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A Two-Day International (Web) Conference On "New Vistas in Aquatic & Terrestrial Biology and Environment during Current Pandemic" (ATBE-2021)

Organized by

Department of Zoology

R. S. S. P. Mandal's Nanasaheb Y. N. Chavan Arts, Science & Commerce College, Chalisgaon, Dist. Jalgaon (M.S.) India

In Joint Collaboration with

Nepal Aquaculture Society, Nepal,

Glocal Environment and Social Association (GESA), New Delhi

March 26 & 27, 2021

Conference Special Issue - 23 March - 2021

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A Two-Day International (Web) Conference On

"New Vistas in Aquatic & Terrestrial Biology and Environment during Current Pandemic"

(ATBE-2021)

Date : 26 & 27 March, 2021

Organized by

Department of Zoology, R. S. S. P. Mandal's Nanasaheb Y. N. Chavan Arts, Science and Commerce College, Chalisgaon, Dist. Jalgaon (M.S.) India.

In Joint Collaboration with

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About Organizers:

Nanasaheb Yashvantrao Narayanrao Chavan Arts, Science and Commerce College, Chalisgaon, Dist. Jalgaon (M.S.), India:

Nanasaheb Yashvantrao Narayanrao Chavan Arts, Science and Commerce College, Chalisgaon, Dist. Jalgaon (M.S.) is a branch of the huge tree of the Rashtriya Sahakari Shikshan Prasarak Mandal Limited, Chalisgaon established in 1984, under the tenure of Shikshan Maharshi Shri. Nanasaheb Yashwantrao Narayanrao Chavan with his noble mission **"Saa Vidya Ya Vimuktaye**". The College runs 20 departments of the U.G. courses along with post-graduation in the subjects of Zoology, Computer science, Botany, and Geography. The college also runs effectively the courses viz. BCA, BBM, MCM and 21 COP courses viz. Certificate, Diploma and Advanced Diploma. Research facilities are also available in the department of Zoology, Geography, English and Chemistry respectively. The department of Zoology of the college has rich heritage of Dr. B. M. Murhar pioneering contribution towards research in Helminthology.

Nanasaheb Yahvantrao Narayanrao Chavan Arts, Science and Commerce College is affiliated to Kavayitri Bahinabai Chaudhari North Maharashtra University, Jalgaon, (M.S.), India and is recognized under section 2(f) & 12 (b) of the UGC Act 1956. National Assessment and Accreditation Council (NAAC), Bangalore has re-accredited the college in IInd Cycle with A grade (CGPA 3.10) in 2014 and in IIIrd Cycle with B^{++} grade (CGPA 2.77) in 2019. The college is the recipient of Best College Awardee of KBCNMU, Jalgaon.

Glocal Environment and Social Association (GESA), New Delhi:

In order to serve a bit, the Nature and Society for better future, the Glocal Environment & Social Association (GESA) is constituted. Its headquarter is located in New Delhi. Its main aim is to develop and promote 'global thought and local action' ideology to save the nature. It organizes the seminars; workshops etc. to aware and educate the people on blazing environmental and social issues. The GESA felicitates the persons and organizations for their outstanding services rendered in various fields of agriculture, arts, biodiversity conservation, commerce, culture, education, environment, healthcare, humanities, literature, mass communication, music, patriotism, peace and harmony, science, sports, technological innovations and other social services.

About Conference:

The COVID-19 outbreak is a global financial and public health crisis. Economic growth has shown a steep drop and is predicted to continue the same considerably in the near future to a great extent on a long term basis. COVID-19 has raised the alarm and given us the warning signal that scientific cooperation is an important key when dealing with global public health issues.

The Theme- "New Vistas in Aquatic & Terrestrial Biology and Environment during Current Pandemic (ATBE-2021)" is appropriate in the present scenario as the world's population is growing fast and natural resources are becoming limited. With a projected increase in global population by 2050, food production must double. Innovation in biological sciences will play an important role in the future success of animal agriculture, aquaculture, biodiversity, food safety and rural economy.

The research in biological sciences is necessary in order to continue providing safe and abundant food supplies for the growing global community with sustainable approach so as to protect our natural resources.

Aquaculture is the fastest-growing food sector worldwide. Aquaculture refers to raising and breeding aquatic animals (fish, shrimp, crab, shellfish, etc.) for economic purpose by the use of ponds, reservoirs, lakes, rivers and other inland waterways which play an important role. With an increasing global population and improving perception of fish food in diet, aquaculture must ensure that production yields are optimized.

The main aim of the present International conference is to bring together leading academic scientists, researchers, academicians and research scholars to exchange and share their experiences and research results on all aspects of biological sciences, aquaculture and environmental issues across the world. It will also provide a premier interdisciplinary platform for researchers, participants and educators to present and discuss the most recent advances/innovations, trends and concerns in the various fields.

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Nanasaheb Y. N. Chavan Arts, Science & Commerce College,


A Two-Day International (Web) Conference On
"New Vistas in Aquatic & Terrestrial Biology and Environment during Current Pandemic" (ATBE-2021)
Organized by
DEPARTMENT OF ZOOLOGY
Nanasaheb Y. N. Chavan Arts, Science & Commerce College,
Chalisgaon, Dist. Jalgaon (M.S.) India
Valedictory Function
Chairperson
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Guest of Honour

॥ जगरी पेदु ज्ञानज्योत ॥

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Prof. E. Vayunandan

ACTG. VICE-CHANCELLOR

MESSAGE

I am happy to know that R.S.S.P. Mandal's Nanasaheb Yashvantrao Narayanrao Chavan ASC College, Chalisgaon is organizing A Two Day International (Web) Conference on "New Vistas in Aquatic & Terrestrial Biology and Environment during Current Pandemic (ATBE-2021)" on 26th & 27th March, 2021.

This conference is providing a common platform to the researchers to share views on the problems of common interests in Aquatic & Terrestrial Biology and Environment during Pandemic. The deliberations in this conference will definitely play an important role in providing information related to the recent advances during current pandemic. I am sure that this conference will facilitate interaction between researchers and encourage them to pursue their research effectively.

I wish the International (Web) conference a grand success.

E. Vayunandan

(Prof. E. Vayunandan)
Actg. Vice-Chancellor

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MESSAGE

From Chairman's Desk

It is my privilege to extend a very warm welcome to the inaugurator Prof. Vayunandan, the Honourable Vice-Chancellor of Kavayitri Bahinabai Chaudhari North Maharashtra University, Jalgaon, all the eminent Resource Persons, invited speakers and the delegates on the occasion of this International Web Conference on "New Vistas in Aquatic & Terrestrial Biology and Environment During Current Pandemic" organized by the Department of Zoology on 26 and 27 March 2021. Nanasaheb Y. N. Chavan Arts, Science and Commerce College is one of the best colleges in our University area and has completed the third cycle of Assessment and Accreditation with B + + Grade awarded by NAAC. The college is currently running Twenty U. G. and Four Post-Graduate courses.

All the sections of life and all the countries in the world have been adversely affected by the Corona-19 Pandemic. This Conference is of a great relevance as it will shed light on the consequences of Corona virus and will also point out the prospects of sustainable development and applied aspects of Biology and Environment sciences. The scholarly deliberations and presentations by eminent researchers and participants will show innovative ideas or solutions for overcoming this chaotic situation.

Once again I warmly welcome you all to this International Web Conference on behalf of Rashtriya Sahakari Shikshan Prasarak Mandal Ltd, Chalisgaon Dist. Jalgaon (M. S.).

Bapusaheb Dr. Shri. M. B. Patil
Chairman
R. S. S. P. Mandal Ltd. Chalisgaon
(M. S.)

MESSAGE

From Secretary's Desk

It gives me a great pleasure to note that Nanasaheb Y. N. Chavan Arts, Science and Commerce College run by our Sanstha R.S.S. P. Mandal Ltd. Chalisgaon Dist. Jalgaon (Maharashtra) is organizing an International Web Conference on "New Vistas in Aquatic and Terrestrial Biology and Environment During Current Pandemic" on 26 and 27 March 2021.

The theme of the Conference is globally relevant. The Conference will promote studious interactions and presentations by the genuine researchers, eminent Resource Persons and the delegates. The deliberations will throw light on the fundamental and applied aspects of Biology and Environment sciences and pinpoint their significance in the current COVID-19 Pandemic. The Conference will reveal the hidden potentials in Biology and Environment sciences for sustainable development and for successfully overcoming the Pandemic situation. The deliberations and presentations will surely open up new avenues unexplored in these areas.

I heartily welcome the learned Professors, the eminent Resource Persons, the researchers and the participants from abroad and from India and wish this Conference a grand success !!

Bapusaheb Vrukshmitra Shri. Arun B. Nikam
Secretary
R. S. S. P. Mandal Ltd., Chalisgaon
Dist. Jalgaon (Maharashtra)

MESSAGE

From Vice Chairman's Desk

I am very delighted to state that Nanasaheb Y. N. Chavan Arts, Science and Commerce College, Chalisgaon, run by our Sanstha R. S. S. P. Mandal Ltd. Chalisgaon is organizing a Two-Day International Web Conference on "New Vistas in Aquatic and Terrestrial Biology and Environment During Current Pandemic". The theme of Conference will bring a rich fund of knowledge on the new avenues in Aquatic and Terrestrial Biology and Environment and the new applied aspects in these sciences.

The participation of learned and eminent Resource Persons, researchers and delegates will bring to light the potentials and prospects of Biology and Environment for sustainable development. This has a great and unique importance in the current Pandemic situation of COVID-19. I hope that the Conference will show the world the positive signs for overcoming this Pandemic.

My best wishes for the success of this Conference!!

Dadasaheb Dr. Shri. Sanjay Gopalrao Deshmukh
Vice-Chairman
R. S. S. P. Mandal Ltd., Chalisgaon
Dist. Jalgaon (Maharashtra)

MESSAGE

From Joint Secretary's Desk

An International Web Conference is being organized on 26 and 27 March 2021 by Nanasaheb Y. N. Chavan Arts, Science and Commerce College, Chalisgaon Dist. Jalgaon. The selection of the theme "New Vistas in Aquatic and Terrestrial Biology and Environment During the Current Pandemic" is very thoughtfully done. The world has been experiencing the adverse effects of COVID-19 Pandemic. It is in the fitness of things that there are serious deliberations and interactions among the learned scholars and researchers about these sciences to tackle this Pandemic and to promote sustainable development for the present and future generations. Congratulations to the Department of Zoology for selecting the relevant theme for this Conference.

The Conference will add a feather to the crown of the college and the Sanstha-Rashtriya Sahakari Shikshan Prasarak Mandal Ltd. Chalisgaon Dist. Jalgaon (M.S.) Best wishes for the success of the Conference !...

Abasaheb Shri. Sanjay Ratansing Patil
Joint Secretary
R. S. S. P. Mandal Ltd., Chalisgaon
Dist. Jalgaon (Maharashtra)

MESSAGE

From Principal's Desk

We are privileged to organize a Two-Day International Web Conference on "New Vistas in Aquatic and Terrestrial Biology and Environment Sciences During Current Pandemic" on 26 and 27 March 2021.Our college is run by R. S. S. P. Mandal Ltd. Chalisgaon Dist. Jalgaon. Our Sanstha was founded by a visionary Late Shri. Nanasaheb Y. N. Chavan in 1953. At the present the Sanstha has 37 branches including a Senior college, High Schools, Junior Colleges, Kanyashala, Ashramshala and a school for Blind students. The college was established in 1984 and functions strictly in consonance with the vision and mission of spreading higher education in rural area in Social Sciences, Humanities, Commerce and Management and Basic and Applied Sciences with humanitarian, national and international outlook. The college runs courses like B. A., B. Com., B. Sc., B. C. A., B. M. S., M. M. S. and M. Sc. (Botany, Zoology, Computer and Geography). The strength of the college is 2300 and 60% students are female. In addition, there are 23 COP Courses. The college has been awarded A Grade in the 2 nd cycle and B + + Grade in 3rd cycle. The college is the recipient of The Best College Award by KBC North Maharashtra University, Jalgaon and has been the Best College in Sports consistently.

The whole world has been adversely affected by the COVID-19 Pandemic. This Conference is of a great significance because it will shed light on the new avenues in Biology and Environment Science and also their basic and applied aspects. The learned and eminent Resource Persons, speakers and researchers from Nepal and India have been invited for the Conference. The presentations and deliberations in this Conference will show hope for survival and sustainable development of humanity during COVID-19 Pandemic and in future.

DR. S. R. JADHAV
Principal
Nanasaheb Y. N. Chavan Arts, Science and Commerce College, Chalisgaon, (M. S.) India

MESSAGE

From the Desk of Convenor

It's my immense pleasure to welcome all the dignitaries, scientists, delegates and researchers on behalf of Organizing Committee of the Two Day International (Web) Conference On New Vistas in Aquatic & Terrestrial Biology and Environment During Current Pandemic (ATBE-2021) organized by Department of Zoology on 26th and 27th March, 2021. It's a great honour bestowed upon me by Hon. Principal of our College, Dr. S. R. Jadhav for giving me this opportunity to be the Convener of this International Conference. His advice and guidance have enabled me to overcome the difficulties during the course of this event.

The theme of the Conference has a wide scope and great relevance in the context of the current scenario of basic and applied biological and environmental science. The researchers in this field are reaching to the great heights. As it is multidisciplinary and dynamic, it will definitely provide us some good results in the field of sustainable development of global diversity and wildlife conservation, pollution and waste management, bio reclamation and bioremediation.

This Conference is the need of new era. During this conference there will be one keynote address, fourteen plenary lectures and three technical sessions. I hope the Conference will be fruitful by scientific deliberations on fundamental and applied aspects on biological and environmental science.

On behalf of Organizing Committee, I am grateful to our patrons, the Managing Board of R. S. S. P. Mandal who have directly or indirectly helped us for making this conference a successful event.

We are thankful to all eminent Resource Persons, participants and well-wishers for their moral support and cooperation for this Conference.

Prof. Ajit T. Kalse
Convener ATBE-2021

MESSAGE

From the Desk of Organizing Secretary

Dear colleagues

On behalf of the PG Department of Zoology, Nanasaheb Yashwantrao Narayanrao Chavan Arts, Science and Commerce College, Chalisgaon, Dist. Jalgaon, affiliated to KBCNMU Jalgaon, M. S., India and Organizing Committee, it's my great honor and pleasure to invite you to participate in the **A Two Day International (Web) Conference on New Vistas in Aquatic and Terrestrial Biology and Environment during Current Pandemic (ATBE-2021)** to be held on March 26-27, 2021. This Conference is a global platform to discuss and learn about Life sciences, Aquaculture, Terrestrial biodiversity, Animal biodiversity, perspectives in Forensic science, Integrated pest management, Environment issues etc. Our main objective is to generate new findings and collaborations among scientists, researchers, students and learned Professors from various parts of the world, which will provide dynamic platform to exchange the ideas, knowledge and to increase the network. In this International Conference more than 15 plenary lectures will be delivered by experts from different branches of sciences, fields of knowledge and subjects. So we hope that this International Conference will be productive and fruitful. So we invite you and welcome all delegates and participants to join the web conference. Let's be a part of this memorable event.

Dr. Y. M. Bhosale
Organizing Secretary
ATBE-2021

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A Two-Day International (Web) Conference
New Vistas in Aquatic & Terrestrial Biology and Environment During Current Pandemic (ATBE-2021)
26 & 27 March, 2021
Department of Zoology R.S.S.P. Mandal's Nanasaheb Y. N. Chavan Arts, Science and Commerce College Chalisgaon, Dist. Jalgaon (M.S.) India.

Physico-Chemical Characteristics of Sewage Water From Hingoli City, Maharashtra

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Abstract: *Sewage water is wastewater from people living in a community. It is the water released from households after use for various purposes like washing dishes, laundry, and flushing the toilet, thus the name wastewater. The used water moves from the houses through pipes installed during plumbing. The sewage water then moves into sewers, either constructed by the house owner, or into a sewer facility set up by the municipality. Increasing industrialization and population cause increase in living of standard which results decrease in the quality of water. Due to generation of maximum sewage, it flows in open drainage and some percolate in soil. The sewage from Hingoli city is flows and mixed up into Kayadhu River. For the study of physicochemical parameters two points were selected. One where actual flow is discharged and another is one km away from this point in between these points many weeds were present. Monitoring of water from these two points were done after regular intervals. Sewage analyzed for various physicochemical parameters such as pH, temperature hardness, chloride, total dissolved solids, total suspended solids, total alkalinity, BOD, COD, sodium, potassium, etc. The result from these study shows that various physicochemical parameters were reduces at second point. It indicates that the weeds were accumulating the various constituents from the sewage and were helping for reduction of water pollution. There is a dire need for sewers to be emptied owing to the increasing use of water by people. Therefore, treatment is essential. It ensures the water released into the local water ways such as rivers is safe and clean with an aim of ensuring it does not cause harm to the people or the aquatic life. To ensure the waste water is clean and safe, there are various steps involved in the treatment process.*

Key words*: Sewage water, physicochemical parameters, weed, treatment.*

1. INTRODUCTION:

Comprising over 70% of Earth s surfaces, water is undoubtedly the most precious natural resource that exists on our planet. Without the seemingly invaluable compound comprised of hydrogen and oxygen, life on earth would have been nonexistent. It is essential for the growth, development and prosperity of living organisms on our planet. Although we as human recognize this fact, we disregard it by polluting our rivers, lakes, ponds, reservoirs and oceans. Subsequently, it has been slowly but surely harming our planet to the point where the organisms are facing or will have to face unmanageable consequences. Our drinking water has been greatly affected due to our ability to use water for recreational purposes. In order to combat water pollution, we must understand the problem and become part of the solution (Chauhan, 2014).

There are three major categories of pollutants that cause pollution in water. The first category includes disease-causing agents such as viruses, protozoa, parasitic worms, and bacteria, which enter sewage systems and untreated waste. Because of the abundance of these microbes, wastewater acts as the common source of transmission for diseases such as dysentery, cholera, and typhoid. The second category of water pollutants includes oxygen-demanding waste, which includes the biodegradable matter such as plant residues and animal manure, which are added to the water naturally or by human beings. In natural process, this biological waste uses oxygen present in the sewage water and thereby results in oxygen depletion. Once all the oxygen has been depleted, bacteria are able to take control of the sewage, by making the water polluted. The third category of water pollutants includes water-soluble inorganic pollutants such as caustics, salts, acids, and toxic metals. Another kind of water pollutants includes ammonium salts, nitrates,

phosphates, and so on. The pollutants such as nitrates and phosphates are the important nutrients, and these favor the growth of algae and thereby results in eutrophication (Barko and Smart, 1986, Benit and Roslin, 2015).

These wastewater eutrophicates the water bodies, causing the mortality of aquatic biological resources. Hence, the role of treatment plants is in the sustainable use of wastewater as they make the water usable for various purposes (Dixon *et. al.*, 1999). The major objective of the present study was to characterize the sewage water discharged from different sites in Hingoli city. A study of this kind will improve our knowledge on the quality of wastewater being discarded into the environment due to various anthropogenic activities.

2. MATERIAL AND METHODS:

The sewage from Hingoli city (Latitude 19.43 N and Longitude is 77.11 E) flows and mixed up into Kayadhu River. For the study of physicochemical parameters two points were selected. One where actual flow is discharged Site A and Site B is one km away from this point in between these points many weeds were present. Monitoring of water from these two points were done after regular intervals. Sewage analyzed for various physicochemical parameters such as pH, temperature hardness, chloride, total dissolved solids, total suspended solids, total alkalinity, BOD, COD, sodium, potassium, etc.

The collected samples were brought to the laboratory in an icebox. The DO was estimated by Wrinkler's method, and the pH was determined using a pH meter. Nitrate, sulfate, sodium, and potassium were estimated by standard methods of American Public Health Association (APHA, 1998). The other parameters of the wastewater samples analyzed in triplicate by adapting standard procedures from the manual of (APHA,1992, ISI, 1968)

3. RESULTS AND DISCUSSION:

The values of the physicochemical parameters observed in the present study may serve as an indicator of the fertility or pollution level of the study area. The experimental data on physicochemical properties of water samples collected from different sites of Hingoli city are shown in Table 1.

TABLE 1 Physicochemical parameters of sewage water from Hingoli city.

Parameters	Site A (mg/lit)*	Site B (mg/lit)*
pH	7.4	8.2
Conductivity	3.2	0.24
Temperature	30^0C	28^0C
Suspended solids	2050	1050
Dissolved Solids	3500	1000
Total Solids	5500	2000
BOD	60	100
DO	0.078	0.072
Hardness	300	280
Chloride	225.2	175.5
Total Alkalinity	2750	1750
Sulphate	10	5.4
Phosphate	0.32	0.12
Magnesium	27.1	32.2
Potassium	12	12
Sodium	50	50

* Units for the parameters except pH, conductivity and temperature.

Various parameters introduced into drainage water are due to human activity because water flowing in drainage was coming from domestic use. The change in the water temperature may be due to change in atmospheric condition. All the parameters of Site B have lesser values than Site A. The decrease in physic-chemical parameters was due to accumulation of various constituents by the weeds and also due to sedimentation of some metals. Higher values of BOD and lower values of DO indicate more amount of organic matter present in sewage. More amount of alkalinity indicates the presence of hydroxide, carbonates and bicarbonates. Such types of studies were carried out by various authors (Wagh *et.al.,* 2005; Chauhan, 2014;, Paula *et. al,* 2012; Benit and Roslin, 2015)

All categories of sewage are likely to carry pathogenic organisms that can transmit disease to humans and animals. Sewage also contains organic matter that can cause odor and attract flies. Sewage contains nutrients that may cause eutrophication of receiving water bodies; and can lead to ecotoxicity. There is urgent need of treatment of sewage water. Sewage treatment is the process of removing the contaminants from sewage to produce liquid and solid (sludge) suitable for discharge to the environment or for reuse. It is a form of waste management. A septic tank or other on-site wastewater treatment system such as biofilters or constructed wetlands can be used to treat sewage close to where it is created.

Sewage treatment results in sewage sludge which requires sewage sludge treatment before safe disposal or reuse. Under certain circumstances, the treated sewage sludge might be termed "biosolids" and can be used as a fertilizer. In

recent years, however, more stress has been placed on improving means of disposal of the solid residues from the municipal treatment process. In treatment plants the waste water is treated to reduce its strength so that it can be made safe for satisfactory disposal. In practice the treatment plants act as unloading stations where all the undesirable and nuisance causing substances in the waste water are removed and the character of waste water is altered (Chauhan, 2014) and it is acceptable to disposal agencies for safe disposal.

The overall conclusion is that sewage water with a high domestic load has the highest negative impact on water quality. The present study shows that the treatment of untreated sewage disposal is necessary otherwise the entry of this polluted water in ground water shall be highly harmful to the flora and fauna of the region.

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Study Of Phytoplankton Of Lake Bhivapur, Tq.-Tiwasa, Dist. Amravati

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Abstract: *Phytoplankton which are present were in natural water bodies of Bhivapur lake were studied. Phytoplankton such as Chlorophyceae, Cynophyceae, Basillariophyceae , were studied during year 2019-20. In present investigation, above phytoplankton were the indicators of waer pollution.*

Keywords*: Phytoplankton, Chlorophyceae, Cynophyceae , Bhivapur.*

1. INTRODUCTION:

Phytoplanktons were studied from Bhivapur lake ,Taq.-Tiwasa, Dist- Amravati, this is small lake and having different types of phytoplanktons . Because of presence of phytoplanktons, there are changes of ecological status of lake Bhivapur. Some phytoplanktons like, Chlorella, Nitzschia, Synedra which are the parts of Palmers list of sixty more pollution tolerant genera in the world (Palmer, 1969). Most of the worker studied the periodicity and the distribution of algae in Indian fresh water bodies. Important contribution are Khan (1992), Singh et al; (1998),Walawalkar et al (1999), Pullae (2000), More and Nandan (2000) and Angadi (2003). Present study of Phytoplankton species of Bhivapur lake were studied to find out water pollution of Bhivapur lake.

2. MATERIAL AND METHODS:

For phytoplankton analysis, samples were collected a period of one year from June- 2019 to May 2020. Planktons were collected from water samples in two liter plastic can and some crystals of iodine after 24 hours, 10 ml sedimented water samples were taken for phytoplanktons analysis by adding 4% formalin for preservatioin and identification of phytoplanktons carried out under microscope.

Table 1- Monthly observation of phytoplankton during 2019-20 in Bhivapur lake.

Phytoplankton	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
A)Chlorophyceae												
Chlorella sp.	+	+	+	+	+	-	-	-	-	-	-	-
Cosmarium sp.	+	+	+	+	+	+	+	+	+	+	-	-
Oedogonium sp.	+	+	+	+	+	+	+	+	+	+	-	-
Spirogyra sp.	+	+	+	+	+	+	+	+	+	+	+	+
Ulothrix sp.	+	+	+	+	+	+	-	-	-	+	+	+
Ziygnema sp.	+	+	+	+	+	+	+	+	+	+	+	+
Chara sp.	-	-	-	+	+	+	+	+	+	+	+	+
Nitrella sp.	+	+	+	+	+	+	+	+	+	+	+	+
B)Cyanophyceae												
Anabaena sp.	+	+	+	-	+	+	+	+	+	+	+	-
Nostoc sp.	-	+	+	+	+	+	+	+	+	-	-	+
Oscillatori sp.	+	+	+	+	+	+	-	-	+	+	+	+
Microcystis sp.	+	+	+	+	+	+	+	+	-	-	-	+
C)Bacillariophyceae												
Diatom sp.	+	+	+	+	+	+	+	+	+	+	+	+

3. RESULT AND DISCUSSION:

In present investigation, phytoplanktons were study from Bhivapur lake water because of presence of Phytoplankton changes ecological status of the lake Bhivapur. Different group of classes Chlorophyceae, Cyanophyceae, Bacillariophyceae, were studied from which *Cosmarrium, Oedogonium, Spirogyra, Ulothrix, Zygnema, Chara*, and *Nitrella* were observed throught the year. The Chlorella, Oedogonium, Ulothrix and Nitrella, were observed during Monsoon season.Hydrodictyon species were observed in month of June. The most important factor in controlling the population of Former (Lin,1972).

In present study, Bacillariophyceae species such as Diatom occurs throught the year. The occurrence of Diatom is responsible ofvarious enviromental changes (Patil, 1982).

Some species of Cyanophyceae were observed that was Anabena, Nostoc, Oscillatoria were studied throught the year. Microcystis observed in monsoon season. The presence of microcystis was the indicators of toxic substances producing algal species.

4. CONCLUSION:

From the above observation, phytoplanktons are the indicators of pollutions. So on the basis of this study, there is need to conservation of Bhivapur Lake.

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Species Richness and Distribution of Ostracoda of Sonala Dam, Sonala, Dist. Washim (M.S.) India

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Abstract: *The paper deals with Species Richness and Distribution of Ostracoda of Sonala Dam, Sonala, Distt. Washim (M.S.) India. 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. Ostracods are bivalved micro crustaceans found almost in all types of water bodies and are one of the most diverse groups of living crustaceans. The population density of ostracod of Sonala Dam, Sonala was monitored for one year. Samples were collected using plankton net of bolting silk cloth No.25 (56 mesh size and analysed with standard keys. Quantitative estimation was done by drop count method of Lackey. A total of 4 species from the dam water were identified. Results indicate that the population of Ostracoda was maximum during the summer season and minimum during the winter season. Distribution of Ostracoda was influenced by environmental factors like temperature, DO, salinity and sediment decomposition. Conservation of this water body is essential, as this habitat may reveal interesting ostracod fauna present there. There is no report of study on the species richness and distribution of ostracods in this reservoir and that is the reason the present study was planned.*

Key Words: *Sonala dam, Diversity, Ostracods, Zooplanktons*

1. INTRODUCTION:

Dams are the most important water resources. Unfortunately, large quantities of pollutants are accumulated in the reservoir due to indiscriminate disposal of sewage and wastes from anthropogenic activities (Shinde et al., 2011). Studies on freshwater bodies, natural or manmade have recently gained much importance, mainly because of their multiple uses. Aquatic ecosystems are known to support work to range of organism. Ostracods are one of the most diverse groups of living crustaceans. They are bivalved micro crustaceans found almost in all types of water bodies. Although ostracods are abundant and widely distributed but they have received much less attention than Cladocera and Copepoda (Pennak, 1978). They are a vital component of an ecosystem and form an essential link in the food chain and energy transfer at secondary level in aquatic food web between autotrophs and heterotrophs (Dievanni et. al, 2004). Ostracods are extremely sensitive to environmental variations. Their abundance and species diversity can provide important indication of environmental changes. The result will contribute to the understanding of the present status of the ostracods fauna in Indian freshwater lakes. There is no report of study on the species richness and distribution of ostracods in this reservoir and that is the reason the present study was planned.

2. MATERIALS AND METHODS:

2.1 STUDY AREA:

Sonala dam is an earthen dam constructed on River Adan, a tributary of River Godavari. It lays between 77^0, 12‘, 30” E Longitude and Latitude of 20^0, 19‘, 00” N in Sonala village of Washim district in Maharashtra (India). Maximum height is 19.20 meter and 446.90 hectares of submergence with 132.50 square kilometre of catchment area. The reservoir is mainly used for drinking water supply to nearby villages and for irrigation. The selection of six sampling station was made based on human and other domestic activities.

2.2 COLLECTION OF SAMPLES:

The acquisition of meaningful data demands correct sampling and preservation procedures. Water samples were collected from six sampling stations every month in the forenoon (between 7:00 am to 9:00 am.) for one year. 50 litres of water sample were filtered through standard plankton net of bolting silk cloth No.25 (56 mesh size). The sample was

taken in 125 ml plastic bottle and labelled mentioning the time, date and place of sampling. The samples were preserved by adding 2ml of 4% formalin. Quantitative analysis was done by Drop Count Method. Detailed taxonomic identification was carried out with Pennak (1989), Koradkar (1992) and Dhanpati (2000).

3. OBSERVATION AND RESULTS:

In the present study, Ostracoda represented by 4 species in dam water namely *Centro cypris, Cypris species, Hetero cypris, Stenocypris malcomsonii.* Seasonally, Ostracoda showed dominance in summer season, showed maximum 190 ± 3.08 ind/l in summer season and minimum 45 ± 4.5 ind/l in winter season. The yearly mean average of Ostracoda during the study was 77.5 ± 2.9 ind/l. In summer growth of algal blooms and macrophytes is high due to anthropogenic activities and contamination of brick factories. Hence, the abundance of ostracods, especially those of cosmopolitans, could be the indicator of pollution (Padmnabha, 2008; Sontakke et al, 2010). During the study period ***Cypris species 33*.5±2.0** ind/l showed dominance at all stations followed by ***Centro cypris* 28.2±1.2 *ind*/**l. Less appearance was shown by ***Hetero cypris* 17.8±1.5** ind/l and ***Stenocypris malcomsonii* 17.9±1.8.** Stationwise abundance of Ostracoda was in the order.

Station S_3 > Station S_1 > Station S_6 > Station S_5 > Station S_2 > Station S

TABLE NO. 1. Station wise Average values of Ostracoda

Sr. No.	Ostracoda	S1	S2	S3	S4	S5	S6	Average
1	***Centro cypris***	43.3±2.9	19.2±1.6	45.0±2.1	15.8±1.9	20.8±1.6	25.0±1.3	28.2±1.2
2	***Cypris species***	51.7±3.4	22.5±1.0	55.0±3.3	16.7±1.3	27.5±1.7	27.5±1.0	33.5±2.0
3	***Hetero cypris***	26.7±1.1	11.7±1.0	29.2±1.5	13.3±1.3	10.8±1.7	15.0±1.3	17.8±1.5
4	***Stenocypris malcomsonii***	31.7±2.9	10.0±6.6	31.7±2.3	13.3±1.1	9.2±5.5	11.7±1.2	17.9±1.8

4. DISCUSSION:

Data harvested during the study period, the population of Ostracoda was maximum during the summer season and minimum the winter. Distribution of Ostracoda was influenced by environmental factors like temperature, DO, salinity and sediment decomposition. There abundance is also dependent upon the availability of food as opined by Swain (1995) and Clark (1977). Four different species of Ostracoda were identified from this group. The population abundance of Ostracoda was observed at all the sampling stations but found in lesser number at station S_4. The Ostracoda population was abundant and dominated at stations S_1, S_3, S_6. It forms a good food chain and hence more fish catches have been recorded at station S_3. Seasonal variations in abundance of Ostracoda fauna was in order summer>winter>Monsoon. During the monsoon, Ostracoda population was found meagre at almost all stations except stations S_1 and S_2 which indicated productive nature of water.

5. CONCLUSION:

Sonala dam is nutrient rich and contain diversified Ostracoda fauna. They are bivalved micro crustaceans found almost in all types of water bodies, which have often been used to indicate the tropic status of a water body. They are a vital component of an ecosystem and form an essential link in the food chain and energy transfer at secondary level in aquatic food web between autotrophs and heterotrophs. They were most abundant during summer season and showed least abundance during winter season. They 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.

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Habitat Specific Variation in The Metabolism of Freshwater Mussel, *Lamellidens Marginalis*, (Lamarck) From Nathsagar Reservoir At Paithan (M.S.) During Monsoon

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Abstract: *Various environmental factors influence molluscs species distribution and physiological processes. Considering the habitat-specific variations, in the metabolic responses such as rate of oxygen consumption, rate of ammonia excretion, and O: N (oxygen: nitrogen) ratio of freshwater mussels, Lamellidens marginalis in collected two different habitats (i.e. lentic and lotic) from Nathsagar reservoir, at Paithan, during monsoon (August and September Month) were studied. The mussels from the lentic habitat showed a high rate of oxygen consumption and a low rate of ammonia excretion in September. But in animals from the lotic habitat in August, the rate of oxygen consumption slightly increased and the rate of ammonia excretion and O: N ratio gradually decreased. The study supports help in understanding the interaction of habitat on the metabolic activity of the animal.*

Keywords: *Mussels, Lamellidens marginalis, habitat, ammonia excretion, oxygen consumption, O: N ratio.*

1. INTRODUCTION:

Freshwater mussels play an important role in freshwater (lentic and lotic) ecosystems. The *Lamellidens marginalis* mussels economically used as food and production of pearls in India (Rao and Dey, 1989). Aquaculture of this mussel has been developing in India. Hence it's commercial value; physiological activities of this species were understudied. Studying the habitat-specific metabolic rates of this species is important for increasing production.

In the study of energy processes, the parameter of oxygen uptake: nitrogen excretion (O: N ratio) is a good indicator of metabolic shift and the amount of energy available, which helps us understand the diverse demands of an organism under different environmental conditions and contaminants. Biological literature records many values of the measurement of oxygen consumption in the aquatic invertebrates is a valid method to evaluate the effect of environmental factors such as temperature, turbidity, salinity, pH, carbon dioxide, exposition to pollutants, light intensity, and dissolved oxygen because it allows the determination of energetic cost associated with the physiological stress that these combinations impose on the organisms (Villarreal and Rivera, 1993; Brown and Terwilliger, 1999; Lemos et. al., 2001; Altinok and Grizzle, 2003). The rate of respiration in molluscs is also influenced by activity, body size, stage in the life cycle, time of day, as well as by previous oxygen experience and genetic background (Prosser, 1973).

An excellent description of the metabolic pathway, their evolution and relationship to the oxygen availability can be found in the details given by (Hochachka and Somero, 1973). (Davis, 1975) reviewed minimum dissolved oxygen requirement of aquatic life. Bodies of freshwater bivalves often show large variations in the dissolved oxygen, both seasonally and geographically. The respiration rates could be used to evaluate mussels stress and the overall fitness of animal for survival and reproduction. In this respect, many workers have emphasized the relation between physiological responses of bivalves to changes in the environment are extremely variable (Navarro et. al., 1994). According to (Mallet et.al., 1987), 'ecological memory' of the specimens with regards to their original habitat when they are placed in a different environment, to this effect made it possible to affect metabolism. (Bayne and Newell, 1983) stated that the physiological ecology of bivalves can give an insight into the adaptation of animals to function in their particular

environment. Oxygen consumption can be considered for undertaking the physiological adaptation of the species in a given habitat.

This study analyzes the metabolic rates of oxygen consumption and ammonia excretion in mussels from the lentic and lotic habitat of Nathsagar reservoir, at Paithan and evaluates their physiological behavior in terms of habitat-specific endogenous and environmental factors.

2. MATERIALS AND METHODS:

During monsoon (August- September) freshwater Mussels *Lamellidens marginalis* with specific size were collected in two different habitats (i.e. lentic and lotic) from Nathsagar reservoir, at Paithan. The animals with different shell length i.e. lentic animals size (73-75 mm shell length) and lotic animals size (76-79 mm shell length) were selected. After collection, mussels were brought to the laboratory immediately. To remove the algal biomass, mud and other waste materials, the shells of the animals were brushed and washed with freshwater. The cleaned animals were divided into two group's viz. lentic animals (73-75 mm) and lotic animals (76- 79 mm). Each group comprises 10 animals. The length and weight of each mussel were measured. Then, they were allowed to defecation and depuration for 12-13 hrs. in laboratory conditions, under constant aeration.

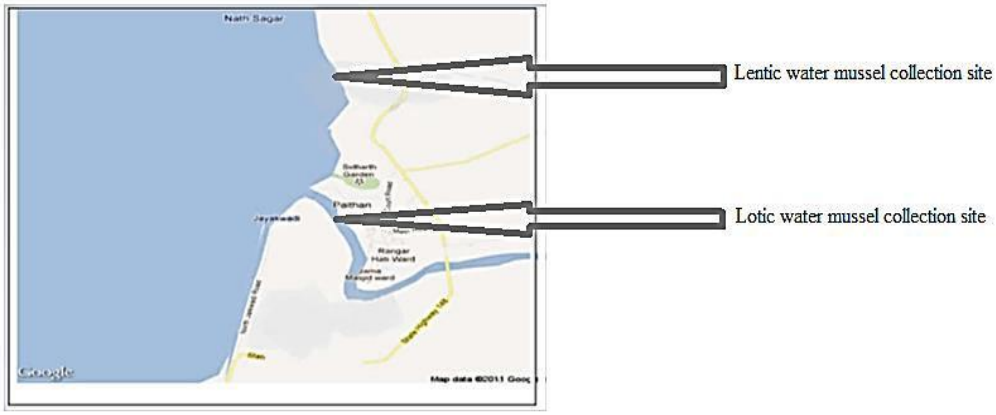

PLATE1:- Satellite map showing collections sites of Nathsagar reservoir (Latitude 190 29' 8.7" N, Longitude 750 22' 12'' E) at Paithani

The Physico-chemical parameters of water i.e. Temperature, pH, hardness and dissolved oxygen contents were also measured. The rate of oxygen consumption of individual animal was determined according to Wrinkler's modified method (Golterman et.al., 1978) for determination of oxygen consumption of individual mussels, four closed respiratory jars one-liter capacity each with an inlet and outlet were used. They were kept in a continuous circulation of water inside the chamber to open their valves. After opening their valves, the flow of water was cut off. A sample of water from it was drawn for the determination of oxygen consumption and ammonia excretion. After one hour, 50 ml of sample water from the chamber was drawn to find out the oxygen content. At the same time, 10 ml of the sample water from the chamber was also drawn and processed for analysis of ammonia according to the phenol-hypochlorite method suggested by (Solorzano, 1969). To integrate the data on oxygen consumption and ammonia excretion and 0:N ratios were calculated for each mussel used in this experiments, by dividing its oxygen consumption rate in moles O and by its ammonia excretion rate in moles N (Widdows, 1978; Bayne and Newell, 1983). The mean values of four individual mussels from each group were used for statistical analysis. Rate of oxygen consumption of individual mussels represented mg O2/l/hr/g body weight and rate of ammonia excreted expressed in mg NH4-N/l/hr body weight.

3. RESULTS:

The results of the experiments were shown in Table.1. The Physico-chemical characteristics of the lentic habitat water were temperature 27.3˚C - 28.5˚C on August and 25.8˚C - 27.7˚C on September, pH 7.2 – 7.8 on August and 7.3 - 8.0 on September. The hardness of water is 153.87– 164.79 ppm on August and 145.35 – 157.88 ppm on September and dissolved oxygen 5.691 - 7.022 ml /l/h on August and 5.93 - 6.116 ml /l/h on September. On the other hand, the Physico-chemical characteristics of the lotic habitat water were temperature 26.3˚C - 27.3˚C on August and 25.4˚C - 27.2˚C on September, pH 7.5 – 8.2 on August and 7.5 - 8.1 on September. The hardness of water is 138.76– 144.95 ppm on August and 133.81 – 143.22 ppm on September and dissolved oxygen 5.365 - 7.001 ml /l/h on August and 6.746 - 6.857 ml /l/h on September during the monsoon season.

Table 1: Habitat specific changes in the rate of oxygen consumption, rate of ammonia excretion and O: N ratio of freshwater mussels, *Lamellidens marginalis* upon lentic and lotic water from Nathsagar reservoir, at Paithan, during monsoon season

Collection site of animals	Animal No.	Animal Size (mm)	Weight of the animal (gm)	Oxygen consumption (ml/gm/lit/hr)	Oxygen consumption (mg/gm/lit/hr)	Ammonia excretion mg-NH_4-N/lit/hr	Ammonia excretion µg-NH_4-N/lit/hr	Atomic equivalent of Oxygen (a)	Atomic equivalent of Nitrogen (b)	O: N Ratio (a/b)
Lentic water	I	73	11.810	0.1792	0.2559	0.00224	2.24	0.0160	0.0001	160
	II	74	11.678	0.2085	0.2977	0.00182	1.82	0.0186	0.0001	186
	III	74	11.922	0.2456	0.3507	0.00322	3.22	0.0219	0.0002	109.5
	IV	75	12.448	0.1958	0.2796	0.0028	2.8	0.0175	0.0002	87.5
					0.2960 ± 0.0403		2.52 ± 0.6156			135.75 ± 45.204
Lotic water	I	76	14.012	0.1916	0.2736	0.0056	5.6	0.0171	0.0004	42.75
	II	78	14.196	0.2458	0.3510	0.0046	4.6	0.0219	0.0003	73.00
	III	78	15.389	0.2113	0.3017	0.00322	3.22	0.0188	0.0002	94.00
	IV	79	15.447	0.2261	0.3229	0.00504	5.02	0.0202	0.0003	67.33
					0.3123 ± 0.0328		4.61 ± 1.0133			69.27 ± 21.076
Lentic water	I	73	11.810	0.3647	0.5208	0.00322	3.22	0.0325	0.00023	141.30
	II	74	12.448	0.2805	0.4005	0.00224	2.24	0.0250	0.00016	156.25
	III	73	11.922	0.3817	0.5451	0.00504	5.04	0.0341	0.00036	94.72
	IV	75	12.678	0.2947	0.4208	0.00364	3.64	0.0263	0.00026	101.15
					0.4718 ± 0.0718		3.535 ± 1.1622			123.35 ± 30.095
Lotic water	I	78	16.742	0.1604	0.2290	0.00798	7.98	0.0143	0.00057	25.09
	II	79	17.112	0.1708	0.2439	0.00742	7.42	0.0152	0.00053	28.68
	III	77	17.392	0.1684	0.2405	0.00602	6.02	0.0150	0.00043	34.88
	IV	79	18.116	0.1480	0.2113	0.0056	5.6	0.0132	0.0004	33.00
					0.2318 ± 0.0274		6.755 ± 1.1280			30.41 ± 4.3964

The rate of oxygen consumption during September was found maximum in lentic habitat mussels as compared to lotic habitat mussels. It was found to be (0.2960 ± 0.0403 mg/gm/lit/hr) on August and on September it was (0.4718 ± 0.0718 mg/gm/lit/hr) mussels collected from lentic water habitat. While in lotic habitat mussels oxygen consumption was found to be (0.3123 ± 0.0328 mg/gm/lit/hr) on August and on September it was (0.2318 ± 0.0274 mg/gm/lit/hr).

The rate of ammonia excretion of individual mussels ranged from 1.82-3.22 µg-NH4-N/lit/hr (on August) and 2.24-5.04 µg-NH4-N/lit/hr (on September) in mussels collected from lentic habitat and 3.22-5.6 µg-NH4-N/lit/hr(on August) and 5.6-7.98 µg-NH4-N/lit/hr (on September) in mussels collected from lotic habitat, during monsoon season.

The calculations of the O: N ratio (the ratio of oxygen consumption to nitrogen excretion) after determining the atomic equivalent of oxygen and nitrogen were ranged from 123.35-135.75 in lentic mussels on the other hand in lotic mussels range 30.41- 69.27.The O: N ratio revealed high values in August as a compared month of September, during monsoon in both habitat.

4. DISCUSSION:

In the present study on *Lamellidens marginalis* inhabit a lentic and lotic environment at Nathsagar reservoir. In lentic animals, the rate of oxygen consumption gradually increased during September but gradually decreased during August. While in lotic animals, the rate of oxygen uptake gradually increased in August as compared to September, during monsoon. The metabolic rate is strongly dependent on nutritive stress and body conditions; instead, the reduction

in oxygen uptake clearly shows that degradation in nutritional status and a shift to a conservative metabolic strategy. (Baker and Hornbach, 1997) Stated that the oxygen sensitivity and oxygen uptake rate of many freshwater organisms appear to reflect the habitat in which they live. (Vidal et al., 2002) revealed that, the oxygen consumption rate is dependent on oxygen concentration at nearly all levels of dissolved oxygen, he shows that, *Corbicula fluminea*, which inhabits only well-oxygenated habitats. The present study on *Lamellidens marginalis* from two different habitats (i.e. lentic and lotic) revealed that the rate of oxygen consumption found more in bivalve collected from lentic water habitat in September, during monsoon season, which possibly showed reliance of mussels on carbohydrate and protein metabolism. In the effect of habitat dependent variations, the rate of oxygen uptake increase in bivalves collected from lentic water habitat due to high temperature and small size,(73-75mm) because small individuals with relatively small glycogen reserves, increase considerably their protein catabolism, whereas large ones to a great extent on their relatively large glycogen storage (Bayne, 1973).

The numbers authors have noted that ammonia is the major excretory product of protein catabolism in aquatic animals (Clarke et al., 1994; Brockington, 2001) the rate of excretion of nitrogenous waste products can show strong seasonal fluctuations that relate to an environmental variable (e.g. water temperature; food concentrations) and the reproductive and nutritional state of the animal. Increased protein catabolism is indicated by a high level of ammonia and decline in Oxygen: Nitrogen ratio (Bayne, 1973) and thus changes in the rate of nitrogen excretion are best understood in the contents of physiological energetic and nitrogen balance, when related to overall metabolic rate utilizing the Oxygen: Nitrogen ratio (Suja, 2007). The O: N ratio is an index of protein utilization in energy metabolism (Yu Zhen et al., 2010). In the present study on the *Lamellidens marginalis* values of rate of ammonia excretion shown an increase in animals which collected from lotic water, Increase in the rate of ammonia excretion might be due to starvation, because during starvation there are more protein catabolism, hence ammonia excretion rate increases. Increases ammonia excretion indicated increased protein catabolism during starvation (Bhagade and Mane, 2005). Higher values of the O: N ratio in lentic habitat indicates increased catabolism of carbohydrates or lipids, and low values of O: N ratio in lotic habitat indicates protein catabolism. (Vedpathak et al., 2011) stated that, O: N ratio varied considerably with habitat and complex interactions with exogenous environmental factors (temperature, pH, hardness, Dissolve Oxygen etc.).

The increase or decrease of oxygen consumption, ammonia excretion and O: N ratio in mussels on different habitats, noticed that the individual group belong to a specific habitat which showed the possible effects of habitat and environmental condition (Temperature, pH, hardness, Dissolve Oxygen etc.) on level of metabolic activity and overall physiological fitness of the mussels. Further study needed to evaluate habitat-specific variation in the metabolic activities correlation with reproductive index among the freshwater mussels *Lamellidens marginalis*.

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Seasonal Variation, Diversity Indices and Correlation Of Phytoplanktons from Nakana Lake, District Dhule (MS) India

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Abstract: *Present study discovered the incident of 38 phytoplanktonic species during two years. Amid these 17 species of Chlorophyceae, 9 species of Bacillariophyceae, 9 species of Cyanophyceae and 3 species of Euglenophyceae were observed. The total density of phytoplanktons were recorded as (8152/l) and (7656/l) with significantly significant seasonal variation in year 2014-15 and 2015-16 respectively. Total density was decreased in next year as compare to first. Maximum density of phytoplankton found in summer season, moderate in winter and in monsoon it was least in condition. Spirogyra spp, Fragillaria capulina, Lungbya and Euglena pisciformis, were showed dominant position from each phytoplanktonic group. Total 6 diversity indices were estimated among them Shannon-Weiner Index (363.5157) and (344.3082), Simpson's Dominant Index were (0.0775) and (0.0429). Physico-chemical parameters like pH, Turb, TDS, EC and O_2 were positively correlated however Temp, Free CO2, TH, Ca^{++} and Mg^{++} were negatively correlated with phytoplanktons.*
Key words: *Chlorophyceae, Euglena pisciformis, Simpson's Dominance Index*

1. INTRODUCTION:

Phytoplanktons are drifting or floating organisms that live in all aquatic habitats i.e. fresh, Marine as well as estuarine water., (Sharma, 2010). Few are having capability of self-regulation as compare with who those are float with water. First tropic level starts from phytoplankton because they are autotrophs and form the basic link in the food chain of all aquatic animals. They are expansively detained that predominantly significant to the food web of aquatic ecosystem. Phytoplanktonic diversity plays a key role in aquatic habitat, (Devi *et al*. (2016). No systemic analysis has been carried out regarding seasonal fluctuations and diversity and dominance analyzes by diversity indices of phytoplanktons from Nakana Lake. In sort to fill up this lacuna, present investigation had commenced.

2. MATERIAL AND METHODS:

The study area Nakana Lake was visited at monthly intervals during couple of year study between 7.00am to 9.00am, map of study area mention in fig.-1. By using 25mm mesh size plankton net 100 liters of surface water were sieve, net was washed with water by inverting it to collect the phytoplanktons attached to the net. Filtrate was taken in another sterilized bottle, labeled and for preservation 4% formalin was added. For further analysis sample were brought to the laboratory. 10 ml of sample was concentrated by centrifuging at 2000 RMP for 5 to 10 minutes. Quantitative analysis completed with the help of "Sedgwick–Rafter counting cell". The systemic identification of phytoplanktons was made by using standard keys of Edmondson (1959),Tonapi (1980)and Dhanpathi (2000) Determination of plankton density the average of 5 to10 counts was made and the result was expressed as number of organisms per liter (org/l) of sample water.

During study tenure i.e. Feb., 2014 to Jan., 2016, collected data were pooled for four months and three seasons and estimated for seasonal changes. After this, the Mean and standard Error of Mean (SEM) was calculated for each season and One Way ANOVA with various physico-chemical parameters were performed. The Pearson correlation was calculated by keeping plankton as dependant variable and other abiotic and biotic factors as independent variables with the help of SPSS 7.5 for windows.

3. DATA ANALYSIS OF DIVERSITY INDICES

Diversity Indices were estimated by Shannon and Wiener (1963); Simpson (1949); Margalef (1958) and Pielou (1966) methods.

1. Shannon – Weiner Index (H): $H= -\sum Pi (In Pi)$,
2. Simpson's Dominance Index (D): $D= \sum n(n-1)/N(N-1)$,
3. Simpson's Index of Diversity = 1-D,
4. Simpson's reciprocal Index = 1/D,
5. Margalef's Index (R): R= S-1/Ln (n)
6. Pielou's evenness Index (J): J = H/Ln*S

Where, S = Number of species
N = Total number of individual of all species.
Pi = A/T where A is number of each species in the sample,
T = Total number of individual of all species in the sample.
n = Total number of individuals of particular species.

TOTAL PHYTOPLANKTONS:

Diversity of Phytoplanktons was recorded with 38 species, mention in Table-1. They belong to four groups: Chlorophycae, Bacillariophyceae, Cynophyceae and Euglinophyceae. Species wise percentage includes Chlorophyceae (44%), Cynophyceae, (24%), Bacillariophyceae (24%) and Euglenophyceae (8%), shown in fig.-1. Seasonal variation in density of Phytoplanktons was shown in Table- 2. Phytoplanktons as biotic parameters correlated with abiotic parameters i.e. physico-chemical status of water. Estimated values were shown positive and negative correlation with each other, publicized in Table- 3.

The total density of phytoplanktons recorded (8152 / l) ($F_{2\,44}$ 12.94) ($p< 0.01$) in year 2014-15 and (7656/l) ($F_{2\,44}$ 20.69) ($p< 0.01$) in 2015-16. Seasonal variation ranges in between (2536/l) in year 2014-15 and in year 2015-16 shown (3039/l). The population of phytoplanktons estimated significant seasonal variation, in winter it was minimum (634.00 ± 25.59) (591.25 ± 23.26), moderate in monsoon (646.25 ± 2.52) (586.75 ± 11.43) and maximum in summer (759.75 ± 21.27) (736 ± 19.31) at 2014-15 and 2015-16 respectively.

Total phytoplankton density was positively correlated with pH, Turb, TDS, EC and TA at 0.01 (Two tailed) while free CO_2 at 0.05 (One tailed) and negative correlation shown with Temp, free CO_2 and Mg at 0.01 (Two tailed) TH and Ca^{++} at 0.05 (One tailed) in year 2014-15, same again in year 2015-16 it was positively correlated with Turb, TDS, EC and TA at 0.01 (Two tailed) while pH and DO at 0.05 (One tailed) whereas negative correlation at Temp., DO, TH, Ca^{++} and Mg^{++}, among these DO and Ca^{++} at 0.05 (One tailed), Borics *et al.* (2021)

CHLOROPHYCEAE:

Total 17 species of were identified from group Chlorophyceae. It was found in dominant quantitative composition at both years: (3062/l) (2921/l). The richness of the group Chlorophyceae ranges in between (208/l) to (326/l) observed in month of July and Nov. respectively in year 2014-15 while in year 2015-16 it was (202/l) month of Mar. and (329/l) in Nov. Recorded values express species dominance by species *spirogyra spp*. (94/l) and (96/l) in summer season 2014-15 and 2015-16 respectively on the other hand least count reported by species *Ankistrodesmis falcatus* (30/l) in summer at year 2014-15 and *Zygnema* was (22/l) in winter 2015-16.

