-uniformly continuous real function if f is T- continuous real function. Suppose f is T- continuous function and $\in > 0$ is given. We have to find $U \in U$ such that $(x, y) \in U \Rightarrow |f(x) - f(y)| < \in$. For $x \in X$

Put $G_x = f^{-1}(f(x) - \frac{\in}{2}, f(x) + \frac{\in}{2})$. Since f is T continuous at x,

G_x is an open set containing x. Take $U = \bigcup_{x \in X} G_x \times G_x$.

Then U is neighborhood of each point (x, x) of Δ.

Now we show that $(u, v) \in U \Rightarrow |f(u) - f(v)| < \in$.

Let $(u, v) \in U$. Choose $x \in X$ such that $(u, v) \in G_x \times G_x$.

Thus $u \in G_x$ and $v \in G_x$.

Since $G_x = f^{-1}(f(x) - \in/2, f(x) + \in/2)$ and $u \in G_x$, $v \in G_x$.

$f(u) \in (f(x) - \in/2, f(x) + \in/2)$ and $f(v) \in (f(x) - \in/2, f(x) + \in/2)$.

i.e $|f(u) - f(x)| < \in/2$ and $|f(v) - f(x)| < \in/2$

Hence $|f(u) - f(v)| = |f(u) - f(x) + f(x) - f(v)|$

$\leq |f(u) - f(x)| + |f(x) - f(v)|$

$< \frac{\in}{2} + \frac{\in}{2} < \in$.

Thus there is $U \in U$ such that $(x, y) \in U \Rightarrow |f(x) - f(y)| < \in$.

This proves that f is U-uniformly continuous function.

Hence (X, U) is a uniformly continuous uniform space.

Theorem 07:- Let (X, d) be a pseudo metric space and U be the uniformity consisting of all neighborhoods of Δ. Then (X, U) is a uniformly continuous space and. (X, U_d) need not be a uniformly continuous space.

Proof: - From Theorem 6 it follows that,

(X, U) is a uniformly continuous space.

Now we show that (X, U_d) need not be a uniformly continuous space.

Consider $X = \mathbf{R}$ and function $f : \mathbf{R} \to \mathbf{R}$ defined by $f(x) = x^2$, $x \in \mathbf{R}$. f is continuous on $\mathbf{R}$.

We show that f is not U_d uniformly continuous function. For any $\delta > 0$, take $x_\delta = \frac{1}{\delta}$ and

$y_\delta = \frac{1}{\delta} + \frac{\delta}{2}$

Then $|x_\delta - y_\delta| = \frac{\delta}{2} < \delta$

But $|f(x_\delta) - f(y_\delta)|$

$= \left| (\frac{1}{\delta})^2 - (\frac{1}{\delta} + \frac{\delta}{2})^2 \right|$

$= \left| \frac{1}{\delta^2} - \frac{1}{\delta^2} - 2\frac{1}{\delta}\frac{\delta}{2} - \frac{\delta^2}{4} \right|$

$= \left| (1 + \frac{\delta^2}{4}) \right| = 1 + \frac{\delta^2}{4} \geq 1$

Thus for $\in = 1$, there does not exist any $\delta > 0$,

$|x - y| < \delta \Rightarrow |f(x) - f(y)| < 1$ is satisfied.

Thus for $\in = 1$, there does not exist any $\delta > 0$, $|x_\delta - y_\delta| < \delta$

$\Rightarrow |f(x_\delta) - f(y_\delta)| < \in$.

i.e f is not U_d uniformly continuous function.

$\therefore (R, U_d)$ is not uniformly continuous space.

Conclusion:-

It is proved that on a pseudo metric space there may be unequal uniformities compatible with the topology out of which one is uniformly continuous uniformity while the other need not be.

References:-

01) Bourbaki. Nicolas. "Elements of Mathematics General Topology (Part 1)", Addison Wesley Publishing Company, 1966.

02) Kelley, John. L., "General Topology", Affiliated East-West Press Pvt. Ltd. New Delhi. 1969.

03) Dr. S.M. Padhye and Priti.P. Umarkar., "Uniform structures Compatible With A Given Topological Space", IJIRSET, Vol. 03., Issue 12, pp. 18070 – 18074. Dec 2014.

Generalized Half Canonical Transforms And Some Reslults

Dr. A.V. Joshi

Department of Mathematics

Shankarlal Khandelwal Arts, Sceince & Commerece College, Akola

Abstract:

The important transform in the class of half linear canonical transform (HLCT). It has been used in several areas, including optical analysis and signal processing. For practical purpose half canonical transforms is more useful. Hence in this paper we have proved some important results for half canonical transforms.

Keywords: CCT, Fractional Fourier Transform.

Introduction:

Some idea of the fractional powers of Fourier operator appeared in mathematical literature as early in 1930. It has been rediscovered in quantum mechanics by Namias [5]. He had given a systematic method for the development of fractional integral transforms by means of Eigen values. Later on numbers of integral transforms are extended in its fractional domain. For examples Almeida [2] had studied fractional Fourier transform, Akay [1] developed fractional Mellin transform, Gudadhe, Joshi [3] studied number of property of generalized canonical cosine transform etc. These fractional transforms found number of applications in signal processing, image processing, quantum mechanics etc.

Recently further generalization of fractional Fourier transform known as linear canonical transform was introduced by Moshinsky [4] in 1971. Pei, Ding [6] had studied its eigen value aspect.

Linear canonical transform is a three parameter linear integral transform which has several special cases as fractional Fourier transform, Fresnel transform, Chirp transform etc. Linear canonical transform is defined as,

$$[LCTf(t)](s) = \sqrt{\frac{1}{2\pi ib}} \cdot \int_{-\infty}^{\infty} e^{\frac{i}{2}\left(\frac{d}{b}\right)s^2} \cdot e^{\frac{i}{2}(a/b)t^2} \cdot e^{-i(s/b)t} f(t)\, dt, \qquad \text{for } b \neq 0$$

$$= \sqrt{d}\; e^{\frac{i}{2}(cd)s^2} \cdot f(d \cdot s), \text{ for } b = 0, \text{ with } ad - bc = 1,$$

Where a, b, c, and d are real parameters independent on s and t.

Pei and Ding [6, 7] had defined canonical cosine transform (CCT) as

$$[CCTf(t)](s) = \sqrt{\frac{1}{2\pi ib}} \cdot \int_{-\infty}^{\infty} e^{\frac{i}{2}\left(\frac{d}{b}\right)s^2} \cdot e^{\frac{i}{2}\left(\frac{a}{b}\right)t^2} \cdot \cos\left(\frac{s}{b}t\right) f(t)\, dt,$$

Now a day in optical image processing, image encryption technique has great importance and fractional Fourier transform, Fresnel transform, Wavelet transform are some of the transformation used for this.

In this paper first we have defined generalized half Canonical cosine, sine transforms. We have proved some results on some selected generalized functions.

Generalized Half Canonical Transforms

The Half Canonical Cosine Transform:

The half Canonical cosine transform $f \in E'(R^n)$ can be defined by, $\{HCCT\, f(t)\}(s) = \langle f(t), K_{hc}(t,s) \rangle$

where, $K_{hc}(t,s) = \sqrt{\frac{2}{\pi ib}} e^{\frac{i}{2}\frac{d}{b}s^2} e^{\frac{i}{2}\frac{a}{b}t^2} \cos\left(\frac{s}{b}t\right)$

Hence the half canonical cosine transform $f \in E'(R^n)$ can be defined by,

$$[HCCT\, f(t)](s) = \sqrt{\frac{2}{\pi ib}} e^{\frac{i}{2}\frac{d}{b}s^2} \int_{0}^{\infty} e^{\frac{i}{2}\frac{a}{b}t^2} \cos\left(\frac{s}{b}t\right) f(t)\, dt$$

.

The Half Canonical Sine Transform:

The half Canonical sine transform $f \in E'(R^n)$ can be defined by, $\{HCST\, f(t)\}(s) = \langle f(t), K_{hs}(t,s) \rangle$

where, $K_{hs}(t,s) = -i\sqrt{\dfrac{2}{\pi ib}}\, e^{\frac{i}{2}\frac{d}{b}s^2}\, e^{\frac{i}{2}\frac{a}{b}t^2}\, \sin\left(\dfrac{s}{b}t\right)$

Hence the half canonical sine transform $f \in E'(R^n)$ can be defined by,

$$[HCST\, f(t)](s) = -i\sqrt{\frac{2}{\pi ib}}\, e^{\frac{i}{2}\frac{d}{b}s^2} \int_0^\infty e^{\frac{i}{2}\frac{a}{b}t^2}\, \sin\left(\frac{s}{b}t\right) f(t)\, dt .$$

Half Canonical Cosine Transform Of Some Selected Generalized Functions:

In this paper we have obtained the values of half canonical cosine transform of some selected functions.

Half Canonical Cosine Transform Of $\delta(t)$:

$$\{HCCT\,[\delta(t)]\}(s) = \sqrt{\frac{2}{\pi ib}}\, e^{\frac{i}{2}\left(\frac{d}{b}\right)s^2} \int_0^\infty e^{\frac{i}{2}\left(\frac{a}{b}\right)t^2} \cdot \cos\left(\frac{s}{b}t\right) \cdot \delta(t)\, dt$$

$$= \sqrt{\frac{2}{\pi ib}}\, e^{\frac{i}{2}\left(\frac{d}{b}\right)s^2} \int_0^\infty e^{\frac{i}{2}\left(\frac{a}{b}\right)t^2} \cdot \cos\left(\frac{s}{b}t\right) \cdot \delta(t)\, dt$$

$$= \sqrt{\frac{2}{\pi ib}}\, e^{\frac{i}{2}\left(\frac{d}{b}\right)s^2} \left[e^0 \cdot \cos(0) \right]$$

$$= \sqrt{\frac{2}{\pi ib}} \cdot e^{\frac{i}{2}\left(\frac{d}{b}\right)s^2} (1)$$

$$\{HCCT\,[\delta(t)]\}(s) = \sqrt{\frac{2}{\pi ib}} \cdot e^{\frac{i}{2}\left(\frac{d}{b}\right)s^2}$$

Half Canonical Cosine Transform Of 1:

$$\{HCCT\,(1)\}(s) = \sqrt{\frac{2}{\pi ib}}\, e^{\frac{i}{2}\left(\frac{d}{b}\right)s^2} \int_0^\infty e^{\frac{i}{2}\left(\frac{a}{b}\right)t^2} \cos\left(\frac{s}{b}t\right) 1\, dt$$

$$= \sqrt{\frac{2}{\pi ib}} \cdot e^{\frac{i}{2}\left(\frac{d}{b}\right)s^2} \int_0^\infty e^{\frac{i}{2}\left(\frac{a}{b}\right)t^2} \cdot \cos\left(\frac{s}{b}t\right) \cdot dt$$

$$= \sqrt{\frac{2}{\pi ib}}\, e^{\frac{i}{2}\left(\frac{d}{b}\right)s^2} \frac{1}{2}\left[\sqrt{\pi}\, \frac{e^{\frac{\left(\frac{s}{b}\right)^2}{4\frac{ia}{2b}}}}{\sqrt{\frac{ia}{2b}}} \right]$$

$$\{HCCT(1)\}(s) = \frac{1}{i}\sqrt{\frac{1}{a}}\left[e^{\left(\frac{1-da}{ia}\right)\frac{s^2}{2b}} \right]$$

Half Canonical Sine Transform Of Some Selected Generalized Functions:

In this paper we have obtained the values of half canonical sine transform of some selected functions.

Half Canonical Sine Transform Of $\delta(t)$:

$$\{HCST\,[\delta(t)]\}(s) = -\sqrt{\frac{2}{\pi ib}} \cdot e^{\frac{i}{2}\left(\frac{d}{b}\right)s^2} \int_0^\infty e^{\frac{i}{2}\left(\frac{a}{b}\right)t^2} \cdot \sin\left(\frac{s}{b}t\right) \delta(t) \cdot dt$$

$$\{HCST\,[\delta(t)]\}(s) = 0$$

National Conference on Multidisciplinary Research in Science and Technology for Healthy Lifestyle Management (NCMRST- 2020) Organizer :- Shri R.L.T. College of Science, Akola

24th Jan. 2020

$$\{HCST (\sin t)\}(s) = -\sqrt{\frac{2}{\pi i b}} \cdot e^{\frac{i}{2}\left(\frac{d}{b}\right)s^2} \int_0^\infty e^{\frac{i}{2}\left(\frac{a}{b}\right)t^2} \cdot i\sin\left(\frac{s}{b}t\right)\sin t \cdot dt$$

Half Canonical Sine Transform Of $\sin t$:

$$= (-i)\sqrt{\frac{2}{\pi i b}} \cdot e^{\frac{i}{2}\left(\frac{d}{b}\right)s^2} \int_0^\infty e^{\frac{i}{2}\left(\frac{a}{b}\right)t^2} \cdot \frac{1}{2}[\cos\left(\frac{s}{b}+1\right)t - \cos\left(\frac{s}{b}-1\right)t]dt$$

$$= (-i)\sqrt{\frac{2}{\pi i b}} \cdot e^{\frac{i}{2}\left(\frac{d}{b}\right)s^2}[\frac{1}{2}\int_0^\infty e^{\frac{i}{2}\left(\frac{a}{b}\right)t^2}\cos\left(\frac{s}{b}+1\right)t\,dt - \frac{1}{2}\int_0^\infty e^{\frac{i}{2}\left(\frac{a}{b}\right)t^2}\cos\left(\frac{s}{b}-1\right)t]dt$$

$$= (-i)\sqrt{\frac{1}{2\pi i b}} \cdot e^{\frac{i}{2}\left(\frac{d}{b}\right)s^2} \frac{1}{2}[\frac{\sqrt{\pi i}\cdot e^{\frac{-i\left(\frac{s}{b}+1\right)^2}{4\frac{a}{2b}}}}{\sqrt{\frac{a}{2b}}} - \frac{\sqrt{\pi i}\cdot e^{\frac{-i\left(\frac{s}{b}-1\right)^2}{4\frac{a}{2b}}}}{\sqrt{\frac{a}{2b}}}]$$

$$= (-i)\sqrt{\frac{1}{2\pi i b}} \cdot e^{\frac{i}{2}\left(\frac{d}{b}\right)s^2} \frac{1}{2}[\frac{\sqrt{2b}\sqrt{\pi i}\cdot e^{\frac{-i\left(\frac{s}{b}+1\right)^2}{\frac{2a}{b}}}}{\sqrt{a}} - \frac{\sqrt{\pi i}\sqrt{2b}\cdot e^{\frac{-i\left(\frac{s}{b}-1\right)^2}{4\frac{a}{2b}}}}{\sqrt{a}}]$$

$$= (-i)\sqrt{\frac{1}{2\pi i b}} \cdot e^{\frac{i}{2}\left(\frac{d}{b}\right)s^2} \frac{1}{2}\frac{\sqrt{2b}\sqrt{\pi i}}{\sqrt{a}}\left[e^{\frac{-i\left(\frac{s}{b}+1\right)^2 b}{2a}} - e^{\frac{-i\left(\frac{s}{b}-1\right)^2 b}{2a}}\right]$$

$$\{HCST(\sin t)\}(s) = \frac{(-i)\cdot e^{\frac{i}{2}\left(\frac{d}{b}\right)s^2}}{2\sqrt{a}}\left[e^{-i\left(\frac{s}{b}+1\right)^2 b} - e^{-i\left(\frac{s}{b}-1\right)^2 b}\right]$$

Half Canonical Sine Transform Of $e^{-i\left(\frac{a}{b}\right)t^2}\sin t$:

$$\{HCST (e^{-i\left(\frac{a}{b}\right)t^2}\sin t)\}(s) = -i\sqrt{\frac{2}{\pi i b}}\cdot e^{\frac{i}{2}\left(\frac{d}{b}\right)s^2}\int_0^\infty e^{-\frac{i}{2}\left(\frac{a}{b}\right)t^2}\sin\left(\frac{s}{b}t\right)\sin t\,dt$$

$$\{HCST (e^{-i\left(\frac{a}{b}\right)t^2}\sin t)\}(s) = -i\sqrt{\frac{2}{\pi i b}}\cdot e^{\frac{i}{2}\left(\frac{d}{b}\right)s^2}\int_0^\infty e^{-\frac{i}{2}\left(\frac{a}{b}\right)t^2}\frac{1}{2}[\cos\left(\frac{s}{b}-1\right)t - \cos\left(\frac{s}{b}+1\right)t]dt$$

$$= -i\sqrt{\frac{2}{\pi i b}}\,e^{\frac{i}{2}\left(\frac{d}{b}\right)s^2}[\frac{1}{2}\int_0^\infty e^{-\frac{i}{2}\left(\frac{a}{b}\right)t^2}\cos\left(\frac{s}{b}-1\right)t\,dt$$

$$-\frac{1}{2}\int_0^\infty e^{-\frac{i}{2}\left(\frac{a}{b}\right)t^2}\cos\left(\frac{s}{b}+1\right)t\,dt]$$

$$= -i\sqrt{\frac{1}{2\pi i b}}\cdot e^{\frac{i}{2}\left(\frac{d}{b}\right)s^2}(I_1 + I_2)$$

Where, $I_1 = \int_0^\infty e^{-\frac{i}{2}\left(\frac{a}{b}\right)t^2}\cos\left(\frac{s}{b}-1\right)t\cdot dt$, ...(1)

$I_2 = -\int_0^\infty e^{-\frac{i}{2}\left(\frac{a}{b}\right)t^2}\cos\left(\frac{s}{b}+1\right)t\cdot dt$ .....(2)

Differentiating (1) using Leibniz's Rule, we get

$$\frac{\partial I_1}{\partial s} = -\int_0^\infty t\,e^{-\frac{i}{2}\left(\frac{a}{b}\right)t^2}\sin\left(\frac{s}{b}-1\right)t\,dt$$

Integrating by parts, be letting

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293 (Special Issue No.70) Peer Reviewed Journal www.aiirjournal.com Mob. 8999250451

400

$$u = \sin\left(\frac{s}{b}-1\right)t \Rightarrow du = \left(\frac{s}{b}-1\right)\cos\left(\frac{s}{b}-1\right)dt \quad \text{and} \quad dv = -te^{-\frac{ia}{2b}t^2} \Rightarrow v = \frac{be^{-\frac{ia}{2b}t^2}}{ia}$$

$$\frac{\partial I_1}{\partial s} = \left[\left(e^{-\frac{i}{2}\left(\frac{a}{b}\right)t^2}\sin\left(\frac{s}{b}-1\right)t\right)_0^\infty\right] - \frac{\left(\frac{s}{b}-1\right)}{2\frac{i}{2}\left(\frac{a}{b}\right)}\int_0^\infty e^{-\frac{i}{2}\left(\frac{a}{b}\right)t^2}\cos\left(\frac{s}{b}-1\right)t\ dt$$

$$\frac{\partial I_1}{\partial s} = 0 - \frac{(s-b)}{ia}I_1$$

$$\frac{\partial I_1}{I_1} = -\frac{(s-b)}{ia}\partial s$$

Integrating both sides, we get

$$\log I_1 = -\frac{(s^2-bs)}{ia}+C$$

$$I_1(t,s) = e^{-\frac{(s^2-bs)}{ia}}+C$$

To find the value of constant C, by setting s = 0

$$I_1(t,0) = Ce^0 = C = \int_0^\infty e^{-\frac{ia}{2b}t^2}\cos 0\ dt = \sqrt{\frac{b\pi}{2ia}} \quad I_1(t,s) = e^{-\frac{(s^2-bs)}{ia}}+\sqrt{\frac{b\pi}{2ia}}$$

$$I_2(t,s) = -e^{-\frac{(s^2+bs)}{ia}}-\sqrt{\frac{b\pi}{2ia}}$$

Similarly,

$$\{HCST\ (e^{-i\left(\frac{a}{b}\right)t^2}\sin t)\}(s) = e^{-\frac{(s^2+bs)}{ia}}+\sqrt{\frac{b\pi}{2ia}}-e^{-\frac{(s^2-bs)}{ia}}-\sqrt{\frac{b\pi}{2ia}}$$

$$\{HCST\ (e^{-i\left(\frac{a}{b}\right)t^2}\sin t)\}(s) = e^{-\frac{(s^2+bs)}{ia}}-e^{-\frac{(s^2+bs)}{ia}}$$

Half Canonical Sine Transform Of 1:

$$\{HCST(1)\}(s) = (-i)\sqrt{\frac{2}{\pi ib}}\cdot e^{\frac{i}{2}\left(\frac{d}{b}\right)s^2}\int_0^\infty e^{\frac{i}{2}\left(\frac{a}{b}\right)t^2}\cdot\sin\left(\frac{s}{b}t\right)dt$$

$$= (i)\sqrt{\frac{2}{\pi ib}}\cdot e^{\frac{i}{2}\left(\frac{d}{b}\right)s^2}\cdot(0)$$

$$\{HCST(1)\}(s) = 0$$

Conclusion:

In this paper, brief introduction of the generalized half canonical cosine transform are given and some results for half canonical cosine, sine transforms obtained which will be useful in solving differential equations occurring in signal processing and many other branches of engineering.

References:

1) Akay O. and Bertels, (1998): Fractional Mellin Transformation: An extension of fractional frequency concept for scale, 8th IEEE, Dig. Sign. Proc. Workshop, Bryce Canyan, Utah.
2) Almeida, L.B., (1994): The fractional Fourier Transform and time- frequency representations, IEEE. Trans. on Sign. Proc., Vol. 42, No.11, 3084-3091.

3) Gudadhe A. S. and Joshi A.V. (August - 2012): Generalized Canonical Cosine Transform, International Journal of Engineering Research & Technology (IJERT) Vol. 1 Issue 6.

4) Moshinsky, M.(1971): Linear canonical transform and their unitary representation, Jour. Math, Phy.,Vol.12, No. 8 , P. 1772-1783.

5) Namias V. (1980): The fractional order Fourier transform and its applications to quantum mechanics, Jour. Inst. Math's. App., Vol. 25, 241-265.

6) Pei and Ding, (2002) : Eigenfunctions of Linear Canonical Transform Vol. 50, No.1.

7) Pie and Ding, (2002): Fractional cosine, sine and Hartley Transforms, IEEE. Trans. On Sign. Proc. Vol. 50, No.7, 1661-1680.

Virtual ECG Using Biomedical Toolkit

Anjali J. Deshmukh

Associate Professor Department of Electronics

Shri Shivaji College, Akola (Maharashtra), India. Pin Code-444005

Abstract

The state of cardiac heart is generally reflected in the shape of ECG waveform and heart rate. ECG if properly analyzed can provide information regarding various arrhythmia diseases related to heart. The use of advanced virtual instrumentation system based on National Instrument's Lab-VIEW software is much more helpful for the acquisition and study of different types of virtual electrocardiogram. Lab-VIEW provides a clear and easy-to-use method for obtaining, analyzing, and displaying the desired signal by tightly integrating hardware, software validation and reporting tools. Lab-VIEW by National Instruments consists of the most popular and powerful tools available and provides the best solution for rapidly developing and testing complex medical devices.

In the present work ECG signal for various cardiac abnormalities related sinus and nonsinus arrhythmias is simulated using National Instruments Lab-VIEW software's Biomedical Toolkit, which is helpful to improve study and enhance the understanding of theoretical knowledge.

Keywords: - Virtual ECG, arrhythmia diseases, virtual instrumentation, Lab-View, Biomedical Toolkit

Introduction:

The Electrocardiogram (ECG) provides the valuable information regarding the cardiovascular diseases. ECG is a test that measures the electrical activity of the heart. The morphology and heart rate reflects the cardiac health of human heart beat. It is a non invasive technique that means this signal is measured on the surface of human body, which is used in identification of the heart diseases. Any disorder of heart rate or rhythm, or change in the morphological pattern, is an indication of cardiac arrhythmia, which could be detected by analysis of the recorded ECG waveform. The amplitude and duration of the P-QRS-T wave contains useful information about the nature of disease afflicting the heart.

The virtual instrumentation can rapidly create applications using intuitive graphical language, it is easy to customize the instruments and add new functionality by modifying the Lab-VIEW code. The Biomedical Workbench in Lab-VIEW Biomedical Toolkit provides applications for biosignal and biomedical image analysis. These applications make possible to apply biomedical solution using National Instruments software, such as Lab-VIEW with National Instruments hardware. User can use these applications to screen and play biosignals, simulate and generate biosignals, evaluate biosignals, and view biomedical imagery National Instruments hardware and the applications in this kit can also be use to generate standard analog biomedical signals to validate and test biomedical instruments The Lab-VIEW Biomedical Toolkit includes tools that can be use to acquire, pre-process, extract, and analyze biosignals and biomedical images. User can also add his own applications or LabVIEW VIs in Biomedical Workbench.

NI LabVIEW Biomedical Toolkit: Tools for Biomedical Data Acquisition and Signal Processing:

The NI Lab-VIEW Biomedical Toolkit is a collection of ready-to-run applications, utilities, and algorithms designed to simplify the use of Lab-VIEW software in physiological DAQ, signal processing, and image processing. The toolkit includes applications commonly used in teaching physiology, bioinstrumentation, and biomedical signal processing and provides researchers with tools to create powerful custom LabVIEW applications to accelerate their research. Ready-to-run applications include Biosignal Data logger and Player, File Viewer, Biosignal Generator, ECG Feature Extractor, Heart Rate Variability Analyzer, Non-invasive Blood Pressure Analyzer, 3D Image Reconstructor, and File Format Converter. The file conversion utility imports many common biomedical data logger formats into NI Technical Data Management Streaming (TDMS) format including Biopac .ACQ, iWorx, .MAT, EDF, and HL7. Toolkit functions include signal processing algorithms for common processing tasks on many biosignals such as EEG and ECG signal simulation, EEG bispectral and coherence analysis, ECG feature extraction, and EMG power analysis. The Biomedical Toolkit requires the Advanced Signal Processing Toolkit to also be installed on development machine.

Simulation of Virtual ECG using Simulate ECG Express VI from Biomedical tool kit:

User can acquire real world and real-time biomedical data by using biomedical sensors and National Instruments hardware; also can import biomedical information from online data bank files, such as Physio bank MIT-BIH database to the applications in this kit for analysis. National Instruments hardware and the applications in this kit can also be use to generate standard analog biomedical signals to validate and test biomedical instruments.

Simulation Express VIs consist Function Palette Simulate ECG Express VI shown in figure 1 used to simulates electrocardiogram (ECG) signals for various conditions. Using configuration window user can set parameters available in this window shown in figure 2 to simulate different types of ECG signals related to various abnormalities. User can add noise by setting parameter White noise amplitude and power noise. Different types of signals are selected using parameter Signal type shown in configuration window, user can also be simulate user define signal using this function palete. This simulated signal is useful for study and analysis.
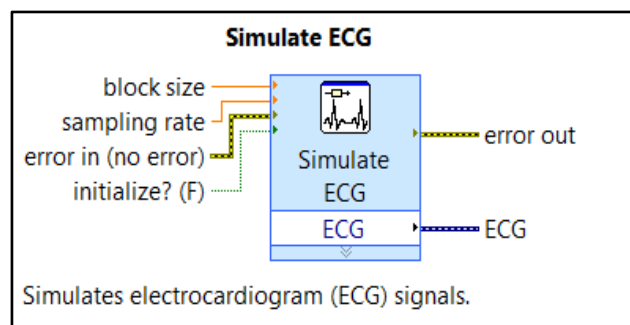
Result:

Virtual ECG signal for various cardiac abnormalities related sinus and nonsinus arrhythmias are simulated using Simulate ECG Express VI from Biomedical tool kit. Simulated ECG signal is displayed on front panel with parameters. Some sample simulated ECG signals are shown in front panel diagram with configuration window.

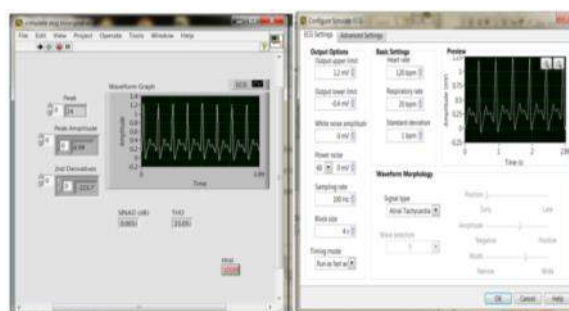**Figure 4 Front Panel and Configuration Window for Normal ECG signal**

Figure 4 Front Panel and Configuration Window for Normal ECG signal
Figure 5 Front Panel and Configuration Window for Atrial Tachycardia

National Conference on Multidisciplinary Research in Science and Technology for Healthy Lifestyle Management (NCMRST- 2020) Organizer :- Shri R.L.T. College of Science, Akola
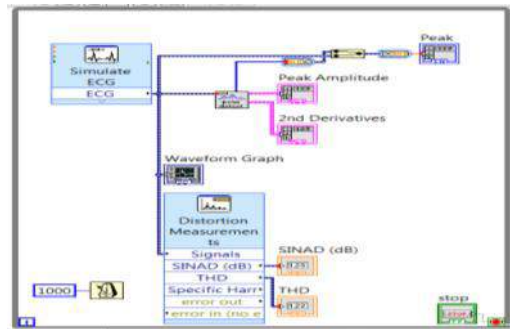
24th Jan. 2020

Figure 6 Front Panel and Configuration Window for AV Block
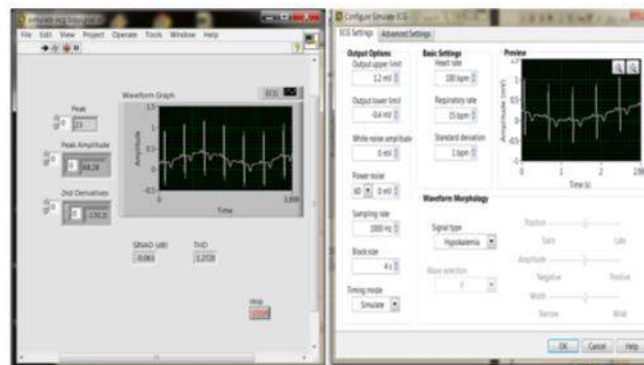

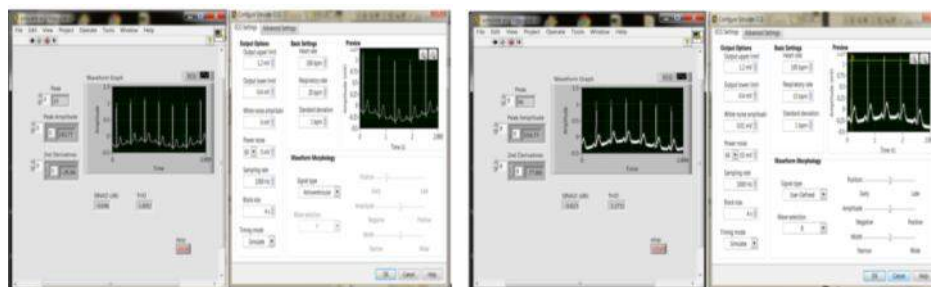**Figure 7 Front Panel and Configuration Window for Hypokalemia**

Figure 8 Front Panel and Configuration Window for User Define ECG Signal

Thus by setting configuration window we can simulate ECG signal for different abnormality and display on front panel. Data values can also stored using **Export Data** facility in Excel format or in spread sheet.

Conclusion:

Thus the Simulation of virtual ECG using National Instruments Lab-View Biomedical tool kit is much more helpful for the acquisition and study of different types of virtual electrocardiogram for various cardiac abnormalities related sinus and nonsinus arrhythmias. Thus software can be utilized as a test bench for the study of ECG signals at the laboratory level with more interactive and simplicity, which helps to enhance the understanding of theoretical Knowledge.

References:

1) Chr. Zywietz. A Brief History of Electrocardiography –Progress through Technology, Biosigna Institure for Biosignal Processing and Systems Research, Hannover, Germany.
2) Anjali Deshmukh, Yogendra Gandole "Simulation of ECG sgnal using Advanced Virtual Instrumentation based on Lab-View, International Journal of Science and Research, Volume 3 Issue 9, September 2014
3) National instrument LabVIEW signal processing.
4) zone.ni.com › ... › Manuals › LabVIEW 2014 Biomedical Toolkit Help

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293 (Special Issue No.70) Peer Reviewed Journal www.aiirjournal.com Mob. 8999250451

405

5) Anjali Deshmukh and Yogendra Gandole., ECG Feature Extraction Using Ni Lab-View Biomedical Work bench, International Journal of Recent Scientific Research Vol. 6, Issue, 8, pp.5603-5607, August, 2015

6) D.C.Reddy, "Biomedical Signal Processing: Priniciples and Techniques", 2nd edition Tata McGraw-Hill, New Delhi,2005

7) Joseph..D.Bronzino, "Biomedical Engineering Handbook", 3rd edition CRC Press, 2005

8) LabVIEW 2013 Biomedical Toolkit Help Edition Date: June 2013 Part Number: 373696B-01 »View Product Info June 2013, 373696B-01

9) labView for ECG Signal Processsing: http://zone ni.com/devzone/cda/plid/5832

10) Using Lab VIEW for Heart Rate Variability Analysis http://www. ni.com/white-paper/6349/en

11) www.ni.com/example/308

Study Of Derivatives And Integrls Of Fractional Order With Their Applications

S. V. Nakade*

Head & Assistant Professor, Dept. of Mathematics,

Sharda Mahavidyalaya, Parbhani,

(Affiliated to SRTMU Nanded) Maharashtra, India.

R. N. Ingle

Principal

Bahirji Smarak Mahavidyalaya, Basmatnagar,

(Affiliated to SRTMU Nanded) Maharashtra, India

Abstract:

In recent years Fractional order derivatives and Fractional order integrals (Fractional Calculus) is highly growing field in research because of its wide applicability and interdisciplinary approach. The main reason for the success of Fractional Calculus applications is that these new fractional-order models are often more accurate than integer-order ones, i.e. there are more degrees of freedom in the fractional order model than in the corresponding classical calculus. In this article we study some special functions, various approaches of fractional calculus, Integral transform of some fractional approaches, and some applications of Fractional calculus.

AMS subject classification 2010: 33B15, 33E12, 26A33, 44A10

Keyword: Special Functions, Mittag Leffler function Fractional Calculus, Grumwald-Letnikov differintegro, Riemann-Liouville Fractional derivative, Riemann-Liouville Fractional integral, Caputo's Fractional derivative , Integral Transform, Laplace Transform, Mellin Transform.

Introduction:

- **Fractional Calculus:**

Origin of classical calculus and fractional calculus has found to be very close in 17th century but its name as "Fractional Calculus" and work on it found later in 20th century. Answer given by great mathematician Leibnitz on 30th September 1695 to the question raised by another great mathematician L'Hospital through letter as "What will be the meaning of $\frac{d^n f}{dx^n}$, if n=1/2?" as "This is an apparent paradox from which one day a useful consequence will be drawn". After 30th September 1695 mathematicians who are working on classical calculus with special case of differentiation and integration of arbitrary order named the field as **Fractional calculus**. Though the study of Fractional calculus begins at the end of 17th century but good work held's only since last three to four decades. Special functions such as Gamma Function, Beta Function, Mittag Leffler Function, Incomplete Gamma Function etc are very closely related with Fractional Calculus and plays important role in development of fractional calculus [7]. Different approaches of Fractional calculus are given throughout the history such Riemann approach, Liouville approach, Caupto approach , Wely approach, Lacorix approach, Grunwald approach, Letnikov approach, Riemann-Liouville approach, Grunwald-Letnikov approach and many more with applications of Fractional Calculus. Integral Transform such as Laplace Transform, Millin Transform Sumdu Transform etc applied to solve fractional calculus approaches called fractional integral transform.

This paper consist of seven sections which are Introduction to Fractional Calculus, Historical development of Fractional Calculus, Special Functions, Study of different approaches of Fractional Calculus, Fractional Integral Transform, Applications of Fractional Calculus and Conclusion.

- **Historical Development of Fractional Calculus:**

In the classical calculus, students are taught to understand the concepts of differentiation and integration through their physical significance. The derivative has an important geometric interpretation; namely, it is associated with the concept of tangent, velocity, acceleration etc, and the integration has important geometric interpretation; namely, it is associated with the concept of area under curve, volume, Arc length etc in comparison to what occurs in the case of Fractional Calculus. This difference can be seen as a problem for the slow progress of Fractional Calculus up to 3 to 4 centuries from its origin. In 1695 Leibniz, in 1738 Euler [6,7] noticed the problem for a derivative of non integer order. In 1819, Lacroix devoted two pages to the discussion of the derivative of arbitrary order, in his book with seven hundred pages.

In 1822, Fourier [2, 6, 7] suggested an integral version in order to define the derivative, and his representation can be considered the first definition for the derivative of arbitrary (positive) order. In 1826, Abel [2,5-7] solved an integral equation associated with the tautochrone problem (Tautochrone: It is to determine a curve so that an object under the effect of gravity on it tumbles without friction, the time motion is independent of the starting point), which is considered to be the first application of Fractional Calculus. In 1832-1837 Liouville [3, 5] developed a definition based on the formula for differentiating the exponential function. This definition is known as the first Liouville definition. The second definition formulated by Liouville in terms of an integral of non integer order. In 1847 most important paper was published by Riemann, ten years after Liouvilles death. In 1867-1872 Gr ̈unwald [6, 7] and in 1868-1872 Letnikov [7], independently, developed an approach to non integer order derivatives in terms of a convenient convergent series. In 1892 Hadamard published a paper where the non integer order derivative of an analytical function must be done in terms of its Taylor series. For solving some particular problems, other definitions were proposed by respective mathematicians, name of some of these are Weyl , Riesz . In 1927 Marchaud introduced a new definition for non integer order of derivatives. In 1940 Erd ́elyi-Kober developed definition for non integer order of integration which is useful in applications involving integral and differential equations. In 1967 Caputo proposed more restrictive definition then others. After the first conference at the University of New Haven, in 1974, FC has developed and several applications emerged in many areas of scientific knowledge. As a consequence, distinct approaches to solve problems involving the derivative were proposed and distinct definitions of the fractional derivative are available in the literature. Oldham and Spanier (1974) [6], Samko, Kilbas & Marichev (1987), Miller & Ross (1993) [7] and I. Podlubny (1999) [2] gives in brief historical development of Fractional Calculus.

Special Functions:

- **Gamma function**

Gamma function very closely related special function with fractional calculus. Swiss mathematician Leonhard Euler (1707 – 1783) invented the gamma function and known as Euler's integral of second kind. The gamma function belongs to the special transcendental function category [1-11]. It is the generalization of factorial function. Euler's Gamma function is the improper integral of another function, for $z \in C \setminus \{0, -1, -2, -3 \ldots\}$ is defined as

$$\Gamma(z) = \int_0^\infty e^{-t} \, t^{z-1} \, dt, \qquad Re(z) > 0 \qquad (1)$$

In limit form Euler's Gamma function is defined as

$$\left\{ \frac{n! \; n^z}{z \, (z+1) \, (z+2) \, (z+3) \ldots (z+n)} \right\} \qquad (2)$$

And in product form it is defined as

$$\Gamma(z) = \frac{1}{z} \prod_{n=1}^\infty \left\{ \left(1 + \frac{1}{n}\right)^z \left(1 + \frac{z}{n}\right)^{-1} \right\} \qquad (3)$$

- **Beta Function**

Beta function is also known as Euler's integral of first kind. Beta function which is related with gamma function widely useful in different field, mostly used in solving definite integral, which is defined as [1, 2, 10, 11]

$$B(x,y) = \int_0^1 t^{x-1} (1-t)^{y-1} \, dt, \qquad Re(x), Re(y) > 0 \qquad (4)$$

$$B(x,y) = \frac{\Gamma(x)\Gamma(y)}{\Gamma(x+y)} \tag{5}$$

- **Mittag-Leffler function (MLF)**

Mittag-Leffler function is the generalization of exponential function, which plays very important role in fractional calculus. One parameter Mittag-Leffler function was introduced by G. M. Mittag-Leffler as (see [1, 2, 10, 11])

$$E_\alpha(z) = \sum_{k=0}^{\infty} \frac{z^k}{\Gamma(1+\alpha k)}, \quad \alpha, z \,\epsilon\, C, \quad Re(\alpha) > 0. \tag{6}$$

Two parameter Mittag-Leffler function is defined as

$$E_{\alpha,\beta}(z) = \sum_{k=0}^{\infty} \frac{z^k}{\Gamma(\beta+\alpha k)}, \quad \alpha, \beta, z \,\epsilon\, C, \quad Re(\alpha), Re(\beta) > 0. \tag{7}$$

Equation (7) is the generalization of equation (6) which is introduced by R.P. Agrawal in 1953. For $\beta = 1$ MLF of two parameter is reduces to MLF of one parameter. The importance of the Mittag-Leffler function was re-discovered when its connection to fractional calculus was fully understood.

- **Some definitions of Fractional calculus :**

The three most frequently used definitions for the general fractional differintegral are the Grunwald-Letnikov (GL) , the Riemann-Liouville (RL) and the Caputo derivative

- **Grumwald-Letnikov Definition :**

Anton Karl Grunwald proposed the Grunwald definition of differintegrals in 1867 at Prague. Same type of definition was also given by Aleksey Vasilievich Letnikov in 1868 at Moscow. Hence this definition is sometimes known as the Grunwald-Letnikov definition [1-9]. Given by

$$a\,D_x^\alpha f(x) = \left\{ \frac{\left(\frac{x-a}{N}\right)^{-\alpha}}{\Gamma(-\alpha)} \sum_{j=0}^{N-1} \frac{\Gamma(j-\alpha)}{\Gamma(j+1)} f\left(x - j\left[\frac{x-a}{N}\right]\right) \right\} \tag{8}$$

where $\alpha \,\epsilon\, C$ and $[x]$ means the integer part of x, a and x are the bounds of the operation.

The Grunwald-Letnikov definition is used to compute a differintegral numerically, without having to differentiate or integrate a function directly. This definition can also be applied to numerical data which is not necessarily described by a function.

- **Riemann-Liouville Definition :**

The most commonly used definition of a fractional differintegral was proposed by Riemann and Liouville [1-9]. The Riemann-Liouville definition allows for the calculation of a differintegral of any real order. There are two forms of the Riemann-Liouville definition. The first one, used to calculate the integral of a function, Given by

$$I_{a+}^\alpha f(x) = \frac{1}{\Gamma(\alpha)} \int_a^x \frac{f(t)}{(x-t)^{1-\alpha}} dt, \quad where\ \alpha\,\epsilon\,(-\infty,\infty) \tag{9}$$

The procedure required to obtain a fractional derivative using the Riemann-Liouville Definition requires first taking a fractional integral of the function in question, followed by an integer order derivative. Here, n is the integer of lowest possible value that is greater than the real number α. The Riemann-Liouville derivative operator is as follows:

$$D_{a+}^\alpha f(x) = \frac{d^n}{dx^n}\left[\frac{1}{\Gamma(n-\alpha)} \int_a^x \frac{f(t)}{(x-t)^{1-(n-\alpha)}} dt \right], \tag{10}$$

$$where\ n-1 < \alpha < n$$

However, definitions of the fractional differentiation of Riemann-Liouville type create a conflict between the well-established and polished mathematical theory i.e. it is not properly applicable with initial value problems and nonzero of differentiation of a constant.

- **M. Caputo (1967) :**

The main advantage of using the Caputo definition is that it is easily interpreted initial conditions and it is also bounded, meaning that the derivative of a constant is equal to 0. The definition is as follows:

$$a \, D_x^\alpha f(x) = \frac{1}{\Gamma(\alpha - n)} \int_a^x \frac{f^n(t)}{(t - x)^{1-(n-\alpha)}} dt, \qquad (11)$$

Let α > 0 and n-1 < α < n, n ϵ N, and a < x < b, Left hand and Right hand Caputo Fractional derivative is defined as

$$^C D_{a+}^\alpha f(x) = \frac{1}{\Gamma(n-\alpha)} \int_a^x (x - t)^{n-\alpha-1} f^{(n)}(t) dt, \qquad (12)$$

$$^C D_{b-}^\alpha f(x) = \frac{(-1)^n}{\Gamma(n-\alpha)} \int_x^b (x - t)^{n-\alpha-1} f^{(n)}(t) dt. \qquad (13)$$

Caputo in1967 [1–9] formulated a definition, more restrictive definition than the Riemann-Liouville but more appropriate to discuss problems involving a fractional differential equation with initial conditions. Due to the importance of the Caputo version, we will compare this approach with the Riemann-Liouville formulation. The definition as proposed by Caputo inverts the order of integral and derivative operators with the non integer order derivative of the Riemann-Liouville. We summarize the difference between these two formulations. In the Caputo: first integer order derivative calculated and after non integer order integral calculated. In the Riemann-Liouville: first non integer order integral calculated and after integer order derivative calculated.

Integral transform of some fractional approaches:

- **Laplace Transform of the Riemann-Liouville Fractional Integral:**

The Riemann-Liouville Fractional Integral is given by

$$D^{-\alpha} f(x) = \frac{1}{\Gamma(\alpha)} \int_a^x (x - t)^{\alpha-1} f(t) dt.$$

Its Laplace transform [3, 4, 12-14] is given by

$$\mathcal{L}\{D^{-\alpha} f(x)\} = \frac{1}{\Gamma(\alpha)} \mathcal{L}\{x^{\alpha-1}\} \mathcal{L}\{f(x)\} = s^{-\alpha} \, F(s), \quad \alpha > 0.$$

- **Laplace Transform of the Riemann-Liouville Fractional Derivative**

The Riemann-Liouville Fractional differential operator is given by

$$D^\alpha f(x) = \frac{1}{\Gamma(n - \alpha)} \left(\frac{d}{dx}\right)^n \int_a^x (x - t)^{n-\alpha-1} f(t) dt,$$

The Laplace transform of Riemann-Liouville Fractional differential operator [3, 4, 12-14] is given by

$$\mathcal{L}\{D^\alpha f(x): s\} = s^\alpha F(s) - \sum_{k=0}^{n-1} s^k \left[D^{(\alpha-k-1)} f(0)\right]$$
$$= s^\alpha F(s) - \sum_{k=0}^{n-1} s^{n-k-1} [D^k I^{n-\alpha} f(0)]$$

- **Laplace Transform of the Caputo Fractional Derivative**

The Caputo Fractional Differential operator is given by

$$ac D_x^\alpha f(x) = \frac{1}{\Gamma(n-\alpha)} \int_a^x (x - t)^{n-\alpha-1} f^{(n)}(t) dt,$$

The Laplace transform of Caputo Fractional Differential operator [3, 4, 12-14] is given by

$$L\{acD_x^\alpha f(x):s\} = s^\alpha F(s) - \sum_{k=0}^{n-1} s^{\alpha-k-1}f^{(k)}(0), \quad n-1 < \alpha < n.$$

- **Mellin Transform of the Riemann-Liouville Fractional Integral:**

  Mellin transform of Riemann-Liouville fractional integral operator [3, 4, 12-14] is given by

$$M\{D^{-\alpha}f(x)\} = F(s) = \frac{\Gamma(1-s-\alpha)}{\Gamma(1-s)}F(s+\alpha)$$

- **Mellin Transform of the Riemann-Liouville and Caputo Fractional Derivative:**

  Mellin transform of Riemann-Liouville and Caputo fractional derivative

  operator [3, 4, 12-14] is given by

$$M\{D^{\alpha}f(x)\} = F(s) = \frac{\Gamma(1-s+\alpha)}{\Gamma(1-s)}F(s-\alpha)$$

Applications of Fractional Calculus:

- **Diffusion Equation:**

Diffusion equation is an interesting application of fractional calculus. The study of thermal flux on a given surface is important due to its influence on material wear and performance. In addition once the thermal flux is known, the temperature can be obtained. The brake disks are treated as semi-infinite bodies and assumed to have a constant temperature distribution.

Agrawal (2004) [15] published a paper which analyzes the effectiveness of using fractional order derivatives to obtain the heat flux at a given point. Traditionally this was achieved by performing a transient analysis of two nearby points. His motive was the thermal study of disk brakes. The following diffusion equations govern the thermal distribution of the body.

$$\frac{\partial T(x,t)}{\partial t} = \frac{K}{\rho c}\frac{\partial^2 T(x,t)}{\partial x^2}$$

Where T(x, t) is the temperature at point x and time t, K is the thermal conductivity,   ρ the mass density and c the specific heat of the disk material. After non-dimensional zing and applying Laplace Transform it is converted in fractional partial differential equation given by

$$\frac{1}{\sqrt{\propto}}\frac{\partial^{1/2}\theta(x,t)}{\partial t^{1/2}} = \frac{\partial\theta(x,t)}{\partial x}$$

Using this fractional equation heat flux Q(t) and temperature at that point obtained.

 Lot of Mathematicians work on diffusion equation some of them, Kulish gives more information on thermal flux analysis with fractional order derivatives in his paper [16], Lokenath Debnath also gives more detailed applications of fractional calculus relating to the diffusion equation in an paper [17].

- $P\,I^\lambda\,D^\mu$ **Controller**

The concept of a fractional order $P\,I^\lambda\,D^\mu$ is proposed In a paper written by Igor Podlubny in 1999 [2], where the integrator and differentiator are of a fractional order. A fractional order transfer function is provided as

$$G_c(s) = \frac{U(s)}{E(s)} = K_P + K_I s^{-\lambda} + K_D s^\mu, \qquad \lambda, \mu > 0$$

Here λ is the order of the integrator, μ is the order of differentiator, $G_c(s)$ is the transfer of controller, U(s) is the controller's output and E(s) is an error. If λ =1 and $\mu = 1$ equation becomes traditional P I D controller equation If λ =1 and $\mu = 0$, equation converts to a P I controller equation. If λ =0 and $\mu = 1$ equation converts to a P D controller equation.

In the time domain, it becomes an open-loop system is described by

$$\sum_{k=0}^{n} a_k D^{\beta_k}y(t) = K_P w(t) + K_I D^{-\lambda}w(t) + K_D D^\mu w(t)$$

Here w(t) is the input , y(t) is output of the system, β(k= 0,1,2….n) arbitrary real number and a_k (k= 0,1,2….n) arbitrary constants.

Effectiveness of this controller can be analyzes by an example of PD^μ controller. The transfer function and time domain fractional order differential equation are

$$G(s) = \frac{1}{a_2 s^{\beta_2}} + a_1 s^{\beta_1} + a_0$$

$$a_2 y^{\beta_2}(t) + a_1 y^{\beta_1}(t) + a_0 y(t) = u(t)$$

With initial condition y(0) = 0, y'(0) = 0, y''(0) = 0.

Following figure shows the effectiveness of the controllers.
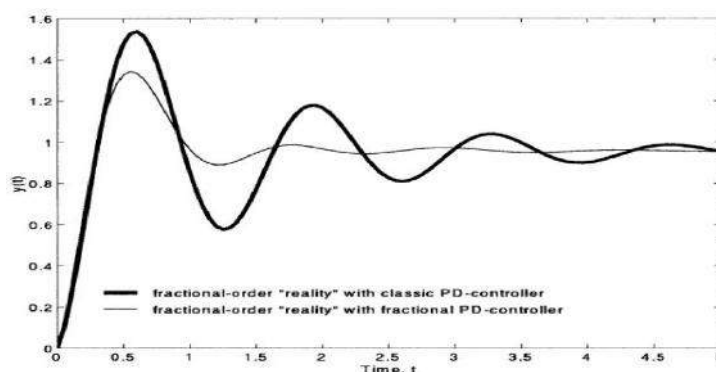
Figure 1 is the comparison of conventional P D controller (thick line) and fractional PD^μ controller (thin line).

Conclusion:

Fractional calculus acts as an powerful mathematical tool used to obtain solution to real world problems. Applicability of fractional calculus attracted mathematicians to work in their field using this branch of mathematics. The purpose of this paper is to attract new researcher to work in this field since though beginning of fractional calculus may be same as traditional calculus but actual work found in last three to four decades.