The population of Chlorophyceae was recorded in minimum in monsoon (234.0 ± 7.51), moderate in winter (248.25 ± 19.51) and maximum in summer (285.25 ± 17.90). It shown non-significant seasonal variation ($F_{2\,44}$ 2.77) ($P> 0.05$) at year 2014-15 while it was in 2015-16 estimated minimum in monsoon (209.50 ± 8.88), moderate in winter (225.50 ± 16.45) and maximum in summer (295.25 ± 16.12), it shown significantly significant seasonal variation ($F_{2\,44}$ 10.29) ($P< 0.01$).

When group Chlorophyceae correlated with all water parameters, the observed values given away, pH and CO_2 (One tailed) whereas Turb, TDS, EC, TA, TH and Ca^{++} (Two tailed) were positively correlated as well as Temp, DO and Mg^{++} was negatively correlated (One tailed) at year 2014-15. However pH and CO_2 (One tailed) in addition to Turb, TDS, EC and TA (Two tailed) was positively correlated while Temp (Two tailed) and TH, DO, Ca^{++} and Mg^{++} were negatively correlated (One tailed), Jain *et al.* (2018).

BACILLARIOPHYCEAE:

Total 9 species were recorded during couple of year and pull off second position on level of dominancy. Species richness of this group was (2451/l) and (2288/l) in year 2014-15 and 2015-16 respectively. Range of richness of group Bacillariophyceae in between (174/l) (230/l) in the month of June and Dec. respectively in year 2014-15 whereas (161/l) in month July and Nov. it was (219/l) in year 2015-16. Species dominance from observed values was highest *Fragillaria capurina* (120/l) in summer season and lowest *Synedra affinis* (56/l) in Monsoon season in year 2014-15 even as *Diatom vuloare* highest (125/l) in winter season and lowest (56/l) in monsoon season.

Composition of this group was shown significantly significant seasonal variation ($F_{2\,44}$ 24.13) ($P< 0.01$) at year 2014-15 while it was ($F_{2\,44}$ 5.94) ($P< 0.01$) in year 2015-16. Recorded values displayed different seasons like, in summer it was maximum (231.75 ± 3.75), moderate in monsoon (190.75 ± 3.19) and minimum in winter (190.25 ± 6.79) at year 2014-15 then again in summer it was maximum (209.50 ± 5.69), moderate in winter (183.25 ± 9.02) and minimum in monsoon (179.25 ± 4.75) at year 2015-16.

Group Bacillariophyceae was shown positive and negative correlations as follows, pH and CO_2 (One tailed) and Turb, TDS, EC and TA (Two tailed) whereas Temp, DO, TH, Ca^{++} and Mg^{++} (Two tailed) in addition to pH, Turb, TDS, EC, DO, CO_2, TA (Two tailed) while Temp, TH, Ca^{++}, Mg^{++} (One tailed) at 2014-15 and 2015-16 respectively, Rawat and Trivedi (2018).

CYNOPHYCEAE:

Total 9 species were reported during tenure of research and it held on third position on level on ascendancy. Richness of species revealed difference in values, like (2087/l) (1943/l) in year 2014-15 and 2015-16. Group Cyanophyceae publicized variable values as reference to richness, highest population in month of January (201/l) and lowest at month of Aug. (149/l) in year 2014-15 whereas in year 2015-16 it was reported highest (189/l) in two months of Jan. as well as Mar. while lowest in month of July (136/l). Species dominance shown by *Nostoc spp.* (123/l) and least count by species *Oscillatoria chlorine* (15/l).

The population of group Cyanophyceae estimated significant seasonal variation ($F_{2\,44}$ 19.92) (P< 0.01) in year 2014-15 at the same time it was ($F_{2\,44}$ 12.24) (P< 0.01) in year 2015-16. Seasonal variation ranges maximum in summer (193.25 ± 3.00), moderate in monsoon (166.50 ± 3.79) and minimum in winter (162.00 ± 4.41) in year 2014-15 even as it was maximum in summer (184.75 ± 3.32), moderate in winter (152.25 ± 5.76) and minimum in monsoon (148.75 ± 7.12) n year 2015-16.

Cyanophyceaen members positively correlated with pH, Turb, CO_2, TA (One tailed) and TDS, EC, TH (Two tailed) at year 2014-15 as well as pH (One tailed) and Turb, TDS, EC, CO_2, TA (Two tailed) at year 2015-16. Negative correlation shown with parameters Temp, DO, Ca^{++}, Mg^{++} (One tailed) at year 2014-15 and Temp, DO, TH, Ca^{++}, Mg^{++} (One tailed) in year 2015-16. More abundance of Cyanophyceae group in summer season was recorded by Sivalingam (2018).

EUGLENOPHYCEAE:

Total 3 species were identified and detained on last position on level of supremacy. In the present investigation the seasonal numerical density of Euglenophyceae ranges from (552/l) and (504/l) in year 2014-15 and 2015-16 respectively. Richness of group Euglenophyceae given away up and downs in recorded values. Pick population observed in the month of Jan. (59/l) and it occurs least in the month of Nov. (26/l) in the year 2014-15. Just as in year 2015-16 it was pick in the month of July (58/l) and record buck in the month of Nov. (26/l). Species governance made known by species *Euglena pisciformis* was in June (106/l) and lowest in Oct. by *Euglena stellata* (27/l). Scarcity of population of this group was reported by Kathar *et al.* (2015).

In year 2014-15 the inhabitants of Euglenophyceae group exposed significant seasonal variation ($F_{2\,44}$ 12.4) (P< 0.01). It was lower in monsoon (33.50 ± 3.52), moderate in winter (49.50 ± 3.77) and higher in summer (55.60 ± 1.87) even as in year 2015-16 it was revealed significant seasonal variation ($F_{2\,44}$ 13.92) (P< 0.01). It was minimum in winter (30.25 ± 2.17), moderate in monsoon (46.50 ± 2.66) and maximum in summer (49.25 ± 3.30).

Correlation of Eulenophyceae with pH, Turb TDS, EC, CO_2, TA (one tailed) positive at year 2014-15 while same year they were Temp, DO, TH, Mg^{++} (One tailed) and Ca^{++} (Two tailed) were negative. Positively correlated parameters with Euglenophyceae were Turb, TDS, EC and pH CO_2, TA, TH (One tailed) Mg^{++} (Two tailed) even as Temp, Ca^{++} (One tailed) were negatively correlated at year 2015-16 respectively, Suresh (2015).

In both years, present study sequencing of the phytoplanktons on the basis of density in 4 groups like this, Chlorophyceae > Basillariophyceae > Cynophyceae > Euglenophyceae. The diversity and density point of view, group Chlorophyceae established abundantly. Basillariophyceae and Cynophyceae group were found modestly. Euglenophyceae observed was adequately. The density of phytoplanktons observed minimum in monsoon season due to raining, surface and agricultural runoff causing soil erosion is occurred and to end with turbidity increases, Komala *et al.* (2013). Nakana lake located at subtropical region so maximum sunlight penetrated in summer hence shows higher density in this season. Rest of season winter displayed moderate density because of minimum sunlight and temperature.

Species diversity of Euglenophyceae reported lesser but they found abundantly as compare to other groups. According to (Ghosh *et al.,* 2015) members of Euglenophyceae good biological indicators of organic pollution hence low pollution indicated by them. In present studies five organic pollution tolerant genera were listed out viz., *Oscillatoria, Chlorella, Nitzschia, Navicula* and *Euglena.* But all density of phytoplanktons was decreased at next year than earlier. So many studies have been carried out on the seasonal variations of phytoplanktons (Lokhande and Shembhekar (2009); Dalal and Nisal (2012); Sebastian and Thomas (2016).

DIVERSITY INDICES

No equal abundance and richness in every habitat, they are diverging in their relative occurrence. In particular area different kinds of organisms counting as their richness although resemblance of population of each species comprises evenness. When these above things are increases, automatically diversity increases. Diversity indices were calculated and obtained values were mention in Table- 4.

Species richness of phytoplanktons of Nakana lake was 38 at two year study period and abundance (8152) and (7656) in year 2014-15 and 2015-16 respectively. Shannon- Weiner Index was estimated in year 2014-15 (363.5157) and in year 2015-16 was (344.3082). Simpson's Dominance Index (0.0775) and (0.0429) while Simpson's Index of Diversity (0.9225) and (0.9571) ranges in between 0 to 1 in couple of year indicated that Nakana lake has richer in diversity and density of phytoplanktons. Simpson's Reciprocal Index were (12.9032) and (32.3100) whereas Margalef's Richness Index (4.1083) and (4.1372) in addition to Pielou's Evenness Index (99.9332) and (94.6529) in year 2014-15 and 2015-16 respectively. But point to noted at year 2015-16 all indices were declined except Simpson's Index of

Diversity and Pielou's Evenness Index. Some studies agree with our work Kawade and Pandharkar (2016); Singh *et al.* (2016)

4. CONCLUSION:

In wrapping up, Nakana lake wires excellent diversity and density of planktons because the lake is manmade and built on Panzara River which was originated from hills. It is eternally afar from drainage of city, garbage and industrial effluents. But anthropogenic activities increased day by day hence physico-chemical parameters exposed seasonal fluctuations. Phytoplanktons are good indicators of these changes. They strongly affected and respond rapidly against water pollution. If care is not taken Nakana lake almost immediately suffer and develops into deteriorated habitation.

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FIG.-1. Map of the Study area, Nakana lake.

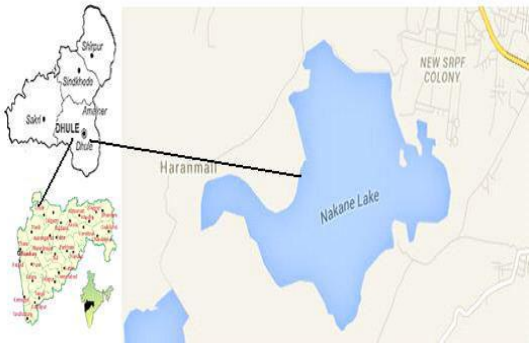

FIG.-2. Percent diversity of different groups of Phytoplanktons from Nakana lake

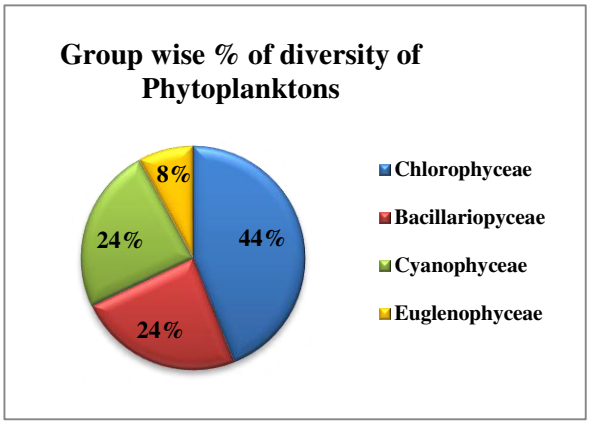

TABLE- 1. Percentage Of Diversity With Density Of Groups Of Phytoplankton.

Sr. No.	Name of Species	2014-15	2015-16
Chlorophyceae (17)			
1	*Ankistrodesmus falcatus*	4.4	3.8
2	*Chara spp*	6.8	6.6
3	*Chlamydomonas conferta*	5.2	4.8
4	*Chlorella conglamerata*	6.7	6.7
5	*Chlorella valgoris*	5.4	4.9
6	*Cladophora spp*	6.3	5.6
7	*Closterium limneticum*	5.9	5.5
8	*Hydrodictyon spp*	4.7	4.9
9	*Micrasterias spp*	5.1	4.4
10	*Nitrela spp*	6.9	6
11	*Oedogonium patulu*	7.9	7.3
12	*Pediastrum duplex*	6.5	6.9
13	*Pediastrum simplex*	6.3	6.6
14	*Spirogyra spp*	7.3	7.8
15	*Ulothrix zonata*	6.1	6.4
16	*Volvox spp*	4.7	6
17	*Zygnema spp*	3.1	4.8
Bacillariopyceae (9)			
18	*Bacillaria paradox*	10.1	10.8
19	*Diatom vuloare*	12.9	12.5
20	*Diatom spp*	13.5	13.4
21	*Fragillaria capurina*	13.7	13.9
22	*Navicula gracilis*	11.1	10.6
23	*Navicula viridula*	10.1	10.4
24	*Nitzschia subtilis*	10.5	10.2
25	*Pinnularia species*	9.7	9.7
26	*Synedra affinis*	8.1	8.1
Cyanophyceae (9)			
27	*Anabaena constrict*	11.5	11.6
28	*Anacysitis spp*	11.5	11.4

29	*Lyngbya spp*	12.8	12.6
30	*Merismopedia punctata*	13.2	12.4
31	*Microcystis aerugenose*	11.8	11.2
32	*Nostoc spp*	12.8	15
33	*Oscillatoria chlorine*	4.7	3.6
34	*Oscillatoria limosa*	10.6	11.1
35	*Phormidium muciola*	10.5	10.7
Euglenophyceae (3)			
36	*Euglena pisciformis*	49	49.8
37	*Euglena viridis*	32.8	33.5
38	*Euglena stellata*	18.1	16.6

TABLE-2. Seasonal Variations in density (Mean ± SEM) of different groups of Phytoplankton (org /l) at Nakana Lake during Feb. 2014 to Jan. 2016.

Sr. No	Groups	Study tenure	Season wise value (Mean ± SEM)			F Value	P Value
			Summer	Monsoon	Winter		
1	**Total Phyto.**	2014-15	759.75±21.27	646.25±2.52	634.00±25.59	12.94	**
		2015-16	736.00±19.31	586.75±11.43	591.25±23.26	20.69	*
2	**Chloro.**	2014-15	285.25±17.90	234.00±7.51	248.25±19.51	2.77	NS
		2015-16	295.25±16	209.50±8.88	225.50±16.45	10.29	**
3	**Bacillario.**	2014-15	231.75±3.75	190.75±3.19	190.25±6.79	24.13	**
		2015-16	209.50±5.69	179.25±4.75	183.25±9.02	5.94	*
4	**Cyano.**	2014-15	193.25±3.00	166.50±3.79	162.00±4.41	19.92	**
		2015-16	184.75±3.32	148.75±7.12	152.25±5.76	12.44	**
5	**Eugleno.**	2014-15	55.60±1.87	33.50±3.52	49.50±3.77	12.4	**
		2015-16	49.25±3.30	46.50±2.66	30.25±2.17	13.92	**

TABLE -3. Pearson Correlations: Phytoplankton density with abiotic parameter in Nakana lake during Feb, 2014 to Jan, 2016.

Sr. No	Para.	T. Phyto.		Chloro.		Bacillario.		Cyano.		Eugleno.	
		2014-15	2015-16	2014-15	2015-16	2014-15	2015-16	2014-15	2015-16	2014-15	2015-16
1	**Temp**	-0.29*	-0.244*	-0.255*	-0.274**	-0.089**	-0.244	-0.453	-0.199	-0.124	-0.42
2	**pH**	0.701**	0.622*	0.650*	0.604*	0.654*	0.692**	0.643*	0.602*	0.545*	0.251*
3	**Turb**	0.804**	0.746**	0.746**	0.721**	0.892**	0.732**	0.651*	0.735**	0.507*	0.239
4	**TDS**	0.935**	0.787**	0.905**	0.780**	0.858**	0.826**	0.881**	0.702**	0.551*	0.366
5	**EC**	0.870**	0.790**	0.849**	0.779**	0.893**	0.815**	0.732**	0.690**	0.517*	0.426
6	**DO**	-0.600*	-0.580*	-0.581*	-0.564*	-0.697**	0.659**	-0.465	-0.445	-0.411	0.665
7	**CO_2**	0.646*	0.636*	0.578*	0.559*	0.544*	0.791**	0.636*	0.678**	0.643*	0.187*
8	**TA**	0.711**	0.735**	0.698**	0.697**	0.723**	0.686**	0.612*	0.680**	0.363	0.375*
9	**TH**	-0.951**	-0.373	0.954**	-0.407	-0.871**	-0.393	0.892**	-0.441	-0.512*	0.82*
10	**Ca^{++}**	-0.824**	-0.520*	0.819**	-0.523*	-0.877**	-0.560*	-0.633*	-0.515*	-0.681**	-0.024
11	**Mg^{++}**	-0.534*	-0.376	-0.498*	-0.361	-0.688**	-0.415	-0.32	-0.416	-0.491	0.142**

The P value for ANOVA is Non-significant if P > 0.05 (ns), significant if P < 0.05 (*), significantly significant (**) if P < 0.01 and highly significant if P < 0.001(***). At (**) Correlation is significant at the 0.01 level (two-tailed), whereas at (*) correlation is significant at 0.05 level (two-tailed).

TABLE-4, phytoplankton species richness, abundance, diversity and dominance indices of Nakana lake.

Sr. No.	Index	2014-15	2015-16
1	Species Richness	38	38
2	Species abundance	8152	7656
3	Shannon-Weiner Index	363.5157	344.3082
4	Simpson's Dominance Index	0.0775	0.0429
5	Simpson's Index of Diversity	0.9225	0.9571
6	Simpson's Reciprocal Index	12.9032	32.3100
7	Margalef's Richness Index	4.1083	4.1372
8	Pielou's Evenness Index	99.9332	94.6529

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Biochemical Profile and Inhibitory Effect of *Haliclona permollis* (Bowerbank, 1866) Marine Sponge of Ratnagiri, West Coast of India

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Abstract: *The intertidal marine sponge, Haliclona permollis was assessed for the antimicrobial effect of various crude extracts, against pathogenic microbes by agar well diffusion method as well as to determined preliminary biochemical screening. The methanol and acetone depicted strong positive antimicrobial activity. It may be due to the presence of alkaloids, glycosides, tannins, flavonoids, proteins and amino acids, steroids, carbohydrate, fats and fixed oil. The hexane and chloroform showed weak positive antimicrobial activity because presence of biologically active compounds in small quantity. The investigation indicated that Haliclona permollis remain an interesting source for antimicrobial activity and also suggest that could be a good source of the secondary metabolite. However it required further investigation for isolation of pure compound.*

Keywords: *Antimicrobial activity, Haliclona permollis, Biochemical profile, Intertidal, Pathogens.*

1. INTRODUCTION:

The marine sponges are the oldest metazoan group and characterized as sessile active filter feeders [1]. Sponges are simple, multicellular, sessile animals with no true tissue layers or organs [2]. This rocky shore area directly exposed to sea and it inhabited by diverse flora and fauna. Sponges are the most primitive multicellular animals that have existed for more than 800 million years. The sponges (Porifera), being evolutionarily ancient inhabit every type of marine benthic environment [3]. Sponges are primitive marine invertebrate's presence of high number natural products than any other marine phylum. The marine sponges are broadly distributed from intertidal zones to thousands of meters deep in the ocean [4].

The sponges are one of the richest sources of biologically active secondary metabolites and chemical diversity (5) (6). Until now, more than 5000 different compounds have been isolated and identified from about 500 species of sponges (7) with nearly 800 of them exhibiting antibiotic activity (8). These natural products belonged to different class of compounds like terpenoids, alkaloids, macrolides, polyether's, nucleoside derivatives and peptides. In recent time attention has been directed to the search of bioactive peptides from sponges, being actually a well-established sector in the research of marine natural product. Antitumor studies were conducted with 19 marine natural products in a number of experimental and clinical models proved that sponges act as an excellent source for bioactive compounds (9).

Marine sponges are a rich source of structurally novel and biologically active secondary metabolites [10]. Over 60% of potentially useful bioactive compounds discovered from living organisms have been obtained from marine fauna, 70% of which detected from sponges [11]. The sponge class Demospongiae is known for producing the largest number and diversity of secondary metabolites isolated from marine invertebrates [12]. Many sponge or sponge symbiont–derived metabolites are potent antibacterial, antifungal, anti-feeding and antifouling compounds [13]; a number of bacteria associated with sponges were found to be the sources of antibiotics and other bioactive compounds in the marine environment [14].

However, the bioactive potential of compounds from Indian sponges has been little studied, especially west coast of India. Therefore, In the present investigation report the antimicrobial and biochemical potential of marine intertidal sponge, *Haliclona permollis* collected from Ratnagiri coast (16°55'N73°16'E).

2. MATERIALS AND METHODS:

Collection of sample & preparation of crude extract-

The marine sponge, *Haliclona permollis* were collected from the low intertidal rocky pools of Ratnagiri coast (16°55'N 73°16'E), Maharashtra, India. The sponge was collected by an eco-friendly. Identified sponge tissues samples were washed with sea water, air dried and chopped into small size and extracted with 1000 ml (1:10) methanol, acetone, chloroform and hexane for about 7 days. Then extract was filtered through Whatmann paper No. 1 and solvent was processed by rotary vacuum evaporator (Buchi type-Superfit, Bangalore) under reduced pressure to get the crude extract of sponge. The concentrated extract was used for further study.

Antibacterial activity of *Haliclona permollis*

The assays were performed by agar well diffusion method is widely used to evaluate the antibacterial activity of crude extracts [15]. The four pathogenic bacterial strains were used as test organisms such as *Escherichia coli*, *Salmonella typhi*, (Gram negative bacteria) *Bacillus subtilis*, *Staphylococcus aureus* (Gram positive bacteria). All bacteria were stored at -20℃ until use. Cells were grown at 3^0C in Muller Hinton broth to an OD 420 = 1.9 (approx. 105 CFU/mL), and were transfer to Muller Hinton agar. The broth cultures swabbed onto agar medium so as to achieve a lawn of confluent bacterial growth separately for each strain. The sterile stainless steel borer (6 mm) was used to make well in the agar medium. Five wells were bored in each plate. The sponge crude extract (100µg /mL) was loaded in to the well and to find out the inhibitory potential. Triplicate plates were maintained for each test. Discs of Streptomycin (25µg/ml) were used as positive control. The bacterial assay plates were incubated at 37℃ for 24 hrs. Growth of bacteria around each well was observed carefully and the diameter of the zone of inhibition around each agar well was measured using a Hi-media zone reader.

Antifungal activity of *Haliclona permollis*

The assays were performed by agar well diffusion method is widely used to evaluate the antifungal activity of crude extracts [15]. Assays were performed by agar well diffusion method. The crude extract was tested against *Aspergillus* spp., *Penicillium* spp., *Alternaria* spp. and *Fusarium* spp. The fungal cultures were maintained in 0.2% Sabouraud dextrose broth; each fungal inoculum was applied on plate and evenly spread on Sabouraud dextrose agar using a sterile cotton swab. The Fluconazole discs were used as the positive control. The sponge crude extract (100µg /mL) was loaded in to the well and to find out the inhibitory potential. The fungal assay plates were incubated at 28℃ for 48 hrs.

Preliminary biochemical screening of *Haliclona permollis*

The preliminary biochemical analysis was carried out using following methods [17, 18]. The sponge crude extracts were qualitatively analyzed for the presence of various biologically active compounds.

1. **Detection of alkaloids**

i. **Mayer's Test:** Extracts were treated with Mayer's reagent (potassium mercuric iodide). The formation of a yellow coloured precipitate indicates the presence of alkaloids in the extract.

ii. **Wagner's** Test: Extracts were treated with Wagner's reagent (Iodine in Potassium Iodide). The formation of a brown/reddish precipitate indicates the presence of alkaloids in the extract.

iii. **Dragendroff's Test:** Extracts were treated with Dragendroff's reagent (solution of Potassium Bismuth Iodide). The formation of a red precipitate indicates the presence of alkaloids in the extract.

iv. **Hager's Test:** Extracts were treated with Hager's reagent (saturated picric acid solution). The formation of yellow coloured precipitate confirmed the Presence of alkaloids.

2. **Detection of glycosides**

Legal's Test: The extracts were treated with sodium nitropruside in pyridine and sodium hydroxide. The pink to blood red colour indicates the presence of cardiac glycosides in the extract.

3. **Detection of tannins**

i. **Gelatin Test:** To the extract, 1% gelatin solution containing sodium chloride was added. The formation of a white precipitate indicates the presence of tannins in the extract.

ii. **Ferric Chloride Test:** With 1% ferric chloride solution the extract gives blue, green, or brownish green colour indicating the presence of tannins.

4. **Detection of flavonoids**

i. **Alkaline Reagent Test:** Extracts were treated with few drops of sodium hydroxide solution. The formation of intense yellow colour, it becomes colourless on addition of dilute acid indicates the presence of flavonoids in the extract.

ii. **Lead acetate Test:** Extracts were treated with few drops of lead acetate solution. The formation of a yellow coloured precipitate indicates the presence of flavonoids in the extract.

iii. **Shinoda Test:** Take 2-3 ml of extract, a piece of magnesium ribbon and 1 ml of conc. hydrochloric acid was added. The Pink or red coloration of the solution indicates the presence of flavonoids in the extract.

iv. **Zinc Hydrochloride Test:** To the test solution, add a mixture of zinc dust and conc. Hydrochloric acid. It gives red colour after few minutes.

5. **Detection of proteins and amino acids**

i. **Xanthoproteic Test:** The crude extracts were treated with few drops of concentrated nitric acid. The formation of a yellow colour indicates the presence of proteins.

ii. **Ninhydrin Test:** To the extract, 0.25% w/v ninhydrin reagent was added and boiled for few minutes. The formation of a blue colour indicates the presence of amino acid.

6. **Detection of saponins**

Foam Test: Take the 0.5 gm of extract was shaken with 2 ml of water and Then formation of foam persistently for ten minutes it indicates the presence of saponins in the extract.

7. **Detection of sterols and terpenoids**

Salkowski's Test: Extracts were treated with few drops of concentrated sulphuric acid, red colour at the lower layer indicates presence of steroids and formation of yellow colour at the lower layer indicates the presence of terpenoids in the extract.

8. **Detection of carbohydrates**

i. **Molisch's** Test: Filtrates were treated with 2 drops of alcoholic α-naphthol solution in a test tube. The violet ring at the junction indicates the presence of Carbohydrates in the extract.

ii. **Benedict's Test:** Filtrates were treated with Benedict's reagent and heated gently. The orange red precipitate indicates the presence of reducing sugars in the extract.

iii. **Fehling's Test:** Filtrates were hydrolysed with diluted HCl, neutralized with alkali and heated with Fehling's A & B solutions. The formation of a red precipitate indicates the presence of reducing sugars in the extract.

iv. **Selwanoffs Test:** Take 1 ml of a sample solution of extract is placed in a test tube. The 2 ml of selwinoffs reagent (a solution of resorcinol and HCL) is added. The solution is heated in a boiling water bath for two minutes. The formation of red product indicates the presence of carbohydrates.

v. **Camnelisation Test:** 1 ml crude extract were treated with strong sulphuric acid, it gives a burning sugar smell. This indicates the presence of carbohydrates in the extract.

9. **Fats and Fixed Oils**

Stain Test: The small amount of extract was pressed between two filter papers. The oily stain on filter paper indicates the presence of fixed oil in the extract.

3. RESULTS:

The *Haliclona permollis* crude extracts methanol, acetone, chloroform and hexane were used to investigate the antimicrobial activity against four human pathogenic bacteria as well as four plant pathogenic fungal species; and the preliminary biochemical screening. Figure 1 shows result of in vitro testing of sponge extracts against pathogenic bacteria. Inhibition zones of sponge crude extracts against the specific test organisms were measured in mm. The crude extract restricted the growth of pathogens strains on the media around wells. The maximum inhibition zone (5-7 mm) was observed in methanol and acetone crude extract against *Escherichia coli*, *Salmonella typhi*, *Bacillus subtilis*, *Staphylococcus aureus*. The minimum inhibition zone (2-4 mm) was noticed in chloroform and hexane extract against all four pathogenic bacterial strains.

The figure 2 shows results of sponge crude extract against plant pathogenic fungal species. The maximum inhibition zone (5-7 mm) was observed in methanol crude extract against *Aspergillus* spp., *Penicillium* spp., *Alternaria* spp. and *Fusarium* spp. and acetone extract shows (4-5) inhibition against *Aspergillus* spp., *Penicillium* spp., *Alternaria* spp. and *Fusarium* spp.. The minimum inhibition zone (1-3.5 mm) was noticed in chloroform and hexane extract against all four pathogenic fungal strains.

The figure 3 to figure 10 depicted the various biochemical present in different extracts of sponge *Haliclona permollis;* the methanol and acetone crude extract contains alkaloids, tannins, flavonoids and proteins and amino acids, steroids, carbohydrates, fats and fixed oils strongly in high quantity; as well as chloroform and hexane extract contains presence of secondary metabolites in small quantity.

4. DISCUSSION:

In the present study the crude methanol, acetone, chloroform and hexane extracts of *Haliclona permollis* showed antimicrobial action against the bacteria and fungi. The crude extract of methanol shows maximum antimicrobial activity against all test microorganisms. The sponges shows wide spectrum of antibacterial efficacy and exhibited the growth of all the test bacteria. The reports on antibacterial activity of sponges revealed their activity on gram positive bacteria. Various studies have confirmed the predominance of gram negative producers in the marine environment [19]. Marine sponge *Aplysina cavernicola* produces the aeroplysinin, aerthionin derivatives, with some antibiotic activity against *Bacillus subtilis* and *Proteus vulgaris* [20].

Various studies have been done on anti–microbial properties of the bacteria associated with the sponges. The antibiotics produce by these bacteria ranged from broad spectral to species specific [21]. The discovery of new classes of antibiotics is necessary due to the increased incidence of multiple resistances among pathogenic microorganisms to

drugs that are currently in clinical use [22]. The Sponges of Demospongiae class are known to produce the largest number of secondary metabolitesss, most of them with medically relevant biological activities and important ecological roles [23].

Sponges are primitive marine invertebrate's present high number of natural products than any other marine phylum. Many of their products have strong bioactivities including anticancer, antimicrobial, larvicidal, hemolytic and anti-inflammatory activities and are often applicable for medical use [24]. The anti-tumour activity of cell free extracts from sponge associate actinomycetes might be due to the presence of the biologically active compounds alkaloids and guninine [25]. Hence, the present results profounded the promising antimicrobial activity of *Haliclona permollis* against eight active pathogenic strains. The study shows that *Haliclona permollis* possessed excellent source of antimicrobial properties and secondary metabolites.

5. CONCLUSION:

The present investigation reveals that the marine sponges *Haliclona permollis* shows the potential source for the antimicrobial and biochemical properties. The methanol and acetone depicted strong positive antimicrobial activity. It may be due to the presence of alkaloids, glycosides, tannins, flavonoids, proteins and amino acids, steroids, carbohydrate, fats and fixed oil. The hexane and chloroform showed weak positive antimicrobial activity because presence of biologically active compounds in small quantity. The investigation indicated that *Haliclona permollis* remain an interesting source for antimicrobial activity and also suggest that could be a good source of the secondary metabolite. Probably is the first report on the antimicrobial activity and biochemical profiling of *Haliclona permollis* from Ratnagiri coast, Maharashtra, India, to the best of our knowledge. However it required further investigation for isolation of pure compound.

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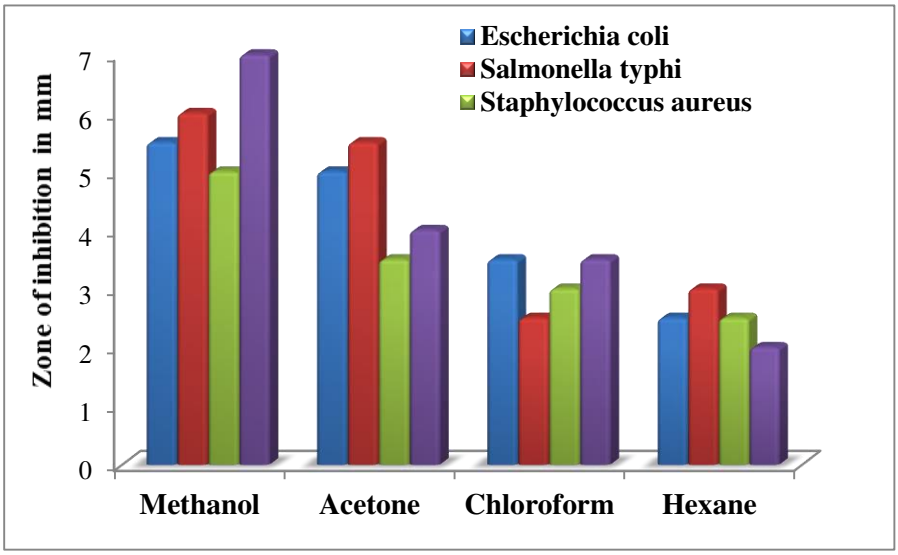

Figure 1: Antibacterial activity of crude extract of *Haliclona permollis.*

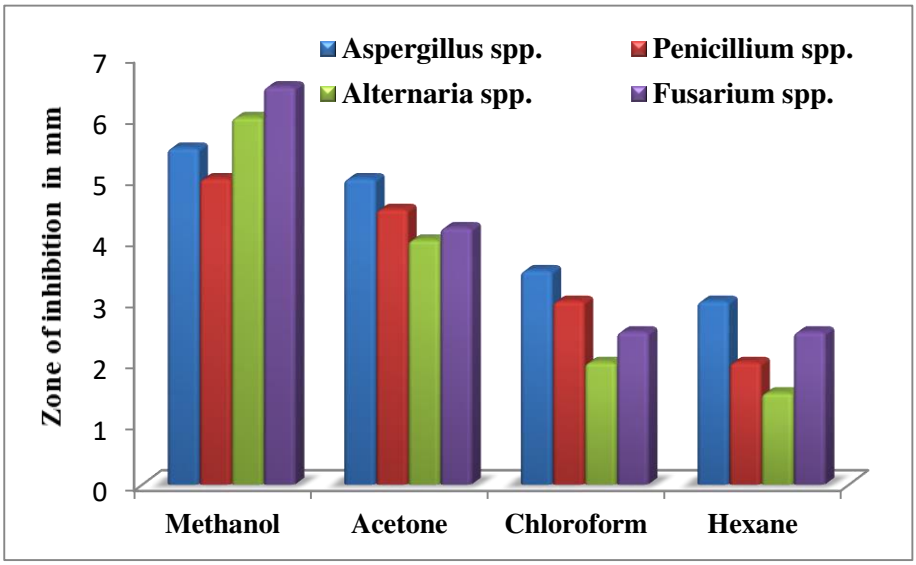

Figure 2: Antifungal activity of crude extract of *Haliclona permollis.*

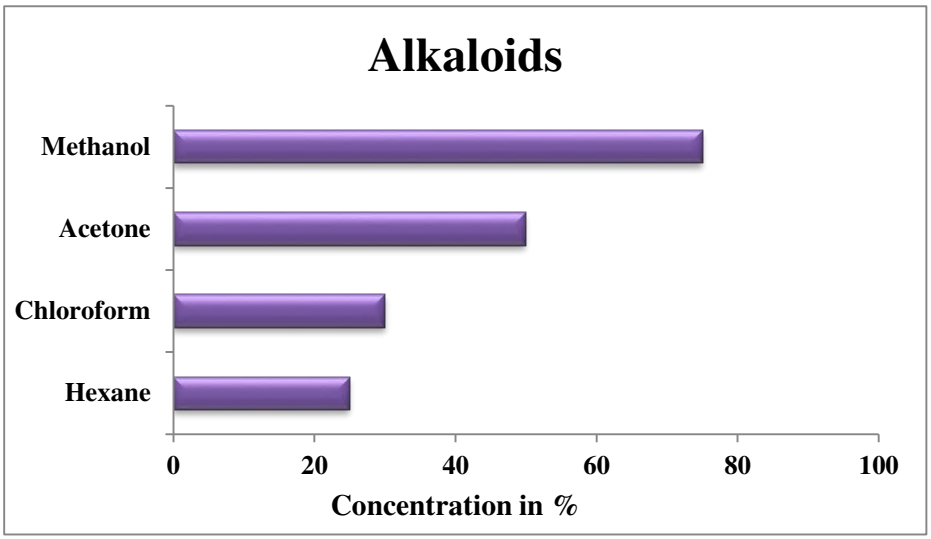

Figure 3: Alkaloid content in crude extracts of *Haliclona permollis.*

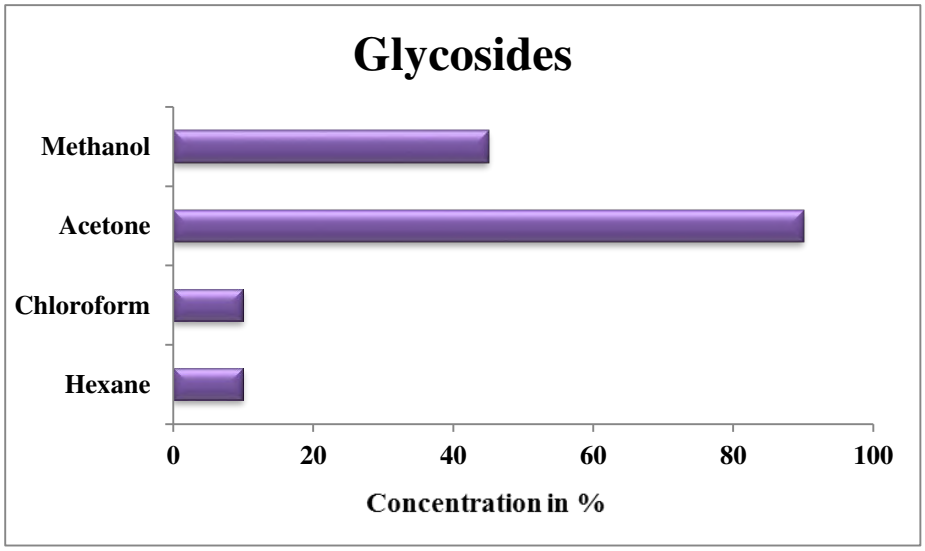

Figure 4: Glycoside content in crude extracts of *Haliclona permollis.*

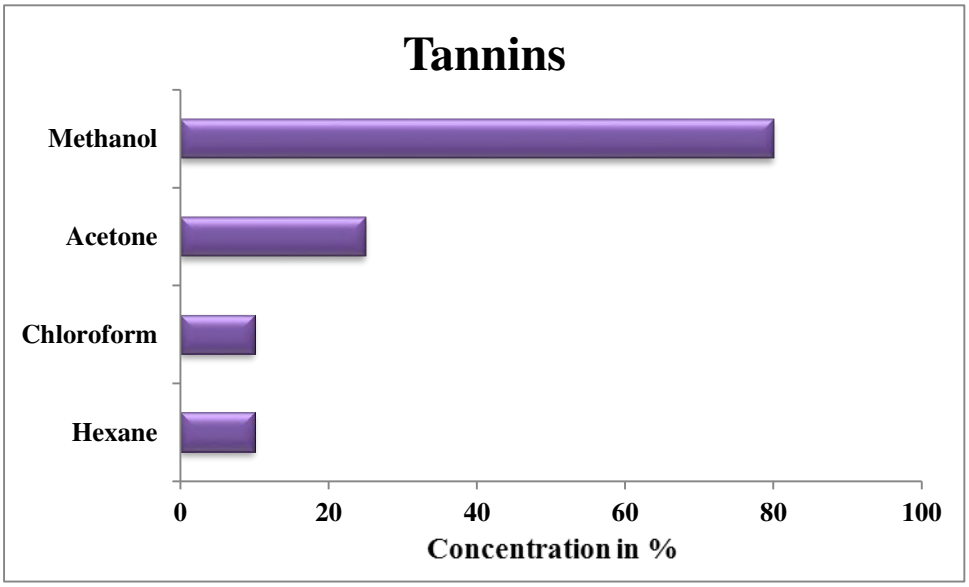

Figure 5: Tannin content in crude extracts of *Haliclona permollis.*

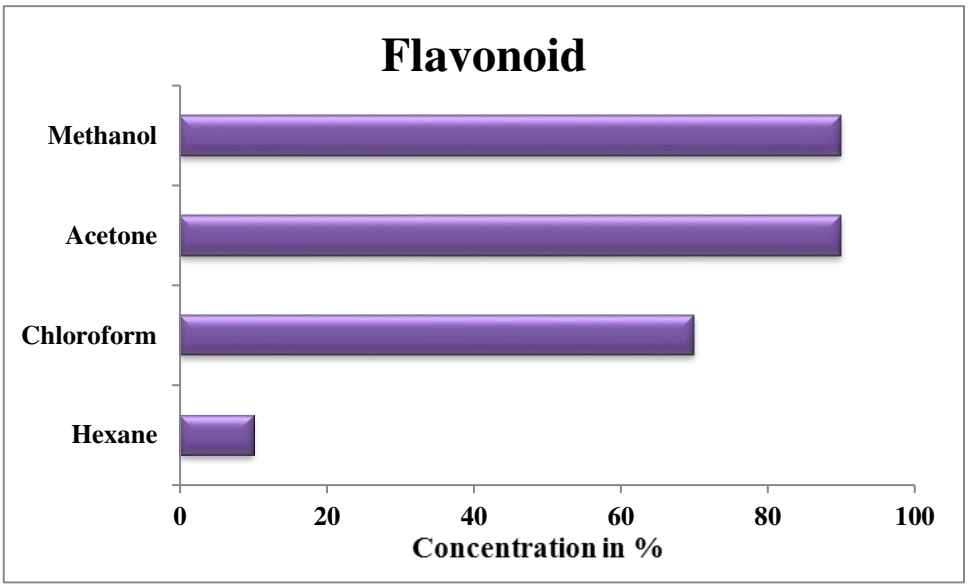

Figure 6: Flavonoid content in crude extracts of *Haliclona permollis.*

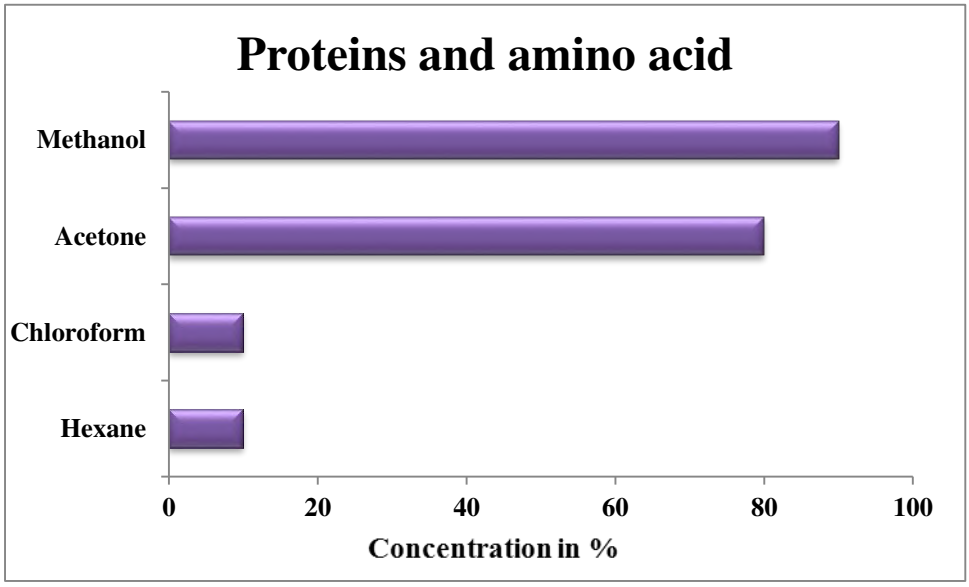

Figure 7: Proteins and amino acid content in crude extracts of *Haliclona permollis.*

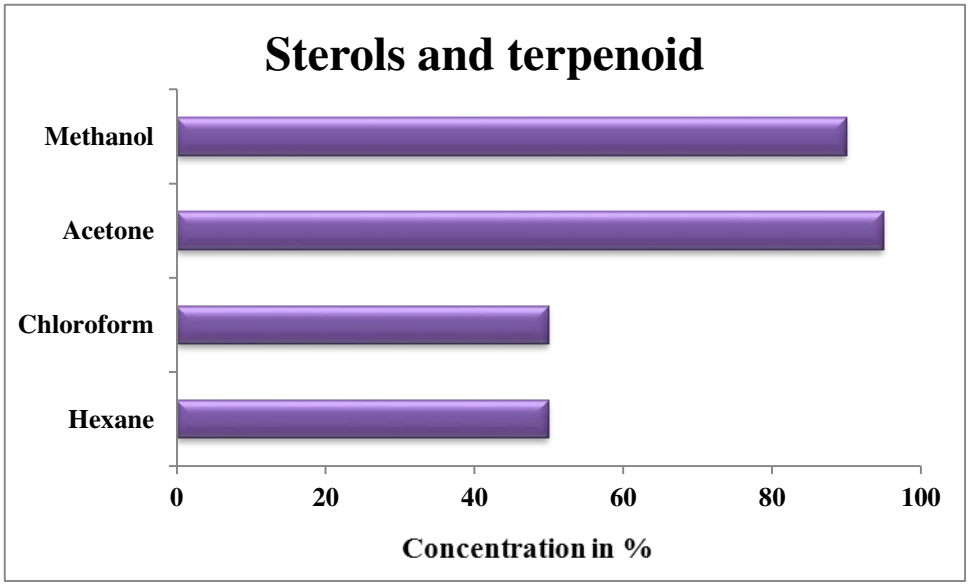

Figure 8: Sterols and terpenoid content in crude extracts of *Haliclona permollis.*

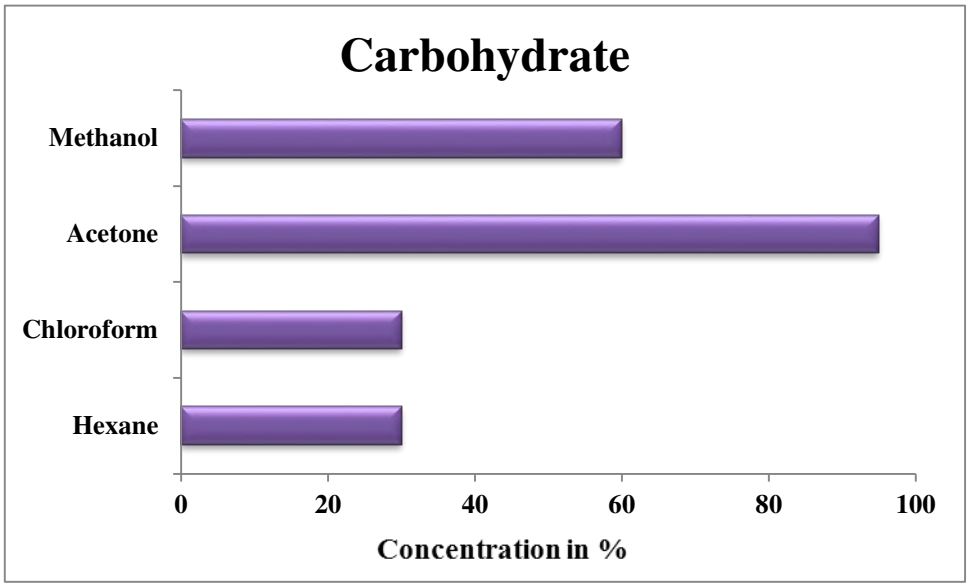

Figure 9: Carbohydrate content in crude extracts of *Haliclona permollis.*

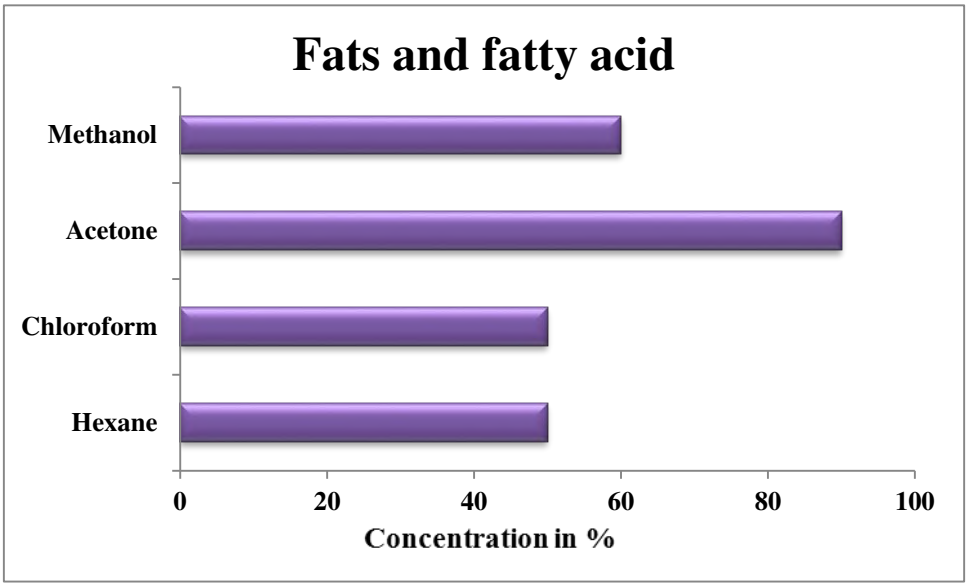

Figure 10: Fats and fatty acid content in crude extracts of *Haliclona permollis.*

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Benefaction of Aquatic Ecosystem in Biodiversity and Fisheries

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Abstract: *Freshwaters are one of the ecosystems most heavily affected by human activity. Major impacts on biodiversity include pollution, habitat loss and degradation, draining wetlands, river fragmentation and poor land-management. Biodiversity of fish can and does serve as indicators of ecosystem health. Freshwater biodiversity is threatened and has declined in many areas as a result of these impacts. Aquatic ecosystems (inland and marine) represent the most biodiversity sources of food consumed by humans. This includes vascular plants and algae, and animals such as crustaceans, mollusks, reptiles, amphibians and finfish. Freshwater ecosystems cover only about 1 percent of the earth's surface, but provide habitat for over 45 percent (13,500) of the world's freshwater fish species. Another 2,100 species of fish can also live in brackish water. The geotropically regions contain the highest amounts of fish biodiversity and the tropical and subtropical floodplain rivers and wetlands are the with the highest levels of biodiversity. Rice fields are an important source of biodiversity and include over 200 species of fish, insects, crustaceans, mollusks, reptiles, amphibians and plants (in addition to rice) that are used by local communities. Many freshwater species are important to the aquaculture industry as sources of bloodstock for spawning and early life history stages (e.g. eggs, larvae) for on growing. Non-native aquatic species can contribute significantly to the production and value in inland fisheries and aquaculture*

Keywords: *Fisheries, Livestock, Aquatic Ecosystem, Biodiversity.*

1. INTRODUCTION:

Many freshwater species are important to the aquaculture industry as sources of bloodstock for spawning and early life history stages (e.g. eggs, larvae) for on growing. Non-native aquatic species can contribute significantly to the production and value in inland fisheries and aquaculture. Aquatic biodiversity in both freshwater and marine environments are under continuous decline because of overexploitation of species, introduced exotic plant or animal, pollution sources from cities, industries and agricultural zones, loss and changes in ecological niche. Their conservation and management in the form of bio reserve points and bioregional management and worldwide monitoring are needed for the protection of the aquatic biodiversity. This review is presenting information on biodiversity in aquatic habitats and their resources, in marine and fresh water ecosystems. . Aquatic biodiversity in both freshwater and marine environments are under continuous decline because of overexploitation of species, introduced exotic plant or animal, pollution sources from cities, industries and agricultural zones, loss and changes in ecological niche. Their conservation and management in the form of bio reserve points and bioregional management and worldwide monitoring are needed for the protection of the aquatic biodiversity. This review is presenting information on biodiversity in aquatic habitats and their resources, in marine and fresh water ecosystems. Complete information about the total species diversity in the freshwater resources is incomplete especially among invertebrates and microbes and in the tropical zones of the world that serves as a dwelling spot of dissimilar species of the world. From amphibian's phylum, total of 5760 species has been identified since last 9 years [1]. Documentation about invertebrate animal's diversity in tropical freshwaters are not available. However, great endemism and species richness at local habitat do exist in the groups of crustaceans, mollusks and aquatic arthropods [2] [3] [4]. Compassion of the biodiversity in fresh water resources is more than any other global ecosystems [5]. The susceptibility of the freshwater habitat is because irregular numbers of plant and animal communities are growing in the water regime. As predictable by Lundberg et al. [6] freshwater bodies are enrich with more than 10,000 fish species, which comprise approximately 41% of global fish community and one fourth of varied vertebrate population at global scale. Combining countless number of amphibians, aquatic reptiles and mammalian populations to the total quantity of freshwater-fish clearly depicts the freshwater habitat as the only favorite biological spot of all vertebrates. Complete information about the total species diversity in the freshwater resources is incomplete

especially among invertebrates and microbes and in the tropical zones of the world that serves as a dwelling spot of different species of the world. From amphibian's phylum, total of 5708 species has been identified since last 11 years [1]. Mekong drainage in Cambodia has been identified as one of the global "hotspots" for regional river fish biodiversity; Basin has variety of species richness making it globally recognized. Recent research estimation has revealed fish wealth of about 1710 species [7]. It has been noticed that freshwater biological regions are given less interests than terrestrial zones [8]. Large aquatic bodies in the tropics have more species diversity than those in temperate regions; in addition species richness increases rapidly in lower latitudes than higher ones [9]. Flow regimes of running aquatic bodies are important. It adds to the sustaining capability of Rivers and their associated flood plain. Any alteration of flowing stream often claims to be the serious and threatens wetlands and their species diversity. Similarly seedling survival and plant growth rates are affected by changes in rates of water level fluctuation and disturbance frequency and intensity [10]. In this review information on biodiversity in aquatic habitats and their resources, in marine and fresh water ecosystems. The Great Barrier Reef in Australian continent is the largest coral reef ecosystem in the world, habitat of over 700 varieties of coral, and also giving shelter to diverse varieties of fish and mollusks species. Coral reefs are the systems with extreme biodiversity of marine animals. One studies from the Red Sea region of Gulf of Aqaba, has revealed that egg releasing phase of aquatic animals are different throughout the year.

2. THE ROLE OF DIVERSITY IN ECOSYSTEM FUNCTIONING:-

The diversity of functional types in soils is strongly linked to productivity. Many experiments have shown significant enhancements of planet production owing to the presence of soil animals, and specifically their diversity in the case of earthworms (Lavelle et al. 2006). The enhancement of primary production might be the result of increased release of nutrients from decomposition, enhancement of micro-organisms protection against diseases, and effects on soil physical structure. However, experimentally removing key taxonomic groups from soil food webs may have little impact on rates of processes such as soil respiration and net ecosystem production (Ingham et al. 1985; Liiri et al. 2002; Wertz et al. 2006), possibly because the exceptional diversity of soil organisms and the relatively low degree of specialization in many groups means that many different species can perform similar processes (Bradford et al. 2002; Fitter et al. 2005 In intensively managed and disturbed ecosystems, maximum productivity is typically achieved in systems of very low diversity, for example heavily fertilized monocultures. However, these systems require large inputs of resources, including fertilizers, biocides and water, which generally are not environmentally or economically sustainable (Wright 2008). Sustained high production without anthropogenic resource augmentation is normally associated with high levels of biodiversity in mature ecosystems. In an eight-year study, Bullock et al. (2007) reported positive effects of increased species richness on ecosystem productivity in restored grasslands on a range of soil types across southern England. Similarly, Potvin and Gotelli (2008) reported higher productivity in biologically diverse tree plantations in the tropics, suggesting that increasing diversity in timber plantations.