Refrences
1) S. V. Nakade, R.N. Ingle, Study of some Special functions in Fractional Calculus, International Innovative Journal, ISSN 2319-8648. Special Issue for International conference on Applied Science 2017.
2) I. Podlubny, Fractional Diff erential Equations, Academic Press, New York, (1999).
3) S. V. Nakade, R.N. Ingle, Note on Integral transform of fractional calculus, International Journal of Research and Review, 2019, 6(2): 106-110.
4) S. V. Nakade, R.N. Ingle, Study Of Some Mathematical Modeling Using Fractional Calculus, Ajanta An International Multi. Qtly Research Journal ISSN 2277-5730,pp 84-92.
5) S. Samko, A. Kilbas, O. Marichev; Fractional integrals and derivative: Theory and Applications, Gordon and Breach science publisher, 1993.
6) K. B. Oldham, J. Spanier, The Fractional Calculus, Academic Press, New York,
7) (1974).
8) K.S. Miller and B. Ross, An Introduction to the Fractional Calculus and Fractional diff erential Equations Wiley, 1993.
9) Gorenflo R. and Mainardi F., Essentials of fractional calculus , MaPhySto Center, 2000.

10) Greenberg M., Foundations of applied mathematics, Prentice-Hall Inc., Englewood Cliffs, N.J. 07632, 1978.

11) M. Abramowitz and I. Stegun, Handbook of mathematical functions, Dover, New York,1964.

12) Erdélyi, et al. (Eds.), Higher Transcendental Functions, vols. 1_3, McGraw-Hill, New York, 1953.

13) Sneddon Ian N. The use of Integral Transform, McGraw-Hill Book Co., NY1972.

14) Erdelyi, A., W. Magnus, F. Oberhettinger and F.G.Tricomi, Tables of Integral Transfer, McGraw-Hill Book Co., NY1954.

15) Davies G., Integral Transforms and Their Applications, 2nd ed. Springer-Verlag,New York,1984.

16) O. P. Agrawal. Application of fractional derivatives in therma analysis. Nonlinear Dynamics, 38:191–206, 2004.

17) V. V. Kulish and J. L. Lage. Fractional-diffusion solutions for transient local Temperature and heat flux. Journal of Heat Transfer, 122, 2000.

18) Lokenath Debnath. Recent applications of fractional calculus to science and engineering. International Journal of Mathematics and Mathematical Sciences, 54:3413–3442, 2003.

A Review Of The Graphene A Wonder Material In The Field Of Vision / Nanoparticles Composites Synthesis And Applications

Rohan K Shirsat
Department of Physics,
Shankarlal Khandelwal Arts, Science and Commerce College, Akola (MS)

Abstract

The advancement of graphene/nanoparticles composites materials is at present the issue of enormous research intrigue. Graphene sheets have surface deformities and oxygen useful gatherings, which make them perfect layouts for combination of semiconductor and metal nanoparticles. To date graphene have made a colossal research interests due to its brilliant electronic, optical, mechanical, and warm properties, graphene has indicated incredible guarantees in a wide scope of uses, for example, photovoltaic application, vitality stockpiling gadgets, photograph synergist hydrogen advancement, and gas detecting application. Upgraded properties are normal in these graphene/nanoparticles composites, which emerge from the synergic impact of the graphene sheets tied down nanoparticles. Right now, strategies for combination of graphene/nanoparticles composites have been talked about. In spite of the fact that, graphene/semiconductor nanoparticles composites, in fields of photovoltaic, vitality stockpiling, Photo reactant hydrogen development and gas detecting applications have been considered.

Introduction

Graphene sheet is the astounding monolayer of sp2-fortified carbon molecules organized in honeycomb structure, has pulled in broad enthusiasm for late years and developed as the most seriously contemplated material. The band gap inside graphene sheet can be opened by lessening the elements of the graphene sheets to the nano-level or by presenting dopants. As of late researchers brightened different semiconductor/metal nanoparticles on graphene sheet. Thus, surface fictionalization of graphene is required to improve the This survey first gives a record of graphene and a general outline of nanoparticles, trailed by a short depiction to union of graphene/nanoparticles composites and afterward the ongoing application on the graphene/nano-particles composites. Presently a day's graphene has gotten impressive consideration on account of its one of kind properties, including high warm conductivity, high electrical conductivity, and enormous explicit surface region. Nanoparticles examine is as of now a territory of extreme logical research, because of an expansive assortment of potential applications. Nanoparticles are of incredible logical enthusiasm as they are adequately an extension between mass materials and nuclear structures. Size-subordinate properties are watched. The explanation for this adjustment in properties is principally because of the adjustment in surface Plasmon reverberation. At the point, when the size of nanoparticles is small than the wavelength, a surface Plasmon reverberation is created and which exceptionally valuable in photovoltaic application.

Method's of synthesis

There are various synthesis methods available for synthesis of graphene /nanocomposite described below;

- **In-situ growth approach**

One of the normally utilized techniques to get ready graphene/semiconductor nanoparticles composites is the in-situ development approach, by direct response of the graphene sheets and the semiconductor nanoparticles in arrangement.

- **Electrochemical deposition**

Electrochemical statement is a proficient technique to plan graphene/semiconductor nanoparticles composites, for example, ZnO, Cu2O, and CdSe nanoparticles as contrast with wet impregnation, microwave light, miniaturized scale emulsion. Electrochemical affidavit strategy is generally utilized utilizing various philosophies, for example, cyclic voltammeter, potential advance statement and twofold heartbeat.

- **Sol-gel process**

Sol-gel process, is generally directed under mellow conditions, (for example, low temperature and environmental weight) and don't have high prerequisites on hardware. Mirzaei and Davoodnia announced the microwave helped sol-gel union of MgO nanoparticles and their synergist action in the amalgamation of Hantzsch 1, 4-dihydropyridines.

- **Hydrothermal approach**

The aqueous procedure, one of the regular techniques for union of semiconductors, is another successful strategy instead of co-precipitation technique for the arrangement of semiconductor materials with graphene. Right now, nanoparticles are stacked on the graphene oxides sheets, which are decreased to graphene.

- **Solution mixing method**

Arrangement blending is a basic strategy to arranged graphene/semiconductor composite arrangement blending is begun with an ultrasonic blending and afterward UV-helped photo catalytic decrease of GO.

Applications of Graphene/Semiconductor nanoparticles composites

Currently, the graphene/semiconductor nanoparticles composites are generally utilized in photovoltaic applications. This PV cell with improved the retention of sun oriented radiation and charge bearer transport utilizing semiconductor nonmaterial's which have capable to expanded in power change proficiency. In the present day it is extremely important to comprehend the essential instrument of PV cell, let us take a case of bi-layer PV cell. In a bi-layer gadgets structure comprises of a straightforward conductor, a photoactive layer and the cathode. The photoactive materials to be specific contributor and acceptor are sandwiched between the straightforward conductor and the anode. PV cells containing graphene/nanoparticles composites as dynamic materials have been contemplated widely. The most generally indium tin oxide (ITO), with its work capacity of 4.4-4.5 eV, is utilized as the straightforward conductive anode. ITO is weak and restricted as an adaptable substrate. To conquer this disadvantages as of late different specialist supplant ITO by grapheme as an exchange insect leading terminal has a work capacity of 4.5 eV . The entire structure was made on a supporting substrate. In photovoltaic gadgets, grapheme sheets have been for the most part utilized as charge acceptors, straightforward terminals, and charge transport spans 1.2Graphene/Semiconductor nanoparticles composites for vitality stockpiling gadgets: The surface properties of graphene can be balanced by means of compound adjustment, which offers magnificent open doors for the improvement of functionalized graphene-based materials. Such graphene-based materials show special electronic and optical properties, which make these materials appealing for some, potential applications including vitality stockpiling. Graphene/Semiconductor Nanocomposite for Photo catalytic Hydrogen Evolution Photo catalytic hydrogen advancement is a long-standing objective for analysts since it can assist with providing the developing overall vitality request in light of its natural agreeableness. The pressing interest for spotless and sustainable elective vitality recourses has been as of late activated research on hydrogen development draws near, particularly photo catalytic hydrogen generation from sunlight based vitality through semiconductor nonmaterials. The graphene because of its enormous explicit surface territory has progressively dynamic adsorption destinations and photo catalytic response focuses, which is skilled for exceptionally amplify the response space and improve photo catalytic movement for hydrogen advancement. Graphene/Semiconductor nanoparticles composites for gas detecting application Gas sensor interfaces with a gas and measures the convergence of gas in its encompassing territory. Semiconductor nanoparticles utilized for identifying dangerous gases and work through a gas touchy film. The delicate film responds with gases, actuate the gadget when dangerous levels are available.

Conclusion

As talked about thus, a few procedures have been utilized for graphene/nanoparticles combination, and its usage in various parts of cutting edge in different fields was affirmed. Until this point in time, graphene/nanoparticles are applied in photovoltaic cells, vitality stockpiling gadgets, photo catalytic hydrogen assessment, and gas sensing application, attributable to its adaptable properties, for example, optical, electrical, and mechanical properties. The graphene into the nanocomposite predominantly acts to advance the partition of

charge bearers and transport of photo generated electrons. The exhibition of composites is exceptionally reliant on the semiconductor nanoparticles and their morphologies and surface states. In this way, the improvement of novel composites is required. In any case, there are as yet numerous difficulties and open doors for graphene/based nanoparticles nanocomposite particularly semiconductor nanoparticles and they are as yet expected to be created as potential application to address different natural and vitality related issues.

References

1) Lightcap IV, Kosel TH, Kamat PV. Anchoring semiconductor and metal nanoparticles on a twodimensional catalyst mat. Storing and shuttling electrons with reduced graphene oxide, Nano Lett 2010; 10:577-583.

2) Zhang XY, Li HP, Cui XL. Synthesis and photocatalytic TiO2 graphene composite hydrogen production activity, Chin J Inorg Chem. 2009; 25:1903-1907.

3) Nemade KR, Waghuley SA. In situ synthesis of graphene/SnO2 quantum dots composites for chemiresistive gas sensing, Mater. Sci. Semicond. Process 2014; 24:126-131.

4) Lambert TN, Chavez CA, Lu BHSP, Bell NS, Ambrosini A, Friedman T *et al.* Synthesis and

5) Characterization of Titania-Graphene J. Phys. Chem. C 2009; 113:19812-19823.

6) Cao A, Liu ZS, Chu MWu, ZYe, Z Cai, Chang Y *et al.* A Facile One-step Method to Produce Graphene-CdS Quantum Dot Nanocomposites as Promising Optoelectronic Materials, Adv. Mater 2010; 22:103-106.

7) Chai GY, Lupana O, Rusuc EV, Stratanc GI, Ursaki VV, Ontea VS *et al.* Chow, Functionalized individual ZnO microwire for natural gas detection, Sens. Actuators, A 2012; 176:64-71.

8) Jimenez-Cadena G, Riu J, Rius FX. Gas sensors based on nanostructured Materials, Anlyatic 2007; 132:1083-1099.

9) Nemade KR, Waghuley SA. LPG sensing application of graphene/Bi2O3 quantum dots composites, Solid State Sciences 2013; 22:27-32.

10) Chen S, Zhu J, Wu X, Han Q, Wang X. Graphene oxide-MnO2 nanocomposites for supercapacitors, ACS Nano 2010; 4(5):2822-30.

11) Nemade KR, Waghuley SA. Role of defects concentration on optical and carbon dioxide gas sensing

12) properties of Sb2O3/graphene composites, Opt. Mater 1014; 36:712-716.

13) Ren Z, Meng N, Shehzad K, Xu Y, Qu S, Yu B *et al.*Mechanical properties of nickel-graphene composites synthesized by electrochemical deposition, Nanotechnology 2015; 26:1-8.

14) Golsheikh AM, Huang NM, Lim HN, Zakaria R, Yin CY. One-step electrodeposition synthesis of silvernanoparticle-decorated graphene on indium-tin-oxide for enzymeless hydrogen peroxide detection, Carbon 2013; 62:405-412.

15) Prunaa A, Reyes-Tolosab MD, Pullinic D, Hernandez-Fenollosab MA, Busquets-Mataixb D. Seed-free electrodeposition of ZnO bi-pods on electrophoreticallyreduced graphene oxide for optoelectronic applications, Ceramics International 2015; 41:2381-2388.

16) Mirzaei H, Davoodnia A. Microwave assisted sol-gelsynthesis of MgO nanoparticles and their catalytic activity in the synthesis of hantzsch 1, 4-dihydropyridines, Chin. J Chem. 2012; 33:1502-1507.

17) Geim K, Novoselov KS. The rise of graphene. Nat Mater 2007; 6:183-191.

18) Novoselov KS, Geim AK, Morozov SV, Jiang D, Zhang Y, Dubonos SV *et al.* Electric Field Effect in Atomically Thin Carbon Films, Science 2004; 306:666-669 17. Barone V, Hod O, Scuseria GE. Electronic structure and stability of semiconducting graphene nanoribbons, Nano Lett 2006; 6:2748-2754.

19) Wei DC, Liu YQ, Wang Y, Zhang HL, Huang LP, Yu G. Synthesis of N-Doped Graphene by Chemical Vapor Deposition and Its Electrical Properties, Nano Lett 2009; 9:1752-1758.

20) Mathew DS, Juang RS. An overview of the structure and magnetism of spinel ferrite nanoparticles and their synthesis in microemulsions, J. Chem. Engin 2007; 129:51-58.

National Conference on Multidisciplinary Research in Science and Technology for Healthy Lifestyle Management (NCMRST- 2020) Organizer :- Shri R.L.T. College of Science, Akola

24th Jan. 2020

21) Waghuley SA. Synthesis, Charecterization and CO2 gas sensing response of SnO2/Al2O3 double layer sensor, Indian J. Pure Appl. Phys 2011; 49:816-819.

22) Telipan G, Ignat M, Tablet C, Parvulescu V. Synthesis, characterization and gas sensing properties of rutile TiO2 doped with Pt obtained by sol-gel method, J Opto. Adv. Mater. 2008; 10:2138-2141.

23) Nemade KR, Waghuley SA. Highly responsive carbondioxide dioxide sensing by graphene/Al2O3 quantum dots composites at low operable temperature, Indian J Phys. 2014; 88:577-583.

24) Morales-Torres S, Pastrana-Martínez LM, Figueiredo JL, Faria JL, Silva AMT. Design of graphene-based TiO2 photocatalysts-A review. Environ. Sci. Pollut. Res. Int 2012; 19:3676-3687.

25) Li F, Son DI, Kim TW, Ryu E, Kim SW. Carrier transport mechanisms of bistable memory devices

26) fabricated utilizing core-shell CdSe/ZnSe quantumdot/multi-walled carbon nanotube hybrid nanocomposites, Nanotechnology 2009; 20:1-5.

27) Gur I, Fromer NA, Chen CP, Kanaras AG, Alivisatos AP. Hybrid solar cells with prescribed nanoscale morphologies based on hyperbranched semiconductor nanocrystals, Nano Lett 2007; 7:409-414.

28) Wu Y, Wadia C, Ma W, Sadtler B, Alivisatos AP. Synthesis and Photovoltaic Application of Copper (I) Sulfide Nanocrystals, Nano Lett 2008; 8:2551-2555.

29) Granqvist CG. Transparent conductors as solar energy materials: a panoramic review, Sol. Energy Mater. Sol. Cells 2007; 91:1529-1598.

30) Wu J, Agrawal M, Becerril HA, Bao Z, Liu Z, Chen Y, *et al.* Organic light-emitting diodes on solutionprocessed graphene transparent electrodes, ACS Nano, 2009; 4:43-48.

31) Sun S, Gao L, Liu Y. Enhanced dye-sensitized solar cell using graphene-TiO2 photoanode prepared by heterogeneous coagulation, Appl. Phys. Lett 2010; 96:083113-3.

32) Yin Z, Wu S, Zhou X, Huang X, Zhang Q, Boey F *et al.* Electrochemical deposition of ZnO nanorods on transparent reduced graphene oxide electrodes for hybrid solar cells, Small 2010; 6:307-312.

33) Wang X, Zhi L, Mullen K. Transparent, conductive graphene electrodes for dye-sensitized solar cells, Nano Lett 2008; 8:323-327.

34) Guo C. Layered graphene/quantum dots for photovoltaic devices, Angew. Chem. Int. Ed 2010; 49:3014-3017.

35) Radich JG, McGinn PJ, Kamat PV. Graphene-based Composites for Electrochemical Energy Storagek, Electrochem. Soc. Interface 2011; 20:63-66.

36) Yang N, Zhai J, Wang D, Chen Y, Jiang L. Two- Dimensional Graphene Bridges Enhanced Photoinduced Charge Transport in Dye-Sensitized Solar Cells, J Am.Chem. Soc. 2010, 4887-894.

37) Khare PS, Yadav R, Swarup A. RGO-ZnO Nanocomposit Material of Enhanced Absorbance for

38) Solar Energy Conversion, Int. J Appl. Phys. Math. 2013; 3:95-97.

39) Kim HN, Yoo H, Moon JH. Graphene-embedded 3DTiO2 inverse opal electrodes for highly efficient dyesensitized solar cells: Morphological characteristics and photocurrent enhancement. Nanoscale 2013; 5:4200-4204.

40) Tang Y, Lee C, Xu J, Liu Z, Chen Z, He Z *et al.* Incorporation of graphenes in nanostructured TiO2 films via molecular grafting for due-sensitized solar cell application. ACS Nano 2010; 4:3482-3488.

41) Sun Y, Wu Q, Shi G. Graphene based new energy materials, Energy Environ. Sci. 2011; 4:1113-1132.

42) Wang K, Ruan J, Song H, Zhang J, Wo Y, Guo S *et al.* Biocompatibility of Graphene Oxide, Nanoscale Res

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293 (Special Issue No.70) Peer Reviewed Journal www.aiirjournal.com Mob. 8999250451

417

Photoluminescence Properties Of Sm^{3+} Doped Libabo$_3$ Phosphor

Y. P. Manwar[1*], S.K.Tayde[2], R. S. Palaspagar[3], R. P. Sonekar[4], S. K. Omanwar[5]

[*1,2]*Department of Physics, RLT Science College, Akola-444 602(M.S.), INDIA*
[3,5]*Department of Physics, SGB Amravati University, Amravati-444 602(M.S.), INDIA*
[4]*Department of Physics, G.S. College, Khamgaon-444 303, Dist: Buldhana (M.S.), INDIA*

Abstract-

Sm^{3+} *activated LiBaBO$_3$ phosphors were prepared by sol-gel synthesis technique. The obtained powders were characterized by XRD, photoluminescence (PL) and FE-SEM techniques. The PL spectra shows an efficient red (602nm ,and 571nm) band emissions (excited by 405 nm), corresponding to $^6H_{5/2}$ -, $^4F_{9/2}$ and $^4G_{5/2}$ and ^6Hj (j = 5/2,7/2,9/2,11/2) respectively. CIE chromaticity coordinates have been determined from emission spectra to evaluate the emitted light as function of Sm^{3+} concentration.*

Keywords: lithium-borate, sol-gel synthesis, X-ray diffraction, photoluminescence

Introduction

Recently, solid state lighting based on white light emitting diodes has become a prevailing trend in illumination technology due to the significant advantages of wLEDs, for example, high luminous efficiency, low energy consumption, long lifetime and being environmental friendly [1]. (Y, Gd)BO3:Eu^{3+} serves as a good phosphor for plasma display panels (PDPs). A red-emitting phosphor suitable for near-UV phosphor converted LEDs should high colour rendering index, high colour tolerance and high conversion efficiency into visible light [2]. The f-f transition absorption and emission of the crystalline host activated by rare earths ions are of great importance due to their applications as luminescent optical materials emitting in the visible and near IR regions [3].

The selection of the rare earth ion as an activator is a key factor for the preparation of luminescent materials. Among the different rare earth ions, the Sm^{3+} ion is regarded as one of the most popular and efficient doping ions, which can produces intense orange light in the visible wavelength range. Sm^{3+} ions in various hosts show bright emission in orange or red regions because of the transitions from the excited state $^4G_{5/2}$ to the ground state $^6H_{7/2}$ and also to the higher levels ^6Hj (j=7/2, 9/2, and 11/2) and found the application in high density optical storage, temperature sensors, undersea communications, various fluorescent devices, colour display and visible solid-state lasers [4]. Selection of suitable host material is also an important factor for the preparation of luminescent materials for different applications. Among the several inorganic host materials, the borate host matrix constitutes as one of the most important luminescence materials, which can produce plenty of crystal field environments imposed on emission contents [5].

In this work we have focussed on synthesis of Sm^{3+} doped LiBaBO$_3$by sol-gel method and studied the phase, morphology and photoluminescence characteristics of red emitting LiBaBO$_3$:Sm^{3+} phosphor. We have reported the colour coordinates in context with its solid state lighting application.

Experimental

- **Sample preparation**

In the first crucible precursors LiNO$_3$, Ba(NO$_3$)$_2$,H$_3$BO$_3$,Sm(NO$_3$)$_3$, NaCl (Two drops) were taken and mixed together and dried in a china clay basin. The dried precursors were finely milled. The stearic acid (0.5M) was heated slowly to 70^{0}C in second crucible. It melts completely within 5 minutes. The dried precursors in the first basin were added to the molten stearic acid with the addition of 2 drops of acetic acid and were stirred continuously. This mixture was heated to 100-200^{0}C with continuous stirring till the precursors dissolved completely leading to a colourless solution. White gel was formed after cooling. This gelwas heated to 500^{0}C (1h) yielding and converted into a shining black charcoal. The charcoal powder was sintered at 700^{0}C for 2h yielding dried white powder of LiBaBO$_3$:Sm^{3+}

- **Material characterizations**

The phase and surface morphology of as prepared phosphors were characterized by X-ray diffraction measurements using Rigaku Miniflex II X-ray Diffractometer with Cu Kα radiation (λ=1.54059 Å) with scan speed 2°/min and field emission - scanning electron microscopy (FE-SEM) (Hitachi, Model-S4800 type II). The PL & PLE measurements at room temperature were performed on Hitachi F-7000 Spectroflurometer with spectral resolution of 2.5 nm.

Results and discussion

- *X-ray diffraction pattern*

To determine the phase purity of the sample, powder XRD characterisation of the synthesized product was conducted. Figure 1. shows the powder XRD pattern of $LiBaBO_3:Sm^{3+}$.
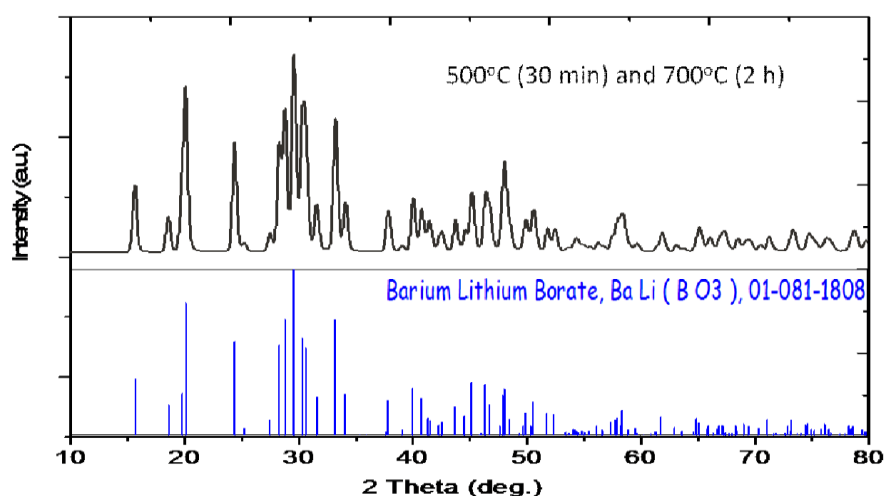
Figure 1. XRD pattern of $LiBaBO_3:Sm^{3+}$.

It is compared with ICDD file number 01-081-1808 in the same figure. It is observed that the XRD of prepared sample is consistent with the standard ICDD file. $LiBaBO_3:Sm^{3+}$ has monoclinic crystal structure with P21/n space group and its lattice parameter values are a=0.6461 nm, b=0.7107 nm, c=0.7403 nm.

- *FE-SEM micrograph analysis*

The surface morphology & average particle size of the prepared sample $LiBaBO_3:Sm^{3+}$ was investigated by SEM characterisation. Figure 2 shows the SEM micrograph of as prepared $LiBaBO_3:Sm^{3+}$. SEM micrograph indicates the surface morphology of the phosphor.The size and shapes of the particles are not uniform. The size of the particles is observed in the range of 0.5-1 µm. The phosphor exhibited irregular morphology with no uniform shape and size and no obvious agglomeration.
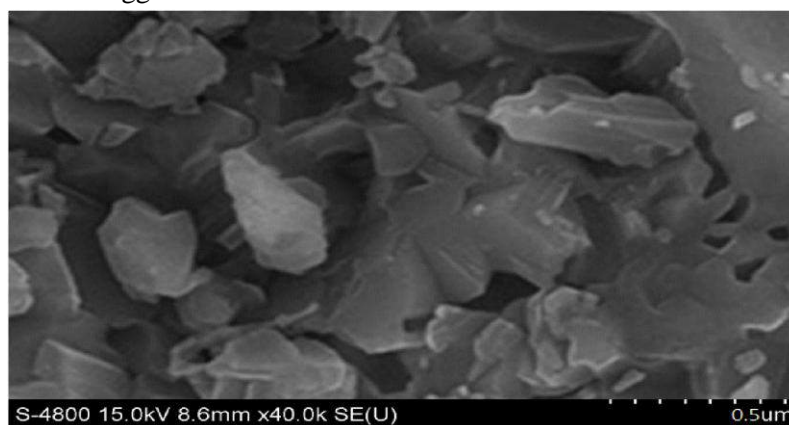

Figure 2. SEM image of $LiBaBO_3:Sm^{3+}$.

- *Photoluminescence*

The interaction of $LiBaBO_3:Sm^{3+}$ phosphor with different exciting wavelengths 402, 377, 360, 345 nm, leads to the transition of Sm^{3+} ions from the ground level $^6H_{5/2}$ to the higher levels $^4K_{11/2}$, $^4D_{5/2}$, $^4F_{9/2}$ $^3H_{7/2}$, respectively. The Sm^{3+} ions from the high states make non-radiative transition up to $^4G_{5/2}$ level after that the transitions are radiative, as the energy gap between $^4G_{5/2}$ and ^6Hj (j = 5/2,7/2,9/2,11/2) states is sufficient to give Red emission. Figure 3.3shows the Emission and Excitation spectra of $LiBaBO_3:Sm^{3+}$. The series of Sm^{3+} doped $LiBaBO_3$ host with various concentration of Sm^{3+} is presented in Figure 3,4.
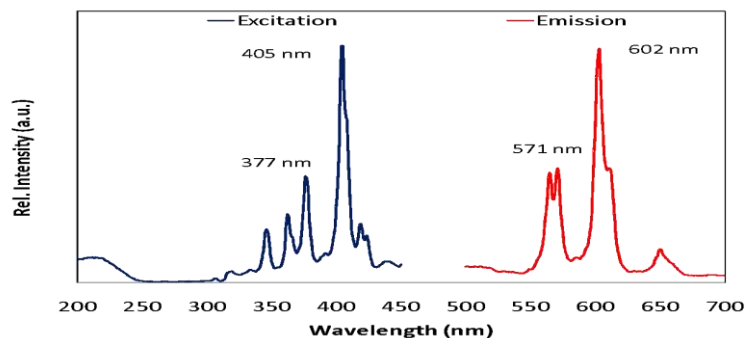
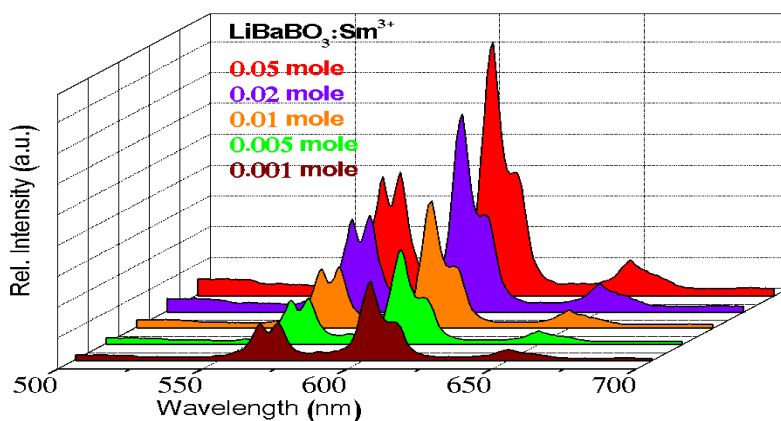**Figure 3. Excitation spectra of $LiBaBO_3:Sm^{3+}$ at 402 nm emission.**

Figure 4. Series of Emission spectra of $LiBaBO_3:Sm^{3+}$ at 402 nm excitation

- **CIE Colour coordinates**

The Commission International de'Eclairage (CIE) chromaticity diagram of the $LiBaBO_3:Sm^{3+}$ phosphor is shown in Figure 5. The chromaticity coordinates of $LiBaBO_3:Sm^{3+}$ phosphors are x=0.56 and y=0.30 which corresponds to red emission.

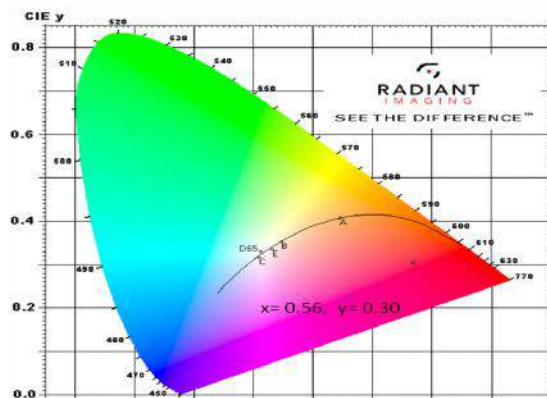**Figure 5. CIE Diagram of $LiBaBO_3:Sm^{3+}$**

Acknowledgement

References

1) Ahemen, F. B. Dejene, J. Nanopart. Res. 19 (2017) 6.
2) S. Ye, F. Xiao, Y.X. Pan, Y.Y. Ma, Q.Y. Zhang, Mater. Sci. Eng. 71 (2010)1.
3) M.R. Brown, A.F. Cox, W.A. Shand, J.M. Willian, J. Phys. C: Solid State Phys. 5 (1972) 502.
4) Y.L. Li, Y.H. Chang, Y.F. Lin, Y.S. Chang, Y.J. Lin, J. Alloys Comp. 439 (2007) 367.
5) S. Zhao, J. Yao, E. Zhang, G. Zhang, J. Zhang, P. Fu , Y. Wu, Sol. Scien. 14 (2012) 305.
6) X. Zhang, Y. Chen, S. Zeng, L. Zhou, J. Shi, M. Gong, Cer. Inter. 40 (2014) 14537.
7) L. Wu, X.L. Chen, Y. Zhang, Y.F. Kong, J.J. Xu, Y.P. Xu, J. Solid State Chem. 179 (2006) 1219.
8) X. Wang, H. Li, Z. Sun, Adv. Mater. Res. 621 (2013) 70.
9) H. Liu, S. Guo, Y. Hao, H. Wang, B. Xu, J.Lumin. 132 (2012) 2908.
10) L. Zeng,W. Tang, Ceram. Int. 38 (2012) 837–840.
11) Y. Cong, B. Li, S. Yue, Y. Liu, W. Li, J. Phys. Chem. C, 113 (2009) 113.
12) D. S. Thakare, S. K. Omanwar, S. V. Moharil, S. M. Dhopte, P. L. Muthal, V. K. Kondawar, Opt. Mater., 29 (2007) 1731.
13) M. Han, S. J. Oh, J. H. Park, H. L. Park, J. Appl. Phys., 73 (1993) 4546.
14) W. R. Liu, C. H. Huang, C. P. Wu, Y. C. Chiu, Y. T. Yeh, T. M. Chen, J. Mater. Chem., 21 (2011) 6869.
15) Z . Rui, W. Xiang, J Alloys Compd 509 (2011) 1197.
16) Z.C. Wu, J. Liu, W.G. Hou, J. Xu, M.L. Gon J. Alloys Compd 498 (2010) 139.
17) I.N. Ogorodnikov, A.Y. Kuznetsov, A.V. Kruzhalov, V.A. Maslov, Rad. Meas. 24 (1995) 423.
18) D.A. Keszler, J.M. Tu, Mater. Res. Bull. 30 (1995) 209.
19) G. Aka, F. Mougel, F. Auge, A.K. Harari, D. Vivien, J.M. Benitez, F. Salin, D. Pelen, F. Balembois, P. Georges, A. Brun, N.L. Nain, M. Jacquet, J Alloy Comp 401 (2000) 303.
20) L. Guifang, C. Quanxi, L. Zhimin, H. Yunxia J Rare Earths 26 (2008) 792.

Implementation of "Circuit Wizard" for Effective Teaching & Learning in Practical Electricity, Electronics & Embedded Systems

Yash Vidyasagar
Student, M.Sc. I year,
Department of Electronics,
Fergusson College Pune, India

Abstract

Knowledge is acquired through facts, information and skill through experience and education. When we practically work on a topic, we come across more facts, information and in turn we start building up our knowledge. The awareness or familiarity gained by experience of a fact or situation while working on a particular topic generates deeper comprehension.

Many students hesitate to move ahead in learning Electronics because of the fear of failures. Also to build actual circuits after buying all the components by spending sufficient amount of money and getting failure as a reward discourages many students or to even researchers and developers. That's exactly where the simulation software for electronic circuits comes into picture and plays a vital role in relieving the students from the fear of failures and also encourage them towards new investigations. Also, simulation software also makes the learner expert in fault finding and analysis of the electronics circuits and components.

The "Circuit Wizard" presented here is the real time simulation tool, for practical comprehension of the topics of basic electricity, practical applied electronics and embedded systems. You can use this tool to visualize the actual working of the circuit, model or a network and analyze it for all possible parameters, by using number of in-built measuring instruments given in it.

One can get outstanding results of improved understanding of the topic, both in teaching and learning processes. The "Circuit Wizard" is freely available on the net with its student edition, which contains rich visual library of power supply, connectors, input components, passive components, discrete semiconductors, logic gates, integrated circuits, output components, microcontroller boards and visual instruments.

Keywords— circuit wizard, real time simulation, applied electronics, embedded systems

Introduction

Electronic circuit simulation uses mathematical models to replicate the behavior of an actual electronic device or circuit. The Circuit Wizard simulation software allows for modeling of circuit operation and is an invaluable analysis tool. With just some mouse clicks and keyboard shortcuts, anyone can create different circuits and analyze them during actual simulation.


Circuit Wizard is a complete electronics design solution offering diagram design and simulation, printed circuit board (PCB) layout design and simulation, real-world virtual instruments, control programming, CAD/CAM manufacture and much more. By integrating the entire design process, it provides you with all the tools necessary to produce an electrical, electronic project from start to finish – including on-screen testing of the PCB before actually making it.

How to start?

A. **Teach/Learn with Sample Circuits**

The best way to start using Circuit Wizard is to refer the Sample circuits. To open samples click on Help in menu and then click sample circuits…, as shown below.
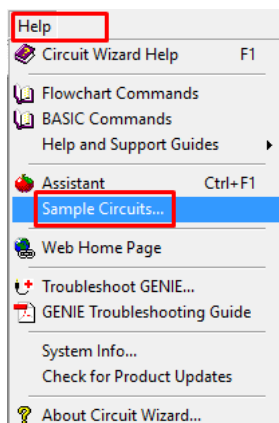

There are three folders given as samples: elementary circuits, basic circuits and advanced circuits. Open any one of them and then open a file as per your interest.
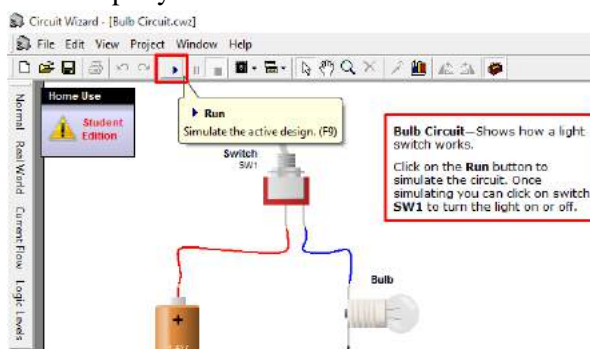
Click on "Run" button to start the simulation. Read the information for the circuit given on right hand side. With this information one can easily use the application to understand its effective use.

B. **Demonstrate / Design your own Circuit**

To demonstrate in front of students or design your own circuit requires slightly more understanding of the use of different tools in Circuit Wizard. But if you have already gone through the sample circuits, then it becomes quite easy. So to start, create a new file by clicking on "File" or white-sheet icon, as shown below:
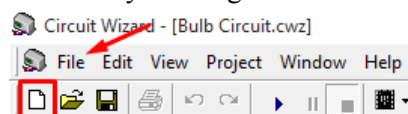
Choose one of the templates below to use as the basis of your new project. There is variety of options available to create your project.

1. Standard GENIE board section has flowchart option and basic option.
2. Electronics Project section gives you the options of design with flowchart, design with basic, elementary circuit, breadboard circuit.
3. Program GENIE without circuit provides two options of flowchart and basic.

Now if you want to start with simple electronic or electrical circuit, choose "Design with basic" from Electronics Project section. This will provide you the environment of drawing and simulating any circuits with symbols of all the components. In this mode, when you draw the circuit, its PCB layout is automatically created under PCB tab. You can write relevant notes in Basic tab for your future reference. Find these tabs at the bottom of application window.
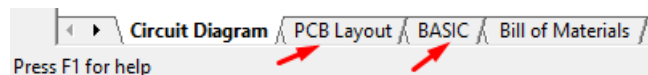
Necessity of Circuit Wizard in Teaching

I observed number of problems during teaching the students about a particular topic in electricity or electronics. They cannot draw the circuits properly. It creates confusion in them about the arrangement of different components; whether a resistor is in parallel with that capacitor, or in series, and the like.Just practicing the circuit drawing on paper, neither creates interest in student nor do they grasp the working of the circuit.

But if you actually build the circuit in front of them in work area of Circuit Wizard, by dragging number of components, they witness visual constructional details of the circuit. And after that when the circuit actually "runs" i.e. when we simulate it, it takes complete grip of students' attention. He/she starts showing interest in the topic.I have done lot of experiments of different category of students with Circuit Wizard and I got fantastic results in the improvement of understanding the topic. After learning a circuit in this application, the students can easily draw the circuit on paper and explain its working without a mistake.

Before using the application, I taught them a topic on whiteboard with pen only. Then I took their test for that topic. After that I taught them same topic, *the next day*. Then again I took their test for the same topic. The results were outstanding. A comparative graph of students' improvement:
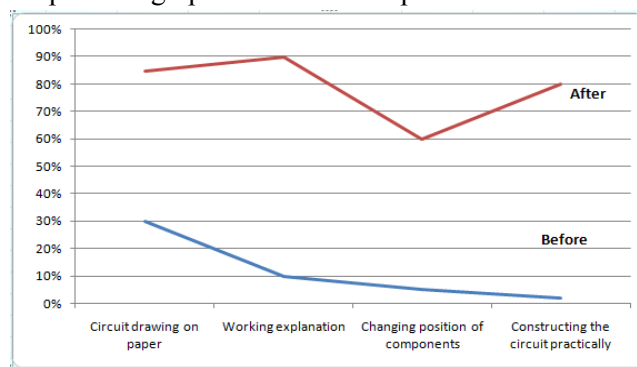
Teaching / Learning PCB Layouts

As we have seen already the Circuit Wizard can create the PCB automatically when you build a circuit for simulation. The generated PCB is actual size PCB and can be directly used for practical purpose. You can show the demonstration of this PCB to the students to make it practically. For that you need to print the PCB on a transparent sheet on a Laser printer and then take its impression on Copper clad. Then make the proper layout with permanent marker pen and do the process of etching in $FeCl_3$ aqueous solution.

This method is of practical demonstration helps the students understand complete process of PCB making and cut off the manual part of layout making.

This demonstration of PCB making was exercised by me during number of practical sessions for simple rectifier circuits, filter circuits, hobby circuits containing maximum of two transistors and for IC 555/ IC 741 simple circuits.

After such demonstrations, I ask the students to select a simple circuit of their own choice, build it in Circuit Wizard, test its working with simulation method and then make its PCB. The performance of the students was very nice. The comparative analysis is given below.

C. **Results of manual PCB making**

In this session, after simulating the circuit on Circuit Wizard, I asked the students to draw the PCB manually on given piece of Copper clad.

However, this was very confusing to the students, even though they actually built the circuit on the application. I think this is because they never thought about the different sizes of components used and their spacing required on the PCB layout.

Practically this confusion is very hard to overcome among students. But I observed that after using the treatment of making a couple of PCB layouts through Circuit Wizard, the students comprehend the sizes and spacing of components automatically.

D. **Results of automatically generated PCB making**

This method was really fruitful and the results were outstanding. After making a couple of PCBs, students completely comprehend the idea of PCB making and they can then make large size PCBs of amplifier circuits, IC logic circuits, etc. Check the comparative analysis graph, below.
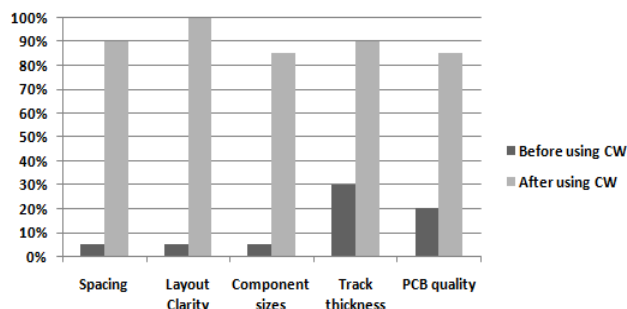

The above comparison clearly shows the great improvement in the performance of students. I strongly recommend using automated method for PCB layouts during practical sessions.

Use of Real Time Graphs & Instruments

The Circuit Wizard is stuffed with lots of facilities to display real time graph with number of different measuring instruments like digital voltmeter, ammeter, frequency generator, cathode ray oscilloscope, etc.

When I demonstrated these tools during my practical sessions, it was of great help. Students get attracted toward its real use and start understanding voltmeter must be connected in parallel and ammeter in series, shown below:
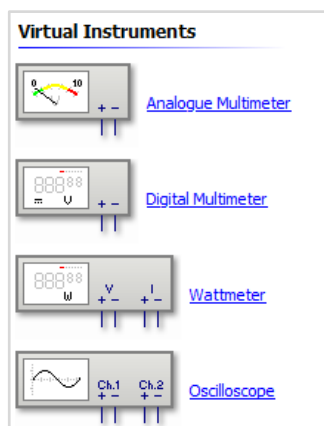
The real time graph tool makes it very easy for the students to actually visualize the progression of waveforms on time axis. You can start a graph to display just by clicking on the given icon, as shown below.
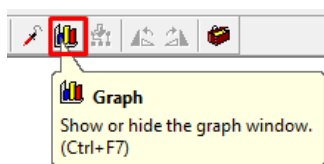
I have designed number of circuits to demonstrate the working simulation with real time progression of graphs:

Basic Circuits: Parallel and series combination of resistors, Charging & discharging of capacitor, Generation of back e.m.f. in inductor, Study of Ohm's law, Study of Kirchhoff's Current/Voltage Law, Study of potential divider, Wheatstone bridge, Behavior of Tank circuit, bulb dimmer, working of H-Bridge, etc.

Basic Discrete Circuits: Study of LED, Diode; parallel combination of different color LEDs, Diodes; DRL logic with diodes, resistors and LEDs; clippers & clampers; study of AC & DC with diode & LED, etc.

Transistorized Discrete Circuits: Motor speed control, light switch with LDR, heat controlled fan, simple audio oscillator, TTL logic circuits, etc.

IC 555 Circuits: Simulation of internal blocks, AMV, MMV, BMV, duty cycle control, street light control, temperature switch, beeper circuits, relay circuits, clap switch, PWM, PPM, PAM circuits; etc.

IC 741 Circuits: Simulation of internal blocks, inverting, non-inverting, adder, subtractor, integrator, differentiator, buffer, comparator, Schmitt trigger circuits; simple audio amplifier circuits, etc. I have made these circuits freely available on my website. Number of students download these circuits and study the simulations. I received large number of positive feedbacks.

References

1) Satpute, Hemant & Vidyasagar, Dattaraj. (2015). EXCEL-LENT Technological Tool for Enhancement of Quality Learning in Network Analysis.
2) Vidyasagar, Dattaraj. (2019). On the Tank circuit using a coil and capacitor in parallel to produces damped oscillations. 10.13140/RG.2.2.30505.13928.
3) Vidyasagar, Dattaraj. (2019). IC555 Bible - Everything about it!.
4) Vidyasagar, Dattaraj. (2019). Real Time Simulation of Working of Timer IC 555 using its Internal Block Diagram. 10.13140/RG.2.2.11385.01124.
5) (2020). Basics of circuit simulation with PLECS. 10.1016/B978-0-12-817364-0.00002-3

Dark Matter, Dark Energy and Cosmological Model

Dr. R. G. Deshmukh

Department of Physics,

Shri Shivaji Arts, Commerce and Science College, Akola

Abstract:

A little under 14 billion years ago our universe wrinkled into existence in momentous event known as the Big Bang where previously there was nothing no matter, no energy, not even space and time.

Today the space of our universe is filled with invisible stuff matter which expanding under the action of gravity which was dark matter. In 1990's astronomical observation and theoretical calculation was leading astrophysicists to believe that not only the dark matter but also there is vacuum empty space filled in universe that is dark energy. It is suggested that the apparently disparate cosmological phenomenon attributed to so called "dark matter" and dark energy arise from quantum level of spacetime itself. This creation of spacetime results in metric expansion. A recent modification of Einstein's theory of general relativity by Chadwick, Hodgkinson and McDonald incorporate spacetime expansion. Recent evidence predicts that apparent amount of dark matter increases with age of universe. In addition proposal leads to the same result for the small but non-vanishing cosmological constant, related to dark energy.

Keywords: Big Bang, Dark matter, Dark Energy.

Introduction

Since the 1990s it has become clear that the universe is expanding at an accelerating rate, a phenomenon that was historically attributed to so-called "dark energy"1. The hypothetical dark energy is invisible, and can be thought of as an intrinsic property of spacetime rather than usual matter (stress-energy) that is the source of spacetime curvature. The density of "dark energy" is constant, also in contrast to ordinary matter/energy. A popular method of accounting for the dark energy phenomenon is by attributing it to Einstein's "cosmological constant" Λ [3].

An ostensibly separate phenomenon—the flattening of galactic rotation curves with radial distance–is also well known. This unexpectedly large value of rotational velocities for the outer observable matter in galaxies is an anomaly for standard Newtonian and Einsteinian gravitational theories, and in order to preserve them, it has been attributed to an invisible hypothetical form of matter dubbed "dark matter." However, rather than postulate "dark matter," some researchers have been exploring modifications of Newtonian gravitational theory. One such effort, "Modified Newtonian Dynamics" or MOND, was introduced by Milgrom. MOND has been successful in fitting the observed rotation curves, but it has the drawback of being an ad hoc alteration to the basic gravitational theory.

The situation has recently progressed significantly: Chadwick *et al.* have proposed a modification of Einstein's general relativity based on the principle that (idealized) point masses give rise not only to the usual spacetime curvature, but also to spacetime expansion. For a particular value of the parameter governing the magnitude of the expansion, they find that their theory perfectly fits the galactic rotation data. It should also be noted that their expansion parameter does in principle have time dependence, although in the approximation studied by them so far, corresponding to the MOND formulation, the time dependence is suppressed.

Currently, there is no known physical mechanism or process underlying the phenomena attributed to dark matter and dark energy (or the finite value of Λ if that is an accurate expression of the latter effect). This paper proposes such a physical process: a specific kind of spacetime emergence underlying a form of matter-based spacetime expansion that has not been previously taken into account. Thus, given the quantification of spacetime expansion by the CHM theory, we may be able to physically account for the "dark matter" phenomenon through a previously unsuspected expansion generated by ordinary matter. In addition, "dark energy" may be understood as an artifact of the same emergence process, arising from the discreteness of spacetime and its quantum origins.

We should hasten to note that the current proposal is not itself a theory of quantum gravity, although it may serve as an ontological guide to such a theory. In any case, no particular theory of quantum gravity is required in order for the basic concept to be useful and applicable as a new kind of ontological understanding of

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293 (Special Issue No.70) Peer Reviewed Journal   www.aiirjournal.com Mob. 8999250451

427

the relationship between the quantum level and an emergent spacetime manifold. In what follows, we first review the proposed general framework for spacetime emergence and then show that it naturally leads to the description provided by the CHM theory. Then we discuss another aspect of the emergence process that naturally leads to the non-vanishing, but very small, value of Λ that accounts for the "dark energy" phenomenon.

The Cosmological Constant and "Dark Energy"

We now return to the issue of "dark energy." As noted above, the result of the transactional spacetime emergence process is to yield a causal set of the sort contemplated by, although the elements of the set have more structure in this picture; they are networked transactions $I(E_i,A_j)$ (where the indices are a shorthand representing birth order, chain membership, conserved physical quantities transferred, etc.). In this regard, they more closely resemble the "influence network" of Knuth *et al.* Nevertheless, the fact that elements of causet are added in Poissonian fashion means that the current model yields the same non-vanishing, but very tiny, value for Λ.

Specifically, in natural units (h = G = 1) Λ has units of inverse length squared, and observations indicate that
$$\Lambda \lesssim 1/V_1/2 \quad (1)$$
Based on empirical data, Λ must be very close to zero; but to a first order approximation, one might find a very small but non-negligible value5. Sorkin provides such a first-order approximation, as follows. One notes (based on unimodular gravity) that Λ and V are essentially conjugate; i.e.,
$$\Delta\Lambda\Delta V \sim 1 \quad (2)$$
(in natural units), analogously to the quantum mechanical uncertainty relations. Sorkin notes that this conjugate relationship between Λ and V is evident from the action integral,
$$S=-\Lambda\int(-g)1/2d4x=-\Lambda V \quad (3)$$
Thus, if Λ has a non-vanishing value, it may be due to its uncertainty
$$\Delta\Lambda \sim 1/\Delta V \quad (4)$$
based on any uncertainty in V. In the causet model, V is proportional to the number of elements N, since the latter specifies how many "atoms of spacetime" exist; or, in the RTI picture, how many $I(E_i,A_j)$ have been actualized. Now, given that elements are added to the (discrete) spacetime manifold in a Poissonian process, the number N of elements has an intrinsic uncertainty of $N^{1/2}$ for any given value of the proper time τ. Since V is a function of τ, V inherits this uncertainty: $\Delta V \sim V^{1/2}$. If the uncertainty is the only (significant) contribution to the value of Λ, then we get precisely.

Conclusion

We have proposed a specific mechanism of spacetime emergence from the quantum level that leads to the spacetime expansion quantitatively described in the theory of Chadwick *et al.*, which correctly predicts observed galaxy rotation data attributed to "dark matter." In addition, we have shown that the same mechanism yields a discrete spacetime characterized by Poissonian uncertainties, similar to that proposed by, which results in the necessary value of Λ to account for the "dark energy" phenomenon, according to current observational data. In this model, we may understand "dark energy" as a property arising from the ever-present basic quantum uncertainty in the spacetime volume V.

This possible relation of dark energy and matter is intriguing, as it would unify apparently disparate and yet equally unexpected cosmological phenomena. If an expansion of spacetime around mass points can account for the excess rotation of the outskirts of galaxies (i.e., "dark matter"), and if this expansion is related to dark energy as outlined herein, we gain explanatory parsimony as well as evidence for a fascinating connection of spacetime with the quantum level. The latter could aid efforts to find a theory of quantum gravity.

References:

1) Rideout DP, Sorkin RD. A classical sequential growth model for causal sets. Phys Rev. (2000) D61:024002. doi: 10.1103/PhysRevD.61.024002.

2) Huterer D, Turner MS. Prospects for probing the dark energy via supernova distance measurements. Phys Rev D (1999) 60: 1–5.