3. SPECIES DIVERSITY IN PRODUCTIVITY – FISHERIES AND FOOD.

Biodiversity is also associated with enhanced productivity in marine systems different components of biodiversity influence the performance of macro algal assemblages in natural communities. They found positive relationships for biomass and species richness with productivity but also relationships of spatial aggregation and species evenness with some of the productivity-related variables analyzed. In a meta-analysis of published experimental data it was found that increased biodiversity of both primary producers and consumers enhanced the ecosystem processes examined; the restoration of marine ecosystems has also been shown to increase productivity substantially. Overfishing together with climate change and other pressures are producing impacts of unprecedented intensity and frequency on marine ecosystems, causing changes in biodiversity, structure and organization of marine assemblages directly and indirectly .Numbers and diversity of large pelagic predators have been sharply reduced and the impacts of this loss can cascade through marine communities (Heithause et al. 2008). Predictions about how communities will respond to marine predator declines have to consider the risk effects and behaviorally mediated indirect interactions. In the case of vertebrate predators and long-lived prey species in particular, a sole focus on direct predation might greatly underestimate the community effects of predator loss.

4. AQUATIC ECOSYSTEM:

Ecosystem support a wide range of organisms, including microorganisms, invertebrates, insects, plants, and fish. Some hydrologists work in understanding the tropic systems within aquatic ecosystems and their health as a function of environmental conditions such as water temperature and turbidity. Aquatic biodiversity is a major concern in water conservation and restoration projects, as well as water resource management. Concern regarding the biological health of wetlands, rivers, and lakes has led to the idea of 'ecosystem services' as a means to quantify or assess the value provided to society by different natural environments, including aquatic environments. While this lens seems biased to the larger species that are of commercial value (i.e. fish), it is understood that healthy waters require the full spectrum of organisms as part of an aquatic ecosystem. The section on aquatic biology provides considerable detail on many of these species.

5. DECOMPOSITION AND MINERALIZATION:

Aquatic ecosystems comprise the largest portion of the biosphere and include both freshwater and marine ecosystems. The sources of organic matter in these systems can be both internal (autochthonous) and external. In general, the autochthonous material has higher available N concentration and is structurally easier to decompose than the plant residues. Decomposition in aquatic ecosystems follows similar patterns as in terrestrial environments (i.e., it involves leaching, fragmentation, and chemical alteration), though with some major differences due to the aquatic environment. A major form of organic matter in aquatic ecosystems is the particulate organic matter (POM). POM can come from both autochthonous. The sources include terrestrial leaves and small twigs, which are usually colonized by fungi and fragmented by shredders, leading to the formation of POM. Autochthonous POM is derived from the fragmentation of dead organisms and other organic material. POM is partly ingested, digested, and mineralized by organisms and microorganisms before settling on the bottom. The remaining organic matter that reaches the bottom is further broken down by bacteria both through aerobic and anaerobic processes. Another important component of organic matter in aquatic ecosystems is the dissolved organic matter by microalgae, phytoplankton, and zooplankton and (2) autolysis – the remains of phytoplankton and zooplankton. DOM is taken up by bacteria and converted into bacterial biomass without undergoing any breakdown into inorganic compounds. This bacterial biomass is later consumed by the zooplankton, which in turn, excretes nutrients in the form of exudates, contributing to a significant portion of the suspended material in the water column. Bacteria then take these exudates (even at very low concentration) to obtain both carbon and nutrients, and a new cycle starts. Thus, in contrast to terrestrial ecosystems, bacteria in aquatic systems act as converters rather than as decomposers, whereas phytoplankton and zooplankton play major roles in the release of available nutrients.

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Restoration of Aquatic Ecosystem of Sagar Village Pond In Desert Area Bikaner

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Abstract: *Sand dune, dry hot air, low rainfall and scanty fresh water reservoir are characteristic features in desert area like Bikaner. It is situated in western part of the Rajasthan with peculiar desert fauna and flora. Sagar village pond is situated 7 km east of the Bikaner city, surounded by eastern and southern side and collects water from north-west sides. In rainy season it receives planty of rain water which get store in 2000 sq m area; the water also carry several nutrients that flourishes the fauna and flora of aquatic ecosystem. After rainy season, day by day the water column of sagar village pond slowly lower down and in winter or before onset of next summer it becomes dry. But each and every year flora and fauna get develops, like molluscs (Lymnaea, Indoplanorbis, Digoniostoma, Thiara, Gabbia), zooplankton, phytoplankton, nekton, neuston, benthos etc. Several human activities like lifting of water by bullock cart, bricks formation, bathing, durga puja evey thing disturb the aquatic flora and faunal diversity and density. Every year after drynes and then after rainy season the aquatic ecosystem of sagar village pond again get restored and fully flourishes.*

Key Words*: - Desert, aquatic ecosystem, fauna, flora .*

1. INTRODUCTION:

Any aquatic ecosystem inhabited several living being, aquatic flora and aquatic fauna which includes- invertebrates, vertebrates, neckton, neuston, benthos, periphyton, zooplankton, phytoplankton, weeds etc., these all living beings directly or indirectly depends on the presence or absence or availability of water and nutrients of any aquatic system. Ponds or lakes or any water body have different water level depends on rainfall, catchment area, locality and so many other factors like slopes etc. Desert region has very specific harsh, dry, peculiar hot condition, low rainfall and also very scattered situated (natural and manmade) ponds (water body). Such condition also reflects in aquatic ecosystem of this area and so the living being also. Almost every year low rainfall in this area affects the aquatic ecosystem as at a peak of hot summer the water level rapidly go down and ultimately it become dry, clay get break up and aquatic living being get vanish. 3-4 months passed in such a way and any living activity not notices in dry clay. But in monsoon season few amount of rain water comes in dry pond and the aquatic living being again get appear and grown up in density and diversity and flourishes the aquatic ecosystem.

2. STUDY AREA

The State of Rajasthan, having an area of 3, 42,274 $km^{2,}$ constitutes the largest State of the Indian republic. It extends between 23°3'N and 30o12'N latitudes, and $69^0$30'E and 78°17'E longitudes (Fig.1). The Aravalli range, running from Sirohi in the SW to Khetari in the NE, bisects the state into two unequal parts. The north-western region constitutes the major part of the Indian desert while the south-eastern region is a combination of semiarid and fertile lands. Bikaner, where the study has been carried out, occupies a central position in the former region (28°N and 73°17'E, MSL 228 m). India, in general, has a tropical monsoon climate, but the area under investigation, being a hot desert, shows a typical arid climate.

Sagar Village Pond is situated about 7 km east of Bikaner city. The maximum depth of the pond is 5.5 m and the surface water spread is about 2000 m^2. It has stone and brick walls on the eastern and southern banks. The former banks support buildings of Scout - Guide Training Centre and a temple. The north-west part of the pond is open and the surrounding plains act as catchments for the pond. The maximum depth is available in the north-east of the pond while the banks in the south-west are shallow littorals. Clay from the latter end is lifted for brick making and other purposes. The south-east end is relatively secluded and less disturbed. Common rooted vegetation also found in the pond. Nekton fauna freely swim or move and not controlled by water waves, includes fishes and frog.

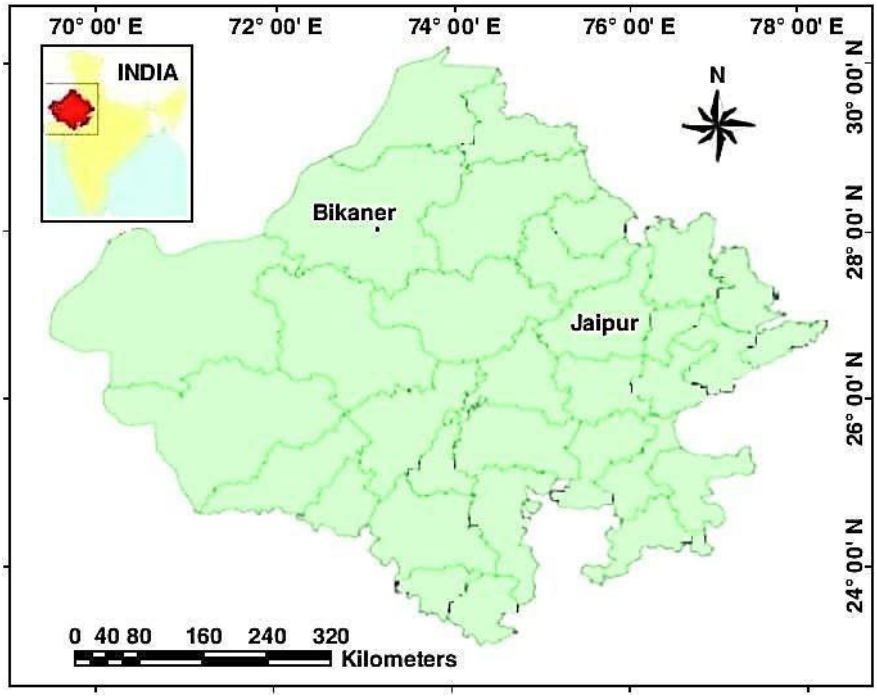

Fig 1:- Location Of Bikaner In Rajasthan Map

Fig 2 :- Sagar Village Pond

3. METHODOLOGY:

Collection of water sample

Water samples were collected from a depth of 0.5m at monthly intervals. Since the water was shallow, no samples could be collected from greater depths. The sampling was carried out during morning hours between 06.00-11.30 Hrs. The samples were collected with the help of a plastic bucket of 15 litre capacity, and were transferred to well rinsed polyethylene bottles for the analysis of physical and chemical parameters.

Collection of sediment and fauna-

The mud sample from each station was collected with the help of a quadrate of known dimensions (i.e., 500 cm^2), as the water was shallow. The mud from this quadrate was taken out with the help of a shovel and transferred to plastic bucket. The volume of mud was measured and it was transferred to duly labelled polythene bags. The samples were transported to the laboratory for examination of physical-chemical variables and for benthic populations.

For collection of benthic forms, the mud was transferred to plastic bucket and some water was added to prepare a suspension. This was filtered through a sieve of 2mm mesh size. The residue was transferred to an enamel tray and benthic forms were picked up mechanically. These were preserved in spirit.

Analytical methods -

Some parameters were monitored on the spot while for other estimates the sample bottles were brought to the laboratory on ice. The samples were kept in deep freeze until they get analysed. Abiotic parameters monitored included

Water temperature, Transparency, pH, Electrical conductance (EC), Total dissolved solids (TDS), Dissolved oxygen (DO) and Total alkalinity. Transparency, temperature, pH, EC, TDS, DO and alkalinity were measured on the spot. Parameters like temperature, pH, EC and TDS were analysed with the aid of a portable water analyser kit (Century: CK 710). Transparency was recorded with the help of a standard Secchi disc. For the analysis of various chemical variables, the methods as prescribed by Strickland & Parson (1972), Golterman et. al. (1978), and APHA-AWWA-WPCF (1981) were followed. Dissolved oxygen and alkalinity were determined by volumetric methods.

Assessment of population-

Benthic fauna collected by sieving method was studied under stereoscopic binocular microscope and bull lens. The forms were identified and counted. Identifications were made following Subba Rao (1989). The results were expressed in terms of No./m^2.

4. RESULTS:

Although being shallow and small body of water, village pond constitutes almost only the wetland ecosystem in far and wide stretches of barren sandy plains of the Indian desert. Being physically isolated from each other, they vary in their biodiversity which is ofcourse adapted to ecological challenges like extremes of temperature, high evaporation rate of water influencing depth and concentration of electrolytes in the medium, dry spells, particularly during drought years, besides other environmental extremities.

THE BIOTOPES-

The physical-chemical limnology of water and sediment revealed that:

i. The annual average of water temperature was around about 26^0C.
ii. The transparency of water was poor in this shallow water, not exceeding 1 m.
iii. In terms of total alkalinity, the water of sagar pond was mostly alkaline.
iv. The alkaline water have the pH ranging between 7.5 to 8.8. The pH was lowest during monsoon and greatest during summer, obviously because of greater decomposition activity during monsoon and high salt concentration during summer.
v. EC and TDS were ranging in safe guideline.
vi. Although the water was well oxygenated, the least DO value was noted during winter coupled with high free CO_2. High DO noticed during rainy season and it lower down as get used by the organisms.

THE FAUNA AND FLORA:

Availability of water and nutrients determines the density, diversity, distribution and adaptiveness of all living being. In dry summer, by desiccation, rupturing of clay, vanish the all living being (aquatic fauna and flora) of sagar village pond. After first shower, the rain water slowly comes in pond through the catchment area and it get stored. Soon the biota of pond grows and enrich the pond. Several flora like hydrilla, vallisneria, and phytoplanktons algae, cyanobacteria, diatoms, dinoflagellates was noticed. Cyclops, daphnia, euglena, paramecium, vorticella, water spider, etc also noticed as fauna.

Among different nearby biotopes investigated, sagar pond was harboured by four species (*Lymnaea acuminata*, *Indoplanorbis exustus, Gabbia orcula Digoniostoma pulchella* while *Thiara tuberculata* was not present in this waters. Thus it was evident that the gastropod diversity was not uniformly distributed among the water bodies studied.

The discontinuous distribution of the gastropod species among these desert waters does not seem to be controlled by local ecology since almost same kind of biotopic conditions are offered by these waters. It mostly seems to have been dependent upon occasional introduction and subsequent survival success and propagation of the species in a given body of water. Within a body of water, littorals with hard stony substrates and rich macrophytes growth were found to be better populated by gastropod species.

5. CONCLUSION:

Among gastropod species, pulmonate *I. exustus* and prosobranch *G. orcula* were found to be the most widely distributed, indicating their wider range of tolerance to given conditions.

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Submerged Biofilers For Recirculating Aquaculture

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Abstract*: Submerged biofilters are used in recirculating aquaculture systems for treatment of wastewater generated from fish ponds due to presence of uneaten food material, fish faecal matter, growth of algae and other microorganisms. These types of biofilters presume that enough amount of dissolved oxygen is present in wastewater to be treated for providing it to biofilm. Submerged biofilters can be packed, expanded or expandable. Packed bed submerged biofilters includes submerged rock, plastic packed bed and shell filter. Expanded bed submerged biofilters includes fluidized sand filter, moving bed bioreactor and downflow microbead. Expandable submerged biofilters can be floating bead bioclarifier, upflow sand filter and foam filters. This paper reviews submerged biofilters for treatment of wastewater in recirculating aquaculture systems.*

Keywords: *Aquaculture, submerged biofilter, dissolved nutrients, fish production, pond, wastewater treatment.*

1. INTRODUCTION:

Submerged biofilters used for treatment of wastewater from fish ponds in recirculating aquaculture systems. They are easy to build, operate and maintain. Media is submerged under the water surface (Areerachakul,2018).They provide a high specific surface area for increasing nitrification. In case of submerged biofilters, it is assumed that it contains dissolved O_2 in wastewater to be treated, as wastewater moves through submerged filters (Kır, 2009).

TABLE 1: Submerged biofilters

Packed bed	It consists of a fixed packed bed of media. Biofilm is formed on the surface of media.
Expanded bed submerged biofilters	It consists of media which expand continuously. Biofilm is formed on the surface of media. As media is continuously moving, biofilm is abraded continuously. Media with high specific surface area is used (e.g. fine sand, tiny plastic beads). They don't remove solid particles.
Expandable bed submerged biofilters	It consists of a packed bed of media. Biofilm grown on the surface of media. Excess biofilm is removed by expanding media by abrasion against each other with the help of compressed air, water flow or using agitator. Packed bed is settled and wastewater is sent for treatment. They act as mechanical filters for solids removal, biofilters for ammonia removal.

TABLE 2: Types of submerged biofilters

Submerged biofilters	Packed bed	Submerged rock biofilters, Plastic packed beds Shell filters
	Expanded bed submerged biofilters	Fluidized-sand beds, Microbead filters Moving bed bioreactors
	Expandable bed submerged biofilters	Upflow sand filters Floating bead bioclarifiers Foam filters

2. DIFFERENT TYPES OF SUBMERGED BIOFILERS

They are of three different types mainly packed bed, expanded bed submerged biofilters and expandable bed submerged biofilters (Table 1). These three basic types of submerged biofilters can be subdivided as shown in Table 2. Table 3 shows strategies used for designing biofilters to consider oxygen supply and biofilm management of submerged biofilters (Malone and Pfeiffer, 2006).

TABLE 3: Strategies used in the design of biofilters (oxygen supply and biofilm management) for various types of submerged biofilters

Filter	Oxygen transfer mechanism	Biofilm management	Specific surface area
Submerged rock filter	Flow transport	None	Low
Submerged shell filter	Flow transport	None	Low
Submerged packed bed	Flow transport	None	Low
Upflow sand filter	Flow transport	Backwashing	High
Floating bead ioclarifier	Flow transport	Backwashing	High
Sponge filter	Flow transport	Backwashing	High
Fluidized sand bed	Flow transport	Continual abrasion	Very high
Microbead	Flow transport	Continual abrasion	Very high
Moving bed reactor	Direct aeration	Continual abrasion	Moderate

2.1 PACKED BED SUBMERGED BIOFILTERS-

In packed beds submerged biofilters, packing material is placed to form a fixed bed of media. On the surface of the media, biofilm is formed. In this biofilter, wastewater to be treated flows either from the bottom to top (upflow) or from the top to bottom (downflow). Thus, the residence time of wastewater can be controlled by adjusting the flow rate. To prevent clogging of the biofilter, the size of packing material is comparatively large. Different types of packing can be used. In this type of biofilter, it is difficult to control biofilm thickness, solid removal rates and surface area for contact of wastewater with biofilm. Few difficulties include low dissolved oxygen concentration, solid accumulation, back flushing, operation COST, BIOFOULING (EBELING, 2006)

2.1.1 SUBMERGED ROCK BIOFILTERS:

This type of biofilters contains bed of crushed rocks having diameter more than 5 cm so as to provide void spaces for preventing clogging of biofilter. Five centimeter crushed rock gives specific surface area of around 75 m^2/m^3 and porosity of 0.4 to 0.5 (Ebeling, 2006).

2.1.2 PLASTIC PACKED BEDS:

In this type of biofilter, plastic media of size more than 2.5 cm diameter is used. If random packings are used, they provides a specific surface area of around 100-200 m^2/m^3 with void fraction 0.95. (Ebeling, 2006).

2.1.3 SHELL FILTERS:

Raw mussel shells are used as packing material for this type of biofilter. Advantages of shell packing material includes i) Control of pH and alkalinity. These shells would slowly dissolve (which is a source of alkalinity) changing pH. ii) By crushing or grinding process, the surface can be controlled. iii) Used mussel shells can be managed as organic waste, making this type of packing material as environmentally friendly (Soula, 2020).

2.2 EXPANDED BED SUBMERGED BIOFILTERS:

In this type of biofilters, solid media is in moving state or continuous expansion. Biofilm is formed on the surface of solid media. As the media is continuously moving, biofilm is continuously abraded. Fine sand or small plastic beads can be used as media. Fluidized-sand beds, microbead filters, and moving bed bioreactors are few expanded bed submerged biofilters. Expanded bed filters keeps media in the state of continuous expansion by using fine sand or small plastic beads and called as fluidized sand bed if fine sand is used, microbead filter if small beads are used and moving bed bioreactors which is a attached growth biological treatment process continuously working with low head loss, providing high surface area and non-clogging biofilm (Szyper et al., 2005).

2.2.1 FLUIDIZED-SAND BEDS:

These types of biofilters provides large surface area. The size of biofilter is comparatively small and uses fine sand, activated carbon, granite, anthracite etc. as media and also wide range of media diameters for adjusting abrasion. They are continuously expanded by hydraulic means and therefore requires pump for continuous movement of wastewater flow. Wastewater entering fluidized-sand beds submerged biofilters needs to be preoxidized before entering bioreactor.

2.2.2 MICROBEAD FILTERS:

These types of filters use small floating polystyrene beads (density 16 kg/m^3, 1 to 3 mm diameter size) in a down flow mode, thereby having advantage of high specific area of the media. They can be considered as a low cost alternative to fluidized sand filters. Operation cost of microbead filters is approximately 50% of conventional fluidized sand bed biofilters as they require high volume pumps with low heads (Edling, 2006).

2.2.3 MOVING BED BIOREACTORS:

Moving bed biological reactors (MBBR's) are continuous flow, non plugging biofilm biofilters, with low head loss, high biofilm surface area, without backwash need. This can be operated under both aerobic (for nitrification) as well as under anoxic conditions (during denitrification). During nitrification compressed air is circulated in biofilter for aeration and submerged mixer is used for anoxic conditions. This type of biofilter media bed is continually expanded via hydraulic, mechanical, or pneumatic motion (Greensword, 2017). Advantage of this type of bioreactor is low maintenance cost as compared to conventional trickling bed and rotating biological contactors. (Ebeling, 2006). Moving bed biological reactors (MBBR's) removes nitrogen at high loadings, and used for intensive applications.

2.2 EXPANDABLE BED SUBMERGED BIOFILTERS:

These types of biofilters consist of fixed bed of media which can be expanded intermittently by making use of air, water or mechanical mixers. Expansion of bed helps in removing extra biofilm thickness because of abrasion. They act as mechanical filters for solid removal as well as biofilters for treating wastewater. Smaller size media used as compared to packed bed biofilter. These filters are subdivided as an upflow sand filter, floating bead bioclarifier and foam filters.

2.2.1 UPFLOW SAND FILTERS:

Upflow sand filters removes solids present in wastewater using mechanical filtration and biological wastewater treatment. Difficulties in the functioning of biofilters includes high flow rates, slow growth rate of biofilm and high rate of backwashing. They are rarely used due to high water losses in the process of backwashing.

2.2.2 FLOATING BEAD BIOCLARIFIERS:

These type of biofilter carry out function of bioclarifier (both biofiltration and clarification in single unit) as observed in conventional sand filters. They provide large surface area for biofilm formation. Solid particles are removed by four different mechanisms depending on the size. Particles greater than 100 micron size are removed by straining. Particles in the range of 50 to 100 micron size removed by settling. Particles in the range of 50 to 100 micron size removed by interception (process caused by collisions between particles and media surface). particles having size less than 20 microns are removed through bioabsorption on the surface of biofilm (Ebling,2006). Floating bead filters (FBF's) uses spherical or oblong plastic media that remains stationary except for intermittent expansion for backwash and biofilm management (Greensword, 2017). These type of biofilters are hardly face chances of biofouling and requires less water for backwashing. Beads (diameter 3 to 5 mm, density 910 kg/m^3) are used. Advantages of these biofilters includes compact design, easy installation and operation.

2.2.3 FOAM FILTERS:

These types of biofilters consist of pieces of sponge as a media material. Biofilm grows over the surface of sponge as they remove solid particles by absorption on its surface; Water pump pulls the water through a sponge filter. They are used for small aquariums and specially for breeding. Backwashing of this type of filters is done by manual compression of media.

3. CONCLUSIONS:

Submerged biofilters can be used for treating wastewater from recirculating aquaculture systems. In this type of biofilter, the media is submerged below the water surface. These types of biofilers are easy to build, operate and maintain and provide sufficient specific surface area for nitrification. For submerged biofilters wastewater needs to be aerated before sending it to the biofilter. Submerged biofilters can be used for treating wastewater includes packed bed, expanded bed submerged biofilters and expandable bed submerged biofilters. Packed bed biofilters and expanded bed biofilters can be used to act as mechanical filters for removing solid particles along with biological treatment of wastewater, whereas expanded bed biofilters carry out only biological treatment of wastewater.

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Impact of Cypermethrin On Glycogen Content Of Liver and Intestine Of Freshwater Fish *Ophiocephalus Orientalis*

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Abstract: *Pyrethroids insecticides, including cypermethrin are widely used for the control of insect pests all over the world to increase the production of food grain and other agricultural products. The intake of insecticides affects the biochemical composition of fishes. The effect of cypermethrin on glycogen in liver and intestine of Ophiocephalus orientalis exhibited notable alterations. Liver and intestine being the main site of metabolic activity in body was selected for the study purpose. Dns(Di nitro salicyclic acid) Sadasivam and Manickam (1992) method was adapted for estimation of glycogen in tissues of freshwater fish Ophiocephalus punctatus and measured in The sub lethal concentration of cypermethrin treated with Ophiocephalus orientalis at different time interval and in the treated liver and intestine, glycogen content showed declined trend.*

Keywords*: Pyrethroids, cypermethrin, Ophiocephalus orientalis, Liver, Intestine.*

1. INTRODUCTION:

Pyrethroids insecticides, including cypermethrin are widely used for the control of insect pests all over the world to increase the production of food grain and other agricultural products.It may also be used in public health applications to control insects such as cockroaches, mosquitoes, ticks and flies which may act as a disease vector. Pyrethroids are several orders of magnitude more toxic to fish than organophosphate pesticides they are replacing in many agricultural, commercial and residential applications (Oros et al., 2005). The intake of insecticides affects the biochemical composition of fishes (Jebakumar et al., 1990; Sultatos, 1998; Kumble and Muley, 2000; Prasad et al., 2002). It has been shown by many scientists that insecticides mainly affects liver of fishes (Murty and Devi, 1982; Anthony et al., 1986; Bhushan et al., 2002). This is because of its relatively slow blood flow as compared to cardiac out put (Gingerich,1982)as well as the much closer association of hepatocytes to biliary system than is found in mammals (Hinton and Lauren, 1990). Pesticide due to their potential toxicity produce biochemical changes in the tissues and organs of exposed animals, (Sastry and Sharma, 1979). The pesticides thus reaching the aquatic ecosystem get enriched in the aquatic food chain through bio-accumulation, bio-concentration and bio-magnification process (Murty, 1986). Energy for maintenance and activity comes from catabolism of food. In fish, protein is one of the main sources of energy which plays an important role in maintenance of blood glucose level. Exposure to chemical pollutants elicits many molecular and biochemical changes in fish which preside cellular and systemic dysfunction so that if appropriate parameters are monitored early warning signs of distress may be detected. To encounter stress metabolic excess involved in the interchange of organic constituents, that are responsible for production of energy, undergo change on carbohydrate and lipid constituents particularly such labile metabolites as glycogen. The present investigation is aimed to understand the alterations in glycogen levels at different time intervals in tissues like liver and intestine of freshwater fish, *Ophiocephalus orientalis* exposed to cypermethrin toxicity.

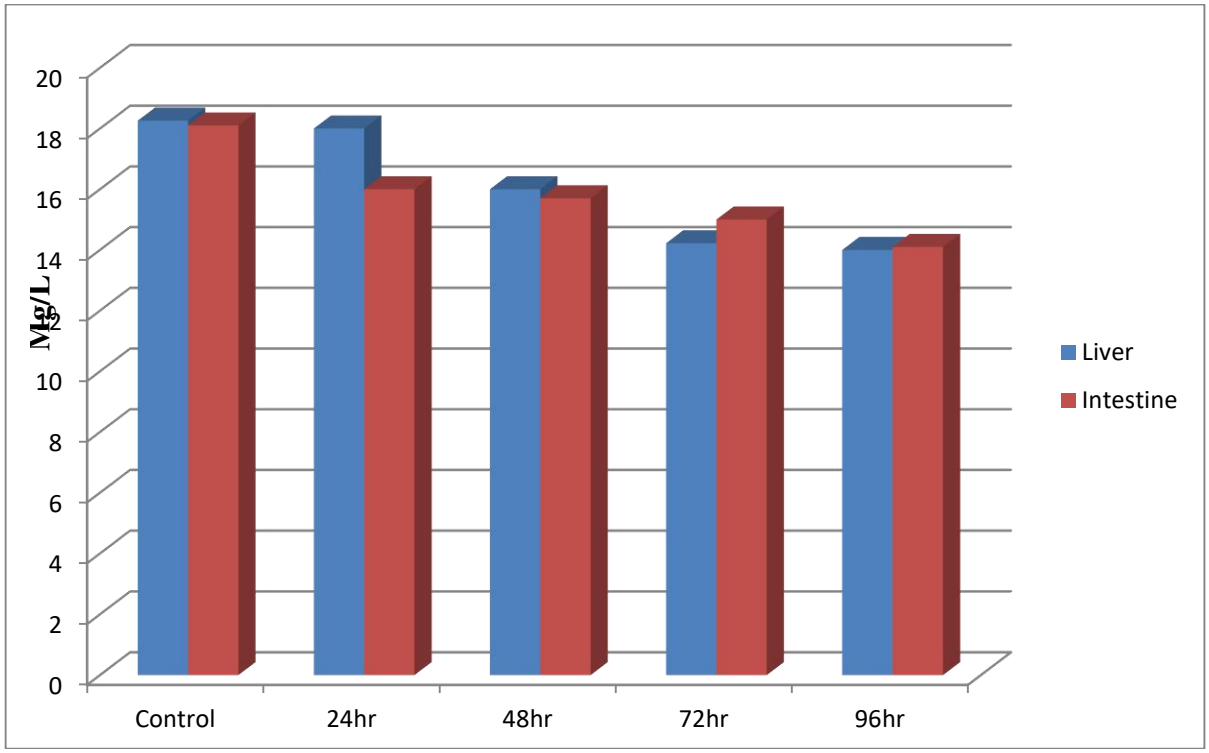
2. MATERIALS AND METHODS:

The fish were obtained from Wadali Lake in Amravati region. The fish having 12-30 cm length, 13-25g weight were selected for experiment. After the normal process of acclimatization and washing a group of six fishes were transferred to another aquarium containing sublethal concentration 0.0007 µ/L of cypermethrin for predetermined exposure at 24, 48, 72 and 96hr. The fishes were scarified and fresh tissue was isolated. Biochemical study Dns(Di nitro salicyclic acid) Sadasivam and Manickam (1992) method was adapted for estimation of glycogen in tissues of freshwater fish *Ophiocephalus orientalis* and measured in mg/L.

3. RESULTS:

The impact of sub lethal concentration of cypermethrin on glycogen level in the liver and intestine tissues of *Ophiocephalus orientalis* observed at different time intervals

Fig. 1 Effect of cypermenthrin on glycogen of the fresh water fish *Ophiocephalus orientalis* at different time intervals (mg/L).



There was observed a gradual decline in the glycogen level from the control value with an increase in the time period of treatment up to 96 hr. In intestine, there was fluctuation inglycogen value as compared to control value. These decreased values of glycogen showed disturbed carbohydrate metabolism due to toxic stress.

4. DISCUSSION:

Biochemical alteration indicates functional impairment of the organs. As shown in result the glycogen level of fish showed decreased trend similar to be observed by Reddy et al., (1986) in prawn. In Laellidens marginalis, exposed to malathion, decreased in the glycogen content reported by Ahemad et al., (1978). Grant and Mehral (1973) observed that endrin inhibit the hydrolysis of glucose -6 phosphate by the inhibition of glucose 6- phosphatase. Mamata Kumari (2007) observed that there was fluctuation in glycogen level exposed to pesticide abate. Usually during toxic stress conditions there occurs a demand for excess energy, (Chandravathy and Reddy, 1994). It has been reported that catecholamine may deplete the glycogen reserve, as suggested by Pickering (1981). Several reports are available on the effect of muscular exercise on liver glycogen energy reserves in fish, which get depleted, (Black et al., 1962; Nath and Kumar, 1987; Singh and Singh, 2002). Above study clearly indicate that the toxic nature of the cypermethrin affect the glycogen content of liver and intestine of fish *Ophiocephalus punctatus*.

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Effect of Biochemical Variations Induced by Pesticide-Phosalone in *Cirrhina Mrigala.*

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Abstract: *Present study deals with the effect of pesticide-Phosalone on carbohydrates. Proteins, and lipids level in Cirrhin mrigala. For find out the level of carbohydrates, proteins and lipids biochemical estimation of different organs of fish such as gills, liver, intestine and kidneys were used. The level of different food constitution in all organs were decreased with increasing concentration of pesticide- phosalone in 2, 4, 6 and 8th days.*
Keywords: *pesticide-Phosalone, carbohydrates, Proteins, lipids and Cirrhina mrigala.*

1. INTRODUCTION:

Different types of pollution are burning issues in front of the world today. One of them is water pollution because of man-made activities. Particularly agriculture activities by which various types of pesticides, herbicides, insecticides and chemical fertilizers are spreading in the larger quantities for better growth, and high yielding of crops, grains and fruits. The different types of pesticides liberated and mixed into any aquatic ecosystems that results very dangerous effects on the aquatic flora and fauna, one of them is pesticide-Phosalone which is widely used for plant protection from pest. Generally carbohydrates proteins and lipids play vital role in bodybuilding, body construction and energy metabolism in animal. The effect of pesticide-Phosalone on the carbohydrates proteins and lipids. Present study was done to observe and understand the effects of biochemical variations induced by pesticide-Phosalone in Indian major *Cirrhina mrigala.*

2. MATERIALS AND METHODS:

The Indian major carp *Cirrhina mrigala* fingerlings were brought in plastic containers without any mechanical injury and kept in the aquarium for a week to get acclimatized in laboratory condition. Water in aquarium change every day for maintenance and supply sufficient oxygen level. The fingerlings were fed with rice bran and groundnut oil cake once in a day at morning. For study fingerlings were randomly divided into two groups, experimental-A and control-B.

For toxicity study, the concentration of pesticide-Phosalone taken in the form of 0.001, 0.002, 0.003, 0.004 ppm. and applied to experimental-A group for estimation of median lethal toxicity (Lc50) for 24hours. Simultaneously the control-B group were maintained without applied pesticide-Phosalone. After 24 hours the rate of survival and mortality of fingerlings were noted of both groups. The Ls50 value of pesticide-Phosalone was determined.

For biological study 10 fingerlings were kept in the aquarium of 20lit.capacity water. The fingerlings were exposed to the sub lethal concentration (0.002, 0.003 and 0.004 ppm) for 2, 4 and 6 days. The control-B group observed simultaneously. Fishes were sacrificed after completing the experiment and tissue of gills, liver, intestine and kidney were taken to estimation of carbohydrates, proteins and lipids.

3. RESULTS AND DISCUSSION:

In present study the biochemical estimation was carried out of gills, liver, intestine and kidney. The variation of biochemical in the level of carbohydrates proteins and lipids at higher and lower concentrations of pesticide-Phosalone stress were mentioned in tabular form (Table No.1).

Carbohydrates level decreased significantly in various concentrations. Carbohydrate one of the cheapest source of energy in animal food. It also play significant role in the metabolism. It is used as principle and instant source of energy precursor in fish under the stress conditions. Similar observation noted by various workers (Umminger,1970, Jagatheeswari,2005).

Protein level was significantly depleted in the subacute period were observed in various tissues in the experimental-A fingerlings. When fishes were under more stress condition, they utilised more Protein for maintenance energy demand. Many workers reported depletion of tissue Protein in fishes when exposed to various toxins (Macleay and Brown,1974; Sakaguchi and Hamaguchi,1975; Jagatheeswari J,2005).

Lipids level also significantly decreased in various concentrations. The decrease level of lipids might be because of the utilisation of lipids for additional energy required under stress condition of pesticide-Phosalone in fishes. Similar observation noted by other workers (Roe and Rao, 1981, Jagatheeswari, 2005). The liver and kidneys are principle organs of detoxification in vertebrate animals (Bhattacharya and Mukherjee, 1976).

TABLE: 1 Biochemical changes induced by Phosalone in *Cirrhina mrigala* at different concentrations

Parameters (µm/lit0	Tissues		Second Day				Fourth Day				Sixth Day		
		Control	Concentration (ppm)			Control	Concentration (ppm)			Control	Concentration (ppm)		
			0.002	0.003	0.004		0.002	0.003	0.004		0.002	0.003	0.004
Carbohydrates	Gills	0.33	0.30	0.26	0.20	0.31	0.28	0.25	0.18	0.29	0.25	0.20	0.15
	Liver	0.45	0.42	0.38	0.32	0.42	0.38	0.32	0.27	0.40	0.30	0.23	0.20
	Intestine	0.25	0.22	0.18	0.15	0.20	0.15	0.12	0.08	0.17	0.14	0.10	0.07
	Kidney	0.32	0.30	0.26	0.22	0.27	0.22	0.18	0.12	0.23	0.20	0.12	0.08
Proteins	Gills	52.30	51.20	50.00	47.25	51.30	50.25	48.20	45.25	50.25	47.50	46.25	45.40
	Liver	42.53	41.52	40.25	39.20	41.45	40.60	39.90	38.70	40.20	38.75	37.50	35.90
	Intestine	44.60	43.90	42.50	41.30	43.55	42.70	41.85	40.90	42.10	40.90	40.00	38.75
	Kidney	54.43	53.75	52.90	51.35	52.80	51.50	50.80	50.25	51.35	50.25	49.75	48.90
Lipids	Gills	252	245	225	215	242	235	228	220	235	215	200	180
	Liver	560	542	515	485	550	523	520	505	530	500	450	405
	Intestine	470	462	437	425	445	435	415	400	425	400	365	325
	Kidney	312	303	292	265	305	300	285	250	290	250	225	200

4. CONCLUSION:

During the present study after observation and estimation of different organs tissues of experimental-A fishes, it was concluded that, presence of pesticide-Phosalone in a small quantity in the aquatic ecosystems may lead to synergistic effect and physiological variations on the vital organs Also create the dangerous effects of water pollution in the life of aquatic fauna in aquatic ecosystems.

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Survey On Proportion and Determination of Polycystic Ovarian Syndrome Among Females (14 To 45 Age) Of Bhiwandi

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BNN College, Bhiwandi, Dist. Thane, India

ABSTRACT: *Reproduction is the utmost important process for every organism on the earth. Continuity of life depends on it. Human female however cannot discuss the problems related to reproductive cycle/menstruation openly. Bhiwandi is a small town in Thane district. PCOS or polycystic ovarian syndrome is the condition seen to be increased in the last decade. Many of the reproductive aged women are unaware of the conditions like this. In this paper baseline information is collected from developing Google form questionnaire to record their age, knowledge about PCOS, health history like diabetes mellitus, hypertension, stress disorder, Anaemia, Hypothyroidism. Information is also noted for use of oral contraceptive, any other medical disorder, Infertility, skin disorders like acne, medical treatment, Anorexia, obesity, status of menstrual cycle. This study aims to find out the status of female having PCOS in small town Bhiwandi and may throw some light on root causes of it.*

KEYWORDS: *PCOS, Infertility, Menstruation Bhiwandi.*

1. INTRODUCTION:

Today the most common endocrine disorder faced by women is Polycystic Ovarian Syndrome (PCOS). This multifaceted disorder requires multidisciplinary approach to find the solution of it. According to National Institute of Health and Rotterdam criteria it is hormonal disorder in which at least one ovary shows presence of multiple cysts. It is also associated with ovulatory dysfunction and excessive release of androgens. Globally about 6-8 % of women are affecting by this syndrome. PCOS is seen to be started at an early age when female is maturing to young adult. During pubertal age transition of many features may be in evolution, hence many findings may be transitory. In order to prevent early and late sequel of the syndrome its knowledge is necessary for every prepubertal female. Certain characters like Acne, Hair Growth, Heavy bleeding, darkening of the skin, weight gain, headache are consider to be normal happening and released to hormonal changes taking place at prepubertal age. Gainie and Kalra pointed out the fact about health budget of India is likely to meet the costs posed for tackling the multiple consequences of PCOS. It is need of time to recognize this disease as an important non communicable disease. Wide spread and liberal screening of female of reproductive age is cost effective approach for early diagnosis and prevention of sequel of syndrome. Since this syndrome increases the risk of various metabolic, dermatologic, reproductive and psychological aberration; early diagnosis is the right approach to tackle this syndrome. Although the patients show high risk of developing said disorder; unless and until she encounters with hirsutism, androgenic acne, alopecia, obesity and infertility PCOS may not be diagnosed. Recognition of physical manifestations is prerequisite in diagnosis of PCOS. Imperative nature of women made it difficult in early diagnosis of the syndrome hence study of detailed history of determinants become necessity with this background in mind study of PCOS in small town, Bhiwandi is undertaken. Bhiwandi is a city in Thane district of Maharashtra, Kokan. It is located 20 kilometres northeast of Mumbai and 15 km northeast of the city Thane.

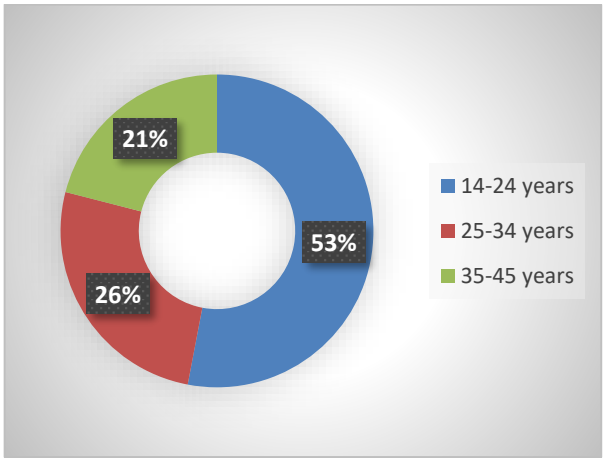
2. MATERIALS AND METHODS:

Data were collected from women of age group of 14 to 45 years using self-administered questionnaire. 200 females responded. After their approval the information is used for this study.

OBSERVATION TABLE:

SR NO.	QUESTION ASKED IN QUESTIONNAIRE	OPTIONS	RESPONSES IN PERCENTAGE (%)	FIG NO.
1	AGE	14-24 years 25-34 years 35-45 years	106 52 42	Fig No. 1
2	HAVE YOU EVER SUFFERED POLYCYSTIC OVARIAN SYNDROME	Yes No May be	16 67 17	Fig No. 2
3	DIABETES MELLITUS	Yes No	4 96	Fig No. 3
4	HYPERTENSION (BP)	Yes No Maybe	11 76 13	Fig No. 4
5	ANXIETY OR STRESS DISORDER	Yes No	29 71	Fig No. 5
6	ANEMIA	Yes No	13 87	Fig No. 6
7	HYPOTHYROIDISM (DEFICIENCY OF THYROID)	Yes No	9 91	Fig No. 7
8	USE OF ORAL CONTRACEPTIVES	Yes No	14 86	Fig No. 8
9	ANY MEDICAL DISORDER	Yes No	84 16	Fig No. 9
10	INFERTILITY	Yes No	94 6	Fig No. 10
11	HAS ACNE AS AN ADULT	Yes No	56 44	Fig No. 11
12	ANY MEDICAL TREATMENTS FOR ACNE	Yes No	21 79	Fig No. 12
13	DYSLIPIDEMIA (CHOLESTEROL)	Yes No	8 92	Fig No. 13
14	ANOREXIA (EATING DISORDER)	Yes No	20 80	Fig No. 14
15	OBESE (OVER WEIGHT) BETWEEN AGES 14-45	Yes No	31 69	Fig No. 15
16	BETWEEN THE AGES OF 14-45 HAVE YOU EVER NOTICED A MILKY DISCHARGE FROM YOUR NIPPLES (NOT INCLUDING DURING PREGNANCY OR RECENT CHILD BIRTH)	Yes No Maybe	10 82 8	Fig No. 16
17	HAS ACNE IN THE AGE 14-45	Yes No	44 56	Fig No. 17
18	AVERAGE NUMBER OF MONTHS OF ORAL CONTRACEPTIVE USE	1-2 months 2-3 months 3-4 months None	9 6 1 82	Fig No. 18
19	OLIGOMENORRHEA (IREGULAR MENTRUAL BLOOD FLOW)	Variable or Long Menstrual Cycle < 9 menses annually Irregular menses with weight gain	53 21 26	Fig No. 19
20	BETWEEN THE AGE OF 14-45 ABOUT HOW LONG WAS YOUR AVERAGE MENSTRUAL CYCLE (TIME FOR FIRST DAY OF THE NEST PERIOD)	< 25 days 25-34 days 35-60 days Totally variable	36 45 8 11	Fig No. 20
21	PREGNANCY	Previously pregnant Previously attempted	15 2	Fig No. 21

		Previously attempted without success for > or = 1 year	1	
		None	80	
22	NIPPLE DISCHARGE EXCLUSIVE OF PREGNANCY OR BREASTFEEDING	Yes	12	Fig No. 22
		No	88	
23	DURING YOUR MENSTRUATING YEARS (NOT INCLUDING PREGNANCY) DID YOU HAVE A TENDENCY TO GROW DARK COARSE HAIR ON.	Upper Lip	18	Fig No. 23
		Chin	7	
		Breasts	6	
		Chest between the breast	6	
		Back	9	
		Belly	6	
		Upper arms	2	
		Upper thigh	15	
		None	66	
24	COARSE HAIR GROWTH	At one or more sites	49	Fig No. 24
		At 2 or more sites	7	
		At 3 or more sites	8	
		Troubled by Hair Growth	16	
		Treatment for Hair Growth	6	
		Increased Hair Growth with Weight Gain	14	
25	FAMILY HISTORY	Diabetes	44	Fig No. 25
		Acne	26	
		Eating Disorder	10	
		Hypothyroidism	6	
		Hypertension	33	
		Liver Disease	3	
		Blood Clotting Disorder	2	
		PCOG	1	
		Cancer	11	
		Obesity	13	
		Kidney Disorder	4	
		Anemia	5	
		Urinary Tract Infection	15	



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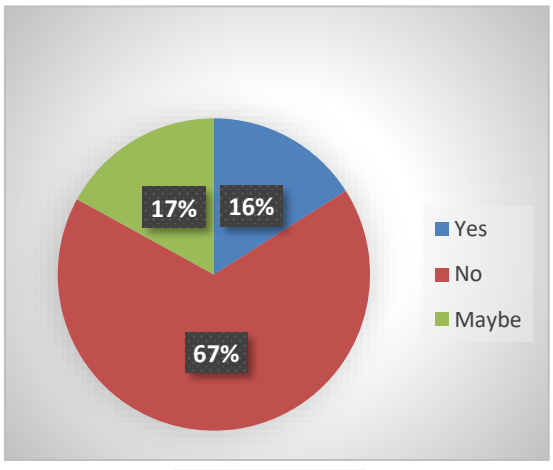

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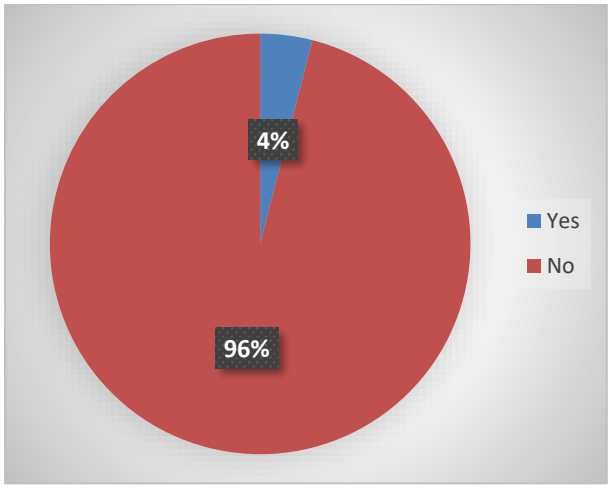

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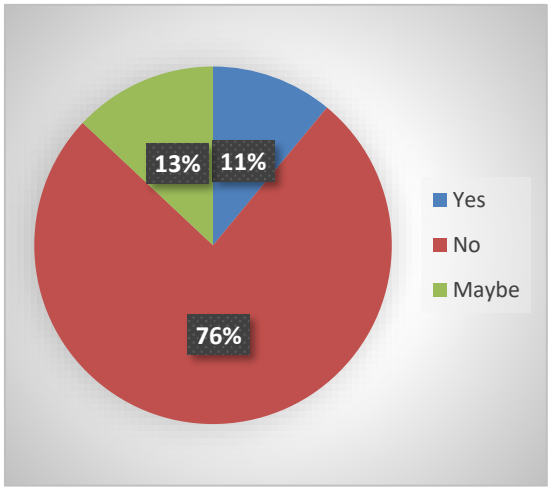

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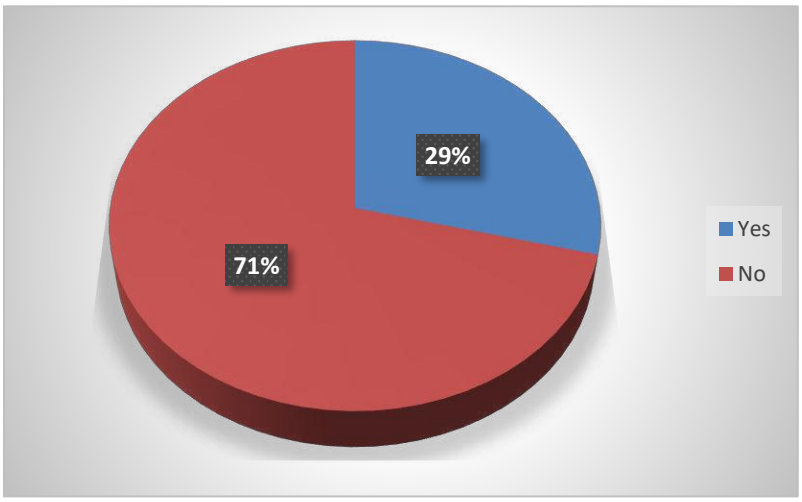

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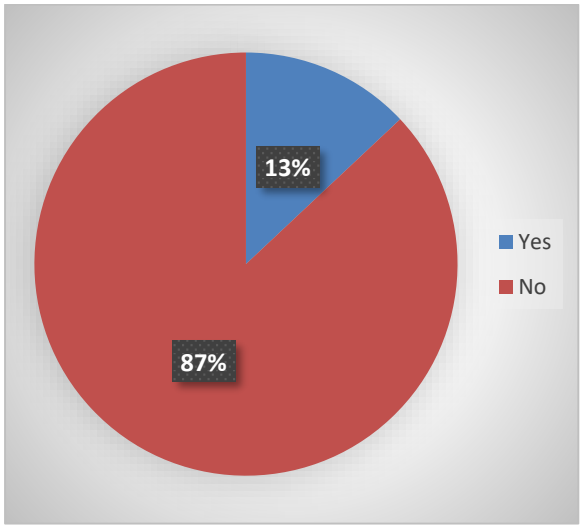

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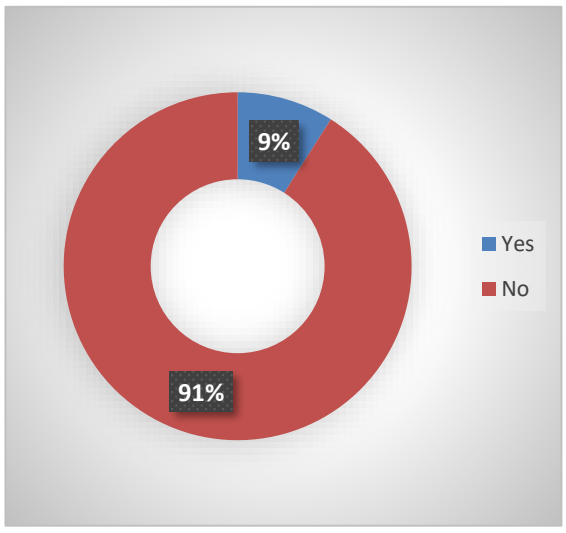

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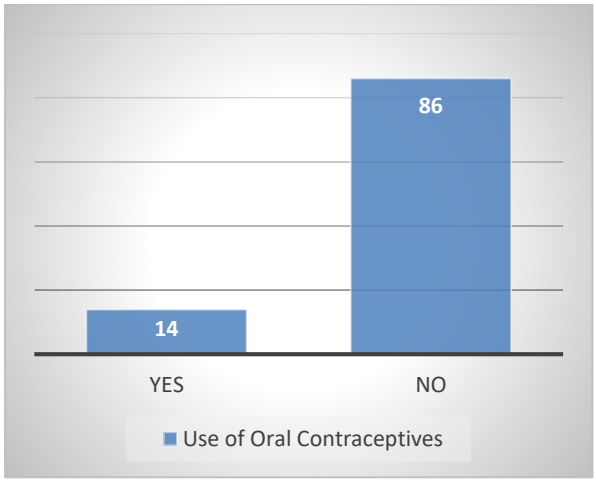

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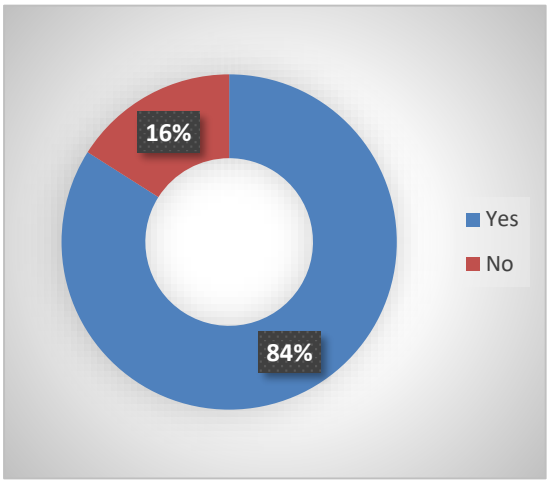

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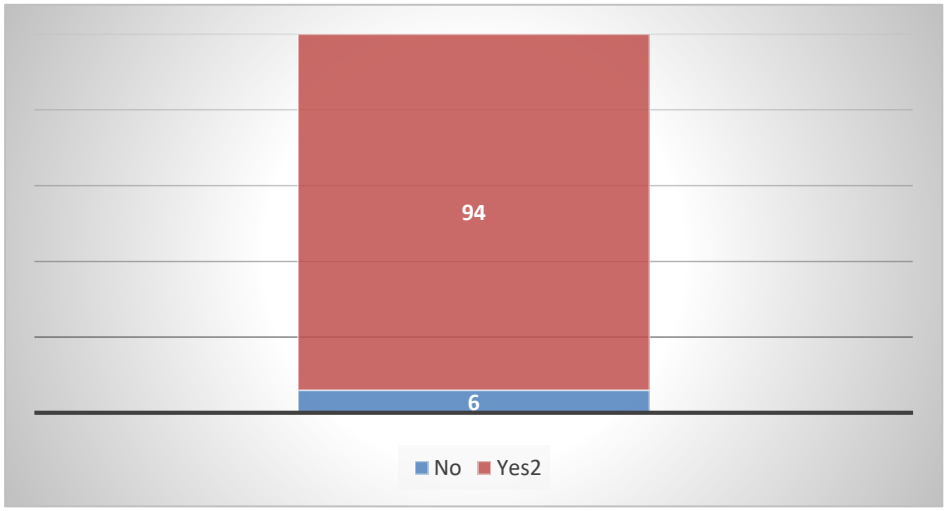