3) Einstein A. Kosmologische Betrachtungen zur allgemeinen Relativitaetstheorie. In: Sitzungsberichte der Königlich Preussischen Akademie der Wissenschaften Part 1. Berlin. (1917). p. 142–52.

4) Rubin V, Thonnard N, Ford WK Jr. Rotational properties of 21 Sc galaxies with a large range of luminosities and radii from NGC 4605 (R = 4kpc) to UGC 2885 (R = 122kpc). Astrophys J. (1980) 238:471–87.

5) Milgrom M. A modification of the Newtonian dynamics as a possible alternative to the hidden mass hypothesis. Astrophys J. (1983) 270:365.

6) Chadwick EA, Hodgkinson TF, McDonald GS. A gravitational development supporting MOND. Phys Rev. (2013) D88:024036. doi: 10.1103/ PhysRevD.88.024036

7) Heisenberg W. Physics and Philosophy. New York, NY: Harper-Row (1958).

8) Kastner RE. The Transactional Interpretation of Quantum Mechanics: The Reality of Possibility. Cambridge: Cambridge University Press (2012).

9) Kastner RE. The possibilist transactional interpretation and relativity. Found Phys. (2012) 42:1094–113. doi: 10.1007/s10701-012-9658-4

10) Cramer J. The transactional interpretation of quantum mechanics. Rev Mod Phys. (1986) 58:647–88.

11) Maudlin T. Quantum Nonlocality and Relativity. 3rd ed. Oxford: Blackwell (2011).

12) Kastner RE. The relativistic transactional interpretation: immune to the maudlin challenge. In: Aerts D, Dalla Chiara ML, de Ronde C, Krause D editors. Probing the Meaning and Structure of Quantum Mechanics. Singapore: World Scientific (2017).

13) Kauffman S. Humanity in a Creative Universe. Oxford: Oxford University Press (2016).

14) Kastner RE. The emergence of spacetime: transactions and causal sets. In: Licata I. editor. Beyond Peaceful Coexistence. Singapore: World Scientific (2016). p. arXiv:1411.2072.

15) Kastner RE, Cramer JG. Quantifying Absorption in the Transactional Interpretation (2018). Available online at: https://arxiv.org/abs/1711.04501

16) Bombelli L, Henson J, Sorkin RD. Discreteness without symmetry breaking: a theorem. Mod Phys Lett. (2006) A24:2579–87. doi: 10.1142/S0217732309031958

17) Walsh JL, Knuth KH. An information physics derivation of equations of geodesic form from the influence network. In: MaxEnt 2015 Conference, Bayesian Inference and Maximum Entropy Methods in Science and Engineering, Potsdam NY (2015). Available online at: https://arxiv.org/abs/1604.08112

National Conference on Multidisciplinary Research in Science and Technology for Healthy Lifestyle Management (NCMRST- 2020) Organizer :- Shri R.L.T. College of Science, Akola

24ᵗʰ Jan. 2020

18) Panov A. Inverse Quantum Zeno Effect in Quantum Oscillations. (2001). Available online at: http://cds.cern.ch/record/515461/files/0108130.pdf

19) Genzel R, Schreiber NM, Übler H, Lang P, Naab T, Bender R. Strongly baryon-dominated disk galaxies at the peak of galaxy formation ten billion years ago. Nature (2017) 543:397–401. doi: 10.1038/nature21685

20) Knuth K, Bahreyni N. A potential foundation for emergent space-time. J Math Phys. (2014) 55:112501. doi: 10.1063/1.4899081

21) Ng J, van Dam H. A small but nonzero cosmological constant. Int J Mod Phys. (2001) D10:49–56. doi: 10.1142/S0218271801000627

22) Sorkin RD. Is the cosmological "constant" a nonlocal quantum residue of discreteness of the causal set type? AIP Conf. Proc. (2007) 957:142–53. doi: 10.1063/1.2823750

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293 (Special Issue No.70) Peer Reviewed Journal   www.aiirjournal.com Mob. 8999250451

430

Effect Of Uv Radiation On The Dielectric Constant Of Salicylic Acid Doped Thin Films Of Ps

Vidhale S.G.
Department of Physics, Dr.Sau.Kamaltai Gawai
Institute Of Engineering And Technology,Darapur

Belsare N.G.
Department of Physics, Dr.Sau.Kamaltai Gawai
Institute Of Engineering And Technology,Darapur

Abstract:

The thin films of PS, pure and doped with 1%,3%,5%,7%,9% salicylic acid(SA) were prepared by using isothermal evaporation technique .The measurement of dielectric constant (εr) for all above samples have been carried out within the temperature range 323k-363k and at frequencies in the range 1KHz-1MHz.The result reveal that the dielectric constant was strongly affected by the UV radiations. It has been observed that the value of dielectric constant decreases with increase in the exposure time of UV radiation. The sample was characterized by XRD, SEM and FTIR.

Keywords: - PS-Polystyrene, SA-Salicylic acid, UV- Ultraviolet Radiation.

Introduction

Ionizing radiation found to be widely applicable in modifying the structure and properties of polymers, and can be used to tailor the performance of either bulk materials or surfaces (Clough R.L.,2001).It has been fifty years since researchers first began exposing polymeric materials to ionizing radiation, and reporting the occurrence of cross linking and other useful effects .Today , a substantial commercial industry is in place based on processing of polymers with radiation .Innovation in this field has by no means ended; important new products made possible through radiation technology continue to enter marketplace , and exciting new innovation in the application of radiation to macromolecular materials are under exploration at research institution around the world .In this paper we had studied the effect of UV radiation on the dielectric properties of salicylic acid doped poly blend thin film of PS.

Experimental

The polymer i.e.(Polystyrene) (Aldrich,USA) was taken and dissolved in THF (Tetrahydrofuran).Then films of PS pure and doped with salicylic acid in different weight percentage (1%,3%,5%,7%,9%) were prepared by isothermal evaporation technique (Narayan et al., 1991)(Bahri et al., 1997)(Sangawar et al.,1995)(Belsare et al.,1998).Further the dried films were sandwiched between silver coins for better electrode contact .The thickness of the film was measured by digital micrometer (Mitutoyo Corporation, Japan). These films were exposed to UV radiation for 5 minutes and 10 minutes .Then the film was kept between the electrodes of specially designed sample holder. The AC frequencies were applied (in the range 1KHz-1MHz) across the sample by using the 4284 A precession LCR meter (20Hz-1MHz) supplied by Agilent Technologis,Singapur and the corresponding dielectric constant (εr),ac conductivity were measured in the temperature range 323 K -363K.

Results and discussion

1) Effect of UV irradiation on dielectric constant

Before irradiation, value of dielectric constant for all samples is in the range of 7-1.03. After irradiation of 5 minutes the value of dielectric constant is in range 1.5-0.64 and for 10 minutes irradiation the value is in the range of 1.5- 0.30.This means that the dielectric constant gets decreased with the increase in time of exposure and the rate at which the dielectric constant decreases also becomes higher with the increase in time of exposure. This can be explained as under:

The bonds between the atoms in many polymers have dissociation energies that are very similar to the quantum energy present in UV radiation which is capable of breaking the bonds in the polymer chain to generate a cascade of reaction, oxygen radicals, hydro peroxide unit's carbonyl group formation, chain cleavage. As a result, the polarization groups may get reduced and dielectric constant gets decreased (Scierka *et al*, 2003).Also the evaporation of THF solvent during the preparation of thin film may have led to the formation of pores in the thin film (Dixit *et al*.,2009)(Rajendran *et al*.,2008)(Stephan A. M. *et al*., 2000). It

should be emphasized that the formation of porous film follows the principle of phase separation. In this principle one phase is induced to create the matrix and the other (i.e. solvent) to create convex surface shapes, which can be removed to leave free space by evaporation. Decreasing the density produces a further reduction in the dielectric constant. Therefore, ultra low K- dielectrics with K less than 2.6 must be porous (Mikhail R B et al 2006). So from above explanation, we can say that after exposure to UV radiation, the porosity in film gets increased (Abdallah *et al*., 2006) (Khol *et al*., 2006). Materials with dielectric constant less than one is called metamaterials (Dixon 2012). These materials are made with high dielectric inclusions with specific shapes and sizes in a lower dielectric matrix. So from above explanation we concluded that the dielectric constant of pure and doped polymer (PS) can be reduced by increase in time of exposure. Such low dielectric constant is required basically as insulators (Zulkifli Ahmad 2012). They are known as passivation materials. Their applications ranged in isolating signal-carrying conductors from each other, fast signal propagation, interlayer dielectric to reduce the resistance-capacitance (RC) time delays, crosstalk and power dissipation in the high density and high speed integration (Tummala *et al*.,1985). They are of necessity in very dense multi-layered IC's, wherein coupling between very close metal lines need to be suppressed to prevent degradation in device performance. This role involves packaging and encapsulation. In electronic packaging, they separate interlayer's and provide isolated pathways for electronic devices connection in multilayer printed circuit boards. As the trends are towards miniaturization in microprocessor fabrication, any decrease in relative permittivity will reduce the deleterious effect of stray and coupling capacitances. Dielectric materials are also employed to encapsulate the balls which bridge the die and substrate. This encapsulation is specifically called under fill which helps to protect any circuitry failures as well as reducing thermal mismatch between the bridging layers as shown in fig 1. In LED encapsulation low dielectric materials is used for insulation at the lead frame housing.
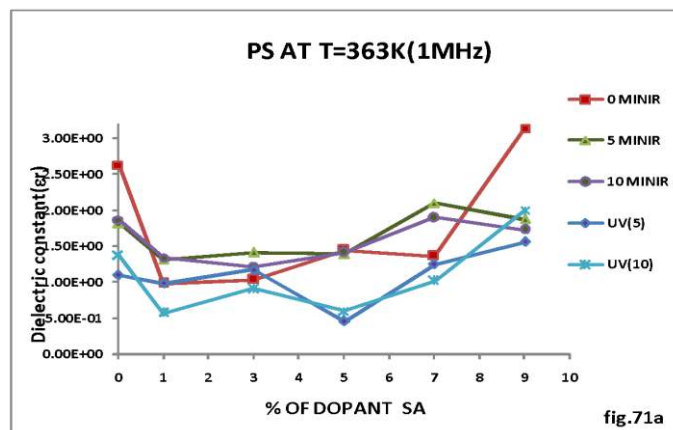

Figure 1. Variation of dielectric constant with % of doping for time of exposure to UV radiation.
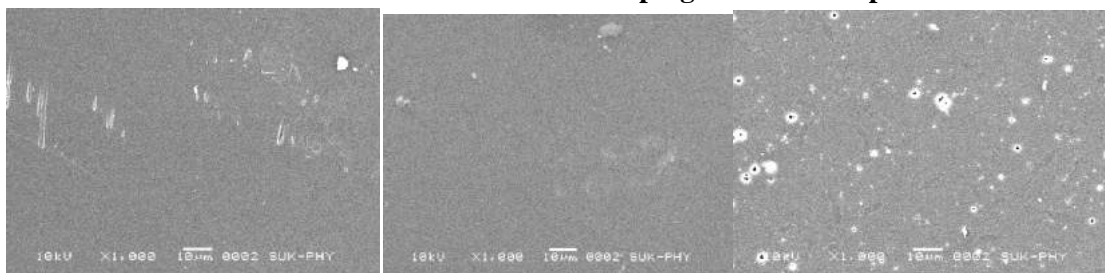

Figure 2:- SEM images of a) PS (0) b) PS (3) c) PS (9) before irradiation
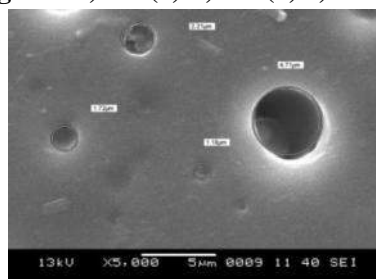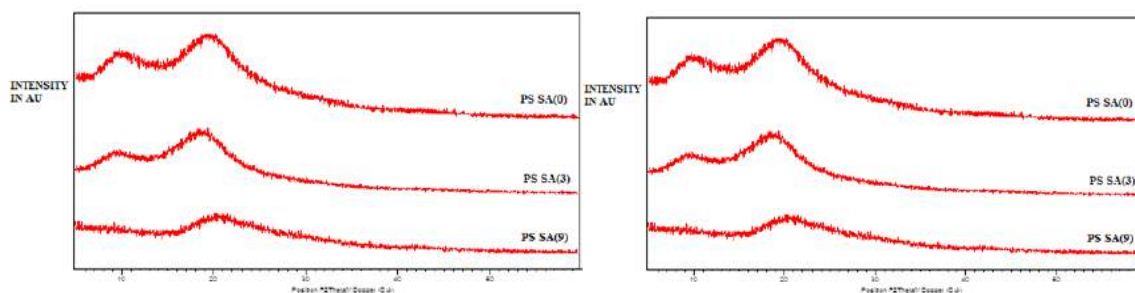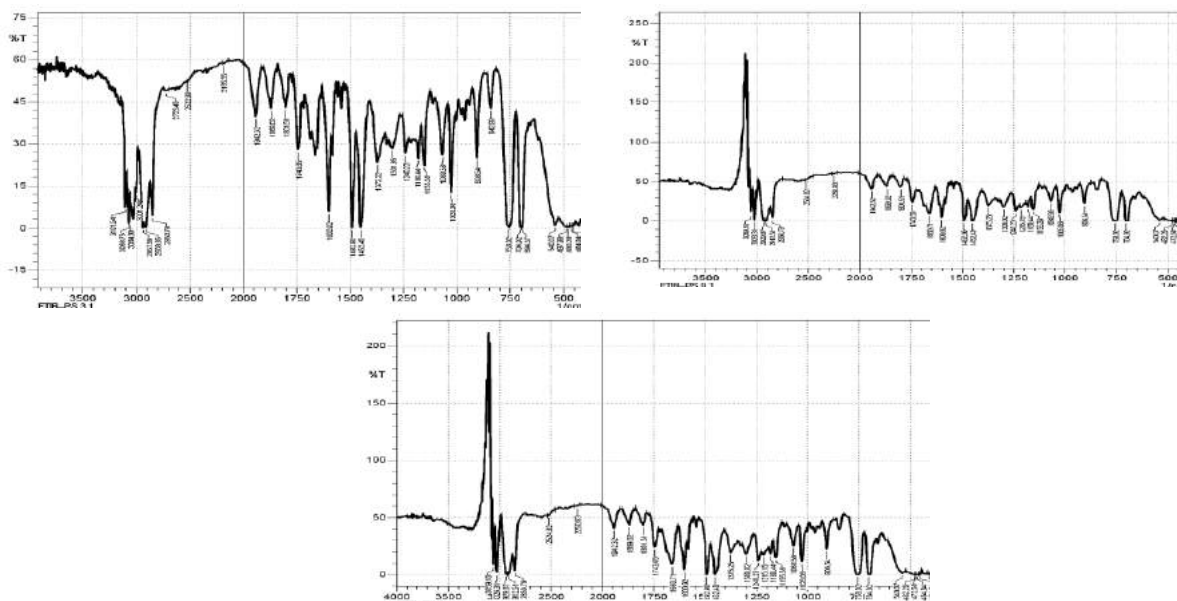
Figure 3:- SEM images of a) PS after irradiation

Figure 5:-XRD spectra for a) PS (0) b) PS (3) c) PS (9) for pristine sample and irradiated sample

Figure 6:-FTIR spectra for PS (0),PS(3),PS(9)

Conclusions

The dielectric properties of pristine and irradiated polymer blend were studied over a wide range of frequency and at different percentage of doping .Dielectric constant are observed to change significantly after irradiation. This might be attributed to the breaking of chemical bonds and as a result the polarization groups may get reduced and dielectric constant gets decrease.XRD result showed that crystalline size and percentage crystalline decreased after irradiation which is responsible for changes in electrical properties. Surface roughness observed from SEM images. Formation of blending confirms from FTIR spectra.

Acknowledgements

References:

1. Belsare N.G.and Deogaokar V.S. (1998), Indian Journal of Pure and Applied Physics, Vol
2. 36, 280-89.
3. Belsare N.G.and Deogaokar V.S. (1998), Journal of Polymer Materials (Oxford and IBM Pub.Co.Pvt.Ltd.), Vol 15,157-70.
4. Bahri R.and Seth R.K. (1997), Indian Journal of Pure and Applied Physics, Vol 35, 104-108.
5. Clough R.L. (2001), Nuclear Instruments and Methods in Physics Research B (Elsevier), 185, 8-33.
6. Kane M.C., Lascola R.J., and Clark E.A. (2010), Radiation Physics and Chemistry (Elsevier), 79, 1189-1195.
7. Khaled M.A., Hussein A.M. and Abdullah K. (2003), Egypt J.Sol.Vol.26 No (1) 83 -91.

8. Liang-Tse Yu (1963), Journal of physics 24, 330.

9. Mott N.F. and Davis E.A. (1979), Electronic Processes in Non-crystalline Materials (Clarendon Press, Oxford), 2nd Ed.

10. Muhammad Akram, Athar Javed and Tasneem Zaher Rizvi (2005), Turk J. Phys, 29,355-62.

11. Narayan A. and Singh H.P. (1991), Indian Journal of Pure and Applied Physics, Vol 29, 814-816.

12. Rao Vijayalakshmi, Ashokan P.V. and Sridhar M.H. (2000), Mater.Sci.and Engg. (Elsevier)A281, 213-220.

13. Reda S.M. (2006), Dyes and Pigments (Elsevier), 1-7.

14. Scierka Stephni and Forster Amanda (2003), 81st annual meeting technical Program of FSCT.

15. Seanor D.A. (1982), Electrical Properties of Polymers (Academic Press New York) 1-57.

16. Shukla J.P.and Gupta M. (1987), Indian J. Pure and Appl. Phys. 25,242-244.

17. Tager A. (1972), Physical Chemistry of Polymers (MIR Publication; Moscow) 151.

18. Van-Taut Yu N (1962), Plastmassy No.5, 40.

19. Webb J.B. and Brodie D.E. (1973), Canad. J. Phy., 51, 1593.

Machine Learning & Deep Learning (ML/DL) For Security of IOT System For Facilitating Secure Communication between devices to Security Base- Intelligent System

Neehan Aeman
Dept. of Computer Science & IT,
Shri Shivaji College,Akola.

Abstract:

Internet of things (IOT) connects millions of devices together. Internet of things plays a very important role in enhancing various smart applications that can improve life. The multidisciplinary components have introduced new security challenges. The various security measures such as authentication, network security, encryption, etc. are ineffective now days. Machine learning & Deep learning (ML/DL) are powerful methods for data security. ML/DL is a powerful technique to learn the normal & abnormal behaviour of IOT ecosystem. This paper focuses on Machine learning methodology for IOT system. The security phase provided by (ML/DL) Machine learning & Deep learning is also discussed in the paper. The Big Data issue is also been discussed in the paper.

Keywords: Machine learning, Deep learning, Internet of things, Big Data, Secrity.

Introduction:

IOT is one of the fastest growing fields in the history of computing. IOT systems are complex & consist of various components to make smarter decisions. IOT architecture uses sensors and actuators to sense different types of data from various environments, these data are abundant. On the other hand the huge network of IOT system with various components has introduced new Security challenges.

IOT system are complicated therefor securing the data is a big challenge. IOT devices are connected through wireless technique in a network so it is possible that any intruder may get into the data line & hack the information by eavesdropping. The security system in IOT is not that strong because of the resource and lower power consumption, communication, computing, but also because it has to constantly access the data from the environment and the required work is also the part of cyber physical system.

In growing stage of IOT it also have to consider security, Big Data analytics, and efficiency, of the technology. To achieve something we cannot live out other important aspects. So researchers have to focus on other challenges of security of data in IOT. The IOT architecture consists of three layers with the help of which IOT convert physical devices to a smart device by using the technology. Such as communication with internet protocol, sensors & actuators, etc. IOT is a massive huge giant network which uses heterogeneous devices communication for connecting humans-to-machines, machines-to machines, humans-to-machines. The IOT network is integrated to provide smart services to users.

Related Work:

There are lots of researches which focus on IOT security to provide guide line for better security methodology for security the big IOT data for getting hacked & misused. Mohammad Ali Al-Garadi [1] has given a brief discussion on ML/DL methods for IOT security & have described the advantages & disadvantages, short coming of each methods. Also focuses on security threats that are inherited. The paper also explains that ML & DL has developed various powerful analytical methods to enhance IOT security. Yue Xu [2] explains that machine learning deals with Big Data which can process information for making smart decision. This paper also focuses on various machine learning algorithms such as Bayesian statistics, K-Nearest Neighbours (K-NN), Neural Network, Support Vector Machines (SVM), Decision Tree (DT). Etc. Also focuses on different application such as in Energy, Routing, industry, etc. Mohammad Saied Mahdarinejad [3] researches have discussed different machine learning Methods. Also explains taxonomy of ML algorithms applied on data in order to extract higher order information. Fatima Hussain [4] explains in her paper future research directions for ML/DL based security system for IOT. They discuss on the security attack vector, current security solutions for IOT networks. Fotios Zantalis [5] gives a brief review on smart transportation that covers lot of technique within such as smart parking, smart light, road anomalies. This also explains Intelligent Transportation System (ITS).
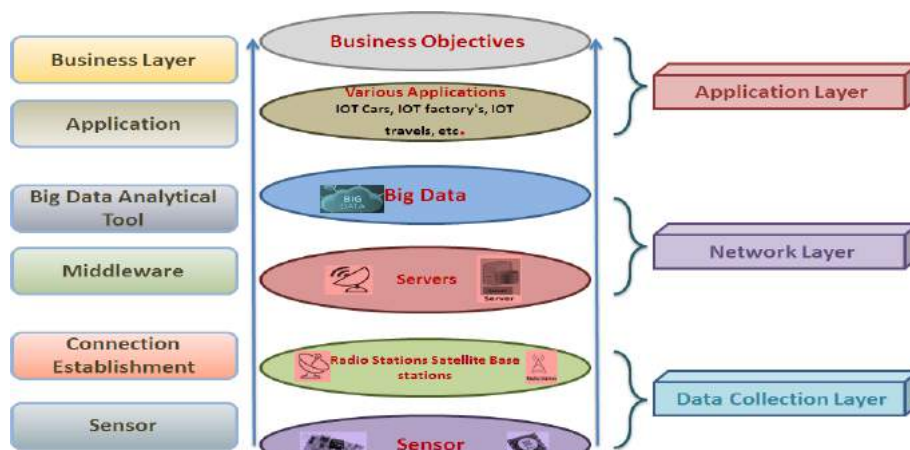
Overview of IOT System:

Figure.1 IOT Detail architecture.

- *Data Collection layer*: It consists of sensors/ actuators various different sensors such as RFID, Pressure sensors, Proximity Sensors, Passive infrared sensors, IP sensors, etc. The data in various environments is sensed & processed to move them in the next layer. A large amount of Big Data is been generated at this layer.

- *Connection Establishment (Connectivity):* The data which is collected by the sensors have to be connected for providing them smart services. There are certain challenges in IOT network connectivity.

- *Middleware*: The middleware is responsible for connecting various IOT devices in a sink so that the data collected by them should be securely forwarded in the upper layer for processing. The security of data is also one of the major tasks of the middleware so to keep the human or data coming from different sectors should be kept private & secure.

- *Big Data Analytics:* The data collected by IOT objects are in a huge amount. This data is increasing every second which make Big Data. To deal with this big data researchers have to find out various Analytical Tool.

- *Application*: The user Interface which helps the user to get information & use it for betterment is given by the Application. Various application of IOT has been proposed & used now days such as smart health management, Smart Home, Smart city, Smart waste management, etc.

- *Business Level*: These levels give human effectively how to utilize the data collected, transmitted & analysed, to improve the growth in each field of common man. Also give a good chance to analyse the factors that can improve the business economy using IOT at these level.

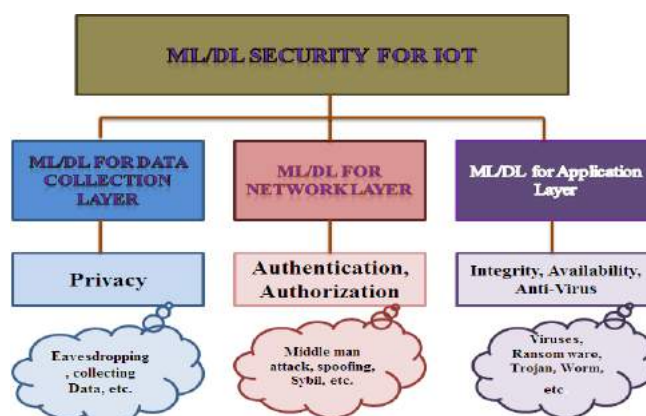## IOT Security & Machine learning:

Figure 2. ML/DL Security for IOT

IOT Security is a big factor to be focused on. The Big data collected from the various devices is immune to get affected by different attacks. Such as Cyber-attacks, passive or active attacks. Passive attack is those which disrupt the connectivity of the IOT system and active attacks disturb the authentication, authorization, integrity and availability of an IOT system. So it is very important to secure the IOT data by machine learning technique.

Machine learning is a technique which give the Big Data analytics & Intelligence to process the information which is been collected to make smart decision & predictions. Though the ML models also have some bug which have to be set for betterment of the security system therefore Deep learning (DL) give a better security model which prevents the IOT system from active or passive cyber-attacks on the IOT system.

- *ML/DL for data collection layer:* these prevent the sensed row data form eavesdropping's to happen, if such attacks are detected the algorithm detects the attacks and further prevents the data to be stolen.
- *ML/DL for network layer:* The middle man attack, spoofing, Sybil are some types of attacks which takes place in network layer which are prevented by ML/DL. The ML/DL makes the network more strong and vulnerable for these attacks to keep the IOT system secured from hacking.
- *ML/DL for Application layer:* The virus attacks , Trojan, Worm, Ransom ware attacks takes place at the application layer these attacks, damages the data base and crashes the application or does not allow application to run smoothly. So ML/DL security prevents the layer from these attacks by maintaining the integrity, availability, etc.

Conclusion:

IOT is a system which connects human with devices and vice versa. The IOT system architecture makes it possible to connect devices to devices, machines to machines, machine to human and vice versa. With the help of IOT system architecture we use sensor to collect the data from various environment and pass it to upper layer for processing by using Artificial Intelligence. We make it possible for devices to take appropriate decision and also help business to develop their economy using IOT.

The Machine learning and Deep learning (ML/DL) prevent IOT architecture for connectivity issues, various types of attacks, from eavesdropping, viruses, ransom ware, authentication issues , etc. The Machine learning (ML) give IOT Big Data an artificial intelligence teaching so that the system can make it self-smart for decision. Deep learning (DL) give the improve method of security , the advancement in ML machine learning security to prevent the privacy and security of the information related to humans or industries.

Reference:

1) Mohammed Ali Al-Garadi "A Survey of Machine and Deep Learning Methods for Internet of Things (IoT) Security".
2) Fatima Hussain, "Machine Learning in IoT Security:Current Solutions and Future Challenges", arXiv:1904.05735v1 [cs.CR] 14 Mar 2019.
3) Fotios Zantalis, "A Review of Machine Learning and IoT in Smart Transportation"Received: 19 March 2019; Accepted: 8 April 2019; Published: 10 April 2019.
4) Yue Xu," Recent Machine Learning Applications toInternet of Things (IoT)", http://www.cse.wustl.edu/~jain/cse570-15/ftp/iot_ml/index.html.
5) Mohammad Saeid Mahdavinejad, "Machine Learning for Internet of Things Data Analysis:A Survey", Preprint submitted to Journal of Digital Communications and Networks February 20, 2018.
6) Jasmin Guth, Uwe Breitenbücher, Michael Falkenthal, Frank Leymann, and Lukas Reinfurt," Comparison of IoT Platform Architectures: A Field Study based on a Reference Architecture", Email: [lastname]@iaas.uni-stuttgart.de, November2016 IEEE.
7) Huansheng Ning and Ziou Wang "Future Internet of Things Architecture:Like Mankind Neural System or Social Organization Framework?" , IEEE COMMUNICATIONS LETTERS, VOL. 15, NO. 4, APRIL 2011.
8) Chayan Sarkar_, Akshay Uttama Nambi S. N._, R. Venkatesha Prasad_, Abdur Rahimy, "A Scalable Distributed Architecture Towards Unifying IoT Applications".

9) Ravi C Bhaddurgatte* and Vijaya Kumar BP, "Review: QoS Architecture and Implementations in IoT Environment", ISSN:2319-9873, S1,September- 2015.

10) Darko Androcec," Machine Learning for the Internet of Things Security: A Systematic Review", 13th International Conference on Software Technologies, January 2018.

11) Ravi C Bhaddurgatte," Machine Learning and Prediction-Based Resource Management in IoT Considering Qos", International Journal of Recent Technology and Engineering (IJRTE) ISSN: 2277-3878, Volume-8 Issue-2, July 2019.

12) Rashid Ashraf Malik," MACHINE LEARNING IN THE INTERNET OF THINGS – STANDARDIZING IOT FOR BETTER LEARNING", International Journal of Advance research in Science and Engineering, Volume No. 07, Special Issue No.04,ISSN:2319-8354, March 2018.

13) Kritika Sharma," IOT BASED SENSOR DATA ANALYSIS USING MACHINE LEARNING", June 1st, 2018|Conference Publications, IPG Conf. 2018.

14) Mengyao Zheng," Challenges of Privacy-Preserving Machine Learning in IoT", November 2019 Pages 1–7https://doi.org/10.1145/3363347.3363357.

National Conference on Multidisciplinary Research in Science and Technology for Healthy Lifestyle Management (NCMRST- 2020) Organizer :- Shri R.L.T. College of Science, Akola

24th Jan. 2020

MQTT Based Raspberry Pi Home Automation System

Mayur Thete,Nikita Pulate[1,2] and Ranjana Ubale[3*]

[1,2,3] *Department of Electronic Science, Fergusson College(Autonomous), Pune, Maharashtra, India*

Abstract

MQTT Protocol and installed local MQTT server on our Raspberry Pi for controlling the GPIO locally. But the drawback of local MQTT server is that we cannot control the GPIOs from anywhere in the world, it only provides services locally. But if this MQTT server is hosted on some cloud then any appliances connected to Raspberry Pi can be controlled globally. We will use Adafruit IO as MQTT broker to control an AC appliance connected to Raspberry Pi GPIO. Also check other IoT controlled Home Automation we will use SSH to access Raspberry Pi on the laptop. You can use VNC or Remote Desktop connection on the laptop, or can connect your Raspberry pi with a monitor. Learn about Raspberry Pi headlessly here without a monitor. Adafruit IO platform is used with Raspberry Pi as MQTT broker. As we have used Adafruit IO platform in Raspberry Pi. Just make an account on Adafruit IO platform and make a feed.

Keywords: Home Automation system, wireless electronic system, MQTT database, IoT.

Introduction

Home automation is anything that enables you to use your home's lighting, heating and appliances more conveniently and efficiently. It can be as simple as remote or automatic control of a few lights, or it can be a complete system that controls all major parts of your home, custom set to your own personal preference. Home automation is anything that gives you remote or automatic control of things around the home. A home automation system will control lighting, climate, entertainment systems, and appliances. It may also include home security such as access control and alarm systems.[2] When connected with the Internet, home devices are an important constituent of the Internet of Things ("IoT").A home automation system typically connects controlled devices to a central hub or "gateway". The user interface for control of the system uses either wall-mounted terminals, tablet or desktop computers, a mobile phone application, or a Web interface, that may also be accessible off-site through the Internet.

Lighting control system: a "smart" network that incorporates communication between various lighting system inputs and outputs, using one or more central computing devices. MQTT is Protocol is for the transferring the message to the system for the mobile phone for long distance communication Installation of computer control for heating, ventilation and air conditioning systems. Internet/remote/network access to all installed components and equipment Installation and maintenance of network-enabled surveillance cameras and physical security systems. Central control and management capabilities over electrical fixtures and electronic appliances Devices within the home automation system connect and communicate with each over a local wired or wireless network. The entire home automation system usually requires system management software, installation of device/appliance controllers, motion and temperature sensors and other components.

Literature Review

Many such implemented systems are commercially available in market, after the literature survey done on each, the same kind of technology existed but what matters is analysed below. Wireless Student MQTT based home automation system by Mayur thete and Nikita Pulate presented Implementation of IoT Based home automation System. In this paper the concept of Internet of Things (IoT) is applied to the basic automation system in a class room, home. The home automation is done using MQTT protocol and recorded by Raspberry pi with external used Relay Module.

Smart home automation System using wireless technology proposed automation system using smart mobile phone devices with wireless technology attached to a MQTT server. Smart Home Automation System Using Adafruit login.

Proposed System Overview

The model uses primarily an Arduino Uno which will be replaced by Raspberry Pi, a MQTT protocol and an IO. Adafruit server where Bulbs is based on a MQTT protocol

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293
(Special Issue No.70)   Peer Reviewed Journal   www.aiirjournal.com Mob. 8999250451

439
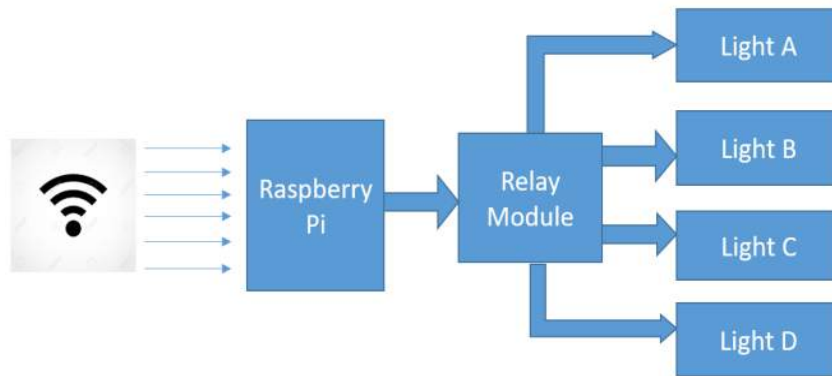
System overview

Mes Sage Qu E Ui Ng Telemetry Transport

Message Queuing Telemetry Transport (MQTT) is a light weight transport protocol that efficiently uses the network bandwidth with a 2 byte fixed header [1]. MQTT works on TCP and assures the delivery of messages from node to the server. Being a message oriented information exchange protocol, MQTT is ideally suited for the IoT nodes which have limited capabilities and resources. MQTT was initially devel-oped by IBM [2] in 1999 and recently has been recognized as standard by Organization for the Advancement of Structured Information Standards (OASIS) [3]. MQTT is a publish/subscribe based protocol. Any MQTT connection typically involves two kinds of agents: MQTT clients and MQTT public broker or MQTT server. Data that is being transported by MQTT is referred to as application message. Any device or program that is connected to the net-work and exchanges application messages through QTT is called as an MQTT client. MQTT client can be either publisher or subscriber. A publisher publishes application messages and subscriber requests for the application messages. MQTT server is a device or program that interconnects the MQTT clients. It accepts and transmits the application messages among multiple clients connected to it. Devices such as sensors, mobiles etc. are considered as MQTT client. When an MQTT client has certain information to broadcast, it publishes the data to the MQTT broker. MQTT broker is responsible for data collection and organization. The application messages that are published by MQTT client is forwarded to other MQTT clients that subscribe to it. MQTT is designed to simplify the implementation on client by concentrating all the complexities at the broker. Publisher and subscriber are isolated, meaning they need not have to know the existence or application

Message Queuing Telemetry Transport

Message Queuing Telemetry Transport (MQTT) is a light weight transport protocol that efficiently uses the network bandwidth with a 2 byte fixed header. MQTT works on TCP and assures the delivery of messages from node to the server. Being a message oriented information exchange protocol, MQTT is ideally suited for the IoT nodes which have limited capabilities and resources. MQTT was initially devel- oped by IBM in 1999 and recently has been recognized as standard by Organization for the Advancement of Structured Information Standards (OASIS). MQTT is a publish/subscribe based protocol. Any MQTT connection typically involves two kinds of agents: MQT clients and MQTT public broker or MQTT server. Data that is being transported by MQTT is referred to as application message. Any device or program that is connected to the net- work and exchanges application messages through MQTT is called as an MQTT client. MQTT client can be either publisher or subscriber. A publisher publishes application messages and subscriber requests for the application messages. MQTT server is a device or program that interconnects the MQTT clients. It accepts and transmits the application messages among multiple clients connected to it. Devices such as sensors, mobiles etc. are considered as MQTT client. When an MQTT client has certain information to broadcast, it publishes the data to the MQTT broker. MQTT broker is responsible for data collection and organization. The application messages that are published by MQTT client is forwarded to other MQTT clients that subscribe to it. MQTT is designed to simplify the implementation on client by concentrating all the complexities at the broker. Publisher and subscriber are isolated, meaning they need not have to know the existence or application other. Before transmitting the application messages. An MQTT control packet consists of a fixed header, a variable header and payload. CONNECT, CONNACK, PUBLISH, PUBACK, PUBREC, PUBREL, SUBSCRIBE, SUBACK,

etc. are some of the MQTT control packets exchanged between MQTT clients and MQTT server." Topic" in MQTT provide the routing information. Each topic has a topic name and topic levels associated with it. There may be multiple topic levels separated by / in a topic tree. Wildcard characters such as #and + are used to match multiple levels in a topic. Featuring the queuing system, MQTT server buffers all the messages if client is offline and deliver.

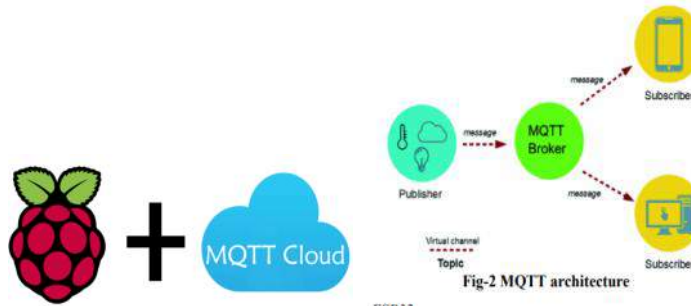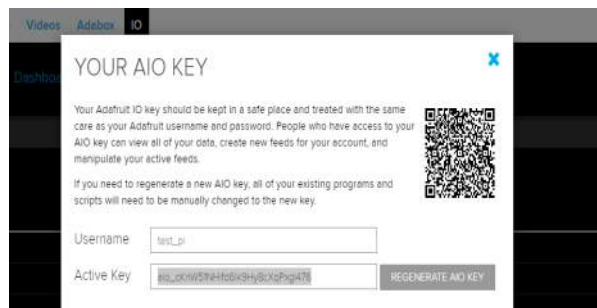Fig-2 MQTT architecture

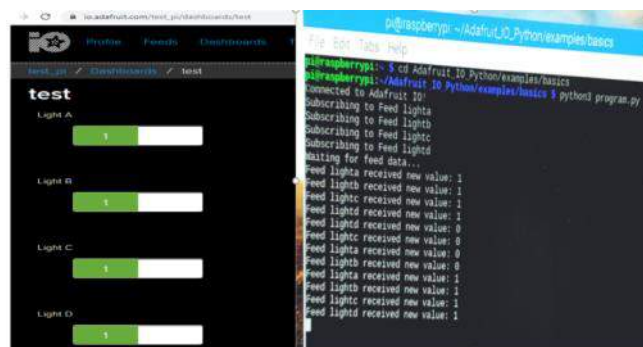**Illustration 1: Relay module**

The output is displayed on Bulbs (Organic light-emitting diode) display

Software Implementation:

The Python_3 is used for the software purpose. The login id and password create firstly. The enrolled unique id number given, which matches when the actual code is executed.

You will need to the ADAFRUIT_IO_KEY And ADAFRUIT_IO_USERNAME, which can be found from the Adafruit dashboard The software have to use support to run the module for the Adafruit library for and Adafruit library The whole system setup of the proposed Relay module

Conclusion

The proposed system model for the home automation system using MQTT protocol, and Relay module easy to install we will be further developing this system with raspberry pi model which has inbuilt Bluetooth and Wi-Fi module. MQTT is thus a light weight protocol that occupies low bandwidth and consumes less power. Considering the ease Taking this further ahead, cloud platform can be used to aggregate, analyse and visualize data. Customized GUI can be developed to remotely access the devices to monitor and control them

Acknowledgment

References

1) [Mqtt v3.1 protocol specification. [Online]. Available: http://public.dhe.ibm.com/software/dw/webservices/ws-mqtt/mqtt-v3r1.html
2) Hivemq. [Online]. Availablhttp://www.hivemq.com/blog/ mqtt-essentials-part-1-introducing- mqtt
3) Mqtt version 3.1.1 becomes an oasis standard. [On-line]. Available: https://www.oasis open.org/news/announcements/
4) mqtt-version-3- 1-1- becomes-an- oasis-standard Oasis mqtt version 3.1.1. [Online]. Available: http://docs.oasis-open.
5) org/mqtt/mqtt/v3.1.1/os/mqtt-v3.1.1-os.html
6) (2014, October) Mqtt version 3.1.1 oasis standard. [Online]. Available:
7) http://docs.oasis-open.org/mqtt/mqtt/v3.1.1/mqtt-v3.1.1.html
8) S. Nasrin and P. J. Radcliffe, "Novel protocol enables diy home au-
9) tomation," in Telecommunication Networks and Applications Conference
10) (ATNAC), 2014 Australasian, Nov 2014, pp. 212–216.
11) H. ElKamchouchi and A. ElShafee, "Design and prototype implemen- tation of sms based home automation system," in Electronics Design,
12) Systems and Applications (ICEDSA), 2012 IEEE International Confer- ence on, Nov 2012, pp. 162– Kumar and S. Johari, "Push notification as a business enhancement technique for e-commerce," in 2015 Third International Conference on
13) Image Information Processing (ICIIP), Dec 2015, pp. 450–454.
14) Nodemcu – an open-source firmware based on esp8266 wifi-soc. Available: http://nodemcu.com/index en.html/
15) Eclipse. Mosquitto an open source mqtt v3.1/v3.1.1 broker. [Online]. Available: http://mosquitto.org/
16) Mqttlens - chrome web store. [Online]. Avail- able: https://chrome.google.com/webstore/detail/mqttlens/ hemojaaeigabkbcookmlgmdigohjobjm?hl=

Smart Attendance System Using Bio-Metric Identifier with OLED Display

Freni Malviya, Paulami Nath1,2   and Panchsheela Kamble3*

1,2,3 Department of Electronic Science, Fergusson College, Pune, Maharashtra, India

Abstract

In today's world of security personal identification has become more crucial with stringent unique identifiers in use , like used for usual security means of smart cards, passwords, banking transactions etc.. The buzz word IoT (Internet of Thing) is emerging with more secure norms , in current scenario biometric identifiers are the most commonly used like the one is fingerprint recognition technique which is widely opted for personal identification. The paper proposes a smart attendance management system using biometrics. The portable, low cost, wireless electronic system can record attendance as well as stores all the data fetched on a SQL server database which can be future used as a reference for records. Use of Optical fingerprint sensor will do fingerprint detection and verification up to 1000 entries. Arduino UNO is used for primary testing which will be replaced by Raspberry pi which will make the system wireless. The resultant message will be displayed on an OLED display and a SQL server.

Keywords: Smart attendance system, biometric, wireless electronic system, SQL database, IoT.

Introduction

Biometric identifiers are unique, measurable characteristics often distinguished by physiological versus behavioural nature of an individual. For example fingerprint, palm veins, DNA, face recognition, iris recognition, retina, voice etc... Fingerprints are the most popular and trusted biometrics technology due to its uniqueness, stability, permanence and ease of acquisition. The traditional approach to mark attendance was using marking attendance in a register or manual call entries. Hence dummy attendance marking, real time analysis of entries with total information wasn't possible hence a smart way to mark the attendance was this proposed model in paper.

Biometrics identifier methods implementation can solve these above problems and proposed paper model will be primary ideal tool for attendance entries by institutions, schools, organizations for attendance monitoring .The proposed model has a primary MCU used for processing the enrolled fingerprint data using a finger print sensor and the OLED to display the enrolled and stored data output .

Literature Review

Many such implemented systems are commercially available in market, after the literature survey done on each, the same kind of technology existed but what matters is analysed below. Wireless Student Attendance system using fingerprint sensor by Yu Maw Win, Saw Aung Nyein [2] presented Implementation of IoT Based Attendance System. In this paper the concept of Internet of Things (IoT) is applied to the basic attendance system in a class room. The student verification is done using Finger Print module and recorded by Arduino with external used Wi-Fi Module esp8266. Next was Portable Biometric Attendance system using Raspberry Pi by Renuka Sawant, Mayuri Talekar, Neha Salvi , Rutuja Shetye and Vinayak Chvan [5], the attendance of the students was marked using a finger print sensor module and the data collected was processed using RPI . Also Smart attendance system based on frequency distribution algorithm with passive RFID tags by Qianwen Miao, Fu Xiao, Haiping Huang , Lijuan Sun , Ruchuan Wang [5], proposed staff attendance using individual RFID tags and a processor to process the RFID data.

Smart Mobile Attendance System using Bluetooth technology by Ankit B Dubey , Nitesh Gupta , Ankit M Dubey , Nilima Nikam [4] proposed attendance system using smart mobile phone devices with Bluetooth technology attached to a local server. Smart Student Attendance System Using QR Code by Arpankumar Patel, Ansel Joseph, Shubham Survase and Rohini Nair

Proposed System Overview

The model uses primarily an Arduino Uno which will be replaced by Raspberry Pi, a fingerprint scanner module R-307 and an I2C OLED module where OLED display is based on a SSD1306 OLED driver IC.

System overview

Hardware Implementation:

Working of finger print sensor:

      The skin on the palms of our hands has a special pattern called friction ridges that help us grab things effectively without slipping. These patterns consist of ridges and valleys arranged in certain configurations and are unique for each individual. Our finger tips also have them as you can see from the above image. When a finger comes in contact with a surface, the ridges make strong contact with the surface. When we strongly grab something, the moisture, oil, dirt and dead skin cells on our finger can attach to the surface of the material, leaving an impression we call a fingerprint. Various forensic methods involving the use chemicals are used to extract such fingerprints from crime scenes and are called latent fingerprints. But an optical fingerprint scanner works a bit differently.

      An optical fingerprint scanner works based on the principle of Total Internal Reflection (TIR). In an optical fingerprint scanner, a glass prism is used to facilitate TIR. Light from an LED (usually blue colour) is allowed to enter through one face of the prism at a certain angle for the TIR to occur. The reflected light exits the prism through the other face where a lens and an image sensor (essentially camera) are placed.

      When there's no finger on the prism, the light will be completely reflected off from the surface, producing a plain image in the image sensor. When TIR occurs, a small amount of light leaked to the external medium and it is called the Evanescent Wave. Materials with different refractive indexes (RI) interact with the evanescent wave differently.

      When we touch a glass surface, only the ridges make good contact with it. The valleys remain separated from the surface by air packets. Our skin and air have different RIs and thus affect the evanescent field differently.

This effect is called Frustrated Total Internal Reflection (FTIR). This effect alters the intensities of the internally reflected light and is detected by the image sensor (see this image). The image sensor data is processed to produce a high contrast image which will be the digital version of the fingerprint.
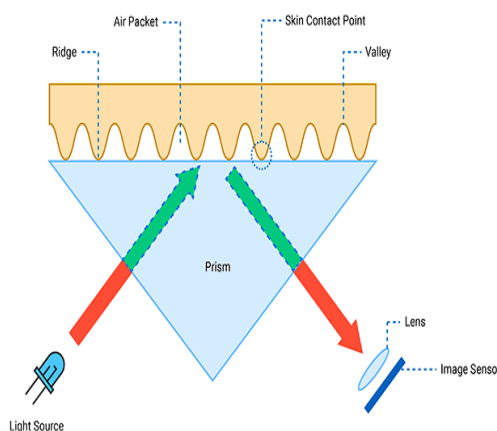
      In capacitive sensors, which are more accurate and less bulky, there's no light involved. Instead, an array of capacitive sensors are arranged on the surface of the sensor and allowed to come in contact with the finger. The ridges and air packets affect the capacitive sensors differently. The data from the sensor array can be used to generate a digital image of the fingerprint.
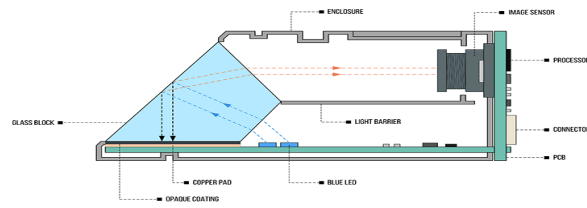
Illustration 1: R-307 Fingerprint Scanner module

The output is displayed on an OLED (Organic light-emitting diode) display

0.96 Inch 4 pin blue and yellow display module with i2c interface. Consumed low power up to 0.06W with DC voltage range from 3V-5V

Software Implementation:

The Arduino IDE is used for the software purpose.

The finger print enrolment is done firstly. The enrolled fingerprint has a unique id number given ,which matches when the actual code is executed .
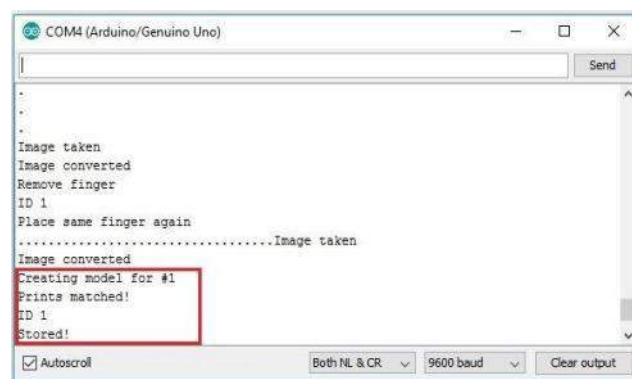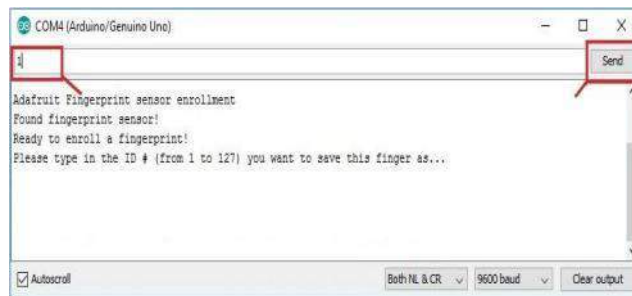
The software have to use some specific library support to run the module for fingerprint scanner module the Adafruit library for fingerprint and Adafruit library for SSD1306 OLED display which has I2C interfacing code

The whole system setup of the proposed module

Conclusion

The proposed system model for the smart attendance using bio-metric identifier is low cost, portable, easy to install we will be further developing this system with raspberry pi model which has inbuilt Bluetooth and Wi-Fi module also thinking for replacing the Arduino by ESP32 MODULE which has camera module along with inbuilt Bluetooth and Wi-Fi.

Acknowledgment

We wish to thank the department of Electronic science, Fergusson College for the support and providing lab to carry out the experimentation.

References

1) "Wireless Student Attendance System using Fingerprint Sensor" Yu Maw Win1, Saw Aung Nyein of Electronic Engineering, Mandalay Technological University, Mandalay, Myanmar, International Journal of Trend in Scientific Research and Development (IJTSRD) Volume: 3 | Issue: 4 | May-Jun 2019 Available Online: www.ijtsrd.com e-ISSN: 2456 – 6470

2) "Smart attendance system based on frequency distribution algorithm with passive RFID tags" by Qianwen Miao, Fu Xiao, Haiping Huang , Lijuan Sun , Ruchuan Wang [5],in Tsinghua Science and Technology,vol. 25.no.2,pp.217-226.

3) "Smart Mobile Attendance System using Bluetooth technology" by Ankit B Dubey, Nitesh Gupta, Ankit M Dubey, Nilima Nikam, Dept. of Computer Science and Engineering, YTIT college, Karjat, India, at International Research Journal of Engineering and Technology (IRJET) Volume:06| Issue:03| Mar 2019 Available Online: www.irjet.net e-ISSN: 2395 – 0056

4) "Portable Biometric Attendance system using Raspberry Pi" by Renuka Sawant, Mayuri Talekar, Neha Salvi , Rutuja Shetye and Vinayak Chvan [5], International Research Journal of Engineering and Technology (IRJET) Volume:06| Issue:01| Jan 2019 Available Online: www.irjet.net e-ISSN: 2395 – 0056.

5) "Implementation of IoT Based Attendance System on a Dedicated Web-Server", by Nadar Prince, abhishek Sengupta, Ms.Keerthi Unni, International Journal of Scientific & Engineering Research, Volume 7, Issue 6, June-2016.

6) "Smart Student Attendance System Using QR Code" by Arpankumar Patel, Ansel Joseph, Shubham Survase and Rohini Nair at 2nd International Conference on Advances in Science & Technology (ICAST-2019) Mumbai, Maharashtra, India

Study of Structural & Optical Properties of PVA Doped with FeCl₃

R. Risodkar

Dept. of Physics, R. A. Mahavidyalaya, Washim-444505

R. Joat

Dept. of Physics, Vidyabharti Mahavidyalaya, Amravati-444602

Abstract :

The polyvinyl alcohol (PVA) thin film added with different concentrations of Ferric chloride (FeCl₃) 5, 10, &15 weight% prepared by solution cast method has been investigated for Structural & Optical Properties. The structural investigation was done by using Fourier Transform Infrared Spectroscopy (FTIR). When PVA doped with FeCl₃ we found that (C= C) and (C–O) stretch the bond which shows that there is structural change that increases with dopant salt concentration. The absorbance and transmittance spectra have been recorded in the wavelength range of (320-620) nm in order to study the Optical Properties with UV-Vis which revels that as salt concentration increases (Cuo, FeCl₃) absorbance also increases.

Keywords: PVA , UV-VIS, FTIR, Thin film, Polymer complex

Introduction

In recent years polymers have been a subject of considerable interest because of their physical, chemical, electrical and optical properties. Polymers are widely used as an insulator in electrical industries as well as in micro electronics. Different polymers films i.e pure and doped with different additives used in various medical, biological and technological applications. Polyvinyl alcohol (PVA) is a cheap polymer with a high density of functional –OH groups, it also shows potential for chemical cross-linking [1,2].Polyvinyl alcohol has excellent film forming, emulsifying and adhesive properties. It has high tensile strength and flexibility, It is odorless and nontoxic. PVA is an exceptional polymer with high dielectric strength, good charge storage capacity and dopant dependent optical and electric properties [3]. PVA is a semi crystalline material with fully degradable and dissolve in water which goes towards green chemistry. According to literature, several combinations of PVA with acid and salts have been studied to improve structural and optical properties. Tawansi et al [4,5] studied the (PVA) films filled with various mass fractions of FeCl₃and prepared by using a casting method. The filling level (FL) dependence of certain IR absorption peaks was correlated with the obtained physical parameter characterizing the other properties. K. Meena et al[6] studied made an attempt to disperse CuO nanoparticles in the polyvinyl alcohol (PVA) and to understand the change in structural, optical and electrical properties of the polymer film.

In this study, PVA thin films are prepared with addition of ferric chloride (Fecl₃)With different concentrations to study structural and optical properties. The Optical Properties have been recorded in the wavelength range of (320-620) nm.

Experimental

PVA, Ferric chloride (FeCl3) were the starting material. Polymer electrolyte membrane complex with FeCl3 (PVA: 5wt%) & CuO (PVA: 5wt%) were prepared by solution cast method. First of all, PVA was dissolved in Deionized water to which FeCl3 was added in different stoicheiometric ratios along with continue stirring(4 hours) to obtain homogeneous viscous solution . These homogenous viscous solutions were casted in a glass Petri dish and left to dry for a week to remove any residual solvent. These polymer films were cut into circular pieces for characterization .To investigates the structure of the polymer by using FTIR type (SHIMADZU Japan) and the absorbance and transmittance measurement were carried out by using (UV-visible 1800 spectrophotometer) in the wavelength range ((320-620)nm.

Results and Discussion

A) Structural Investigation By FTIR

Today, the infrared spectroscopy includes the region of electromagnetic spectrum of approximately from 0.78 to 1000 μm. The most useful segment of the infrared region of the spectrum is from 2 to 16 μm. The absorption bands, which occur in this region, are due to the fundamental molecular vibrations. Consequently, they lend themselves for identification, qualitative analysis and band assignment. In fact, the matter absorbs infrared radiations selectively with respect to the wavelength.

The presence of broad absorption peaks in FTIR spectra for all the samples is evident. The broadening of absorption peaks in each spectrum is attributed to semicrystalline/partial amorphousness of complexes. The broadening of absorption peaks increases with increase in increase in dopant concentration. Obviously such broadening of absorption peak(s) indicates increased amorphous nature owing to doping.

Fig.1A FTIR of Pure PVA
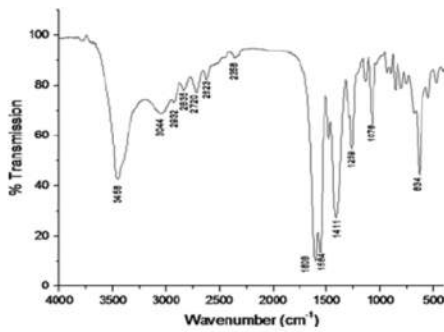
Fig.1B FTIR of (PVA95:Fecl₃ 5%)
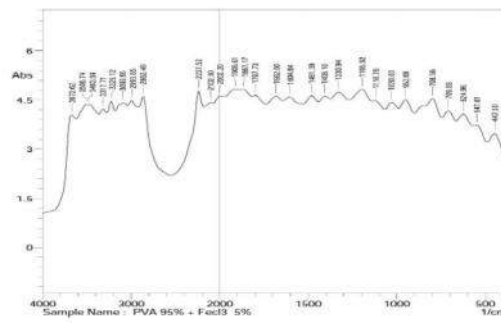
Fig.1C FTIR of (PVA90:Fecl₃ 10%)
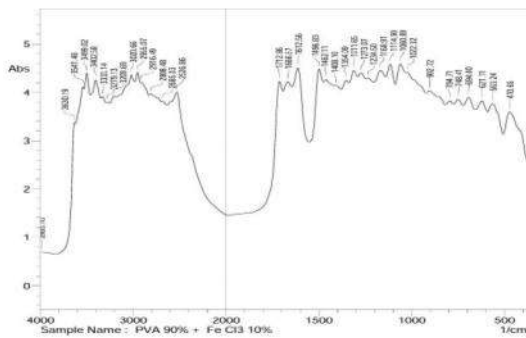
Fig.1D FTIR of (PVA85:Fecl₃ 15%)
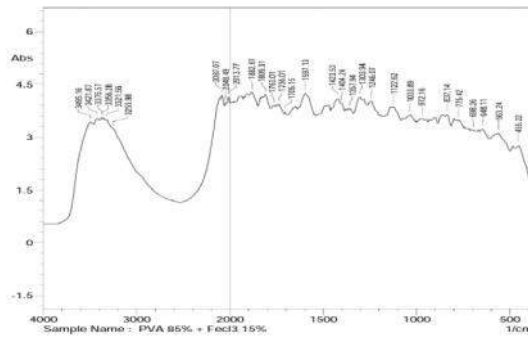
Figure1 which represents IR spectrum of Polyvinyl Alcohol with Ferric Chloride. The peak was recorded at $1597.13\ cm-1$ indicates the presence of C = C stretch bond, C = C stretch was recorded at $1404.24\ cm-1$ and C − O stretch was recorded at $1033.89\ cm-1$, at $3375.57 cm-1$ indicates the presence of FeCl3.

B) Optical Properties by UV-Vis Spectroscopy

Fig.2A **UV–Vis of** Pure PVA

Fig.2B UV–Vis of (PVA 95 - FeCl3 5%)

Fig.2 C UV–Vis of (PVA 90 - FeCl3 10%)

Fig.2 D UV–Vis of (PVA 85 - FeCl3 15%)

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293
(Special Issue No.70) Peer Reviewed Journal www.aiirjournal.com Mob. 8999250451

448

Fig. (2) shows the relation between absorbance and transmittance with the wavelength, we found that the behavior of all curves is same. The rapid increases of the a absorption in the low energy and sudden decrease in special energy and the absorbance increases with increasing the concentration FeCl3 that is related to change in films structure, transmittance increases with the wavelength and decreases with increasing the concentration of FeCl3.

We can determine the absorption coefficient () by using the following equation

$$\alpha = 2.303 \ A/t$$

Where A is the absorbance. The optical absorption coefficient (α) is important to determine the kind of electronic transition. If ($\alpha > 10^4$) the transition is direct and if ($\alpha \leq 10^4$) the transition is indirect [15,16]. It shows the dependence of the absorption coefficient on the photon energy for samples before and after doping.

Conclusion

In this study the polymer thin films of pure PVA and doped with FeCl3 are synthesized using Solution Casting technique. From FTIR study it has been found that, the concentrations of FeCl3(15%) increases the structural disorder. PVA before doping acts as an insulator and after doping it became semiconductor. From UV-VIS study it is clear that the optical constants of polyvinyl alcohol are changing with the increasing concentrations of FeCl3.

References

1) Suzhu Yu , Peter Hing, and Xiao Hu, "Dielectric properties of polystyrene-aluminum nitride composites", Journal of Applied Physics 88 (1), 398-404 (2000).
2) C. Um Devi, A.K. Sharma, and V.V.R.N. Rao, "Electrical and optical properties of pure and silver nitrate doped polyvinyl alcohol films", Material Letters 56, 167-174 (2002).
3) Omed Gh. Abdullah, and Dana S. Muhammad, "Physical properties of pure and copper oxide doped polystyrene films", International Journal of Material Science, 5 (4), 537-545 (2010).
4) M.Akram, A Javed, and T.Z. Rizvi, "Dielectric properties of industrial polymer composite materials", Turk J. Physs. 29,355-36 (2005).
5) Omed Gh. Abdullah, Bakhtyar K. Aziz, and Alan O. Saeed "Kaolin light concentration effects on the dielectric properties of polyvinyl alcohol films" International Journal of Science and Advanced Technology (ISSN 2221-8386) Volume 2 No 1 January2012.
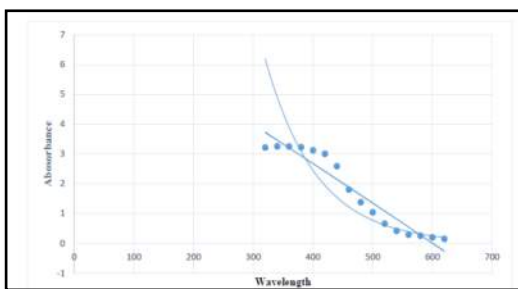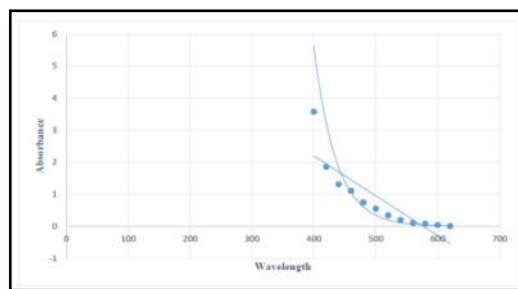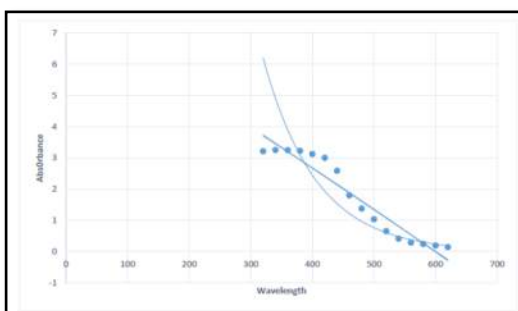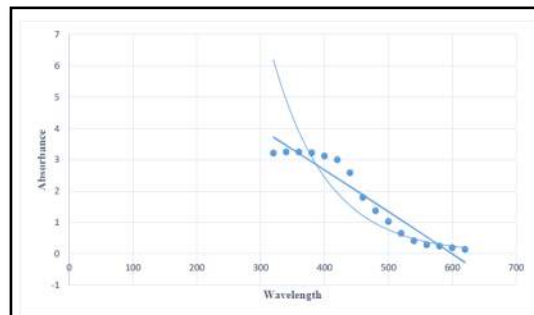6) R.J. Sengwa, S. Sankhla, S. Choudhary, "Dielectric relaxation processes and ionic conduction behavior in poly(ethylene oxide) montmorilloniteclay nanocomposite aqueous colloidal suspenssions", Colloid Polym. Sci. 287, 1013-1024 (2009).
7) C. Uma Devi, A.K. Sharma, and V.V.R.N. Rao, "Electrical and optical properties of pure and silver nitrate-doped polyvinyl alcohol films", Material Letters 56, 167-174 (2002).
8) G. Vijaya Kumar¤ and R. Chandramani" Doping and Irradiation Dependence of Electrical Conductivityof Fe3+ and Ni2+ Doped Polyvinyl Alcohol Films" VOL117 (2010) *ACTA PHYSICA POLONICA A* No. 6.
9) A. El-Khodary, "Vibrational, thermal, optical and magnetic investigations of PVA films with FeCl3 and CoCl2", Physics B 404, 1287-1294, (2009).
10) O.Gh. Abdullah, B.K. Aziz, S.A. Hussen, "Optical Characterization of Polyvinyl alcohol – Ammonium Nitrate Polymer Electrolytes Films", Chemical and Material Research 3(9), 84-90 (2013).
11) H. Zahr El-Deen, and A.I. Hafez, "Physico-chemical stability of PVA films doped with Mn2+ ions against weathering conditions", The Arab Journal for Science and Engineering 34(1A), 13-26 (2009).

Analytical Solution Of The Stress-Focusing Effect In Functionally Graded Hollow Sphere Subjected To Electromagnetic Or Γ- Ray Pulses

D. P. Deshmukh
Department of Physics,
L.R.B Arts, Comm. and S.S. Bharti Science College,
Arni, Yavatmal, India

Abstract

 This paper investigate the magneto-electro-thermo-elastic response of a functionally graded hollow sphere subjected to thermal sudden loading produced by known electromagnetic pulse, electric pulse, X-ray or γ- ray pulse of high energy. The solution of thermal stresses influenced by electric and magnetic field is obtained using finite integral transform technique. The numerical calculation is carried over the functionally graded which are obtained by using the infinitesimal theory of electro-magneto-elasticity subjected to subjected to the mechanical, magnetic and electric loading. Evaluated results show good agreement in the literature with those available. It is interesting to note that selecting a specific value of inhomogeneity parameter N can optimize the electro-magneto-elastic responses, which will be of particular importance in modern engineering designs.

Keywords: Functionally Graded Material, thermal response, sphere, thermal shock, Maxwell's equations, Electrical potential.

Introduction

 Functionally Graded Materials (a material showing compositions and/or functions varying continuously or step-wisely) have been developed as a new material that is adaptable as heat-resistant materials and have attractive application in furnace lines, space structures, fusion reactors and electronics component packaging. It is important to know the most effective composition in an FGM to decrease thermal stresses. The optimum material designs have been achieved with numerical approaches like Finite Element Method (FEM) and advanced powerful computers. On the other hand, a theoretical approach is also useful because the advanced small computers have helped various numerical discussions. But there have been not so many reports on the theoretical solutions for the transient problem of non-homogeneous material because it is difficult to analyze the unsteady temperature field on it.

 It is observed that structural failure occurs due to sudden load impact causing large thermal stress responses. So it is meaningful to investigate the thermoelastic behaviour of piezoelectric functionally graded hollow structures with defined boundary conditions. The thermoelastic problem under thermal shock has been studied for many years by several research workers using different methods. Of most recent literature, some authors have undertaken the work on functionally graded material for thermoelastic analysis, which can be summarised as given as: Ashida el al. [1] investigated response of a piezo-thermo-elastic plate of crystal class 6 mm subject to axisymmetric heating using potential function theory. Dai et al. [2] investigated the electro-magneto-elastic behaviours of functionally graded piezoelectric solid cylinder and sphere. Ding et al. [3-5] applied separation of variables method and Bessel's function to solve the transient responses of piezoelectric hollow cylinder and avoided the use of Laplace transform for plane strain problems. Horgan et al. [6] analysed the classical problem of stress distribution in an inhomogeneous isotropic rotating solid disc and pressurized hollow cylinder.

 In the present paper an attempt is made to study the theoretical solution for thermoelastic behaviour to determine the unknown displacement and stress functions of functionally graded hollow structures. Integral transform technique is utilized to investigate the thermoelastic behaviour of hollow structures problem with defined thermomechanical boundary conditions.

Basic formulations and solutions

 Consider radially polarized functionally graded hollow sphere referred to spherical coordinates (r, θ, φ) are considered in uniform magnetic field $\bar{H}(0, 0, H_\phi)$. The inner surface $r = a$ and the outer surface $r = b$ of

the sphere are subjected to a rapid change in temperature $T(r,t)$ produced by the absorption of an electromagnetic pulse or $\gamma-$ ray pulse radiant energy. It is postulated that in the absence of the displacement electric current $\partial D/\partial t$ and charge density ρe, the Maxwell's equations follows Eq. (1) given below. Applying an initial magnetic field vector $H(0,0,H_\varphi)$ in the spherical coordinate (r,θ,φ) system to Eq. (1) yields

$$\bar{U}=\bar{U}(u(r,t),0,0), \ \bar{H}=\bar{H}(0,0,H_\varphi), \ \bar{e}=-\mu(r)(0,-H_\varphi\frac{\partial u}{\partial t},0) \tag{1a}$$

$$\bar{h}=Curl(\bar{U}\times\bar{H})=\left(0,0,-H_\varphi\left(\frac{2}{r}\frac{\partial(ru)}{\partial r}\right)\right)=\left(0,0,-H\left(\frac{\partial u}{\partial r}+\frac{2u}{r}\right)\right) \tag{1b}$$

$$\bar{h}=(0,0,h_\varphi), \ \bar{J}=\left(0,\frac{\partial h_\varphi}{\partial r},0\right), \ h=-H\left(\frac{\partial u}{\partial r}+\frac{2u}{r}\right) \tag{1c}$$

Hence, in the formulation, displacement vector is of the form $u_r=u_r(r,t), u_\theta=0, u_\varphi=0$ and $\phi=\phi(r,t)$ as electrical potential is considered for an axisymmetric plane strain, so that hollow sphere is a special case.

The basic equations for the above problem can be summarized as follows:
Components of strain electric field strength and displacement relationships:

$$\gamma_{rr}=\frac{\partial u}{\partial r}, \ \gamma_{\theta\theta}=\gamma_{\varphi\varphi}=\frac{u}{r}, \ E_r=-\frac{\partial\phi}{\partial r} \tag{2}$$

where γ_{ij} are the strain and E_r is the radial components of electrical potential.
The stress-strain relationships:

$$\sigma_{rr}=c_{rr}\gamma_{rr}+(c_{r\theta}+c_{r\theta})\gamma_{\theta\theta}+e_{rr}\frac{\partial\phi}{\partial r}-\lambda_r\Theta(r,t) \tag{3a}$$

$$\sigma_{\theta\theta}=c_{r\theta}\gamma_{rr}+(c_{\theta\theta}+c_{\theta\phi})\gamma_{\theta\theta}+e_{r\theta}\frac{\partial\phi}{\partial r}-\lambda_\theta\Theta(r,t), \tag{3b}$$

$$D_r=e_{rr}\gamma_{\theta\theta}+(e_{r\theta}+e_{r\theta})\gamma_{rr}-\varepsilon_{rr}\frac{\partial\phi}{\partial r}+p_r\Theta(r,t) \tag{3c}$$

where the stress components $\sigma_{ij}\ (i,j=r,\theta)$, radial electric displacement D_r, elastic constants c_{ij} $(i,j=r,\theta)$, linear thermal expansion coefficient $\alpha_i\ (i=r,\theta)$, thermal strain $\lambda_i\ (i=r,\theta)$ are stress-temperature constants, piezoelectric constants of the material $e_{ij}\ (i,j=r,\theta)$, dielectric constant $\varepsilon_{ij}\ (i,j=r,\theta)$, pyroelectric constants of the material p_r and $\Theta(r,t)$ is the temperature above a reference temperature at which the cylinder is stress free when undeformed, respectively.
Without consideration of body force and body charge, the equilibrium equations can be given as:

$$\frac{\partial\sigma_{rr}}{\partial r}+2\frac{\sigma_{rr}-\sigma_{\theta\theta}}{r}+f_\varphi=\rho\frac{\partial^2 u_r}{\partial t^2} \tag{4}$$

where f_φ is defined as Lorentz's force which may be written as

$$f_\varphi=\mu(\bar{J}\times\bar{H})=\mu_0 H_\varphi^2\frac{\partial}{\partial r}\left(r^N\frac{\partial u_r}{\partial r}+r^N\frac{2u_r}{r}\right) \tag{5}$$

with ρ as the mass density.
In absence of free charge density, the charge equation of electrostatics is

$$\frac{1}{r^2}\frac{\partial}{\partial r}\left(r^2 D_r(r,t)\right)=0 \tag{6}$$

The solution of equation (1) can be obtained as

$$D_r(r,t) = \frac{1}{r^2}\eta(t)$$

(7)

where $\eta(t)$ is an unknown function with respect to time t.

Then by the virtue of equation (2), the third equation of equation (3) can be rewritten as

$$\frac{\partial\phi}{\partial r} = \frac{e_{rr}}{\varepsilon_{rr}}\gamma_{rr} + \frac{2e_{r\theta}}{\varepsilon_{rr}}\gamma_{\theta\theta} + \frac{p_r}{\varepsilon_{rr}}\Theta(r,t) - \frac{1}{r}\frac{\eta(t)}{\varepsilon_{rr}}$$

(8)

Further, we assume that the linear thermal expansion coefficients are constants while all other material constants follow simple power dependence on radial coordinate

Substituting equation (8) into first two equations of equation (3) and utilizing equation (2) yields

$$\sigma_{rr} = r^N\left(C_1\frac{\partial u}{\partial r} + 2C_2\frac{u}{r} + E_1\Theta(r,t)\right) - D_1\frac{\eta(t)}{r}$$

(9)

$$\sigma_{\theta\theta} = r^N\left(C_2\frac{\partial u}{\partial r} + C_4\frac{u}{r} + E_2\Theta(r,t)\right) - D_2\frac{\eta(t)}{r}$$

(10)

where

$$C_4 = C_{\theta\theta} + C_{\theta\varphi} + \frac{E_{r\theta}E_{r\theta}}{\Omega_{rr}}$$

(11)

For thermo-mechanical boundary conditions, we shall assume that the

$$\sigma_{rr}(r,t)\big|_{r=a} = 0$$

(12)

$$\sigma_{rr}(r,t)\big|_{r=b} = 0$$

(13)

and the initial conditions are

$$u(r,t)\big|_{t=0} = u_0(t), \quad \frac{\partial u(r,t)}{\partial t}\bigg|_{t=0} = v_0(t)$$

(14)

where $u_0(t)$ and $v_0(t)$ are known functions.

Substituting the equations (12)-(13) in equation (5) and utilizing equation (14), the equilibrium equation is obtained as

$$\frac{\partial^2 u}{\partial r^2} + (N+2)\frac{1}{r}\frac{\partial u}{\partial r} - \varpi_1^2\frac{u}{r^2} = \frac{1}{C_L^2}\frac{\partial^2 u}{\partial t^2} + X_1(r,t) + X_2(r)\eta(t)$$

(15)

where

$$\varpi_1^2 = 2\frac{C_4 - \mu_0 H^2(N-1) - C_2(N+1)}{C_1 + \mu_0 H^2}, \quad C_L = \left(\frac{C_1 + \mu_0 H_z^2}{\rho_0}\right)^{1/2},$$

$$X_1(r,t) = -\frac{1}{C_1 + \mu_0 H_z^2}\left\{[E_1(N+2) - E_2]\frac{\Theta(r,t)}{r} - E_1\frac{\partial\Theta(r,t)}{\partial r}\right\},$$

$$X_2(r) = \frac{D_1 - 2D_2}{C_1 + \mu_0 H_z^2}r^{-2}$$

(16)

Equations (1)-(16) constitute the mathematical formulation of the problem under consideration.

Solution of the problem

It is convenient first to introduce a new dependent variable $w(r,t)$ in boundary conditions (12)-(13) and equation (15) as

$$u(r,t) = r^{-(N+1)/2}w(r,t)$$

(17)

$$\frac{\partial w}{\partial r} + h\frac{w}{r}\bigg|_{r=a} = \hat{p}_i(t) \tag{18}$$

$$\frac{\partial w}{\partial r} + h\frac{w}{r}\bigg|_{r=b} = \hat{p}_o(t) \tag{19}$$

$$w(r,t)\big|_{r=a} = 0 \tag{20}$$

$$w(r,t)\big|_{t=0} = u_1(r), \quad \frac{\partial w(r,t)}{\partial t}\bigg|_{t=0} = v_1(r) \tag{21}$$

$$\frac{\partial^2 w}{\partial r^2} + \frac{1}{r}\frac{\partial w}{\partial r} - \varpi^2\frac{w}{r^2} = \frac{1}{C_L^2}\frac{\partial^2 w}{\partial t^2} + g_1(r,t) + g_2(r)\eta(t) \tag{22}$$

where

$$\varpi^2 = (1 + 2N + N^2 + 4\varpi_1^2)/4, \quad g_1(r,t) = r^{(N+1)/2}X_1(r,t), \quad g_2(r) = r^{(N+1)/2}X_2(r), \quad h = (4C_2 - (1+N)C_1)/2C_1,$$

$$u_1(r) = r^{(N+1)/2}u_0(r), \quad v_1(r) = r^{(N+1)/2}v_0(r),$$

$$\hat{p}_i(t) = (a^{(N+1)/2}/C_1)\{E_1\,\Theta(a,t)a^{N+1} - D_1\eta(t)\},$$

$$\hat{p}_o(t) = (b^{(N+1)/2}/C_1)\{E_1\,\Theta(b,t)b^{N+1} - D_1\eta(t)\} \tag{23}$$

For convenience in the analysis, we consider $w(r,t)$ constructed by the superposition of the simpler problem as

$$w(r,t) = w_1(r,t) + w_2(r,t) \tag{24}$$

where $w_1(r,t)$ is the solution of the quasi-static part with non-homogenous boundary conditions and $w_2(r,t)$ satisfies the solution with homogenous boundary conditions.

Assume that the static term $w_1(r,t)$ satisfy the inhomogeneous boundary conditions (18) and (19) and can be obtained [7] as

$$w_1(r,t) = A_1(r-a)^m\hat{p}_o(t) + A_2(r-b)^m\hat{p}_i(t) \tag{25}$$

in which

$$A_1 = \frac{b^m}{mb(a-b)^{m-1} - h(a-b)^m}, \quad A_2 = \frac{ab^{m-1}}{am(a-b)^{m-1} + h(a-b)^m} \tag{26}$$

here m is an arbitrary integer, which should not be less than 2, and should satisfy

$$\{[(a-b)h + m](a-b)^{m-1}\}\{[(b-a)h + m](b-a)^{m-1}\} \neq 0 \tag{27}$$

Substituting $\hat{p}_i(t)$ and $\hat{p}_o(t)$ from equation (6) into equations (8), $w_1(r,t)$ can be written as

$$w_1(r,t) = f_1(r,t) + f_2(r)\eta(t) \tag{28}$$

where

$$f_1(r,t) = (f_a(r)\Theta(b,t)b^{N+1} + f_b(r)\Theta(a,t)a^{N+1})E_1, \quad f_2(r) = -(f_a(r) + f_b(r))D_1,$$

$$f_a(r) = A_1(r-a)^m(b^{(N+1)/2}/C_1), \quad f_b(r) = A_2(r-b)^m(a^{(N+1)/2}/C_1) \tag{29}$$

Substituting equation (28) into equations (18)-(22) yields an inhomogeneous equation $w_2(r,t)$ and homogenous boundary conditions as

$$\frac{\partial^2 w_2}{\partial r^2} + \frac{1}{r}\frac{\partial w_2}{\partial r} - \mu^2\frac{w_2}{r^2} = \frac{1}{C_L^2}\frac{\partial^2 w_2}{\partial t^2} + G(r,t) \tag{30}$$

National Conference on Multidisciplinary Research in Science and Technology for Healthy Lifestyle Management (NCMRST- 2020) Organizer :- Shri R.L.T. College of Science, Akola

24th Jan. 2020

$$\frac{\partial w_2}{\partial r} + h \frac{w_2}{r}\bigg|_{r=a} = 0 \quad , \quad \frac{\partial w_2}{\partial r} + h \frac{w_2}{r}\bigg|_{r=b} = 0 \tag{31}$$

$$w_2(r,t)\big|_{t=0} = u_1(r) - g_2(r)\eta(0) \quad , \quad \frac{\partial w_2(r,t)}{\partial t}\bigg|_{t=0} = v_1(r) - g_2(r)\frac{\partial \eta(0)}{\partial t} \tag{32}$$

where

$$u_2(r) = u_1(r) - g_1(r,0) \quad , \quad v_2(r) = v_1(r) - \frac{\partial g_1(r,0)}{\partial r} \quad ,$$

$$G(r,t) = g_3(r,t) + g_4(r)\eta(t) + g_5(r)\eta''(t) \quad ,$$

$$g_3(r,t) = g_1(r,t) + \left(\frac{\mu^2}{r^2} - \frac{1}{r}\frac{\partial}{\partial r} - \frac{\partial^2}{\partial r^2}\right) f_1(r,t)$$

$$g_4(r) = g_2(r) + \left(\frac{\mu^2}{r^2} - \frac{1}{r}\frac{\partial}{\partial r} - \frac{\partial^2}{\partial r^2}\right) f_1(r) \quad g_5(r) = \frac{1}{C_L^2} f_1(r) \tag{33}$$

In order to remove the left hand side group of equation (30) from the differential equation (30) for the homogenous boundary conditions (31) of the third kind, we apply finite Marchi-Zgrablich integral transform with respect to radial coordinate r to equations (30) and initial boundary conditions (32) as

$$\frac{d^2 \overline{w}_2(n,t)}{\partial t^2} + \omega^2 \overline{w}_2(n,t) = \overline{q}(n,t) \tag{34}$$

and

$$\overline{w}_2(n,t)\big|_{t=0} = \overline{u}_1(n) - \overline{g}_2(n)\overline{\eta}(0) \quad , \quad \frac{\partial \overline{w}_2(n,t)}{\partial t}\bigg|_{t=0} = \overline{v}_1(n) - \overline{g}_2(n)\frac{\partial \overline{\eta}(0)}{\partial t} \tag{35}$$

where $p = \mu$, $\alpha_1 = h$, $\beta_1 = h$, $\alpha_2 = 1$, $\beta_2 = 1$, $\omega = C_L \mu_n$, $\overline{q}(n,t) = -C_L^2 \overline{G}(n,t)$ and the eigenvalues μ_n are the positive roots of the frequency of characteristic equation

$$J_p(\alpha,\mu a) Y_p(\beta,\mu b) - J_p(\alpha,\mu b) Y_p(\beta,\mu a) = 0 \tag{36}$$

The solution of equation (7.78) is

$$\overline{w}_2(n,t) = B_3 \cos \omega t + B_4 \sin \omega t + \frac{1}{\omega}\int_0^t \overline{q}(n,\xi) \sin \omega(t-\xi) d\xi \tag{37}$$

where B_3 and B_4 are unknown constants which can be determined from boundary conditions.

Applying the inverse finite Marchi-Zgrablich finite integral transform to equation (37) the solution $w_2(r,t)$ may be expressed as

$$w_2(r,t) = \sum_{n=1}^{\infty}\left(\frac{1}{C_n}\right) S_p(\alpha,\beta,\mu_n r) \overline{w}_2(n,t) \tag{38}$$

where $\overline{w}_2(n,t)$ is the finite Marchi-Zgrablich finite integral transform image of $w_2(r,t)$ with respect to kernel function $S_p(\alpha,\beta,\mu_n r)$ and weight function r, and normalizing constant,

$$C_n = \int_a^b r[S_p(\alpha,\beta,\mu_n r)]^2 dr \tag{39}$$

By substituting equation (24) and (28) into equation (38) the general solution of the basic governing equation (22) becomes

$$w(r,t) = f_1(r,t) + f_2(r)\eta(t) + \sum_{n=1}^{\infty}\left(\frac{1}{C_n}\right) S_p(\alpha,\beta,\mu_n r) \overline{w}_2(n,t) \tag{40}$$

Finally, substituting the solution from equation (40) into equation (17), we obtain the desired radial displacement equation as

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293 (Special Issue No.70) Peer Reviewed Journal www.aiirjournal.com Mob. 8999250451

454

$$u(r,t) = r^{-N/2}\left\{ f_1(r,t) + f_2(r)\eta(t) + \sum_{n=1}^{\infty}\left(\frac{1}{C_n}\right)S_p(\alpha,\beta,\mu_n r)\overline{w}_2(n,t) \right\} \quad (41)$$

By the virtue of equation (41), expressions of the radial stress and tangential stress can be easily obtained by substituting it into equations (9) and (10). Finally the radial electric displacement can be obtained by integrating equation (8) with respect to radial coordinate r and the perturbation response of the magnetic field vector in a functionally graded cylinder can be obtained substituting equation (41) in (1).

Numerical results and discussion

Consider functionally graded piezoelectric material (FGPM) hollow cylinder and sphere placed in a uniform magnetic field and electric load. As a further example we consider a uniform temperature change produced by a known electric-current pulse or by absorption of an electromagnetic wave as

$$T(r,t) = T_0 \qquad \text{for all } t \geq 0 \qquad (43)$$

where T_0 is prescribed temperature change. For numerical computation following material properties [1] are employed:

$$C_{rr} = 110.0\,GPa, \quad C_{r\theta} = 77.8\,GPa, \quad C_{rz} = C_{\theta z} = 115.0\,GPa, \quad C_{\theta\theta} = 220.0\,GPa, \qquad E_{rr} = 15.1\,C/m^2,$$

$$E_{r\theta} = -5.2\,C/m^2, \quad \Omega_{33} = 5.62\times10^{-9}\,C^2/Nm^2,$$

$$\mu_0 = 4\pi\times10^{-7}\,H/m, \quad H_z = 1.796\times10^9\,A/m, \quad H_\phi = 1.796\times10^9\,A/m,$$

$$P_r = -2.94\times10^{-6}\,C/m^2\,K, \quad \alpha_r = 2.0\times10^{-5}/K, \quad \alpha_\theta = 1.0\times10^{-5}/K,$$

$$\Lambda_r = 6.21\times10^5\,N/m^2\,K, \quad \Lambda_\theta = 5.51\times10^5\,N/m^2\,K, \quad H_z = H_\varphi = 2.23\times10^9\,A/m \qquad (44)$$

Taking other parameter for calculation as

$$T_0 = 1.0, \quad \eta(t) = 100 + 50t + 2t^2 + 0.1t^3, \quad \tau = \tau_n = 20, \qquad (45)$$

The radius of the FGPM hollow cylinder and sphere is taken as $a = 0.5$, $b = 1$ and gradient index N of the material properties takes five values: -2, -1, 0, 1, 2.

Figures 1-3 shows the distributions of radial stress distribution σ_r, tangential stress distribution σ_θ and the perturbation of the magnetic field vector in the FGM hollow sphere for $N = -2, -1, 0, 1$ and 2, respectively are nearly same. From the figure 1, we see that response curves of σ_r satisfy the given boundary conditions and shows a nearly linear distribution with increasing gradation index. Figure 2 depicts that the magnitude of circumferential stress is larger that that of radial with increasing gradation index at same point. From the figure 3, we see that a distribution of perturbation of the magnetic field vector is similar to figure 2.

Conclusion

In this paper, the new variable and classical Marchi-Zgrablich integral transform is introduced to obtain the displacement and stress distribution of a radially polarized functionally graded hollow cylinder and hollow sphere subjected to electromagnetic or $\gamma-$ ray pulses. In order to examine the present solution, displacement profile and the required histories of stresses are examined and graphs are plotted using a computer loaded with MathCAD 13 software. The results agree well with those obtained in previous literature of similar kind, and hence the validation of the solution is clarified. From the above, one concludes that the present solution is valid theoretically and may be used as a reference to solve other problems.

References

1) Ashida, F., Tauchert, T. R., and Noda, N., Response of a piezothermoelastic plate of crystal class 6 mm subject to axisymmetric heating, International Journal of Engineering Science, Vol. 31, pp. 373-384 (1993).

2) Dai, H. L., Fu, Y. M., and Yang, J. H., Electromagnetoelastic behaviours of functionally graded piezoelectric solid cylinder and sphere, Acta Mech. Sin, Vol. 23, pp. 55-63 (2007).

3) Ding, H. J., Wang, H. M., and Hou, P. F., The transient responses of piezothermoelastic hollow cylinders for axisymmetric plane strain problems, International Journal of Solid and Structures, Vol. 40, pp. 105-123 (2003).

4) Ding, H. J., Wang, H. M., and Ling, D. S., Analytical solution of a pyroelectric hollow cylinder for piezothermoelastic axisymmetric dynamic problems, Journal of Thermal stresses, Vol. 26, pp. 261-276 (2003).

5) Ding, H. J., Wang, H. M., and Chen, Y. M., Dynamic responses of a multilayered pyroelectric hollow cylinder of crystal class 2 mm for axisymmetric plane strain problems, International Journal of Mechanical Sciences, Vol. 47, pp. 799-821 (2005).

6) Horgan, C. O. and Chan, A. M., The pressurized Hollow cylinder or Disk problem for functionally graded isotropic linearly Elastic material, Journal of Elasticity, Vol. 55, pp. 43-59 (1999).

7) Lekhnitskii, S. G., Theory of Elasticity of an Anisotropic Body, Mir, Moscow, (1981).

8) Marchi, E. and Zgrablich, G., Vibration in hollow circular membranes with elastic supports, Bulletin of the Calcutta Mathematical Society, Vol. 22 (1), pp. 73-76 (1964).

Combustion Synthesis and Luminescence of Rare Earth Doped Ortho-Borate Phosphors For Lightning And Display

K.K. Rathod., K.V. Bhakade, J. T. Ingle

Department of Physics, Government Vidarbha Institute of Science and Humanities,

Amravati, India.

Abstract

The rare earth activated inorganic borate host phosphors YBO3:RE (RE=Eu3+,Tb3+) has been prepared by a novel solution combustion technique. The synthesis is based on the self-propagated exothermic reaction between the fuel (Urea) and Oxidizer (Ammonium nitrate). The heat generated in reaction is utilized for combustion of ingredients. The photoluminescence study carried out under UV excitation. The phosphor YBO3:Eu3+and YBO3:Tb3+ shows strong absorption in UV region and exhibits intense orange red and green emission upon excited by 254 nm UV light. The phosphor YBO3 doped with Eu3+ and Tb3+   phosphor is commercially used for lighting and display applications.
Keywords: Borates, Combustion Synthesis, Photoluminescence, Phosphor.

Introduction

In the recent years, intensive research has been devoted to formation of efficient luminescent materials due to their diverse applications in the field of the fluorescent lamps, display devices, detector system and scintillators of phosphor marking [1]. The borates have proved to be potential candidates for the mentioned applications. The present tendency of development of such materials is not oriented especially towards new phases but mostly towards a better knowledge and a better control of the microstructures and resulting optical properties of materials. Among the parameters, which govern the luminescence efficiency, the method of preparation of these materials has been shown by experience, to be the most significant and important. It is well established that combustion synthesis with R/O ratio (necessarily stoichiometric one), offer the possibility purity of without parasitic phases.

Yttrium and lanthanide Orthoborates LnBO3:RE (Ln = Y, RE=Eu,Tb) are an interesting class of materials having high UV transparency, good nonlinear properties and exceptional optical damage threshold which allows them to withstand against the harsh conditions present in vacuum discharge lamps [2-4]. In the present paper we are reporting synthesis of YBO3:Eu3+/Tb3+ with vaterite phase and luminescence properties under UV light.

Experimental

Combustion synthesis of YBO3: RE3+ (RE=Eu 3+, Tb 3+)

The samples were prepared by solution combustion technique [5-10]. The starting ingredients Y(NO3)3 , Eu(NO3)3 &Tb(NO3)3 (IRE Ltd.), H3BO3, NH4NO3 & NH2-CO-NH2 (S D Fine AR) were used. The stoichiometric amounts of the ingredients were thoroughly mixed in an Agate Mortar, adding little amount of double distilled water and obtained an aqueous homogeneous solution. The aqueous solution was then transferred in to a china basin. The China basin was introduced in to preheated muffle furnace maintained at 550°C. The solution boils, foams and ignites to burn with flame and obtained a voluminous foamy powder. The entire combustion process was over in about 5 minutes. Following the combustion, the resulting fine powders were annealed at temperature 800°C for about 90 min. and suddenly cooled to room temperature.

The stochiometric /balanced reaction:

Characterisation of samples

The X-ray diffraction (XRD) pattern of host sample of YBO3 was recorded on Rigaku MiniFlex diffractometer with Scan speed 2.000 deg/min. The morphology of the phosphors was studied by scanning electron microscopy (SEM) using Philips XL 30 SEM system. UV PL and PLE measurements at room temperature were performed on a Hitachi F-7000 spectrofluorimeter equipped with a 450W Xenon lamp in the range 200–600 nm, with spectral slit width of 2.5 nm.

XRD Analysis

The XRD profile of synthesized YBO3:RE (RE=Eu3+,Tb3+) as shown in Fig.1 corresponds to stable Phase of host YBO3 of vaterite type crystal structure with a hexagonal P63/m space group and cell parameters, a = 3.7960 ˚A and c = 8.81506 A˚ few weak peak of Eu, Tb related phase was detected. It is in good agreement with ICDD Card No.01-088-0356 of YBO3, because rare earth ions have similar radius, co-ordination structure and physical–chemical properties as a result when one rare earth ion is replaced by another rare earth ion, the crystal structure does not change dramatically.
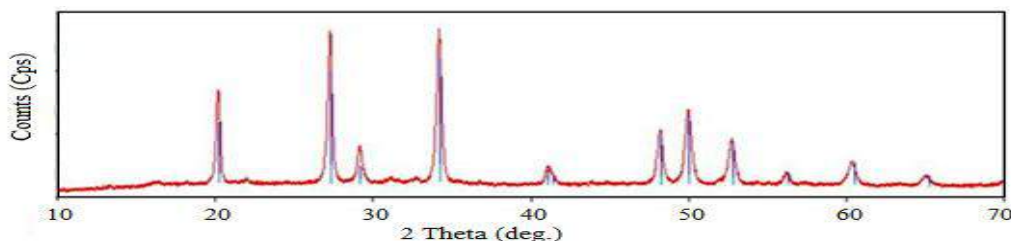
Fig. 1 XRD Pattern of YBO3 (ICDD Card No.01-088-0356)

Surface Morphology:

The SEM micrographs of YBO3:Eu/Tb prepared under the same conditions are shown in Fig. 2. The SEM images shows densely agglomerates SEM images of these materials with averages size of grains about to submicron range about 1-2 μm.
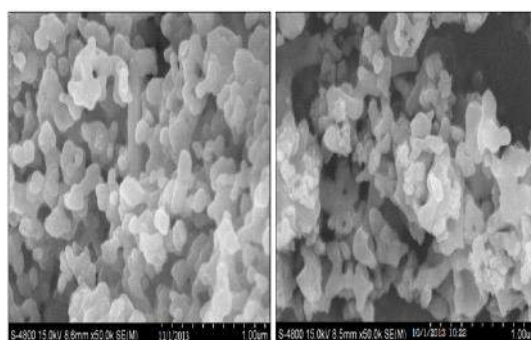
Result and Discussion

The UV PL spectra of YBO3:Eu3+ phosphor is depicted in Fig.3. The excitation spectrum (a) monitored at 592 nm emission shows a single intense broad band peaking around 254 nm. This band corresponds to the charge transfer (CT) transition within the Eu3+ - oxygen center. The emission spectrum (b) under the 254nm excitation, consists of multiple peaks at 590,598, 612 nm which corresponds to the 5D0 □ 7FJ, (J=1,2,3) transitions of Eu3+.

The prominent emission occurs at 592 nm in the orange red region of the spectrum. The red emission at 612 nm is comparatively weak.
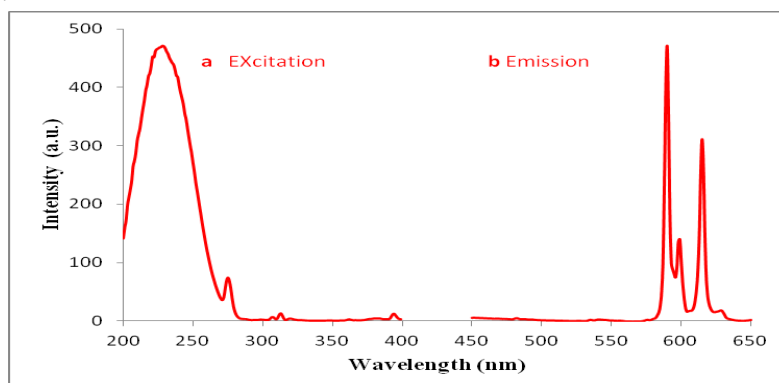
Fig 3: (a) Excitation and (b) Emission spectra of YBO3: Eu3+

The prepared YTbBO3 phosphor produces intense green emission at 546nm under UV excitation at 254 nm. The photoluminescence (PL) spectra of synthesized powder YTbBO3 shown in Fig.4 Emission of Tb3+ ions originates from transition of 5D4→7FJ (J=3, 4, 5,6,7) The strongest and sharp emission peak observed at 546 nm is due to the electric dipole transition of 5D4→7F5.
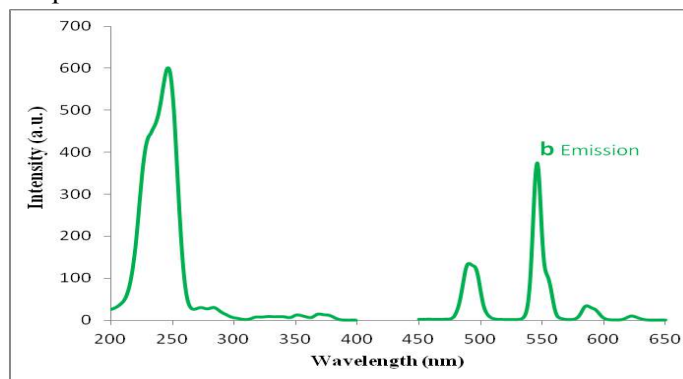
Fig 4: (a) Excitation and (b) Emission spectraof YBO3: Tb3+ .

Conclusion

The commercial inorganic borate host phosphor YBO3: Eu3+,Tb3+ has been prepared by a solution combustion technique. The combustion synthesis is simple, time saving, low temperature and inexpensive novel technique. Under 254 nm UV excitation YBO3: Eu3+ exhibits strong absorption and efficient emission in the orange red region of the spectrum, under identical conditionYBO3:Tb3+ shows prominent emission line occurs at 546 nm in intense green region. These phosphors could be employed in lighting and display devices.

References

1) D. Boyer, G. Bertrand-Chadeyron, R. Mahiou, C. Caperaa, J.C. Cousseins, J. Mater. Chem. 9 (1999) 211.
2) Z.Wei, L. Sun, C.Liao, J.Yin, X.Jiang, C.Yan, J. Phys. Chem. B 106,(2002),106.
3) D.Boyer,G.Bertrand,R.Mahiou, J. Lumin, 104,(2003), 229.
4) G.Chadeyron,M.Ghozzi,D.Boyer,R.Mahiou,J.Cousseins,J. Alloy. Compd. 317-318 ,(2001),183.
5) J.T. Ingle, A.B.Gawande, R.P.Sonekar, S.K.Omanwar, Y. Wang, L. Zhao, Journal of Alloys and Compounds Vol.no.585, (2014), 633.
6) J. T. Ingle, R.P.Sonekar, S.K.Omanwar, Yuhua Wang and Lei Zhao, Combust. Sci. Technol.Vol.no.186, (2014), 83.
7) J. T. Ingle, R.P.Sonekar, S.K.Omanwar, Yuhua Wang, Lei Zhao J. Alloys and Compd. Vol.no. 608 (2014), 235.
8) J.T. Ingle, R.P. Sonekar, S.K. Omanwar , Yuhua Wang, Lei Zhao Optical materials , Vol.no.36 (2014),1299.
9) J.T. Ingle , R.P. Sonekar, S.K. Omanwar, Yuhua Wang, Lei Zhao Solid State Sciences,Vol.no.33, (2014),19.
10) J. T. Ingle, R. P. Sonekar & S. K. Omanwar, J Mater Sci: Mater Electron DOI 10.1007/s10854-016-5175-0

The Role of ICT/ E-Learning and Communication Skills in Science

Prof. Jayesh Arjun Gajare

Shri S.N. Arts And U.K. Commerce College, Akola

Abstract: -

The advancement of Science and Technology contributed immensely in the well being of life. The services rendered through I.C.T. are faster and more effective. U.G.C. Liberally contributes grants to university and affiliated colleges to install the I.C.T. facilities and Communication Skills laboratory to generate digital environment. INFLIBNET is a good example. Researchers and Teachers are greatly benefited by this.

Science which is based on cause and effect is greatly benefited by the use of language and modern tools. Effective communication in scientific language clarifies the concept in the mind of reader. Communication Skills labs help the students from all branches, may it be Arts, Commerce and Science. Various software are available in the market which helps one to understand the concept better. Easy accessibility of Technology helps one to develop himself/herself. Students from science faculty can express themselves more effectively as their language gets better through the use of Technology.

Introduction:-

Mastery over languages helps one to express themselves in all ways. Good books can be written if one is familiar with the nuances of language. In any language different words have different shades. Each word also has various shades. Meaning is to be derived by the use of those words in their proper context. Wrong choice of words leads to disastrous consequences. In science particularly, if we cannot communicate effectively the end result would be very different. In other words expected experiments will fail to achieve its destined results.

Computer forms the basis of ICT With the help of computers data can be transmitted from one place to other easily. It runs on hardware and software. Computer software is also called programs, which are written in high-level languages. Here role of languages in modern computer plays vital role.

Hardware must support software to enable it to run smoothly. Here we can say that science is like a hardware and language like software. Combination of both leads to proper functioning of the system. Thus a communication skill is an integral part of science.

Computer, running applications software works for the users. while system software includes operating system which enable the computer to function. Use of computer in language learning helped the students to grasp language easily and quickly. Exposure of language to students had become possible due to computers only. Students can listen to desired instructions or lessons any number of times. More they listen the better they get mastery over their subject.

Advent of ICT enables E-Learning, E-Commerce, E-Business, Robotic Surgery and many more. Continuing increases in the computational power of computers and the capacity of networks to carry data have put us on the doorstep of a new era. In such scenario computer security has become very crucial. Security refers to protecting computer system and information they contain against unwanted access, damage, modification or destruction. Computer owners and administrators use a variety of security techniques to protect their systems.

Four basic components of learning any language are L S R W i.e. Listening, Speaking, Reading and Writing. Listening and Reading are considered as input while speaking and Writing are considered as output. To increase output or rather say for desired output we have to increase the quantity and quality of input. More we practise Listening and Reading More we get efficiency. Here modern technology can help the learner as vast material is available on internet. Computer is required to use internet thus modern technology comes to rescue if one thinks of achieving mastery over language or one's own subject. Correct Grammar which includes punctuation is necessary to express meaningfully in any language. Knowledge of Grammar and punctuation we can get from the use of online videos available on the topic. Pronunciation of language is also very important. For example English should sound like English and not like your mother tongue. Though, mother tongue influence is widely noticed in Indian Subcontinent. Different people having different language speak English differently due to their mother tongue influence. This difficulty can be easily overcome by listening to correct pronunciation online. This, online tool serve greatly in the absence of a good teacher. Students from rural India will get immense benefit if they turn to use modern technology and get themselves familiar with computer. Practice of speaking helps one to be conversant in any language. Here also modern technology can give you

good practise. We can have chat with online teachers available to us through the medium of various applications on smart phones. We can call smart phones as mini-computers also. Computers are adapted to pocket. Like pocket dictionary computer has become in the modern era. Also Computer facilitates auto-correct mechanism while learning these skills. Even blind learner got immensely benefited by the use of Technology. This has made their language learning or learning of any subject much easier. Example of Stephen Hawking tells us that any deformity can be overcome with the use of Technology and E-Learning.