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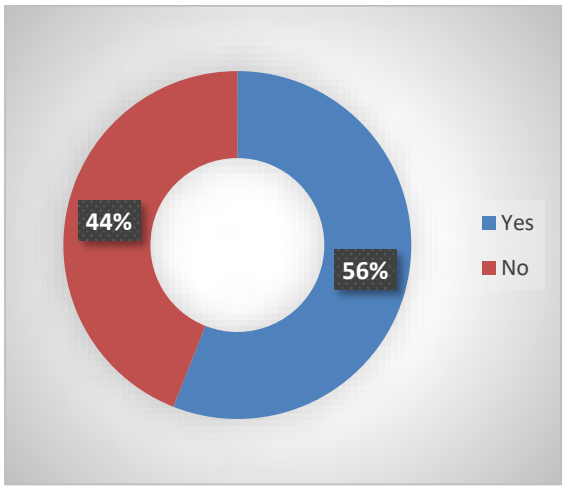

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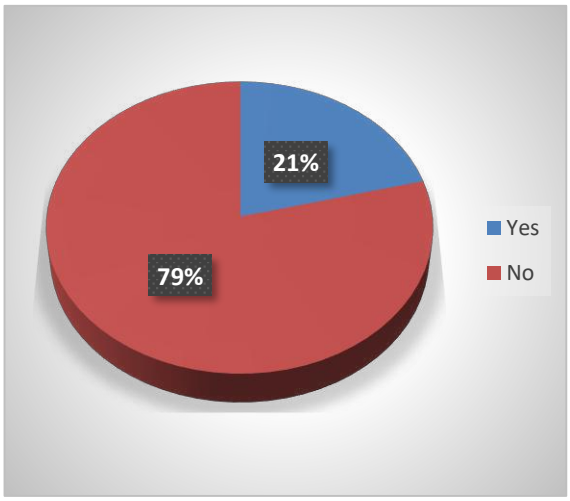

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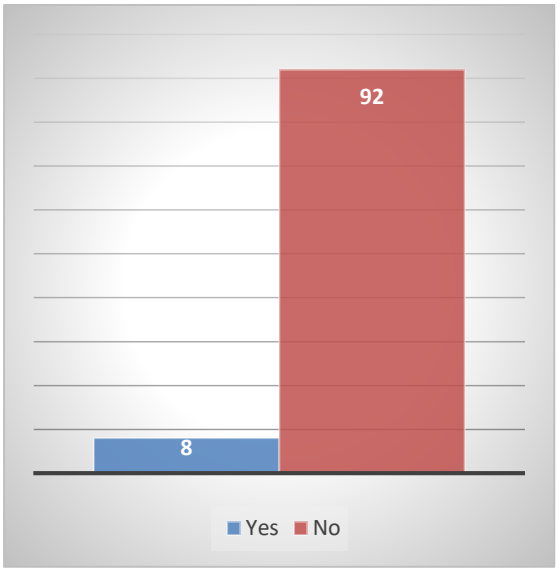

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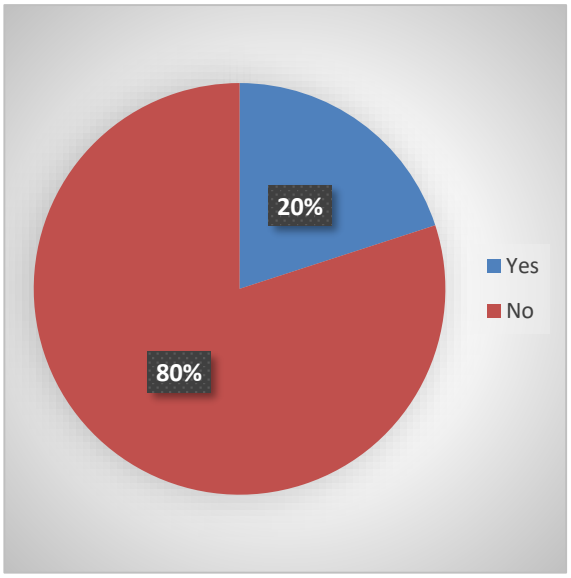

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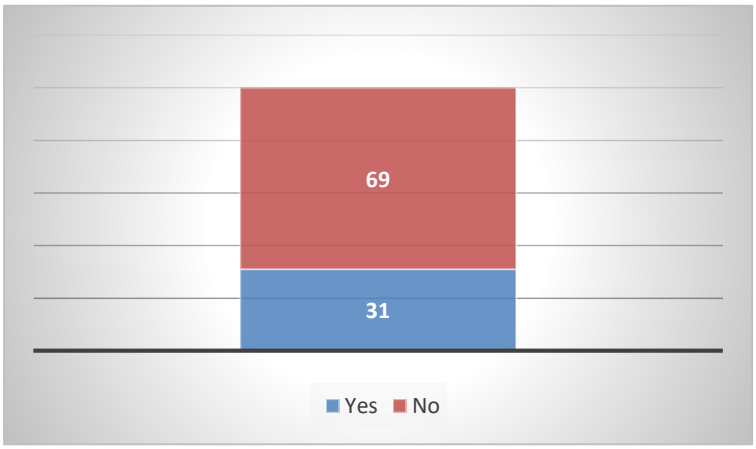

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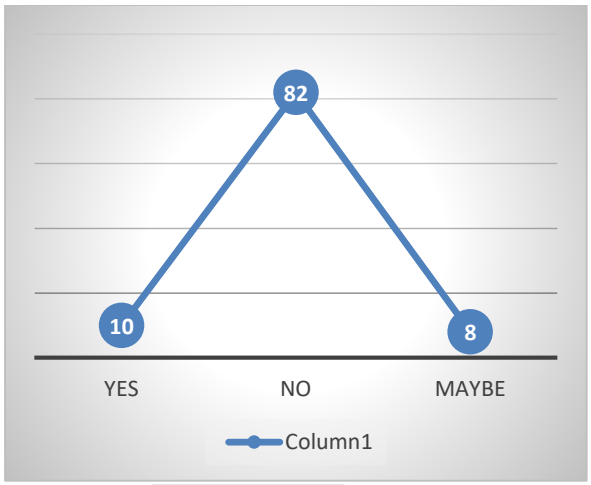

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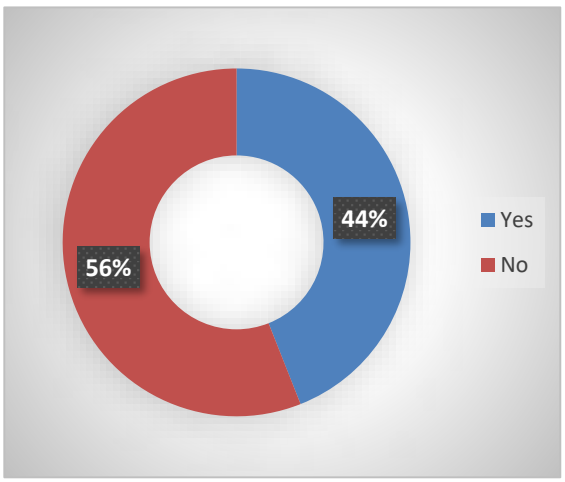

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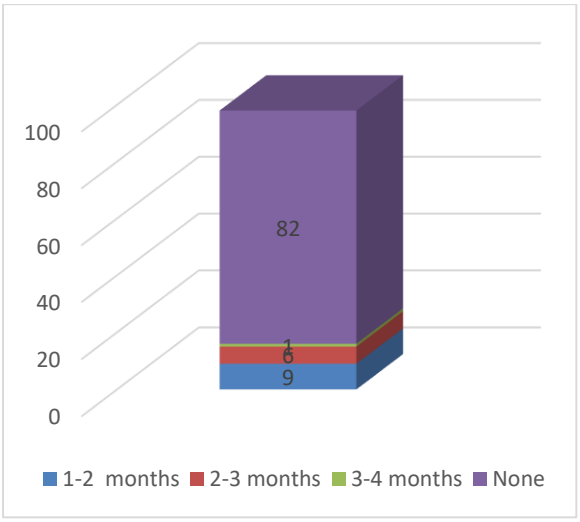

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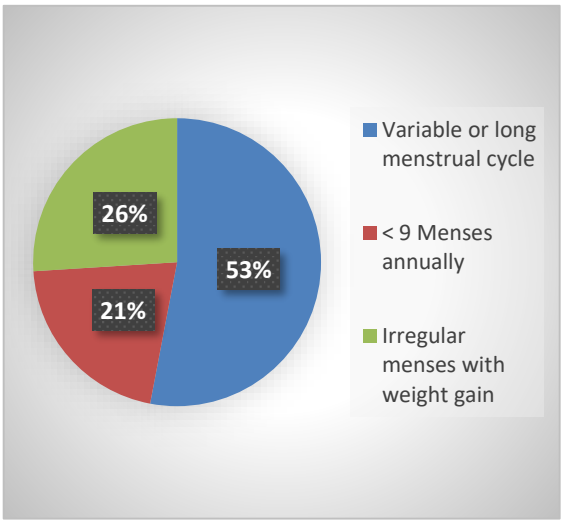

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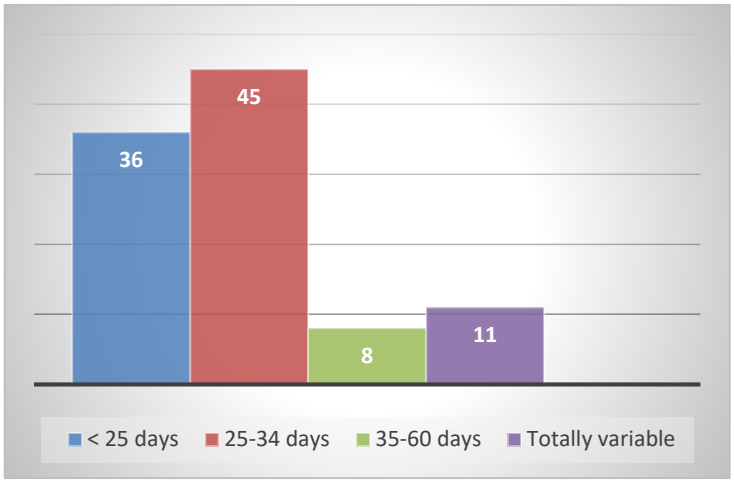

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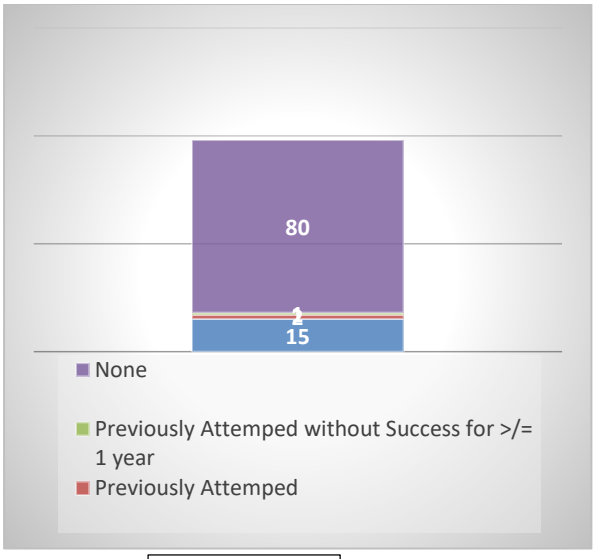

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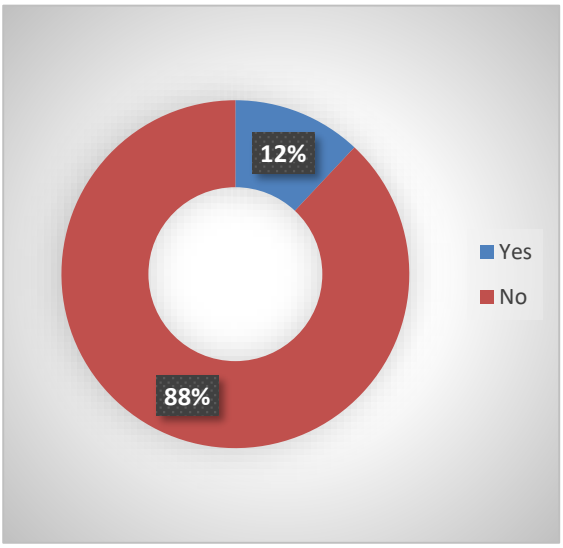

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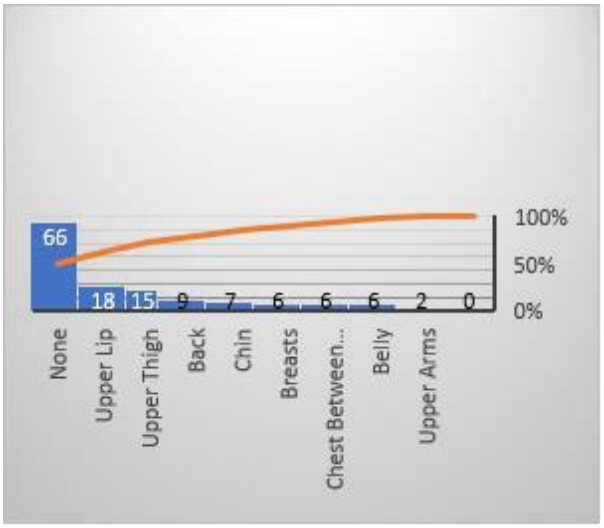

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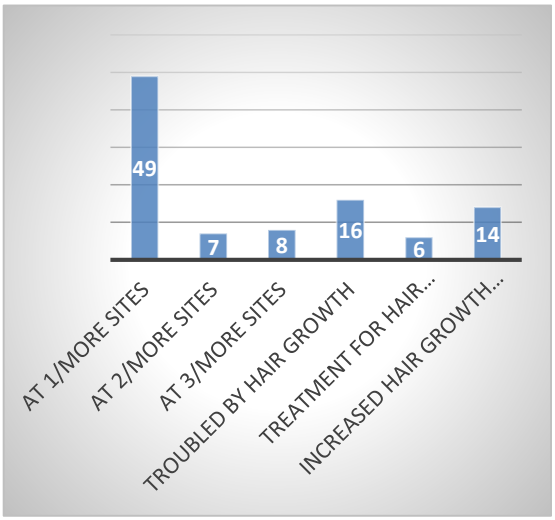

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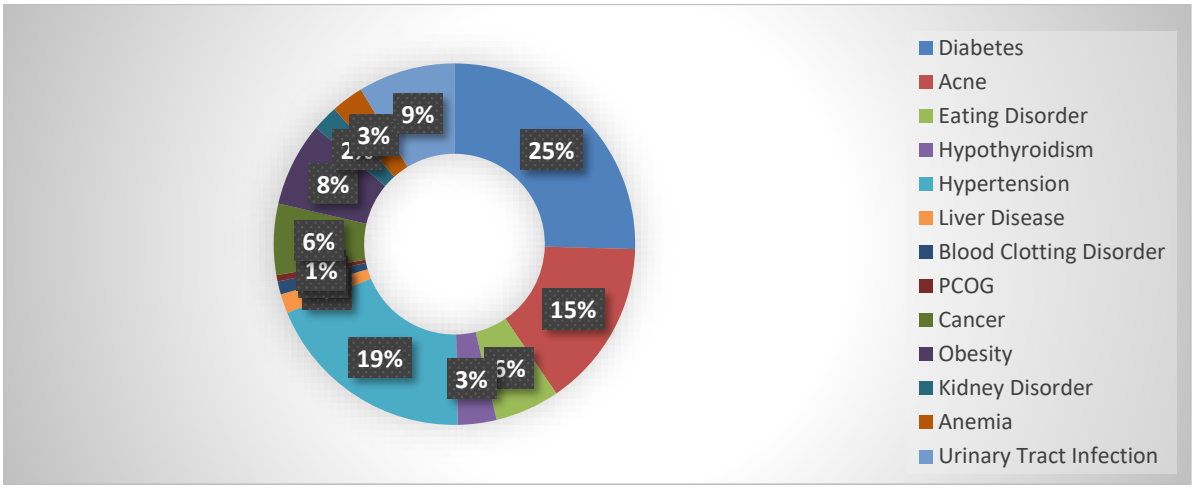

Fig No.25

3. DISCUSSION AND COLCLUSION:

A survey was conducted on the topic of (PCOS) polycystic ovarian syndrome between the age group of 14-45 and total 200 responses are collected. The response received from the different age group of 14-24 is 53%, age group 25-34 is 26% and the age group of 35-45 is 21% . For the history of diabetes mellitus 96% no diabetes and 4 % have diabetes. 67% have respond they don't suffer polycystic ovarian syndrome (PCOS) ever. But 16% has given response positive for this and 17% of respondent ambivalent about it. For the history of Blood pressure (hypertension) 11% respondent have blood pressure where as 76% of respondent does not have blood pressure and 13% of respondent are ambivalent about it. History of anxiety or stress disorder 29% of respondent suffer from it where as 71% of respondent does not suffer, 87% of respondent does not suffer from Anemia where as 13% of respondent have suffered. Only 9% have hyperthyroidism where as 91% have no deficiency of thyroid. Out of 200 responses only 14% of respondent use oral contraceptives. 6% of respondent have other medical disorder and 6% of respondent have infertility issue. 44% of respondent have acne problem in which only 21% are medically treated their acne. 8% have cholesterol (Dyslipidemia). 20% of respondent have eating disorder (Anorexia). 31% of respondent have (over weight) obese. 10% of respondent have noticed milky discharge from their nipples where as 8% of respondent have ambivalent from it.

According to this study 16% of women suffered from polycystic ovarian syndrome (Fig.2). In other Indian studies it was 15% among university student. In this study 53% females of age group 14-24 years. Many of them are students. Our observation is similar to the observation made by Beena Joshi et al (2014). 17% of the women were not aware about the PCOs since they responded they may be or may not be suffering from PCOS. 53% of females show oligomenorrhea (irregular menstrual flow) supports the observation made by us (Fig.2 and Fig.19). However during adolescence transitory appearance of symptoms and signs of PCOS may not be sufficient enough to labelled them as having PCOS. To confirm diagnosis three signs: cyst in the ovaries, high level of male hormone and irregular or skipped periods are necessary to confirm.

Since our study is not supported by finding out the hormonal level and sonography. It is to early to say that 16% among age group 14-45 are suffering from PCOS. It may be associated with obesity since 31% of them are obese (Fig.15). 44% of them have problem of acne (Fig.17). 45% of female have 25-34 days gap between the menstrual cycle (Fig.20). Similar observation was made by Franks, White PM (1993).

According to our survey it may be concluded that 16% women suffered from PCOS and 67% are not suffered from it while 17% are ambivalent. In diverse socio-cultural and economical background this study emphasize the need of education among youth regarding PCOS to minimize further complication which are resulted due to PCOS. This sort of survey is need of time since worldwide, obesity associated PCOS become common problem. Life style modification and psychological help is needed by the patient to manage with this kind of endocrine disorder.

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Dietary Intake Patterns and Nutritional Status of Women Of Reproductive Age in Bhiwandi

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Abstract: *Nutrients deficiency in women of reproductive age in town of Bhiwandi has resulted in ill-effects on health. The main reason behind the survey was to know the nutritional status & dietary intake pattern among the women, as a woman plays an important role in family planning & her health is priority in every house. The Survey was carried out through google form questionnaire to record their age, weight, profession, education, nutritional knowledge, meals per day, consumption of fast food, dietary intake, health issues, daily water intake, consumption of alcohol or tobacco, functioning of menstrual cycle, pre menstrual tension, exercise & meditation, nutrients deficiency, complications during pregnancy, age of menopause, health problem related to menopause. Random sampling of 250 women was done. Findings show that 50% were student still their knowledge about nutrition was moderate, 33% were housewife, 17% were working women. 24% were having poor nutritional knowledge. Among the dietary intake pattern 42% women consumed fast food on weekly basis & 12% women consumed on daily basis. About 61% women do not include milk in their daily meals & only 9% women drink fruit juice on daily basis. 21% women take Vitamins as a dietary supplements & 10% women take protein as a dietary supplement. The women who were having 4 meals per day were obese it shows they were not considering doing exercise and meditation. 35.3% women were having vitamins as nutrients deficiency. Women who were underweight faced complications during pregnancy. 27.3% women faced problems associated with menopause such as weight gain. The conclusion came out that the dietary intake pattern is not according to healthy food habits. Women's nutritional status show that there must be changes in their diet to avoid any ill-effects on health.*

Key Words: *Dietary knowledge, women's, nutritional status, reproductive age, Bhiwandi.*

1. INTRODUCTION:

Nutritional status of women is directly related with her well being especially during pregnancy & lactation. In India women's has been given less priority when it comes to there healthcare & due to this their nutritional status has been low for many decades reproductive age group of women improper nutrition affects her overall growth & her future children's life. In modern world where education is given such an importance still women's in India are not aware of nutrition & proper dietary intake. Tradition & customs related to daily food intake do not include proper nutrition. In the time of fast food & growth of fast food consumptions, women's who are economically stable prefer feat food & they face obesity as a major health problem. Whereas women's who are financially weak face problem such as malnutrition & underweight. Indian women health card has been poor since ancient times due to tradition and customs that result in poor nutritional status of women in reproductive age. Nutrients deficiency leads to various health disorders in long run such as obesity, anemia, osteoporosis, underweight, impaired menstrual cycle and emotional health issues. There are many causes that affect the nutritional status of women, some of the factors include poverty, illiteracy, gender discrimination, marriage in small age, early child bearing, quality of education &traditional stigmas related to women in reproductive age. According to a report of UNICEF India on nutrition, a quarter of women of reproductive age in India are under nourished with a body mass index (BMI) of less than 18.5kg/m. Anemia is highest among lactating & pregnant women, this shows women of reproductive age are vulnerable to poor nutrition. During pregnancy unawareness on healthcare results in negative outcomes for both the mother & the child. Various Studies have proven that a healthy woman are more likely to give birth to a baby with high cognitive intelligence. Women who include vegetables & animal food in their diet have good nutritional status but women who are vegetarian lack protein as a major nutrient in their diet. To overcome this issue a proper diet plan & including all essential nutrients will avoid any kind of nutritional

deficiency. Tracking calorie count on daily basis will help to keep track of nutritional status of a particular women. A well- nourished women will be better equipped to the growth & development of her own well-being, her family & the environment in which she lives. The main reason behind this study was to know the dietary intake pattern & nutritional status of reproductive age of women in Bhiwandi. As nutrition plays an important factor in determination of women health & associated health problems.

2. MATERIALS AND METHODS:

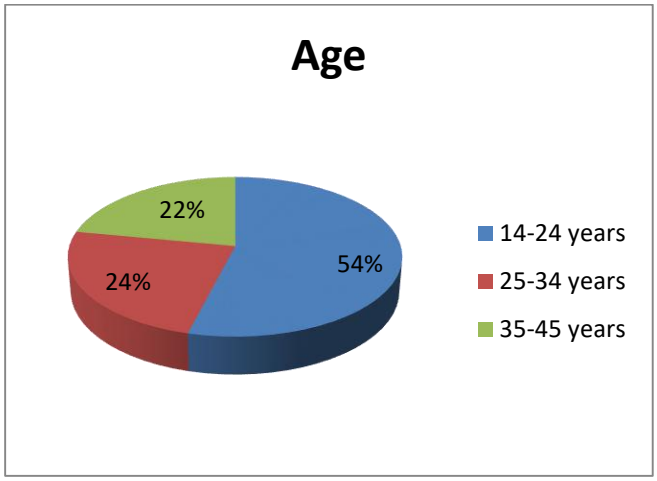
The study area for assessment was town of Bhiwandi. About 250 women were assessed through Google form questionnaire & the data was collected in pie diagram & chart.

2.1 OBSERVATION TABLE:

SR NO.	Question asked in Questionnaire	Options	Responses in Percentage (%)	Fig no.
1	Age	a. 14-24 years b. 25-34 years c. 35-45 years	54% 24% 22%	Fig No. 1
2	Weight	35-50 Kg 50-65 Kg 65-80 Kg 85-95 Kg	22% 45% 19% 14%	Fig No. 2
3	Profession	Student Working Women House Wife	50% 17% 33%	Fig No. 3
4	Education	Literate Illiterate	86% 14%	Fig No. 4
5	Knowledge about nutrition	Yes No	80% 20%	Fig No. 5
6	How do you rate your nutritional knowledge?	Poor Moderate Excellent	24% 44% 32%	Fig No. 6
7	Diet	Vegetarian Non-Vegetarian Flexitarian	38% 24% 38%	Fig No. 7
8	Meals per day	2 3 4	52% 41% 7%	Fig No. 8
9	Consumption of fast food	Daily Weekly Monthly Rarely	12% 42% 18% 28%	Fig No. 9
10	Do you drink milk?	Daily Sometimes Rarely Never	27% 61% 5% 7%	Fig No.10
11	Do you include salad in your meal?	Daily Sometimes Rarely Never	26% 60% 7% 7%	Fig No.11
12	Do you drink fruit juice?	Daily Sometimes Rarely Never	9% 69% 17% 5%	Fig No.12
13	Have you been obese?	Yes No Still Obese	13% 73% 14%	Fig No.13
14	Do you consume alcohol or tobacco?	Daily	00% 3%	Fig No.14

		Sometimes Rarely Never	7% 90%	
15	Daily water intake	Less than 1 litre 1-2 litre 2-3 litre 4-5 litre	8.2% 3.2% 55.9% 1.2%	Fig No.15
16	Following any diet plan	Yes No	15% 85%	Fig No.16
17	Intake of dietary supplements	Vitamins Minerals Proteins None	21% 2% 10% 67%	Fig No.17
18	Menstrual cycle	Normal Abnormal	93% 7%	Fig No.18
19	Do you Face pre-menstrual tension?	Always Sometimes Never	1.9% 37.3% 60.8%	Fig No.19
20	Do you face	Anger Anxiety Stress Loneliness Depression Sadness Hypertension None	10% 3% 16% 2% 1% 3% 4% 61%	Fig No.20
21	Do you exercise or meditate?	Daily Sometimes Rarely Never	14.7% 46.1% 11.8% 27.5%	Fig No.21
22	Nutrients deficiency	Vitamins Minerals Proteins None	35.3% 6.9% 14.7% 43.1%	Fig No.22
23	Health issues	Overweight & Obesity Underweight High Blood pressure High Cholestrol Osteoporosis None	22.5% 13% 3.6% 1% 6% 53.9%	Fig No.23
24	Do you faced any complications during pregnancy or at time of giving birth?	Yes No	59% 41%	Fig No.24
25	Age of Menopause	14-24 25-34 35-44	16% 24% 60%	Fig No.25
26	Do you see any weight gain after Menopause?	Yes No	27.3% 72.7%	Fig No.26

OBSERVATION CHART:



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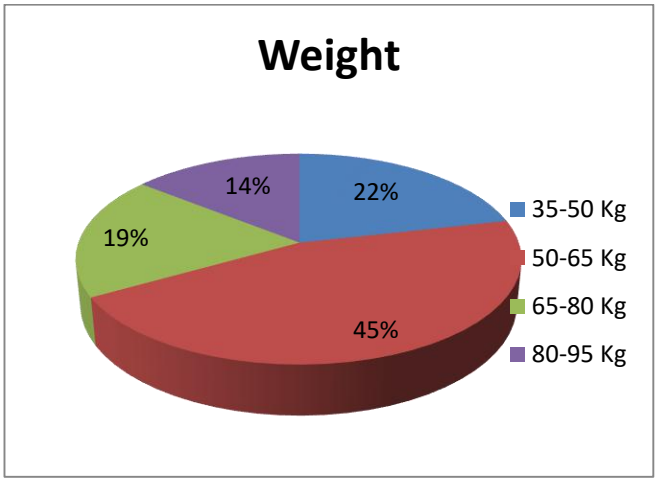

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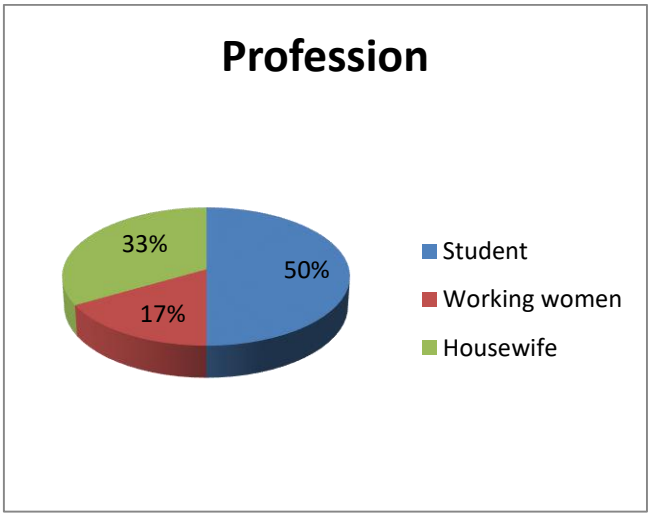

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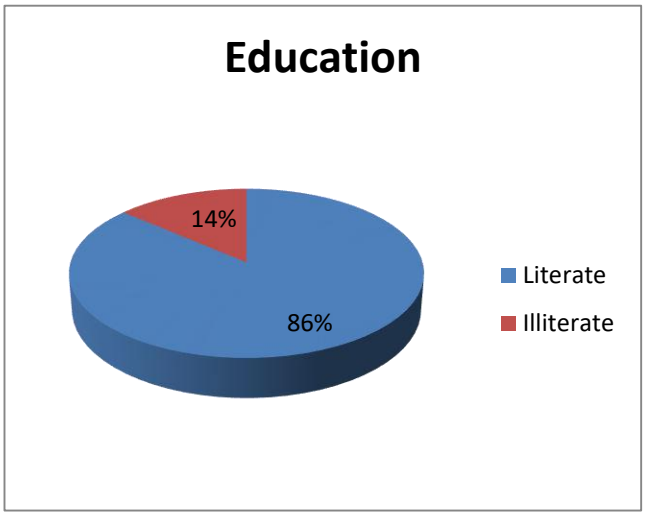

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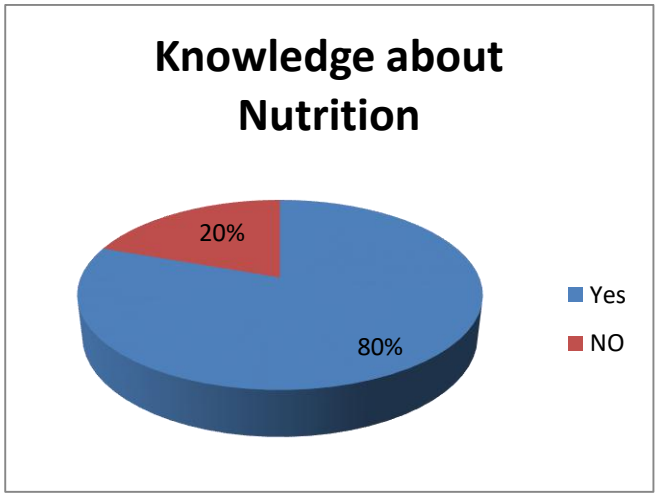

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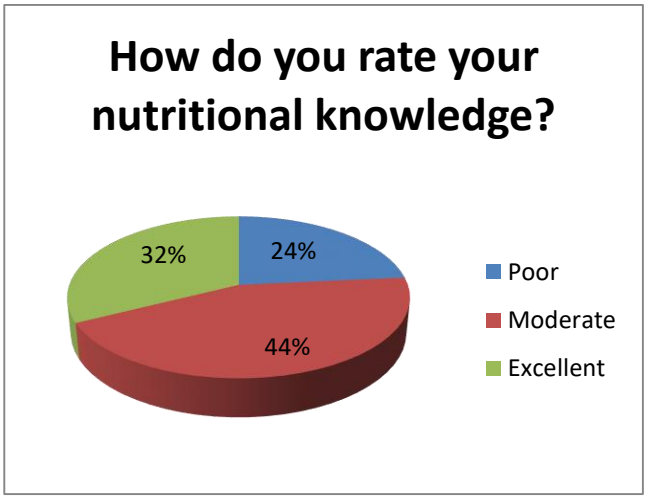

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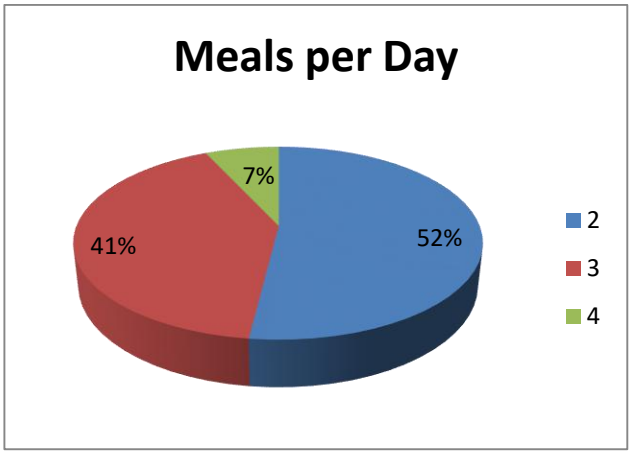

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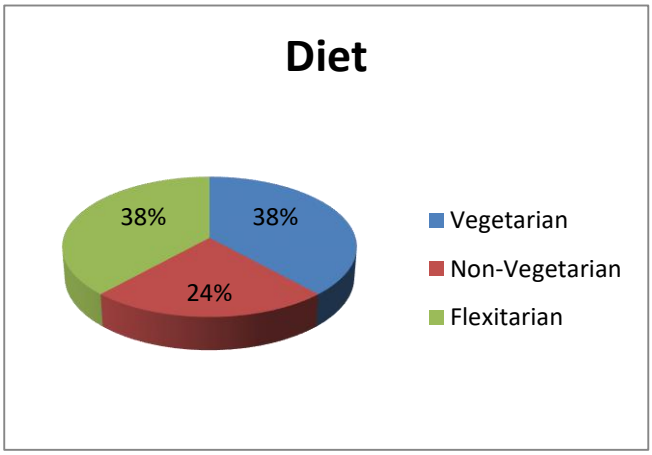

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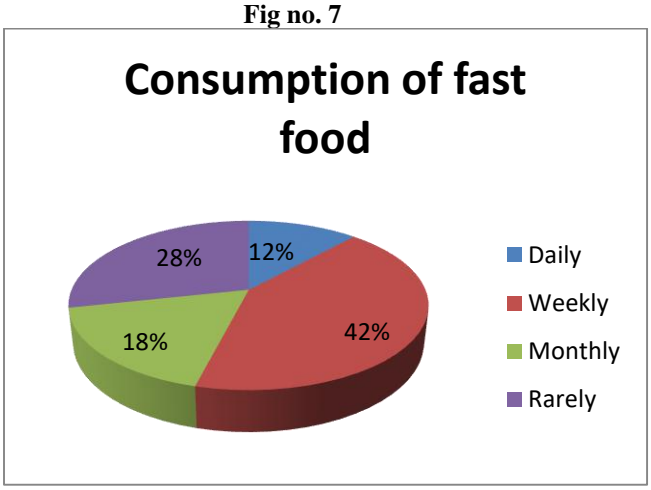

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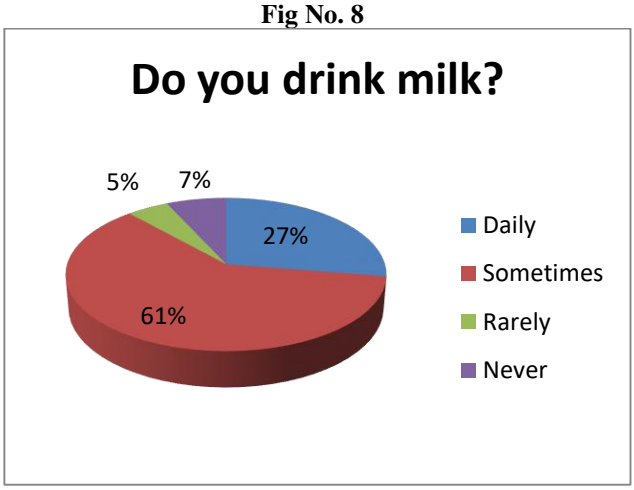

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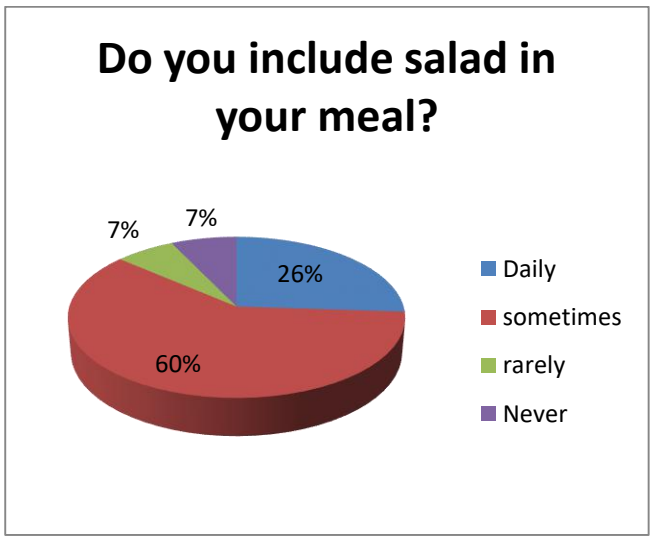

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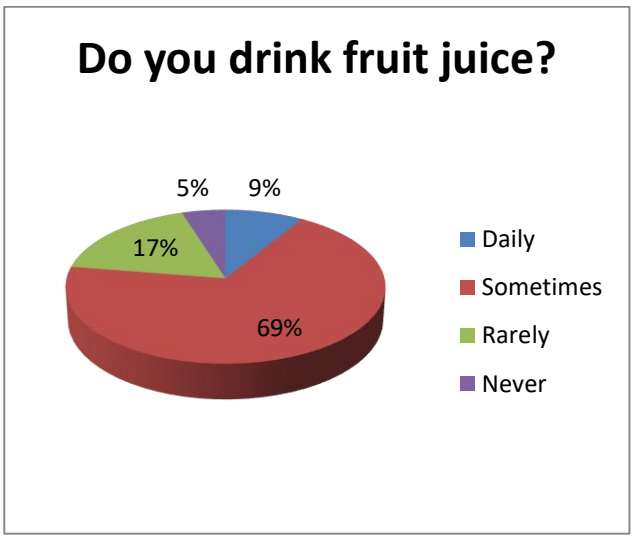

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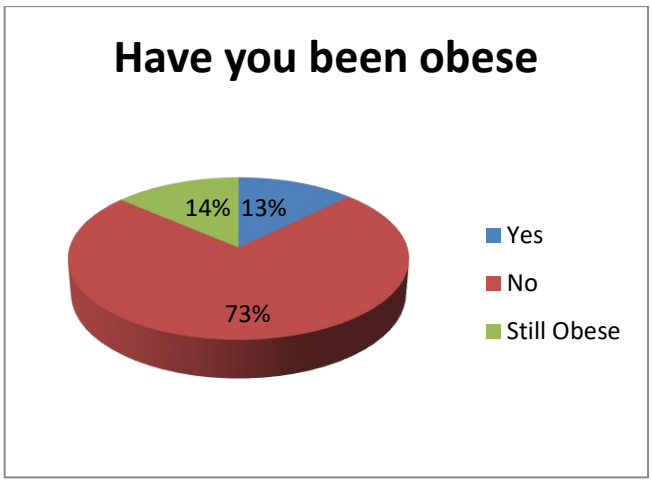

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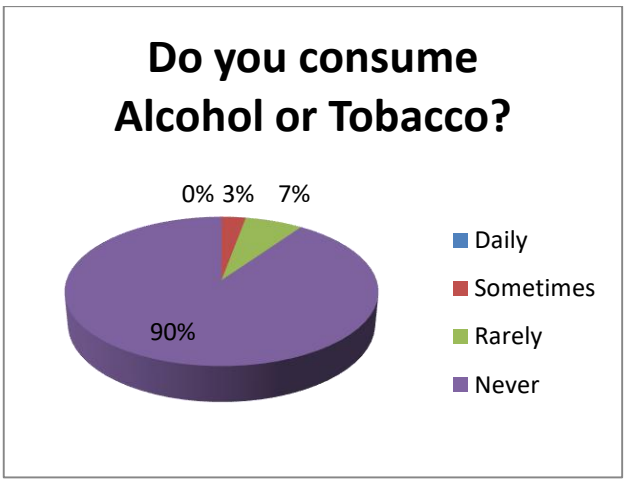

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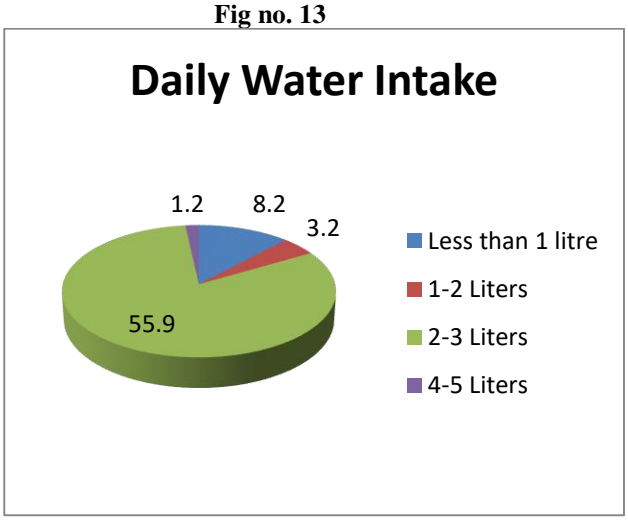

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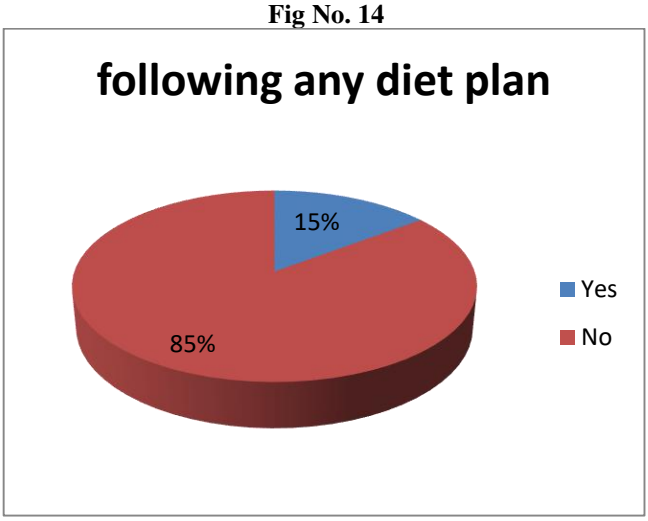

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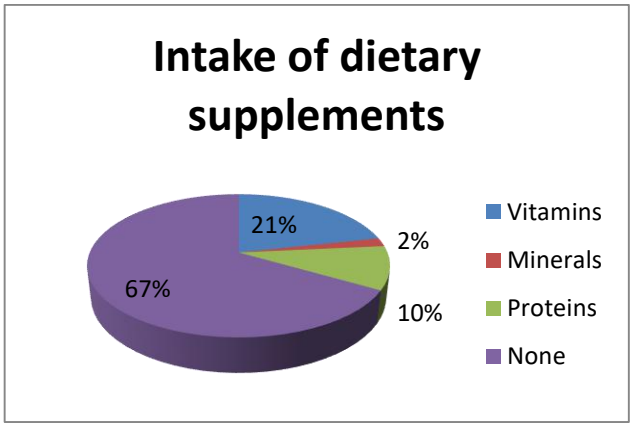

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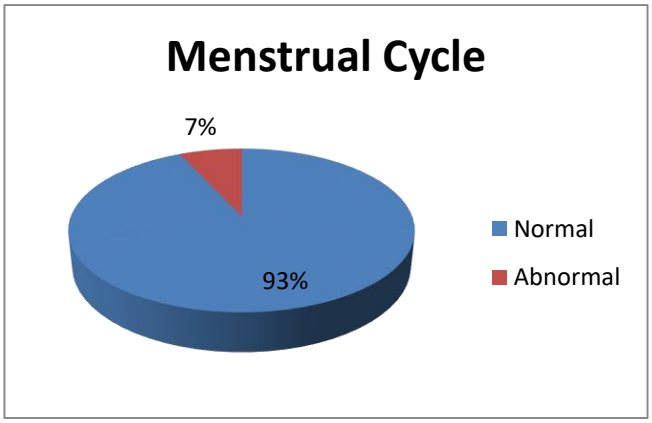

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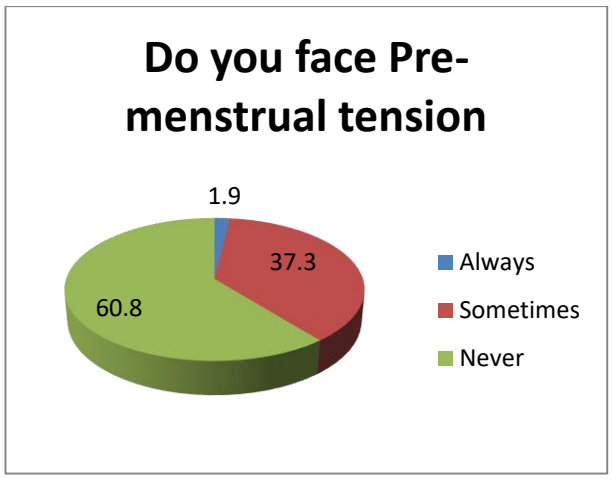

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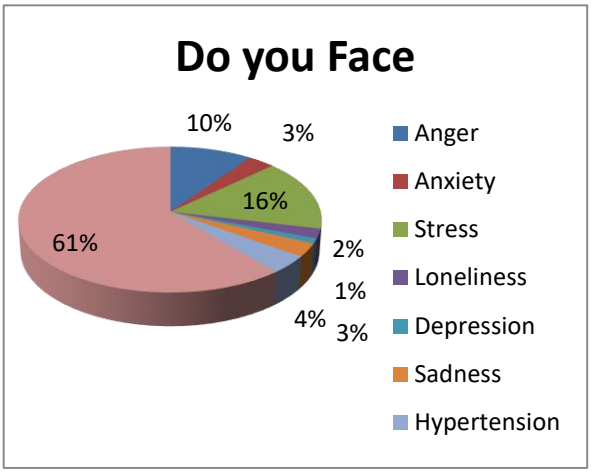

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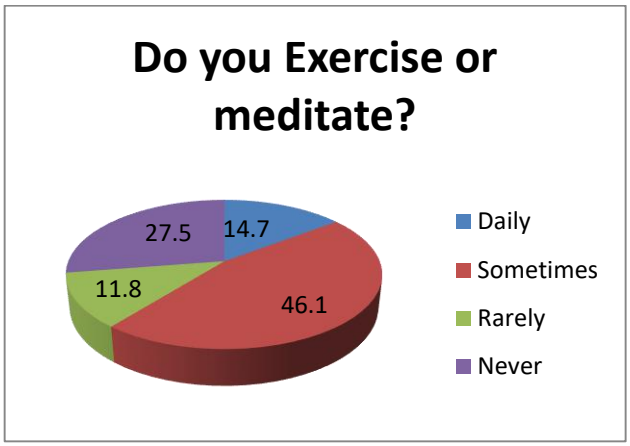

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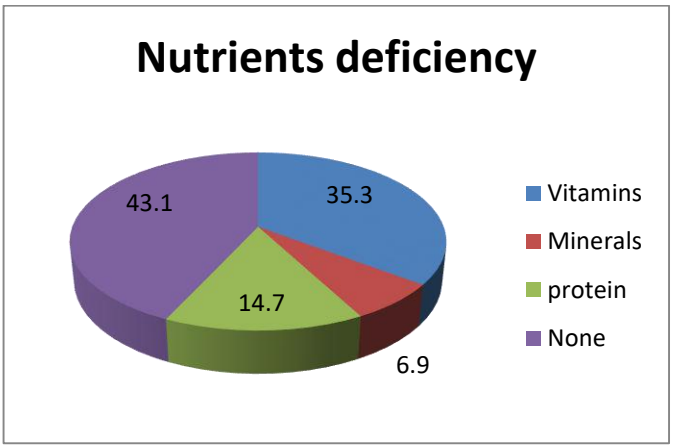

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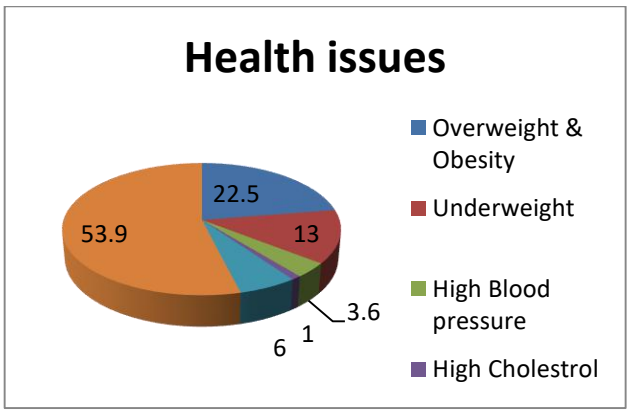

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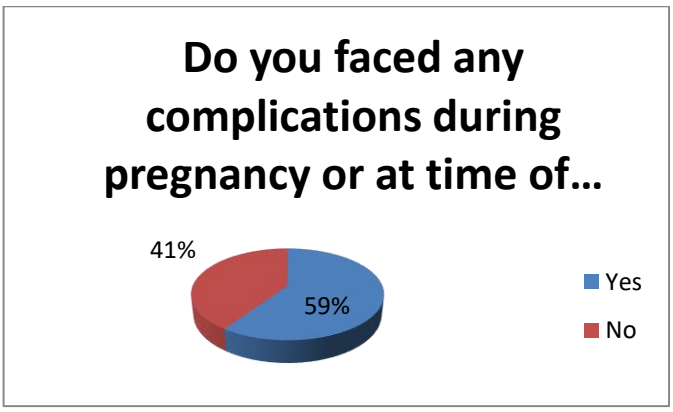

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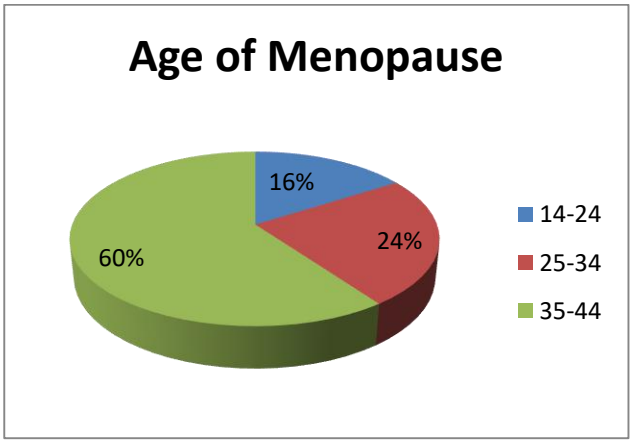

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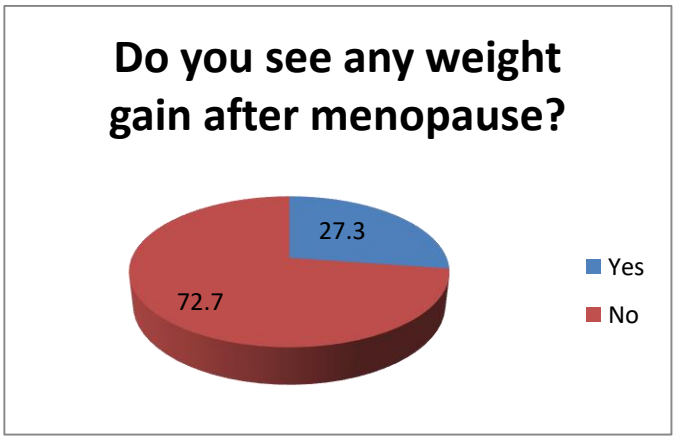

Fig No.26

3. RESULT AND DISCUSSION:

About 250 women were assessed about their dietary intake pattern and nutritional status. From the given responses 50% were student, 17% were working women and 33% were housewife. About 80% women were aware of nutrition but about 44% rated their nutritional knowledge moderate & 24% rated their knowledge poor. It shows women are aware of nutrition, still they are not fully educated about its role in their growth & development. 38% women responded they are flexitarian & prefer vegetables & animal food in their diet. 41% were having 3 meals per day and most of them were obese. Consumption of fast food was preferred by about 42% women on weekly basis. A milk an important dietary food was not consumed on daily basis as about 61% women response was they prefer drinking occasionally rather on daily basis. Salad provides our body with vitamins & minerals but as the milk, salad too was considered in the dietary intake on daily basis only 26% women had salad on daily basis. 60% were not having salad on daily basis as they prefer occasionally, only 26% women were consuming salad on daily basis. The obesity was seen around 27% of women. Around 90% women to response on alcohol & tobacco consumption was negative. The daily water intake in average women was between 2-3 litres. Diet plan was not followed by 85% of women & it directly reveal women are not aware about its healthy effects on body. When it comes to taking dietary supplements about 21% women were taking help of vitamins as a dietary supplements. The menstrual cycle of about 7% was abnormal, pre menstrual tension was found in 37.3% women. In the survey, women also faced emotional health problem such as anger was faced by 10% women, 16% faced stress, 3% faced sadness, 1% were in depression. Exercise & meditation was done occasionally by 46.1% but only 14.7% prefer it doing on daily basis. Exercise & meditation reveals a healthy Lifestyle but women were more involved in their family & work they don't get enough time but there are women who are used to such life where they don't prefer doing so. Nutrients deficiency of vitamins was about 35.3% was seen & 14.7% were proteins deficient, 6.9% were minerals deficient. Health issues such as overweight & obesity, underweight, high blood pressure, high cholesterol, osteoporosis & digestive problems was found in surveyed women's. 59% married women faced complication during their labor. 16 % women had menopause at the age of between the age of 14 to 24 & 24% had between the age of 25 to 34. 27.3% women responses they faced weight gain after menopause. From this survey it is clear that women who are educated & know about nutrition still they are not fully aware about diet& diet plan to follow to improve their health & nutritional status. Women who are uneducated follow traditional method as they are not aware of nutrition. Tradition & customs related to daily food in Indian house ultimately affect the overall health of the women & their future's kid's. Many women are obese still they do not prefer exercise & meditation to improve their lifestyle. The dietary intake of the women's consume on daily basis is sufficient to fulfill their nutrition deficiency. Awareness of nutrition & it's health benefits to the women's can help to improve their dietary intake pattern & nutritional status. Including milk, vegetables, proteins rich food in diet & track on calorie intake will improve the overall health of women in reproductive age.

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Effect of Alprazolam On Morphometric Parameters of Life Cycle Stages of *Lucilia Sericata* (Diptera: Calliphoridae)

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Abstract: *Lucilia sericata (Diptera: Calliphoridae) species were collected on the decaying meat in the Aurangabad region. The development is holometabolous and the life cycle includes egg, three instars, pre-pupa, pupa and adult stages. Changes in the life cycle of Lucilia sericata species was studied after exposure to alprazolam. The alprazolam treated food cause the effect on growth of the larvae. As the concentration of alprazolam increases in the food the larval development slows down and the pupal development was also delayed. The flies emerged first from control then from 0.4 ppm, while in higher concentrations of alprazolam, the pupation was delayed.*
Key words: *Calliphoridae, Lucilia sericata, alprazolam, life cycle.*

1. INTRODUCTION:

Forensic science is the application of a broad spectrum of sciences to answer questions in relation to a crime or a civil action. The main areas used in forensic science are biology, chemistry and medicine, although it also includes the use of computer science, physics, geology and psychology. Forensic scientists study objects, substances, chemicals, tissue traces and impressions left at the crime scene. It fulfills the growing demand for expertise in investigatory, enforcement and monitoring work, including incident scene investigation, physical evidence collection and laboratory analysis of evidence and defense of testimony (Lincoln, 2010).

Forensic entomology is mainly associated with death investigations however it may also be used to detect poisons and drugs, determine the location of an incident and the presence and time of the infliction of wounds. Forensic entomology is the broad field where arthropod science and the judicial system interact. It has been subdivided into three principal areas focused on those issues are most often litigated (Lord and Stevenson, 1986).

Blowflies are usually the first organisms to arrive at a corpse, sometimes within minutes of death and they are also the species of greatest forensic importance (Goff, 2000; Byrd and Castner, 2001; Arnaldos et. al., 2005). A blow fly belongs to the family Calliphoridae and are commonly called greenbottles or bluebottles. *Lucilia sericata* is the most well-known green bottle fly species found in most areas of the world and *Lucilia sericata* begin their life cycle by laying a mass of eggs in a wounded area, corpse or in necrotic or decaying tissue.

Sedatives at higher doses may result in slurred speech, staggering gaint, poor judgment and slow, uncertain reflexes. All sedatives when taken regularly over a period of time can cause physiological and psychological dependence, even at therapeutic doses (Yi et al., 2007; Ebert et al., 2006 and Sarrecchia et al., 1998). Dependent users may shows symptoms ranging from restlessness and insomnia to convulsions and death. When users become psychologically dependent, they feel as if they need the drug to function.

Alprazolam has a relatively high potential for recreational use and is the most commonly misused benzodiazepine. It is primarily used to treat moderate to severe anxiety disorders, panic attacks, moderate depression. Overdoses of alprazolam can be mild to severe depending on how much of the drug is taken. Alprazolam is significantly more toxic in overdose having higher rates of fatalities compared to other benzodiazepines. Combined overdose with tricyclic antidepressants, opiates or alcohol or overdoses of alprazolam in the elderly significantly increases the possibility for severe toxicity and fatality.

Forensic entomology is a recognized method of estimation postmortem interval, but comparatively little research has carried out in the use of larvae in forensic entomology in India. Forensic entomology-toxicology includes the study of effects of toxins and drugs on development rate of carrion-feeding insects. Analysis of living material, such as larvae offers a number of technical advantages for detection of drug in putrefied human remains. The presence of the sedative drugs in the dead tissue can also affect on the longevity of the life cycle stages of the insects of forensic

importance and hence it is essential to study the effect of the sedative drug alprazolam on the periods of the developmental stages of blow flies.

2. MATERIALS AND METHODS:

The *Lucilia sericata* (Calliphoridae) flies were used as the biomaterials. The flies do not need the flesh of specific animal and hence those which occurs on the dead human body, also occurs on the flesh of any animal and hence for the study goat or other available flesh in the market was used. After one day of putrification, the liver and other meat was placed in open air for collection of flies. After sometime the flies gathered on the rotten liver. The flies of calliphoridae family were collected by means of insect collecting net after identification they were released in insect rearing cages.

TREATMENT OF ALPRAZOLAM:

The flesh was finely chopped in the mixer and was mixed with the alprazolam so as to make the concentration as 0.4 ppm, 0.8 ppm, 1.2 ppm and 1.6 ppm. The concentrations were decided as per the doses given to the human with respect to the effective doses. The first instar maggots were released on the 50 gms each of the diazepam mixed flesh in separate culture chambers, one with only flesh was maintained as control. Fresh chopped meat was provided twice a day as food. Honey soaked in cotton was also provided as the source of sugar and glucose. Wet cloth piece was maintained on one side of the cage to maintain the humidity. The feed was changed on each day and the mortality was recorded.

The developing stages were collected on each day, were narcotized in menthol water and were stored in vials containing AGA solution (alcohol, glycerol and acetic acid). Narcotization inactivates the maggots at relaxed condition and thus after preservation there is no contraction of the maggots. The vial was labeled as the stage collected, date and time. The stages were photographed and weighed on the electronic balance. Measurements of these stages were made by means of the microscope whose least count is 0.001. At the same time the temperature and humidity were recorded. Measurements of five maggots were done at each time and their average with the standard deviation. Difference among the mean values of control and treated were analyzed by Student's t-test. Difference were considered statistically significant when, $p < 0.05$. The data obtained is tabulated in the tables for different groups.

3. RESULTS AND DISCUSSION:

The flies belonging to the family calliphoridae of the order diptera found on the decaying flesh in Aurangabad region were *Lucilia sericata*. For the treatment of alprazolam eggs of *Lucilia sericata* were collected on first day. Then thirty eggs were placed separately on 0.0 ppm (Control), 0.4 ppm, 0.8 ppm, 1.2 ppm, 1.6 ppm alprazolam containing chopped flesh. The observations were made each day with respect to the dose of concentrations and are given in the table 1.

The results showed that alprazolam treated food cause the effect on growth of the larvae. As the quantity of alprazolam increases in the food the larval development slows down and the pupal development was also delayed. The flies emerged first from control then from 0.4 ppm, while in higher concentrations, the pupation was delayed as per the dose of alprazolam as given in table 1. The temperature variations and the humidity variations in the room conditions at the time of experiment are also mentioned in the table.

TABLE 1. Effect of alprazolam on the Morphometric parameters of life cycle stages of *Lucilia sericata.*

PMI Days	Stages	Conc of Alprazolam	Length (mm)	Width (mm)	Weight (mg)	Temperature ^{0}C			Humidity %		
						Max	Min.	Recorded	Max	Min.	Recorded
	Ist Instar	Control	3.5±0.018	0.8±0.0.01	04±0.18						
	IstInstar	0.4 ppm	3.5^{NS}±0.019	0.8 ^{NS} ±0.01	04 ^{NS} ±0.19						
	IstInstar	0.8 ppm	3.4 ^{NS} ±0.017	0.7 ^{NS} ±0.009	03 ^{NS} ±0.14						
	Ist Instar	1.2 ppm	3.3 ^{NS} ±0.017	0.6 ^{NS} ±0.008	02*±0.10				38		
1	Ist Instar	1.6 ppm	3.2*±0.016	0.5*±0.009	02*±0.11	38.2	30	34.3		15	27
	IInd Instar	Control	7.1±0.034	1.5±0.04	14±0.76						
	IInd Instar	0.4 ppm	7.1 ^{NS} ±0.031	1.4 ^{NS} ±0.04	14 ^{NS} ±0.78						
	IInd Instar	0.8 ppm	7.0 ^{NS} ±0.034	1.4 ^{NS} ±0.03	13 ^{NS} ±0.74						
	IInd Instar	1.2 ppm	6.9 ^{NS} ±0.032	1.3 ^{NS} ±0.03	12*±0.71		29		40		
2	IInd Instar	1.6 ppm	6.7*±0.030	1.2*±0.021	11*±0.70	36.4		33.3		16	29
	IIIrd Instar	Control	9.1±0.63	2.3±0.035	29±1.15						
	IIIrd Instar	0.4 ppm	9.0 ^{NS} ±0.61	2.3 ^{NS} ±0.034	29 ^{NS} ±1.18						
	IIIrd Instar	0.8 ppm	8.9 ^{NS} ±0.58	2.2 ^{NS} ±0.028	28 ^{NS} ±1.13						
	IIIrd Instar	1.2 ppm	8.7*±0.55	2.1 ^{NS} ±0.027	27*±1.11						31
3	IIIrd Instar	1.6 ppm	8.6*±0.54	2.0*±0.025	26*±1.08	35.2	28	31.8	42	17	
	Pre-pupa	Control	8.8±0.61	2.5±0.038	40±1.75						
4	Pre-pupa	0.4 ppm	8.7 ^{NS} ±0.62	2.4 ^{NS} ±0.034	39 ^{NS} ±1.69	35.4	29	31.2		17	32

	III[rd] Instar	0.8 ppm	9.0 ^{NS} ±0.67	2.4 ^{NS} ±0.033	37*±1.62				43		
	III[rd] Instar	1.2 ppm	8.8 ^{NS} ±0.65	2.3 ^{NS} ±0.031	35*±1.54						
	III[rd] Instar	1.6 ppm	8.7 ^{NS} ±0.63	2.2*±0.030	34*±1.51						
	Pre-pupa	Control	8.7±0.59	2.5±0.038	41±1.83						
	Pre-pupa	0.4 ppm	8.6 ^{NS} ±0.51	2.5 ^{NS} ±0.037	40 ^{NS} ±1.65						
	Pre-pupa	0.8 ppm	8.6 ^{NS} ±0.52	2.4 ^{NS} ±0.035	39*±1.58						
	Pre-pupa	1.2 ppm	8.5 ^{NS} ±0.53	2.3 ^{NS} ±0.034	38*±1.47						
5	Pre-pupa	1.6 ppm	8.4*±0.50	2.2*±0.032	37*±1.37	37.3	29	32.6	39	16	28
	Pupa	Control	8.4±0.55	2.8±0.041	40±1.57						
	Pupa	0.4 ppm	8.3 ^{NS} ±0.48	2.7 ^{NS} ±0.040	39 ^{NS} ±1.42						
	Pre-pupa	0.8 ppm	8.5 ^{NS} ±0.58	2.6 ^{NS} ±0.39	39 ^{NS} ±1.41						
	Pre-pupa	1.2 ppm	8.4 ^{NS} ±0.53	2.5*±0.037	39 ^{NS} ±1.47						
6	Pre-pupa	1.6 ppm	8.3 ^{NS} ±0.49	2.4*±0.033	38*±1.38	35.4	28	31.6	41	17	30
	Pupa	Control	8.0±0.51	3.0±0.04	39±1.87						
	Pupa	0.4 ppm	7.8 ^{NS} ±0.45	3.0 ^{NS} ±0.038	38 ^{NS} ±1.85						
	Pupa	0.8 ppm	8.0 ^{NS} ±0.53	2.9 ^{NS} ±0.034	38 ^{NS} ±1.83						
	Pupa	1.2 ppm	7.8 ^{NS} ±0.50	2.8 ^{NS} ±0.035	37*±1.68						26
7	Pupa	1.6 ppm	7.7*±0.49	2.6*±0.038	37*±1.61	38.2	29.3	34.7	40	15	
	Adult	Control	8.1±0.55	4.0±0.048	46±1.93						
	Adult	0.4 ppm	8.0 ^{NS} ±0.53	4.0 ^{NS} ±0.051	45 ^{NS} ±1.89						
	Pupa	0.8 ppm	7.9 ^{NS} ±0.51	3.0 ^{NS} ±0.044	37*±1.64						
	Pupa	1.2 ppm	7.7*±0.45	3.0 ^{NS} ±0.041	36*±1.53		28.5				
8	Pupa	1.6 ppm	7.7*±0.47	2.9*±0.038	36*±1.54	36.6		32.9	38	14	27
	Adult	0.8 ppm	7.9±0.48	4.0±0.048	44±1.93						
	Pupa	1.2 ppm	7.8 ^{NS} ±0.41	3.0 ^{NS} ±0.041	36*±1.61						
9	Pupa	1.6 ppm	7.6* ±0.43	2.8*±0.037	34*±1.23	33.7	28.1	31.8	43	19	32
	Adult	1.2 ppm	7.9±0.44	4.0±0.042	43±1.91						
10	No Adult	1.6 ppm	Dead pupa	-	-	33.5	27.5	31.3	44	19	33

Where, *p<0.05 (Significant t test), NS- Not significant

Identifying species found in association with a corpse is one of the first steps a forensic entomologist performs to estimate the post-mortem interval (PMI) (Watanabe et al., 2002). Blowflies feed on decaying organic matter and may show how much time has passed between a death and the time of discovery of the corpse (Merrit et al., 2000). The blowfly eggs of many genera are of forensic importance and have been studied in many parts of the world (Kitching, 1976; Greenberg and Szyska, 1984; Erzinclioglu, 1989; Liu and Greenberg, 1989; Greenberg and Singh, 1995; Greenberg and Kunich, 2002).

The most valuable use for entomological data is the estimation of the postmortem interval (PMI), or the time elapsed since death (Hall, 2001). Developmental data for primary blow flies provide the most accurate means of estimating the PMI using arthropod information (Greenberg, 1991). It is presumed that the first individuals that arrives at corpse and lay eggs a within hours after death (Catts and Goff, 1992).

Important area of entomotoxicology is the investigation of the effects of drugs and toxins on arthropod development (Goff and Lord, 1994). The use of drugs prior to death can result in an inaccurate estimation of PMI based on insect development (Goff et. al., 1991). For example, Bourel et. al., (1999) found that morphine can cause an underestimation of the PMI in *Lucilia sericata* by 24 hours. Tabor 2004 observed effects of ethanol on development rates of 3[rd] instar *P. regina* maggots feeding on meat from treated pigs were significantly different from development rates of maggots feeding on meat from untreated pigs.

Studies show that use of various drugs and toxins can affect maggot development rates, resulting in inaccurate estimations of postmortem intervals (PMI) based on insect development (Goff et al., 1992, Bourel et al., 1999). Goff et al., (1989) studied the effects of cocaine on development of the sarcophagid fly, *Boettcherisca peregrine*.

Several times the victims suicide or murdered by giving the sedative drugs and under such conditions the body tissue has large amount of the sedative drug. This drug can affect the duration of the life cycle stages and hence in such condition it is important to find the correct Post Mortem Interval (PMI). The standard data related to effect of some sedative drugs on the duration of the life cycle stages and the impact on their morphometric measurement is essential. The commonly used sedative drug, alprazolam were used in the present study and their effect on different stages of life cycle of the *Lucilia sericata* and their morphometric parameter helps in crime investigations.

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Image Analysis of Wound Healing Treated with Three Medicinal Plants

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Abstract: *Hamiltonia suaveolens, Sphaeranthus indicus and Ziziphus jujuba Mill are one of the most important traditional medicinal plants. The primary indigenous use of these plants appears to be of the leaves, flowers and root as a topical treatment for wound healing. The Methanol extract of leaves, flower and root of these plants were used to evaluate the wound-healing activity in rats, using excision wound model. Animals were randomly divided into six groups of six for each model. Test group animals in each model were treated with the Methanol extract of H. suaveolens, S. indicus and Z. jujuba topically in the form of ointment and the control group animals were maintained with no application. Healing was assessed by the rate of wound contraction, time until complete epithelialization. On 16th day, the extract-treated animals exhibited 100% reduction in the wound area when compared with controls which exhibited 63%. Conclusively, increase in percentage of fibrin followed by granulation and decrease in percentage of necrosis results into the admirable process of healing. Thus, in the present study H. suavolens and S. indicus have high percentage of necrosis as compared with Z. jujuba. Thus, this plant demonstrated outstanding activity as compared to placebo and standard group of animals.*

Keywords: *Excision wound model, Image analysis, Hamiltonia suaveolens, Sphaeranthus indicus and Ziziphus jujube.*

1. INTRODUCTION:

The Indian traditional system of medicine is based on pragmatic facts of the observations and the experience over millennia. More than 1200 diseases are mentioned in different classical texts. Traditional medicine, being a significant element in the cultural patrimony, still remains the main choice for a large majority of people for treating various diseases and ailments. Management in various forms of diseases like Diabetes, Cardiovascular disorders, hepatoprotective, antibacterial, antifungal and the wound healing etc. are made with more than 1000 medicinal plants (89.93%); 58 minerals, metals, or ores (5.24%) and 54 animal and marine products (4.86%) (Sharma, 2003). Modern medicine has been certain essential polypeptides of the low concentration present in animal serum, called Growth Factors (Robert *et al*., 2007), controls the cell proliferation. However, a recent study reveals that some of these growth factors may have serious and untoward effects such as carcinogenesis (Ellis, 1998). Classical management of wounds follows various therapeutic steps, starting with an aseptic dressing and ending with the rehabilitation of the normal structure and function (Biswas and Mukharjee, 2003). These therapeutic measures are aimed not only to accelerate the healing process but also to maintain the quality and aesthetics of the healing. As described in literature, 70% of the wound healing drugs are of plant origin, 20% of mineral origin, and the remaining 10% are of animal products (Biswas and Mukharjee, 2003). These drugs are stated to be effective in different circumstances such as wounds, ulcers, sinuses, abscess, syphilitic ulcers, and maggots in wounds, septic wounds, and inflammatory changes of wounds, cellulitis, purulative ulcer, diabetic carbuncle, and fistula-in-ano. Scientific investigations have been carried out to access the wound healing properties of some plants (Jaiswal *et al*., 2004; Biswas and Mukharjee, 2003 and Muthu *et al*., 2003). Here an attempt has been made to evaluate three medicinal plants for their wound healing activity.

2. MATERIALS AND METHODS:

The plant materials were collected from North Maharashtra Region except *H. suavolens* was collected from Chikhaldara forest, District Amaravati, Maharashtra state, India. The plant materials were shade dried. After complete drying the plant material was crushed and grinded to form coarse powder. One kg of dried powdered plant material was exhaustively extracted in soxhlet apparatus with successive solvents. Methanol extract was selected for further detailed

study, on the basis of results obtained from screening of nine selected plants in the laboratory. The solvent extract so obtained was then filtered to remove any suspended impurities. Each extract was separately concentrated under reduced pressure and controlled temperature (55^0C to 60^0C). All the extracts of plants were preserved in a desiccator. Thus MeOHx of each plants obtained were screened for their wound healing activity in simple ointment form in rat model.

PROCESSING

Formulation was prepared by IP method. Ointment was prepared by taking 0.3% preservatives (methyl paraben, propyl paraben), 30% humectants (petroleum jelly) and 19.5% emulsifying wax in 500 ml of distilled water and 1.5% emulsifying agent (cetyl alcohol) and 15% glycerin in 45% liquid paraffin. Both oily and aqueous phases were mixed at 70^0C and then 10% methanolic extract of each plant was added separately. Resultant mixture was homogenized by hand homogenizer at 3000 rpm into a creamy form and stored in tight plastic container.

ANIMAL USED

The adult Wistar strain rat (*Ratus norvegicus)* of either sex, weighing between 180-200gm procured from Yash pharm, Pune were used for the study. Animal handling and experimental protocol was approved from the IAEC and the number is IAEC/11/CPCSEA/MJ/12-13.

EXCISION WOUND MODEL:

Screening for the wound healing activity was performed by excision wound model as described by Chopda (2015).

THE WOUND HEALING EVALUATION:

The animals were divided into nine groups of six animals in each. Group-1: untreated, as the control; Group-2: ointment base, as the placebo; Group-3: 1%w/w Framycetine sulphate, as the standard ; Group- 4 and 5: 2.5% and 5% MeOHx of *H. suavolens;* Group-6 and 7: 2.5% and 5% MeOHx of *S. indicus;* Group-8 and 9: 2.5% and 5% MeOHx of *Z. jujuba*

All the test samples in the form of ointment were applied topically. The percentage of wound contraction was calculated as a percentage of the corresponding 0 days (first day) wound area in mm^2.

$$\text{Per cent of wound contraction} = \frac{\text{Healed area}}{\text{Total wound area}} \; X \; 100$$

WOUND ANALYSIS BY IMAGE PROCESSING:

Wound tissue analysis is required for the assessment of the healing of skin wounds. In the present study percentage of changes in the granulation tissue, fibrin and necrosis in the wound, during healing was evaluated by using WITA software. The image was then processed using WITA software. Image then processed by thresholding, is one of the algorithms and helps to select the area of interest from the background and selected the pixel property. This analysis is very simple. Just click analysis, wound analyzed and results displayed over screen in the form of percentages of granulation, fibrin and necrosis (Fig. 3 – A and B) respectively. Images formed from control group were compared with images from experimental group of animals.

3. STATISTICAL ANALYSIS

An additional advantage of the computer system is the easy statistical processing of primary data. The data are expressed as mean ± SD using analysis of variance (one way ANOVA) followed by Bonferroni's Multiple Comparison Test by using software. Significance is calculated by comparison between test groups versus control group. The value of $p<0.05$ were considered significant.

4. RESULTS AND DISCUSSION:

Results obtained for the wound healing are shown in fig. 1, wound contraction progressed faster when MeOHx was applied on the wound compared to untreated wounds. In the first two days after wounding, fluid was oozing from the untreated wound (control) and to some extent from standard drug framycetin sulphate ointment treated wounds also. However, in the case of *H. suavolens* leaves extract and *Z. jujuba* root extract treated wounds; the drug adhered on the wound and prevented the discharge from the wound within a few hours after the application.

TABLE 1 Percentage of yields of successive MeOHx of three promising plants

Sr. no.	Name of plants	Parts used	Yield (%)
1. 01	*Hamiltonia suavolens* Roxb	Leaves	1.80
2. 02	*Sphaeranthus indicus* Linn	Flower	4.50
3. 03	*Ziziphus jujuba* Mill	Root	5.49

In the *H. suavolens* treated group of rats, wounds were completely healed in less than 21 days where as in the control group of animals required more than 23 days (Fig.2). The surface area of the 2.5 and 5% *S. indicus* treated wound was reduced by 94 and 98% on the day 16^{th} as compared to control (89%) was found to be significant ($P<0.05$). Fig. 2 reveals that the percentage wound contraction was nearly 100% for MeOHx of *Z. jujuba* in 16 days while for the control

group of animals it was 23 days ($p<0.001$). The wound healing activity may be due to presence either of flavonoids /glycoside/tannin or steroidal alkaloid agents present in the root of *Z. jujuba*.

5. WOUND IMAGE ANALYSIS:

Here results are reported on three plants for 8th and 12th day of post wounding. Three processes *viz* granulation, fibrinogenesis and necrosis are involved in wound healing, these are considered for wound image analysis. Healing process started from inflammation stage and ends with remodeling phase. Since inflammatory phase required 2-5 days and proliferative phase 3 weeks. Therefore, in present study we have selected 8th and 12th post wounding day for wound image analysis. Analysis of *H. suavolens* showed granulation on 8th post wounding day and this was significantly increased by 15.37% ($p<0.001$) as seen from Fig.3-A, while fibrin content was not significant, 0.44% ($p>0.05$).

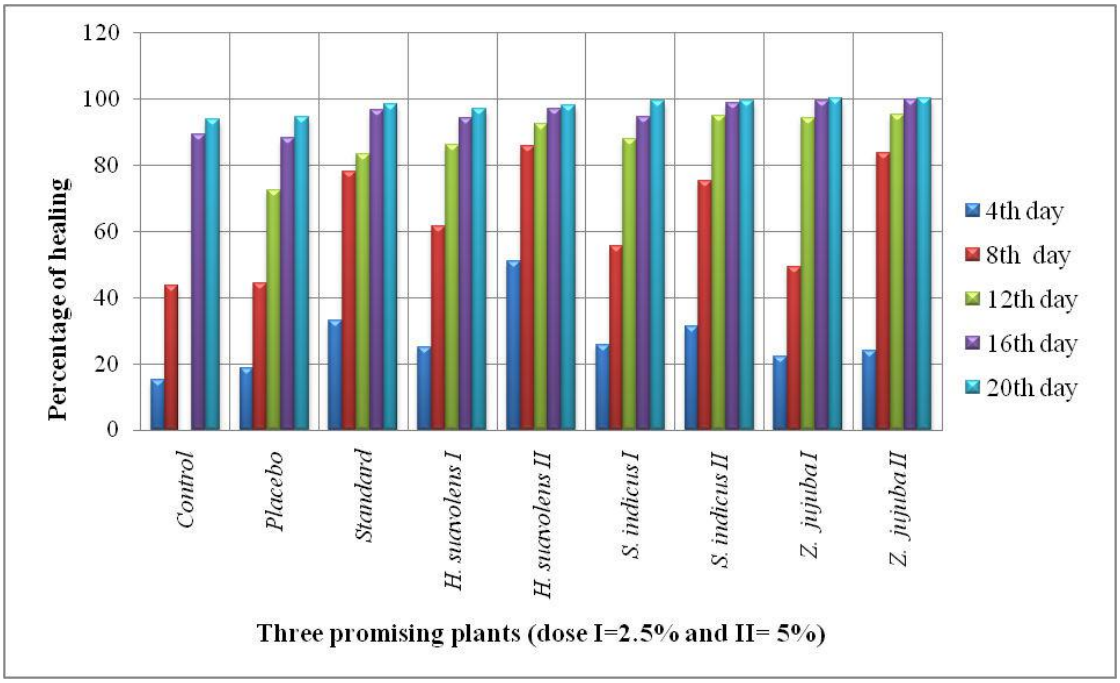


FIG. 1 Effect of successive MeOHx of three promising plants on wound contraction in percentage at different days in excision wound rat model

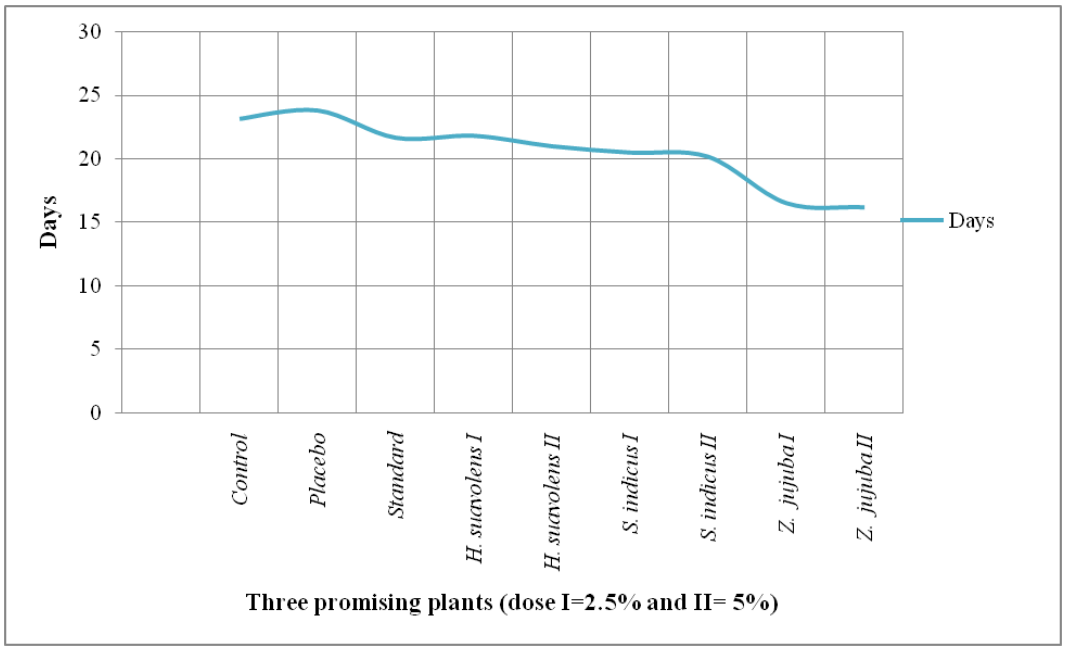
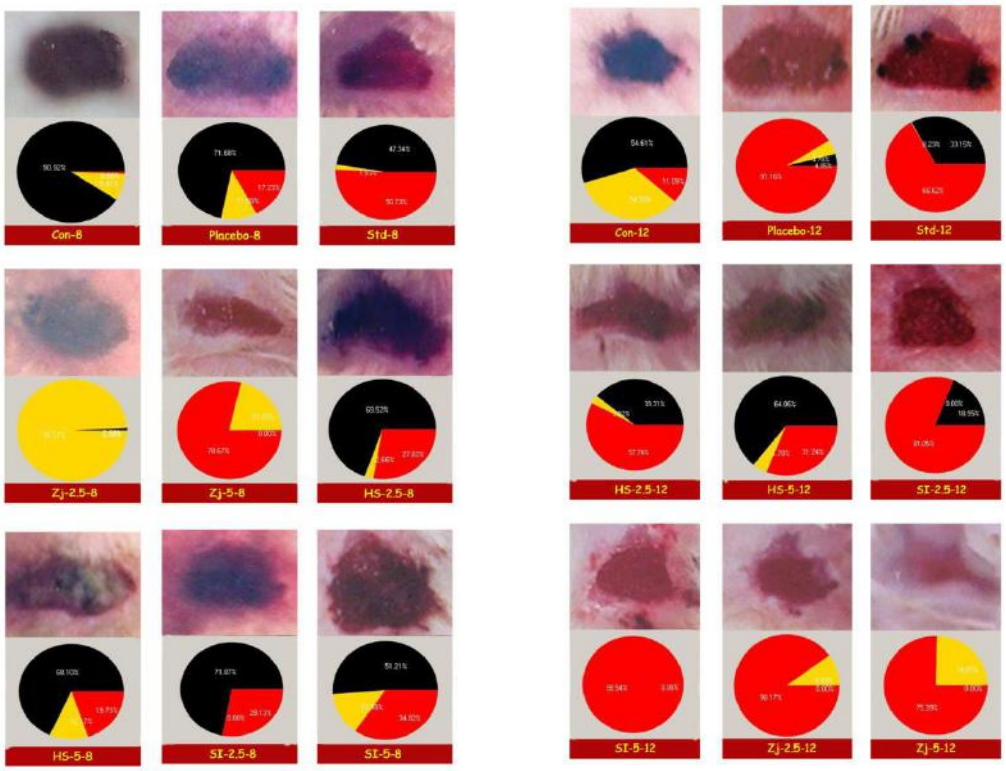


FIG. 2 Effect of successive MeOHx of three promising plants on period of epithelisation in days in excision wound rat model

The necrosis process was significant 84.17% ($p<0.001$) at a 5% dose when compared with control group of animals (granulation 0.63%, fibrin 8.12% and necrosis 91.24%) illustrated in table 2-3. However, at a 10% dose the granulation (18.65%) was significantly ($p<0.05$) increased. It is pertinent to note that no appreciable progress seen in the fibrin content and necrosis process ($p>0.05$) and the effect was 17.36% and 67.37% respectively. On the other hand, on 12th day of post wounding, same results were found in case of a 5% dose. At a dose of 10%, the outcomes were significantly ($p<0.001$) increased in the granulation 49.83% and fibrin content 5.62%. Necrosis was noted on the 12th day and no change was observed as compared to control group of animals (Table 2-3). Findings on *S. indicus* on 8th day exhibit formation of granulation 28.37% and 32.14% were significantly ($p<0.001$) increased (Fig.3-A) but fibrin formation was negligible and 11.34% at 5% and 10% concentrations respectively (Fig.3-B). However, it is evident from the table 7 that, slightly necrosis was decreased ($p<0.05$) 56.52% and 71.62% ($p<0.001$) at both doses as compared to control group of animals. On 12th day of post wounding granulation was increased significant ($p<0.001$) 82.38% and 99.56% (Fig.3-A). However, less than 1% fibrin content was noted in both doses. Less percentage of necrosis *i.e.* 17.61% and 0% was a good sign of healing process at both doses as compared with control group of animals (Table 2-3).



A **B**

FIG 3 Wound Image Analysis of (A) 8th and (B) 12th day

In *Z.jujuba,* granulation formation was found very poor 1.30% what is significant is to note that fibrin formation was excellent 32.47% ($p<0.001$) as compared to control group of animals (Table 2-3). Necrosis was 46.22%, which was decreased significantly as compared with *H. suavolens and S. indicus* at a dose 5% on 8th day of post wounding (Table 2-3). An Interesting results were found at 10% concentration, the granulation (81.32%) and the necrosis (0%) significant ($p<0.001$), whereas, the fibrin content (18.50%) was not significant ($p>0.05$) as compared with control group of animals on 8th day, it is evidenced from Fig.3-A, 3-B. Increased in granulation percentage 96.13% and 88.85% was found significant ($p<0.001$), while fibrin formation was 3.86% and 11.14% at both doses respectively on the 12th day at both doses respectively. It is evident from table 2-3 that at both concentrations of root extract of *Z. jujuba* no necrosis was observed.

The collagen composed of amino acid (hydroxyproline) is the major component of extracellular tissue, which gives strength and support. Breakdown of collagen liberates free hydroxyproline could be used as an index for collagen turnover (Shukla *et al*., 1999). The progress of the wound healing induced by ointment containing extract of *H. suavolens, S. indicus, Z. jujuba,* framycetin sulphate, placebo and control on rats are shown in table 6. Time for wound closure as well as for falling of eschar by ointment, placebo and control are comparable and all resulted effective healing percentage (89-99%) after 15 days of treatment. About 20 members of family Asteraceae followed by 9 members of family Rubiaceae are reported to have wound healing activity in animals (Udupa *et al*., 1991; Chopra *et al*., 1986). Seven members occurred in Khandesh region *i.e.* North Maharashtra Region of the family Rhamnaceae. Out of these 3 members are native of this place. No report on any member of Rhamnaceae family appeared in literature on wound healing agent in experimental animals (Chopda and Mahajan, 2009). The results obtained from present study of the

flowers of *S. indicus* confirms the finding of Sadaf *et al*., (2006), indicating that the active principles are distributed throughout the aerial parts and secondly the activity is not animal specific.

6. CONCLUSION:

Conclusively, increase in percentage of fibrin followed by granulation and decrease in percentage of necrosis results into the admirable process of healing. Thus, in the present study *H. suavolens* and *S. indicus* have high percentage of necrosis as compared with *Z. jujuba*. Thus, this plant demonstrated outstanding activity as compared to placebo and standard group of animals.

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TABLE 2 Percentage of healing on the basis of image based analysis by using WITA software

Day / Group	8		
Steps →	Granulation	Fibrin	Necrosis
Control	0.63 ± 0.36	8.12 ± 4.04	91.24 ± 3.95
Placebo	22.24 ± 5.49	12.77 ± 1.69	64.99 ± 5.87
Standard	46.64 ± 3.01	0.70 ± 1.09	52.65 ± 3.03
H s I	15.37 ± 7.36 ^{A}	0.44 ± 1. 08 ^{D}	84.17 ± 8.28 ^{B}
H s II	18.65 ± 8.00 ^{C}	17.36 ± 3.92 ^{D}	67.31 ± 11.87 ^{D}
S i I	32.14 ± 6.43 ^{A}	11.34 ± 3.58 ^{D}	56.52 ± 6.37 ^{A}
S i II	28.37 ± 7.35 ^{A}	0.00 ± 0.00 ^{D}	71.62 ± 7.35^{C}
Z j I	1.30 ± 2.57 ^{D}	32.47 ± 23.28 ^{A}	46.22 ± 22.57 ^{A}
Z j II	81.32 ± 3.21 ^{A}	18.50 ± 3.00 ^{D}	0.00 ± 0.00 ^{A}

TABLE 3 Percentage of healing on the basis of image based analysis by using WITA software

Day / Group	12		
Steps →	Granulation	Fibrin	Necrosis
Control	9.13 ± 1.44	48.36 ± 9.39	42.50 ± 8.06
Placebo	93.45 ± 1.89	2.31 ± 2.80	4.22 ± 1.02
Standard	73.88 ± 3.68	0.13 ± 0.11	26.15 ± 3.63
H s I	18.70 ± 14.89 ^{D}	2.04 ± 2.38 ^{A}	79.26 ± 15.95 ^{A}
H s II	49.83 ± 8.20 ^{A}	5.62 ± 1.80 ^{A}	44.53 ± 7.55^{D}
S i I	82.38 ± 1.22 ^{A}	0.00 ± 0.00 ^{A}	17.61 ± 1.22 ^{A}
S i II	99.56 ± 0.70 ^{A}	0.44 ± 0.70 ^{A}	0.00 ± 0.00 ^{A}
Z j I	96.13 ± 4.56 ^{A}	3.86 ± 4.59 ^{A}	0.00 ± 0.00 ^{A}
Z j II	88.85 ± 7.70 ^{A}	11.14 ± 7.70 ^{A}	0.00 ± 0.00 ^{A}

Mean ± S.D., n= 6.*p<0.001, test *vs* control, I = 5% and II = 10% dose,

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Neorosecretory Cells of a Spotted Water Beetle in Jalgaon District M.S., (India)

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Abstract: *The cerebral neurosecretory cells in the central nervous system and retrocerebral endocrine complex (corpora cardiaca and corpora allata) were studied in spotted water beetle. In whole mount of brain there are two group of cells situated anterior side of the pars intercerebralis each group having 12 'A' cells. 'A' cell of brain is dark purple in colour with Aldehyde Fuchsin stain, which are rounded or pear shaped. Whole mount of suboesophageal ganglia shows the presence of 2 'A' type neurosecretory cells situated anteroventrally in the suboesophageal ganglia. The neurosecretory cells in the brain are classified according to the variation in their morphology and stainability 'A' type of cells stain dark purple with Paraldehyde Fuchsin. They contain large number of granules which filled up most of the perikaryon. These cells are pear or sometime irregular in shape. B' type of cells is intensively stained green with Halmi's mixture. The secretion is evenly distributed in the cytoplasm. Usually, these cells are almost less in number and smaller in size. There are 'A' and 'B' type of cells in males. Female insects do not show any differences in number of neurosecretory cells.*

Key words: *Neurosecretion, Paraldehyde Fuchsin, Halmi's mixture, Spotted Water Beetle.*

1. INTRODUCTION:

The neuroendocrine system refers to the neurosecretory cells in the central nervous system and retrocerebral endocrine glands Such as corpora cardiaca and corpora allata of insects. The term neurosecretion was introduced by the Scharrer in the early 1930's. A great deal of work has been done on the distribution, morphology and physiology of neurosecretory cells in different insect order's (Vander Kloot, 1960, Novak, 1966). The distribution of neurosecretory cells is numerically and topographically variable in different insect orders. The nerve cells synthesize, transport and secrete chemical substances, which control the various functions of the various systems organ etc. is broadly the defination of neurosecretion.

All neurosecretory cells secrete acidophilic products. On permanganate oxidation acidophilic products of some of the neurosecretory cells become, basophilic. Neurosecretory cells generally resemble typical bipolar nerve cells but are characterized by showing cytological evidence of secretion. The secretions are granular. The granules are synthesized in the cells bodies and pass down the axon.

Several types of cells can be differentiated by their reaction, but these types are not always comparable. The different types may represent successive stages in a cyclic secretion of a cell (Delphin, 1965). Gomori's classic staining methods or their modifications are used for the observation of the histological structure of neurosecretory cells (Bern and Knowles, 1966)

Different types of neurodsecretory cells are classified by using the stain, paraldehyde fuchsin, Halmi's mixture; Chromealum haemotoxylin, phloxing and paraldehyde thionin, phloxin. Johansson (1958, b) distinguish 4 different types of neurosecretory cells in *Oncopellus faciatus*. Fletcher (1969) described thirteen different types of neurosecretory cells on stainability, which were further divisible into subtypes on size. Dogra and Tandon (1964) have established in situ demonstration of 'A' type of cells in whole brain by Victoria blue, Paraldehyde Fuchsin, Paraldehyde Thionin. The above studies indicate that they exist a great variability in the types of neurosecretory cells present in the brain of the

insect. 'A' type with granules greater than 1000 A^0 in diameter and 'B' types with granules less than 1000 A^0 diameter (Knowles,1965). Neurosecretory cells are present most of the ganglia of the central nervous system.

2. MATERIALS AND METHODS:

Spotted water beetles were collected from a small stream (nala) nearby Pratap college, Amalner. For the whole mount dissect the spotted beetle in insect ringer under dissecting binocular. fixed in Bouins fluid for 12 to 24 hours. Wash the brain with 70% alcohol and removed picric acid, oxidized in performic acid for 15 minutes. Rinsed in distilled water. Bleached in 4% solution of potassium metabisulfite under the microscope until the tissue become completely white, washed in distilled water for 5to 10 minutes, passe through 30% to 70% alcohol for 10 to 15 minutes in each. Then stained in Paraldehyde Fuchsin (PF) for 30 minutes. If there are some stained precipitates on the surface of the brain wash it in 70% alcohol. Removed neurolemma, cleared in cidar wood oil for 2 hours. Washed the oil with xylene and mounted in DPX or Canada balsum.

For the permanent slide the neurosecretory cells in central nervous system were studied histologically by Paraldehyde Fuchsin, Halmi's mixture.

1) The entire nervous system with neuroendocrine organs were fixed in aqueous Bouin's fluid for 24 hours.
2) The material was washed thoroughly in 70% alcohol and then stained in alcoholic eosin, dehydrated and embedded in paraffin wax.
3) 6 to 8 mm of frontal, transverse and sagittal section was cut.
4) Sections were dewaxed, hydrated and oxidized in freshly prepared mixture of equal volume of 0.6 % $Kmno_4$ and 0.6 5 H_2So_4 for 1 minute at 20^0C to 22^0C.
5) Rinsed in distilled water.
6) Bleached in 2.5% sodium metabisulfite for 20 to 4 seconds.
7) Washed in running tap water for 5 minutes.
8) Passed through distilled water, 30% to 70% alcohol.
9) Stained in PF for 2 minutes.
10) Washed in 2 or 3 changes of 96% alcohol.
11) Passed through 70% to 30% to distilled water.
12) Immersed 10 minutes in the mixture containing 4% phosphotungstic acid and 1% phosphomolybdic acid.
13) Rinsed briefly in distilled water and stained in Halmi's mixture for 1 hours.
14) Rinsed in 95% alcohol containing 0.2% acetic acid.
15) Dehydrated in absolute alcohol, cleared in xylene and mounted in DPX.

3. OBSERVATION AND DISCUSSION:

Whole mount of brain shows two groups of cells situated anterior of the intercerebralis each group having 12 'A' cells. 'A' cell of the brain is dark purple in colour with Aldehyde Fuchsin stain, which are rounded or pear shaped (plate-I, fig1,2). The processes from the 'A' cells groups as they emerge from the brain form a pair of nerves the nervi corporis cardiac (NCC I) which extended and innervate to the corporacardiaca.

Whole mount of suboesophageal ganglia shows the presence of 2 'A' type neurosecretory cells situated anteroventrally in the suboesophageal ganglia. These cells laying side by side or some time one anterior and another slightly posterior to the first (Plate-I fig.3). The axon of these cells run towards the dorsal face of the ganglion. These 'A type cells are pear shaped or some time irregular in size and stained darker than the brain 'A' cells. The secretions from these cells can pass along the interganglionic connectives in either directions and also out words along peripheral nerves. The neurosecretory cells are absent in the thoracic ganglia.

In whole mount of axon pathway neurosecretion is transported from the site of synthesis to the areas of release through nerves. The axons of these neurosecretory cells run forward for a very short distance decussate with their counterparts (Plate-I, fig.4) Then sink downwards and backward to emerge from the tritocerebrum as first nervi corporis cardiac. The most direct route out of the axon would be the passage of the intact granule across the membrane into the circulatory medium.

The neurosecretory system in the Central Nervous System-

The neurosecretory cells are classified according to the variation in their morphology and stainability 'A' type of cells stain dark purple with Paraldehyde Fuchsin. They contain large number of granules which filled up most of the perikaryon. These cells are pear shaped or some time irregular. 'B' type of cells is intensively stained green with Halmi's mixture. The secretion is evenly distributed in the cytoplasm. These cells are usually smaller in size and almost fewer in number than the 'A' cells. These cells are oval or irregular in shape. Axon from these cells run a much simpler and more direct interganglionic course from the perikaryon to the point of exit. Their forming the paired nervi corporis cardiac II (NCC II) which are lateral to exit of the NCC I.

T.S. of Brain–

The neurosecretory cells of water beetles are classified into two types by using the stain Paraldehyde Fuchsin, Halmi's mixture. There are 'A' and 'B' type of cells the males. Female insects do not show any marked differences in

number of neurosecretory cells or in the distribution of neurosecretory cells. These are stimulated in the pars intercerebralis. The pars intercerebralis medialis contains two groups, one group containing 12 'A' type of cells (Plate-II, Fig.-5,6,7). They are immediately beneath the neurilemma. The 'B' type of cells lies in the pars intercerebralis and lateralis. They are stimulated in between the neurilemma and the medullary mass of the protocerebral lobes. In section they are round or oval in shape with green colour.

In *Hydrous triangularis* Say., Govardhan et al. (1978) described paired dorso-median and dorso-lateral NSC groups. In both dorso-median groups, 20-30 NSCs were observed and sun-divided into A1-, A2- and B-cells. There were 5-6 NSCs in each dorso-lateral group. In *Hydrophilus olivaceus* Fabr., Gundevia and Ramamurty (1972) described also paired NSC groups in the median and lateral portions of the brain in total, about 30 NSCs in each lateral group. According to tinctorial properties of their NSMs, the median and lateral NSCs were subdivided into A and B cells whose number, however, was not announced.

In *hydrous piceus*, De Lerma (1956) described paired NSC groups in the pars intercerebralis and in lateral protocerebrum near the calyx of the corpus pedunculatum. About 40 large (30-35micer m in diameter) NSCs were found in the whole pars intercerebralis and 5-6 large NSCs in each lateral group. The median NSCs were filled with a NSM stained positively with PF and gomoris chrome alam haematoxylin.

4. CONCLUSION:

Present study indicates that the different orders and different families of order seem to have distribution of neurosecretory cells in different ways in the brain. In the water spotted beetle there are 24 'A' type cell in the brain and less number 'B' type cells present.

Neurosecretory cells are absent in thoracic ganglia of the water beetle. 'A' type of neurosecretory cells in suboesophageal ganglia is constant in many insect species studied but number of neurosecretory cells in other ganglia of central nerve cord seem to be species specific.

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Plate – I

Fig.1-Whole mount of Brain (X 500)

Fig.2-Whole mount of Brain (X 1125)

Fig.3- Whole mount of Suboesophageal Ganglia (X 400)

Fig.4- Whole mount of Axon Pathway (X 1125)

Plate – II

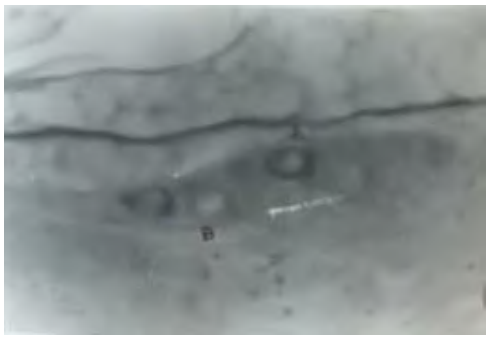

Fig.5 Transverse section of Brain showing

Fig.6- Transverse section of Brain (X 500)

A type cell and B type cell (X 1125)

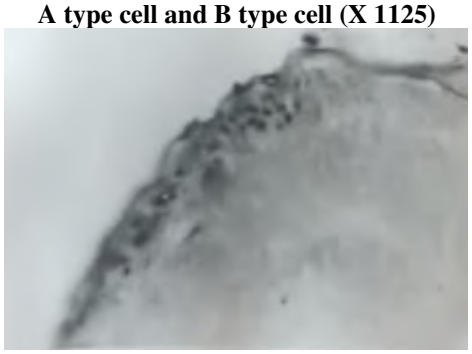

Fig.7 Sagittal section of Brain (X 500)

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Renal-Protective Role Of Leaf Extract Of *Pithecollobium Dulce* Against Chloramphenicol Induced Renal -Toxicity In *Mus Musculus*.

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Abstract: *Due to the climatic changes or changing the life style of the human being the various microbes have been evolved that cause the different infectious diseases. So that the uses of antibiotics have been increased in order to get relief from the microbial infection. The microbes infect the living things by various vectors, vehicles, etc. However indiscriminate uses of antibiotics as well as chemotherapeutic drugs lead to health issues like nephrontoxicity like glomerulonephritis, inflammation of renal tubules, etc. Pithecellobium dulce Benth is an important medicinal plant. This study focused on the evaluation of protective effect of Pithecellobium dulce Benth against chloramphenicol induce renal changes like kidney damage in the form of dialated tubules with regressed blood vessels and vacuolated glomeruli. On the basis of above mentioned literature one has to study the leaf extract of Pithecellobium dulce (L.E. of PD). It was evaluated for its protective role against chloramphenicol induced renal-toxicity in mice. The activities of renal function parameters like blood urea nitrogen (BUN) was increased and creatinine decreased in toxin group. Whereas these levels were recovered in prophylactic groups. The level of glutathione (GSH) and catalase (CAT) were elevated whereas superoxide dismutase (SOD) and lipid peroxidation (LPO) levels were declined in toxin group. While these values were recovered in the prophylactic group.It is concluded that the antioxidants in the LE of PD like Dienestrol, Quercetin, Fisetin (flavonoid) etc are useful to share the electron with free radicals in order to stop the role of free radicals to damage the kidney.*

Keywords: *Pithecellobium dulce, chloramphenicol, renal-protection, leaf extract, phytocompounds.*

1. INTRODUCTION:

Chloramphenicol was discovered after being isolated from Streptomyces venezulae in 1947 (Pongs, O. 1979) It is an antibiotic which is useful for the treatment of various bacterial infections like eye ointment to treat conjuctivitis, used to treat meningitis, plague, cholera, thyphoid fever, etc. However it is used in undeveloped as well as some developing nations due to its side effects includes bone marrow suppression, nausea, diarrhea, gray baby syndrome in young children etc.

One must take the antibiotics for complete relief against bacterial infections, but these side effects can be minimised by some medicinal plants. Medicinal plants play the most important role in the traditional medicines in various developing countries. Most of the flora remain virtually of the medicinal utilizing through traditional eastern system of medicines strongly upholds the use of elements for curing many diseases (**Kaneez Fatima et al., 2010**). It is evident that the plant has great potentials in treating a number of ailments where the free radicals have been reported to be the major factors contributing to the disorders (**Aruoma, 1998**).

Pithecellobium dulce Benth Seeds are particularly rich in proteins and peptides and having potential to combat protein malnutrition. The decoction is also given as excellent treatment for anemia. The constituents of *Pithecellobium dulce* fruits have been isolated and characterized (**Nigam et al., 1997**). The anti-inflammatory activity due to saponin fraction of *Pithecellobium dulce* fruits (**Bhargvakrishna et al., 1970**) was also studied.

2. MATERIALS AND METHODS:

I Plant material and authentication

The flowers of plants collected from local region of Mumbai and the plant is authenticated by BLATTER HERBARIUM, ST. Xavier's college, Mumbai-400001, India.

II Preparation of plant extract

The powdered form of leaves of *Pithecollobium duice* extracted with methanol as the reagent (95 % v/v) for about 18 hours by using soxhlet apparatus. The extract was filtered and the filtrate was concentrated under reduced pressure using rotary evaporator to obtain the extract as solid as resid ues. The extraction value (% w/w) of methanol was 18 (**M. Sugumaran, et. al., 2008**).

III Animals- mice

The animals used for the studies of toxicity and for efficacy were healthy Albino Swiss mice (*Mus musculus*), weighing between 30-35 gm obtained from Haffkins Institute, Parel (E), Mumbai- 400012. Under the Animal Maintenance permit Registration Number Invochem Laboratory, 226, "Gauri" Commercial Complex, Station Road, Vasai Road (E), Dist. Thane-401210; CPCSEA Registration No. 851/C/04/CPCSEA, from the ministry of Social Justice and Empowerment, Government of India. After procurement, the male and female mice were kept in same cage. The cages were provided with rice husk bedding and were cleaned daily. The house was maintained at 28±2° c and exposed to 10-12 hours of day light and a relative humidity of 30-70 %. The animals were provided with drinking water ad libitum and fed on commercially available feed supplied by AMRUT FEED.

IV Drug- chloramphenicol

Chloramphenicol was procured from Mehta Pharmaceutical Limited, 315, Janki Centre, Plot No. 29, Shah Industrial Estate, Off Veera Desai Road, Andheri (W), mumbai, India. It is kept in below room temperature. Chloramphenicol is beneficial to control the growth of gram positive and gram negative bacteria, however chloromycetin at high concentrations results in renal-toxicity **(Saba et al., 2000**). Therefore, to study an extent of toxicity of chloramphenicol, there should be low, medium and high dose of drug given to the mice. It can be determined by LD_{50} of chloramphenicol such as ¼ th of LD_{50} was the low dose, ½ of LD_{50} was medium dose and ¾ th of LD_{50} was the high dose of chloramphenicol that was given to mice for the study. LD_{50} of chloramphenicol is 2300 mg/kg body weight of mouse according to Pfizer material safety data sheet, 2007.

V Experimental protocol

Group I (6 mice) were used as controls. Group II (6 mice) received low dose of chloramphenicol i.e. 500 mg/kg. Group III (6 mice) received 200 mg of leaf extract of *Pithecellobium dulce* (L E of P D). Group IV (6 mice) received low dose of chloramphenicol i.e. 500 mg/kg and 200 mg/kg of flower extract of *Pithecellobium dulce*.

VI Blood sample collection and analysis

Blood sample was collected by puncture of retro- orbital vein and put the blood in EDTA vial for all renal analysis like blood urea nitrogen (BUN)**,** creatinine, other biomarkers are glutathione (GSH), superoxide dismutase (SOD), catalase (CAT) and lipid peroxidation (LPO).

VII Histopathological studies

The animals were sacrified to remove the kidney. The kidney was fixed in Bouin's solution for 12 hrs and then embedded in paraffin's wax using conventional methods (**Galighor A. E., et al., 1976**), cut into 5 µm thick sections and stained haematoxylin – eosin dye. The sections were then observed for histopathological changes.

Statistical analysis

The results of antirenaltoxicity activity were presented as the mean ± SE of 6 mice each group. Results were analyzed statistically using analysis of variance (ANOVA) two ways without replication followed by 'f' test. Values of $P < 0.05$ were considered significant.