E-learning also helps one to understand the concept without attending conventional class rooms. Students who due to some reason cannot complete their education can learn through this resource. One cannot get whole lot of knowledge with the help of technology within the confines of four walls and this too at a very minimum cost. Time and energy is saved due to E-Learning.

Conclusion:-

Thus to conclude we can say that "The number one benefit of information technology is that it empowers people to do what they want to do. It lets people be creative. It lets people be productive. It lets people learn things they did not think they could learn before, and so in a sense it is all about potential" and "The number one benefit of Communication in Science is that it enables end user to analyse data correctly. Proper analysis leads to accurate results." In this way Science and language help one another for smooth processing of a task.

Bibliography

1) Fundamentals of Information Technology, 2nd edition, Mathews Leon, published by Vijay Nocole Imprints Pvt. Ltd. Chennai (2009).
2) Data and Computer Communications 10th edition, William Stallings, published by Pearson India Education services Pvt. Ltd. Chennai (2014)

Study Of The Effectiveness Of Blended Learning For Geography Subject On Student's Achievement

Mrs. JagrutiRohanMahajani
Assistant Teacher, Geography Department, Fergusson College, Junior Wing, Pune 4

Mr. Hemant Yashwant Satpute
Assistant Teacher, DOES, Fergusson College, Junior Wing, Pune 4

Abstract

The information technology revolution has led to rapid expansion across a wide range of areas in the modern world. This has made it an essential requirement for schools, universities and other educational institutions to identify potential benefits from these changes so as to improve teaching and learning environments as well as cope with an ever increase demand for education and training. New internet bases education techniques have removed traditional place and time obstacles and have provided students access to information whenever and wherever they want (Murphy, 2003).

Blended learning is a new type of education prepared for a certain group by combining the positive aspects of different learning approaches. Blended learning will provide a big convenience for the course to achieve its target by combing the face to face interaction in traditional learning and time; place and material richness provided by web based learning.

Thus, blended learning is an education program (formal or informal) that combines online digital media with traditional classroom methods. It requires the physical presence of both teacher and student, with some element of student control over time, place, path, or pace. While students still attend "brick-and-mortar" schools with a teacher present, face-to-face classroom practices are combined with computer-mediated activities regarding content and delivery.

Present paper narrates an experiment done in Geography Department, Fergusson College, Junior Wing, Pune 4, to study the effectiveness of Blended Learning for Geography subject on student's achievement.

Keywords: Blended learning, ICT enabled Geography, Effectiveness of Blended learning for Geography

Introduction

Technology-based training emerged as an alternative to instructor-led training in the 1960s on mainframes and mini-computers. The major advantage that blended learning offers is scale, whereas one instructor can only teach so many people. Mainframe-based training had a number of interface limitations that gave way to satellite-based live video in the 1970s.

The advantage here was serving people who were not as computer literate. The major challenge was the expense required to make this work. In the early 1990s, CD-ROMs emerged as a dominant form of providing technology-based learning as bandwidth through 56k modems weren't able to support very high quality sound and video.

Modern blended learning is delivered online, although CD-ROMs could feasibly still be used if a learning management system meets an institution's standards. Some examples of channels through which online blending learning can be delivered include webcasting (synchronous and asynchronous) and online video (live and recorded). Solutions such as Khan Academy have been used in classrooms to serve as platforms for blended learning.

Need of this study

Previously geography was taught in a tradition way. If the content will be taught by using blended learning, will it be effective? What will be the outcome on learning? To find the answers to these questions, research was conducted.

Importance of this study

Students: Blended learning will be useful for students to understand the concepts in geography. It will also help the students to develop skills in students.

Teachers:Teachers will get an idea about effectiveness of such a blended learning. They can prepare such program for their teaching subjects.

Principals: It will be helpful to School Principal to chalk out a similar kind of program for other subjects using this developed program.

Objectives of the study

1. To develop blended learning programme for geography subject for types of agriculture
2. To implement the programme for geography subject for types of agriculture.
3. To study effectiveness of blended learning on types of agriculture in geography.

Conceptual Definitions

Effectiveness: Effectiveness is the observation of increase or decrease in score. (en.m.wikipedia.org)

Blended Learning: To mix or combine instructional technology with actual job tasks in order to create a harmonious effect of learning and working. (en.m.wikipedia.org)

Achievement: Achievement is the difference in the scores of two groups. (en.m.wikipedia.org)

Operational Definition

Effectiveness - To measure the difference between achievement score by using experimental method of pretest and post test single group design for Class XI students of State Board in teaching geography content.

Blended Learning– It can be classified as Face – To – Face driver, where the teacher drives the instruction and augments with digital tools. It can be also classified as Online Driver, where students complete an entire course through online platform with possible teacher checking.

Achievement – It is something accomplished, especially by special efforts of teachers and students.

Scope Of The Study

This research is related to class XII Maharashtra State Board students of Pune City, studying Geography as an optional subject.

Limitation Of The Study

The researcher will not consider Emotional, Mental, Physical conditions of students. The conclusions of the research are dependent upon the response of the students.

Delimitation Of The Study

The research is limited to study of different types of agriculture in geography.This research is limited to Class XII students of Maharashtra State Board who selected Geography as an optional subject.This research is limited to 30 Arts students of Fergusson College, Pune.

Research Methodology

Experimental method and Pre-test, Post-test Achievement Test, Single group design was implemented to carry out this research.

Population consisted of class XII English Medium geography students studying in Pune city, as optional subject. The sample selected for the study is incidental sample consisting of 30 geography students of class XII from Fergusson College. The data collected was with the help of achievement test and the statistical technique used for the analysis is 't – test'.

Before conducting the study, interview of four teachers teaching Geography at Junior College level, having teaching experience for more than 5 years, were conducted. According to them, geography is a technical subject. Thus, using traditional lecture method is not enough. From the interview it was clear that, these teachers are using ICT in teaching – learning process. They are also using various maps and charts to teach the subject. According to them, the topic Agriculture cannot be made interesting by only by mere reading lecture method. According to them, it is very important for the students to understand the types of agriculture, their characteristics and types of crops grown under particular type of agriculture. For this, pictures, images and documentaries can also be shown to make the topic easy for understanding. We found the topic interesting and hence decided to conduct the research on it.   The data was then collected and the single group design was chosen. To analyse, the best suited statistical method 't – test' is used.

Pre and post testof all the 30 students were conducted to observe the reliability co – efficient between the pre test and post test using Pearson's Coefficient method.

Observations

1. The students did not understand the types of agriculture if taught by lecture method. But after the blended learning program was applied. The students showed great interest in the topic.
2. After the blended learning program was applied, the students developed interest in map work skill. It helped them to locate the places easily.
3. The students showed great interest in preparing the power point presentation on the topics given to them.
4. There was a great improvement in increasing knowledge, understanding and observation skills in students after the application of Blended Learning Program.

Figure 1: Comparison of pre test and post test mean
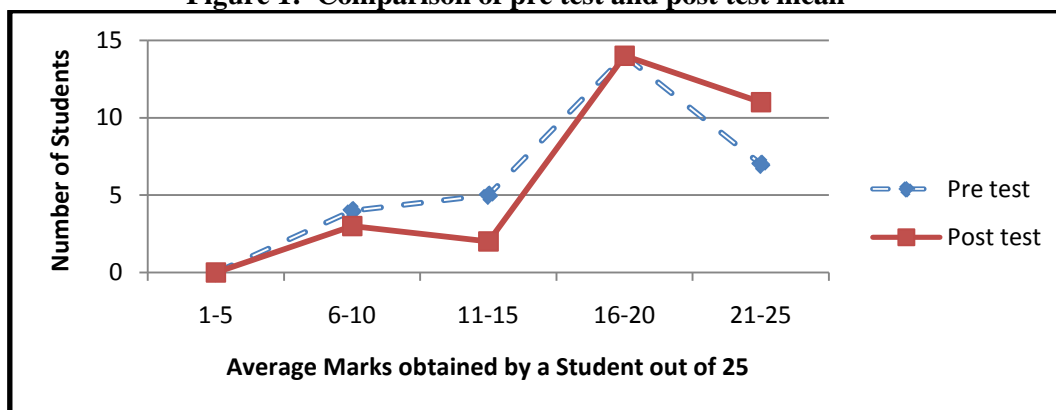
Conclusion

The calculated value of 't' i.e. 3.48 is greater than the table value at 0.05 level which is 2.04 and at 0.01 level which is 2.76.

Blended learning is effective for teaching geography.Blended learning helped the students for proper understanding in map work skill.With the help of blended learning program, grasping geography concepts became easy for the students.Also the blended learning program helped the researcher to utilise the ITC.

From the results, we found out that there is a significant difference between the achievement of XII standards students in understanding types of agriculture, when it is taught by traditional lecture method and by blended learning program. The researcher also found out that there was difference between the Pre test and Post test mean. Thus, there is achievement found in the students. Hence, we can conclude that Blended Learning Program is more effective for understanding the types of agriculture.

This research can prove to be a helpful guideline for new research. The Blended Learning Program will be helpful in making teaching – learning process easy for any subject.It will also be helpful for making teaching – learning easy for Students, Teachers and Principals.The Blended Learning Program will help in easy grasping of the content.

Future Scope

The students can make use of the Blended Learning Program in studying different chapters in Geography syllabus.They can make use of this program to upgrade their knowledge not only for geography subject but for other subjects too. Teachers can develop a blended learning program for XII standard students.Blended learning program can also be useful for the teachers teaching XI standard students.Teachers can make use of blended learning program for other subjects too.According to the researcher, the future researchers can make use of this Blended Learning Program in various topics of Geography subject.Also this Program can be used in any other subject including Languages,Sciences and even Mathematics.

References

1) 1.Best J.W. and Kahn J.V. (2005). *Research in Education,* Edition IX. New Delhi, Prentice hall of India Pvt. Ltd.
2) Dr.Biswas N.B.(1999) "Curriculum Studies(A Model for SAARC Countries), Delhi, Indian Publishers Distribution.
3) Garrett, H. E. & R. S. Woodworth. (2008). *Statistics in Psychology and Education*: Surjeet Publication, Delhi.
4) KoulLokesh, (2004), "Methodology of Educational Research", Vikash Publishing House Pvt. Ltd., New Delhi
5) Mangal, S. K. (2010). *Advanced Educational Psychology*. (Second Edition): PHI Learning Private Limited, Delhi.
6) Pandya, Shefali R. (2013). *Educational Research*: Creative Graphics, Delhi.
7) Sharma R.A. (2008), "Educational Research", R.Lall Book Depot, Meerut
8) ValiathanPurnima(2002), Blended Learning Models

Importance of Biomechanics in Sport

Ulhas V.Bramhe

Director Of Physical Education

S.P.M.College,Chikhli, Dist.Buldana

Abstract:

During this study we will research about the term 'Biomechanics', we will explore its history, meaning and importance in sports. The significance of biomechanics as a feasible sub discipline of physical education is currently perceived for the change in the techniques of sport. Experts, Teachers, Coaches can take benefit by the study of biomechanics, they can enhance their techniques and comprehension by considering standards of biomechanics. It will give a superior comprehension of inside and outer strengths and the human body. They will have the capacity to comprehend things profoundly and can instruct and enhance accordingly and this will include more preformation in their preparation. It additionally gives scientific knowledge that can be used amid the practice or rivalry. In current time rivalries are exceptionally intense, so it is essential that the coaches must know that how to upgrade the abilities and give better performance of athletes with the assistance of new methods and types of equipment.

Keywords: Biomechanics, kinematics, kinetics, kinesiology, biological, mechanics, performance, training

Introduction:

Definition of the word biomechanics is blend of two words Bio and Mechanic. The term biomechanics is gotten from the Greek. The word bio alludes to living things, and the word mechanic alludes to the field of physics and the powers that follow up on body's in movement. In Biomechanics we learn about the structure and arrangement of biological organisms. On the off chance that we allude to humans under biomechanics, we study how the muscles and skeletal system functions under various conditions/circumstances.

At some point the word biomechanics is utilized for kinesiology in light of the fact that both are necessarily related. Before pushing forward, we will sharp our comprehension about the word kinesiology. So what is Kinesiology? Kinesiology is connected with the anatomical and physiological components that do movements- particularly bones, muscles, tissues and nerves. It is expected to comprehend human movements and how the movement happens. Kinesiology is the logical investigation of human movement, the term kinesiology is gotten from the Greek Kinesi, means motion. Kinesiology is not just about the investigation of human movement; it incorporates non-human movement moreover.

Area of Biomechanics:

Biomechanics is utilized as a part of various fields of biology, physiology, engineering, physical therapy, pharmaceutical, material science, oral and orthopedic specialists, cardiologists, aviation. Instructors, trainers, coaches and exercise physiologists additionally use biomechanics in practical fields. Biomechanics has turned out to be extremely prominent and broadly acknowledged in the field of physical education. A man may study a few properties of human body and mechanical aspects and he can apply that information in different fields moreover. For instance, a coach learns about the human body and the principal of mechanical physics with the goal that he can accomplish successful execution by applying this information on the learners.

Area of Study- There are two major areas of study.

1) Biological

2) Mechanics

1) **Biologica**l: The principal zone of biomechanics is biological in light of the fact that every last development and movement of human body is biological, it incorporates skeleton and muscular system. Without application of force we can't do any action even we can't raise our hand. Movement is the consequence of force, without force no movement is possible. At whatever point we do any action that time our body apply force to our bones, contraction of muscles, and bones act as a lever. For producing movements, bones, nerves and muscles work together. Without knowing biological perspectives, it is impractical to understand motor skill development.

2) Mechanics: The second territory of biomechanics is mechanics. It is essential in light of the fact that here the laws and standards of physics to human motion or movement. There are two subfield of mechanics, first is statics and second one is dynamic. In static mechanics we study steady/constant movement either at rest or move with a constant speed. In dynamic mechanics we study kinematics and kinetics.

- **Kinematics-** it is the study of the motion of bodies with respect to time displacement velocity and speed moment either in a straight line or in a rotary direction
- **Kinetics-** it is the study of the forces associated with motion, including forces causing motion and forces resulting from motion

How it can help in improving performance in sports

There are such a variety of components which influence the game execution like physical wellness, motor movement, technical information, technique or tactics, physiological element, regular and scientific training and so on. Aside from these elements some different components are additionally there which enhance the execution, one of those component is biomechanics. On the off chance that the competitor executes the tenets and standards of biomechanics then he will have the capacity to perform better. In many games steadiness is required like sports events, gymnastics, wrestling, weight lifting and so forth. Biomechanics rule lets us know that focal point of gravity ought to be on the focal point of the base of your body, it will give more steadiness to the competitor. It is broadly acknowledged that for enhancing performance in games is to enhance the athlete's strategies, and strategies can be enhanced through biomechanics knowledge.

Biomechanics can enhance the strategy in two ways. In first way instructors or coaches can enhance the strategy by their knowledge into biomechanics. Second the biomechanics analysts find new and viable techniques. In this way they can enhance the aptitude in two ways- qualitative and quantitative biomechanical analysis methods.

Reason for studying Biomechanics in field of physical education

Bimechanics helps in improvement of the plan of sport equipment. Designs of various types of equipment are assessed by the bimechanicts and after assessment they make/propose changes in equipment that can be useful in enhanced performance. It is the aftereffect of biomechanics that in pole vault event fiber shafts are utilized rather than bamboo shafts in light of the fact that the fiber is more adaptable than bamboo. Designs of shoes are likewise changed to enhance friction which helps in upgrade speed and keep up body balance. Design of dresses are likewise changed for instance the costume of swimmers and outfit of athletes to diminishing water and air resistance.

Biomechanics helps in comprehension the body structure. Coaches with biomechanics knowledge can distinguish which body structure is proper for which sport, this will enhance sports and sports training result. Through Biomechanics knowledge competitors know how to use energy. Competitors can accomplish better outcomes by expending energy in an oversaw way. For instance, a competitor save energy by wiping out undesirable movements while running.

Injuries are extremely normal in games and it influences the performance of the players. A few injuries are serious to the point that it requires a long time for recuperation. With the assistance of sports biomechanics various types of safety equipment are built which are imperative and valuable in sports to save competitors from injuries, for instance shin protector is utilized for football and hockey players. Pad, gloves, elbow guard, thigh guard, helmet and so on are utilized for cricket. The knowledge of biomechanics is vital for players, coaches, physical education teachers, trainers to forestall injuries. Sports biomechanics principles are based on fact, lets us know that what sort of principles to be actualizes to decrease odds of injuries. For instance, while taking high catch in cricket fielder moves his hands back toward the chest while catching the ball, in this way he is expanding the distance and diminishing the force of ball.

Importance of biomechanics in sports:

1. Improves performance in sports.
2. Development of improved sports performance.

3. Helps in understand human body.

4. Create confidence in sportsperson.

5. Prevents sports injuries.

6. Helps in research work.

7. Improves in training techniques.

8. Increases the popularity of sports.

Conclusion:

Significance of biomechanics is expanding day by day Giving performance in games is becoming difficult nowadays. To offer great performance and to reprieve old record in sports, new techniques are exceptionally important and these techniques can be discovered with the assistance of biomechanics. Athletes are continually attempting to discover approaches to get speedier, higher and stronger with insignificant injuries. Enhancing your biomechanics might be one imperative method for upgrading your athletic skills. There is a major part of biomechanics in the accomplishment of athletes. Biomechanics has assumed a critical part for development of sports equipment, which are useful in sports performance.

References

1) Cavanagh PR. Biomechanics: A bridge builder among the sport sciences. Medicine and Science in Sports and Exercise. 1990; 22:546-557

2) Elliott B. Biomechanics: An integral part of sport science and sport medicine. 1999; 2:299- 310.

3) Role of biomechanics in sport, Dr. Suman, International Journal of Academic Research and Development , ISSN: 2455-4197, Volume 1; Issue 11; November 2016; Page No. 55-57

4) Role of biomechanics in physical education and sports, Shambu Dutt, National Journal of Multidisciplinary Research and Development ISSN: 2455-9040,   Volume 3; Issue 1; January 2018; Page No. 983-984

Need Of Biomechanics In Sports

Dr. Kamini Mamarde

Director Of Physical Education

Raje Chatrapati Kala Mahavidyalaya, Dhamangaon Badhe, Maharashtra, India

Abstract:

When coaches understand how forces work on muscles and affect motion in sports, they have a clear advantage over those who lack this knowledge and its applications. Athletes who know the basic concepts have a rationale for learning the correct way to execute skills. Knowing the reason behind learning a challenging technique gives them more motivation to master it. The key to success is finding effective instructional cues that help the athlete achieve correct mechanical technique. Coaches with a command of mental training tools and sports training principles can help athletes make amazing things happen on the field. Anatomy and physiology lay the foundation for biomechanics and kinesiology, areas of study about human movement.

Keywords: Biomechanics, Sports

Introduction:

Sports biomechanics is a quantitative based study and analysis of professional athletes and sports activities in general. It can simply be described as the Physics of Sports. In this subfield of biomechanics the laws of mechanics are applied in order to gain a greater understanding of athletic performance through mathematical modeling, computer simulation and measurement. Biomechanics is the study of the structure and function of biological systems by means of the methods of "mechanics." –which is the branch of physics involving analysis of the actions of forces. Within "mechanics" there are two sub-fields of study: statics, which is the study of systems that are in a state of constant motion either at rest (with no motion) or moving with a constant velocity; and dynamics, which is the study of systems in motion in which acceleration is present, which may involve kinematics (the study of the motion of bodies with respect to time, displacement, velocity, and speed of movement either in a straight line or in a rotary direction) and kinetics.

Human biomechanics is a branch of science studying the impact of internal and external forces on human body.

Sometimes biomechanics is identified with kinesiology. Kinesiology studies physiological, psychological, and mechanical rules in relation to the motions of living organisms. Therefore, kinesiology is superior to biomechanics. McGinnis (2005) defined biomechanics of sport and physical exercise in the following way:

- **Biomechanics of sport:** By sport it is meant an organized, competitive, fun activity, requiring skills, ability, determination, strategy, and fair play, in which the winner can be determined by objective means within a firm set of rules.
- **Physical exercise:** By physical exercise it is meant any intentional physical activity which enhances or maintains physical fitness, performance, health, or wellness. The secondary goal of sport biomechanics is strongly related to the main goal because a healthy athlete will perform better than an athlete plagued with frequent injuries. How can biomechanics fulfill its goals.

Performance Improvement:
Technique Improvement:

Improvement of technique with the help of biomechanics can be used by teachers and coaches to correct motions of students or athletes. Moreover, research workers in the field of biomechanics may develop a new and more effective technique for better execution of a sport motion. In the former case teachers and coaches make use of the methods of qualitative biomechanics analysis in their everyday practice to produce changes in the technique used by their charges. In the latter case research workers in the field of biomechanics use quantitative biomechanics methods to develop new techniques which can then be implemented into

teaching and training processes. For instance if a gymnastics coach sees that her charge has difficulties to turn a somersault she can come up with three recommendations to help the gymnast execute this exercise correctly: 1. to jump higher, 2. to fling arms with more energy before taking off, or 3. to curl up more tightly. All these recommendations can help to execute this task correctly and are based on the principles of biomechanics. If the gymnast jumps higher, she has more time to finish the turn during the flight phase. To curl up more tightly means to increase the speed of rotation while keeping the same angular momentum. To fling arms with more energy increases the angular momentum which helps the gymnast to rotate faster.

Equipment Improvement:

Use of biomechanics can also lead to a better look and better functioning of sport equipment. For example ski boots can have a real impact on sport performance. Sophisticated sport equipment gives advantage to both elite and recreational athletes. Researchers have recently also developed a new swimming suit which helped swimmers at the Sydney Olympics in 2000 better several world records because it has a favorable influence on the draft force and buoyancy of water that is acting against swimmers. This swimming suit had such an influence on sport performance in swimming, in fact, that its use was later banned.

Injury Prevention:

The concept of injury prevention is part of public health and its goal is to improve the general health of the population and thus to increase the quality of life. Biomechanics is a tool that can be used in sport medicine to identify forces and mechanical energy that cause injuries. It helps to
understand how injuries originate, how to avoid them during sport performance, and how to identify exercise suitable for injury prevention and rehabilitation. Biomechanics offers possibilities to create alternative techniques of executingspecific movements, using new equipment, and carrying outmore effective training methods, which also contributes to injury prevention.

Injury reduction through changes to equipment function:

One of the examples of using the results of biomechanics research for improving the functioning of sport equipment can be found in running. The number of people who realize the importance of healthy life style is recently growing. Running, as an elementary human locomotion, is a legitimate part of healthy lifestyle. But the growing numbers of people engaged in running also brought higher prevalence of injuries. Running shoes at the beginning of the 1970s were too stiff for in experienced runners. Among the injuries with growing prevalence were stress fractures and shin bone pain. Shoe manufacturers therefore started to market shoes with soft soles. However, soft soles did not offer good stability and motor control. Runners started to suffer from ankle, knee and hip injuries. Biomechanics research has made it possible to manufacture running shoes which reduce impact forces and, at the same time, offer good stability and motor control. With the help of biomechanics it is even possible to recommend custom made shoes for individual athletes. Prevalence of injuries in running has decreased again. Isn't human body itself the best equipment for running? People who wear shoes from very early age mostly touch the ground first with their rear foot when they walk. Lieberman et al. (2010) studied the style of running in

Kenyans who never wore shoes and assert that in barefoot running people naturally touch the ground first with their forefoot. This produces slower loading rate in foot compared to running in shoes and touching the ground first with rear foot. Grand reaction forces during running may cause chronic injuries that runners often suffer from.

References:

1) Aboelkassem Y. Selective pumping in a network: insect-style micro scale flow transport. Bio inspiration & Bio mime tics 2013; 8(2).
2) Davis KG, Marras WS. Assessment of the relationship between box weight and trunk kinematics: Does a reduction in box weight necessarily correspond to a decrease in spinal loading? Human Factors 2000; 42:195-208.
3) Nikolas KJ. Plant Biomechanics: An Engineering Approach to Plant Form and Function (1 Ed.). New York, NY: University Of Chicago Press, 1992, 622.
4) Advantage of biomechanics in sports, Sravan Kumar Singh Yadav, International Journal of Applied Research 2016; 2(5): 669-670

Sports and Healthy Lifestyle

Prof. Sachin J. Kokode

(Director of Physical Education & Sports)

Shri Shivaji Sci. & Arts College, Chikhli Dist. Buldana. (M.S.)

Introduction:

What do we mean by "sport"?

"Sport" means all forms of physical activity which, through casual or organized participation, aim at expressing or improving physical fitness and mental well-being, forming social relationships or obtaining results in competition at all levels.

Sports are the best way to make you fit in all respects. It plays a vital role in our life as it keeps us healthy, wealthy and of course active. There is a great saying "Healthy mind lives in a Healthy Body." Therefore, it is necessary to put more emphasis on sports. Besides that, sports help in making ourselves happy and refresh our mind. It also helps in the development of our social and communication skills. Hence, Sports are the greater source of recreation. Sports remove stress and provide relaxation to our mind and body.

Sports, and especially team games, are an important part of our lives, whether we are spectators or participants. For many, football is a never-ending source of conversation, fans feel a deep affinity with their team, and star players are given the status of heroes. The current fashion for people to want to look good, youthful, athletic and healthy is manifested by the number of fitness clubs opening up and the quantity of magazines published about slimming, while parks are filled with joggers. Other activities which involve mental rather than physical exertion, such as chess, are also considered sports. There are sports to suit all tastes and temperaments and thus sport can truly be closely linked to our identity and culture at some point in our life.

What is a healthy lifestyle?

We've heard it many times before, but do we really know what a healthy lifestyle means:
Good nutrition, daily exercise and adequate sleep are the foundations of healthy living. A healthy lifestyle keeps you fit, energetic and at reduced risk for disease. According to (WHO), Healthy living is a way of living that helps you enjoy more aspects of your life. It is a way of living that lowers the risk of being seriously ill or dying early. Health is not just about avoiding a disease or illness. It is about physical, mental and social well-being too.

When you adopt a healthy lifestyle, you provide a more positive role model for other people in your family, particularly children. You will also create a better environment for them to grow up in. By helping them to follow a healthier lifestyle, you will be contributing to their wellbeing and enjoyment of life now and in the future.

Components of healthy lifestyle:

Healthy living is not that hard. In fact, the entire process is simple, provided you are willing to make even the slightest changes into your life. Minor changes, like walking for 20-30 minutes every day, can make a drastic impact to your overall health.

You can also achieve your goal of living a healthy lifestyle if you make sure that the following components form part of your overall plan:

Healthy Diet:

American Heart Association stated that several factors can dramatically affect your ability to be healthy – one of which is your present diet. You have to watch what you eat as a healthy diet is one of the major components of a healthy lifestyle. Keeping yourself healthy requires you to find the best sources of fat, protein, carbohydrate and other essential nutrients. Generally, a good diet consists of polyunsaturated fats, not the saturated type, high quality protein, low-sugar fruits, healthy veggies, and foods rich in fiber.

Exercise:

A healthy lifestyle wouldn't be complete without proper exercise. It plays a major role in attaining your health and weight goals. The good news is that you can freely choose the kind of physical activity you can do. However, you need to make sure that you do it for at least thirty minutes a day. Some of your best options are moderate intensity exercises like biking and jogging. Do these for thirty minutes daily to maximize their effects. You can also do rigorous aerobic activities. Since these are more intense than the previous exercises, you can just dedicate around 10 to 20 minutes every day for this.

You can also further maximize the effects of your workout plan by adding muscle strengthening activities for two days per week. The good thing about making regular exercises a part of your healthy lifestyle plan is that it provides numerous benefits including lower blood pressure, lower risk of developing heart disease, higher energy, and better mood. This can also help you control your weight and improve the quality of your sleep.

Proper Sleep and Rest:

Another vital component of a healthy lifestyle is enough sleep and rest. Avoid depriving yourself of sleep as it can have a drastic effect on your health. Have proper rest, as well, instead of overworking yourself. Take breaks once in a while. When it comes to sleep, try to get the recommended 7-8 hours of sleep every night. Make sure that your bedroom is conducive for sleeping to ensure that you get quality sleep. Both enough sleep and proper rest are crucial to living healthy as these contribute to your mood, your brain, your ability to fight stress and weight gain or obesity, and your overall health.

Mind:

It is also necessary to cultivate your mind if you want to lead a healthy lifestyle. Keep in mind that your mental health has a drastic effect in your overall health. If you don't do something to nurture the health of your brain and mind, then this will interfere with your immune system, causing you to develop a number of chronic illnesses. It's time to let go of negative and stressful thoughts that can only harm your overall health. Nurture your mind, instead, by filling it with positivity and doing something to relieve yourself from stress.

Social Relationships:

You also need to build healthy relationships with the people around you. Engaging in joyful, supportive and positive relationships can clearly benefit your overall health and well-being. It even plays a role in your longevity. Foster a healthy kind of relationship within your circle of friends, family and colleagues, and you will notice an improvement in your level of happiness and your overall health.

Living a healthy lifestyle does not require you to make lots of major changes. What you need to do is to just think of better ways to improve the quality of your life and health. Note that even minor changes count.

What is a relation between sports and healthy lifestyle?

For most people, taking part in sport will improve your general health and wellbeing. There are plenty of reasons why you should become involved in sport with reduced body fat, bone strengthening, improved stamina and flexibility being some of the reasons why you should take up a sport.

The following are just some of the many health and fitness benefits of starting out in a new sport which we hope will apply to whatever sport you opt for:

- Playing sports helps reduce body fat or controls your body weight.
- Sports allow you will gain the satisfaction of developing your fitness and skills.
- Sports can help you fight depression and anxiety.
- Sports allow you to challenge yourself and set goals.
- Playing sports helps strengthen bones.
- Sports help aid coordination, balance and flexibility.
- Many sports can help improves stamina and concentration.
- Sports allow you to experience the highs and lows of both winning and losing!

- Through sports you will meet people with a similar interest to yourself and are likely to gain many new friends.
- Sports are a great way for families to get exercise together.
- If you are sporty then you are more likely to have a healthy lifestyle.

Getting involved in sports to divert attention from a specific thing or subject:
Healthy lifestyle has various advantages for people. If a person is involved in a sport, it can play a major role in allowing them to divert their attention from something that they wish to avoid. If people remain idle, they might get more chance to get involved in something that can be bad for their health and also allow them to have an addictive behavior. It is for this reason that many people opt for sports as an alternative so that they can make changes to their mind, body and spirit. If they are motivated towards it, they would definitely end up living an active and healthy life and get amazing results within a short period.

Getting fully energized with the help of sports:
Instead of considering sports as an exercise or medication that would allow people to remain healthy and fit, it should be taken as a source of entertainment, which can freshen up the mind and body of the person. Once a person is able to become healthy through sports, they would be able to see things in an optimistic manner and their opinions about various things would change in a good manner. Sports allow the person to remain active all the time. It ensures that sufficient amount of energy reaches the mind and body of the person and they can feel content and start living an active and healthy lifestyle.

Conclusion:
To conclude the number of factors influences the way in which sports impacts on health in different populations. Sport and physical activity in itself may not directly lead to benefits but, in combination with other factors, can promote healthy lifestyles. Elements that may be determinants on health include nutrition, intensity and type of physical activity, appropriate footwear and clothing, climate, injury, stress levels and sleep patterns. Sport and physical activity can make a substantial contribution to the well-being of people in developing countries. Exercise, physical activity and sport have long been used in the treatment and rehabilitation of communicable and non-communicable diseases. Physical activity for individuals is a strong means for the prevention of diseases and for nations is a cost-effective method to improve public health across populations.

Reference:
1. https://www.quora.com/why-is-sports-importance.
2. nhp.gov.in/health-lifestyle.
3. adiahealth.com/what-is-a-healthy-lifestyle/- 3rd July 2019.
4. Dkamagazine.com/top 5 components of a healthy lifestyle/ August 4, 2016 ALBERT.
5. https://www.realbuzz.com/articles-interests/sports-activities/article/the-health-and-fitness-benefits-of-sport/

Innovations in Library Automation and Information Science

Miss Priyanka S. Jaiswal,
Rsearch Schalors, Shri R.L.T College Of Science, Akola

Mangesh Ubale.
Librarian, Shri R.L.T College Of Science, Akola

Abstracts:

The main purpose of this study is to assess self-estimated overall Information science and library automation. These same disruptive forces are acting on the academic library. Although many have called for a transformation in the library, there is a relatively minimal amount of discussion regarding what the transformation entails. Library automation, Information science is reference, articles, Journals, etc. It is also refers to use of computer to keep tracks of all the books that are added, issue, returned in library. Library automation is the part of management system in information technology era. This system ensure to handling proper book in library by the process of library automation.

Information Science is related to all discipline in knowledge branch. Such as social science, pure science. It is mostly related to library science. Library science is likely to information science. Information is useable. When is use or process, New information is generate by it. Information is generating in data, information, and knowledge. Information Science means processing of information. Library and Information science works like this. In this paper state that innovation of Library automation and information science in all discipline.

Introduction:

Library automation will play a vital role in library management system. Library automation stated in single term is the application of computers and services in the performance of different library operations and function. Technological advance and market demands required the vendors of library automation system to develop new generation of powerful integrated system. There is no need to an annual maintains to open source Library automation software. Libraries, which have completed their RECON projects can transfer their large bibliographic database to the new integrated system and Library automation all their operations. Library users education is need to use the library automation database effectively.

Library automation is a part of management system that is library automation facilities to better utilization library collection, library services, libraries technology work and all possible work in library housekeeping operation. Library automation is a technology that reducing manual execration, duplication of all possible works in library. Library automation concept use in library for right reader, right place, right time, give appropriate information. In this reason this concept came in library science sector. Library automation is a single term that collaborate all work by machine.

It is important to know Library automation concept that widely use in libraries and it is critical and expensive process so if we want to apply it and information Science is related to library Science. Therefore, it is important to know deeply.

Definition

Information Sciences: Information science is an interrelated science that deals with the properties and behaviour of information and control the for and use of information for processing, storage, management and other subject.

Library Automation : Library automation is the application of automatic and semiautomatic date processing machines to performs traditional library house keeping actives such as acquisition, circulation, cataloguing and reference and serials control.

Information Science and Library automation

Information Science concept use in all subject fields. It is related to handling of information, use utilization and processing of information. library automation is on part of in this processes. Information Science could have faster, accuraency to come automation facility. So Automation is a technique which is use in information Science to better utilization information processing and information services. Library and

information centre is centre which is storage, use, utilization and process information. Automation gives it accuracy, speed and mechanism in it.

Prerequisite for Library Automation:

The basis requirement for any library automation program is as below.

- ➢ Software packages.
- ➢ Hardware
- ➢ Program application
- ➢ Networking devices
- ➢ Database server
- ➢ Adequate collection
- ➢ Financial assistance
- ➢ Maintenance of department
- ➢ Knowledgeable manpower.
- ➢ Open source software.
- ➢ Computer system.

Generation of Library automation software:

In the history of Library automation there are four part generation of Library automation software. This generation are based on their facilities, capabilities and interconnectivity, software of Library automation is a continuous process.

First generation: In the first generation classification, cataloguing, circulation method is the used in this system. It developed to run hardware and software programs for operating system.

Second generation: In the second generation computer system is used in library automation. It offered link between systems, function commands drive.

Third generation: In this generation it is based on open source software & interconnection with open system.

Fourth generation: In this generation computer RFID use for library automation. Internet, web design, facilitates accessing multiple information source.

Necessity of library automation software:

Library have growing organisation is fifth law of library science called us that information is always growth and also growth their storage tools. That why library has needed to mechanism in library housekeeping operations. Library automation best information services in today ICT era.

Nowadays most of libraries have saturated or already have completed the process of computerization such as acquisition, cataloguing, circulation, serial control, OPAC, etc. There are several reason for automation. Considerable saving efforts. Time and resource involved in manual processing can be achieved.

Needs of library automation as below.

- To provide create a report statistic within short time.
- To reduce the duplication of housekeeping operation.
- To promote quality research and share the resource through library networking.
- Improved control covers library collection and library services.
- To provide EDI (Electronic Data Interchanged).
- To provide for quick reservation and materials, booking, web catalogue interface.
- Excellent control over circulation and save time of readers.
- Eliminates human errors, execration, and human willingness while performing routine library work.
- It help to accuracy, speed, fast services all possible work in library.
- To maintain all the records in computerized form.

Implementation of library automation system :

Library automation is a complex process. Library management must develop an implementation plans for the library automation such as project, installation, application programs. Implementing library automation is prepared to a database for library collections and to proper organizing retrieving the information and providing the information to the users. Library automation is used in implementation sector, division of library automation process. It is important for decide method, economical access, other requirement for hardware, software maintains.

- Circulation Section
- Technical section
- Reference Services
- Searching Tools
- Acquisition
- Library Resources sharing
- Serial Control etc

Library automation software packages :

The library automation software activities are develop day by days. Varies software are used in library automation process. Help of software is easy to access library automation. In information science and library automation software increase new version in software which developed software in library.

- SOUL
- KOHA
- E-GRANTHALAYA
- GRANTHALAYA
- SLIM
- LIBSYS
- ALICE for Windows.
- NG-TLMS.
- VIRTUAILS
- LAMP
- AUTOLIB
- TECHLIB PLUS
- WINSANJAY
- LIBSUITE.
- AUTOLIB
- NEWGENLIB
- NEXLIB

Future of library automation :

The development of lib services and library automation in higher learning is complex process to cover up advances of planning for acquisition use of ICT. New technologies library provides several new materials, media, and mode of storing and communication information. The library systems all over the world are going through a process of transformation to address the effects and implications of technological changes. For the future library automation software package are upgraded to users. Library is growing organising, library knowledge is growing rapidly, libraries are procuring the large amount of various collection like books, periodicals, E-resource and non-book materials. To fulfil the needs of the library users.

- RFID: It is smart card based inventory control. Radio Frequency Identification is the technology that is slated to replace barcodes in library application. It is use for library automation such as issue return, Stock verification, Library security etc.

- Web OPAC and M OPAC: Online Public Access Catalogue is versatile search facility; it must be integrated with other modules. By using Boolean operators in all programs. WEB-OPAC: Web-OPAC applications are useful in Public libraries on Android. It is Book Search .it is serving as a gateway to the resource .M-OPAC: is a smart phone based Book search app offers a low cost based platform to all the libraries in world to share book data. It is easy to implement upgraded books data available and their no training required.
- Open Source Software: OSS is software for which the source code id freely available. Anyone can access the sources code and make changes.
- Z-39.50: Information Retrieval Protocol the growth of shared cataloguing and cooperative cataloguing is allow capturing of bibliographic data from remote library serves over the Internet.
- Integrated Access Interface: it is refers to the ability of LMSs to combine multitude of resource and search mechanism.
- Web – centric Architecture: It is based on access for staff and users to ensure platform for library services. It is help to overcome space and time berries.
- FRBP – It is stand for Functional Requirement for Bibliographic Records. It is based on bibliographic data model. It is conceptual model for management of bibliographic databases.
- UNICODE: it is enables the input and display of different language. it is character coding system ,encoding ,representation and handling of text system.

Conclusion:

Information Sciences is generalises field which is use any branch of subject like computer science, social science etc. library and information centre has work to control information. So Library automation is one technique which is use for in it.   Library automation is machinery process using by library to perform library housekeeping operations. Many time users did not fulfil their requirement which they want that time library automation fulfil their requirement so it is not giving fully knowledge base services, but support it. Sometime there have been barriers that mismatch all the operation, such as technological error, digital tools, human willingness, human tendency, but there are many advantages of library automation. It gives accuracy in the work as well as speed in work, fast services to library services.

Reference / Bibliography :

1) Cooper Michael D.(1996). Design of Library Automation System : New York: Wiley
2) Kent Allen(1997). Encyclopaedia of library information science. New York: Marcel Dekkar.
3) Boss,Richard W.(1997). The Library Administrator's Automation Handbook, Medford.
4) Lloyd, Naomi,ed.(2000)."Library Automation Resources". <http://www.escape.ca/automate/re.
5) Yogendra Singh(2004).Library Automation in Academic Library in India: Problems and prospects, Calibre(2003).

Digital Library : Role in Education

Dr. Bharat R. Lokalwar

Librarian Sharadchandra Arts, Science and Commerce College,
Naigaon (Bz.) Tq. Naigaon (Bz.) Dist. Nanded

Abstract.

It has been rightly said that "university/College is a community where scholars and teachers are head, students are the body and library its heart."Digital libraries are quite new-about 20 years age at the same time, they have been growing at a fast pace. Digital libraries have the following characteristics they Store, Preserve, distribute, Protect content and different formats at the same time. Over the centuries, libraries have been the Keepers and Distributors of books, Journals, Maps and Others materials that are used by students in the Learning process. Digital library Provide digital formats information Acquisition, Preservation, Display, Library operation, Digitization, etc tasks performed through it. Due to it Student/Teacher/Reader can prepare individual collection of information knowledge in large scale. User can get Unknown, Rare, Valuable, Important information. Digital library have no boundaries of time, place and language as well money and many users get same information at the same time.

Keywords: Digital library, Preserve, Acquisition, Knowledge etc.

Introduction

"How you manage your information determines whether you win or lose". In this paper digital libraries role in education. WWW's growing popularity and the tremendous growth of CD-ROM products, digital libraries offer a huge range of multimedia information, everything from movies, speeches, Images and photos to sounds, text and beyond. The amounts of online, CD-ROMs and other digital sources of information are exploding and infrastructure for accessing material improves almost daily. Digital libraries in their role of courseware and reference holders and distributors are of paramount importance in distance learning and training. "Digital Library" represents a new resource for education, as it may in other domains. The flexibility of a digital library and the richness of the tools now being developed to exploit them invite exploration of content. Exploration in education is generally rewarded by discovery, enabling inquiry-based, and constructivist approaches to learning.Digital libraries are electronic libraries in which large numbers of geographically distributed users can access the contents of large and diverse repositories of electronic objects ± networked text, images, maps, sounds, videos, catalogues of merchandise, scientific, business and government data sets ± they also include hypertext, hypermedia and multimedia compositions.

Definitions

"Digital libraries are organizations that provide the resources, including the specialized staff, to select, structure, offer intellectual access to, interpret, distribute, preserve the integrity of, and ensure the persistence over time of collections of digital works so that they are readily and economically available for use by a defined community or set of communities."A digital library is a library in which collections are stored in digital formats (as opposed to print, microform, or other media) and accessible by computers. The digital content may be stored locally, or accessed remotely via computer networks. A digital library is a type of information retrieval system.

Digital Libraries

A digital library is understood to have the information stored predominantly in an electronic or digital medium. The digital information collection may include digital books, digital scanned images, graphics, textual and numeric data, digitized films, audio-video clips, etc. A digital library is expected to provide access to the digital information collections. A digital library maintains all, or a substantial part, of its collection in computer-processible Form as an alternative, supplement, or complement to the conventional printed and microfilm materials that currently dominate library collections. The first use of the term digital library in print may have been in a 1988 report to the Corporation for National Research Initiatives. A digital library is nothing but a large database for the people who are working on hypertext environment. It is an environment, which supports the full life cycle of creation, storage, preservation, dissemination and use of data, information and knowledge.

Role in Education of Digital Libraries

A digital library is nothing but a large database for the people who are working on hypertext environment. It is an environment, which supports the full life cycle of creation, storage, preservation, dissemination and use of data, information and knowledge. Creating, capturing, and deploying a learning experience, these are fundamental requirements for the application of digital libraries in education, and maybe also define some of the most important roles they can play. Digital libraries can play create, store, analyze, organize, retrieve and disseminate digital information (text, images, sounds) in digital libraries or any type of information. Analysis of the Cardboard Kayaking example clearly identifies at least three roles that digital libraries can play in education: as a resource for teaching (curriculum development), as an environment for learning (student experience) as authoring space (again, in support of student experience). In general, students have been patrons of the libraries of their institutions. They have also been the legal deposit of part of the products of scholarly publications – theses & dissertations, articles, technical reports, etc. Digital libraries are especially critical in developing countries. One reason for this is that traditional sources of information – for example, books – are often hard to obtain there, and digital libraries make it possible for large numbers of people to access them at a potentially low replication cost. Another is that web access in developing countries is typically low, widening the knowledge gap between the developed and developing world. Digital library technology can ameliorate this, because – despite many people's assumptions to the contrary – it does not have to depend on the Internet for distribution.

All libraries – physical and digital – are service organizations, based upon the fundamental requirement to serve their users. When examining the applications of digital libraries in education we need to consider the needs of various users and stakeholders:

• Students;
• Teachers;
• Educational authorities, including governments and teaching standards organizations.

Changing world of Education

There are profound changes going on in the educational system. These changes are needed because of ever growing pressure in the school systems themselves, partly because society itself is changing into one in which knowledge work becomes ever more important, and partly because of the very information and communication technologies which are transforming our economies. They changes are as follows:

5.1 The number of students is still growing.

5.2 Increasingly, work and study are combined, and that leads to a need for more flexible learning arrangements in which the campus or school building is no longer central to the educational process.

5.3 Lifelong learning leads to an emphasis on "learning to learn". Knowledge becomes obsolete at an ever-increasing rate in a knowledge economy, and knowledge workers need to be able to refresh their knowledge on a regular basis.

5.4 Different types of students are asking for education; participation of women, older students, and students from ethnic minorities is growing. Different students bring different experiences with them.

5.5 Higher education institutions have long had a monopoly in providing education, but increasingly, companies and public bodies possess knowledge that can be reused for educational purposes, partly for in-house training (knowledge management) but also to offer to external markets.

5.6 Teaching staff will exhibit more job-hopping behavior than they did in the past.

5.7 Education is under constant budget pressure, thus there is a need for more efficient and effective education.

5.8 There are too many dropouts in the current educational system.

Digital Library and References

This is extremely important in the high undergraduate years and in the graduate level. Research is based on a lot of searching, retrieving and reading. So, libraries must carry and make available collections to fulfill this need. The digital library seeks additional books, journals, theses & dissertations, technical reports and other

items that enhance the learning process. A very special situation occurs in continued education when focusing on training Professional staff who works in remote locations, as for example engineers in road and dam constructions, and offshore oil drilling. Current trends in continued education make digital libraries very useful, specially due to the Possibility of customization of contents to meet individual needs

Digital Portfolio

Initially, digital portfolios were developed as an alternative way of assessing student progress, with more emphasis on the learning process and the material results a student achieves throughout a course of study. Additionally, a portfolio, which continues to grow during training, can be used in job interviews to show prospective employers the candidate's background in a much richer way. Digital portfolios work especially well in situations where students work with assignments to solve real-life problems and are free to manage their own learning process. Digital portfolios are an extension of the first domain identified -- digital libraries and digital learning environments -- but now include the intranet. The emphasis here is on the institution as a knowledge organization, and the integration of that knowledge with other information resources.

Enhancement Staff and Organization

Digital libraries to digital learning environments, standards issues, knowledge-sharing, support in education, more active support of educational processes, classroom instruction, development of course modules in multi disciplinary teams, rethinking and redesigning library buildings-- all these issues have obviously profound implications for library personnel. Library staffs have an advantage: they can build on their expertise in digital libraries, and they have a head start in using modern technology. Ultimately, in Rader's view, librarians should become partners in educational innovation. The academic technology specialist is a hybrid function, combining library and ICT expertise, and the specialist's task is to support teaching staff in the use of new technology. Most of the time (about four days a week), these specialists work with faculty in their offices and classes; the remaining day of the week is used to exchange experiences.

Conclusions

Infrastructure must be essential to deployment of digital libraries in education. That aspect of the project is not what we consider essential to its mission, although an important part, if we value equity access. New opportunities for teaching, authoring and learning, using knowledge and information. Content in a digital library cam be made to embody that kind of knowledge and information that is so vital for learning.In this 21st century a digital library provide to users, students and teachers various services and digital libraries in education can be made to change that perception.

References:
1) American Library Association, *A Progress Report on Information Literacy: An Update on the American Library Association Presidential Committee on Information Literacy: Final Report*, 1998,
2) Carol Ann Hughes, "Information Services for Higher Education. A New Competitive Space," *D-Lib Magazine*, December 2000.
3) Roes, H., "Digital Libraries and Education", D-Lib Magazine, Vol 7,No 7/8, July/August 2001.
4) Lee L. Zia, "The NSF national science, mathematics, engineering, and technology education   digital library (NSDL) program," *D-Lib Magazine*, October 2000.
5) http://www.olddigilab.rog
6) http://www.unesco.org
7) http://www.research.ibm.com
8) http://www.dlib.org
9) http://www.educause.edu/ir/library

Science And Technology Helps To Improve Sports Skill

Dr. Rajesh D. Chandrawanshi
Director of Physical Education & Sports
Shri R.L.T. College of Science, Akola Sant Gadge Baba Amravati University, Amravati

Introduction

There is worldwide progress in every area of human life. Struggle is the base of human life in modern era. The human body cannot function like a machine and it has its limitations. The performance of skill in any field and in activities of human body depends upon body structure, heredity, gender, age factors, weather, diet plan, guidance, training and coaching methods. Due to science and technology there have been tremendous changes in all areas of human life. Sports and Physical activities are the basic need of human body for fitness. Games and Sports are the most important factors for fitness with entertainment and also very much useful for leisure time. The field of games, sports and physical activity is very broad and involves a lot of physical activities and sports skill. Fitness is most important for performing higher level of sports skill. Speed, Stamina, Endurance, Flexibility, Muscular Power and Strength these concepts are included in fitness. Body mind coordination is a most important to achieve higher level of sports skill at the time of performance. Human body has limitations to perform sports skill in continuous higher level. Science and technology is very useful to analysis the lacuna in body movements and prepared latest sport's equipment to support sports skill performance.

Purpose

The purpose of this research is to know how science and technology helps to improve sports skills.

Science

Science is a most important stream for development in every field of human life. Scientific approach makes human life progressive, safe, lavish and full of facilities. The concept of science is very wide but generally Mathematics, Physics, Electronics, Computer, Information Technology, Microbiology, Bio-Chemistry and Medical Sciences etc. these subjects are included in science concept. In the field of sports science related some subjects i.e. Anatomy, Kinesiology, Bio mechanical aspects, Physiology and Test and measurements are included. Now a day's sports field requires more scientific based knowledge to improve sports activities level.

Mathematics

Mathematics is a common subjects which supportive every subject for record maintain. Mathematics includes the study of quantity, structure (algebra), space (geometry) and change (mathematical analysis). Mathematics is the science that deals with the logic of shape, quantity and arrangement. Mathematics is very much helpful in Sports field. In the field of sports activities mathematics helps to prepared skill based parameters, data record and data analysis. Without geometry helps the various sports arenas and the latest developments in the field of sports as well as analyzing sports skills is not possible. Algebra, Geometry and Mathematical Analysis is important, supportive and directive to achieve higher level of sports skills.

Physics

Physics related Measurement, Motion in One Dimension, Motion in Two Dimensions, Relative Motion, Newton's Law, Applications of Newton's Laws, Gravity, Work and Energy. Linear Momentum and Collisions, Rotational Dynamics & Properties of Matter these concepts are plays an important role in sports skill performance.

Electronics, Computer & Information Technology

The unique combination of Electronic, Computer & Information Technology these subjects are very helpful in development of modern technology based on sports skill performance. Sports skills performance related data collection with accurate electronics gadgets, perfect huge data timely storage with the help of computer, live records with the help of video, and scientific study on available data with live action with the help of computer software's. Information technology is important for storing, retrieving and sending information at worldwide level. Worldwide publicity of sports skill performance is height lighted through

information technology so the players, coaches or sports related personalities are motivated to achieve higher level of sports skills performance.