3. RESULTS:

Biochemical analysis

Table 1 shows the effect of leaf extract of *Pithecollobium duice* on renal parameters of mice like BUN, creatinine, others are GSH, SOD, CAT and LPO. All values like BUN & LPO were increased in drug administration. Whereas the other values i.e. GSH, SOD and CAT were decreased at chloramphenicol given to mice. However, all the values were significantly get recovered due to administration of leaf extract of *Pithecollobium duice*.

Table – 1: Renal Observations After Treatment & Recovery with The Help Of Leaf Extract Of *Pithecollobium Dulce Benth* In *Mus Musculus.*

Groups	BUN mg/dl	Creat. Mg/dl	SOD U/mg	CAT OD/mg	GSH µg/mg	LPO n moles/gm
Control	17.23±1.5	0.53±0.094	35.6±7.23	3.8±0.44	4.78±0.77	117.3±2.7
Chloramphenicol	27.58±7	0.48±0.09	30.2±7.92	2.22±0.3	2.28±0.43	263±54.6
LE of PD	16.53±1.8	0.47±0.14	33.1±8.32	3.8±0.5	4.33±0.55	97.8±17.1
Chloramphenicol + LE of PD	16.9±1.3	0.52±0.07	24.4±6.6	2.69±0.6	2.7±0.46	188±25.2

P values < 0.05 by 'f' test. The values are expressed as Mean ±SE from 6 mice in each groups. LE of PD means leaf extract of *Pithecollobium dulce*.

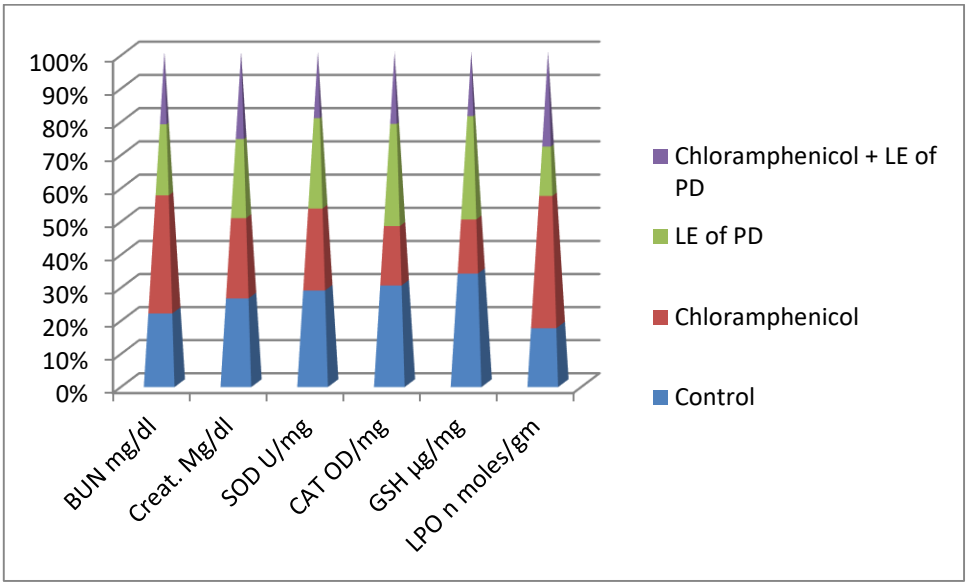

Fig. 1 – Effect Of LE OF PD On Kidney Function Markers Of Mice With Chloramphenicol Induced Renal Changes (Values Are Mean ±SE From 6 Mice/Group. P Values < 0.05 Comapared Control Group With Others).

HISTOPATHALOGICAL ANALYSIS:

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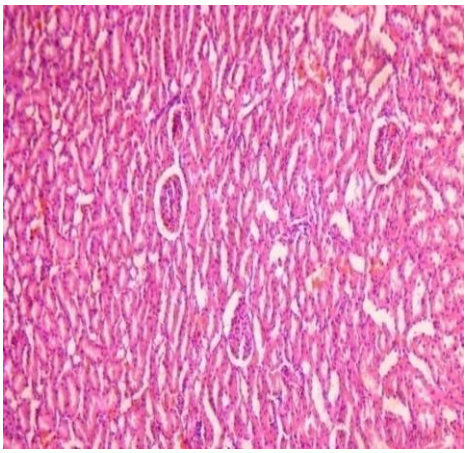
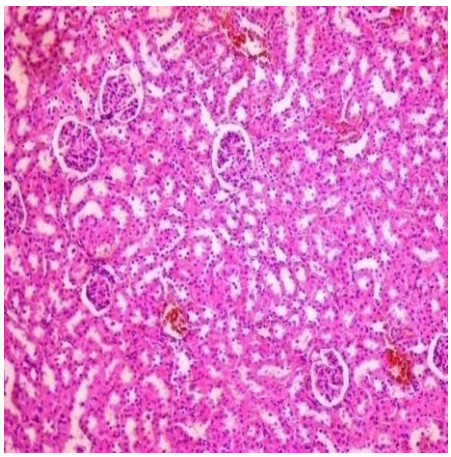

A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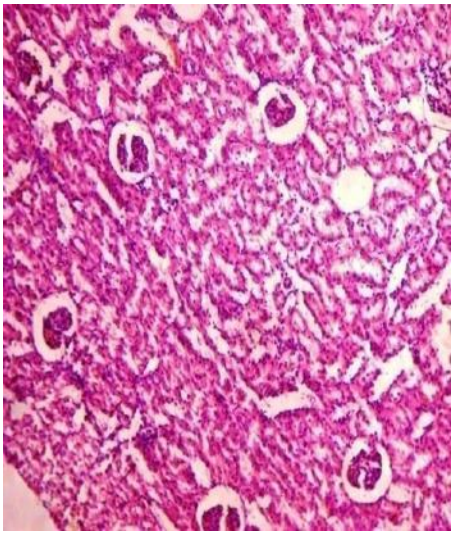
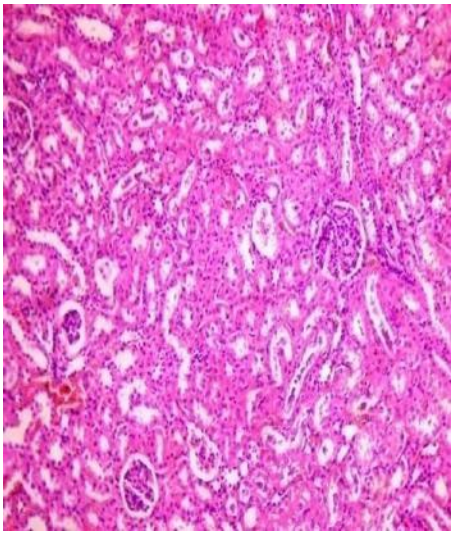

C


D

Nephroprotective Effect Of LE Of PD With Chloramphenicol As A Toxicant.
A-Normal Structure Of Kidney,

B- Highly Regressed Glomeruli & Dialated Tubules In Chloramphenicol Group,
C- Slight Regression Of Glomeruli And Tubules In LE Of PD Group.
D- Very Little Regressed Glomeruli And Dialation Of Tubules

4. DISCUSSION:

The phytochemicals present in leaf extract of *Pithecollobium dulce* have great role to recover the damaging effect caused by chloramphenicol like nephro-toxicity in the mice. The kidney was damaged due to releasing of free radicals. According to **Khan et al., 2013.** Fisetin is able to scavenge free radicals as a result of its electron donating capacity, which is due to the presence of two hydroxyl groups on one ring and a hydroxyl group on another ring. It is the polyphenol the type of flavonoids that used to protect the kidney as well as other body organs also against the free radicals".

The elevated levels of blood urea nitrogenin toxin group of mice was marked reduced by the dose of leaf extract of *Pithecollobium dulce* in both prophylactic group as well as group of leaf extract of *Pithecollobium dulce.*

According to Bennett (1980) "Elevation in BUN and serum creatinine and significant fall in creatinine clearance has been reported with the toxic use of gentamicin which was in agreement with the current findings for gentamicin treated animals. The protective role of *C. tamala* extract can easily be concluded from current results".

The slightly decreased level of creatinine in toxin group was remained similar in even dosing of leaf extract of *Pithecollobium dulce* to the mice, whereas the level of creatinine in prophylactic group of mice administered with leaf extract of *Pithecollobium dulce* was recovered to the normal control group of mice.

It is studied by **Boroushaki et al., 2013,** that "pomegranate seed oil is evaluated for its nephron protective activity the findings clearly showed attenuation of Diazinon–induced nephrotoxicity via; a) improving kidney function by reducing urinary glucose; b) reducing serum urea and creatinine; and c) decreasing MDA concentration."

SOD, CAT and GSH values are decreased in toxic group whereas the LPO level is increased in the toxic group. These values are recovered in leaf extract as well as prophylactic groups. It indicated as the phytochemicals are present in the L E of P D that recovered the kidney against the free radicals formed due to the toxic activity of chloramphenicol.

Kanbur and coworkers have reported LPO contents to increase in the liver tissues of PCM-induced liver damage in mice. According to **Viswanadha et al., 2012,** "Administration of Lindane induced histopathological alterations and increased levels of serum hepatic and renal markers and malondialdehyde (MDA) with a significant decrease in GSH content and CAT, SOD, GPx and GST activities. Co-treatment of quercetin along with lindane significantly decreased the lindane induced alteration in histology, serum hepatic and renal markers and MDA and also improved the cellular antioxidant status".

5. CONCLUSION:

The biochemical analysis shows that the treatment of leaf extract of *Pithecollobium dulce* protected the mice moderately as slight dialation of renal tubules as well as slight regression in glomeruli too. The phytocompounds in the leaf extract of *Pithecollobium dulcehave* active antioxidants to protect the kidney from LPO. The further studies should be conducted to know the benefits of phytocompounds to protect the other organs too.

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Comparative Study of Milk Composition and Nutritive Value of Goat and Cow

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Abstract: *Milk is an excellent source of vitamins and minerals. It provides Potassium, B12, Calcium and vitamin D. It is also a good source of vitamin A, Magnesium, Zinc and Thiamin. Many infants and children are feed nutritional milk. Studies suggested that the goat milk resembles human milk, is homogenous, less allergic. Goat milk has an excellent medicinal property; it is better digested and absorbed than the cow milk. The aim of the present study is to find out the nutritional and medicinal property goat and cow milk. Physiochemical analysis is the important tool to monitor the quality of milk and other dairy products. Food energy, Total solid, Total Protein, Fat Content, Conductivity, pH, Ash content, Specific gravity, Lactose, Minerals all these Physicochemical properties are studied in this paper. The nutritive value of goat milk and cow milk was not significantly different but the size of fat globule was smaller in goat milk, therefore it is easy to digest and more nutritive. The basic composition (macronutrients) of goat milk is similar to that of cow milk in regards to total solid, casein, whey proteins, fat, vitamins, minerals, lactose. Goat milk comes out on top for protein and cholesterol, but cow milks fat content is ever so slightly lower. Goat milk has more calcium, potassium and vit A than cow milk, but cow milk has more vit B12, selenium and folic acid.*

Key Words: *Cow milk, Composition, Goat milk, Nutritive, Physicochemical.*

1. INTRODUCTION:

Milk is consumed directly by all the humans. It is a vital and most common source in human diet; it supports the development of neonate in the first six months of life till they can digest the other source of food. Many feed formulae for infants are made from the cow milk. Milk provides a complete source of proteins, lipids and carbohydrates. Although there are about more than 450 breeds of goats are present only 5 to 6 are useful for milk purpose. They live from desert region to the region of higher attitude. Use of Goat and Cow milk is done from the ancient time for consumption from infants to adults. This is due to their nutritional value for human. Cow milk is use from the long time due to its better nutritional value, along this the goat milk stands as one of the best option or alternatives to cow milk due to its nutritional value and medicinal property, therefore it is superior to cow milk. Some people can do long fasting after consumption of goat milk. "Goat milk is a complete food according to the Journal of American Medicine" It contains enzymes, proteins, vitamins, fatty acids, electrolytes, minerals, that are used by our body perfectly that is why it takes only 20 to 30 minutes to digest goat milk while cow milk takes up to 3 hours. About one cup of goat milk supplies 33% of calcium, 19% of daily need of B2. Biochemically goat milk has greater concentrations of essential fatty acids such as linoleic and arachidonic acid, vitamin B3, B6, Vitamin A and Potassium (K) than cow milk.

VITAMINS:

Cow milk contains more Thiamine (B1) than goat milk. Caprine milk lacks the precursor carotenoid pigment, which is the characteristic of bovine milk, therefore causes the goat milk to be more whitish in color than cow milk as it contains the casein. Goat milk is having deficiency of B12, D, C , Folic Acid, Pyridoxine (Park, 1994) . Goat milk mainly supplies the Calcium and Phosphate. Goat milk contains 1.3 g of calcium 1g Phosphate per liter, these are similar to that of cow milk (Jennes,1980) According to experts Goat milk is made up of very small fat particles which form a softer, smaller curd in stomach. These small particles are easy to break by enzymes so goat milk is easy to digest. Goat milk has higher amount of fatty acid chain.

LACTOSE:

Carbohydrate that is identified in the goat milk is the lactose. Lactose concentration is usually found to be lesser amount than in cow milk. Lactose is the main carbohydrate in dairy products, but it is present in low amount in goat milk than cow milk. Therefore, goat milk is good option to consume to those people who don't like cow milk. Analyzing

methods of the lactose are in non-hydrated form or in mono-hydrated form. Thus, water of hydration may affect about five percent variation in reported concentration of the same actual amount

MINERAL SALT:

Minerals present in the goat milk are Fe, Cu, Co, Se, Mn, Zn, K, P, Mg, Na, Ca. Milk contains minerals which have many health benefits. The chloride content of goat milk was significantly higher ($p>0.05$) than that of the buffalo milk as well as cow milk. The calcium content determined in five replications ranged between 114.78 and 138.48 mg/100 ml with a mean value of 125.11 mg/100 ml in goat milk. In cow milk, range of calcium was 110.99-122.67 mg/100 ml with a mean value of 120.24 mg/100 ml. Goat milk contains about 134% more K elements. Calcium content of buffalo milk was significantly higher ($p>0.05$) than that of the goat milk as well as cow milk. The magnesium content was determined between 18.48 and 21.16 mg/100 ml with a mean value of 19.94 mg/100 ml in goat milk.

ALKALINITY:

Goat milk contains high amount of Potassium whereas cow milk has little less amount of potassium. High level of potassium in goat milk reacts in an alkaline way with our body as compare to cow milk which reacts in an acidic way due to minor amount of potassium. Many food leads to the health hazards. Goat milk has superb buffering action inside the human body. Cow milk, Goat milk, Antacids, Soy milk all have their buffering capacity, according to the Journal of Dairy Science. Here goat milk exceeds the buffering capacity of other three. Journal of Nutrition found that oligosaccharides from goat milk plays a major role in repair and protection of intestine as they act as prebiotic and have anti – infective property. Other milk products increase the blood pH as they do not contain the L-glutamine an alkalinizing amino acid, which is only present in higher amount in the goat milk. Goat milk smooths the digestive tract so it is use in the treatment of Ulcers.

DETERMINATION OF PH

Inside the mammals, carbon dioxide is present in the dissolved form in milk which makes it acidic. But when the milk is taken out, the carbon dioxide is released from it which makes it alkaline. pH should be taken after some time, so that to gases inside will pass out. In the preparation of cheese, the pH is determining so that to make sure that lactic acid is produce or not at desired rate by added microbes. pH deceases as increase in temperature. The pH of colostrums can be low as 5.8 and that of mastitis and end of lactation milk is as high as 7.5. High pH is due to increase in Na and Cl.

ENZYMES:

Peroxidase activity in cow and goat milk is similar. Xanthine oxidase level is lower in the milk of goat. Higher activity is observed in both ribonuclease and lysozymes. Enzymes heat susceptibility is same.

SPECIFIC GRAVITY:

Lactometer is used to measure the specific gravity. Temperature derivation of milk is taken into consideration and correction is applied the lactometer is called Correct lactometer reading (CLR) Fat is present in milk, which increases the specific gravity of milk than that of water. If milk composition is changed the specific gravity also changes. Specific gravity is increase as the fat is removed as the weight of fat is much lower than the water. Milk nutritive content is increase as the fat content is increase, while the specific gravity decreases.

SOLID NON- FAT (SNF):

Solid Non- Fat is the important thing in the milk. SNF includes the nitrogenous substance, mineral related matter, milk sugar. Minimum SNF is about 8.5 percent in whole milk. Lactometer is used to measure the SNF of milk at 40 degree Celsius. Increases in energy level and concentration of dairy cattle rations have usually resulted in increased SNF and protein in milk, presumedly through alteration of the YFA produced in the rumen. The usual pattern is an increase in the propionate content and a decrease in the acetate to-propionate ratio. It has been suggested that the increased propionate indirectly influences the synthesis of milk protein through control of amino acid metabolism in the liver. This may be due to the relatively large change in blood glucose required to influence milk lactose. Pelleting the hay portion of the ration has often resulted in higher milk SNF.

TABLE: 1 Fat, SNF, Protein values in Goat versus Cow

ANIMAL	FAT	SNF	PROTEIN
GOAT	6.3	8.96	4.35
COW	4.21	8.21	2.73

FAT CONTENT:

Fat occurs as the suspended globules. Fat present in milk is called as butterfat. It is seen via microscope. Fats present in all the ruminant species is nearly similar, but goat milk has more fat than the cow milk. There are some breeds having different composition of fat. The percentage of goat milk fat depends on the genetics, stages of lactation, and the quantity and quality of the feed

PROTEIN CONTENT:

Proteins are the major component essential for the body. The milk protein is nearly similar to the egg protein except for the amount of methionine and cystines are less. The limiting factors are the sulfur amino acids Protein content is an important feature

of milk. Milk contains of Lactoglobulin, Casein, Lactoglobulins. Casein is about 80 percent of the protein and remaining are the Whey proteins. Casein binds with the calcium and forms the Calcium- Casein ate complex. Rennet, alcohol and heat can precipitate this complex

ASH CONTENT:

Ash is inorganic residue. It mainly measures the mineral amount in food. It is the waste remain after organic matter and water are removed by heating in the presence of oxidizing agent. Minerals are distinguished from the other food contents and on the basis of analytical techniques one can find out total mineral content. Mineral are not been destroyed by heating and are less volatile as compare to other food component

TABLE: 2. Goat milk versus Cow milk. The Basic Composition of Goat and Cow Milk

Constituents	Goat	Cow
Lactose (g/ 100 g)	4.2	4.8
Minerals (g/ 100 g)	0.7	0.6
Total Proteins g/ 100 g)	3.5	3.3
Food energy (Kcal)	69	61
Fat (g/ 100 g)	4.2	3.6
Ash content (g/ 100 g)	0.82	0.72
Total solids (g / 100 g)	12.61	13.2

CONDUCTIVITY:

Fat content is the important factor for the conductivity of milk. Decrease in E.C of cream and fresh milk with increase in fat. Electrical conductivity (E.C) is a measure of material's ability to carry an electrical current. E.C of normal whole milk is o.466 Sm-1. Salt in the milk determines the E.C of milk. Decrease in the pH results in the release of calcium ions from casein micelles. Colloidal calcium phosphate dissolve and equilibria of milk buffer system to change which causes in saturation of E.C due to decrease in pH. The protein hinderance is the main effect which depresses the E.C of milk.

MEDICINAL PROPERTY OF GOAT MILK:

Goat milk is referred as bio-organic Sodium animals. It is useful in keeping the joints mobile and tender. Goat milk also contains the trace mineral selenium, which keeps immune system strong. It is having antioxidant property too.

GOAT MILK IS LESS ALLERGIC:

Cow milk is more allergic. Cow milk contains 20 allergen proteins and these are not been recognized by the immune system so causes vomiting, abdominal cramps, skin rashes, diarrhoea, runny nose, etc. Alpha s1 casein is the main allergen present in cows milk. Goat milk contains less amount of Alphas1 than cows' milk, and has higher amount of Alpha s2, which is non allergic. Goat milk can improve the gastrointestinal tract allergies. Goat milk do not produce mucus as it contains smaller fat globules as a result it there are not immune response against it, while cow milk has bigger fat globules which causes the mucous forming and so gut irritation Due to shifting to goat milk from cow milk can cure the chronic enteropathy. Goat milk when used as a first source of protein after breastfeeding, was less allergic than cows milk.

GOAT MILK IS NATURALLY HOMOGENIZED:

When goat and cow milk are freshly refrigerated overnight, we can see that cow milk get separated into two phase with cream on top layer and skim milk at the bottom level which occurs naturally by a compound called agglutinin. To make or to keep the cow milk homogenous i.e to keep cream and skim milk together, the fat globule cells are destroyed by mechanical homogenization techniques. Released of superoxide (free radical) take place in Mechanical Homogenization, which causes lots of problems and even mutations. In case of goat milk, it remains as same as the original fresh milk. Goat milk have smaller fat globules, and due to absence of agglutinin it remains homogenous and also eliminates the drawbacks associated to the mechanical homogenization.

MILK IS RAPIDLY DIGESTED AND ABSORBED: GOAT

Goat milk contains the taurine 20-35 times than cow. Taurine plays the bile salt formation, osmoregulation, calcium transport and antioxidation. Medium chain and long chain fatty acids are more in goat milk as compare to cows milk. These chains having larger surface to volume ratio and are easily digested and absorbed quickly than long chain fatty acids chain. Goat milk contains taurine glycine and glutamic acid as free amino acid. Short and medium chain fatty acids such as caproic, caprylic, capric and lauric acids are higher in goat milk than cow. The number of fat globules measuring 4 µm is 84 percent in goat milk as compared to cow milk that is having 62 percent. Goat milk contains higher amount of energy rich substate adenosine triphosphate (ATP) than cow.

2. CONCLUSION:

The size of fat globule is bigger in cow milk and smaller in goat milk, which increases the digestibility and nutritive importance of goat milk to monitor the quality of dairy products and milk physico- chemical analysis. The basic composition (macronutrients) of goat milk is similar to that of cow milk in regards to total solid, casein, whey proteins, fat, vitamins, minerals, lactose. Goat milk comes out on top for protein and cholesterol, but cow milks fat

content is ever so slightly lower. Goat milk has more calcium, potassium and vit A than cow milk, but cow milk has more vit B12, selenium and folic acid.

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Influence of Total Hardness On The Lethal Toxicity Of Ammonia To Freshwater Fish *Lepidocephalichthys Guntea*

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ABSTRACT: *Ammonia is the nitrogenous waste released by aquatic animals like fishes which is found naturally in water. Increase in ammonia concentrations in aquatic habitat is due to several sources like industrial wastes, coal, gasification, liquefaction conversion process and agriculture discharges, which enter natural water system and affect the fishes and other aquatic organism. The physicochemical factors such as total hardness affect the toxicity of chemicals to fishes. So the static renewal bioassays were done to study the influence of total hardness as $CaCO_3$ mg/l on the lethal toxicity of ammonia to the freshwater fish Lepidocephalichthys guntea. The studies shows that as the total hardness of water increased the toxicity of un-ionised NH_3 to Lepidoceephalichthys guntea increased, And as total hardness increased the toxicity of NH_3-N increased their toxicity to the said fish. The 24, 48, 72 and 96 hours LC_{50} values were found to be 1.011, 0.999, 0.974 and 0.962 mg/l at 30 mg/l total hardness as $CaCO_3$ and at 100 mg/l as total hardness $CaCO_3$ the 24, 48, 72 and 96 hours LC_{50} values were 0.789, 0.764, 0.746 and 0.715 mg/l respectively for the said fish exposed to Un-ionised ammonia respectively and for NH_3-N the 24.48. 72 and 96 hours LC50 values for 24, 48, 72 and 96 hours were 65.6, 64.8, 63.2 and 62.4 at 30 mg/l total hardness $CaCO_3$ and 24, 48,72 and 96 hours LC_{50} values were 51.2, 49.6, 48.4 and 46.4 mg/l respectively for the said fish, this indicates that as the total hardness increases the toxicity of un-ionised ammonia increases and as the total hardness increases the toxicity of NH_3-N increases.*
KEY WORDS*: Lepidocephalichthys guntea, Un-ionised Ammonia, NH_3-N, Toxicity, Total Hardness as mg/l $CaCO_3$.*

1. INTRODUCTION:

Ammonium salts are used as fertilizers in fish rearing ponds and also for aquatic weed control (Alabaster and Lloyd., 1982) Ammonia act as stimulants to fish and affects gills and other organs of the body (Metelev et..al., 1983).Ammonia has several sources including industrial wastes, coal, gasification , liquefaction conversion process and agriculture discharges, which enter natural water system and affect the fish and other aquatic organisms (Thurston et. Al 1981, Broderius et.al., 1985) Temperature, pH and total hardness affect the toxicity of chemicals to freshwater fish (Thurston et.al., 1981).A considerable amount of toxicity testing with ammonia to fish has been conducted but still the data are inadequate as there is meagre information on influence of total hardness on ammonia toxicity to fish, So the study was taken to study ammonia toxicity on freshwater fish *Lepidocephalichthys guntea* by conducting static renewal bioassays.

2. MATERIALS AND METHODS:

Lepidocephalichthys guntea used for the study were collected from unpolluted freshwater and acclimated to laboratory conditions for ten days in glass aquarium and fed daily with commercial fish food the size of the fish was 3.5±0.5cm long and 1.5±0.5g in weight. Test were conducted in triplicate with control, Group of ten fish were exposed to each concentration of ammonia. Stock solutions were prepared from chemical grade reagent of BDH make of ammonia with de-ionised water and required quantity of the stock solutions were used to have appropriate concentrations and were delivered to each glass aquarium. Feeding was stopped one day prior to the commencement of the experiment and they were not fed during the test experiment till the end of 96 hours. The chlorine free tap water was used as the medium having the temperature of 26.5- 27.^{O}C., Dissolved oxygen 6.9-7.1 mg/l and pH of 6.5-7.2 (APHA.,1985).The test solution was renewed for every 24 hours for a period of 4 days for the two different total hardness of 30 and 100 mg/l as $CaCO_3$, The LC_{50} values and 95% confidence limits were calculated statistically by obtaining dose- mortality

rate on Log- Probit graph (Litchfield Wilcoxon., 1949).In this study ammonia concentrations are expressed as un-ionised ammonia , and NH_3-N, since it is generally proposed that it is the molecular form of ammonia that is primarily responsible for the adverse effect on the fish and aquatic life ,Ammonia nitrogen was measured by Nesslerization method and un-ionised ammonia concentration was calculated (Emerson et al 1975, Thurston et al 1979).

3. RESULTS AND DISCUSSION:

Lepidocephalichthys guntea were exposed to un-ionised ammonia and NH_3-N at two different total hardness 30 mg/l and 100mg/l as $CaCO_3$, The LC_{50} values at 24, 48,72 and 96 hours exposure period the said fish are given in Table 1 and 2 , When the fish came in contact with toxicant it started showing abnormal swimming behaviour with excitation and fast movement later it became hypoactive and started staying at the surface for longer time and gulping of atmospheric oxygen and avoided toxicant medium the abnormal movement and damage to the gills were observed , the fish slowed down the movement and died at the bottom of the aquaria. The reported 96h LC_{50} values for Three spined stickle back were 0.88 and 0.60 mg/l of un-ionised NH_3-N at p H 7.25 and pH 7.10 (Daniel et al., 1982). For Golden trout were 23.3 mg/l of un-ionised NH_3-N at pH 8.02 and 8.06 (Thurston and Russo 1981).

The fish *Lepidocephalichthys guntea* is susceptible to un-ionised NH_3 and –NH_3-N at different concentrations of toxicants at various exposure of total hardness. The 24,48,72 and 96 hours LC_{50} values were found to be 1.011, 0.999, 0.974 and 0.962 mg/l at 30 mg/l total hardness as $CaCO_3$ and at 100 mg/l as total hardness $CaCO_3$ the 24, 48,72 and 96 hours LC_{50} values were 0.789, 0.764, 0.746 and 0.715 mg/l respectively for the said fish exposed to Un-ionised ammonia respectively and for NH_3-N the 24.48. 72 and 96 hours LC_{50} values for 24, 48, 72 and 96 hours were 65.6,,64.8, 63.2,and 62.4 at 30 mg/l total hardness $CaCO_3$ and 24, 48,72 and 96 hours LC_{50} values were 51.2, 49.6, 48.4 and 46.4 mg/l respectively for the said fish, This indicates that as the total hardness increases the toxicity of un-ionised ammonia increases and as the total hardness increases the toxicity of NH_3-N increases to *Lepidocephalichthys guntea* respectively.

TABLE 1: LC_{50} Values and 95 percent confidence limit for the fish *Lepidocephalichthys guntea* exposed to Un-Ionised Ammonia at two different Total Hardness as $CaCO_3$.

Total Hardness as $CaCO_3$ (mg/l)	24 hours	48 hours	72 hours	96 hours
30	1.011 (0.985-1.037)	0.999 (0.979-1.018)	0.974 (0.957-0.990)	0.962 (0.947-0.974)
100	0.789 (0.755-0.823)	0.764 (0.743-0.785)	0.746 (0.725-0.766)	0.715 (0.696-0.734)

TABLE 2: LC_{50} Values and 95 percent confidence limit for the fish *Lepidocephalichthys guntea* exposed to NH_3-N at two different Total Hardness as $CaCO_3$

Total Hardness as $CaCO_3$ (mg/l)	24 hours	48 hours	72 hours	96 hours
30	65.6 (63.93-67.30)	64.8 (63.52-66.09)	63.2 (62.14-64.27)	62.4 (61.59-63.21)
100	51.2 (49.04-53.45)	49.6 (48.24-50.98)	48.4 (47.08-49.75)	46.4 (45.18-47.65)

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On A New Cestode Of *Moniezia* (Cestoda-Anoplocephalidae) From The Intestine Of *Capra Hircus* (L.) From Ghansavangi, District Jalna (M.S.)

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Abstract: *The present investigation deals with systematic observation of the cestode parasites Moniezia Blanchard, 1891, that is, Moniezia mehdii Sp. Nov. collected from the intestine of domestic goat Capra hircus Linnaeus, 1758 at Ghansavangi, District Jalna. The present worm comes closer to all the known species of the genus Moniezia in general topography of organ but differs due to having the scolex small squarish, mature proglottids nearly two times broader than long, testes small, oval to rounded in shape, 130-140 in numbers, cirrus pouch large cylindrical, ovary horse-shoe shaped, vitelline gland post ovarian, inter proglottidal glands 15-16 in numbers.*
Keywords*: Anoplocephalidae, Capra hircus, Jalna, Moniezia*

1. INTRODUCTION:

The genus *Moniezia* was established by Blanchard, 1891. Skrjabin and Schulz (1937) divided this genus in to three subgenera as follows:

1) Inter proglottidal glands grouped in rosettes----------*Moniezia*.
2) Inter proglottidal glands arranged lineally----------*Blancharia*.
   (Some time absent)
3) Inter proglottidal glands absent----------*Baeriezia*.

The present worm agrees in all characters with subgenus *Blancharizia.* Skrjabin and Schulz, 1937 includes having two species *M.* (B.) *benedeni* (Moniez, 1879), Skrjabin and Schulz, 1937 and *M.* (B.) *pallida*, Monnig, 1926. In India Shinde *et.al.,* 1985 added two species of the genus i.e. *M.* (B.) *aurangabadensis* and *M.* (B.) *bharalae* from *Ovis bharal* in Aurangabad district, (M.S.), India. Later on Patil, *et.al.,* 1997 described *M.* (B.) *warnanagarensis* from *Capra hircus* (L.). In 1999 Nanware, *et.al.* erected *M.* (B.) *kalawati* and Kalse, *et.al*. erected *M.*(B.) *murhari* from *Capra hircus* (L.). In 2004, Pawar *et.al.* added *M.* (B.) *Shindei* and Tat and Jadhav B. V. added *M. (B.) hircusae* from *Capra hircus* (L.). Pokle, *et.al*. added *M.* (B.) *caprai* from *Capra hircus* (L.). Borde, *et.al.,* 2007 erected new species i.e. *M. (B.) rajalaensis* from *Capra hircus* (L.). *M.* (B.) *caprae* is added by Nanware S. S. 2010. Padwal, *et.al.* 2011 added *M.* (B.) *govindae* from *Capra hircus* (L.). Later Humbe, *et. al.,* erected four more species i.e. *M* (B.) *babai*, 2011, *M.* (B.) *ovisae*, 2011, *M (B.) osmanabadensis*, 2012 and *M* (B.) *devraoi,* 2013. Later on Barote, *et.al.* added two more species i.e. *M.* (B.) *shegaonesis*, 2013 and *M.* (B.) *shivajiraovae*, 2014. Ravi Solunke, 2015 erected *M.*(B.) *sureshi* and Amol Thosar, *et.al.,* 2015 erected *M (B.) jadhavii* from *Capra hircus* (L.). Later on *Moniezia* (B) *marathwadensis* is added by Shaikh Kalim 2015, *Moniezia* (B) *bhalchandrai* is added by Kalse A. T. *et. al*., 2016, Sunita Borde, *et. al.,* 2017 erected *M.* (B.) *bordeae* from *Ovis bharal* (L.) and Jadhav V.M. *et. al.* 2018 erected *Moniezia* (*B.*) *madhavae* from *Capra hircus* (L.). Recently Amol Thosar, *et. al.,* 2020 *Moniezia* (B) *shilae*, added to this genus from *Capra hircus* (L.).

The present communication, deals with the description of a new species, *Moniezia mehdii* Sp. Nov. collected from the *Capra hircus* Linnaeus, 1758 at Ghansavangi, District Jalna.

2. MATERIALS AND METHODS:

Cestode parasites were collected from the intestine of *Capra hircus* (L.) from Ghansavangi, District Jalna (M.S.) India. These cestodes were preserved in 4% formalin and stained with Acetocarmine or Harris Haematoxylin, passed through various alcoholic grades, cleared in xyline, mounted in D.P.X. and drawings are made with the aid of Camera Lucida. All measurements are given in millimeters. The identification is made with the help of Systema Helminthum.

3. DESCRIPTION:

The cestodes are long consisting scolex, neck and proglottids. Proglottids are immature and mature. The scolex is small in size, squarish in shape and measures, 1.567 (1.485-1.650) in length and 1.435 (1.386-1.485) in width. The suckers are large, oval in shape, four in numbers, arranged in two pairs, obliquely placed and measures, 0.429 in diameter. The neck is long and measures, 5.362 (5.280-5.445) in length and 0.957 (0.924-0.990) in width. Mature proglottids are large in size, rectangular, almost two time broader than long, each proglottids with a double set of reproductive organs and measures, 3.663 (3.630-3.696) in length and 7.837(7.425-8.25) in width. The testes are small, oval to rounded in shape, 130-140 in numbers, scattered in the posterior half of the segment in between two longitudinal excretory canals and measures, 0.049 (0.033-0.066) in diameter. The vas-deference is long, thin coiled tube and measures, 0.940 in length and 0.033 in width. The cirrus pouch is large, cylindrical, situated in middle margin of the segments and measures, 0.445 (0.396-0.495) in length and 0.297 (0.264-0.330) in width. The cirrus is thin tube, cylindrical, inside the cirrus pouch and measures, 0.445 in length and 0.297 in width. The ovary large, horse shoe shaped, compact with acinia, two in numbers and measures, 1.419 (1.353-1.485) in length and 1.320 (1.320 -1.320) in width. The ootype is small, elongated, anterior to the ovary and measures, 0.099 in diameter. The vagina posterior to cirrus pouch, long tube reaches to the ootype and measures, 0.858 in length and 0.049 in width. The genital pores medium in size, oval in shape, bilateral, middle in position and measures, 0.198 (0.165-0.231) in length and 0.066 (0.066-0.066) in width. The vitelline gland small, oval in shape, compact, post-ovarian and measures, 0.247 (0.231-0.264) in diameter. The Inter-proglottidal glands present in between two proglottids, oval to rounded, 15-16 in numbers, arranged in a single row in between two longitudinal excretory canals, and measures, 0.379 (0.330-0.429) in diameter. The longitudinal excretory canals are thin, present on both lateral sides of segments along the body length and measures, 0.082 (0.066-0.099) in width.

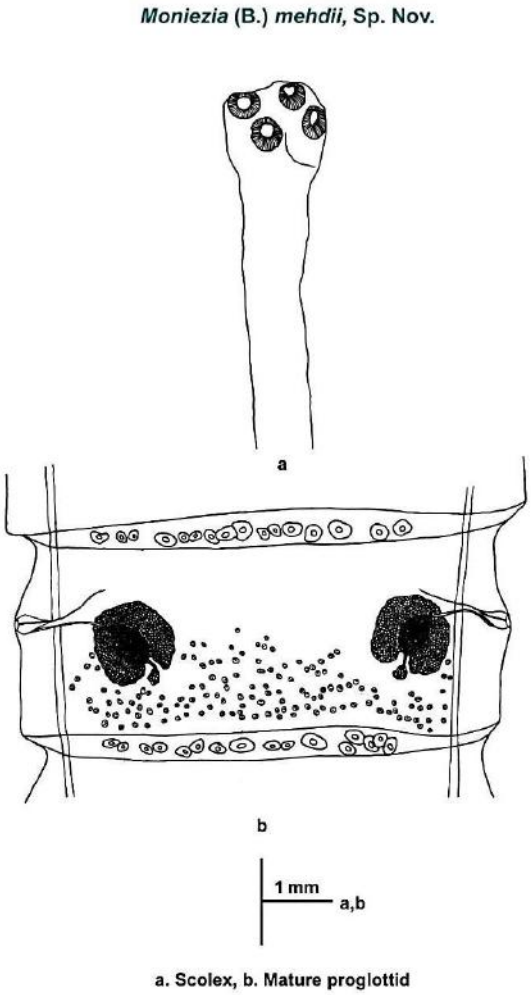

Fig. 1 Microphotograph And Camera Lucida Of
a) Scolex; B) Mature Proglottid

4. RESULTS AND DISCUSSION:

The genus *Moniezia* was erected by Blanchard in 1891. The worm under discussion is having the scolex small squarish, mature proglottids nearly two times broader than long, testes small, oval to rounded in shape, 130-140 in numbers, cirrus pouch large cylindrical, ovary horse-shoe shaped, vitelline gland post ovarian, inter proglottidal glands 15-16 in numbers.

- The present worm differs from *Moniezia* (B) *benedeni,* Moniez, 1879, Skrjabin and Schulz, 1937, which is having numerous proglottids broader than long, posterior proglottids fleshy, testes 500 in numbers, arranged in two groups, cirrus pouch short and wide, vas deferens with 2-3 coils, ovary compact, in the center of the segments, eggs well developed, inter proglottidal glands liner and close to the posterior margin of the segments, arranged transversely and reported from the Calves and Lambs.
- The present cestode differs from *Moniezia* (B) *pallida,* Monnig, 1926, which is having the uterus external, dorsal and ventrally over excretory canals, the inter-proglottidal glands varying in size and reported from the host horse in South Africa.
- The present parasite differs from *Moniezia* (B) *aurangabadensis*, Shinde, *et al.* 1985, which is having the scolex quadrangular, testes small, 1100-1200 in numbers, vas deferens coiled, cirrus pouch cylindrical, oval with some rounded acini, gravid proglottids broader than long, uterus reticulate, inter proglottidal glands 12-15 in numbers and reported from *Ovis bharal* (L.).
- The present tapeworm differs from *Moniezia* (B) *bharalae,* Shinde, *et al,* 1985, which is having testes rounded, 190-200 in numbers, vas deferens short, elongated, fusiform, genital pores bilateral, sub marginal, ovary compact, inter proglottidal glands arranged in two rows, small in size, 38-44 in numbers and reported from *Ovis bharal (L.).*
- The present form differs from *Moniezia* (B) *warananagarensis*, Patil, *et al*. 1997, which is having scolex large, globular, testes 300-320 in numbers, distributed throughout the proglottids, in single field, ovary indistinctly lobed with 13-15 short, blunt acini, transversely elongated, inter proglottidal glands, 56 in numbers, oval, medium in size, cirrus pouch medium, oval, transversely elongated, slightly obliquely placed and extend beyond longitudinal excretory canal.
- The present cestode differs from *Moniezia* (B) *kalawati,* Nanware, *et al.* 1999. Which is having squarish scolex, oval shaped cirrus pouch, testes small, oval, distributed throughout the segment, 172 in numbers, ovary medium, short, blunt acini, and 54 inter proglottidal glands in the inter segmental region, medium, oval either single or paired, irregularly arranged in the central width of the segments and leaving space on each lateral side.
- The present tapeworm differs from *Moniezia* (B) *murhari,* Kalse, *et al,* 1999, in having the scolex squarish, testes 405-415 in numbers, cirrus pouch elongated in the anterior region of the segments, ovary inverted horse shoe shaped, indistinctly bilobed each with numerous short, blunt, round, acini and inter proglottidal glands 63 in numbers.
- The present parasites differs from *Moniezia* (B) *caprai,* Pokale, *et al,* 2004, which is having the scolex is medium, squarish, with large four suckers, without rostellum, testes oval in shape, 255-260 in numbers, cirrus pouch is medium in size and ovary medium in size, kidney shaped.
- The present worm differs from *Moniezia* (B) *shindei,* Pawar, *et al.,* 2004 in having scolex large, mature segments craspedote, testes 190-200 (195) in numbers, scattered all over segment and ovary a single mass, large, oval, cirrus pouch oval, elongated, in center of the segment and vitelline gland large, oval, internal to ovary.
- The present cestode differs from *Moniezia* (B) *hircusae,* Tat and Jadhav B. V., 2004 which is having scolex large, globular, mature segments big, craspedote, testes 168 in numbers, small, scattered in a single field, ovary large, oval, a single mass, in anterior half of the segment, inter proglottidal glands 14-15 in numbers, large, oval and cirrus pouch in anterior 1/3rd region of the segment.
- The present cestode differs from *Moniezia* (B) *rajalaensis,* Borde, *et al.* 2007, in having scolex large, globular, mature proglottids squarish, broader than long, testes 250-260 in numbers, medium, scattered throughout proglottids, ovary large, horse shoe shaped, inter proglottidal glands 31-32 in numbers, large, oval and cirrus pouch oval.
- The present cestode differs from *Moniezia* (B) *caprae,* Nanware S.S., 2010 in having scolex large, mature segment big, almost three and a half times broader than long, testes 84-85 in numbers, medium in size, oval in shape, ovary large, bilobed, inter proglottidal glands 40 in numbers, oval, rounded and cirrus pouch on each side.
- The present cestode differs from *Moniezia* (B) *govindae,* Padwal, *et al.,* 2011 in having scolex large, globular, mature proglottids big, broader than long, testes 100-140 in numbers, medium, scattered throughout proglottids, ovary large, compact, nut shaped, inter proglottidal glands 40-42 in numbers, large, oval and cirrus pouch elongated.
- The present cestode differs from *Moniezia* (B) *babai,* Humbe, *et al.*, 2011 in having scolex globular, mature segment four times broader than long, testes 190-220 in numbers, small in size, rounded in shape, ovary large, rounded, inter proglottidal glands 18-20 in numbers, oval, rounded and cirrus pouch on each side.
- The present cestode differs from *Moniezia* (B) *ovisae,* Humbe, *et al.*, 2011 in having scolex broad anteriorly and narrow towards neck, mature segment two times broader than long, testes 155-165 in numbers, small in size, rounded in shape, ovary large, bilobed, inter proglottidal glands 32-35 in numbers, oval, rounded and cirrus pouch on each side.

- The present cestode differs from *Moniezia* (B) *osmanabadensis,* Humbe, *et al.,*2012 in having scolex globular, mature segment five times broader than long, craspedote, testes 170-200 in numbers, small in size, rounded in shape, ovary large, bilobed, inter proglottidal glands 38-40 in numbers, oval, rounded and cirrus pouch on each side.
- The present cestode differs from *Moniezia* (B) *devraoi,* Humbe, *et al.,* 2013 in having scolex quadrangular, mature segment four times broader than long, testes 160-180 in numbers, small in size, rounded in shape, ovary large, bilobed, inter proglottidal glands 40-45 in numbers, oval, rounded and cirrus pouch on each side.
- The present cestode differs from *Moniezia* (B) *shegaonensis,* Barote, *et al.,* 2013 in having scolex globular, mature segment four to five times broader than long, testes 190-220 in numbers, small in size, rounded in shape, ovary compact, inter proglottidal glands 20-25 in number, oval, rounded and cirrus pouch on each side.
- The present cestode differs from *Moniezia* (B) *shivajiraovae,* Barote, *et al,* 2014 in having scolex squarish, large in size, mature segment six to eight times broader than long, testes 84-95 in numbers, small in size, rounded in shape, ovary horse-shoe shaped, inter proglottidal glands 40-42 in numbers, oval, rounded and cirrus pouch on each side.
- The present cestode differs from *Moniezia* (B) *sureshi,* Ravi Solunke,.2015 in having scolex oval, quadrangular, mature segment four to five times broader than long, testes 180-185 in numbers, single field, unevenly distributed, ovary medium, horse-shoe shaped, in appearance having numerous short, blunt acini, inter proglottidal glands 18-19 in numbers, oval and cirrus pouch on each side.
- The present cestode differs from *Moniezia* (B) *jadhavii,* Amol Thosar*, et. al.,* 2015 in having scolex squarish, mature segment craspedote, five times broader than long, testes 210-220 in numbers, small, oval to round, ovary horse-shoe shaped, compact, inter proglottidal glands 46-52 in numbers, arranged lineally in one or two rows, cirrus pouch small oval.
- The present cestode differs from *Moniezia* (B) *marathwadensis,* Shaikh Kalim, 2015 in having scolex quadrangular, mature segment five times broader than long, testes 125-130 in numbers, small, oval in shape, ovary compact with numerous blunt acini, inter proglottidal glands 50-52 in numbers, arranged lineally in one or two rows, cirrus pouch large, elongated, oval.
- The present cestode differs from *Moniezia* (B) *bhalchandrai,* Kalse A.T. *et. al.,* 2016 in having scolex quadrangular, mature segment rectangular in shape, almost four and half times broader than long, testes 196-200 in numbers, oval in shape, ovary medium in size, inverted cup shaped, inter proglottidal glands 13-14 in numbers, oval in shape, highly muscular, single regularly and lineally arranged, cirrus pouch large, oval in shape.
- The present worm differs from *Moniezia* (B.) *bordeae*, Sunita Borde *et. al*., 2017 in having scolex quadrangular, mature segment nearly four to five times broader than long, testes 130-170 in numbers, spread in the medulla in between the longitudinal excretory canals, ovary bean shaped, small, forms concavity posteriorly, inter proglottidal glands 5-9 in numbers, arranged single row, cirrus pouch on each side and reported from *Ovis bharal* (L.).
- The present cestode differs from *Moniezia* (B) *madhavae,* Jadhav V.M. *et. al.,* 2018 in having scolex quadrangular, mature segment near five times broader than long, testes 45-60 in numbers, medium in size, oval in shape, ovary distinctly bilobed, inter proglottidal glands 40-42 in numbers, oval in shape, cirrus pouch small in shape, curved.
- The present cestode differs from *Moniezia* (B) *shilae*, Amol Thosar *et. al.,* 2020 in having the scolex quadrangular, mature proglottids nearly four times broader than long, craspedote in shape, testes small in size, oval to rounded, 180-210 in numbers, cirrus pouch oval, ovary large, compact, horse-shoe shaped, vitelline gland post ovarian, inter proglottidal glands 26-30 in numbers.

The above differentiating characters are valid enough to erect a new species for these cestodes and hence the name *Moniezia* (B) *mehdii* Sp. Nov is proposed, in honour of late Prof. Syed Mehdi Ali, well known Helminthologist in India and Ex-head and professor, Department of Zoology, Dr. Babasaheb Ambedkar University, Aurangabad-431004.

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Taxonometric Evaluation of A New Mammalian Cestode, *Stilesia* Ralliet 1893 (Cestoda: Thysanosomidae) Infecting *Capra Hircus* At Bhadgaon, M.S., India

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ABSTRACT: *The genus Stilesia was erected by Ralliet in 1893 with its type species Stilesia globipunctata (Revolta 1874) from Ovis aries. The present communication deals with a new species Stilesia bhadgaonensis is collected from Goat Capra hircus at Bhadgaon, M.S., India.*

The present form differs from all known species, having characters as scolex dome shaped with four suckers; neck medium; mature segments are wider than long; genital pore irregularly alternate; testes 3-4 in number, unevenly distributed; cirrus pouch medium, oval; cirrus thin, unarmed; vas deference long, coiled; ovary small, single mass, near posterior margin, with acini; vagina posterior to cirrus pouch.

KEYWORDS: *Stilesia bhadgaonensis, Bhadgaon, Capra hircus.*

1. INTRODUCTION:

The genus *Stylesia* was erected from *Ovis aries* in Europe, Africa and Asia as *stylesia globipunctata* (Rivolta, 1874) by Railliet in 1893.Latter on *stylesia hepatica* was added to this genus by Woffhugel (1903) from sheep and goat in east Africa. *Stylesia vittate* was reported by Railliet in 1896 from camelus dromedaries from Africa and India. *Stylesia okapi* was erected as a new species of this geneus by Leiper (1936) from Okapi in Africa. It is regarded by Baer(1950) as a variety of *Stylesia globipunctata*. The present article deals with description of *Stylesia Bhadgaonensis n.sp.* collected from intestine of goat Capra hircus from Bhadgaon (M.S.) India.

2. MATERIALS AND METHOD:

The goat, *Capra hircus* intestines were collected, dissected and parasites- cestodes were obtained. Twenty specimens of tapeworm were collected at Bhadgaon, Dist: Jalgaon (M.S.) All cestodes were flattened and preserved in 4% Formalin, stained in Harris hematoxylin passed through various alcoholic grades, cleared in xylol, mounted DPX. Drawings are made with the help of camera lucida and microphotographs were taken with Olympus camera. All measurements are in millimeters.

3. DESCRIPTION:

The scolex is small dome shape broad anteriorly and narrow posteriorly, distinctly marked off from the strobila and measures 0.607 to 0.650 in length and 0.514 to 0.557 in breadth. The scolex bears 4 suckers, unarmed, medium in size, oval to spherical in shape, arranged in two pairs, one pair in each half of the scolex, touching to lateral margin of the scolex, overlapping on each other in each pair and measure 0.300 to 0.342 in length and 0.214 to 0.235 in breadth. The rostellum is absent.

The neck is medium in size, broad anteriorly and narrows posteriorly and measures 0.335 to 0.371 in length and 0.178 to 0.250 in breadth.

The mature proglottids are medium in size, thin, only one set of reproductive organs in each segment, broader than long, almost 13 times broader than long, with distinct segmentation and convex lateral margins, the segments are free at the corners and measure 0.013 to 0.016 in length and 0.183 to 0.186 in breadth.

The testes are 3 to 4 in number on each lateral side, in each segment, medium in size, round in shape, unevenly distributed, outside the longitudinal excretory canals, lateral to the ovary and measure 0.010 to 0.016 in diameter.

The cirrus pouch is medium in size, elongated oval in shape, slightly obliquely or transversally placed, present in anterior half of the segment, open marginally and measures 0.023 to 0.030 in length and 0.016 to 0.020 in breadth.

The cirrus is unarmed, wavy, thin, contained within the cirrus pouch and measures 0.020 to 0.026 in length and 0.003 to 0.006 in breadth.

The vas deferens is thin, long coiled, run transversally and measures 0.050 to 0.053 in length and 0.003 to 0.006 in breadth.

The ovary is small in size, single mass, oval to spherical in shape, placed near posterior margin of the segment and measures 0.023 to 0.026 in length and 0.030 to 0.033 in breadth.

The vagina is thin, straight tube, posterior to the cirrus pouch, arise from the genital pore, run transversally and measures 0.150 to 0.153 in length and 0.003 to 0.006 in breadth.

The genital pores are small in size, open marginally, irregularly alternate, placed at anterior region of the segment and measure 0.003 to 0.006 in breadth.

The vitelline gland is absent.

The excretory canals are longitudinal and narrow and measure 0.032 in breadth.

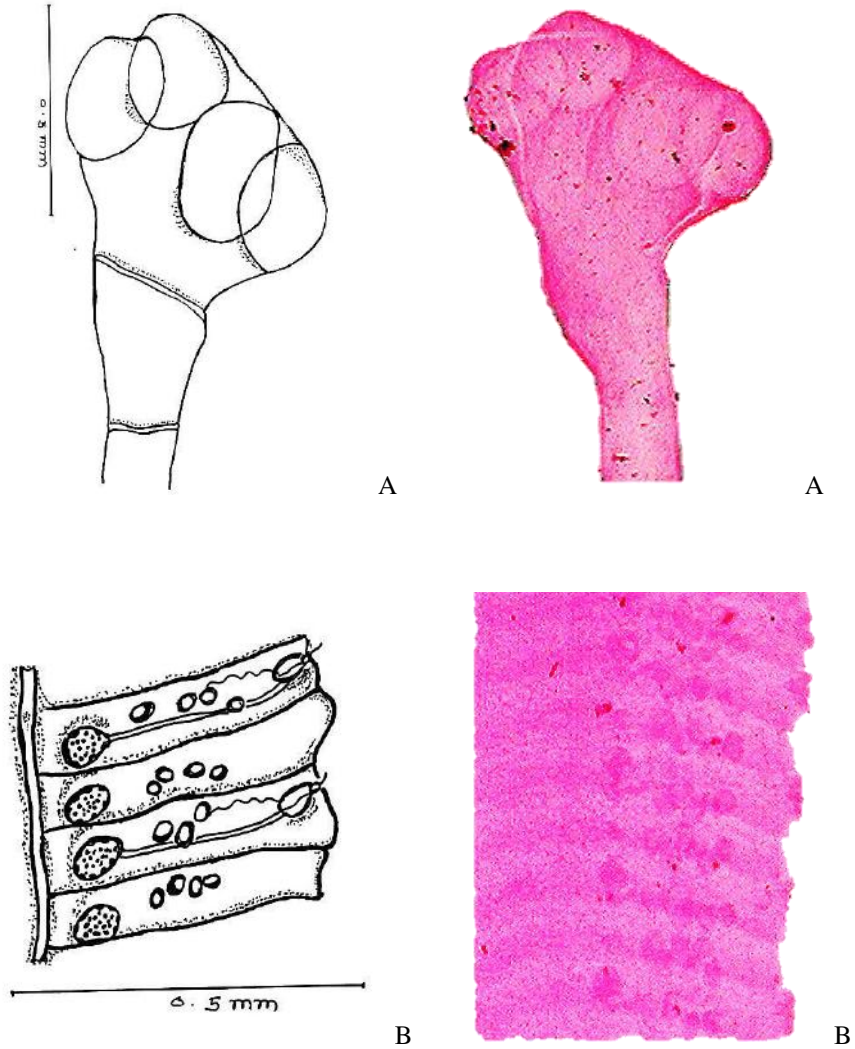

Fig: 1- Camera Lucida And Microphotograph Of *Stilesia Bhadgaonensis* N.Sp.
A- Scolex; B- Mature Segments

4. DISCUSSION:

The worm under discussion having scolex small, dome shaped and suckers 4 in number, oval to spherical, neck is medium, broad anteriorly and narrow posteriorly. The mature segments, almost 13 times broader than long, genital pore unilateral, irregularly alternate, near anterior margin of the segments. Testis 3-4 in number, on each side, round in shape, cirrus pouch medium, oval shape, cirrus thin, vas deference thin, coiled; ovary spherical with numerous acini, vagina posterior to cirrus pouch.

1) The present tapeworm, differs from *S. globipunctata* which is having the scolex round, testis 4-7 in number, in two groups, on each side, vas deference not closely coiled and present in between cirrus pouch and excretory canal, cirrus pouch small, pyriform, ventral to the vagina, ovary globular, vagina dorsal to cirrus pouch and found in *Ovis aries*.

2) The present forms, differs from *S. vittata* which is having testes in two groups, 5-9 on each side, cirrus pouch elongated, cylindrical, cirrus armed and found in *Camelus dromedarius.*
3) The worm under discussion, differ from *S. hepatica* which is having the testes in two groups, 6-7 on each side, preovarian, in the anterior half of the segments, ovary small, compact and oval, vagina anterior to cirrus pouch and found in the *Buffelus caffer* and *Bos taurus*.
4) The present tapeworms, differs from *S. leiperi* which is having, circular scolex, testes in two groups, 5-6 on each side, vas deference not closely coiled, cirrus pouch elongated, cylindrical and found in *Ovis bharal*.
5) The cestode under discussion differs from *S. caballeroi* in having testes 1-11 on each side and vas deference form a less dense bundle of convolutions, anterior to the testes.
6) The present parasite, differs from *S. southwelli* in having scolex, quadrangular in shape, mature segment 5 time broader than long, testes only 4 in each group, cirrus pouch large, sac like and ovary medium, round, compact without acini.
7) The present cestode, differs from *S. aurangabadensis* in having the large scolex, spherical, testes in two lateral groups, 5 on each lateral side, vas deference straight, reaches up to longitudinal excretory canal, cirrus pouch elongated, cylindrical, cirrus coiled, vagina posteriodorsal to the cirrus pouch and found in *Ovis bharal*.
8) The worm under discussion differs from *S. garhwalensis* in having the oval to spherical testes, 0-9 in number on each lateral side.
9) The present forms, differs from *S. kotdwarensis* in having the testes 1-12 in number and found in *Ovis aries*.
10) The present parasites, differs from *S. marathwadaensis* in having scolex circular, testes 5-7 in number, in two groups, the vas deference straight, runs up to longitudinal excretory canal and ovary medium, compact, oval, in anterior half of the segment.
11) The present cestodes, differs from *S. yawalensis* in having the scolex quadrangular, testes 2-3 on each side, lateral to ovary, ovary medium, globular, and vagina anterior to cirrus pouch.
12) The present forms, differs from *S. jadhavae* in having the scolex globular, mature segment 8 times broader than long, testes 5-7 in number, vagina anterior to the cirrus pouch and reported from *Ovis bharal*.
13) The present tapeworm, differs from *S. alli* in having the scolex oval, broad in middle, narrow at both the ends, mature segments squarish, testes medium, 11 in number (5+6 or 6+5), unevenly distributed and genital pore regularly alternate.
14) The present parasites, differs from *S. dhondagae* in having the scolex quadrangular, testes 8-10 in number, arranged in two rows, ovary distinctly bilobed, elongated with 8-9 acini in each lobe and par uterine organs simple.
15) The present cestode, differs from *S. caprai* in having the scolex globular, mature segment squarish, testes 8-9 in number, arranged in two lateral fields, vas deference long, slightly curved and ovary medium, oval, with irregular margin.
16) The worm under discussion, differs from *S. pandeyi* having scolex large, globular, testes 20 in number, arranged in two lateral fields, vas deference curve and ovary oval, near anterior margin of the segment.
17) The present tapeworm, differs from *S. daulatabadensis* in having the scolex globular, mature segment squarish, testes small, 11 in number, 7 on poral and 4 on aporal side and vas deference medium slightly curved.
18) The present form, differs from *S. indapurensis* in having the scolex quadrangular, mature segment squarish, testes medium, 8-9 in number, cirrus pouch large, elongated and ovary medium in size, oval in shape.
19) The present cestode, differs from *S. jadhavi* in having scolex large, the testes 14 in number, scattered on dorsal, lateral and ventral sides of the ovary and ovary bilobed with several acini, near posterior part of segment.
20) The present worms, differs from *S. hircusi* in having the scolex circular, testes 10-12 in number, ovary medium, globular and uterus bilobed sac.
21) The present cestodes, differs from *S. kapadnaensis* in having scolex globular, mature segment 8 time broader than long, testes 4-6 in number and vagina dorsal to cirrus pouch.
22) The present form, differs from *S. shrigondaensis* in having the scolex round, mature segment 9-10 times broader than long, testes 10-12 in number, in two lateral fields.
23) The present parasites, differs from *S. songirensis* in having scolex globular, mature segments are acraspidote, testes 7-8 in number and ovary oval.
24) The present worms, differs from *S. kanegaonensis* in having the scolex oval, testes 17-19 in number, in two lateral groups, ovary medium, oval, divided in two pairs, genital pore regularly alternate and reported from *Ovis bharal*.
25) The present cestodes, differs from *S. intestinalis* in having scolex rectangular, mature segment 8 time broader than long, testes 4 in number, on each side, vagina anterior to cirrus pouch, genital pore regularly alternate and reported from *Ovis bharal*.
26) The present parasite, differs from *S. alii* (minor) in having scolex quadrangular, mature segment 12 to 13 time broader than long, testes 9 to 10 in number on each side and genital pore regularly alternate.
27) The present parasites, differs from *S. indiana* in having scolex globular, testes 4-5 in number, vas deference curved and ovary compact, U shaped.

28) The present form, differs from *S. gangakhedensis* in having the scolex quadrangular, mature segment broader than long, testes 9 in number, four on poral and five on aporal side and with two big paruterine organs.
29) The present tapeworms, differs from *S. abhimanyui* in having the scolex circular, mature segments 20-30 times, broader than long, testes 11-12 in number, cirrus pouch pyriform and vagina anterior to cirrus pouch.
30) The present worms, differs from *S.ganeshraoji* in having testes 14 in number, in two lateral fields, ovary medium, bilobed, paruterine organs two in number with eggs and genital pore regularly alternate.
31) The present cestodes, differs from *S. gangadharraoi* in having scolex globular, testes 8-10 in number, in two lateral fields, par uterine organs one on each lateral side and genital pore regularly alternate.
32) The present worms, differs from *S. jadhavae* (minor) in having scolex quadrangular, testes 24 in number, in two lateral fields and ovary medium, bilobed.

Additional differentiating characters with all the species are given in the comparative chart at the end.

The above noted characters are valid enough to accommodate these worms into a new species and hence the name *S. bhadgaonensis* n. sp. is proposed after the locality.

Type of species	:	*Stilesia bhadgaonensis* n.sp.
Host	:	*Capra hircus* (Linnaeus, 1758).
Habitat	:	Intestine
Locality	:	At. Bhadgaon, Dist. Jalgaon, (MS), India.
Date of collection	:	07th January, 2017.

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Study of *Eimeria Ovina* in Sheep from Beed, Maharashtra State India

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ABSTRACT: *During the present study ten species of Eimeria are found in sheep, eight species are redescribed and two are new species.*

KEY WORDS*: Eimeria, Coccidia, oocyst, sporocyst, sporozoite*

1. INTRODUCTION:

Coccidiosis is a parasitic disease affecting a variety of animals, especially mammals and birds. The causative organism is a microscopic, spore – forming, single – cell protozoa called coccidia. Coccidia are from the same class of organisms (sporozoa) that cause malaria. Coccidia are sub-classified in to many genera.

In sheep and goats, coccidiosis is caused by the genus *Eimeria*. Within this genus, there are more than ten species of coccidia that are known to infect sheep and goats. Not all of the species are pathogenic or have the same level of pathogenicity. In fact, only a few are usually responsible for disease outbreaks.

2. MATERIAL AND METHODS:

The material for the study of coccidia of goats and sheep was obtained from various slaughter houses as well as from different fields in and around Beed (M.S.). Different parts of the intestine of slaughtered goats were examined and processed within 4-5 hours after collection.

The faecal contents were diluted with distilled water and sieved to remove the large faecal debris. After repeated washing the oocysts were concentrated by centrifugation at 3000 rpm for 10 minutes. The oocysts were then spread out in shallow petri dishes and covered with 2.5% solution of potassium dichromate for sporulation.

3. OBSERVATION AND RESULTS:

During the study ten species of *Eimeria* are found in sheep, eight species are redescribed and two are new species. *Eimeria crandallis* was the most frequent, being found in 108 out of 594 positive samples (18.18%) or 4.38% of the total samples. *Eimeria parva* was the second common species found in 90 out of 594 positive samples, representing 15.15% of the positive samples and 3.65% of the total samples examined. *Eimeria weybridgensis* was the third species found in 82 out of 594 positive samples, representing 13.80% of the positive samples and 3.33% of the total samples examined. *Eimeria ninakohlyakimovae* was the fourth found in 75out of 594 positive samples, representing 12.62% of the positive samples and 3.04% of the total samples examined. *Eimeria intricata* was the fifth found in 61out of 594 positive samples, representing 10.26% of the positive samples and 2.47% of the total samples examined. *Eimeria ahsata* was the sixth species found in 55 out of 594 positive samples, representing 9.25% of the positive samples and 2.23% of the total samples examined. *Eimeria ovina* was the seventh species found in 41 out of 594 positive samples, representing 6.90% of the positive samples and 1.66% of the total samples examined.

4. DESCRIPTION OF THE OOCYST OF *EIMERIA OVINA:*

The oocysts are elongated with micropyle and micropylar cap. The anterior end is slightly tapering and somewhat flattened at micropylar end. Micropylar cap is saucer shaped. The oocysts are covered with two layered wall which is 2.5µm thick. The outer layer is yellowish in colour, 1.2µm thick while inner layer is dark brown in colour and 1.1µm thick. The micropyle is 6 to 12µm wide. Polar granule may or may not be present. Oocystic residuum is absent.

The unsporulated oocyst shows spherical sporoblast which is vacuolated and measures 16 to 20µm in diameter. The sporocysts are elongate, ovoid and slightly tapering without stieda body. The sporozoites are elongated comma shaped and lie head to tail longitudinally. Each sporozoite carries two refractile bodies, large one at the broader end, and small one at the narrower end. Sporocystic residuum is in the form of a small group of granules near the middle of the sporocyst.

Table 1: The Dimensions Of The Sporulated Oocysts Of *Eimeria Ovina* From Sheep Are As Follows

(All measurements are in microns)

Particulars	Oocyst from sheep
Length of the oocyst	35.5 – 50.2 (49.57)
Width of the oocyst	30.2 – 42.4 (36.3)
Length width ratio of the oocyst	1.3 – 1.3 (1.37)
Length of the sporocyst	10.5 – 20.8 (14.8)
Width of the sporocyst	6.5 – 13.4 (9.82)
Length width ratio of the sporocyst	1.5 – 1.6 (1.50)

The frequency distribution of the lengths and widths of the oocysts of *Eimeria ovina* from sheep shown in **fig.1**

Sporulation time:

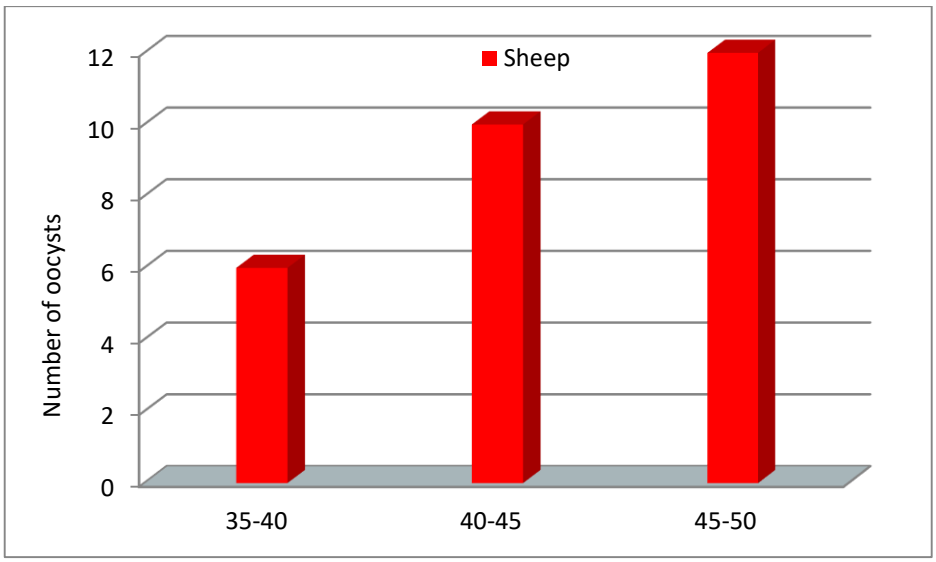
The sporulation time of the oocysts was 72 to 84 hours.

Prevalence:

The species was found in 1.66% of the 2462 sheep examined from Beed district.

Unsporulated oocyst of *Eimeria ovina* from sheep

Sporulated oocyst of *Eimeria ovina* from sheep



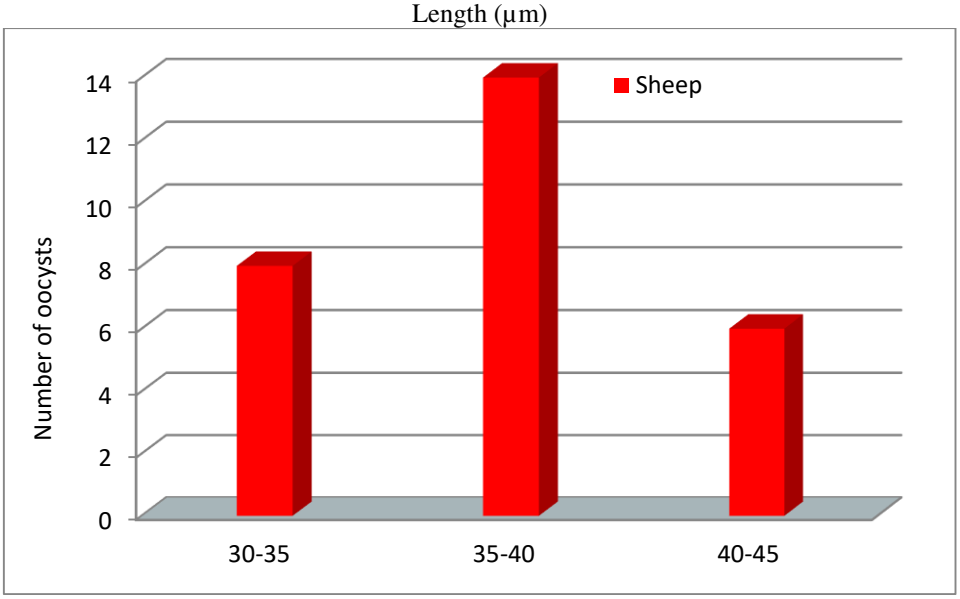


Fig.1.Showing The Frequency Distribution Of The Lengths And Widths Of Oocysts Of *Eimeria Ovina* From Sheep.

Table. 2 Showing the comparative dimensions of oocysts of *Eimeria ovina* from sheep (Based on various authors) (All measurements are in microns)

Sr.no.	Author	Length of the oocyst	Width of the oocyst	Average
1	Levine and Ivens (1970)	23.0 – 36.0	16.0 – 24.0	27.0 x 20.0
2	Norton et.al (1974)	25.0 – 36.0	15.0 – 24.0	31.0 x20.0
3	Bawazir (1980)	31.62 – 47.94	18.36 – 26.52	37.46 x 20.87
4	Present author	40.2 – 55.2	30.2 – 42.4	49.57 x 36.3

5. COMMENTS:

This species was first described by Levine and Ivens (1970) to resemble the *Eimeria arloingi* type of oocyst described from sheep. The authors suggested that oocysts described as *E. arloingi* by earlier workers from sheep and goats differed from one another. This species was described in detailed by Norton et.al (1974) and later on by various workers like Bawazir (1980), Varghese and Yayabu (1985), OCallaghan et.al. (1987), Dasilva et.al. (1991), Amarante and Barbosa (1992), Maingi and Munyua (1994), Arsalan et.al. (1999), Galip Kaya (2004), Gul A (2007), Karl Skirnisson (2007), Fawzia H. Toulah (2007), Yakhchali and Zarei (2008), Yakhchali and Eqbal Golami (2008) and Gauly (2008). A comparison of the oocysts from sheep of present author with the previous worker is given in **Table 1**. After the observation of the previous workers it has seen that the oocyst described herewith those described by Levine and Ivens (1970), Norton et. al. (1974) and Bawazir (1980) show interesting variation. The oocyst wall is thinner in the forms described by Norton et.al. (1974) compared to the other three while the thickness of the wall of the present oocysts is similar to described by Levine and Ivens (1970). The micropylar cap in the present form is slightly larger than the one described by Levine and Ivens (1970). The body dimensions of the present forms are larger than Levine and Ivens (1970), Nortan et.al. (1974), and Bawazir (1980). Stieda body was reported by Levine and Ivens (1970) and Bawazir (1980). There was no stieda body in the oocysts of Norton et. al. (1974). Present species matches with it as the stieda body is absent here. Inspite of minor differences in morphometrics the species is considered as *E. ovina* and redescribed here.

Host -	*Ovis aries*
Habitat-	Oocyst found in intestinal content
Locality-	Beed, (M.S)

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Study of Coccidiosis in Goat in Vaijapur Tehsil Of Aurangabad District Of Maharashtra State, India

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Abstract: *Coccidial infection is universal and the young one of sheep and goats are more susceptible for coccidial infection. The phylum Apicomplexa, of subkingdom protozoa, having genus Eimeria showing majority of parasitic protozoan causing coccidiosis in various vertebrates. Parasitological, gross and microscopic examinations revealed Eimeria infection was common in goat.*

Extensive survey from June 2020 to January 2021 was carried out to record the prevalence of coccidia in goat in Vaijapur tehsil of Aurangabad district. Material for this investigation was obtained from various villages and fields around the Vaijapur tehsil. The collected faecal samples are laced in separate plastic pouch and placed it in the refrigeration until examination. During the period of eight months total 583 samples were examined, out of which 126 were positive for coccidial infection, the percentage prevalence is 21.61%.

Key Words: *Goat, Coccidia, Vaijapur, prevalence etc.*

1. INTRODUCTION:

Maharashtra has highly uneven distribution of rainfall. For example, while the Konkan region receives as high as 2500 mm; Marathwada receives lesser than 800 mm of rainfall, annually. Maharashtra and Marathwada facing possibly the worst droughts in the past 100 years, third drought in the last four years. This is due to lots of factors; relative dry winter excessive depletion inn ground water level, effect of al-nino etc.

Agricultural economy of Marathwada is mostly dependent on so many small rudiment like sheep and goats, poultry, fishes and so on. Meat, milk, skin, eggs, manure, wool are the lots of product of these rudiments playing a major role in poor's people family. Osmanabadi, Sangamneri and Surti are recognised goat breed of Marathwada called Deccani breed. Goat is hardy animals, adapted to harsh conditions of Marathwada.

Rearing goat is mainly extensive range management system on community range land, crop residues and forest land. On goat farming near about Approximately 50 lakh families and on sheep rearing Approximately 1.5 lakh families are depending throughout Maharashtra. Rearing practices of both carried out in rural population of Maharashtra. Vaijapur tehsil of Aurangabad comes under low rainfall zone so farmers from this tehsil rear more goats as a subsidiary business.

Coccidiosis is an economically disease that caused by *Eimeria* spp. Small and large intestines are target tissues of this protozoan parasite[1] Several species of coccidia causes extensive pathological damage and mortality in cattle, poultry, pig, sheep, goat and other animals. The study of coccidia has enhanced this group's pathological, medical and veterinary importance. The aim of this study was to determine the prevalence of coccidial infection and pathology of coccidiosis of goats.

2. MATERIAL AND METHODS:

Extensive survey from April 2020 to March 2021 was carried out to record the prevalence of Coccidia in goat in Vaijapur tehsil of Aurangabad district. Material for this investigation was obtained from various villages and fields around the Vaijapur tehsil. The collected faecal samples are laced in separate plastic pouch and placed it in the refrigeration until examination.

The samples were examined and processed within four to five days after collection. The faecal contents were diluted with distilled water and sieved to remove the large faecal debris. After repeated washing the oocysts were concentrated by centrifugation at 3000 r.p.m. for 10 minutes. The oocysts were then spread out in shallow Petridish and covered with 2.5% solution of potassium dichromate for sporulation. Care was taken to see that they were properly aerated and also to prevent desiccation. The sporulation was carried in all cases at room temperature (about 28°c – 32°c).

The oocysts were examined regularly to check up if they are sporulated. The checking was done twice daily in the case of species with a sporulation time of more than one or two days.

3. RESULTS:

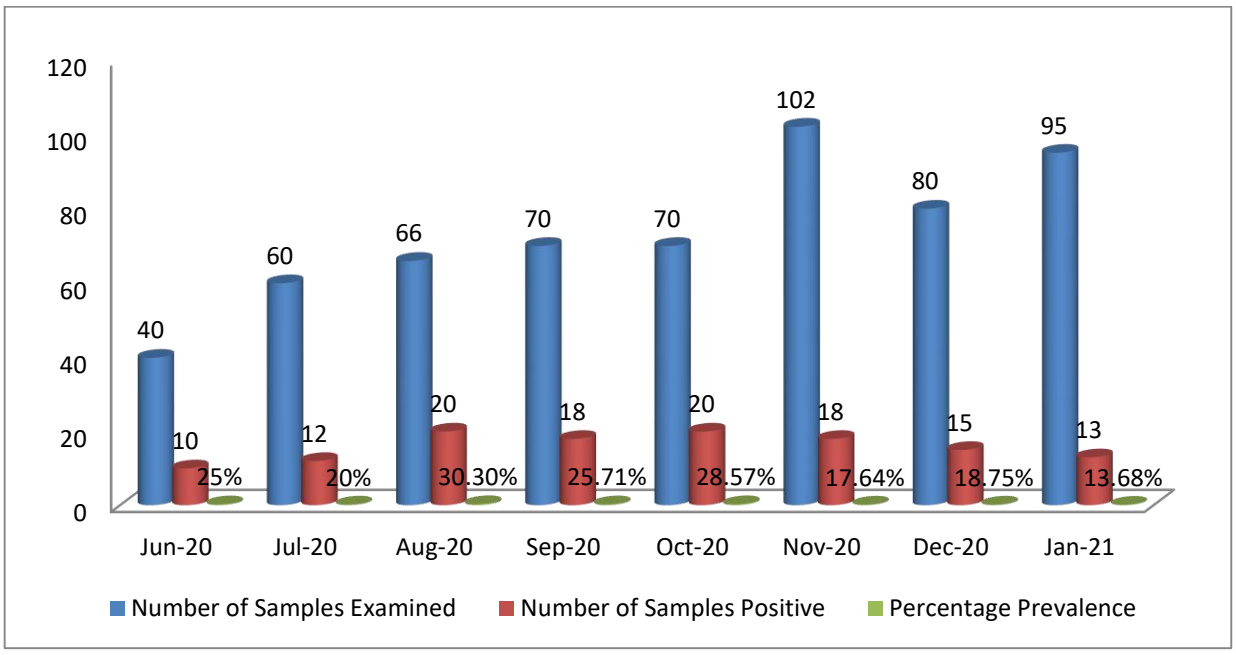
Extensive survey from June 2020 to January 2021 was carried out to record the prevalence of Coccidia in goat in Vaijapur tehsil of Aurangabad district. Material for this investigation was obtained from various villages and fields around the Vaijapur tehsil. The collected faecal samples are laced in separate plastic pouch and placed it in the refrigeration until examination. During the period of eight months total 583 samples were examined, out of which 126 were positive for coccidial infection, the percentage prevalence is 21.61%.

A month wise analysis of the eight months prevalence showed that maximum prevalence was during August (30.30%), October (28.57%), September (25.71%), June (25%), July (20%). The lowest prevalence was during December (18.75%), November (17.64%), January (13.68%). The details of the number of samples examined and the month wise prevalence is shown in following table

TABLE NO. 1. Showing The Month Wise Prevalence Of Coccidia In Goats In Vaijapur Tehsil During The Period June 2020 To January 2021

Sr.No.	Period	Number of Samples Examined	Number of Samples Positive	Percentage Prevalence
1	June 20	40	10	25%
2	July 20	60	12	20%
3	August 20	66	20	30.30%
4	September 20	70	18	25.71%
5	October20	70	20	28.57%
6	November 20	102	18	17.64%
7	December 20	80	15	18.75%
8	January 21	95	13	13.68%
	Total	**583**	**126**	**21.61%**

FIG. NO. 1 :- Showing the month wise prevalence of Coccidia in goats in Vaijapur tehsil during the period June 2020 to January 2021



4. DISCUSSION:

The overall prevalence of coccidial infection in goat in the present study was 21.61% which is comparable to previously reported prevalence of Aleksandra Balicka-Ramisz In Western Pomerania the highest intensity of excretion of oocysts was during May-July and the lowest during November-January in West Ukraine Province the peak of oocysts excretion was in May-July and the lowest in October-December[4]. And According to 0. M. Majaro and 0. 0. Dipeolul (1981) there were relatively few coccidia oocysts between October and March and peaks occurred in August and September [5].

5. CONCLUSION:

The pattern suggested that the peak is in the mid of monsoon up to the starting of winter. The prevalence gradually reduces after the mid of winter and onset of summer.

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Taxonomic Observation of Tapeworm and Histopathological Studies On Infected Intestine Of *Capra Hircus*

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Abstract: *The present investigation deals with taxonomic observation of new tapeworm of genus Aliezia viz. Aliezia kalsei n. sp., collected at Shirud, Tq. & Dist. Dhule, (M.S.), India. The worms general topography show scolex medium, quadrangular, with 4 suckers; neck medium; mature proglottids larger; interproglottidal glands small, 8-12 in number; testes 3-6 in number; cirrus pouch medium; cirrus thin; ovary medium; vagina posterior to cirrus pouch; ootype and vitelline glands absent; genital pores small, gravid segments broader than long; par uterine show Oncospheres. Histopathological study show heavy infection of Aliezia kalsei causing damage to intestinal layers showing deep ulceration.*

Keywords: *Aliezia kalsei, Shirud, histopathology, intestinal layers, Capra hircus.*

1. INTRODUCTION:

The genus *Aliezia* was erected by Shinde in 1968 with its type species *Aliezia indica* from a sheep, *Ovis bharal* at Aurangabad, M.S., India. He also reported a new species as *Aliezia indica minor* from the same host. Ali and Deshpande redescribed the same genotype in 1971 from deer. One more species *Aliezia aurangabadensis* is added by Shinde, Jadhav and Kadam in 1979. Later on three species were added viz., *Aliezia kaijensis* by Lakhe, 2004 from *Ovis bharal, Aliezia shindei* by Kalse, 2008 from *Capra hircus* and *Aliezia hircusae* by Suryawanshi, 2019 from *Capra hircus*

The present form deals with the description of new tapeworm, *Aliezia kalsei.* Cestode lives in a hazardous environment where the parasitic movement towards gut and passage of food make the possession of an efficient form of attachment. Taxonomical studies reveal that the hold fast organ namely sucker is stout with heavy musculature adopted to attach to the mucosa of hosts intestine. Some Penetrative type of scoleces show attachment and invaded into crypts of Lieberkhun while non - penetrative type superficially attached to mucosal epithelium of intestinal villi (Shinde and Mitra, 1980). Important contributions were done in this direction by Joshi and Kamalpur (1971); Mitra and Shinde (1981); Jadhav and Shinde (1981); McDonough and Gleason (1981); Banarjee *et al*. (2006); Patil and Chaudhari (2010). Histopathology revealed disseminated erosion at the site of attachment, lymphocyte migration and hyperplasia of connective tissue in the lamina propria (Ivona, 2006). However, the extent of damage depends upon the depth of penetration of scolex type and number of cestode parasites where they localize in the body of host (Paperna and Zwerner, 1976).

In the present study of histopathological an attempt has been made to visualize up to what extent the infestation of cestode parasites *Aliezia kalsei* caused the damage to the intestine of host *Capra hircus.*

2. MATERIAL AND METHODS:

The survey of *Capra hircus* were made at Shirud Tq. & Dist. Dhule, M.S., India for cestode parasites. Twenty Five worms were collected from the intestine. Few worms were flattened and preserved in 4% formalin, stained with Harris Haematoxyline, passed through various alcoholic grades, cleared in Xylol and mounted in DPX. Drawings were made with the help of camera lucida. All measurements are in millimeters.

The infected intestine attached with worms and pieces of uninfected intestine were fixed in Bouin's fluid, later washed in running water, dehydrated through various alcoholic grades, cleared in Xylene, embedded in paraffin wax at (58-60°C), blocks were prepared, cut at 7mμ and slides stained in Haematoxylin eosin double staining method and mounted in the DPX. The photomicrographs were taken with the help of camera.

***Aliezia kalsei n*. sp.**

3. DESCRIPTION (Figs. 1: A, B, C)

Twenty five specimens, of the cestode parasites, were collected, from the intestine of a goat, *Capra hircus* at Shirud, Tq. & Dist. Dhule, M.S., India; in the month of June, 2019. The worms were small, having thick musculature, with scolex, numerous immature, mature and gravid segments.

The scolex is medium in size, quadrangular in shape, with 4 suckers, without rostellum and rostellar hooks and measures 0.250 to 0.260 in length and 0.253 to 0.300 in breadth. The suckers are large in size, oval in shape, arranged in two rows, slightly overlapping to each other on each side and measure 0.116 to 0.120 in length and 0.100 to 0.113 in breadth.

The neck is medium in length, slightly broad anteriorly and narrows posteriorly and measures 0.183 to 0.190 in length and 0.140 to 0.160 in breadth.

The mature proglottids are large in size, broader than long, almost 12 and half times broader than long, with concave lateral margin and measure 0.018 to 0.023 in length and 0.285 to 0.294 in breadths.

The interproglottid glands are small in size, oval in shape, distributed on either side of the proglottids, at their lateral corners in the intersegmental regions, 8 to 12 in number, on each side.

The testes are medium in size, oval in shape, 3-6 in number, unevenly distributed, present at the lateral side of the segments and measure 0.006 to 0.009 in length and 0.003 – 0.006 in breadth.

The cirrus pouch, one in each segment, medium in size, elongated, oval in shape, situated in the middle of the segment, transversely placed and measures 0.015 to 0.023 in length and 0.006 to 0.009 in breadth. The cirrus is thin, curve, within the cirrus pouch and measures 0.018 to 0.024 in length and 0.003 in breadth.

The vas deferens is densely coiled, wavy and measures 0.051 to 0.059 in length and 0.003 in breadth.

The ovary on each side is medium in size, oval in shape, situated in the middle of the segments, a single mass with unequal width and measures 0.009 to 0.015 in length and 0.009 to 0.011 in breadth.

The vagina is a thin tube, situated posterior to the cirrus pouch, runs transversely, straight, situated in the middle region of the segment and measures 0.062 to 0.071 in length and 0.003 in breadth.

The ootype and vitelline glands are absent.

The genital pores are small, situated in the middle of the lateral margin and measure 0.003 in width.

The gravid segments are broader than long, almost 7 times broader than long and measure 0.053 to 0.060 in lengths and 0.400 to 0.413 in breadth.

Oncospheres develop inside the uterus which is internal and enclosed in well-developed par uterine organ. Oncospheres measures about 0.003 to 0.009 in diameter.

4. DISCUSSION:

1) The present worm, differs from *Aliezia indica* in the size of Scolex (0.250 - 0.260 x 0.253 - 0.300 as against 1.22 x 0.96), from *A. indica minor* (0.250 - 0.260 x 0.253 - 0.300 as against 0.95 x 1.22), from *A. aurangabadensis* (0.250 - 0.260 x 0.253 - 0.300 as against 1.67-1.74 x 1.14 -1.17), from *A. kaijensis* (0.250 - 0.260 x 0.253 - 0.300 as against 0.011-0.351 x 0.909-1.499), from *A. shindei* (0.250 - 0.260 x 0.253 - 0.300 as against 0.491 - 0.535 x 0.379 - 0.428) and from *A. hircusae* (0.250 - 0.260 x 0.253 - 0.300 as against 0.100 - 0.108 x 0.100 - 0.137).

2) It differs in having a definite number of testes, on each side of proglottids from *A. indica* (3-6 as against 4-6), from *A. indica minor* (3-6 as against 4-5), from *A. aurangabadensis* (3-6 as against 4), *A. kaijensis* (3-6 on each side as against 5-8), from *A. shindei,* (3-6 as against 1-5) and from *A. hircusae* (3-6 as against 3-5).

3) It differs in the total number of interproglottid glands, at the corners in each segment from *A. indica* and *A. indica minor* (8-12 as against 10-12), from *A. aurangabadensis* (8-12 as against 16-20), from *A. shindei* (8-12 as against 16-28) and from *A. hircusae* (8-12 as against 13-14).

4) It differs in the width of mature proglottids from *A. indica* (0.018 -0.023 x 0.285 - 0.294 as against 1.67), from *A. indica minor* (0.018 - 0.023 x 0.285 - 0.294 as against 1.61), from *A. aurangabadensis* (0.018 -0.023 x 0.285 - 0.294 as against 1.28 -1.30), *A. kaijensis* (0.018 -0.023 x 0.285 - 0.294 as against 1.101-1.158), from *A. shindei* (0.018 - 0.023 x 0.285 - 0.294 as against 0.848 - 0.982) and from *A. hircusae* (0.018 -0.023 x 0.285 - 0.294 as against 0.036 - 0.053 x 0.316 - 0.366).

5) It differs in the position of genital pore from *A. indica,* (situated in the middle of segment as against in anterior half), from *A. indica minor* (situated in the middle of segment as against in anterior half at one fourth level.), from *A. aurangabadensis* (situated in the middle of segment as against in anterior or posterior half), from *A. kaijensis* (situated in the middle of segment as against anterior or posterior to the middle of segment) and from *A. hircusae* (situated in the middle of segment as against in anterior half of segment).

6) It differs in their host from *A. indica*, *A. indica minor* and *A. kaijensis* (*Capra hircus* as against *Ovis bharal).*

As above distinguishing characters are enough, to erect a new species for these worms and hence the name *Aliezia kalsei* n.sp. is proposed, in the honor of Prof. Dr. A. T. Kalse, Nanasaheb Y. N. Chavan Arts, Science and Commerce College, Chalisgaon, Dist. Jalgaon, for his constant encouragement.

Type species	:	*Aliezia kalsei* n. sp.
Host	:	*Capra hircus* (Linnaeus, 1758)
Habitat	:	Intestine
Locality	:	At. Shirud, Tq. & Dist. Dhule, M.S.
Date of collection	:	7thJune, 2019.

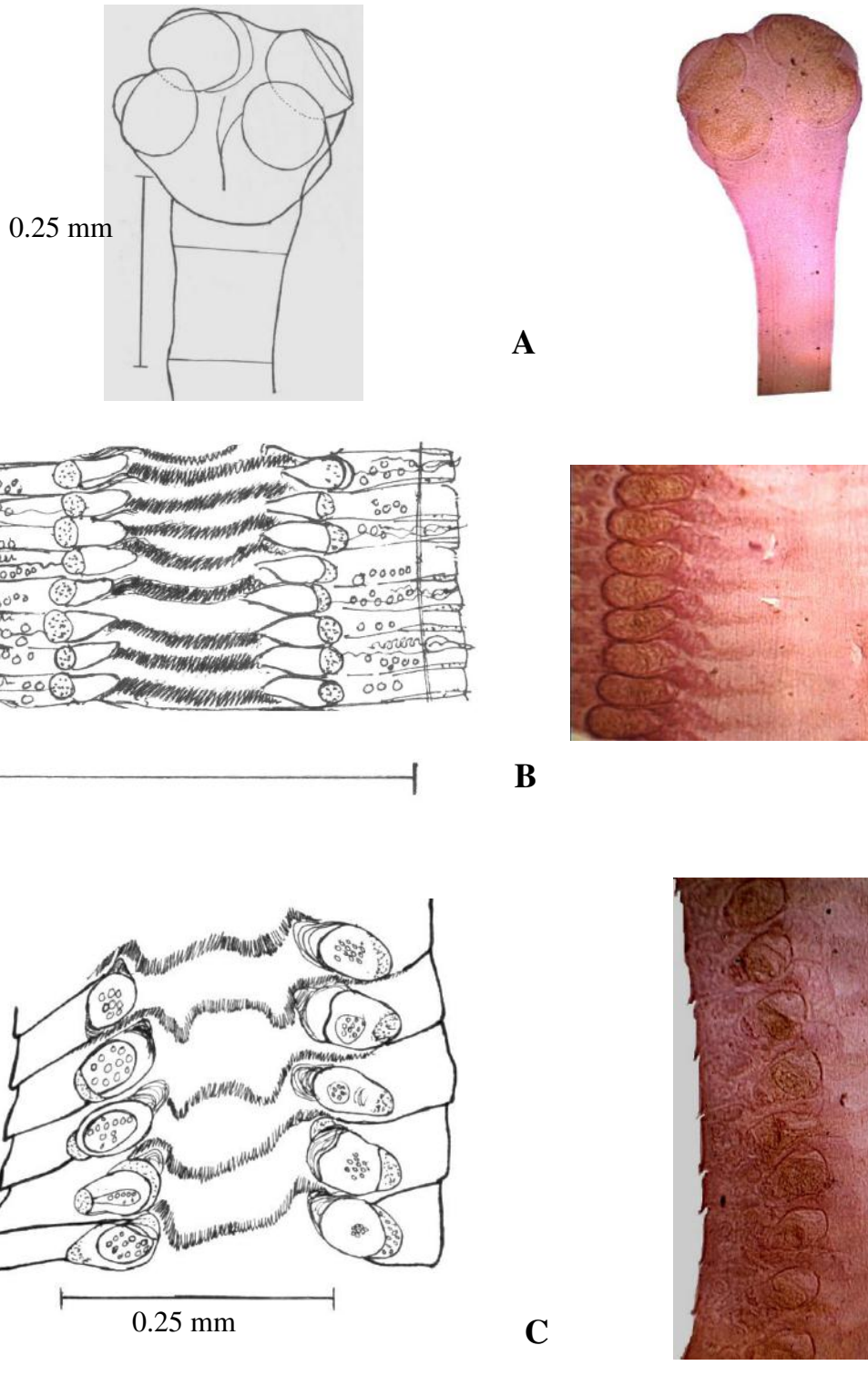

Fig: 1 – Camera Lucida And Microphotograph Of *Aliezia kalsei* n. sp.

A – Scolex; B – Mature segments; C – Gravid segments

HISTOPATHOLOGICAL STUDIES:

The study pertains to histopathological observations of *Aliezia kalsei* intestinal Cestode partasite of host *Capra hircus*. On closer observations, the transverse section of healthy host intestine, shows intact histological architecture and all layers are clearly observed in Fig 2(A), whereas in the transverse section of infected intestine show penetrative type of scolex, inserted in the intestinal wall of the host. It shows considerable damage to intestinal mucosa and submucosa layer as shown in the Fig. 2(B).

By damaging the hosts' intestinal wall, parasite minimizes the absorptive area of digestion, which increases the loss of nutrients and creating local intestinal ulceration of the host intestine. When the scolex of the cestode reaches up to the muscularis externa layer, cellular infiltration occurs. The cells present at the site are invaded by leukocyte, eosinophil and lymphocytes. The parenchymal muscles are broken and appear at damaged region of inner villi of intestine. These cells are adapted for resisting parasites. Redness of intestine appears because of the firmly attachment with the suckers.

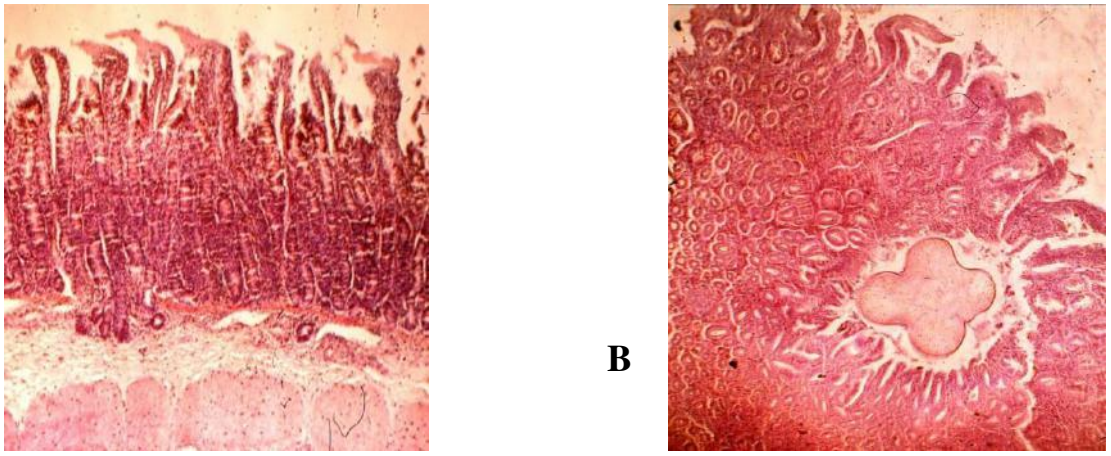

Fig. 2: (A) T.S. of non- infected intestine of *Capra hircus.*
(B) T.S. of Infected intestine showing inserted Scolex of *Aliezia kalsei*
inside the mucosa and submucosal layer.

The worm is not only successful in entering into the intestine, but also forming the ulceration in the intestinal wall. The parasite may affect host physiology in many ways that induce stress in the host. The parasitic infections in turn disturb the metabolic pathways (Esch et al., 1977). The present study shows the similar results as previously reported by (Gopal Krishnan, 1968).

It can be concluded that cestode parasites *Aliezia* collect the nutritive material from the intestine of hosts *Capra hircus* which is essential for their nourishment and growth. It also lowers the nutritional value of the host meat.

ACKNOWLEDGMENT:

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Growth and Sporulation of Seed Borne Fungi of Bhendi

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Abstract: *Plant resources have made substantial contribution to human welfare. The progress of human beings has been associated with his use of plant resources especially for the supply of food, fuel, fiber and medicine. The Indian economy depends greatly on the number of wild plant species. Human beings have cultivated more than 7000 plant species for food throughout the history. Today only 20 species provide 90% of the world's food and just three species mainly wheat, rice and maize supply more than 50% of the world's food. The biochemical's present in the vast majority of the plant species are the great reservoirs of new and potential drugs. The plant resources are the major sources of the antimicrobial agents. They can be used for monitoring the environmental changes.*

In the present study total phenol content (TPC) of ten medicinal plants and common seed borne fungi of Bhendi (Abelmoschus esculentus (Linn) Moench.) were determined. Effect of ten wild medicinal plant leaf extract on the spore germination, dry mycelial weight and sporulation were carried out of selected three seed borne fungi Alternaria tenuis, Curvularia lunata and Fusarium oxysporum. It is evident from results that Dry mycelial weight, sporulation and spore germination inhibited by leaf extract of the medicinal plants Solanum xanthocarpum, Semecarpus anacardium and more Dry mycelial weight, sporulation and spore germination found in the leaf biomass extract of Vitex negundo, Balanites aegyptiaca and Helicteres isora as compared to other test medicinal plants.

Key Words: *Sporulation, Bhendi, Medicinal plants, Dry mycelial weight, TPC, fungi etc.*

1. INTRODUCTION:

Maharashtra state many medicinal plants are very common, dominant and wide spread. They occupy almost all open spaces. The biochemical's present in the medicinal plants have great reservoirs of new and potential drugs. The reports in general on utilization of medicinal plants for vegetable crop Bhendi in relation to the seed borne fungi dry mycelial weight, seed germination percentage and sporulation was carried out.

It is observed from the results that the waste biomass in the form of leaf extracts of ten selected medicinal plants were inhibitory for spore germination, mycelial growth and sporulation of some common and predominant seed borne fungi like *Alternaria, Curvularia* and *Fusarium* in more or less degree. For this the common and predominant seed borne fungi were grown in liquid Glucose Nitrate medium supplemented with biomass powders of medicinal plants. The spore germination of the seed-borne fungi was studied after twenty four hours of incubation period. The growth in terms of dry mycelial weight of the test seed borne fungi was studied after seven days of incubation period and important conclusions were drawn.

It is clear from the results that the leaf biomass of *Semecarpus anacardium* (2.1mg/ gm) and *Solanum xanthocarpum* (2 mg/gm) showed more Total Phenol Content while the leaf biomass of *Vitex negundo* showed very less Total Phenol Content (0.5 mg/gm) as compared to the leaf biomass of the other test medicinal plants. Similar study was carried out by Pandey et al.(2004), Oboh and Alkindahunsi (2004) studied changes in the total phenol content of leafy vegetables. It is clear from the results presented in table 2 that leaf extracts of all the test medicinal plants were found to be more or less inhibitory for the incidence of dry mycelial weight, sporulation and spore germination percentage of selected seed borne fungi of Bhendi. The leaf extract of *Semecarpus anacardium and Solanum xanthocarpum* were found to be more inhibitory and leaf extract of *Vitex negundo, Balanites aegyptiaca and Helicteres isora* were found to be very less inhibitory for the dry mycelial weight, sporulation and spore germination percentage of Bhendi as compared to the leaf extracts of the other test medicinal plants. Neeti et al. (1982) isolated *Fusarium moniliforme, Aspergillus flavus, A. fumigatus A. tereus, A. sulphureus and A. niger* from the seeds of Bhendi. Bodke (2001) screened plant extract of thirty one plants and reported that majority of plant extracts is more or less degree found to be inhibitory for spore

germination, growth and sporulation of *Alternaria tenuis, Curvularia lunata, Drechslera tetramers, Aspergillus flavus and Fusarium moniliforme*.

2. MATERIALS AND METHODS:

Collection of Seed Samples:

Seed samples of the test vegetable Bhendi was collected from field, store houses and market places for further study. A composite seed sample of test vegetable was prepared by mixing the individual samples together, preserved in gunny bags at room temperature during the studies (I.S.T.A. 1966).

Studies on total phenol content (TPC):

Total phenol content of the leaf of the selected medicinal plants were carried out by using Folin- Ciocalteu method which was given by Mahadeven and Sridhar in 1996. For this 1ml of the alcoholic extract of leaf biomass of the selected medicinal plants were taken in a graduated test tube. In this test tube added with 1ml of Folin–Ciocalteu reagent and 2ml of sodium carbonate (Na_2Co_3) solution. The test tube was kept on shaker. After this the test tubes were put in a water bath for one minute boiling water. The test tube was hold under running tap water for cooling. Solution in the test tube diluted by adding 25 ml of distilled water. Diluted blue colored solution used for determination of absorbance. The absorbance of diluted solution was measured at 650nm in a spectrophotometer. Different concentrations of catechol were prepared from which the unknown were read from a standard curve. All the reagents without alcoholic extract of leaf biomass of the test medicinal plants was considered as a blank reading. This was used to adjust the absorbance to zero.

Identification of seed borne fungi:

The seed borne fungi were identified by preparing slides observed under microscope. Microscopic observation of seed borne was carried out. Identification of was done with authentic literature (Mukadam, 1997). Pure culture of the identified fungi were prepared and maintained on PDA (Potato Dextrose Agar) slants (Subramanian, C.V., 1971).

Preparation of spore suspension:

Spore suspension was prepared by adding 10ml sterile distilled water in to pure culture test tubes. These pure cultures were preserved and maintained on PDA slants for one week at suitable temperature. Content of slant was filtered through muslin cloth and filtrates were conserved. The filtrate was used as spore suspension for further study. Similar study was carried out by Iqbal Singh and J.S. Chauhan (1973)

Study of spore germination:

During the present studies, 25ml of GN medium supplemented separately with 2ml of 5% plant extract was poured in 100ml borosil conical flasks. The flasks were previously sterilized. These sterile flask were inoculated with 2ml spore suspension of the selected seed borne fungi. These selected fungi were preserved on Potato Dextrose Agar medium slants for one week. The flasks were incubated at favorable environment for twenty four hours. After inoculation and incubation the spore germination was studied. Spore germination studied by using cavity slides and observing under the microscope (Jha, D.K. 1993).

With the help of calibrated microscope length of germ tubes were measured. The pure culture flasks with Glucose Nitrate medium without addition of the 2ml of 5% plant extract served as control (Bodke, S.S., 2001).

Study of Dry Mycelial weight and sporulation of seed borne fungi:

During the present studies some common and dominant seed borne fungi of Bhendi was carried out and commonly found fungi were selected for further study. The selected fungi were *Alternaria tenuis, Curvularia lunata* and *Fusarium oxysporum* were grown in Glucose Nitrate medium supplemented separately with 2ml of five percent plant extracts of medicinal plant biomass for seven days at room temperature. After the one week content in the flask were separated by the filtration. Previously weighed Whatman filter paper number 1 contained mycelial mat. Mycelial mat oven dried 24 hours at 60^0C temperature. The growths of seed borne fungi were measured by subtracting initial weight of Whatman filter paper number 1 from final weight. Fungi grown without addition of leaf extract were considered as control reading. Sporulation studied by observed under the microscope.

Table No. 1: Studies On Production And Total Phenol Content (TPC) Of Leaf Biomass Of The Medicinal Plants.

Sr. No.	Botanical Name	TPC (mg/gm)		
		Leaf	Stem	Root
01.	*Abrus precatorius* L.	2.0	0.6	0.8
02.	*Aegle marmelos* (L.) Corr.	1.9	0.8	0.6
03.	*Balanites aegyptiaca* Delile.	1.9	0.9	0.5
04.	*Datura metel* L.	2.0	1.2	0.8
05.	*DIOSCOREA BULBIFERA* L.	0.8	0.4	0.2
06.	*Helicteres isora* L.	1.9	1.0	0.6
07.	*Sapindus laurifolius* Vahl.	1.6	0.7	0.9
08.	*Semecarpus anacardium* L.	2.1	1.4	1.2

09.	*Solanum xanthocarpum* Schra.	2.0	1.8	1.2
10.	*Vitex negundo* L.	0.5	0.4	0.7

3. RESULTS AND DISCUSSION:

During the present studies ten medicinal plants which found very common and easily available were selected. Fresh leaves of the selected plants were collected. 100gms of fresh leaves were dried. They were weighed separately after drying. The leaf biomass of the medicinal plants was determined by subtracting weight of the dried leaf from weight of the fresh leaf. The chemical analysis of the leaves biomass was carried out. The total phenol content was determined by Folin Ciocaltue method and their results are presented in table - 1.

It is found from table no. 1 that *Semecarpus anacardium* (2.1 mg/gm) and *Solanum xanthocarpum* leaf biomass (2.0 mg/gm) found highest Total Phenol Content and leaf biomass of *Vitex negundo* (0.5 mg/gm) showed less amount of Total Phenol Content.

It is evident from result recorded in the table no. 1 that *Semecarpus anacardium* and *Solanum xanthocarpum* found highest (1.2 mg/gm) of TPC as compared to other test medicinal plants. Similar study carried out by Yubedee, A. G. (1998) and Pathak, D. and M.P. Srivastava (2000).

It is evident from the results presented in table- 2 that three very common seed borne common fungi (Iqbal Singh and J.S. Chauhan, 1973) were selected for further study and effect of ten wild medicinal plant leaf biomass tested against these three fungi. In this study dry mycelial weight (DMW), spore germination percentage (SGP) and Sporulation (SPL) were considered for further study.

It is found from table no. 2 that *Alternaria tenuis* dry mycelial weight more inhibitory in leaf extract of *Solanum xanthocarpum* (12 mg) and *Semecarpus anacardium* (14 mg). More dry mycelial weight found in the leaf biomass of *Balanites aegyptiaca* (45 mg) which was near about the control reading. *Alternaria tenuis* spore germination percentage inhibited in the leaf biomass of *Semecarpus anacardium* (25%) and highest found in the leaf biomass of *Vitex negundo* (75%) and in control (80%) spore germination was found. Sporulation inhibited by *Abrus precatorius*, *Semecarpus anacardium* and *Solanum xanthocarpum* as compared to other test medicinal plants. Similar study carried out by Komaraiah, M. and S.M. Reddy (1985) in methi.

It is found from table no. 2 that *Fusarium oxysporum* dry mycelial weight more inhibitory in leaf biomass of Datura metel (22 mg) and *Sapindus laurifolius* (44 mg) higher dry mycelial weight as compared to other test medicinal plants. Fusarium oxysporum spore germination percentage inhibited in the leaf biomass of *Solanum xanthocarpum* (20%) and higher spore germination percentage found in the leaf biomass of *Balanites aegyptiaca* (70%) and in control (80%) spore germination was found. Sporulation inhibited by *Abrus precatorius, Semecarpus anacardium* and *Solanum xanthocarpum* as compared to other test medicinal plants. Similar study carried out in okra (Neeti Sexena, Vijaya Kumari and D. Karan, 1982)

It is evident from result presented in the table no. 2 that *Curvularia lunata* dry mycelial weight more inhibitory in leaf biomass of *Solanum xanthocarpum* (15 mg) and *Balanites aegyptiaca* (40 mg) higher dry mycelial weight as compared to other test medicinal plants. *Curvularia lunata* spore germination percentage inhibited in the leaf biomass of *Solanum xanthocarpum* (20%) and higher spore germination percentage found in the leaf biomass of *Balanites aegyptiaca* (66%) and in control (70%) spore germination was found. Sporulation inhibited by *Abrus precatorius, Semecarpus anacardium, Datura metel* and *Solanum xanthocarpum* as compared to other test medicinal plants.