Medical Science

The concept of medical science is included Microbiology, Biochemistry, Medicine, Nutrition, Physiotherapy, Physiology, Human Anatomy, Kinesiology and Sports Medicines. Medical science related subjects are very much helpful to analysis the body condition, function of body organs, fluid level of various organs, deformities in body and body mind coordination of players at the time at the time of performing sports skills. Due to psychological and physically player unable to perform his skills performance at that time medical science is helpful to find out lacuna. Kinesiology is helpful for analysis muscle testing to imbalance in the body's structure, chemical and emotional energy. Microbiology, Biochemistry and Biochemical defines the three macromolecules which provide energy and structure to skeletal muscle - carbohydrates, lipids, and protein, its helps to improve sports skills performance. Medical Science related subjects are helpful to analyze real fact of body mind coordination so the player got correct reason for not performing his sports skills. As per the analysis of non performing reason the training program and skill development program is done by the coaches for the betterment of sports skills.

Sports Engireeing

Sports engineering is a unique combination of art and science of designing, making and maintaining of different sports goods or grounds, sports infrastructure and sports skills based various sport's equipments. Sports engineering is very much helpful to prepared exact size of sports equipments required by players as per his body composition, weight and events. Thus type of sports equipments give safety from injury, player's can apply his full force with perfection and player feel comfortable to perform his higher level of sports skills performance.

Latest Equipments

Scientific and Technology based latest equipments give the correct information of player's body mind coordination with help of data collection and its analysis. The following equipments are helpful to supports, direction, current position of body and able to conduct a variety of coaching, training and scientific research studies to improve Sports Skill Performance.

Major Hardware: Exercise Equipment
- Treadmill (Track master) – High performance exercise ergometer.
- Exercise Bikes
- Electronically Braked Leg Cycle Ergometers
- Free Weights – Various resistance exercise equipment including a squat rack

Major Hardware: Physiology Measurements
- Metabolic Cart Spirometry and indirect calorimetric measures of oxygen consumption including VO2
- Stress Testing Cart (GE Case Exercise Stress Testing Cart) –
- Air Displacement Plethysmography – Body density and body fat assessment.
- Hydrostatic Weighing Tank – Body density and body fat assessment.
- Bioelectrical Impedance Analysis – Weight, impedance, and body fat assessment.
- AD Instruments Data Acquisition Boards – Used with AD Instruments Lab Chart Pro software to collect real-time, continuous, and synchronized signals from a variety of analog and digital inputs from various research equipment.
- Single Lead ECG – Electrocardiogram for heart rhythms and heart rate.
- Strain-Gauge Pneumograph Respitrace – Respiratory rate.
- Handgrip Force Transducer – Continuous handgrip force.
- Skin Thermistors – Continuous skin temperature.
- Rectal Temperature Probe – Continuous core temperature.
- Pulse Sensor – Basic heart rhythms and heart rate.

- Non-Invasive Blood Pressure System – Continuous finger blood pressure and cardiac output, stroke volume, and total peripheral resistance model flow estimates.
- Tonometer Probes – Pulse wave analysis and pulse wave velocity.
- Sphygmomanometer – Continuous digital occlusion cuff pressure.
- Metabolic Physiology System – Metabolic testing-oxygen consumption and VO2
- External video capture – Video capture from external computer screens such as ultrasound machines.
- Ultrasound – Internal body structure visualization and blood flow assessment.
- Muscle Oxygen Near Infrared Spectrometer – Wireless muscle oxygen saturation assessment during rest, exercise, and blood flow occlusion.

Major Hardware: Movement Science Measurements

- Isokinetic Dynamometer – Muscle strength and power testing.
- 3D Motion Capture System (7 Camera Opti Track) – 3D human movement motion capture for Biomechanical and motor behavior analysis.
- Electromagnetic Motion Tracking System – 3D human movement motion capture without the need for 'line of sight' for the object being tracked.
- Force Platforms – Used in biomechanical analysis to measure forces applied on the ground and to calculate torques and forces at joints during walking, running and jumping.
- Virtual Reality System – An immersive method to provide and manipulate subjects' field of view during research.
- Electromyography measurement system – Measuring the activation of muscles.
- Eye Tracking System– Assessment of eye movement and gaze fixation.

Major Software Programs

- Data Integration and Acquisition – Used with AD Instruments Power Lab hardware to collect a variety of analog and digital inputs from various research equipment.
- Exercise Trainer Software – Real-time visualization and recording of muscle oxygen and heart rate data.
- Cycle ergometer software suite – Real-time data acquisition of power and pedal rate for aerobic and anaerobic cycle ergometer exercise tests.
- Motion Monitor Software – A complete software solution for collecting and processing human movement data. Allows 3D kinematic and kinetic analysis. Integrates motion capture from the 7-camera OptiTrack system, Bertec Force plates and Ascension Electromagnetic Tracking System.
- MatLab and LabView – Custom software programming languages for engineering and life sciences.
- Graphing and Statistics (SPSS) – Professional quality graphing and statistics software.

Additional Equipment

- Heart Rate Monitors – Resting and exercising chest strap based heart rate assessment.
- Pulse Oximeter – Blood oxygen saturation stationary and portable.
- Automated Blood Pressure – Automated resting blood pressure and heart rate assessment.
- Manual Blood Pressure Equipment (Various) – Stethoscopes, stand based and portable blood pressure cuffs for the assessment of resting and exercising blood pressure.
- Windmill Spirometers – Forced vital capacity assessment.
- Skin fold Calipers (Lange and various other brands) – Measurement of skin and subcutaneous fat for body density and body fat assessment.
- Gullick Tapes (Various) – Measurement of circumference measurements.
- Stadiometer and Body Weight Scale – Calibrated height and mass measurement.
- Vertical Jump Trainer – Measurement of standing reach height and vertical jump.
- Handgrip Dynamometers (Various brands) – Static handgrip force.
- Aerobic steps – Aerobic step exercise and testing.

- ➢ Goniometers (Various) – Measuring joint angles.
- ➢ Mobile Privacy Screens – For separating the laboratory into more personalized spaces.
- ➢ Accelerometers) – Assessment of physical activity levels.
- ➢ Pedometers – Step count assessment.
- ➢ Metronomes – Pacing for various fitness tests.

Five latest technologies which have changed the sports world:

- **Hawk-Eye Technology.**
  Hawk-Eye is used Cricket, Tennis, Gaelic Football, Badminton, Hurling, Tennis, Rugby, Football, Volleyball to visually track the trajectory of the ball display a profile of its statistically most likely path as a moving image with the help of computer system.

- **HANS's device.**
  A HANS device is very useful for Head and Neck support to reduce the like hood of head and neck injuries such as basilar skull fracture the crash event.

- **Video Technology.**
  Video technology is most important for live movements recording in various dimensions. It is also very useful for correct judgment at the time of sports skills performance. So the players may confirm about his sports skills performance and agreed to accept correct judgment.

- **Wearable Computers.**
  A wearable computer is latest small technological devise. It is capable of storing and processing data related to your body movements. Wearable computers are worn on wrists and they are not only fitness trackers, they also includes wearable such as Heart pacemakers and other prosthetic.

- **Ingestible Thermometer Pills**.
  A pill thermometer is an ingestible thermometer which allows core temperature to be continuously monitored of person. It was developed by NASA in collaboration with Johns Hopkins University for use with astronauts. The pill has been used by mountain climbers, football players, cyclists, F1 drivers.

Conclusion

On the basis of research study it is concluded that Science and Technology is useful to analysis the lacuna of body movements, to rectify the medical internal and external problems of body parts, performance base data analysis, correct judgment with help of latest equipments at the time of sports skills performance and to manufacture latest scientific equipments of various games and sports. Science and Technology is very much useful and helps to players for choosing perfect games and sports activity, sport's equipments, Sport's kit, training method, proper coaching, diet, medicine, to know level of fitness and how to perform higher level of sports skills.

Reference:

1) http://alevelphysicaleducation.co.uk/technology-in-sport/
2) Bahadorreza Ofoghi; John Zeleznikow; Clare MacMahon; Markus Raab (2013)."Data mining in elite sports: A review and a framework". Measurement in Physical Education and Exercise Science. 17 (3): 171–186.
3) Jürgen Perl (2006). "Computer science in sport: an overview of history, present Fields and future applications (part II)". IJCSS Special Edition 2/2006, 36-46.
4) http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4575312/
5) http://www.ocr.org.uk/Images/221108-modern-technology-in-sport- teacher-pack.pdf
6) http://www.ocr.org.uk/Images/77532-ibytes-support-update-issue-05.pdf
7) https://www.kinesiology.com.au/what-is-kinesio
8) http://www.topendsports.com/resources
9) http://www.sportsengineering.org/students/what-is-sports-engineering
10) http://groups.physics.umn.edu/demo/list.html

Role Of Yoga And Sports In Modern Life

Dr. Devendra Gawande

Principal Smt. Salunkabai Raut Arts And Commerce College Wanoja,
Tq. Mangrulpir, Dist. Washim

Abstract

The importance of yoga in modern life is abundant. Yoga teaches us the knowledge of how to lead a healthy living. It improves our concentration, creativity and sharpens our memory, another importance of yoga in modern life can be that yoga improves our muscle strength, stamina and bring immune and mental stability.

Introduction

The modern life tempts us with comfort. And to make our life more comfortable and convenient we pay for it with obesity, hypertension and cardiac problems. Although we have hi-tech medical facilities, we are still leading a stressful, unhealthy and unstable life. In this situation, yoga can bring peace to our body, mind, and soul and add more value to our life. The importance of yoga in modern life is abundant.

Yoga teaches us the knowledge of how to lead a healthy living. It improves our concentration, creativity and sharpens our memory. To maintain a positive physical and mental health, yoga is a must.

Role of yoga in present life
Improves concentration and helps to stay focused

The importance of yoga in modern life is endless. One of the best lessons yoga teaches us is to focus on the present. In recent studies, it was found that practicing yoga every day improves our IQ and memory. Everyday our focus and concentration get bombarded by our modern lifestyle in form of cell phones, laptops, TVs and social media. Thankfully yoga can bring our awareness to the present moment and help us to stay focused and improve our concentration.

For the city dwellers, yoga works like magic. Regular practice of yoga can improve the coordination and reaction time and help them with their busy schedule. It also improves their concentration and helps them to be less distracted by their thoughts.

Helps to build strength:

Yoga plays a vital role when it comes to strengthening your body. Doctors these days suggest their patients perform yoga on a daily basis. For example, for a new mothers, yoga is essential. Yoga helps to strengthen their body and helps them to get back in shape. The reason behind this is, yoga involves a lot of stretching exercises. So even it's a total body workout, it is a low-impact exercise.

We start losing muscle mass around 40 and by 50 the process only accelerate. If we don't do anything to exercise our muscles, we will only get weaker and lose independence later in our life. But thanks to yoga, we can prevent this process. Yoga involves a set of exercise where you constantly transition into different positions. By doing this, we challenge our muscles to support the weight of our body and strengthen it. Regular practice of yoga tones the muscles and helps us to look more attractive.

Improves flexibility & posture:

Another importance of yoga in modern life is that it helps us to have a more flexible body and as a result, our life becomes just a bit more manageable. Often we suffer from knee joint pain. It's because tight hips strain the knee joint due to improper alignment of the thigh and shin bones. Another discomfort occurs due to the inflexibility of muscle is back pain and poor posture. Tight hamstring flattens the lumbar spine and causes back pain. Inflexibility in muscle and connective tissue causes poor posture

Importance of yoga in modern life

Modern life patterns affect our health in different aspects physically, psychologically, and socially. There is a need for increasing people awareness about the effect of modern life to control the effects of the patterns of life. Promoting healthy lifestyle includes proper eating, physical activity, and better way of communicating and socializing in the community. All these have positive impacts which we can easily get in practising yoga. Yoga will reduce the risk of getting so many diseases which resulted from our day to day lifestyles. This paper, therefore, deals with the significance of yoga in modern life. This article is written on the basis of practical lesson I get in practicing Yoga while attending Yoga class in University of Kerala. And in this article I included what I observed in my own situation while training in the centre. Health is a primary goal of any individual and hence without spending lots of money by practicing Yoga one can achieve proper health. This article therefore, deals with significance of Yoga in modern life to encourage the reader to practice Yoga to sustain physical, social and spiritual health.

Role of sports in modern life

Sport has played an important role in our lives for many centuries. Millions of people all over the world are fond of sports and games. Sport keeps us fit, makes us healthy, more organized, better disciplined. It gives us a lot of pleasure, makes us stronger, and prolongs our life.

Importance of sports in today's life

For some it seems as necessary and natural as eating and sleeping, for others it is just an entertainment. Undoubtedly, many people's favourite hobby is sport. They spend much of their spare time playing team games like football or baseball, games for two or four people, like tennis or golf or practicing an individual sport like running, parachuting or swimming. All necessary facilities are provided for them: stadiums, sport grounds, swimming pools, skating rings, skiing stations, football fields, etc. But the great amount of people - both men and women don't realize the importance of sport in their life and keep ignoring them and continue (for instance) smoking and ruining their health and, finally, their lives.

During the 1980s and later there was a great increase in interest in getting fit and staying healthy. A lot of people started running and jogging in their spare time. Aerobics classes opened in every town. The number of sports centers for dance and movement increased. Physical exercises of any kind became people's favourite pastime.

Today people continue leading sedentary life and many of them would like to change it. Since our life no longer provides enough exercise we should include it deliberately into our everyday routines. The man or woman who takes regular sport or exercise will stay physically fit, retain youthful vigour, and perhaps, most important to many people, keep a youthful shape and stamina. There are some exercises to suit everyone. It may be a daily exercise session that takes up little time or planned exercises which improve a problem area. But fitness comes not just from some exercises done now and then but from the way you live all the time. Good eating habits, wise drinking habits, regular sleeping habits and plenty of fresh air are all important parts of the way to keep fit.

Conclusion

The modern lifestyle is complex and filled with tension. As a result, people in urban areas are busy with work schedules to full fill what life demands survival. The modern man is living in a competitive environment due to technological progress. In the current lifestyles especially in urban industrial society the work style, eating habit and family life structure is completely changed. The extended family structure in this society is unthinkable, and administering the nuclear family structure itself is hectic due to the huge demands it requires. This lifestyle brought stress to the individuals which leads to different types of diseases. Therefore, practicing yoga and playing sport is significant in controlling health.

References

1) 1.Anita. Need and Importance of Yoga in Healthy Living An International Indexed Online Journal. Global International Research Thoughts, 2014. www.darpanonline.org/GIRT,accessed14/06/2017.

2) Claire T. Yoga for men. Postures for Healthy Stress free- living. The Career press, Inc, USA, 2004.

3) Farhi D. Bringing Yoga to Life: The everyday practise of Enlightened Living. Harper Collins Publisher, Australia, 2005.

4) Heerman G. Yoga in the Modern World: The Search for The "Authentic" Practice: Asia 489, Independent Research Project, Sociology, and Anthropology thesis, 2014.

5) http://soundideas.pugetsound.edu/csoc_theses Accessed 12/06/2017.

6) Sivananda Sri Swami. Yoga in daily life. Eighth Edition: A divine life society publication, 1999. http://www.SivanandaDlshq.org/. Accessed 14/06/2017.

7) Soewondo S. Stress factors in modern urban lifestyles: Indonesian perspectives. Asia Pacific J Clinical Nutrition. 1996; 5(3):135-137.

Role of Information and Communication Technology in Modern Life and its Importance

Prof. Dr. Umesh Rathi

Arts And Science College Kura Dist. Amravati

Abstract

ICTs stand for information and communication technologies and are defined, for the purposes of this primer, as a "diverse set of technological tools and resources used to communicate, and to create, disseminate, store, and manage information." These technologies include computers, the Internet, broadcasting and many more.

Introduction

The term ICT is also used to refer to the convergence of audiovisual and telephone networks with computer networks through a single cabling or link system. There are large economic incentives to merge the telephone network with the computer network system using a single unified system of cabling, signal distribution, and management. ICT is an umbrella term that includes any communication device, encompassing radio, television, cell phones, computer and network hardware, satellite systems and so on, as well as the various services and appliance with them such as video conferencing and distance learning.

ICT is a broad subject and the concepts are evolving. It covers any product that will store, retrieve, manipulate, transmit, or receive information electronically in a digital form (e.g., personal computers, digital television, email, or robots). Theoretical differences between interpersonal-communication technologies and mass-communication technologies have been identified by the philosopher Piyush Mathur. Skills Framework for the Information Age is one of many models for describing and managing competencies for ICT professionals for the 21st century.

History of Information and Communication Technology

The term "information technology" evolved in the 1970s. Its basic concept, however, can be traced to the World War II alliance of the military and industry in the development of electronics, computers, and information theory. For the next twenty-five years, mainframe computers were used in large corporations to do calculations and manipulate large amounts of information stored in databases. Supercomputers were used in science and engineering, for designing aircraft and nuclear reactors, and for predicting worldwide weather patterns. Minicomputers came on to the scene in the early 1980s in small businesses, manufacturing plants, and factories.

In 1975, the Massachusetts Institute of Technology developed microcomputers. In 1976, Tandy Corporation's first Radio Shack microcomputer followed; the Apple microcomputer was introduced in 1977.

Benefits of Information and Communication Technology

Information and Communications Technology (ICT) has an important role in the world since we are now in the information age era. With ICT, the company can make the business easier to happen with the client, supplier and the distributor. It is also very important in our daily lives. The lack of appropriate information at the right time will result in low productivity, low quality research works, and waste of time to pursue information and even to do research which actually others had done or in other countries. Nowadays ICT cannot be separated with our daily needs.

ICT has a great impact in our daily lives. For example, we can read our local newspaper using the online newspaper. Another example is we still can get connected with our family, relatives, or colleagues even if we are abroad by using the electronic mail, yahoo messenger, call conference, or video conference. Digital computer and networking has changed our economy concept to the economy with no boundary in time and space because of ICT. It brings a lot of advantages for economic development enabling millions of transactions to happen in an easy and fast way.

ICT is one of the economic development pillars to gain national competitive advantage. It can improve the quality of human life because it can be used as a learning and education media, the mass communication media in promoting and campaigning practical and important issues, such as the health and social area. It provides wider knowledge and can help in gaining and accessing information.

ICT has become an integral part of everyday life for many people. It increases its importance in people's lives and it is expected that this trend will continue, to the extent that ICT literacy will become a functional requirement for people's work, social, and personal lives.
Methodology of ICT

The potential of each technology varies according to how it is used. Haddad and Draxler identify at least five levels of technology use in education: presentation, demonstration, drill and practice, interaction, and collaboration.

Each of the different ICTs—print, audio/video cassettes, radio and TV broadcasts, computers or the Internet—may be used for presentation and demonstration, the most basic of the five levels. Except for video technologies, drill and practice may likewise be performed using the whole range of technologies. On the other hand, networked computers and the Internet are the ICTs that enable interactive and collaborative learning best; their full potential as educational tools will remain unrealized if they are used merely for presentation or demonstration. ICTs stand for information and communication technologies and are defined, for the purposes of this primer, as a "diverse set of technological tools and resources used to communicate, and to create, disseminate, store, and manage information." These technologies include computers, the Internet, broadcasting technologies (radio and television), and telephony to be used and their modalities of use.

Importance of ICT

The use of ICT in education add value in teaching and learning, by enhancing the effectiveness of learning, or by adding a dimension to learning that was not previously available. ICT may also be a significant motivational factor in students' learning, and can support students' engagement with collaborative learning. Information and Communications Technology (ICT) is basically our society's efforts to teach its current and emerging citizens valuable knowledge and skills around computing and communications devices, software that operates them, applications that run on them and systems that are built with them.

As a matter of fact, we are living in a constantly evolving digital world. ICT has an impact on nearly every aspect of our lives – from working to socializing, learning to playing. The digital age has transformed the way young people communicate, network, seek help, access information and learn. We must recognize that young people are now an online population and access is through a variety of means such as computers, TV and mobile phones.

Conclusion

ICT is one of the economic development pillars to gain national competitive advantage. It can improve the quality of human life because it can be used as learning and education media, the mass communication media in promoting and campaigning practical and important issues, such as the health and social area. Information and communications technologies (*ICTs*) are permeating modern lifestyles, shaping and coloring the undertaking of activities and travel.

References

1) "ITU releases annual global ICT data and ICT Development Index country rankings - librarylearningspace.com". 2014-11-30. Retrieved 2015-09-01.
2) "Basic information : about wsis". International Telecommunication Union. 17 January 2006. Retrieved 26 May 2012.
3) Jump up to:a b "ICT Facts and Figures – The world in 2015". ITU. Retrieved 2015-09-01.
4) "ICT in Education". Unesco. Unesco. Retrieved 10 March 2016.
5) Blackwell, C.K., Lauricella, A.R. and Wartella, E., 2014. Factors influencing digital technology use in early childhood education. Computers & Education, 77, pp.82-90.
6) "What is Writing to Learn, WAC Clearinghouse".
7) "Evidence for How Writing Can Improve Reading, Carnegie.Org 2010" (PDF).
8) "Closing the gaps – Improving literacy and mathematics by ict-enhanced collaboration, Science Direct, 2016, pg 78". Computers & Education. 99: 68–80. August 2016. doi:10.1016/j.compedu.2016.04.004.
9) Jump up to:a b c d Agence Française de Développement (February 2015). "Digital services for education in Africa" (PDF). unesco.org. Retrieved 19 May 2018.
10) Jump up to:a b "ITU releases annual global ICT data and ICT Development Index country rankings". www.itu.int. Retrieved 2015-09-01.

Contribution of ICT in the Process of Language Teaching and Learning

Archana N. Deshmukh
Research Scholar
Shri Shivaji College of Arts, Commerce and Science, Akola.

Abstract:

The present paper casts the light on the ICT tools that helps in the development of English language teaching and learning. Technology plays a vital role in enhancing teaching and learning as well. It is affecting every aspect of education from teaching learning to assessment and evaluation. It helps to improve the effect of teaching and learning languages.In recent decades we have acknowledged that technology is occupying an important space in the sphere of education. The use of information and communication technology (ICT), adds a dimension to learning that was not previously available.The modern age is defined as the age of knowledge explosion with a single click, we can access a lot of information of the world with the help of ICT. In this age of science and technology no one can imagine education without ICT. 0nly with the help of ICT a large number of people can get education simultaneously and at low cost. It helps to save time, money and energy. ICT has made the process of teaching and learning more enjoyable and convenient. Students can learn with their own pace and convenience.

Language education is an area where open access resources, online courses, virtual classrooms and social networks based on ICT are being used effectively on a large scale. ICT enabled teachers adapt classroom activities and homework assignments as well. Language educators are able to expand language learning opportunities to all students with the help of technology.Its use is effective when it is used as a tool helping to teachers in the process of teaching. In language teaching and learning, teachers have many tools of technology, radio, TV, CD-ROM computers, internet, electronic dictionary, email, blogs, videos and DVDs and so on.The New era assigns new challenges and duties on the language teacher. Language learning and teaching is considered to be a complex process.To make the process easier, the recent development of the internet is of a great help.Nowadays ICT is playing a pivotal role to make the process more effective and productive. The tradition of English teaching has been changed with the help of technology. ICT has enhanced the teaching of English language.

Keywords: ICT, internet, teaching, language.

Introduction:

The history of mankind witnesses the two remarkable inventions which changed the totality of human life. The first one among these was the invention of wheels which enable us to travel from one place to another place.The second one was the invention of computer, internet and communication technology, which help us to bring the whole world into our hands. This has affected each and every sphere of human life. There are enormous advantages of using technology in the process of "teaching and learning". It provides opportunities of interaction between teachers and learners. Only due to technology modern classroom environment has changed a lot than the traditional environment. To get understood the importance of ICT in the education, it is essential to know the definition of ICT. ICT is a different set of technological tools and resources that used to communicate, create, spread and manage information. According to Daniels (2002) information and communication technology (ICT) is considered to be one of the basic building blocks and modern society. The use of ICT in education lends itself to more student-centered learning setting. In the present era the teacher is expected to be the combination of traditional and modern. In recent days, internet has become immensely popular due to its utility. Internet users to interact and collaborate with each other in a social media dialogue as creators of user-generated content in a virtual community. ICT is a great tool for teachers. Teachers can find suggestions, new ideas, lesson plans, information and materials through internet and they can share their subject knowledge with other teachers and students. ICT offers many tools for teaching and learning language like eBooks, audio books, overhead projectors and Language Lab.

Technology assisted teaching environment is more effective than lecture based-classroom. Teachers have found technology as a useful learning instrument for their learners. The use of technology has considerably changed English teaching methods. It provides many alternatives to make teaching interesting and productive. In traditional classroom teachers give lectures in front of students and explains the topic using black board or white board. This method is partially changed and replaced with using computer technology. Technology encourages learners to learn individually according to their own speed and interest. Technology motivates learners and gives self-direction. Technology changes the process from teacher-centred to learner-centred. Teacher's role is now of a facilitator or a guide. ICT and language teaching are walking hand in hand. There are many benefits of the use of ICT in language learning.

1. With the help of ICT, images can easily be used in teaching and improving the retentive memory of students.

2. With the help of ICT, teachers can easily explain complex instruction and ensure students' comprehension.
3. ICT teachers are able to create interactive classes and make the lesson more enjoyable, which help improve student attendance, interest and concentration.
4. The process of language learning can be sped up with the help of ICT.
5. Through ICT teachers finds teaching tips and strategies that enhance and improve their teaching.
6. ICT facilitates exposure to authentic language.
7. ICT provides the access to wider sources of information and varieties of language.
8. ICT helps people in order to get information and to communicate each other in a wider range.

There are some kind of technologies classified into information and communication technology commonly used in language context such as interactive multimedia, computer, audio devices, internet, television, telephone, mobile gadget, interactive whiteboard.In context of language learning ICT has a vital role as the "media enabling the learning process, direct communication between student and teacher although they are not present in same room or place in certain time. Language learning program can be created to enable students to learn the lessons with the guidance or instructions. Computer can store unlimited lessons for references, which can be accessed anytime, anywhere and accurately..

Conclusion:

The literature review has indicated that technology has enhanced the teaching and learning process. Overall ICT is very useful to maximize learning process.If the educational budget is limited; looking for a cost effective and high productivity ICT tool must be the first priority. This tool is flexible, rich and interactive. It is flexible in the term of time and place. ICT has influenced every sphere of mankind. It has influenced the education system greatly.

References:

1) www.enotes.com
2) www.franchiseindia.com
3) Dr. Chouthaiwale, "The Use of ICT Tools in English language Teaching and Learning: A Literature Review", Veda's Journal of English Language and Literature. Vol. 5, Issue 2, 2018

Features Of Academic Library Websites: A Review

Mrs. Supriya A. Bejalwar

Librarian Prof Ram Meghe College of Engineering & Management
Badnera-Amravati.

Abstract:

Academic Libraries use their websites for disseminating information among users and to show their presence by popularizing their services.A website of a library should reflect the vision and mission of the organization and library itself. For Libraries, website is the mosteffective way to make services available to the end user. The success of website depends on design, content, layout, alignment and also user friendly nature of website while accessing information.Like the physical library space, library collections, and library services, the library's website also needupdations and evaluations regularly so as to meet the specific need of the library users. This paper critically reviews literature to come out with the features of an ideal library website. This paper also acts as a guideline to Academic librarians to construct and maintain library website effectively.

Keywords: Library websites, Ideal website, Web contents, Academic libraries.

Introduction

According to Techopedia "A website is a collection of publicly accessible, interlinked Web pages that share a single domain name. Websites can be created and maintained by an individual, group, business or organization to serve a variety of purposes. Together, all publicly accessible websites constitute the World Wide Web." (Techopedia, 2019)

A library website acts as a tool to communicate library's resources to the users and also an organizing tool where every resource is systematically organized for easy access. An ingenious library website provides access to library resources, services and facilities, online databases and e-journals subscribed bythe library;link to databases and institutional repositories. In some cases librarywebsite provides access to a information from various web resources like e-books, e-theses, e-dissertations, e-prints and webbasedreference sources, etc.(Konnur, 2010).

Literature Review:

Adams &Cassener(2002) conducted study to identify the content and design of librarydistance learners. The study concluded with suggestion that Librarians and Web developers must collaborate to make distance education pages easy to locate from the library's home page. The pages should be reviewed for inclusion of appropriate links which makes students to navigate easily.

Kumar and Bansal(2014) took intiative to comparatively evaluate websites of eight new Indian Institutes of Technology. The study focused on the importance of a quality website, accuracy, authenticity and evaluation of the contents provided on the website. The study analyses contents available on websites of eight new Indian Institute of Technology (IITs) and comparative study is presented. Results show that none of the website qualifies the criteria of a quality website. If onewebsite has one feature, it misses another one, and it applies to websites of all the new IITs.

Becker and Yannota(2013)presented a model for creating a strong, user-centered web presence by pairing usability testing and the design process. Usability test was conducted in order to build a new academic library web site. Results of the study showed that in order to construct a website effectively, testing is the best process. One more outcome of the study was that, even if a library website is well designed, users will still need awareness and orientation towards using the website.

Abbas and Hashmi(2016) analyzed 148 university library websites to gather the information regarding the use of website as a tool of marketing towards the students. The study found out that library websites are not fully developed in terms of marketing tool. It showed that usage of library website as a tool to market library is still not famous amongst university.The finding show that 13 % of the universities don't have the websites for the libraries and only 55 % of the libraries have direct link for there library websites.

Konnur, Rajani and Madhusudan(2010) conducted a study to know the different features in the Academic Library Websites in the geographical setting and also tried to identify criteria for the evaluation of academic library websites. Five library websites from Bangalore were considered for the study namely:Bangalore University, Indian Institute of Science (IISc), Indian Statistical Institute (ISI) Indian Institute of Information Technology (IIITB) National Law School of India University (NLSIU). The findings of the study shows that academic library websites in Bangalore city have not come up toexpectations as virtual expressions of the quality level of the academic excellence. Information is still not organized according to norms or keeping users in mind. Hence, the study recommended periodic and timely evaluation of library websites for their usage.

Liu(2008) recommended a conceptual model for future academic library Web site Design by investigating 111 ARL member library Web sites. The outcome of study summarized content of website, format and design patterns, and specialfeatures of the website. The author urged application of Web 2.0 tools to the library websites like RSS, Blogs, Wikis, Podcasts, Personal Bookmarks/Tagging for providinglibrary Web services. The study concluded with the suggestion that future academic library Web site design should be developed keeping in mind user focus, personalization, user engagement, online communities and remixability. Chua and Goh(2010)examining six common Web 2.0 applications and 120 library websites, the study found thatlibraries in North America lead significantly in the adoption of Web 2.0 applications comparedto their European and Asian counterparts. The popular web 2.0 implementation in library were blogs, RSS, instant messaging, socialnetworking services, wikis, and social tagging applications. The difference between public andacademic libraries in implementing Web 2.0 applications is not statistically significant.

There are so many literature reviewed on developing websites in terms of content and structure. The forthcoming paragraph elaborates some of the qualities of ideal academic library website based on review of literature.

Features of Library websites:

While designing library website issues like security, accessibility, design, contact, and Implementation of HTTPS which improves search engine optimization must be considered. Some of the features of websites are:

1. **Formatting:**
Formatting of library website is very important aspect in terms of attracting users to the library. Heading plays important role as Click through rate (CTR)depends on how reachable the heading is. Studies report that eight-word headlines have 21% higher CTR. Heading on library website should be such which will acclaim easy browsing and retrieval. Heading must be descriptive or self-explanatory. This means that even audio/video content should also have proper captioning and transcripts.

2. User Engagement
User engagement can be improved by using freely chosen keywords(folksonomies). According to Wikipedia "Folksonomy is the system in which users apply public tags to online items, typically to make those items easier for themselves or others to find later."(Wikipedia, 2019).It allows user to vote on content hence involving user in library activity.Turning user-created data into contentopens creative wayof users to interact with the data assembled on library website.

3. **Home Page**
Home page is the face of the library. It is depending on which user decides to go further or not. It is typically the most visited page. So it should be wisely made. Common tabs on home page are search box, Location(s) & hours,Contact us/ Ask-A-Librarian etc.

4. Timeliness
Some of the information on website should be kept static.For eg.timing, usage policy, location etc. but keeping whole website static is never recommended. For this purpose some of the pages or information like activities, recent additions in library, lives streaming of courses etc. can be kept dynamic. Moreover, dynamic data should be updated time to time. This will surely improve the usage of library.

5. Easy navigation

Website must be navigable by keyboard only. Library staff must make themselves aware of screen readersand other assistive technologies used by students.Using common navigation options will not confuse users. Multiple navigation options will end up making users frustrated. Common navigation items include: search, about us, help etc. The simple search function which allows users to filter the search between catalog, events, and website quick links for a few digital services must be offered right under the search. Proper navigation tool streamlines the navigation of the site and directs users to the services.

6. Having a Vision

A vision defines library website's goals. It also guides and inspires decisions about library website. Restricting vision statement to one to two sentences which aligns with organization's mission statement will always stand best.

7. Make the Library Website Accessible

Inaccessible websites are barriers to all users. Students/Faculty withincapacitiesface problems if there are several hindrances in accessing the site. This hampers the flow of users tothe library. One can describe html page titles also, validating library website is usable for users who are colorblind. Testing accessibility of website can be done by using free online tools like WAVE.

8. Link juice ratio

Link juice ratio is ratio of external and internal links on the website. This ratio should not be less than 50% otherwise website will look as a portal which houses many links.

9.Social media

To promote library websites and library usage, social interaction can be used. Links for social media like, Facebook, twitter, LinkedIn etc. should be visible on website.Some professionals are yet to understand the power of social media. It's an extension of website. And social media is a great way to get visitors to your website.

10. Easy Access to Search& ease of use

The first thing user does when he/she comes to the website is browsing for required data. Searching through the website for required data is the first step any user takes. Making search box prominent on the home pageand having one search box on a page can also make user'sinformation search easy.The quick links on the website ensures quick and easy access. While designing, librarywebsite should be kept as simple as possible considering the users are from diverse background.

11.Keywords

Words which are appearing maximum time on the website should be considered as keyword for the site. Keywords ensurespeedy retrieval of data. Using several free online tools, library website can be tested for its accessibility.

12. Language

Language on the website should be free of jargons. Using familiar words will ensure user to find the resources fast.

13.Help box

Providing help boxto help users to find articles, e-books or library resources for that matter helps user to decide what they should do next, can be of great help to users.

14. Mobile FriendlyVersion

Now days, users are looking for easiest and handy way to get information. Library website should also be mobile friendly as maximum students are using mobiles for data retrieval and using services of library.

15. Usability Testing and analytics

 Google Analytics is free and they provide a ton of free guidance on how to use it. It's a great tool to understand and monitor what user'saccess onwebsite and for how much time they stay and what they do.Testing users can be a great tool to defend about the library website related decisions.

16. Sitemap

A sitemap allows search engines, like Google, to crawl and index site. It ensures maximum chances of users reaching Library through website.

17.Blog Presence

Bloggingis biggest opportunity to get more leads and improve search results. We can observe that marketing of content is very expensive, but blogging is cheapest online tool to show the presence of library, moreover it has more coverage and effectively than the traditional marketing style. Blogging at least once or twice per month can promote library usage.

18. The events calendar

Events calendar makes user aware of the activities expected from library. User can bookmark the event for future reference. Additional filtering can allow to search by keyword, event type, author readings/lectures, book group, class, homework help, and location.

Conclusion

To summarize the features of library websites a library website should be user focused.The search tool on homepage ensures quick retrieval of both resources and services. A help tab on library website can help to find the resources effectively. Library can help users to become better researchers. Therefore, to get maximum out of library website, all the points mentioned in the article must be considered. Keeping these points in mind while handling, maintaining and updating website will surely improve usage of library.

References:

1) 1.Adams,K. E. &Cassener, M. (2002). Content and Design of Academic Library Web Sites for Distance Learners: An Analysis of ARL Libraries. The 10th off-campus library services conference proceedings. April 17-19,2002. Edited by Patrick B. Mahagony. Ohio. 1-9.

2) Kumar, V. &Bansal, J. (2014). Qualities of a library website: Evaluating library websites of new IITs.International Journal of Information Dissemination and Technology, 4(4), 283-288.

3) Becker, D. A. and Yannotta, L. (2013).Modeling a Library Website RedesignProcess: Developing a User-CenteredWebsite through Usability Testing. Information technology and libraries, March 2013, 6-22.

4) Abbas, S., Khalid, S. and Hashmi, F. A. (2016). Library Websites as Source of Marketing of Library Resources: An Empirical Study of HEC Recognized Universities of Pakistan Qualitative and Quantitative Methods in Libraries (QQML) 5: 235-249, 2016.

5) Chua, A. &Goh, D. (2010). A study of Web 2.0 in library websites. Library and

6) Information Science Research. 32(3), 203-211

7) 6. Vries, Hendrik de. (2015). TheUltimate 10-Point Website Analysis Checklist. (Revised for 2020!). Retrieved from: https://artplusmarketing.com/the-ultimate-website-analysis-checklist-2a605f41809b

8) https://www.techopedia.com/definition/5411/website

9) https://en.wikipedia.org/wiki/Folksonomy

The Role of ICT in English Language Teaching and Learning

Namrata H. Mali
Research Scholar
Shri Shivaji College of Arts, Commerce and Science, Akola.

Abstract:

   Development in Information and Communication Technology (ICT) have made significant impact on teaching learning process. English is an international language. In the world, most of the communication is done in English, as a medium of teaching. To acquire good communication skill in learner, he has to develop interest towards the language or subject. In this regard, the teacher plays an important role in attracting the learner's attention by creating interest among the learners. Language learning and teaching can be made easy by using well advanced teaching aids. Teaching and learning is also developed by new technology. In every aspect of human life, information and communication technology plays a vital role. ICT has influenced the lifestyle of humanity. ICT shows great impact on the learners. It makes learners innovative and also motivates them for learning. ICT has its noticeable impact on the quality of teaching learning process. The present paper highlights on the role of ICT tools that can help in the development of teaching and learning language and its effective use in the classroom.

   Keywords: ICT, internet, English, language, learners.

Introduction:

   ICT stand for Information and Communication Technology. The use of ICT has become essential in everyday classroom teaching and learning. The term ICT refers to forms of technology that are used to transmit, process, store, create, display, share or exchange information by electronic means. It includes such technologies as radio, TV, video, DVD, telephone, mobile phones, satellite systems, computer and network, hardware and software, flash disc, LCD projector, scanners, cameras, printers, optical and magnetic disc, fax, laptops, the equipment and services associated with these technologies. Its use is increasing in the recent years. It plays important role in communicating. There are many ICT tools that can be used in the language teaching and learning. It can also be useful in different education fields. By using ICT, we can get the required information at any time, whenever we want. It makes learning effective and interesting learners can learn independently. Technologies have the capacity to transform our teaching and our students' learning. The productive use of information and communication technologies presents an opportunity as well as challenge in our teaching practice.

Use of ICT in English language teaching and learning:

   ICT can play a vital role in teaching and learning of English language. Open-access resources, online courses, virtual classrooms and social networks based on ICT are being increasingly used to give learners access to information, promote interaction and communication, and enhance digital literacy skills. It improves the quality of education. It is useful in learning grammar, writing, reading, speaking. Communication and information technologies are integral to teaching and learning.The use of ICT adds value to the intended learning. ICT helps to build learning communities by enabling teachers and students to join online collaborative projects and connecting with other students, teachers and experts. Communication technologies allow learners for direct participation in the Language.Technologies provide enhanced opportunities to interact with speakers of the English language in a variety of ways – websites, emails, videoconferences, music and video streaming, etc. They also allow learners to pursue their own interest in the language community outside the classroom.

The internet:

   Nowadays internet is very effective and popular tool used by different kinds of people for different purposes. The internet offers best way to learn language. There are sources like images, audio video clips, available on it. Online learning save our time and energy. With the help of internet learners can learn English anywhere at any time. Internet is a great resource for teachers. Teachers can find suggestion, lesson plans, information and materials through internet. They can also share their subject knowledge with other teachers and

learners. Email is fast, inexpensive and easy service for communication with others. Search engines are helpful in locating information on a particular subject by using various search techniques. ICT tools are available freely on the internet.

EBook:

An eBook is an electronic form of traditional print book. It can be read by personal or by using an eBook reader like Kindle. It is also used to improve the teaching and learning skill. It improves learner's knowledge of English grammar.

Audio books:

Audio books are also available on internet. It develops the four language systems- phonological, semantic, syntactic and pragmatic. Audio books are recordings on digital file of a book which are read aloud. Learner can learn correct pronunciation of words.

Overhead projectors:

It is audio visual teaching aid. Slide projectors are used in language teaching and learning to supplement the blackboard. It is highly beneficial. Teachers can use to show images, diagrams on it.

Mobile phones:

It is a very portable device. It is a mini computer in everyone's hand. Various mobile applications, YouTube, email, blogs can be used for learning and teaching English language. Learners can search for new words by using dictionary app in the mobile phones. It will help to enrich their vocabulary. They can share text, image, audio, videos. Laptop, iPods, tablets, smartphones have made English learning English language learning easier. Mobile phones have wide variety of application in education field.

Language lab:

It is a modern technological teaching aid. In language lab, learners can listen audios, videos of English language. They understand the different accent used and they will also able to speak. It enriches the English language learning process.

Conclusion:

ICT provides quality teaching learning material. It is helpful in English communication skills. ICT equipment helps learners to keep up to date. It also improves professional knowledge. It makes easy coordination of activities. It helps to save time. It is also used for different purposes like for communication purpose, presentation purpose, for skill acquisition and for distance education. It has positive influence on the learners.

Reference:

1. Dr. Chouthaiwale, "The Use of ICT Tools in English language Teaching and Learning: A Literature Review", Veda's Journal of English Language and Literature. Vol. 5, Issue 2, 2018
2. Ammanni, 'The Role of ICT in English Language Teaching and Learning', International Journal of Scientific and Engineering Research, Volume 7, Issue 7, July-2016.

Role Of Exercise In Weight Management

Sanjay K. Kale
Director of Physical Education,
Shri Shivaji College of Arts, Comm. and Science, Akola, Maharashtra-444005

Abstract

Exercise plays a very vital role in keeping human body in shape and healthy. Regular exercise boosts the overall immune system. It helps prevent the "diseases of affluence" such as heart disease, cardiovascular disease, Type 2 diabetes and obesity. It also improves mental health, helps prevent depression, helps to promote or maintain positive self esteem, and can even augment an individual's sex appeal or body image, which is also found to be linked with higher levels of self esteem. Childhood obesity is a growing global concern and physical exercise may help decrease some of the effects of childhood and adult obesity. Health care providers often call exercise the "miracle" or "wonder" drug—alluding to the wide variety of proven benefits that it provides. Exercise helps to control your weight by using excess calories that otherwise would be stored as fat. your body weight is regulated by the number of calories you eat and use each day. Everything you eat contains calories, and everything you do uses calories, including sleeping, breathing, and digesting food. Any physical activity in addition to what you normally do will use extra calories. Regular exercise is an important part of effective weight loss and weight maintenance. It also can help prevent several diseases and improve your overall health. It does not matter what type of physical activity you perform--sports, planned exercise, household chores, yard work, or work-related tasks--all are beneficial. Whether you are trying to lose weight or maintain it, you should understand the important role of physical activity and include it in your lifestyle. The paper aims at exploring the complete processes and steps that play an important role in keeping human body fit and fine.
Key words: Exercise, Weight Management, Physical Activity, Health.

Introduction

A bodily activity that maintains or improves the physical fitness and health is called exercise. It strengthens muscles and cardiovascular system , hones the athletics skills. It also helps in keeping mental health in proper shape. Frequent and regular physical exercise boosts the immune system, and helps prevent the "diseases of affluence" such as heart disease, cardiovascular disease, Type 2 diabetes and obesity. It also improves mental health, helps prevent depression, helps to promote or maintain positive self esteem, and can even augment an individual's sex appeal or body image, which is also found to be linked with higher levels of self esteem. Regular exercise is an important part of effective weight loss and weight maintenance. It also can help prevent several diseases and improve your overall health. It does not matter what type of physical activity you perform--sports, planned exercise, household chores, yard work, or work-related tasks--all are beneficial. Whether you are trying to lose weight or maintain it, you should understand the important role of physical activity and include it in your lifestyle.

Benefits of Regular Exercise

The health benefits of regular exercise and physical activity are hard to ignore. And the benefits of exercise are yours for the taking, regardless of your age, sex or physical ability. Need more convincing to exercise? Check out these seven ways exercise can improve your life.

Exercise controls weight

Exercise can help prevent excess weight gain or help maintain weight loss. When you engage in physical activity, you burn calories. The more intense the activity, the more calories you burn. You don't need to Set aside large chunks of time for exercise to reap weight-loss benefits.

Exercise combats health conditions and diseases

In fact, regular physical activity can help you prevent or manage a wide range of health problems and concerns, including stroke, metabolic syndrome, type 2 diabetes, depression, certain types of cancer, arthritis and falls.

Exercise improves mood

Physical activity stimulates various brain chemicals that may leave you feeling happier and more relaxed. You may also feel better about your appearance and yourself when you exercise regularly, which can boost your confidence and improve your self-esteem.

Exercise boosts energy

Regular physical activity can improve your muscle strength and boost your endurance. Exercise and physical activity deliver oxygen and nutrients to your tissues and help your cardiovascular system work more efficiently.

Exercise promotes better sleep

Regular physical activity can help you fall asleep faster and deepen your sleep. Just don't exercise too close to bedtime, or you may be too energized to fall asleep.

Exercise puts the spark back into your sex life

Individuals who exercise regularly are less likely to have problems with erectile dysfunction than are men who don't exercise.

Exercise can be fun

Exercise and physical activity can be a fun way to spend some time. It gives you a chance to unwind, enjoy the outdoors or simply engage in activities that make you happy.

Find a physical activity you enjoy, and just do it. If you get bored, try something new.

The bottom line on exercise

Exercise and physical activity are a great way to feel better, gain health benefits and have fun.

The Role of Exercise in Weight Management

The benefits of exercise are many, from producing physically fit bodies to providing an outlet for fun and socialization. When added to a weight control program these benefits take on increased significance. We already have noted that proper exercise can help control weight by burning excess body fat. It also has two other body-trimming advantages

1) Exercise builds muscle tissue and muscle uses calories up at a faster rate than body fat; and

2) Exercise helps reduce inches and a firm, lean body looks slimmer even if your weight remains the same. Remember, fat does not "turn into" muscle, as is often believed. Fat and muscle are two entirely different substances and one cannot become the other. However, muscle does use calories at a faster rate than fat which directly affects your body's metabolic rate or energy requirement. Your basal metabolic rate (BMR) is the amount of energy required to sustain the body's functions at rest and it depends on your age, sex, body size, genes and body composition. People with high levels of muscle tend to have higher BMRs and use more calories in the resting stage. Some studies have even shown that your metabolic rate stays elevated for some time after vigorous exercise, causing you to use even more calories

throughout your day.

Better Mental Health

The psychological benefits of exercise are equally important to the weight conscious person. Exercise decreases stress and relieves tensions that might otherwise lead to overeating. Exercise builds physical fitness which in turn builds self-confidence, enhanced self-image, and a positive outlook. When you start to feel good about yourself, you are more likely to want to make other positive changes in your lifestyle that will help keep your weight under control. In addition, exercise can be fun, provide recreation and offer opportunities for companionship. The exhilaration and emotional release of participating in sports or other activities are a boost to mental and physical health. Pent-up anxieties and frustrations seem to disappear when you're concentrating on returning a serve, sinking a putt or going that extra mile.

Exercise and Calories

To lose weight, you must create a negative caloric balance. That is, you must expend more calories than you ingest. Exercise boosts caloric expenditure in three important ways. The additional calories you burn during

your workout create a deficit so long as your food consumption does not cancel out the burned calories. Exercise also builds lean muscle and bone, causing an elevated basal metabolism that burns more calories all day long. And exercise boosts energy, making you less tired and sluggish and more inclined to be active.

Exercise Intensity and Weight Loss

How hard you exercise plays an important role in weight loss. Simply put, high intensity exercise burns more calories. To stimulate weight loss and change the shape of your body, you must exceed your comfort zone during exercise.

Resistance Training Intensity

In a 2007 study published in the Journal of Applied Physiology, researchers found that resistance training stimulates the production of the hormones epinephrine, nor epinephrine and growth hormone, all of which promote fat metabolism. But to engender fat metabolism, exercise intensity must be sufficient to stimulate hormone production. For each exercise, select a weight with which you can barely do eight repetitions with good form and continue repetitions to volitional fatigue, or the point to which you cannot do one more repetition. You will burn more calories during your weight training session and see greater increases in lean mass, basal metabolism and daily caloric expenditure.

Cardiovascular Training Intensity

While long-duration, low-intensity exercise of 20 minutes or longer forces your body to use an increasing percentage of fat to fuel exercise, few people have time to sustain that fat-burning zone long enough to make a significant dent in fat stores. However, interspersing short bouts of high intensity activity during your cardiovascular workout will boost caloric burn and cause adaptations to your system that enable you to exercise at a higher intensity, thereby burning more calories with each workout. Try a walk/run interval workout. After warming up for five to 10 minutes, alternate three minutes of walking or easy jogging with
one to two minutes of all-out running. Gradually increase your intensity as your body becomes more fit.
Studies show that even the most inactive people can gain significant health benefits if they accumulate 30 minutes or more of physical activity per day. Research consistently shows that regular physical activity, combined with healthy eating habits, is the most efficient and healthful way to control your weight. Whether you are trying to lose weight or maintain it, you should understand the important role of physical activity and include it in your lifestyle.

Conclusion

In today's modern world man has became so busy that he don't have time to exercise .But it has became more necessary than the to space some time for our body and exercise every day.

References
1) "Journal of Applied Physiology"; Enhancement of Fat Metabolism by Repeated Bouts of
2) Moderate Exercise; Kasushige Goto, et. al., February 2007
3) Article reviewed by Jeannette Belliveau Last updated on: Jun 14, 2011
4) http://www.livestrong.com/article/ 367 360-the-role-of-exercise-in-weightmanagement/#
5) ixzz239kgsLS5
6) Stampfer, M. J.; Hu, F. B.; Manson, J. E.; Rimm, E. B.; Willett, W. C. (2000). "Primary Prevention of Coronary Heart Disease in Women through Diet and Lifestyle". *New England Journal of Medicine* 343 (1): 16–22. doi:10.1056/NEJ M200007063430103.
7) PMID 108 827 64.http://en.wikipedia. org/wiki/ Physical_ exercise. Retrieved on12/7/2012

The Role of Technology in Teaching and Learning English

Arun B. Khedkar

Asst. Prof. Shri RLT Science College, Akola

Abstract

20th century underwent a tremendous and unprecedented revolution in each and every sphere of life .Whether it is science , arts, literature, language, culture, or knowledge as a whole adding to the wealth of this planet which is Earth .Even education has become more dynamic, modern, pristine and more effective with the advancement in technology in it. In ancient times language was mostly taught and learnt with the traditional methods like imitation, observation, listening, reading and writing. However these techniques still have their prestigious place in inculcating effective language skills, especially the language like English which is a Global language .With the help of technology teaching and learning English has become easier than ever before. Many teachers prefer teaching English with the help of various technical tools as doing so they can save their time. The use of Language Labs, LCD, LED Projectors, smart phones, computers, laptops, translating machines, online and offline dictionaries, sound recorder, audio as well as video lectures, Technology significantly helps teacher to communicate his message far effectively, making learning English interesting as a international language. Learning English with DVDs, electronic dictionaries and T.V., radio appeals to all our senses as students learn better with the first hand experience .Teachers too find themselves at ease while they interact with students with the help of technology the benefit of learning English with technology is not only confined to classrooms only as you can learn anywhere and anytime making learning English more interesting for students. However students today have a lot of opportunities to practice English through social media, newspapers where they can find a variety of methods by using which language can be learnt which is not always possible within four walls. Unlike reading from the textbooks in a familiar way students use tablets for reading as they can carry it anywhere. What is most technology catches our attention and retains it to longer time.

Introduction:-

Human civilization has progressed rapidly since Stone Age. We passed through Iron Age, Brass age, Copper age, Golden age. Now it is the age of technology. Life has become smoother and smoother as we marched ahead. Earlier we used to communicate through signs and symbols. Slowly and gradually language developed. There are thousands of languages in the world. Number one language spoken in the world is Mandarin language, next to it, is English language. Latin, French etc are widely spoken in their respective country and English is considered as an international language, a link language, a global language because English people has ruled over almost all the countries in the world. Common wealth countries are the best example. Wherever those people went they left their impression there. Asian countries have been influenced tremendously where English is used in Government offices on a wide scale.

England a small island during the progress of civilization has ruled all over the world. Wherever they went they took their language with them. Now English is widely spoken throughout the world and it is second largest language in the world. All trade and commerce are conducted in English. To spread their culture England conducted missionaries and left them the job of spreading their language and culture. Earlier before scientific inventions it was very difficult to reach to grass root level. But now due to advancement in science and technology everything has become easy.

Spread and Reach of English

England's common people spoke the English Language but it has become the language of knowledge. All science and technological books are written in this language. Hence it has become very necessary to learn English. It has become gateway of knowledge.

Various modern tools are available to teach English Language, of which some are 1) Audio –Visual Aids 2) LCD Projector 3) Language Labs 4) Translation machine 5) audio Cassettes 6) Electronic Dictionary.
Language Lab: - Computer plays very important role in language labs. Computers are preloaded with software to teach English, Spanish, German, French etc. Head phones are used to listens standard language. These labs provide a very different experience from the traditional system of teaching and learning languages. They

facilitate teacher's role in creating more attractive environment for the students. Learning a language just by studying theory is not enough to guarantee a successful language learning experience. Language lab gives more practice and make student conversant in the language.

<u>LCD Projector: -</u> These are modern tools help to present power point presentation. Students can grasp concept easily with the help of power point presentation as visual things make great impact on learning. This is famously said as, "I hear, I forget. I see, I remember."Thus projector helps student to grasp study material quickly and they can easily retain their attention in the class. LCD projectors are widely used in big institute for their daily teaching. Computer labs are well equipped with all the facilities for presentation. Learners have access to the user technology. The internet connects people to a global network so a wide range of discussion and interaction is possible.

Audio-Visual Aids: -

DVDs are great source of audio visual aids. But limited laptops and limited computers in lab and wrong location of labs have created problems for Teachers. Lack of access to suitable educational hardware and software is a great barrier to ICT utilization in English Language Teaching. Lack of ICT resources such as trolleys with LCD Projectors in the classrooms hampered teacher's attempt to integrate ICT in their teaching.

Translation Machine:

Google translator is often confused as translation machine but it is software developed by Google. Translation facilitates people of various countries to interact with each other. Such tourists either can use translation machine or any software like Google translator. But translation system for many of global languages is at an early stage and the translations they produce are still a long way from professional quality, nonetheless they convey the gist of the original meaning. Sound recorders are equally useful in a way they can be very handy for students to check their pronunciation and correct it for better results and listen to in a proper way ,thus they can learn how to pronounce certain words along Online and offline pronouncing dictionary software and apps help a lot for that matter. Through social media too students can have a lot of exposure to language.

Audio Cassettes:-

Either on your cassette player at home or school or in any vehicle you can listen. There are plenty of great audio study guides that will enable students to learn English language quickly. Thus audio cassettes can serve as a good study material to develop English or any other language. Teaching in smart classrooms having all necessary audio-visual aids is adding a positive outcome, as students learn effectively in this manner. They can fully concentrate on what is being taught example, e-seminar, webinars, online lectures etc. Using multimedia to create a context to teach English has its unique advantage.

Conclusion:-

To conclude we can say that we have a lot to choose from the world of Technology. Radio, TV, CD Rom, Computers, The internet, Electronic Dictionary, E-mails, Blogs, Audio Cassettes, Power point, Video's DVD'S Or VCD's. The last two decades have witnessed a revolution due to onset of technology. This rising and development of Information Technology has offered a best pattern to explore the new teaching model. Thus Technology plays a very important role in English teaching.

References:-
1) www.apple.com/education/research (22nd April 2009)
2) www.eltrec.ukm.my/ijellt (12th March 2009).
3) Language Learning with Technology: Ideas for Integrating Technology in the Classroom. Graham Stanley, Cambridge University Press.
4) English Language Learning and Technology by Carol A. Chapelle, John Benjamins Publishing Company.

Impact of Sport Physiology on Athlete's Performance: Reference to Psychology

Dr. N. W. Deulkar,
Director of Physical Education,
Sudhakarrao Naik Arts & Umashankar Khetan Commerce College, Akola,

Abstract:

In preparation and performance of an Athlete, psychology is one of the major entities of sport physiology which has been found to be given less attention or neglected. Hither to it is proved that psychic set up, spirit to reach the landmark was the most significant statistical link emerged in Olympics. Many established professionals have been agreed with the view that the Athletes' performance is significantly affected by the psychological factor. In the context of the parameters of psychological aspects of athletic performance, it is found that majority of scholarly discussion at the International conferences and seminars on sport psychology pertain to anxiety and aggression towards performance enhancement has become significant. In view of this underlying fact, the present paper attempted to study in detail the impact of psychological element in bringing about improved performance. It is also attempted to establish the fact that psychology is one the major significantly effective components of sport physiology. To achieve the desired objectives as mentioned above, the researcher, in the present research study, has gone through the varied sport theories of the professionals as well as the experts in sport science. The illustration and expert opinions are cited as per MLA style.

Keywords: physiology, sport exercise, sports science, psychology

Introduction

Many established professionals have been agreed with the view that the Athletes' performance is significantly affected by the psychological factor. In the context of the parameters of psychological aspects of athletic performance, it is found that majority of scholarly discussion at the International conferences and seminars on sport psychology pertaining to anxiety and aggression towards performance enhancement has become significant. Based on the criteria of psychological aspects of athletic performance, it is interesting to note that maximum questions raised, discussed and debated at the International conferences and seminars on sport psychology taking into account anxiety and aggression as performance to the genre of emotions which arise under varying sets of circumstances and form a sort of continuum but indicates rising graph always moving upward. The far reaching consequences for the physical and mental health of the people in general and performing athletes in particular, are an open secret. It is also found that stresses result from non-fulfillment of needs and continued stresses create anxieties, and anxiety leads to tension. The residual effect of tension is felt, monitored and evaluated both physiologically and psychologically and is ultimately linked with resultant psychosomatic disorders. In view of this underlying fact, the present paper attempted to study in detail the impact of psychological element in bringing about improved performance. It is also attempted to establish the fact that psychology is one the major significantly effective components of sport physiology. To achieve the desired objectives as mentioned above, the researcher, in the present research study, has gone through the varied sport theories of the professionals as well as the experts in sport science.

Psychological impact of stress

The athlete under stress undergoes physical, mental or emotional barriers which tend to disturb the homeostasis of the body. It is also true that stress is an everyday part of life; if there were no stresses, we would probably face dire of boredom. Stress is inevitable in sport as in life in general, and all performing actors, artists and athletes perform their tasks with varying stress levels. Expressing more broadly, the term may relate to any kind of pressure, it may be due to one's job, school work, marriage, illness or death of a loved one. The common denominator in all of these is change. Loss of familiarity breeds this anxiety with any change which is viewed as a threat. Sports Performance and stress are not simply a product of physiology and biomechanical such as technique factors but also are psychological factors which play a crucial role in determining performance. However, a certain level of stress is experienced by every athlete. It is needed to optimize his or her game. The intensity depends on factors such as past experiences, coping responses and genetics. Stress during sports, as in anything else in life, may be acute, episodic or chronic. For the most part in sports, it is

episodic, whether during a competitive match between friends, or a championship game. Nevertheless the acute stress may actually act as a challenge, if not harnessed, it can evolve to not only an episodic stressor that can affect one in the long term, but can also hamper one's play.

The various studies related to sports performance and health has attempted a critique of how does stress affect performance. The relationship between stress and performance has been portrayed by the stress response curve created by physiologists like Nixon in 1979. The pressure of the event which is an important stressor has also a crucial influence on an individual's response to stress. One of the most noticeable effects of stress in one's life is the changes in his performance. We can easily recognize the consequences of normal or excessive amounts of stress through mere observation. One of the recent study shows that as the level of stress increases, the performance level also increases, to the point of eustress, or healthy tension. Near the point of fatigue, an identified area called the comfort zone indicates the range of stress levels that we can absolutely manage and facilitates good performance levels. The stress is perceived as overwhelming or excessive, the person reaches a fatigue point wherein the performance levels starts to decline. The ultimate end of overwhelming stress, called burnout, can be exhaustion, ill health or breakdown.

Moreover, positive effects appear when performance levels increase when stress management is effective. Stressors such as pressure and demands of achievement can facilitate better stress response which results in higher levels of performance. A basketball player tries to run faster, shoot a three-point shot and succeeds in it because of the pressure he has obtained from the audience, the close scores and the tough opponents. When stress is perceived as uncontrollable or unmanageable, the person begins to experience a gradual to drastic decrease in performance levels, causing a decline in productivity and enthusiasm to respond to the stress. In case if a very tight deadline is given to an office employee who has to take care of her four children at home and a sick mother at the hospital. This overwhelms with mix of situations, if not managed carefully and totally, will result to a poor performance at work, bad relationships with other members of the family. Performance Pressure, one of the significant life stressors, affects performance. You will notice that low pressure or low levels of stress results to s person's stress response as boredom or unchallenging. Even if the task is of great important, in the absence of an appropriate level of pressure, attention and concentration to perform the task are significantly low. On the other hand, extreme level of pressure doesn't mean high performance levels; rather, it's the same as the result from low pressure.

However, there is an area called the area of best performance in which moderate pressure resulting to optimum stress or stress that is totally manageable leads to the highest level of performance. Notwithstanding the common coping strategies for effectively managing emotional responses like anxiety, stress, tension, aggression etc., in relation to the athletic, here are a few simple approaches to tackling of stress in study of sport psychology. When stress comes simply as a stimulus causing distraction, modification of the stimulus itself may be sufficient to reduce stress. Actually stress is a psychological perception of threat that lead to the athlete to learn to feel that demands of the situation which are not difficult for him/her to meet. In situation where stress becomes an illogical perception of a threat, the coach must make efforts to change the athlete's psychological set up of thinking and warn of illogical fears. In case of stress as an anticipated negative consequence, the performer may feel need to undertake overly rehearse which may deviate to the point at success.

Conclusion

Psychic anxiety means a disturbed state of mind, emotional reactivity; arousal; nervousness; and unrealistic and unpleasant state of mind. Anxiety is an essential ingredient of any competitive situation and without certain level of anxiety, there cannot be competitive performance. Neither too high, nor too low level of anxiety is conductive to sports performance. Adequate level of anxiety produces best results. Unless sports persons learn to cope up with stressful competitive situations by managing anxiety, they would fail to achieve their goal. Anxiety has both psychological and physiological implications in sport performance.Once aroused, it raises the general arousal level of the player to such an extent that he finds it hard to concentrate on his game due to constant bombardment on his nervous system and his inability to diffuse tension caused by rising anxiety level. The ability of the player to monitor and judge situations correctly is reduced. His information-processing

mechanism gets over stressed resulting either in wrong or slow response even to emergent situations. Under such a condition, the player is not focused-he wishes to do on thing but does something else. He loses control over his body and mind. The relationship between anxiety and athletic performance has been a subject of vital importance.

Reference:

- Suresh Kutty K. Foundation of Sports and Exercise Psychology, New Delhi, Sports Publications, 2004.
- Ajmer Singh et al. Essentials of Physical Education, New Delhi: Kalyani Publisher's Ludhiana, 3rd Edition, 2008.
- Kamlesh ML. Psychology of Physical Education and Sports, London: Boston Routleoge and Kagan Paul, 1972.
- Devinder Kansal K., Textbook of Applied Measurement Evaluation and Sports Selection, Delhi: Sports and Spiritual Science Publication, 2008,
- Brrow HM, Rosmary MC. Gee, Practical Approach to Measurement in Physical Education", Philiadelohia: Lea and Febiger, 1979.

Enhancing the Language Skill in English with ICT

Dr.Nilima S.Tidke
Department Of English
Shri.Shivaji College,Akola

Abstract:

　　　To teach English and develop English language skills, various approaches and methods are in use in our country. But most of them are traditional, less interesting, ineffective as well as less motivating. So, it is necessary to use modern approaches and tools of ICT (Information and Communication Technology) to develop better understanding and acquisition of basic skills i.e. LSRW (Listening, Speaking, Reading and Writing) of English language among the students . ICT has a lot of things to offer to both teachers and students for the enhancement of their vocabulary and improvement of English language skills. Now a day's ICT tools and approaches are being used widely due to their convenience, omnipresence, effectiveness and being economic.At present, there is a prime focus on the fields of knowledge in which citizens acquire the skills and knowledge necessary for effective communication, e.g. on the teaching of foreign languages and ICT. Probably, the most suitable approach to the teaching of foreign languages with the help of ICT, nowadays seems to be the so-called blended learning.With the emergence of ICT and the internet, we feel that our lives have changed fundamentally.

KeyWords: English,effectiveness,skills, language,knowledge,learning

　　　In-order to become a well-rounded communicator one needs to be proficient in each of the four language skills. These four skills give learners opportunities to create contexts in which to use the language for exchange of real information, evidence of their own ability (proof of learning) and, most important, confidence. Listening and reading are the receptive skills because learners do not need to produce language, they receive and understand it. These skills are sometimes known as passive skills. The productive skills are speaking and writing because learners are applying these skills in a need to produce language

Listening: When people are learning a new language they first hear it spoken.

Speaking: Eventually, they try to repeat what they hear.

Reading: Later, they see the spoken language depicted symbolically in print.

Writing: Finally, they reproduce these symbols on paper.

Listening:

　　　Listening is a receptive language skill which learners usually find the most difficult. This often is because they feel under unnecessary pressure to understand every word. The listener has to get oriented to the listening portion and be all ears. The listener is also required to be attentive. Anticipation is a skill to be nurtured in Listening. In everyday life, the situation, the speaker, and visual clues all help us to decode oral messages. In due course of listening, be in a lookout for the sign post words. Thirdly one should be able to concentrate on understanding the message thoroughly. Listening Skills could be enhanced by focusing on making the students listen to the sounds of that particular language. This would help them with the right pronunciation of words. To equip students with training in listening, one can think about comprehending speeches of people of different backgrounds and regions. This intensive listening will ultimately help a student to understand more on the accents to be used and the exact pronunciation of words. Listening is one of skills should be mastered by English learners. Much exercises would improve students' abilities in understanding the context of certain podcasts.

Speaking:

　　Speaking skills is one of the most important skills that needs to be required especially for the second language learner. It is such a waste if a student is only good on papers, but could not apply the language learnt in his/her communication.Language is a tool for communication. We communicate with others, to express our ideas, and to know others' ideas as well. We must take into account that the level of language input (listening) must be higher than the level of language production. In primary schools elocution and recitation are main

sources to master the sounds, rhythms, and intonation of the English language through simple reproduction. The manifestations of the language in games and pair work activities are encouraging source to learn to speak the language. This assists the learners to begin to manipulate the language by presenting them with a certain amount of choice, albeit within a fairly controlled situation. This skill could be improved by understanding para-linguistic attributes such as voice quality, volume and tone, voice modulation, articulation, pronunciation etc. This could also be further enhanced with the help of debates and discussions.

Reading:

Reading is a learning skill. It helps you improve all parts of the English language – vocabulary, spelling, grammar, and writing. It helps to develop language intuition in the corrected form. Then the brain imitates them, producing similar sentences to express the desired meaning. Using skimming or scanning technique to read quickly is highly effective. While reading underlining of key word is a must. Reading Skills help the students grasp the content and draw conclusions. The students should also make it a point to familiarize themselves with the jargons and new words by making reading a habit be it reading newspapers, articles, books, magazines etc

Writing:

Writing Skills is one of the important skills for effective communication is of utmost importance among the four basic skills (i.e. Listening, Speaking, Reading and Writing). This Skill helps students in appropriately expressing their views, emotions, feelings, thoughts and ideas. Our curriculum designers and pedagogist have always given significant space to writing Skills in teaching and learning process. In this module we will explore possibilities of teaching writing Skills through integration of Information and Communication Technology in traditional (face-2-face) teaching-learning environment.Writing provides a learner with physical evidence of his achievements and he can measure his improvement. It helps to consolidate their grasp of vocabulary and structure, and complements the other language skills. It helps to understand the text and write compositions. It can foster the learner's ability to summarize and to use the language freely. To write flawless language one should excel in the Writing Skills with the help of various methods. Importance should be given to composition and creative writing. One should also focus on coherence and cohesiveness when it comes to writing a language

With these four skills addressed equally while learning English, the learners can be assured of having good communication skills, a great necessity in today's competitive world.With the rapid advances in technology, the prevalence of interactive whiteboards, computers and tablet devices, as well as increasing student ownership of smartphones, schools must have an eLearning plan for integrating ICT into the teaching of English. Discover just how easily schools can implement an ICT enriched English programme using the content below.

Internet tools and services are very popular among all kind of people in the world. This study is about use of Internet among teachers and students while teaching and learning English. ICT impact on communication skill has been particularly significant in developing countries and in rural areas. Through the application of ICT in communication skill high quality education can be provided. ICT can potentially transform the scenario of English language by bringing about a sea - change in communication skills. Internet is useful for different purposes such as Communication, research, education; entertainment etc.Internet is a great resource for teacher. Teachers can find suggestions, lesson plans, practical support, information and materials through internet and they can share their subject knowledge with other teachers and students. ICT have made significant impact on communication skill in English. We begin with digital videos. The use of audio with video makes it more appealing and motivating to learners.Videos are a powerful tool because they provide not only context, but also authenticity, motivation, interest and confidence, the sociolinguistic and pragmatic level of language, nonverbal features, such as gestures and body language, active involvement and participation, and real vocabulary acquisition.

Conclusion:

It is estimated that total amount of information doubles every four to five years. Teachers have to become expert in helping learners to navigate through this sea of information. There is paradigm shift from teacher centred approach to a learner-centred approach. The use of multimedia resources enables the learner for self paced,self–directed and flexible learning. The role of teachers therefore is changing from transmitters of knowledge to mediators in learning.Over the past two decades the way we learn has dramatically changed . We have new sources of information to exchange and interact with information. Teaching & Learning are even more challenging and complex.

References

1) Hornby, A.S.,et al. (Eds.) (2002) : *Oxford Advanced Learner's Dictionary*. New Delhi : Oxford university press.
2) Koul, L. (2010) *Methodology of Educational Research.* Noida: Vikash Publish House.
3) Kumar, D. P. (2009) *The Importance of English Language.*
4) Mathew, Mamman., et al. (Eds.) (2016) *Manorama Year Book*. Kottayam, India: Malayala Manorama.
5) Mohan, R. (2008) *Importance of English Language in India.*

Comparative Study Among Sportsperson and None Sportsperson in Physical and Psycological Aspect

Dr. Rakesh A. Badgujar

Director of sports and Physical Education

Shri Gadge Maharaj Mahavidyalaya Murtijapur, Akola.

Introduction

The aim of the physical education is not out of common education it helps to overall development of child through physical activitiesThe training of psychological factors is very much important for the success of sports.Human being is considered as an intellectual animal that wants to participate in physical activities to attain personal achieve growth and development and to maintain good health. It is natural is both quality anda child to participate in activities like running, jumping, throwing etc., Sport is a dynamic, creative, continuous process which gives meaning to reflect and the values believe and ethics of participation.

Sports is a chief component in promoting friendship, peace and understanding between people society and country because the trouble free delight come only from sports We know the field of physical education objective is to create a learning environment that will not cause students to hate the very things they are learning and the process of learning. Physical education is one of the best subject matter disciplines to foster ones self. There are dozens of studies linking self concept and self esteem to things as body image, physical ability, the estimate of physical ability, and interest in sport activity. A number of specific strategies can be incorporated into physical education which reflect a deliberate attempt to teach for self concept and self esteem. What is self ? The self (according to the dictionary) is the total, essential or particular being of one person. It is thought as a synonym of personality and often stresses on individuals consciousness of what he is. Self Concept –Each person is aware of being an individual self and can reflect and react to himself as an object. The second factor which enables us to achieve a self identity is a sense of continuity over time. According to researchers who have studied the development of self concept found that with increasing age the child's conception of the self seems to become more abstract.

Significance of the study

1) This study will help to compare the self concept among who are sportsman and who are non sportsman

2) This study will help teachers to know the self concept of the students and in turn helping those with low self concept to improve.

3) This study will also help the parents of the children whose self concept is on the lower side.

4) This study will help the teachers and parents to help the students those who are low in their self esteem and motivate them to take to sports or any physical activity.

Physical fitness is a basic component of total fitness which includes efficiencies, mental and emotional stability and social adaptability. Physical fitness is positive quality found in people of all age group but in different degree.
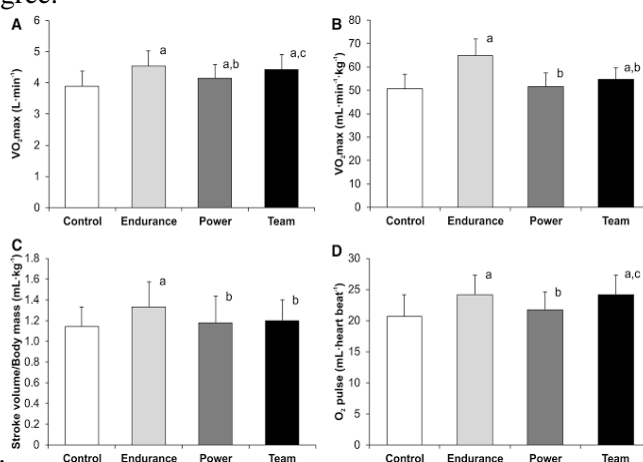
Cardio Vascular Endurance Cardio Vascular endurance is related to work or contractions of large muscle groups over a long period of time, stress is placed on the respiratory systems and circulatory systems of the body when they must supply adequate blood and oxygen to the muscles.

Strength One of the most basic components to success in all movements is strength Muscular Strength is defend as the amount of force that can be exerted by a particular muscle. The development of strength is specific to the muscle or muscles involved in a particular exercise.

FlexibilityFlexibility is the range of movement in a joint the degree of flexibility determiners the extent of extension and flexion of a joint and consequent body in term of bending, reaching, twisting and turning. The degree of flexibility is first determined by the nature of the joint itself and then by the ligament and muscles related to the joint.

Stability principles give athletes rules about holding positions and staying on balance when running. They guide training for improving firmness of positions both for static balance and dynamic balance.

An athlete's center of gravity is the exact middle of the body around which it can rotate freely in any direction and where the weight balanced on all opposite sides. It exists at a point along the midline of the body at about 55% of the athlete's height.

STATIC STABILITY

- POOR - NORMAL - SPORTSPERSON
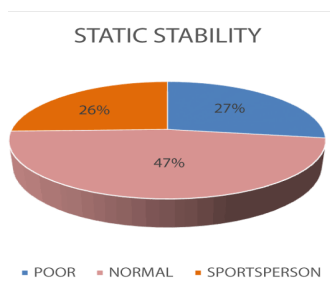
Speed

Speed and strength are integral components of fitness found in varying degrees in virtually all athletic movements. The combination of speed and strength is called power. For many years, coaches and athletes have
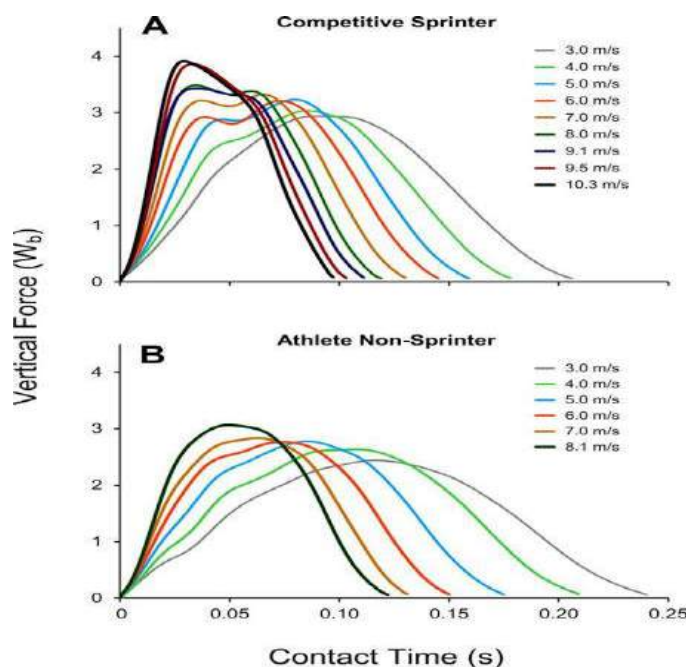
sought to improve power in order to enhance performance.

Sport psychology is an interdisciplinary science that draws on knowledge from many related fields including biomechanics, physiology, kinesiology and psychology. It involves the study of how psychological factors affect performance and how participation in sport and exercise affect psychological and physical factors.

[1] Sport psychologists teach cognitive and behavioral strategies to athletes in order to improve their experience and performance in sports.

[2] In addition to instruction and training of psychological skills for performance improvement, applied sport psychology may include work with athletes, coaches, and parents regarding injury, rehabilitation, communication, team building, and career transitions.
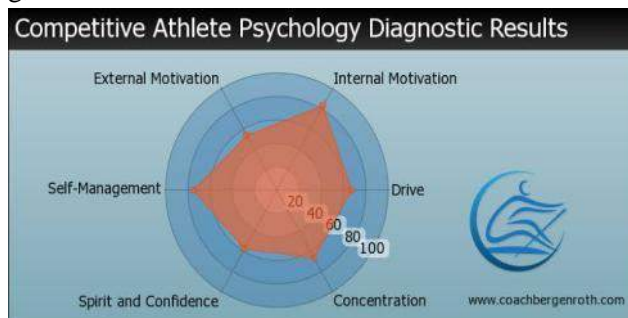
Conclusion

The purpose of the study is to compare the physical fitness of for testing the physical fitness through AAHPER test. Two groups were formed each of sports men and non-sportsmen from the area under consideration. The variables in these tests are speed, agility, power, strength and flexibility. The data were analyzed with reference to the objectives by using differential analysis with student unpaired t-test using statistical software. Out of the five Physical variables Speed, power, Agility, Strength and Flexibility, the study found speed, power and Agility are higher of the sportsman as compared to non sportsman.

Reference

1) A comparative of physical fitness reaction ability and kinesthetic perception among national level gymnasts Kho-Kho players and professional chow-donchi. Asian journal of physical ed. and compuSci 5(1):63-66.
2) Deepla K, Raj JR. A study of physical fitness among athletic and football player of schools in Hyderabad. Asian Journal of physical education and computer science in sports 2011; 5(1):105.
3) Gaurav V, Singh A, Singh S. A study of physical fitness variables among baseball players at different level of achievement. Scientific journal in sports and exercise 2011; 7(2):34-38.
4) Habbinen A. Association of physical fitness with health related quality of life in finish young men. Journal of health and quality of life outcomes 2010; 10:1477-7525.
5) Knutgen (1961), Research Quarterly."Comparison of fitness of Danish and American school children" PP 32:190.
6) Mookerjee (1978), Snipes Journal, "A study of Motor fitness of boys 13 to 17 years of age" PP 35.
7) Robbon (et, at 1979) , "A comparative study of Motor fitness of elementary school children of defense and nondefense personal" PP I:32.

Ranganathan's Five Laws and its Impact to the Technological Innovations of Library and Information Sciences

Mangesh Ramesh Ubale
Shri RLT College of Science, Akola

Abstract

   This paper analytically reviews the five basement laws appear in the field of Library and Information Science (LIS) that, introduced by Dr. S.R. Ranganathan, who was the first class Indian library scientist, and his laws theoretical impacts to the technological enhancements of the field of of Library and Information Science (LIS). Technology transitions from conventional age to Digital age, and individual impacts on element of Ranganathan's laws for that were analytically revived throughout the available literature. Finally, concluded that, most of the technological innovations available at the field of Library and Information Science (LIs). Have based Ranganathan's five laws, and his five laws are still on live of the library and information science domain.

1. Introduction
1.1 Recent Developments of LIS Public Domain

   In 1900s, the libraries were began to more popular among general public, after liberzed them from royal prerogatives, who ruled world before 1900s and transferred the management of the libraries into the progressive philosophers called librarians

   During this renaissance period, many researches and developments taken place toward information organizing and distributing, formulating standards for librarianship and form a better library management system. These were devilishly affected to the revolutionary development in the field of Library and Information science.

   In 1960s dada communication via cables (World Wide Web &Internet) was implemented and it affected to the massive change at the telecommunication industry. Information could be able to send one place to another very fast as packet data, and this technology gradually impacted to the field of LIS to store information and send to another party very quickly on requests.

   Present era called as "Information era" Therefore, information is considered as an important tool in every aspect of human life and very recently it has become the fifth need of human life. Today people are searching information from mobile devices which have connected to the super speed 4G internet. The shapes of the libraries also have become an invisible mode (virtual library). Many cloud based information clusters are waiting until users are requested information. Finally information has become a most important need of the human life.

1.1.1 What is Technological Innovations?

   Technological innovations comprise new products and processes and significant technological changes of products and processes. There is no doubt that technology has had a lasting impact on libraries. Once thought to be going the way of traditional bookstores, libraries have rebounded and are thriving in a technology fuelled world. With the help of innovation, re-imagination and vision, libraries are embracing new technologies while creating dynamic community centres filled with life

1.1.2 S.R. Ranganathan & Five Laws of LIS

   Dr. Shiyali Ramamrita Ranganathan considered the father of library science in India cover certain facets of library and information science. He was a university librarian and professor of library science at Benares Hindu University (1945–47) and professor of library science at the University of Delhi (1947– 55). The last appointment made him director of the first Indian school of librarianship to offer higher degrees. He was president of the Indian Library Association from 1944 to 1953. In 1957 he was elected an honorary member of the International Federation for Information and Documentation (FID) and was made a vice-president for life of the Library Association of Great Britain. As well as he was the author of many LIS text books and founder of Colon Classification system [9]. In 1931, he introduced the five laws to LIS, and most of the contemporaries were accepted those laws as the basic fundamentals of the library management system. These laws are as

follows: 1. Books are for use. 2. Every reader his [or her] book. 3. Every book its reader. 4. Save the time of the reader. 5. The library is a growing organism. The Five Laws of Library Science are some of the most influential concepts in the field (see illustrator 1). Since they were published in 1931, these five laws have remained a centrepiece of professional values of LIS. These basic theories of LIS continue to directly impact the development of this discipline and the service of all libraries.

2. Methodology

When consider the past several decades, it can be seen the field of LIS has developed by multiple ways especially through technological innovations. This paper plans to discuss the interrelationships and impacts of Ranganathan five laws with those enhancements. Latest developments of products and services in field of LIS are considered as technological innovations and compared effectiveness and efficiency of those innovations with his basic learning of five laws.

2.1 Technological Innovations in Library materials

At the present information era, the shape of the information materials already has changed and becoming a smallest. Many e-books are existed without any printed equivalent. Commercially produced and sold e-books are usually intended to be read on dedicated e-readers

Ranganathan's first 4 laws discussed about the library materials and their effectiveness to save the users' time. After he raised the importance of open the books for public readers, it was directly impacted to material enhancements of the libraries. Therefore today it has totally changed the environment of the libraries.

2.2 Technological Innovations in Library services

The internet has become the most technological innovative factor in LIS. It has already had a major impact to small the library and expands their services. As an added service to the lending books the libraries can be able to start e-mail alert information services, Selective dissemination of information (SDI) services and Current Awareness Services (CAS). With this massive change of the LIS field it has become reverse impact like libraries are becoming smallest and services and storage of information are becoming larger. What Ranganathan says in his fifth law "Libraries are a growing organism" now starts to become a shape up with new technology. E-borrowing, e-reading, and online "ask librarians" research services are other most innovative developments in LIS. Many librarians now can connect with their readers online to solve their information needs. Saving readers' time has become a most important factor of the LIS. This need has pointed out by Rangathan on his fifth law. This law is recognition that part of the excellence of library service is its ability to meet the needs of the library user efficiently. He paid more attention about users and always directed to the librarians to minimize the users' time from begin of information search to finish his or her information need. The base of this law was adopted by alternative information providers also to complete their organization goals. Many technological innovators in LIS domain used to base this law before design their product or service. Library classification schemes, indexing & abstracting services and every kind of selective dissemination of Information services are based on saving the users' time. Because saving time is the major satisfaction factor of every kind of customers in product and services. Librarians' reference skills are most impacted to save the users' time. Library cross-reference services, cataloguing technologies, online public assess catalogues (OPAC) are can be named as technological innovations of LIS which accompany with Ranganathan's forth law. As the growing organism the libraries facilitate to their users to access information in correct format and in time

3 Conclusions

At this information age, the libraries have been in the most prominent information and communication dissemination centres, collection development centres and latest technology using centres. Libraries acquire and secure ownership of digital content (typically through license), store the content as the local services, and make it accessible to a target community. Libraries attempt, as technological innovators, to ensure full access to the digital collection through their various kind of information services, and to migrate the content according to latest technology. In the meanwhile, libraries host as a social partners, and growing organism of this global era. As a result of above approaches, domain of LIS is always renewing with the modern developments of technological innovations. E-books, e- journals, web 3.0 technology, social media interaction, online user

feedback systems, worldwide catalogue searching facility (world cat), and web based library circulations, cloud library initiatives, library access via iPhones, kindles, QR code, 3M library gates are the main approaches they applied with modern technological innovations in this information era . Dr. S.R. Ranganathan's five laws of Library Science are still suit for the modern library developments due to their liveliness. Those laws contain whole library management skills and especially as a growing organism, libraries can be able to shape up their basic organization structure according to the users' needs. It is reviled that most of LIS oriented innovations have being started using conceptual framework of R's five laws. Most of the new technology innovations happening on the LIS field based on these five laws foundation. When consider individual law it is shown interconnection between each law with others. As an organization, they library cannot be avoid any of law as thinking they are unusual. This interconnectivity has manipulated the organization culture according to the current requirement as well as productivity of newer innovations.

References

1) Eduscapes. Contemporary Libraries: 1900s [W].2015.Retrieved from: http://eduscapes.com/history/contemporary/1900.htm

2) American Library Association (ALA). About ALA [W]. 2015. Retrieved from: http://www.ala.org/aboutala/

3) Leiner, Barry M. et.al. (2015) A Brief History of the Internet [W]. Retrieved from: http://www.internetsociety.org/internet/what-internet/history-internet/brief-history-internet,

4) International Federationof Library Association (IFLA). The Key Role of Libraries in the Information Society [W].2015. Retrieved from: http://www.unige.ch/biblio/ses/IFLA/rol_lib_030526.pdf

5) M. Tahir, Information Needs and Information-Seeking Behavior of Arts and Humanities Teachers: A Survey of the University of the Punjab, Lahore, Pakistan [J]Libr. Philos. Pract.2008.pp. 1–11.

6) UW Information School. What is Library and Information Science? [W]. 2015. Retrieved from: https://ischool.uw.edu/academics/mlis/what-is-library-science.

7) OECD.org. Definition of Technological Innovations. [W]. 2013. Glossary of Statistical Terms, OECD Frascati Manual, Retrieved from: http://stats.oecd.org/glossary/detail.asp?ID=2688

8) The Blog. How Innovation and Technology Are Shaping Libraries of Today? [W].2015.Retrieved from website: http://www.huffingtonpost.com/frankie-rendon/how-innovation-and-techno_ b_5244601.html.

9) Wikipedia, The free encyclopedia. S. R. Ranganathan [W]. 2015. Retrieved from https://en.wikipedia.org/wiki/S._R._Ranganathan.

10) Wikipedia, the free encyclopedia. E-book [W].2015. Retrieved from: https://en.wikipedia.org/wiki/E-book.

11) Koehler, Wallace, JitkaHurych, Wanda Dole, and Joanna Wall.Ethical Values of Information and Library Professionals – An Expanded Analysis [J]. International Information & Library Review 2000.32 (3/4). pp. 485–506.

12) Ball, R. Quality management of library services in the digital era [J]. Online Information. 2000. pp. 198-163.

E- Learning and E- Services in Academic Libraries

Dr. Vishalsingh R. Shekhawat
Librarian
Vidya Bharati Mahavidyalaya Camp, Amravati

Abstract:

This is an age of computer technology revolution for the future, not only will it be necessary for everyone to be computer literate it will also be necessary for all to be occupied with computer skills. Of course, it is probably true to say that the growth of online learning and usage of e- services in college library is increasing rapidly. In addition, the impact of digitalization in the field of library, where through computer networks such as internet has posed new challenges in education and online Library Services. The objective of this study is to provide overview of e- learning and e-services in library. Besides, present study also gives about pellucid e- learning tools and with the help of those tools it is required, for both the teacher and librarian, to re- evaluate their teaching methodology, services and resources.

Keywords: E- Learning, E- Library Services

1. Introduction

This is an age of computer technology revolution for the future, not only will it be necessary for everyone to be computer literate, it will be also be necessary for all to be occupied with computer skills. Now days, one can find new innovation and impact of Information Communication Technology in the field of library. It is truly said that, "education and library correlates with each other". Of course, it is probably true to say that the growth of online learning and usage of e- services in library is increasing rapidly. The use of the World Wide Web (WWW) dramatically incries and the responsibility on all academics using technology to ensure that they train themselves as well as students. The impact of digitalization in the field of library with the help of computer networks such as Internet has posed new challenges in online Library Services. In fact, e-learners and traditional learners have now started to access online information through e- Library Services. Thus, it is with the help of new technology, online applications and models both teachers and librarians require re-evaluating their methodology, services and resources. From the researcher's perspective, the demand of e-learning and e-library is essential component of quality online learning system. However, the roles of online libraries are the fore front of knowledge when it come services and that suits to the learners. In the same way, e-learning is always beneficial at institutional, national and international level to both learners and teachers. In the age of computer technology, the function of libraries have changed and due to e library services computers is being use do the libraries to process, save, retrieve and telecast the information. Thus, the traditional concept of library is being changed from place to access books from one 'house' to 'screen' with advanced media of Internet. There were days where libraries were judged by quantitative and qualitative books as resources and now libraries are surrounded by computer network that is connected with Internet based systems with registered online databases or different networks. The objective of this study is to provide overview of e learning and e-services in library.

E-Resources

E-Resources are those electronic products that delivers an accumulated data, be it text referring to full text basis, e-journals, image collection, other multimedia products and numerical, graphical as a commercially available till that has been published with an aim to being marketed. These may be delivered on different network through internet. The library and information services of the 21st century are fast changing. With the rapid development of electronic publishing, libraries are not only acquiring reading materials such as printed books and journals but also arranging for providing access to various e-learning resources in electronic form. In the new situation, the role of librarian is dramatically changed in from collection development and management of library services. An E-Resource means electronic resource, which are available in electronic/digital form. The e-resources are very useful in academic libraries. This is most important part related to e-resources. The quality has replaced the quantity of library collection during the present days.

Advantages of e-learning

E-learning has many advantages, some of these are:

- The information can be accessed by any user, at any time and at any where
- It is cost effective and time saving
- Information system is more innovative and interactive
- The information can be shared by more than one user at a time.
- Appreciable time is saved in preparing the E-write-up and for publishing the same
- Status of the pre-print material with the publisher is known much in advance

Disadvantage of E-Learning

E-learning has many disadvantages;

- Lack of face to face conversation
- Maintenance also very costly
- Information and communication infrastructure is required which is costly
- Special e-learning is required to know and operate computer/Internet
- Lack of technical support to learners

Resources of E- Learning and E- Services In Academic Libraries:

- **Computer Technology:**
  The dramatic development in the e-services in the field of academic libraries and has been made by the wide rang use of computer technology. Computer can be referred to as the backbone e-services. In virtually all e-services applications, the computer is interfaced with other devices in order to function effectively.

- **Database Services:**
  A database is an organized collection of digital data for one or more purposes. Libraries provide to users access to a variety of bibliographical databases.

- **Document Scanning Services:**
  Scanner is important equipment in modernization of library. It is useful for scanning text, image and content pages of books and providing great help for establishing digital and virtual library.

- **Electronic Books:**
  E-Books are one way to enhance the digital library with global 24-hours-a-day and 7-days-a-week access to authoritative information for the users and the users quickly retrieve and access specific research material easily.

- **Electronic Journals:**
  Electronic journal may be defined broadly as any journal, magazine, newsletter or type of electronic serial publication which is available over the internet and can be accessed such as World Wide Web. Many publishers who offer subscriptions to print journals, sometimes also offer subscription to the electronic version of the journal. Some publisher's forward password and user Id for Admin and some publishers give access through IP address.

- **Electronic Mail (E-Mail):**
  This E-SERCICE can also be used to send and receive mails. This is commonly and widely used with the internet facilities. E-mail is very useful for sending messages to users. Further, it is also useful in various aspects of library environment. Thus, it may be stated that e-mail may play a significant role in electronic services.

- **Open Source E-Services:**
  Open Source E-Services or the OSES is freely available on computer with free link, which allows altering the source code and customizing the link to anyone & for any purpose. In the last few years we have seen the development of a number of E-Libraries products in the open source world such as

- **SWAYAM-** **https://swayam.gov.in**
- **SWAYAM DTH-** **https://www.swayamprabha.gov.in**
- **NDL-** **http://ndl.iitkgp.ac.in**
- **DIGI LOCKER-** **http://digilocker.gov.in**
- **FOSSEE-** **http://fosse. In**
- **SHODHGANGA** **https://shodhganga.inflibnet.ac.in/**
- **NPTEL-** **http://nptel.ac.in**
- **SPOKEN TUTORIAL** **https://spoken-tutorial.org**

Conclusion

E-Learning and e-services support e-library and are very much significant and import values in education. The librarian can help in creating and developing e-sources for learners. The emergence of ICT enables delivery of library services efficiently. However, e-learning is only a tool and its effectiveness depend upon the quality of the content including the learning resources and useful as a communication tool. To conclude, the researchers believe that the major weakness of the technology is it can't answer your question, when librarians will be able to answer immediately, while searching data from the software may take too much time or might not be able to reach proper source. Thus, e-services, and e-learning in higher education have certainly made information more easily available but at the same time instructors play an important role to provide proper guidance to the learners.

Reference

1. Santhi. J. (2013) E- learning in Library and Information Science Education : An overview. International Journal of Scientific Research.
2. Slade,A. (2000). International Trade and Issues in Library Services for Distance Learning: Present and Future. In P. Brophy, S.Fisher& Z. Clarke (Eds.), Libraries without walls 3: The delivery of library services to distance users. London: Library Association.
3. Vantal, R.M, G.C. Mathapalli, K. Prakash.(2004). Developing Library and Information Services for E- learning Environment. Ed. International Caliber. New Delhi.

Developing Communication Skills Effectively

Dr. Swati Dipak Damodare

Assistant Professor,

Smt. LRT College of Commerce, Akola

Introduction

English communication skills have become a part and parcel of our daily life. In spite of being a Marathi or Hindi language speaker, we ought to get command over spoken English ,as it is the language of today's corporate world, language of globalization and also language of opportunities. That's why ,some important points are discussed here , in order to develop good communication skills of English.

Significance of study

It is true that, today the communication skills are the need of hour. The introduction of new methods of teaching and learning are important, especially the activity-based method, which is one of the best interactive methods that would yield good results. This method is important to sharpen and polish our skills. In this article, some of the important activities are discussed at length that would surely make our teaching effective and effortless.

Today English has become an international commodity, like oil and the microchip! Without petrol and computers, the world will come to a halt. The English language has made the world 'a global village' by giving it a global language for communication. Today no one community can claim sole ownership over the English language, which has gone genuinely global. Its use is not restricted to one country or continent but in all the five continents of the world.

English has not only become an instrument for earning bread and butter, but also helps to develop and progress in all the spheres of life. Still English has become a Herculean task for the non-native learners who find it difficult to cope up with it due to lack of proper attention, approach, policies and healthy environment and atmosphere for learning.

Inborn Fear for English

Though English has become an inseparable part of our life, but still the learner has an inborn fear for English while using it in both written and spoken form of communication. Although, learning the foreign language is a daunting task for the learners who are not familiar and acquainted with the skills and intricacies of the language, so there is a state of confusion prevailing all over and the learner goes for all the self-justified ways of learning English.. But the fear and panic for learning the foreign language can be clearly seen and read from the faces of the learners. Even the English teachers are helpless; their brains stop working, unable to find solutions to the numerous problems, and are always in a dilemma regarding the appropriate, perfect and exact method for teaching English.

The traditional dull, drab and monotonous learning approaches are outdated and are of no use so one has to adopt a novel approach that will remove the panic, fear and disinterest and make the learners confident and English- friendly in all respects.

English Speaking Circle

The learners should form English Speaking Circle comprising minimum five learners to gain utmost result. There should be such activities that would enable the learners to learn English in an enjoyable fashion. Creating a cheerful, merry and pleasant atmosphere with the help of fun-activities will prove a blessing in disguise for the learners. The learners should undertake fun-activities while learning English that would make them enjoy and wipe off the fear and hatred for English. Once the panic is removed from the budding minds of learners, and all the fun activities are properly balanced in the allotted time slot, then it can prove wonders and produce tremendous results in the long run.

Role of the Captain of the English Speaking Circle -

The captain's role is significant and threefold, and he has to perform a role of a ring master in the group. **"He becomes more like the skillful conductor of an orchestra, drawing the music out of the performers".**

(a)To serve as a model- He is required to be a skillful organizer, manager and a manipulator using fun - activities, giving commands, giving cues to elicit correct answers and so on.

(b) To ensure the relevancy of fun-activities- He has to see, check, ensure and decide whether a fun-activity is suitable, appropriate or relevant for learning English. If the activity is related to the realistic situations or day to day situation etc then the learners would be highly benefited from it.

(c) **Active Participation-** He should try to encourage each and every student to participate in the fun-activities in the group. Active participation can build and boost the confidence of the learners that will help them to understand, speak and converse in English easily and effectively. Active participation will be beneficial in producing good results.

Learning English through various Fun- Activities –

The following fun-activities while learning English will prove to be a boon for the learners. These activities can not only make learning of English result oriented but also create enormous fun which would result in effective learning of English. Following activities are to be undertaken -

Interesting Facts of English- English language has many interesting and fascinating facts which can make the learners not only enjoy the weirdness but also learn many new things that are normally not seen and found in the text, and learnt in the normal routine. For example- Palindromes, Anagrams, Oxymoron, Tautology, Pangrams, Irish Bull, Kangaroo words, Letter words, Malapropisms, Spoonerism, Tongue- twisters etc.

Quiz- The Captain can make the learners learn different parts of speech, specific words, and grammar items etc with the help of a Quiz contest in the classroom. He can divide the group in two parts and ask them questions on various topics which can make learners understand the various grammar items easily and effectively. Example- **'His house is near the temple'.** In this sentence the word 'near' is a) Adjective b) Adverb c) Article d) Preposition. **The correct answer is (d) preposition, because near is placed before temple to show the relationship.**

Puzzles / Riddles- The Captain can encourage learners to learn English by asking them puzzles/riddles in the group that can help them to understand grammar and other items easily and effectively. The Captain can also frame puzzles/riddles in the group by giving different clues and hints to the learners. Example- 1) What travels round the world but stays in a corner? Answer: **A Stamp.** 2) What is black and white and red (read) all over? Answer: **Newspaper.**

Jokes, Anecdotes and Short Stories- Everybody loves a good English joke. Telling jokes and making people laugh is an art. One can master the art of telling jokes by regular practice and by telling them often. The jokes can break the silence, boredom and monotonous atmosphere. Along with creating fun and humour, the jokes also help to learn English easily and effectively. Many jokes are helpful in learning various items of English grammar in an incredibly simple and lucid manner. Inspiring and humorous anecdotes prove beneficial and lend a helping hand to learners. Such anecdotes kindle interest and liking for English and take hold of attention and concentration of the students towards it. Inspiring and humorous anecdotes of great writers, poets, playwrights, eminent personalities etc boost the confidence and morale of the learners. Many times even the personal experiences and memorable incidents of learners play a vital role in creating interest amongst the learners for English. It is seen that the learners lack confidence to speak and communicate in English fluently and effectively. He must enable and build confidence of the learners to tell simple short stories in English, to recite various poems, arranging and organizing plays etc to create a healthy English learning atmosphere.

Word Building and Sentence Building- In this particular activity the Captain can make the learners not only active but help them to communicate in English effectively. He draws many squares on the black board and then divides the whole group in two or more groups and asks one group to give a letter and other to use another letter for making a word, and coining of words goes on. Points are given for the correct and sensible word made by a group. In the sentence building a small sentence is made by a learner and the other adds few words to make the sentence more sensible. This goes on until the learners are unable to continue or frame new sentences.

Situational English: Using Real Objects, Flash Cards, Charts etc- Real objects are in many ways the easiest kind of visual aid to use while learning English. For Example-telephone, motor cycle, books, chalks, duster, spoon, pot etc. The set of flashcards describing various events, places, vehicles, activities etc. will surely make the learners understand the text easily and comfortably. Usually the flash cards are useful for single object or action but to display more complex visual information ex. series of pictures telling a story, a table of different verb forms or a diagram showing how a machine works can be conveniently shown on a chart.

Language Games- Many Language Games can be employed and brought in use which would prove helpful and fruitful for learners to learn English effortlessly and efficiently. The games like describing persons, directions and places, imagining, compering and anchoring and so on help the learners to enhance their stock of vocabulary, correct spellings, and achieve perfection and proficiency in all the skills of English

Oration and Extempore- Learners must be made confident in delivering speeches and extempore in English on various universal, wide-ranging and current topics. Even speeches on eminent personalities, social problems, burning issues, global topics and also on daily events can prove to be a helping hand for them.

Use of English in Real Life Situations Language of the textbook is often unnatural and artificial so it seldom helps the learners to communicate effectively. But the situation that occurs in the in real life helps the students to 'pick up' words and expressions for communication. For example- conversation on such topics like- a leaning arriving late, forgetting the textbook or notebook, importance of the day, birthday of any learner etc. During the leisure hours if the captain or the learners use English to say real things, it will give the feeling that English is used for communication and not just a language that belongs to the textbook.

Group Discussion The captain can effectively and successfully utilize the art and skill of group discussion amongst the learners. Motivating all the learners to participate actively and effectively in group discussion is a challenging task. The Captain or the group leader must provide topics of social and general interests (like child marriages, child labour, unemployment, pollution, education for all etc.), New Gov.t policies and strategies, current affairs, sports, seasons, festivals, politics etc. Since group discussion is a process of joint deliberation, it must ensure that all arguments get proper representation and freedom of expression to every learner.

Description- It is another important activity that can help the learners to acquire all the skills of English. The descriptive power of learners is developed by involving them in describing a person, place, a thing, a process, an incident and an event. This type of activity induces learners to learn a list of adjectives to describe a person or verbs to describe a working process or group words while describing events and incidents. Describing a friend, parents, native place, school, a dream, unforgettable incident makes language acquisition an interesting affair with an emotional touch.

Narration Learners can be encouraged to narrate a story. They find it innovative to provide a suitable ending to an incomplete story narrated by one of them. Connective words denoting positions, frequency, exclamatory words and typical words in a story like "once upon a time", "long long ago" etc. The learners will find necessity to hunt for words and phrases to voice their opinion without hurting others.

Locating Places and Directions:

In the present day situation, locating places in busy areas in busy areas is an uphill task. Encouraging the learners to point out the directions to their house, school, college, shops etc., by referring to the landmarks nearby is a highly relevant task for today. Learners will understand the use of 'prepositions' in real life situations.

News Reading

Newspaper is a resourceful insignia that can be put to maximum use in a classroom. Learners can develop the news reading skill and this activity should be widespread throughout a particular course so as to give a fairer chance to everybody in the class. Such activities widen the future prospects of a learner.

Compering and Anchoring:

Learners can take turns in a practicing the art of 'compering' and anchoring .A learner-compere can organise activities like debate, group discussions, consensus seeking activity , paper presentation, speech competition etc. and many more activities can be managed and organized for the benefit of learners .

Imagining:

In this activity, learners are asked to imagine what they would do in a given situation. For example, * If you win a one crore in a lottery or a jack pot, what would you do? , If you are lost in a market or in a fair? , How would you save a drowning person? etc. Learners get an opportunity to modal verbs like 'may', 'might', 'will', 'would', 'shall' etc. This activity exposes the learners to the improbable and incredible condition pattern.

Eminent Personalities:

Here the group leader provides information and brief facts about the eminent personalities of various fields like politics, sports, business, science, Art etc. He asks few questions to ensure the previous knowledge of the learners. He/She provides them the required information to increase their knowledge and keep them updated and aware with the new developments going on in the world.

Other Activities:

Learners can be engaged in various activities that can be successfully employed for their benefits. Giving a running commentary of a match, Analysis of a graphical representation, Problem solving through the students and many more activities can easily and lucratively employed.

Precautionary Measures-

No doubt, the above avowed activities are fascinating and attention & fun grabber, and are a tremendous moral and confidence booster to the native learners who are miles away from achieving mastery over the international language. But it is essential to take proper care and precaution while using them as it may many a times prove problematic and bring you into hot waters.

The following precautionary measures are to undertaken—

- Proper care to be taken to keep all the things under control and the precious time is not wasted.
- It's necessary that every learner must participate in all these activities and no one is left unnoticed.
- The activities undertaken should not hurt the feelings, sentiments and emotions of any learner. It must not attack or assault any caste, creed, religion, language etc.
- These activities must be undertaken on a regular basis and not once in a blue moon otherwise it would not arouse interest and liking for the activities and eventually for the English language.
- The learners must have keen and sincere interest in conducting and participating in the activities.

Today, English is no more limited to fashionable elite or the government officials but has become an inseparable part of the middle and the lower middle class. For them English has become a vehicle of earning bread and butter. With multinationals entering India on a big scale, English has assumed a prerequisite of good and remunerative employment.

To learn the foreign language, one has to remove fear and hatred for the foreign language. The learners must have interest, liking and love for the language which can be created only with the help of various fun-activities that can be output oriented. The stupendous progress & prosperity lies in the effective amalgamation of different techniques and methods of learning English.

Conclusions

1) The old classroom methods have to be changed for better communication skills.
2) Activity based ,two way interactive mentoring is the key for spoken language skill.
3) Fun games, puzzles, group discussions, sharing anecdotes and jocks are simple ways to get commond over language.

References/links

1) Ahuja, B.N. and S.S. Chopra, 1989, *Communication*, New Delhi: Surjeet Publications.
2) Applegate, J.L., 1980, Adaptive Communication: A Study of Teachers' Communicative Strategies', *Communication Education*, 29, 158–170.
3) Stone, Douglas et al. Difficult Conversations: How to Discuss What Matters Most. Penguin Books, 2000. This transformative book can help you see your responsibility in conflicts.

ABC of Sports And Exercise Science

Dr. Sagar Pralhadrao Narkhede
Director of Physical Education & Sports,
Saraswati Arts College, Dahihanda, Tq. Dist. Akola.

Abstract:-
  Sport science is a multi-disciplinary area involved with the information and enhancement of human sports overall performance. Sport technological knowledge may be concept of as a scientific technique used to guide the practice of recreation with the remaining goal of improving sports performance. It is about using the best to be had evidence at the proper time, in the right environment, for the proper character to improve their performance.
Key Words:- *Sports science, Exercise, Performance.*

Introduction:-
  Sports science as a subject is produced from all of these elements, with a focus on physical activity, health and performance. This enables to offer an overall picture factors that could improve, and ultimately restrict, human wearing overall performance at the highest stage.

What Is Sport Science?
  Sport science the look at of technology to sports related activities. The focus of sport science is to help improve overall performance in preparation for events and tournaments while reducing the risk of injury.
  Sports Science' covers a vast variety of fields together with human physiology, psychology and biomechanics, and their dating to sports performance, health and nicely-being. Anatomy and physiology purpose to broaden information and understanding of the fundamental structure and feature of the human body and to discuss how this knowledge may be used to enhance fitness and/or performance. Furthermore, environmental physiology offers the possibility to talk about the boundaries to human performance and survival.

The Importance of Sports Science:-
  Sports Science relates to an athlete/player's movement styles. Sports Science also carries physiology, psychology, motor control, biomechanics, nutrition, food plan, sports activities, technology, and overall performance analysis.
  Sports science, is a combination of numerous special disciplines which focuses in the main at the scientific principles in the back of exercise overall performance. It studies the applicable branches of technology, which includes physiology, psychology, biomechanics and nutrients focusing on how these numerous elements work collectively to improve bodily overall performance. The fundamental recognition of game science is to understand the relationship among workout and human body, from a cellular stage all of the way through to the effect at the frame as a whole.
  Sports Science (additionally sports activities and exercise technology, sports activities medicinal drug) is a area that studies how the healthful human frame works at some stage in exercise, and the way sport and bodily hobby sell fitness and performance from cellular to entire frame views. The study of sports science includes areas of physiology, psychology, anatomy, biomechanics, biochemistry and bio kinetics.
  A sports science covers following all scientific disciplines, each focusing on improving the performance of the athlete.

- ➢ Physiology – the branch of biology that deals with the ordinary capabilities of dwelling organisms and their components.
- ➢ Psychology – the medical take a look at of the human thoughts and its capabilities, in particular those affecting behaviour in a given context.
- ➢ Neurophysiology – expertise the apprehensive gadget and how it capabilities.

- ➢ Biomechanics – the observe of how the skeletal and musculature structures work beneath special conditions.
- ➢ Biochemistry – the department of science worried with the chemical and physico-chemical strategies and materials which occur within dwelling organisms.
- ➢ Psychophysiology – the way in which the mind and frame interact.
- ➢ Anatomy – is the identification and outline of the structures of residing things. It is a branch of biology and medicine.
- ➢ Bio kinetics – provides natural, drugless, nonsurgical health treatments and rehabilitation, and relies on the frame's inherent recuperative abilities.
- ➢ Muscle mechanics – Two styles of muscle contractions are diagnosed and defined by using whether or not a muscle shortens whilst reduced in size.
- ➢ Immunology – The have a look at of the immune machine that is a very essential department of the clinical and organic sciences. The immune system protects us from infection thru various lines of defence. If the immune system is not functioning as it need to, it may result in disease and reduced overall performance stages.

By being exposed to those various disciplines sports science may have a wide foundation of expertise to assist them decide which career direction might be high-quality desirable for them.

Conclusion:-

Sports science is the observe of the body as a performance device. Its specialties span biomechanics and psychology, and call for its professionals is growing. Whether it's supporting normal humans with their physical well-being or schooling elite athletes to react quicker undergo longer or bounce farther, sports scientists and overall performance consultants are playing an increasing number of crucial role in exercising and opposition.

Reference:-

1) https://www.sciencedirect.com/topics/psychology/sport-science
2) https://www.miun.se/en/education/courses/sports-health-and-nursing-sciences/sports-science/
3) https://ssep.com.au/what-is-sport-science/
4) https://www.footballplayeruk.com/item.php?pg=gct&pd=1019&it=11
5) https://en.wikipedia.org/wiki/Sports_science
6) https://evolveabroad.com/what-is-sport-science/
7) http://blogs.nature.com/naturejobs/2017/09/08/sports-science-an-athlete-researchers-experience/
8) https://evolveabroad.com/what-is-sport-science/

Sports Science And Sport Scientist

Prof. Firoz Ansari,

Research scholor,

S.G.B. Amravati University, Amravati

Abstract:-

Sport science applies the study of science to sporting activities. The focus of sport science is to assist maximise performance and endurance in preparation for events and competitions while lessening the danger of injury. It's used to help identify strengths and weaknesses so that a training program can be individualised for everyone from athletes to the elderly, and everyone in-between. Sports Scientists make sure that athletes are up so far with current training protocols, testing, and preparation.

Introduction:-

You're at a party, sinking a few cold ones. Your friend introduces you to one of their mates. They ask you, "what do you do?" A pretty common question to get asked right! For some, a simple answer follows, for others, it's a lot harder to answer. Sport science seems to be one of those professions that many people struggle to understand what they actually do. At times, I have found it difficult to answer this question, so it is not surprising that someone removed from the profession may have little to no understanding. So it begs the questions;

What Is A Sport Scientist?

According to Exercise and Sports Science Australia (ESSA), the leading accreditation body for sport science in Australia, Sport Scientists "help individual athletes and teams to improve their sporting performance through the use of scientific knowledge, methods and applications". Most Sport Scientists will generally undertake a Bachelor of Exercise Science Degree. Because of this, the term Exercise Science is often used interchangeably with Sport Science. Although very similar, Exercise and Sport Science are different professions and it is important to understand this difference when explaining what a Sport Scientist is. The British Association of Sport and Exercise Sciences (BASES) provide a good explanation of the difference between Exercise and Sport Science.

Sport Science tends to refer to the application of sport and exercise science principles within high performance sport, with the primary goal to maximise performance.

Exercise Science tends to refer to the application of these principles within general health and fitness, with the primary goal to improve physical and mental health through exercise.

Although a somewhat simple answer, the field of sport science is complex and multidisciplinary in nature.

Sport Scientists may be working behind the scenes as a researcher, at the coal front as a coach or as a hybrid of both (applied research). The relationship that exists between coaches and researchers plays a vital role in building on and driving our understanding of preparing athletes to perform at their best. The relationship that exists between coaches and researchers is cyclic in nature, that is, one role feeds into the next which feeds back into the previous role etc. etc. etc. In Sport Science this might look something like this;

➢ Coaches apply different training methods to their athletes. Often, some of these training methods are ahead of the research to try and get a competitive edge over their rivals.
➢ Researchers take these training methods and assess the effectiveness of them. They then provide evidence for or against particular training methods, allowing coaches to implement evidence based training programs.
➢ Researchers may also be assessing new and novel concepts around how the body adapts to training, building a base of knowledge around particular training concepts.

➢ This base knowledge may then influence coaches, resulting in them implementing new training methods, yet to be proved by research.

➢ Researchers will then assess these new methods, and the whole process repeats itself.

In addition to the different roles that exist within sport science, there are many different disciplines that coaches and researchers may work within. Disciplines involved in sport science may include biomechanics, strength and conditioning, nutrition, physiology, psychology, skill acquisition and performance analysis. Performance analysis is one discipline that has experienced considerable attention in the past few years, given the ever increasing use of data to drive training and tactical decisions in professional sport. **This is by far not an extensive list, disciplines such as biochemistry could fall under the sport science banner.

Our own research is a great example of working within different disciplines. Jared is investigating how changes in heart rate could be used to indicate changes in fatigue and performance. Using this information, it is hoped that this will allow us to understand how ready an athlete is to train and perform. Ryan (Letter) is investigating what physical and physiological qualities are related to successful performance in cricket pace bowlers. It is hoped that this will highlight the desirable physical/ physiological traits (for example maximal strength), allowing Strength and Conditioning Coaches to plan training sessions to best develop these qualities in pace bowlers.

Like many things, there is more than one way to skin a cat. Sport science is no exception to this. Yes sport science are often complex in nature, but there'll always be an underlying goal that drives a sport scientist.

Be it a Physiologist understanding the latest skeletal muscle adaptation process to a new supplement, a Strength and Conditioning Coach working to develop lower body strength or a Bio mechanist understanding the injury risk of landing in sports.

Conclusion:-

A Sport Scientist Is Someone That Uses Knowledge Domain To Drive Improvements In Sporting Performance.

Reference :-

1) https://www.sportscicollective.com/blog/what-is-sport-science
2) https://www.sportscicollective.com/blog/what-is-sport-science
3) https://brightknowledge.org/sport-leisure/sports-science
4) https://ssep.com.au/what-is-sport-science/

Importance of Playing Sports and Their Impact on Children

Prof. Dr. Anil A. Deshmukh

Prof. Rajabhau Deshmukh Kala Mahavidyalay

Nandgaon (Khn) Dist. Amravati

Abstract

Sport includes all forms of competitive physical activity or games which, through casual or organized participation, at least in part aim to use, maintain or improve physical ability and skills while providing enjoyment to participants, and in some cases, entertainment for spectators. Hundreds of sports exist, from those between single contestants, through to those with hundreds of simultaneous participants, either in teams or competing as individuals. In certain sports such as racing, many contestants may compete, simultaneously or consecutively, with one winner; in others, the contest (a match) is between two sides, each attempting to exceed the other.

Introduction

Sport is generally recognized as system of activities which are based in physical athleticism or physical dexterity, with the largest major competitions such as the Olympic Games admitting only sports meeting this definition, and other organizations such as the Council of Europe using definitions precluding activities without a physical element from classification as sports. However, a number of competitive, but non-physical, activities claim recognition as mind sports. The International Olympic Committee (through ARISF) recognizes both chess and bridge as bona fide sports, and Sport Accord, the international sports federation association, recognizes five non-physical sports: bridge, chess, draughts (checkers), and limits the number of mind games which can be admitted as sports.

Sport is usually governed by a set of rules or customs, which serve to ensure fair competition, and allow consistent adjudication of the winner. Winning can be determined by physical events such as scoring goals or crossing a line first. It can also be determined by judges who are scoring elements of the sporting performance, including objective or subjective measures such as technical performance or artistic impression.

Origin of Sports

The documented history of sports goes back at least 3,000 years. With the first Olympic Games in 776 BC—which included events such as foot and chariot races, wrestling, jumping, and discus and javelin throwing—the Ancient Greeks introduced formal sports to the world.

Development in Sports

Sport for Social Development is a method of bringing about social change through the use of sports. In the U.S. this is commonly referred to as Sports-Based Youth Development. Sport refers to the physical activity and development is any individual, health, social, and economic benefits. Sport for is used as a tool for peace and development. The programs use sport to help children learn lifelong skills as an incentive for the children to improve their scholarship. Sport is used as a tool to reach personal and community goals. Most organizations utilizing this method are geared towards underprivileged children and teenagers in urban areas.

Youth Development

Since the advent of modern Olympics in 1896, athletes have shown that sports enable people to come together in an effort to bring about global peace and to share a desire for self-improvement. Non-profit sports programs aiming to educate through similar means are part of an up-and-coming movement, however.[1] Through sport, children learn sportsmanship and other life skills. Youth sport can help them grow towards positive development and good relationships with others. Sport is a tool utilized to get young people involved in their communities. Positive peer relationships are also encouraged through coaching as well as the physical activity, which makes sport particularly beneficial to children with disorders such as ADHD. This leads to youth feeling integrated with other young people. Through being involved in sports youth can gain self-esteem when they are enjoying the experience of taking part in a sport. Sports help them gain lifelong skills and want to do better in the classroom as well. Involvement in sports have been related to one having better

cognitive functioning as well as higher grades and rest scores, satisfaction in school, engagement in school, aspirations for college, and lower dropout rates. Also, according to the Official Website of the Olympic Movement, being surrounded by a supportive group of people with similar goals, as in playing a sport, "can alleviate the negative effects of poverty." Non-profit organizations are founded in urban areas affected by poverty to help marginalized children by creating an environment to unite people across gender, race, religion, or socioeconomic background.

Methodology for playing sports

Team Member Mentoring

This approach is especially useful where there exists a range of experiences within the athletic group. Experience is not confined by how long an athlete has played. Experience also incorporates relative skill and those who possess more skills in certain areas, can mentor other team members to improve also. Mentoring is also one of the best practice elements for Athlete Induction Programs.

Athlete as Coach

This is a great method for developing depth of skill and knowledge. To be a teacher, means you have to understand your material to a high degree. Asking an athlete to become the coach for a period of the practice means they firstly have to prepare to deliver a meaningful learning experience for their team members. It gives the athlete a higher reputation to live up to and an appreciation for any challenges the coach may be facing.

Real Time and Immediate Video Analysis

There still exists the need to conduct video sessions as a stand-alone session. Sometimes you simply require more time to get your message across. However, video is often under-utilized because it is not done in real time. With modern technology, athletes can be immediately given visual feedback and this can be acted upon. It only need be a 30 second snapshot of the key message you are trying to illuminate. This use of video is far more effective than waiting for a later time and then having a large gap between when the athlete can perform the improvements you desire. Video can also be cut up and sent to the athlete on their smart phones for reference when they choose. This enables the athlete to tailor their learning to suit their needs.

Importance of sports

Taking part in sports is important for children as it reduces stress and enhances their mood. It builds healthy bones and muscles, increases fitness, improves sleep, helps them socialize, improves their cooperation skills, boosts self-confidence and lowers the risk of getting obese.

The health benefits of playing sports include proper weight management, efficient functioning of the heart, controlled diabetes, lower cholesterol levels, improved blood circulation, and lower hypertension and stress levels. It helps in the toning of muscles and strengthening of bones.

Conclusion

Sport refers to an activity involving physical activity and skill. Here, two or more parties compete against each other. Taking part in *sports* is *important* for children as it reduces stress and enhances their mood. It builds healthy bones and muscles, increases fitness, improves sleep, helps them socialize, improves their cooperation skills, boosts self-confidence and lowers the risk of getting obese. The enhancement of physical and mental development of children is certainly the most *important* contribution of *sports* for children. Educationalists have realized the importance of sports and games in the school, which improves the overall development of a candidate.

References

1) "IFAB makes three unanimous historic decisions". FIFA. Retrieved 23 April 2015.
2) "Goal-line technology set up ahead of FIFA World Cup". FIFA. 1 April 2014. Retrieved 9 June 2015.
3) "Hawk-Eye confirmed as goal-line technology provider for Canada 2015". FIFA. 31 March 2015. Retrieved 2 June 2015.
4) "Goal-line technology: Premier League votes in favour for 2013–14". BBC. 11 April 2013. Retrieved 11 April 2013.

5) "Bundesliga approves Hawk-Eye goal-line technology for new season". Carlyle Observer. Retrieved 9 June 2015.

6) "NFL approves rule to change replay process". Business Insider. 20 July 2011. Retrieved 8 June 2015.

7) "Television Match Official – when can they rule". Rugby World. 20 August 2011. Retrieved 8 June 2015.

8) Cleary, Mick (20 August 2012). "New rules for Television Match Officials will not make game boring to watch, insist rugby chiefs". The Telegraph. Retrieved 8 June 2015.

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293 (Special Issue No.70) Peer Reviewed Journal www.aiirjournal.com Mob. 8999250451

528

A Critical Study of Exercise Science with Reference to Biomechanics

Dr. Ravindra Devidas Sawarkar,
Late C. M. Kadhi Kala Mahavidyalaya, Achalpur-Camp

Abstract:

The present paper covers the subject of biomechanics as one of the important components of the study of the science of physiology in the context of exercise science. It is found that Biomechanics is a growing body of the study sport science in the age of advanced technology. The study of the movements of human body in the light of application of the laws of physics is itself increases the vital role of biomechanics to in the life of a sportsman.

Introduction

Biomechanics is a science of studies of the effects of natural law and forces on the body in sport. It is developed from the traditional subject area of kinesiology, which is also a study of movement. Kinesiology has two basic divisions- one is anatomical which is concerned with the construction and working mechanisms of the body and the other is mechanical which is concerned with the biomechanics, or the mechanics of the human body. In this regard Kinesiology is a broad term because it covers wide area of exercise science. It studies both the body parts and the physical laws that govern their movement. This indicates that the biomechanics being part, or one of the component parts is sometimes called mechanical kinesiology. However, in nut shell, in sport biomechanics is the study of the movements of human body and application of the laws of physics to it.

 From study point of view it seems that biomechanics falls into two large categories- the fundamental study of the process of simple movements and the analysis of motor skills, which are more complex and thus more pertinent to sport skills. There are seven means of conducting biomechanics studies in vogue such as the use of cinematography, stroboscopic force, platform studies, electrogoniometry, electromyography, telemetry, and computer-based studies.

Areas of Biomechanics

One of the thrusts areas of conducting the study of biomechanics consists of Cinematography uses motion picture photography to study movement. High-speed individual pictures are taken at timed intervals during a single continuing motion. Likewise, Stroboscopy employs a similar photographic technique, except that an entire skill is captured in a single picture. A stroboscopic light flashes at preselected intervals of time during the performance. Only the positions of the action during the light flashes will show up in the picture, thus providing a representative view of the entire pattern of a motion.

A force platform measures the force pushing against it, such as the amount of push that a jumper uses in leaving the ground. It is used in studying the size and direction of forces, as well as their duration, and helps to give a clearer idea of the variables in performing skills such as the sprint start which measuring the time and amount of force exerted against the starting blocks and when each foot pushes and stops pushing.

Moreover, electrogoniometry records changes in joint angles using electrical instruments, giving a clearer idea of the sequence and ranges of motion that are used in performing a skill. The electromyography uses electrical instruments to record the work of muscles. It can tell what muscles are used in a skill, which muscles only assist with the skill, and what sequence of muscles is used in performing a complex skill.

Similarly telemetry uses instruments to record electrical events in the body, which means any physical activity that can be converted into an electrical signal, such as a heartbeat. Small radio transmitters are then used to send the signal to recording instruments so that the performer can be studied while actually taking part in a normal performance, such as recording the heart activity of someone competing in a 1-mile race. The development of miniaturized electronics has allowed great advances in this type of research.

The recent, more effective electronic device, the computer can help to analyze complex skill performance. In fact, they can now be used to simulate skill activities. The mechanical characteristics of a performer, such as a discus thrower, can be fed into a computer and displayed   on a screen, along with information on the thrower's performance. The com- puter can then simulate or predict how far the discus can

be thrown if specific improvements are made in the thrower's technique. This gives the athlete a clearer idea of how a skill can be improved and the potential gain that might result from the improvement.

It is also found that no description of studies in this area can be up-to-date because the research relies heavily on the instruments of current technology. Because that technology changes rapidly, it is impossible to describe the current capabilities in a textbook because a generation of a computer technology can begin and end between the start of writing and the actual publication of a book. As one example of the benefits of technology, we can manipulate the graphic images of a performance on-screen, seeing how much better the performer could have done under ideal circumstances.

The recent development in technology has brought the advances in the speed, power, and utility of microcomputers have gone far beyond our predictions; with the massive increases in memory and processing speed, we are increasingly able to simplify incredibly complex motion analyses. The speed with which technology advances makes predictions in this area mean- ingless. We can go far beyond the past in our capacity to record the actions of the human body, which allows us to monitor performance as it happens, analyze it, and give instant feedback.

The motion analyses of biomechanics also look at two aspects of motion study- kinetics and kinematics. The kinetics studies what causes the movement of the body, while the kinematics studies the resulting movement itself. There are many other subareas within biomechanics, such as mechanics and dynamics, and even more specialized subdivisions, such as fluid mechanics, but these are better discussed in a biomechanics course. Kinetics and kinematics themselves are subdivisions of dynamics, which is simply the study of motion.

Before advancement in the biomechanical studies, It is found that a qualitative model followed, that is, it tried to develop models of good technique, which people would then try to duplicate in their own performance. Of course, good is a value judgment, a subjective evaluation. Too often, the winning performer by objective standards such as faster, farther, higher was not best in terms of the good technique. Now the change is shifted to a quantitative model, using objective measures. The performance is evaluated numerically, with specific points of measurement not rating scales or other subjective measures. In terms of performance improvement, a person may have his or her movement patterns examined and tested by computer techniques, rather than compared to the model of another person's performance.

The physical scientists like James Hay and Gavin Reid proposed a deterministic model of movement for analyzing performance. The researcher first determines the performance goal or desired outcome. The researcher can then determine the factors that affect that outcome, then go on to determine the priority of those factors. Any factor may have component sub factors, which may themselves have sub factors. This model is increasingly used in research on elite performance because the factors can be interpreted in terms of training methods, as in periodization theory. Many groups are concerned with sport biomechanics and hold meetings at the national and international levels to discuss conduct study in this field. As an instance, the International Society of Biomechanics (ISB) was founded in 1973. As well as the Olympic Scientific Congresses before each Olympic Games have offered a further outlet for research results on this topic. Members of the ACSM are involved in biomechanics research. The American Society of Biomechanics first has also conducted a meet in 1977.

With regards to the scope, the future of biomechanics research will see more joint research projects with motor learning specialists, who are interested in determining how skills are learned and the most efficient teaching procedures, and with coaches, who are interested in improving the technical performances of athletes through scientific expertise and research capabilities. The sport training focus of biomechanics research was a conspicuous part of the successful eastern European athletics in the 1970s and 1980s, with the Soviet Union and the former East Germany leading the way in their application of research capabilities to athletic performance.

Conclusion

The scientific foundations of sport biomechanics and exercise physiology are set up to conduct in depth study. These are the areas traditionally considered the hard sciences of our field. Sport biomechanics shown that the effects of natural laws and forces on the human body during sporting activities are significant. Biomechanics has developed from the traditional subject area of kinesiology, which is also the study of movement. Traditional kinesiology has two basic components- anatomical kinesiology concerned with the

construction and working mechanisms of the body and mechanical kinesiology is biomechanics or the mechanics of the human body. The importance of the study of biomechanics relies with the study of the movement of the human body in the line of the effects of the laws of physics.

Reference:

1) Silverman, S., ed. 2009. The Academy Papers: Advancing research in kinesiology. *Quest.*
2) Massengale, John D., & Richard A. Swanson, eds. 1996. *The history of exercise and sport science*. Champaign, IL: Human Kinetics.
3) Patterson, Jan. Why teach physical education history? *JOPERD in Journal of Physical Education, Recreation and Dance,* 75(7).
4) Perry, Phyllis J. 1998. *Exploring the world of sports: Linking fiction to nonfiction*. Englewood, CO: Libraries Unlimited.
5) Polley, Martin. 2007. *Sport history: A practical guide*. New York: Palgrave Macmillan.

Sport Science And Exercise Science

Prof. Sarjerao Rambhau Wagh
Director of Physical Education,
N. N. College, Dusarbid, Dist. Buldana.

Abstract:-

Sports science is that the application of scientific principles to exercise and sport. It's a rapidly expanding area and will open the door to a variety of jobs within the pharmaceutical, healthcare, fitness and leisure industries.

Sport and exercise science are often applied within a broad range of contexts. The most basic distinction which will be drawn is between its use during a 'sport science' context versus its use in an 'exercise science' context.

Introduction:-

Sport science tends to ask the appliance of sport and exercise science principles within high performance sport, where the appliance of science cares with maximising the performance of an athlete or team.

Exercise science refers to the appliance of sport and exercise science principles within health and fitness, where the appliance of science is primarily concerned with the development of physical and mental health through exercise. This covers both the role that exercise can play in preventing poor health and chronic diseases, such as coronary heart disease and diabetes, and the role of exercise in treating a variety of physiological and psychological disorders.

Sport and exercise science is that the application of scientific principles to sport and exercise, achieved through one among the subsequent three branches of science, or through interdisciplinary approaches:

❖ Biomechanics - an examination of the causes and consequences of human movement and the interaction of the body with apparatus or equipment through the application of mechanical principles. Biomechanics exploring the causes and effects of human movement and therefore the way during which the body interacts with exercise equipment.

❖ Physiology - the branch of the biological sciences that is concerned with the way that the body responds to exercise and training. Physiology is the branch of the biological sciences that is concerned with the way that the body responds to exercise and training.

❖ Psychology - the branch of sport and exercise science that seeks to provide answers to questions about human behaviour in sport and exercise settings. Psychology is that the branch of sport and exercise science that seeks to supply answers to questions on human behaviour in sport and exercise settings.

❖ Interdisciplinary - involves seeking to contribute to the body of knowledge or solve a real-world problem using two or more disciplines in an integrated fashion from the

The science of sport and exercise attempts to answer questions such as:

• What happens to the body during physical activity?
• How and why do injuries occur?
• How does the body and mind react in extreme environments?
• What can physical activity support the prevention and treatment of chronic diseases?
• How can athletes improve their performance?

With the difficulty of participation in physical activity high on the political agenda and high performance sport embracing science quite ever before, the scope and demand for applying sport and exercise science during a sort of contexts is growing.

Interdisciplinary sport and exercise sciences attempt to align theoretical principles with practical delivery, utilising more than one core sub-discipline of sport and exercise science in an integrated and co-ordinated manner, in an effort to unravel real problems for people and groups within the game and exercise environments.

Careers in sport and exercise science:-

The career opportunities available in sport and exercise science are expanding all the time and this expansion appears likely to continue for the foreseeable future. Sport and exercise scientists are employed by hospitals, universities, professional sports clubs, sport institutes and personal healthcare providers, also as a spread of other organisations.

Conclusion:-

Sport science applies the study of science to sporting activities. The focus of sport science is to assist maximise performance and endurance in preparation for events and competitions while lessening the danger of injury. It's used to help identify strengths and weaknesses so that a training program can be individualised for everyone from athletes to the elderly, and everyone in-between. Sports Scientists make sure that athletes are up so far with current training protocols, testing, and preparation.

Reference:-

1) https://brightknowledge.org/sport-leisure/sports-science
2) https://ssep.com.au/what-is-sport-science/
3) https://www.sportscicollective.com/blog/what-is-sport-science
4) http://sport.wales/elite-performance/what-we-do/sport-science-support.aspx
5) https://www.bases.org.uk/spage-about_us-about_sport___execise_science.html

The Role Of ICT, E-Learning And Communication Skills In Higher Education

Author - **Sangita Khare**   Co-Author – **Dr.Taresh P . Agashe**

Ghulamnabhiazad   Art,   Commerce   And   Science   Ghulamnabhiazad Art, Commerce And Science
College Barshitakli Dist. Akola   College Barshitakli Dist. Akola

Abstract

This paper attempts to highlights the role of ICT E-Learning and Communication Skills in higher education.The use of ICT e-Learning and Communication Skills leads itself to more students Centered. Communication is the expressing of an idea that may be verbal visual or vocal that is read perceived and heard by another person .The relationship between thoughts and expressive to the relationship between intent and content of a message.

E-learning is said to be a tool for social equity that is providing educational opportunities to all in respect of caste colour race while the promotion of access within a framework of economic development is a necessary condition for any contribution to social justice to come from ICT and E-learning through distance education

Ict helps facilities the transaction between producers and users by keeping the students updated and enhancing teacher capacity and ability fostering a live contact between teacher and students through email , chalk session e - learning , web - based leaning including internet , intranet, extranet , cd rom, tv audio .

Communication skills helps them to listen , understand the point of view of teacher in the class.
After listing and understanding what teachers are speaking about, students can ask better question with confident and it will help them to gain more knowledge.

E- Learning is a type of teaching and learning that can be obtained by means of online technology. E-learning can involve a greater ofequipments than online . training or learning as the same implies on line involves using the internet or intra net .

E –learning involves all type of electronic media by utilizing all the potentialities of information technology. The role Ict, E- learning , communitation skills in education becoming more and more important and this importance will continue to grow and develop in the 21st century. Thu the paper suggest that ICT , communication skills ,e-learning are not a technique for educational development but also a way of socio –economic development of the nation.

Keywords ICT e-learning communication skills Higher education
1. ICT information and communication technology (ICT) is an extensional term for IT that stresses the role of unified communications and the integration of telecommunications(telephone lines and wireless signals)and computers ,as well nessasory enterprise software middleware storage and audio visual systems ,that enables users to access ,store ,transmit and manipulate information.
2. E- learning–is a learning utilizing electronic technologies to access educational curriculum out side of a traditional class room . in most cases, it refer to a course , program or degree delivered completely online.
3. communication skills are those skills are which are needed to speak and write properly. A person who is able to speak appropriately whilst maintaining eye contact with the audience , uses varied vocabulary and articulate speech to suit the need of the audience id generally said to be an effective speaker.
4. Higher education – training and education at a college or university especially to degree level.

Review of Related literature:-
1. Core ICT indicators: Partnership on measuring ICT for development ,retrieved from http://www.itu.int/ITU
2. Quora, Open study ,webinar,google,wikispaces
3. Varma A 2008 ICT in the field of education Anil Verma information & technology in the field of education first edition icfai university press Hyderabad
4. Victoria .L Tinto ict in education retrieved from http:www.scribed.com
5. Zakaria kasa at all 2008 use of webcasting in education

Introduction

"Education is for improving the lives of others and for leaving your community and world better than found it" In recent years several studies and reports have highlighted the opportunities and the potentised benefits of information and communication technologies for improving the quality of education. ICT is viewed as a major tool for knowledge society. Strong oral and written communication skills are essential for success. collaborative learning is an e- learning approach where students are able to socially interactwith other students.

The concept of moving the traditional classroom of desks, notebook, pencils, blackboard, to an online forum of computer, software, and the internet intimidates many teachers who are accustomed to the face to face

interaction of the traditional class room, in the past 10 years online instruction has become extremely popular as it evident in the rise of online universities. For many students who find it difficult to come to campus due to employment. Family responsibilities health issue, and other time constrains, online education is the only options

Advancements , standard, specification and subsequent adoption have led to major growth in the extensibility , interoperability and scalability of e – learning technologies , E learning is fast becoming a major form of learning .computer multimedia offers ideal opportunities for all ,creating and presenting visually enriched learning environment .

The latest technologies associated with virtual reality will also play an important role in not too in distance future. Management institutes and educators have attempted an incorporation o collaborative group work ,problem solving and decisions making through technology as an integral component of pedagogy . There is no doubt that technology based tool can enhance students cognitive performance and achievements if used appropriately ,in accordance with knowledge learning and as a part of coherent educational approach. Computer based systems have great potential for delivering teaching and learning material in higher education .

Over the last decade in the all world there has been rapid growth in support for the use of technology within teaching and learning in higher education .in particular since 1993 the teaching and learning technology programme (TLTP) has promoted the creation of technology for use across the higher education sector .

The rapid development of ict ,particularly the internet is one of the fascinating phenomena charactrizing the information age . The main objectives of paper are to evaluate the importance of ict ,e-learning and of communication skills in higher education and to analyze the government initiatives for development of ict and e-learning as well communication skills for better results for future perspectives .

ICT And Higher Education .

The UGC initiated scheme called " ICT for teaching and learning process" for achieving quality and excellence in higher education world wide .

Research has shown that ICT can lead to an improved student learning and better teaching method in higher education.

The major teaching and learning challenges facing higher education revolve around student diversity ,which includes amongst others ,diversity in students academic preparedness language and schooling background .

Educationis perhaps the most strategic area of intervention for the empowerment of girls and women in society and the use of information and communication technology as an educational tool in the promotion of womens advancement has immencepotential .

The application of ict as a tool for effective enhancement of learning ,teaching and education management covers the entire spectrum of education from early childhood development to higher education .

E-Learning And Higher Educatoin

E-learning improves the quality of higher education.It can give increased flexibility of learning experience to students enhance access to information resource for more students. The potential to drive innovative and effective ways of learning and teaching at very low marginal cost . e-learning can be devided in several different types web-supplemented courses focus on classroom based teaching but include elements such as putting a course outline and lecture notes on line ,use of email and links to online resources . web - dependent course require students to use the internet for key elements of the programme such as online discussion ,assessment ,or online project work but without significant reduction in classroom time in mixed courses the e learning elements begin to replace

Communication Technologies used in E-learning

Communication Technologies are generally categories as asynchronous or synchronous asynchronous activities use technologies such as blogs ,wikis and discussion boards .the idea here is that participant may engage in the 3exchange of ideas or information without the dependency of other participants involvement at the same time .this learning gives students the ability to work at their own place .this is particularly beneficial for students who had health problems or has child care responsibilities and regularly learning the home to attend lectures in difficult .they have the opportunities to complete their work in a low stress environment and within a more flexible time frame.

Synchronous activities involve the exchange of ideas and information with one or more participants during the same time period .synchronous activities occur with all participants joins in at one ,as with an online chat session or a virtual classroom or meeting .learning management system and learning content management system is software used for delivering tracking the managing training education .lms range from system for

managing training educational records to software for author content courses ,reusable content object computer aided assessment ranging from automated multiple choice tests to more sophisticated system is becoming increasingly common .with some systems ,feedback can be geared towards students specific mistakes on the computer can navigate the student through a series of questions adopting as what the student appear to have learned or not .

Communication Skills And Higher Education

Communication skills are one of the elements of generic skills that are essential among university students Effective communication are more likely to succeed and to be seen as strong leaders. They also tend to enjoy higher earning potential. Generally communication can be defined as a process of exchanging information from person giving the information through verbal and nonverbal method ,to the person giving the information. The most common method of communication is verbal ,using a specific language where it is a two way process ,with feedback on the message received .communication also involve the exchange of ideas

Benefits And Challenges Of Technology In Higher Education

Tools are now available on the internet to assist both teachers and students to manage writing assignments to detect to avoid the pitfalls of plagiarism and copyright violation .one of the great benefits of ict in teaching is that they can improve quality and quantity of educational provision .for this to happen however ,they must be used appropriately .

While using ict in teaching has some obvious benefits ,icts also brings challenges .first is the high cost of acquiring ,installing ,operating ,maintaining and replacing icts .while potentialities of great importance ,the integration of ict into teaching is still in its infancy. Introducing ict system for teaching in developing countries has a particularly has opportunity cost because installing them is usually more expensive in absolute terms than in industrialized countries whereas ,in contrast ,alternative investments are relatively costly .

Use unlicensed software can be very problematic ,not only legally but in the costs of maintenance ,particularly if the pirated software varies in standard formats .even though students can benefits immensely from well pronounced learning resources ,online teaching has its own unique challenges as not all faculties are ict literate and can teach using ict tools.

The four most common mistakes in introducing icts tool into teaching are installing learning technology without reviewing students needs and content availability ,imposing technology from top down without involving faculty and students ,using inappropriate content from other regions of the world without customizing it appropriately and producing low quality content that has poor quality instructional design and is not adopted to the technology in use .

The other challenges fgaced is that in many developing nations the basic requirements of electricity and telephone network is not available .also many colleges do not have proper rooms or buildings so as to accommodate the technology .another challenge is that the teacher need to develop their own capacity so as to efficiently make use of the ict and mooc platforms of e-learning .teachers should not scared that ict wouldreplace teachers English being the dominant language most of the online content is in English .this cause problems as in many nations the people are not conversant or comfortable with English.

Conclusion

ICT E-learning and communication skills have become strong tools to unlock any profession . Students and educator both should participate as proactively as possible to get higher results. It is believed that all these three factors named ict ,e-learning and communications skills can increase access to learning opportunities .it can enhance the quality education with advanced teaching methods ,improve learning outcomes and enhance better management of higher education . Apart from having enabling telecommunications and ictpolicies ,governments and higher education institutions will need to develop strategies for effective ict and media deployment and sustainability .

References

1) Core ICT indicators: Partnership on measuring ICT for development ,retrieved from http://www.itu.int/ITU
2) Quora, Open study ,webinar, google, wikispaces
3) Apprasing the role of information communication technology (ICT) as a change agent for higher education in Nigeria .International journal of education

National Conference on Multidisciplinary Research in Science and Technology for Healthy Lifestyle Management (NCMRST- 2020) Organizer :- Shri R.L.T. College of Science, Akola

24th Jan. 2020

Alterations In Some Haematological Parameters Andserum Proteins During Addiction To Opioid Drug Contramal

R. L. Rahatgaonkar

Department of Zoology,

Shri RLT college of Science, Akola

The male albino mice were made addicted to opium by administrating (im) smaller doses of opioid drug "Contramal" daily for 60 days. After 60 days the mice were sacrificed for investigations pertaining to serum protein profile and haematological alterations. Significant increase in α2 and ϒ globulins was recorded indicating nephrotoxic and hepatotoxic effect of opium after long term addiction

Introduction

Recent speculations have suggested that haematological tests are important diagnostic tools which may be equally valuable as indicators of disease or stress due to drug reactions or toxicants or pollutants. The blood plays an integrated and inevitable part in all immune systems (Lachmann and Peters. 1986; Sadhana *et al* ., 1987; Haedikarin, 2000) Haematological parameters are related to the responses of the organisms to the changing physiological conditions and hence can be used to known the healthy state and tolerance capacity of the animals (Briton, 1963 and Johri *et al* ., 1990). Further, haematological changes obtained during toxicological studies.

Anaemia due to decreased level of hemoglobin content or decreased number of erythrocytes, increase on lymphocytes and neutrophils in nephrosis and liver necrosis are well known haematological alterations (Dacie and Lewis, 1977; Singh *et al* .,1984 Gupta *et al*.,1986)

An opioid analgesic drugs which interferes with functioning of cells involved in immune response as this drug is known to cause injury to bone marrow cells. Anaemia associated with decreased erythrocytes, hemoglobin percentage and haematocrit value has also been recorded to occuer in response to drug addiction (Mello,1987)

Because of the above rather contradictory results in the haematological literature and histo-pathological lesions obtained it was thought to study the chronic effects of contramal with special reference to serum protein profile and haematological alterations in the albino mice.

Materials and Methods

The present investigations were carried out on the male Swiss albino mice weighing about 30 ± 2 g. The mice were obtained from the animal house of P.D. Medical college, Amravati. They were maintained under standard laboratory conditions and fed with pellet diet. (Lipton, India) and water *ad libitum*. Proper care was taken to avoid any infection and only healthy mice were used for experimental purpose.

The mice divided into two groups. Group I was treated as control and it comprised of 10 male and 10 female mice, administered (im) with 0.2ml distilled water, as aa vehicle daily once up to 60 days. The Group II was an experimental group, comprised of 10 males and 10 females mice. Only male mice were administered (Im) with 0.05 mg/kg dose of contramal daily once up to 60 days.

Contramal (tramadol Hydrochloride, 100 mg) was purchased from S G Pharma, Baroda , India. The chemical name of the drug is (I RS: 2RS)-2(dimethylamino methyl)-I-(M-methoxyphenyl)cyclohexanol-hydrochloride.

After 30 And 60 days of the drug administration the male mice of both the groups i.e. control as well as experimental, venous blood from the orbital sinus of each mice was drawn with the help of a corning thin glass capillary. 0.5 ml blood was collected in heparinized glass was taken into eppendorf tube to separate the serum. After blood collection the male mice was sacrificed with cervical dislocation.

The haemoglobin (g %) was recorded by the method of sahil' s acid haematin and RBC count, total leucocytes count, differential leucocytes count was calculated by the method of Neubauer's chamber (Dacie and Lewis, 1977) The serum protein profile was recorded by using PAGE and scanned on Systronic Densitometer (Type 201)

The results are reported as mean ± SE (n =6) and statistical analysis was done by student ' t' test (Fischer, 1950)

Observations and results

No mortality was observed during the experimental period in all athe mice administered (im) with the vehicle and contramal separately. The data showing the changes in some blood parameters of male albino mice after intramuscular administration of contramal for 60 days has been summarized in table (I). The intramuscular

Aayushi International Interdisciplinary Research Journal (ISSN 2349-638x) Impact Factor 6.293
(Special Issue No.70) Peer Reviewed Journal www.aiirjournal.com Mob. 8999250451

537

administration of 0.05 mg/kg dose of contramal resulted into decreased haemoglobin content in male albino mice. The present decrease was 12.94 % and 34.49 %. After 30 and 60 days of treatment (Table 1). After 60 days the decrease was significant at P<0.01, similar decrease in total erythrocytes count was recorded. The decreased erythrocytes count was recorded. The decreased erythrocytes count   was moderately significant after 30 days of treatment (p<0.05)and it was highly significant (P<0.01) after 60 days of treatment. The percent decrease was 6.55 and 25.68 in male mice after 60 days of treatment. Table 1 represent the effects of opioid drug i.e. contramal on the total leucocyte count (TLC) of the male mice, an increase was recorded in TLC after 30 and 60 days of contramal administration. The rise in total leucocyte count was 76.43 % and 125.83 % however, differential leucocyte count was undertaken to know the alterations in lymphocytes. Monocytes, neutrophils, eosinophils and basophils number in control as well as experimental mice. A duration dependent increase in lymphocyte number was observed in contramal treated mice with simultaneous decreases in neutrophils. However, no significant change was recorded in eosinophils, basophils and monocytes.

The serum proteins like albumin and globulins were studied in control as well as drug treated mice. The results are summarized in table 1. The present data indicate that the amount of α globulin and β globulin decreases along with decreases in albumin. The A:G ratio was decreased in experimental mice over that control group.

Discussion

Administration of opioid drug, i.e. contramal in male albino mice resulted into decreased haemoglobin content and decrease in the number of total erythrocytes (Table 1) The present findings are in agreement with the findings of the earlier workers(Briton. 1963 Lachmann and Peters. 1986: sadhana *et al* , 1987; Young and Liu, 1988; Johri *et al*, 1990; Hardikarin 2000).

The decreased haemoglobin content observed in the present investigations might be due to (1) reduced erythrocytes count recorded in all the experimental mice interference of this drug (Table -1) (2) Glucoses-6-Phosphate dehydrogenase deficiency induces massive level when treated with opioid drugs (Rodwell, 1993) Normal functioning of glucose-6-phosphate dehydrogenase is necessary for maintaining glutathione in its reduced or which in turn protects the erythrocytes from damage, The decreased heamoglobin content observed in the present investigation could also be due to deficiency of glucose-6-phosphate dehydrogenase (Hartl, 1993 and kumar *et al*.,1985). (3) The decreased erythrocytes count and haemoglobin content in the present investigation might be due to the interference of contramal with the development of erythrocytes in the bone marrow. According to Nieforth and Cohen (1989) opioid drugs are known the cause injury to bone marrow cells depleting the haemoglobin and erythrocyte count. In the present investigation depleted neutrophil count has been observed which might have resulted due to immune mechanism when the excess to antibodies produced lyse the granulocytes in the presence of drugs (Jain *et a*l,. 1988). However, the increased lymphocyte cunt was noted after 60 days of contramal treatment which might be preventing the damage to the immune mechanism during the course of treatment.

Serum protein studies resulted into increased β globulin in the experimental mice administered with the contramal after 60 days treatment (Table 1). This is due to the accelerated production of lg-G as an immune response to drug, Increased β globulin during histopathological lesions is recorded by several workers (Lachmannans Peters, 1986; Sadhana *et al*., 1990; Dasgupta, 1992; Hardikarin, 2000), Thus the present results are well in agreement with those of above workers, Similarly .the increased level of α_2 globulin in contramal treated mice indicate hepatotoxic nature of drug and increased level of ß globulin during same treatment indicate nephrotoxic nature of contramal. During hepatic lesions there is particularly rise in α_2 globulin and during nephrosis, β globulin increases (Varley, 1969, Neiforth and Cohen, 1989; Rodwell, 1993). In the present investigation, serum albumin was found to be depleted significantly which could be due to increased denaturation and increased production of globulin seen during course of treatment. This has resulted into decreased A:G ratio. Our results are well in agreement with that of Bhaskara Rao *et al* (1985), who reported depleted serum albumin in human beings treated with the analgesic drug, acetic salicylic acid and decreased A:G ratio in the opioid drug like morphine treated mice.

Thus, the present results indicate that the long term use of the drug, contramal produce secondary haematological alterations indicative of hepatotoxicity and nephrotoxicity.

Table 1, Serum proteins and haematological alterations in albino mice (male) administered (im) with contramal for 60 days.

Parameters	Control (With vehicle)	Experimental (After 60 days treatment)	
		30 days	60 days
Haemoglobingm%	11.6 ± 0.66	10 10.1 ± 0.12**	07.6 ±0.05**
R.B.C Count/mm	7.79 ± 0.05	7.28 ± 0.08**	5.79 ±0.02**

W.B.C Count/mm.	8233.00 ± 168	14526.15 ± 331**	18593.03 ±265**
Neutrophils%	49	25.5	23.9
Lymphocytes%	34	59	63.0
Eosinophils%	06	02	03.0
Monocytes%	10	12	09.0
Basophils%	01	1.1	1.5
Serum Proteins (Total)	4.87 ±0.15	6.68 ±0.23**	6.99 ±0.35**
Albumin mg/100ml	02.26	01.61	00.55**
α_1 Globulin	00.26	00.20	0.40
α_2 Globulin	00.40	00.52	1.09
β Globulin	1.62	03.98	4.70*
ϒ Globulin	00.46	00.68	00.24
A:G Ratio	0.44	0.30	0.17

Values are ± SE of 5 replicates from each group *p<0.05. **p<0.01, NS- Not Significant

Serum protein values denote densitometer reading in percent fraction

References

1. BhaskarRao A, Sirsodia P and Sattur PB(1985) Inhibition of heat induced Denaturation of human serum albumin by Anti-inflammatory drugs. *Ind J. Pharma.*17: 236-237
2. Briton CJ (1963) *Disorders of blood,* 9thEdn. Churchill. London.
3. Dacie JV and Lewis SM (1977) *Practical Haematology.* Edinburgh. ELBS and Churchill. Livingstone.
4. DasguptaA(1992) "Modern Immunology", 2ndedn, Jaideep Brothers Medical Publisher. New Delhi. 60-   68.
5. Fischer RA (1950) In : *statistical Methods for research workers.* 11thedn, Oliver Boyd London.
6. Gupta M, Bagchi G, Gupta SD, Dey SN, Mukharjee S, Roy A and Roy DK (1988) Hepatorenal toxicity of nuvacron and furadan in mice. *Ind. J. Expt. Biol.* 26: 237-240
7. Hardikarin BP, Kulkarni NS, Kurve NG and Barve SS (2000) Cytotoxic effects of three analgesic OTC   drugs on lymphocyte culture. *Bulletin of Pure and Applied Science,* 19(A) :15-22.
8. Hartl DL (1983) *Theregulation of gene expression haemoglobin,* Cited from Human Genetics.Pub.by Harper and Row. New York. 99-126
9. Jain P. Khanna NK and Godhwani JL (1988) A possible drug interaction between aspring and L- glutamine   on some experimental inflammatory and analgesic model. *Ind. J. Expl. Biol*.20:368-370
10. Johari RK, Dhar SK, Pahwa GS, Sharma SC and Zutshi U (1984) Toxicity studies with potassium embelate,   a new analgesic compound. *Ind J, Expt. Biol.* 22:608-611.
11. Kumar H. shara V V and Kulshrestha VK (1985) On the effect of some anti-inflammatory drugs on   serum half life and hypoglycemic response. *Ind. J Pharmac..* 17: 158-164
12. Lachmann P and Peters, DK (1986) Clinical aspects of Immunology.Blackwell Scientific Publications. Oxford.24-27
13. Mello N. K (1987) A behavioural analysis of the reinforcing properties of alcohol and other drugs in man.In the pathogenesis of alcoholism, Biochemical factors. B. Kissin, H. Begleiter (eds) New   York. Plenum.Vol-7.133-198.
14. Neiforth AK and Cohen ML (1989) "*Analgesic*" cited form Principles of Medical Chemistry, edt. W. O.   Foye, 3rd edn. Varghase Publisihing House, Mumbai. 277-309
15. Rodwell WW (1993) Protens: Myoglobin and Haemoglobin. Citedfrom Harper's Biochemistry by Murray   R.K. D.K. Granner, P. A. Mayes and V. W. Rodwell.23rd edn Prentic Hall   International.   Inc Mexico. 49-59
16. SadhanaSV , Sharma VV and Kulshestha VK (1987) Comparative biochemical and haematological   study of enfenamic acid and some non steroidal ant-inflammatory drugs. *Ind. J. Pharmac*. 19; 94-99
17. Sing KP, Saxena AK, Srivastava SN and Ravi Shankar (1984) Effect of caffeine (1,3,7-   trimethlxanthine) on bone marrow cells of mice. *Ind. J Expt. Biol.* 22; 608-611.
18. varley H (1969) The plasma proteins, Cited from Practical Clinical Biochemistry, CBS Publisher and Distributor. New Delhi. 230-237
19. Young JD and Liu C (1988) Multiple mechanisms of lymphocyte mediated killing. *Immunol.Today.* 9:   140-156.