Table No. 2: Effect Of Leaf Biomass Of Selected Medicinal Plants On Growth, Spore Germination And Sporulation Of *A .Tenuis, F. Oxysporum And C. Lunata*

Sr. No	Extract of leaf biomass	*Alternaria tenuis*			*Fusarium oxysporum*			*Curvularia lunata*		
		SGP	DMW	SPL	SGP	DMW	SPL	SGP	DMW	SPL
01	*Abrus precatorius* L.	40	25	++	35	30	++	50	35	++
02	*Aegle marmelos* (L.) Corr.	55	35	+++	65	38	+++	58	40	+++
03	*Balanites aegyptiaca* Delile.	74	45	+++	70	40	++++	66	42	+++
04	*Datura metel* L.	35	20	++	40	22	++	30	25	++
05	*DIOSCOREA BULBIFERA* L	42	25	++	43	24	++	40	35	+++
06	*Helicteres isora* L.	62	25	+++	60	30	++	60	38	+++
07	*Sapindus laurifolius* Vahl.	32	15	+++	36	44	+++	34	33	+++
08	*Semecarpus anacardium* L.	35	14	++	29	25	++	33	20	++
09	*Solanum xanthocarpum* Schra.	29	12	++	20	28	++	20	15	+
10	*Vitex negundo* L.	75	41	+++	60	35	+++	45	20	+++
	Control	80	55	+++	76	40	+++	70	55	+++

SGP: Spore germination (%), DMW: Dry mycelium Wt.(mg),
SPL: Sporulation += Low, ++= Medium, +++= High

Line Graph Showing: Effect Of Leaf Biomass Of Selected Medicinal Plants On Growth, Spore Germination And Sporulation Of *A .Tenuis, F. Oxysporum And C. Lunata*

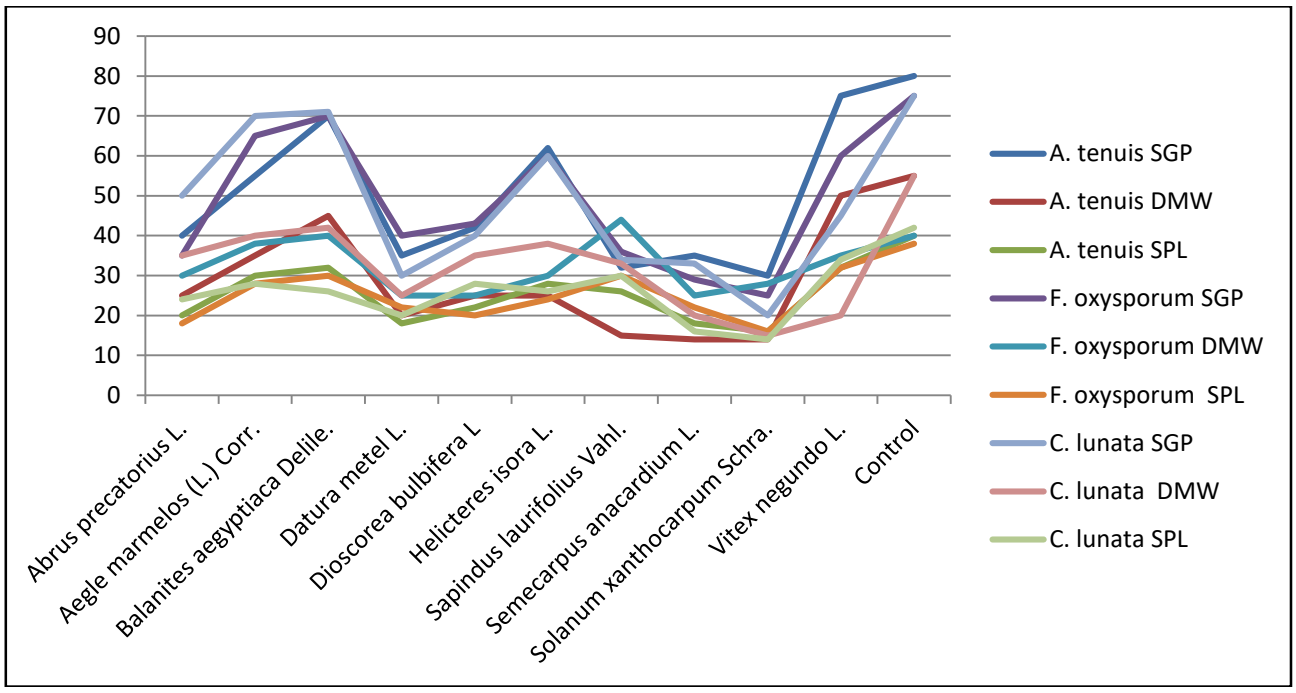

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Plate-19 : Incidence of mycoflora on the seeds of Bhendi -
(*Abelmoschus esculentus (Linn.) Moench)*

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Reporting Status of *Lytocestus Ambae,* Kaknkale 2017

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Abstract: *Nilima Kankale (2017) published a new Species of Caryophyllaeid Cestode Lytocestus ambae collected from the intestine of Clarias batrachus at Wadali dam, Amravati district (M.S). Since the worm collected is mature the eggs are not reported, and compared with only 08 species irrespective of existing 52 species till 2016. By observing the diagram in the journal some remedies and validity of ambae is questioned as new species*
Key Words : *Cestode, Clarias batrachus, Lytocestus, review, status*

1. INTRODUCTION:

A new *Lytocestus* species reported by Kankale (2017) from the intestine of *Clarias batrachus* at wadali dam, Amravati, Maharashtra published in International journal of researches in biosciences, agriculture and technology. The above species is supposed to have characteristics of the family Lytocestidae Wardle & McLeod (1952) and the description of the worm has been shown to possess the following features:

(1) The worm long and measured 0.06310 mm in length and 0.165 mm in breadth. The head is spatulate, roughly triangular, Neck is long wide narrow and broad anteriorly.
(2) The middle part of body measures 0.382 in length and 0.165 in breadth. This part consist maximum number of testes.
(3) The worm shows medium, rounded testicular follicles 925-1000 in number, are preovarian scattered through the body.
(4) Cirrus pouch is oval in shape, medium, obliquely placed in anterior margin or near posterior side, & measures 0.4198 in length and 0.191 in breadth.
(5) Ovary is H Shaped, the ovarian lobe is consist of large, rounded with loose, big acini the ovary measures 0.1325 in length and 0.3154 in breadth situated near the posterior region of worm.
(6) The uterus is branched, longer in size and originated from the middle of segment measures 0.495 in length and 0.533 in breadth.
(7) Uterus is consisting of small rounded eggs measures 0.03883 in diameter.
(8) The vitellaria are follicular, arranged in 2-3 layer in anterior and posterior margin of the segment.

The order Caryophyllidea of the tapeworms are all parasitic in the alimentary canal of freshwater fishes almost worldwide (Mackiewicz, 1972). In India the worms are frequently reported from catfishes mostly from Maharashtra mainly in Marathwada region. Caryophyllidean is a peculiar nature of cestodes, they lack internal or external segmentation with a single set of reproductive organs, unlike that of other eucestodes.

Cohn, 1908 erected the genus *Lytocestus* with its type species L. *adhaerens* from *Clarias fuscus* in Hong-Kong. This genus was first confirmed by Woodland, 1926 that included four more species in addition to the type species. They are *L. filiformis* Woodland, 1923 in *Mormyrus caschive*, Egypt Sudan; *L. chalmersius* Woodland, 1924; *L. cunningtoni* Fuhrmann and Baer, 1925 and *L. indicus* Moghe, 1925 (Syn. *Caryophyllaeces indicus*) from *Clarias batrachus* in India. Mehra, 1930 recorded the same species from *Clarias* magur and Ramadevi, 1973 from *Clarias batrachus* in India. Hunter, 1927 placed the genus in subfamily Lytocestinae and retained only three species i.e. *L. adhaerens, L.filiformis* and *L.indicus*. He put the species *L.cunningtoni* and *L.chalmersius* in the Genus *Monobothrioides*.

Subsequent workers Yamaguti, 1959, Gupta, 1961 and Murhar, 1963 have adhered to these changes. Wardle and McLeod, 1952 followed Hunter's classification but raised the status of Lytocestinae from Sub family to family. Wardle, McLeod and Radinovsky, 1974 suggested a new system of classification of cestodes, which used the term Cotyloda as a class and order Caryophyllidea is kept in this class. Mackiewiez, 1972 included the species *L. javanicus*

(Bovien, 1926). Furtado, 1963 and Lynsdale, 1956 considered *L. alestesi* as Syn. of *L. birmanicus*. But Mackiewiez, 1962 after examination of original material *L. alestesi* (Lynsdale, 1956) concluded that it should be considered as syn. of *L. filiformis* (Woodland, 1923). Ramadevi, 1973 described *L. longicollis* from *Clarias batrachus* in India.

Later on Singh 1975 erected *L. fossilis* from *Heteropneusteus fossils,* Shinde and Phad, 1988 described *L. marathwadensis* from C*larias batrachus.* Jadhav and Gavhane, 1991 added *L. alii* and *L. clariasae* from *Clarias batrachus.* Kadam et al,, 1999 erected *L. naldurgensis* in *Clarias batrachus*. Kalse and Shinde, 1999 described *L. chalisgaonensis* from *Clarias batrachus. L. teranaensis* was erected in 1999 by Kolpuke and Shinde from *Wallago attu*. Later, *L. govindae* described by Patil and Jadhav, in 2002 from *Clarias batrachus*. *L. batrachusae*, added by Shinde and Pawar 2002, from *Clarias batrachus*. Shomendra et al., (2003) described *L. bishnupurensis* but its critical study done by Sahay et al., in 2018, Later on 2004, *L. shindae* was erected by Khadap et al., in 2004, from *Clarias batrachus*. *L. nagapurensis* Lakhe, 2004 were reported from *Clarias batrachus*.

Tandon *et al.,* 2005 erected four new species *L. clariae, L. allenuateus*, *L. assamensis* in *Clarias batrachus* and *L. heteropneustii* in *Heteropneusteus fossils.* Subsequently *L. mujumdari* and *L. bokaroens*is Poonam, 2007 in *Clarias batrachus*, *L. paithanensis* (Shelke, 2007), from *Clarias batrachus*, *L. jagtai* (Tripathi et al., 2007) from *Heteropneustes fossilis* but its critical study done by Sahay et al., 2019, *L. punensis* (Jadhav *et. al.*, 2008) from cat fish *Clarias batrachus*, L. *subhapradhi* (Jawalikar et al.,2008), *L. murhari* (Kaul *et. al.*, 2010), *L. follicularae* and *L. osmanabadensis* (Bhure *et. al.*,2010), *L. shindei* (Surayawanshi *et. al.*, 2010), *L. vyasaei* and *L.purnensis*, Pawar and Hiware,2011, *L. gariepinusae* (Kadam *et. al.*, 2011), *L.* khami (Jawale *et. al.*, 2011),), *L. thapari* and *L.* alii (minor) (Sawarkar B. W, 2012 but this species is already described by Jadhav & Gavahne in 1991 and its critical study done by Sahay et al., in 2019.

L. manjaraensis, Salunke *et. al.*, 2012, L. *rekhaensis*, by Nimbalkar et al., 2012, *L. indica* (Deshmukh et.al.,2015), *L. godavariensis* (Pawar and Dandwate,2016), *L. mastacembellusi*, Pardeshi 2016 from *Mastacembellus armatus* but its critical study done by Sahay et al., in 2019. L. *ambe* Kankale (2017)[25], *L .paithanensis* by Kale 2017 from *Clarias batrachus* but this species is already described by Shelke in 2007 and critical studied by Sahay et al., in 2019. L. *mulaansis* Dandawate (2018) but the figures of the species *mulaanesis* and *godavariensis* is similar given by same author, L. *bharatae* Patil, 2018, but its critical study done by Sahay et al., in 2020, *L. elongates*, Barshe et al., 2018, from *Clarias batrachus.* Then *L. sahayi* by Bhavsar, et. al. in 2020 and *L. laturensis* by Kale et al., in 2020 in *Clarias batrachus*.

1. *L. adhaerens* Cohn (1908)
2. *L. filiformis* Woodland (1923)
3. *L.indicus* Moghe (1925)
4. *L.cunnigtoni* Fuhrmann et al. (1925)…… put in *Monobbothriodes* by Gupta 1961.
5. *L.chalmerisius* Woodland (1926))…… put in *Monobbothriodes* by Gupta 1961.
6. *L.javanicus* Bovein (1926) … *L. alestesi* Lynsdale (1956) was considered a synonym of *L. birmanicus* Furtado (1963).
7. *L.birmanicus* Lynsdale (1956)
8. *L.alestesi* Lynsdale (1956) … synonym of *L. filiformis* Woodland (1923).
9. *L.parvulus* Furtado (1963)
10. *L.moghei* Murhar (1963)
11. *L.longicollis* Ramadevi (1973)
12. *L.lativitellarium* Furtado & Kim Low (1973) ……Ash (2012) synonymised the species with *Lucknowia microcephala* Bovien (1926)
13. *L.fossilis* Singh (1975) …….Post ovarian vitellaria in H.fossilis has been questioned by Tandon et al. (2005) and not *Lytocestus*
14. *L.marathawadensis* Shinde & Phad (1988) …. Ash (2012) considered it to be synonym of *Pseudocaryophyllaeus ritai* Gupta & Singh (1984) but Hafeezullah (1993) considered it synonym of *L. indicus* (Moghe 1925)
15. **L.alii* Jadhav and Gavahne (1991)
16. **L.clariasae* Jadhav and Gavahne (1991)
17. **L.naldurgensis* Kadam, Hiware & Jadhav (1998)
18. **L.chalisgaonensis* Kalse & Shinde (1999)
19. **L.kopardaensis* Shinde & Borde (1999)
20. **L.teranaensis* Kolpuke, Shinde and Begum (1999)
21. **L.batrachusae* Pawar & Shinde (2002)
22. **L.clariasae* (minor) Pawar & Shinde (2002)
23. **L.govindae* Patil & Jadhav (2002)
24. *L.vishnupurensis* Shomendra et al. (2003) … synonym of *L. indicus* Moghe (1925) by Singh et al, 2018.
25. **L.nagapurensis* Lakhe, Pawar & Shinde (2004)
26. **L.shindae* Khadap et al. (2004)

27. *L. assamensis* Tandon, Chakravorty & Das (2005) ….. Ash (2012) synonymised the species with *Lucknowia microcephala* Bovien (1926)
28. *L. attenuatus* Tandon, Chakravorty & Das (2005) ….. Ash (2012) synonymised the species with Bovienia indica Niyogi, Gupta & Agarwal (1982)
29. *L. clariae* Tandon, Chakravorty & Das (2005) … Ash (2012) synonymised the species with Bovienia indica Niyogi, Gupta & Agarwal (1982)
30. *L. heteropneusti* Tandon, Chakravorty & Das (2005) …. Ash (2012) synonymised the species with *Lucknowia fossilisi* Gupta (1961) but valid by Sahay et al 2017.
31. *L. bokaroensis* Poonam (2007) …. Ash (2012) considered synonym of Pseudocaryophyllaeus tenuicollis Bovien (1926)
32. *L. majumdari* Poonam (2007) …… Ash (2012) considered synonym of Pseudocaryophyllaeus tenuicollis Bovien (1926)
33. **L. paithanensis* Shelke (2007) ….
34. *L. jagtai* Tripathi et al. (2007) …… Ash (2012) synonimised the species with *Lucknowia fossilisi* Gupta (1961) and Keep under enquiry by Sahay et al (2019)
35. **L. punensis* Jadhav, Bhure & Padwal (2008)
36. **L. subhapradhi* Jawlikar, Pawar and Shinde (2008)
37. *L. moghei* Sharma (2009)
38. **L. murhari* Kaul, Kalse & Suryavanshi (2010)
39. *L. follicullariae* Bhure et al. (2010)
40. *L. osamnabadensis* Bhure et al. (2010)
41. **L. shindei* Suryavanshi et al. (2010)
42. *L. vyasaei* Pawar & Hiware (2011)
43. *L. purnensis* Pawar & Hiware (2011)

Note:-

* Ash 2012[2] considered synonym of *Lytocestus indicus* Moghe (1925), "Only 8 taxa of family Lytocestidae are valid instead of 59 nominal taxa and 15 genera from 3 caryophyllidean families" Based on DNA sequencing and making gene bank of closely related sequences. But single change in DNA sequence can change the phenotype so different position, size, etc. For example, ovary and uterus also plays important role in taxonomy in Caryophyllideans (Mackiewicz, 1994 and By Sahay et al 2019) In above said species Ovary and uterus are of different size and shape, then how could they are considered as same species.

44. *L. geriapinusae* Kadam et al. (2011)
45. *L. khami* Jawle et al. (2011)
46. *L. thapari* Sawarkar (2012)
47. *L. alii* (minor) Sawarkar (2012) … synonym with *L. indicus* Moghe (1925) by Sahay et al 2019.
48. *L .manjaraensis* Solunki et al. (2012)
49. *L. rekhaensis* Nimbalkar et al. (2012) …. under enquiry By Sahay et al 2017.
50. *L. indica* Deshmukh (2015) …. cannot under genus Lytocestus by sahay et al. 2019.
51. *L. mastacembellusi* Pardeshi (2016) ….. under incertae sedis by Sahay et al 2019
52. *L. godavariensis* Pawar (2016)
53. ***L. ambae* Kankale (2017)**
54. *L. paithanensis* Kale (2017) …. held invalid species by Sahay et al 2019.
55. *L. mulaansis* Dandawate (2018) … kept under "incertae sedis" by Sahay et al 2020.
56. *L. bharatae* Patil (2018) …. kept under uncertain status (incertae sedis) by Sahay et al 2020.
57. *L. elongates*, Barshe et al, 2018
58. *L. Sahayi* Bhavsar (2020)
59. *L. laturensis* Kale (2020)

2. MATERIALS AND METHODS:

Several research paper and books referred. Review method.

3. OBSERVATION AND DISCUSSION:

On critical observation of Kankale 2017, following lacunas are found in the research paper

- The author given the size of mature worm is 0.06310 mm in length and 0.165 mm in breadth is seems to be too small and width is greater than the length. Also it is contradictory with the middle part of body measures 0.382 mm in length and 0.165 mm in breadth, which seems to be bigger than the whole worm. The shortest worm is *L. subhapradhi* (Jawalikar 2008) measuring 1.695 mm in length and 2.248 mm in width and longest worm recorded *L. osmanabadensis* by Bhure et al (2010) and 33 mm in length and 2.8 mm in width
- It seems that Kankale (2017) did not have access to the literature of previous 52 species of *Lytocestus,* else she have compared her specimens with 08 species only: viz. *L. indicus, L. birmanicus, L. longicolis, L. marathwadenesis, L.*

allie, L. clariasae, L. naldurgensis, L. caryophyllidae. She have not compared with remaining species which are enlisted in the introduction.

- The number of testicular follicles in the species under discussion has been mentioned to be (925-1000).The range clearly indicates that worms studied were not of the same age. For all most all species described the testicular follicle range, has been given in past but giving cognisance to this parameter has been negated by Sahay, Khalkho, Singh & Mandal (2019) Sahay et.al., (2019) nullified the key to the species of *Lytocestus* proposed by Jadhav, Bhure & Padwal (2008); Solunke, Fadke, Borde & Jawle (2012); Jawle & Borde (2011) based on the number of testicular follicles giving substantial arguments. Sahay et.al., (2019) argued & opined that "Species identification based on the number of testicular follicles is questionable because, the range depicts that the worms in question were not of the same age and that the worms were more than one. If the worms are of the same age the number of testicular follicles should be more or less constant for a species".

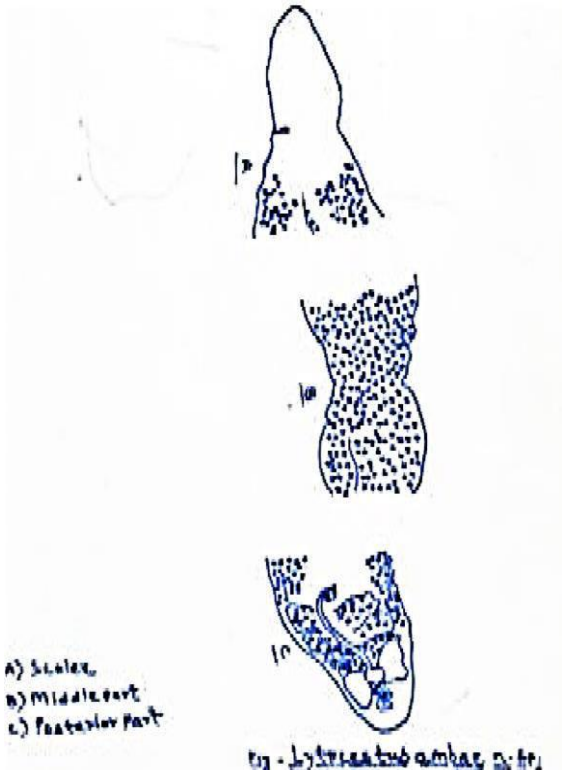

Fig. 1 ***Lytocestus ambae*** **Pg. 243, of IJRBAT, Special Issue (2) Vol- V July 2017**

- The ovary given is H shaped, but in diagram it seems to be **bilobed**. The isthmus is big as per diagram and lobes seems to be **unequal,** having big acini, the ovary measures 0.1325 in length and 0.3154 in breadth, **the measurement is of which lobe** is not clear. The position of the ovary matters for identification of species. For example in the genera *Pliovitellaria* Fischthal (1951) and *Wenyonia* Woodland (1923) ovary is near the middle of the body contrary to rest of the Caryophyllaeids (Lytocestidae sps) where it is by and large clearly posterior. The shape of the ovary too carries meaning as it clearly separate one from another, having the shape of a 'dumb bell' (in Archigetes Leuckart (1878) Hunterella Mackiewicz & McCrae (1962) butterfly (*Breviscolex* Kulakovaskaja (1962), or letters "U" (*Spartoides* Hunter, 1929), "V" (*Bialovarium*, Fischthal, 1954) inverted "A" (Caryophyllaeids Nybelin, 1922) or some variation of "H" (Psedolytocestus, Hunter, 1929) & many other. "Rarely two different forms of ovary occur in the same genus: an exception is *Isoglaridacris* Mackiewicz, 1965 which has both inverted 'A' and normal 'H' morphology"- Mackiewicz, (1965a & 1968b). In Lobulovarium longiovatum Oros et al. (2012) "ovary is H-shaped with several asymmetrical, irregular lobes on dorsal and ventral sides, unite at ovarian isthmus at the level of posterior third of lobes, 0.368-1.122 wide with lateral arms 288-992 long & 111-353 wide, connected by ovarian isthmus". Mackiewicz (1972) holds that "Between the distinctly follicular and compact types many intermediate conditions exist". Further he opines that follicular ovary occurs in some genera (Monobothrioides) but the compact one is not common.
- In the family Lytocestidae the position of uterus with respect to cirrus pouch is an important criteria in both generic and specific level. The author given uterus as branched but in **diagram it don't** seems to be. Also it is stated "Cirrus pouch is oval in shape, medium, obliquely placed in anterior margin or near posterior side, & measures 0.4198 in length and 0.191 in breadth", **not present in diagram**.
- The description of vagina is also **not mentioned**. For identification of *Lytocestus* species the position, coiling, length and openings of vagina is an important criteria.

- The author of *Lytocestus ambae* (2017) forgot to give the measurement of eggs. This indicates that worms studied were not fully grown. The measurement and position of eggs is also an important criterion for *Lytocestus*.
- The period of collection and number of worms also not mentioned.
- Out of 09 references given by author only 05 species matches with description of paper.
- Several spelling mistakes like *C. longicolis, marayhwadensis, L. caryophylid*, etc. and all above points indicates the paper published in hurry.

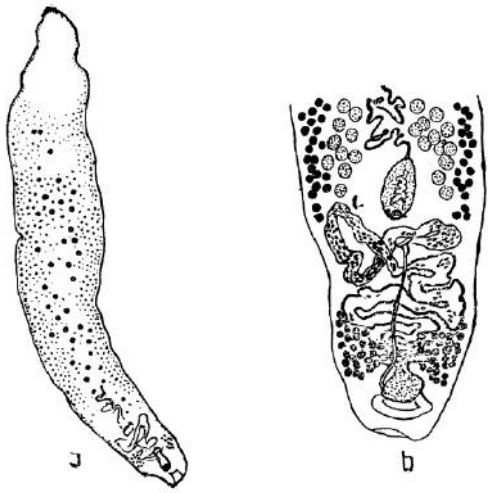

Fig. 2. *Lytocestus indicus* (Moghe 1925) For Reference
a. Entire worm, (After Moghe. 1931).
b. Posterior half of body. (After Rama Devi, 1973)

4. CONCLUSION:

On the above stated grounds, the existence of *L. ambae* becomes doubtful unless the observations made are revised. The claim of Kankale (2017) describing & dealing *Lytocestus ambae* (2017) to be new species is doubtful. Keep the worm in question under uncertae sedis. And request the author of the species to restudy the slides in her possession & clarify the status.

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Morphotaxonomics of Two New Species Of Ptychobothridean Tapeworms From Fresh Water Fishes Of Pune, M.S., India

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Abstract: *The Genus Circumoncobothrium was erected and established by Shinde (1968) with the type species Circumoncobothrium ophiocephali obtained from the intestine of the freshwater fish Ophiocephalus leucopunctatus. It has been subsequently enhanced with over 50 different species by different researchers working at different geographical locations and with a diversity of freshwater fishes. The present communication deals with morphotaxonomical description of two new species; Circumoncobothrium Oreochromisae sp.nov from the intestine of the fresh water fish Oreochromis mozambica at Pashan Lake and Circumoncobothrium shakulwantae sp.nov from the intestine of the freshwater fish Ophiocephalus punctatus at Panshet Lake, Pune, Maharashtra India.Circumoncobothrium Oreochromisae sp.nov, is characterized by; an elongated, conical flask shaped scolex bearing a pair of fleshy bothria; the rostellum armed with 30-34 unequal sized hooks arranged in four distinct quadrants along a single ring; a short squarish neck; squarish and medium-sized mature proglottids with a convex lateral margin; follicular rounded testes 120-160 in number, arranged on both lateral sides of the ovary; bilobed ovary with unequal lobes, connected by a narrow isthmus; follicular vitellaria arranged in 2-3 lateral rows. Circumoncobothrium shakulwantae sp.nov. is characterized by; a large cylindrical scolex tapering at the apex bearing a pair of large ovoid bothria; the rostellum armed with 48-50 hooks of varying sizes arranged in a single ring; presence of an elongated neck; evenly distributed testes, oval, 320-340 in each proglottid; distinctly bilobed post equatorial ovary with unequal lobes connected by a short isthimus; lobulated vitellaria in 1-2 rows. The distinct characters mentioned above, justify the recognition of the two Ptychobothridea as new species.*

Keywords*: Oreochromis mozambica, Ophiocephalus punctatus, Circumoncobothrium Oreochromisae sp.nov, Circumoncobothrium shakulwantae sp.nov Pune.*

1. INTRODUCTION:

The genus *Circumoncobothriu*m was erected by Shinde, 1968 for accommodating *C. ophiocephali* as a type species from the intestine of fresh water fish *Ophiocephalus leucopunctatus.* Since 1968, the genus *Circumoncobothrium* has grown to include more than 50 species by the researchers reporting valid new species from a variety of other freshwater host species from different geographical locations. Chincholikar, 1976 described two new species of this genus *C. shindei* from *Mastacembellus armatus* and *C. bagariusi* from the fresh water fish, *Bagarius* sp.: Jadhav and Shinde, 1976 added two new species to this genus viz. *C. aurangabadensis* and *C. raoii* from *Mastacembellus armatus*. Shinde, 1977 described *C. khami* from *Ophiocephalus striatus*. Jadhav and Shinde 1980 reported *C. gachuai* from *Ophiocephalus gachua.* Jadhav et. al., 1990 described *C. yamaguti* from *Mastacembellus armatus*. Shinde et al., 1994 added *C. alii* from *Mastacembellus armatus*. Patil et al., 1998 described *C. vadgaonensis.* Wongsawad and Jadhav, 1998 added *C. baimaii* from *Mastacembellus armatus*. Shinde and Kalse, 1999 added two new species under this genus viz. *C. armatusae* from *Mastacembellus armatus* and *C. punctatusi* from *Ophiocephalus punctatus.* Shinde et. al., 2002 added *C. mustacembellusae* from *Mastacembellus armatus*. Tat and Jadhav, 2004 described *C. manjari* from *Ophiocephalus gachua*. Supugade et. al., 2005 described *C. vitellariensis* from *Mastacembellus armatus*. Shelke, 2007 added *C. mehdii* from *Mastacembellus armatus*. Kharade et al., 2007 describe *C. cirrhinae* from *Cirrhina mrigala*. Pardeshi, Kalse and Andhare, 2007 added *C. ambajogaiensis,* Borde and Jawale, 2008 described *C. purnae,* Patil, Murhar and Kalse, 2008 added *C. jamdai,* Jawlikar et al., 2008 described *C. yogeshwari,* Patil and Kalse, 2009 added *C. murhari, and* Kalse and Suryawanshi, 2009 added *C. naidui, all from the freshwater fish*

Mastacembellus armatus Menkudale et al., 2010 described *C. thapari* from *Ophiocephalus striatus*. Many other species have since been added from the host *Mastacembellus armatus* - Shah Shabbir, 2010 added *C. paithanensis;* Patel and Kalse, 2011 described *C. inayati;* Kalse and Bhosale, 2011 added *C. sahayi*; Reddy et al., 2011 added *C. hemalatae;* Pardeshi and Hiware, 2011 described *C. jadhavae*. Kadam and Dhole, 2011 added *C. clariasi* from *Clarias batrachus*. Patel and Kalse, 2012 described *C. shabbiri* from *Mastacembellus armatus*. Jadhav et al, 2012 described *C. nandedensis* from *Mastacembellus armatus* Pawar et al., 2012 added *C. sarangkhedensis* from *Mastacembellus armatus*. Sonune and Kasar, 2012 describe *C. chandrabhagae* from *Mastacembellus armatus*. Shinde, 2013 added *C. jadhavi* from *Clarius batrachus*. Fartade and Borde, 2013 described *C. maruliusae* from *Channa marulius.* Sawarkar, 2013 added *C. elichpurii* from *Mastacembellus armatus*. Fartade and Fartade described *C. nathii* from *Channa marulius*. Tambe, 2016 added *C. dnyaneshwarinae* from *Clarius batrachus.* Fartade and Chati 2017 described *C. godavarae* from *Channa marulius.* Shaikh 2017 added *C. jafrabadensis* from *Mastacembellus armatus*. Fartade and Chati 2017 described *C. govindii* from *Channa marulius.* Dandavate 2018 described *C. singhi* from *Clarius batrachus.* Kalse et al., 2018 described *C. jadhavi minor* from *Mastacembellus armatus*. Lakhe, 2018 added *C. devidasensis* from *Mastacembellus armatus*. Shaikh 2018, added *C. gangapurensis* from *Mastacembellus armatus*. Bidyalakshmi and Gambhir, 2019 described *C. morehnus* from *Mastacembellus armatus*. Recently, Khare 2020, has added *C. (postovilata) betwaensis* from *Mastacembellus armatus.* Later on no new species have been added to this genus. The present work was undertaken for investigating the yet unexplored parasite diversity from host species and localities across the Pune region.

2. MATERIAL AND METHODS:

Three specimens of the proposed new species of the ptychobothridean tapeworms *Circumoncobothrium oriochromisae* sp. Nov. were collected from the intestine of a freshwater fish *Oreochromis mozambica ,* at Pashan lake, Pune in the month of December 2008. Nine specimens of the proposed new ptychobothridean tapeworms *Circumoncobothrium Shakulwantae* Sp. Nov were collected from the intestine of the freshwater fish, *Ophiocephalus punctatus* from Panshet dam, Pune, in the month of March 2009. The tapeworms were carefully removed by cutting and examining the gut of the infected host fishes , freshly obtained from the fishermen at the above mentioned localities. The standard procedure was used, which included careful removal of the tapeworms from the host fishes; washing in water, preliminary examination and identification, flattening and pressing of the tapeworms, preservation of the pressed tapeworms in 4% formalin, staining with Harris Haematoxylin and passing the slides through various grades of alcohol for complete dehydration , mounting in DPX after clearing with xylol. The hosts were identified upto genus and species levels. Microphotographs and camera lucida drawings further helped in the identification of the cestode parasite. All the measurements are given in millimeter.

3. DESCRIPTION:

i) *Circumoncobothrium oreochromisae* sp. Nov. (Fig A, B, C, D)

Three specimens of the cestode parasites were collected, from the intestine of a fresh water fish, *Oreochromis mozambica,* at Pashan Lake. The worms are considerably long with a scolex, numerous immature and mature segments. The scolex is elongated, conical flask shaped and measures 0.269 to 0.274 in length and 0.057 to 0.119 in breadth. The scolex bears two bothria which extend completely from the anterior to the posterior end of the scolex and measures 0.205 to 0.208 in length and 0.023 to 0.121 in breadth. The rostellum at the anterior end of scolex is oval in shape and medium sized, transversely elongated, measuring 0.035 in length and 0.055 in breadth. 30-34 rostellar hooks are arranged into four quadrants in a single circle. Hooks are of variable sizes with the longer hooks being present in the centre of each quadrant, smaller hooks measure 0,029 in length and 0,005 in breadth, longer hooks measure 0.067 in length and 0.009 in breadth. The neck is short, broader than long, measuring 0.054 to 0.067 in length and 0.261 to 0.270 in breadth. The mature proglottids are medium sized, squarish with convex lateral margins, anteriorly narrow and posteriorly broad, measuring 0.481 to 0.550 in length and 0.459 to 0.599 in breadth. The testes are follicular, round medium sized 120-160 in number, evenly distributed in two groups on both sides of the ovary. The ovary is distinctly bilobed, medium sized and placed in post-equatorial region of the segment. The ovarian lobes are unequal in size and shape, and connected by an isthimus, with each lobe having many short blunt and round acini. The ovary measures 0.261 to 0.274 in length and 0.108 to o.144 in breadth. The vitellaria are follicular, medium sized, irregular in shape and are arranged in 2-3 rows on each lateral margins, measure 0.036 to 0.049 in length and 0.01 to 0.03 in breadth. The eggs are medium sized, oval and operculated measuring 0.033 to 0.038 in length and 0.015 to 0.020 in breadth.

Type/Species –	*Circumoncobothrium oreochromisae* sp. nov.
Host –	*Oreochromis mozambica*
Habitat –	Intestine
Locality –	Pashan Lake, Pune
No. of specimens –	03 in 3 slides
Holotype –	Deposited in the helminthology research lab
Paratype –	Dept. of Zoology, N.C.R.C.,Chalisgaon, M.S.

Date – 12th December, 2008
Etymology – *Circumoncobothrium oreochromisae* sp. nov. named after the host genus.

DISCUSSION:

The scolex of the parasite is elongated, conical flask shaped. It differs from *C. punctatusi and C. sahayi* that have a rectangular scolex*; C. gachuai, C. baimaii,* and *C. mustacembellusae* that have a pear shaped scolex*; C. dnyaneshwarinae,* that has an ovoid scolex; *C. khami, C. cirrhinae, C. murhari, C. naidui C. paithanensis, and C. nathii* that have a cylindrical shaped scolex; *C. bagariusi* and *C. jadhavae* that have a dome shaped scolex; *C. devidasensis that has a long bluntly rounded scolex;* and all remaining species that have a triangular shaped scolex.

The present species resembles *C. ophiocephali, C. aurangabadensis, C. raoii, C. shindei C. manjari, C. mehdii, C. cirrhinae, C. ambajogaiensis, C. yogeshwari C. paithanensis C. hemalatae C. jadhavi C. maruliusae C. elichpurii C. godavarae C. jadhavi, C. morehnus, C. gangapurensis, C. (postovilata) betwaensis* and *C. devidasensis* in having short neck, however differs from all other species of the *Circumoncobothrium* where neck is absent.

The present species comes closer to *C. aurangabadensis, C. yamaguti, C. punctatusi, C. mustacembellusae, C. manjari, C. ambajogaiensis, C. chandrabhagae, C. jafrabadensis, C. mehdii* and *C. morehnus* in having testes 120-160 in number, however differs from all remaining species of the genus *Circumoncobothrium.*

Follicular vitellaria of the present parasite resembles *Circumoncobothriu*m *ophiocephal, C. bagariusi, C. khami, C. gachuai, C. vadgaonensis, C. armatusae, C. punctatusi, C. mustacembellusae, C. manjari, C. vitellariensis, C. mehdii, C. ambajogaiensis, C. purnae, C. jamdai, C. yogeshwari, C. thapari, C. paithanensis, C. inayati, C. sahayi, C. jadhavae, C. clariasi, C. shabbiri, C. chandrabhagae, C. jadhavi, C. maruliusae, C. nathii C. jafrabadensis, C. gangapurensis, and C. morehnus* however, different from *C. aurangabadensis, C. raoii, C. shindei, C. yamaguti, C. alii, C. baimaii, C. cirrhinae, C. murhari, C. naidui, C. hemalatae, C. sarangkhedensis, C. elichpurii, C. dnyaneshwarinae C. godavarae, C. jadhavi* and *C. devidasensis* is having granular vitellaria.

The host *Mastacebllus armatus* is similar to most of the members of the genus except *C. ophiocephali* from *Ophiocephalus leucopunctatus; C. bagariusi* from *Bagarius* spp.; *C. khami, and C. thapari* from *Ophiocephalus striatus; C. gachuai and C. manjari* from *Ophiocephalus gachuva* from *Ophiocephalus gachua; C. punctatusi* from *Ophiocephalus punctatus: C. cirrhinae* from *Cirrhina mrigala; C. clariasi, C. jadhavi* and *C. dnyaneshwarinae* from *Clarias batrachus; C. maruliusae, C. nathi* and *C. godavarae* from *Channa marulius*

CONCLUSION:

From the above study, it could be concluded that based on the morphological characters the cestode parasite recovered from *Oreochromis mozambica* was found to be belonging to the family Ptychobothridea and the genus *Circumoncobothrium* with enough characters to accommodate these worms into a new species and hence the name *Circumoncobothrium oreochromisae* sp. nov. is proposed after the name of the host genus.

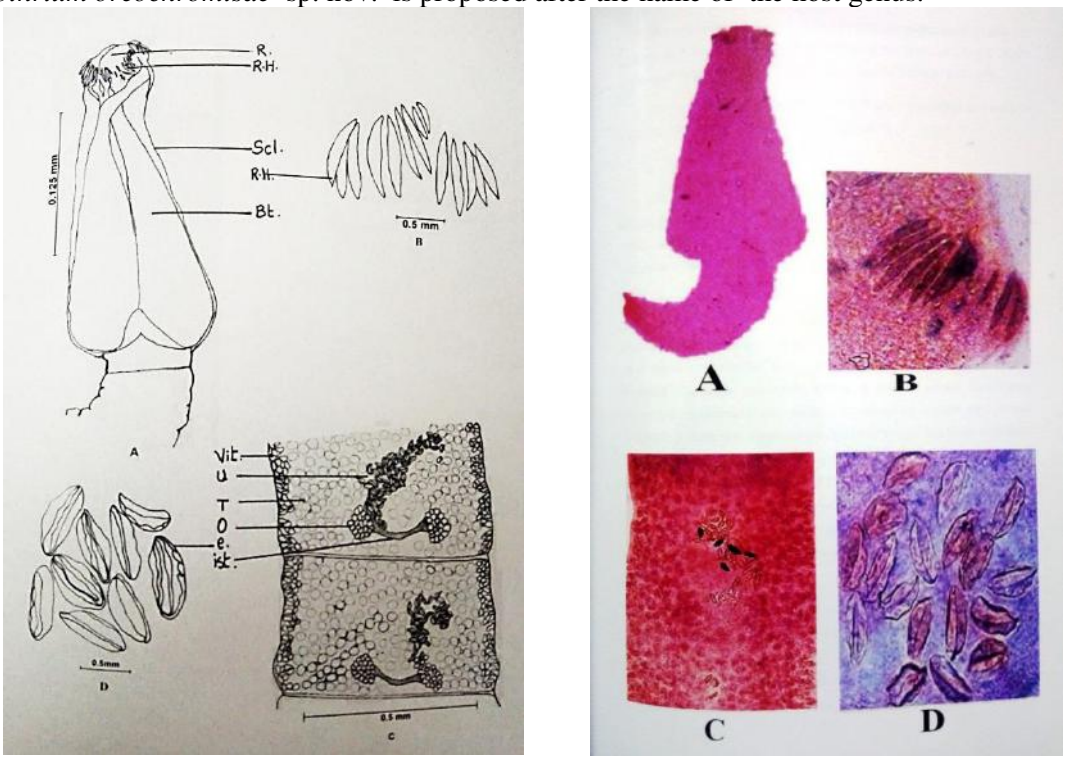

FIG. 1. Camera Lucida Sketch and Microphotographs of *Circumoncobothrium Oreochromisae* Sp. Nov.
A. Scolex; **B.** Hooks; **C.** Mature segments; **D.** Eggs

ii) *Circumoncobothrium shakulwantae* sp. Nov. (Fig A, B, C, D)

Nine specimens of the Ptychobothridean cestode parasites were collected from the intestine of the fresh water fish, *Ophiocephalus punctatus* from Panshet Dam at Pune. The medium sized tapeworms show a distinct scolex and numerous immature and mature proglottids. The scolex is large, cylindrical, slightly tapering at the apex and with a pair of elongated bothria, broad posteriorly and narrow anteriorly. The scolex measures 0.472 in length and 0.157 to 0.225 in breadth. The bothria measure 0.422 to 0.430 in length and 0.031 to 0.085 in breadth. The rostellum at the anterior end of scolex is medium sized, transversely elongated, oval and measures 0.072 in length and 0.166 in breadth. 48-50 rostellar hooks of variable sizes are arranged in a single circle at the anterior end. The longer hooks occupy the centre, while the shorter hooks lie towards the lateral side. The hooks are almost straight or slightly curved, stout and pointed at both ends. The longer hooks measure 0.165 to 0.180 in length and 0.02 to 0.025 in breadth while the shorter hooks measure 0.075 to 0.077 in length and 0.013 in breadth. The neck is distinct, long and rectangular measuring 0.162 in length and 0.112 to 0.148 in breadth. The mature proglottids are of medium size 3-4 times broader than long, rectangular shaped and measure 0.270 to 0.315 in length and 0.890 to 1.103 in breadth. Oval medium sized testes numbering 320-340 are evenly distributed on either side of ovary and measure 0.027 to 0.036 in length and 0.020 to 0.025 in breadth. A distinctly bilobed small ovary is situated transversely in the post equatorial region of the segment. The ovarian lobes are unequal in size and shape and bear many small blunt and rounded acini . the ovary measures 0.058 to 0.085 in length and 0.067 to 0.103 in breadth. Large sized and oval, lobulated vitelllaria are arranged in 1 to 2 rows on each lateral side from anterior to the posterior margin of each proglottid. They measure 0.018 to 0.049 in length and 0.018 to 0.023 in breadth. Oval medium sized operculated eggs are seen in the gravid segment and they are 0.125 to 0.135 in length and 0.060 to 0.070 in breadth.

Type/Species –	*Circumoncobothrium shakulwantae* Sp. Nov.
Host –	*Ophiocephalus punctatus*
Habitat –	Intestine
Locality –	Panshet Dam, Pune
No. of specimens –	09 on 9 slides
Holotype –	Deposited in the helminthology research lab
Paratype –	Dept. of Zoology, N.C.R.C.,Chalisgaon, M.S.
Date –	19th March, 2009
Etymology –	*Circumoncobothrium shakulwantae* Sp. Nov. named in honor of authors mothers name.

DISCUSSION:

The scolex of the parasite is cylindrical in shape it differs from *C. punctatusi and C. sahayi* that have a rectangular scolex*; C. gachuai, C. baimaii,* and *C. mustacembellusae* have a Pear shaped scolex*; C. dnyaneshwarinae,* that have a ovoid/oval scolex;; *C. bagariusi* and *C. jadhavae* having Dome shaped scolex; *C. alii, C. vadgaonensis, C. armatusae, C. manjari, C. vitellariensis, C. mehdii, C. ambajogaiensis, C. purnae, C. jamdai, C. yogeshwari, C. thapari, C. inayati, C. hemalatae, C. clariasi, C. sarangkhedensis, C. chandrabhagae, C. jadhavi, C. maruliusae, C. jafrabadensis, C. jadhavi, C. gangapurensis, C. morehnus, C. (postovilata) betwaensis* in having scolex triangular in shape.

The present species is having 48-50 hooks comes closer to *C. raoii, C. khami, C. shindei, C. baimaii, C. punctatusi, C. manjari, C. vitellariensis, C. ambajogaiensis, C. purnae, C. thapari, C. inayati, C. clariasi, C. devidasensis* and *C. morehnus*

The present species is having short neck resembles *C. ophiocephali, C. aurangabadensis, C. raoii, C. shindei C. manjari, C. mehdii, C. cirrhinae, C. ambajogaiensis, C. yogeshwari C. paithanensis C. hemalatae C. jadhavi C. maruliusae C. elichpurii C. godavarae C. jadhavi, C. gangapurensis, C. morehnus, C. (postovilata) betwaenesis,* and *C. devidasensis*, while differs from all other species of the *circumoncobothrium* where neck is absent.

The present species is having testes 320-340 in number comes closer to *C. cirrhinae*, only while differs from remaining all species of the genus *Circumoncobothrium.*

Only the present cestode has lobulated vitellaria while *C. ophiocephal, C. bagariusi, C. khami, C. gachuai, C. vadgaonensis, C. armatusae, C. punctatusi, C. mustacembellusae, C. manjari, C. vitellariensis, C. mehdii, C. ambajogaiensis, C. purnae, C. jamdai, C. yogeshwari, C. thapari, C. paithanensis, C. inayati, C. sahayi, C. jadhavae, C. clariasi, C. shabbiri, C. chandrabhagae, C. jadhavi, C. maruliusae, C. nathii C. jafrabadensis, C. gangapurensis and C. morehnus* is with follicular vitellaria, while *C. aurangabadensis, C. raoii, C. shindei, C. yamaguti, C. alii, C. baimaii, C. cirrhinae, C. murhari, C. naidui, C. hemalatae, C. sarangkhedensis, C. elichpurii, C. dnyaneshwarinae C. godavarae, C. jadhavi* and *C. devidasensis* is having granular vitellaria.

In having the host *Ophiocephalus punctatus* it is similar to *C. punctatusi* but differs from most of the other species in having the host *Mastacembellus armatus;* differs from *C. ophiocephali* which has host *Ophiocephalus leucopunctatus;* it differs from *C. bagariusi* from the host *Bagarius* spp.; it differs from *C. khami, and C. thapari* from the host *Ophiocephalus striatus;* differs from *C. gachuai and C. manjari* obtained from *Ophiocephalus gachua* differs

from *C. cirrhinae* obtained from *Cirrhina mrigala;* differs from *C. clariasi, C. jadhavi* and *C. dnyaneshwarinae* obtained from *Clarias batrachus; and* differs from *C. maruliusae, C. nathi* and *C. godavarae* obtained from *Channa marulius*

CONCLUSION:

From the above study, it could be concluded that based on the morphological characters the cestode parasite recovered from *Ophiocephalus punctatus* was found to be belonging to the family Ptychobothridae and the genus *Circumoncobothrium* with enough characters to accommodate these worms into a new species and hence the name *Circumoncobothrium shakulwantae* Sp. Nov. named in honor of author's mother's name.

The present work also indicates that the helminth (Cestode) parasites are distributed in the gut of economically important freshwater fishes and there is always the possibility of their transfer to the human beings by consumption of infected fishes.

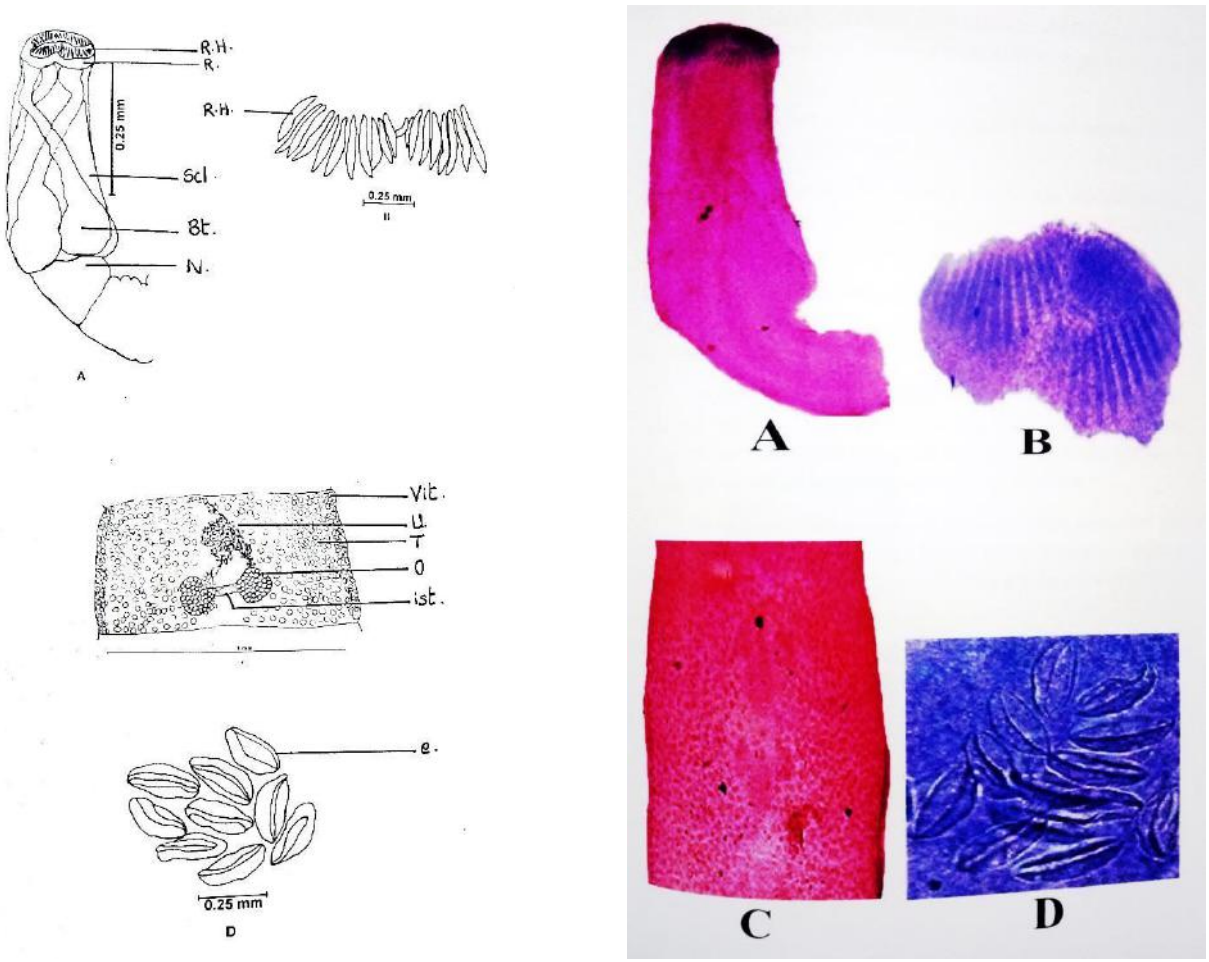

FIG. 2. Camera Lucida sketch and Microphotographs of *Circumoncobothrium shakulwantae* sp. nov.
A.Scolex; **B.** Hooks; **C.** Mature segments; **D.** Eggs

4. ACKNOWLEDGMENTS:

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Study Of Cestode Parasite Population In Fresh Water Fish *Mastacembellus Armatus* From MIDC Lake Of Dhule District (M.S.)

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Abstract: *The present study was carried out to study the population study of cestode parsites from M.I.D.C.Lake.of Dhule evaluation was based on the study of fresh water fish Mastacembellus armatus from July. 2016 to March. 2017. The Fish host examined for the cestode infection in the present study depended largely on their availability in MIDC Lake of Dhule District Dhule. The host examined from these localities include fresh water fishes. Fshes were procured with the help of fisher man from MIDC Lake at Aavdhan village. Parasites collected from the exposed digestive tract and other parts of the fish the worms which could be seen with the naked eyes were picked up with the help of a forceps. Worms were stored in fresh 4% formalin formalin. The fixed worms were stored in fresh fluid of 70% alcohol, 5% formalin and 5% glycerine. photography is made by Canon 3600 Camera.*

Key words *: Mastacembellus armatus Cestodes, parasites, M.I.D.C.Lake, Avdhan,*

1. INTRODUCTION:

The Indian subcontinent has very rich sources of inland water bodies in the form of rivers, lakes and reservoirs. These areas offered a wide variety of suitable habitats to fishes. There are several hundreds of fish species in wetlands of Indian continent (Jones and Sarovini, 1955). The lakes are used for effective utilization of water for irrigation, fisheries and other sort of aquacultures. Rivers, reservoirs and lakes form the important aquatic resources harboring large number of living aquatic animals, which are economically important for nature as well as human being. These aquatic animals are includes mollusks, crustaceans and fishes; which are large and economically important in the aquatic ecosystem. In the productive capacity of water body the important bottom fauna as a link in the energy flow from primary production to fish and other aquatic animals field has been stressed and considerable studies on biodiversity and diversity of aquatic animals from different water bodies of India have been carried out during the last few decades. The bottom fauna are also play an important role in the mineralization and recycling of organic matter. The aquatic plants and animals are bringing about changes in the food web of a fresh water aquatic ecosystem (Kamble and Kamble, 2009). India has contributed more than 30 % of the total fish production, (Jayabhaye et al., 2006). Fishes constitute almost half the total number of vertebrates. Of 39,900 vertebrate species recognized the world over 21,723 are living species of fish under 4044 genera, 445 families and 50 orders of which 8411 are of fresh water and 11,650 marine species. In the Indian region alone of 2500 species, 930 are freshwater inhabitants and 1570 are marine (Jayaram, 1999).

Fishes have a great significance in human diet. Production of fish should be increased to cope the food supply with increasing human population. It grows without his labour and he reaps where he sows not. The importance of fish in diet lies in the chemical composition of the flesh, which is rich in protein and minerals like calcium, phosphorous and iron and vitamins A and D (Lohar, 1998). Some fishes in addition have varying quantities of fats and oils. All these are essential for health of man and they have a good taste and are easily digestible. Fishery is also important from socio-economic point of view as it has the potential of providing employment to people.

2. MATERIAL AND METHOD:

Fish collection: The Fish host examined for the cestode infection in the present study depended largely on their availability in MIDC Lake of Dhule District Dhule. The host examined from these localities include fresh water

fishes.The fishes were procured with the help of fisher man from MIDC Lake at Aavdhan village. From the Dhule District of Maharashtra state.

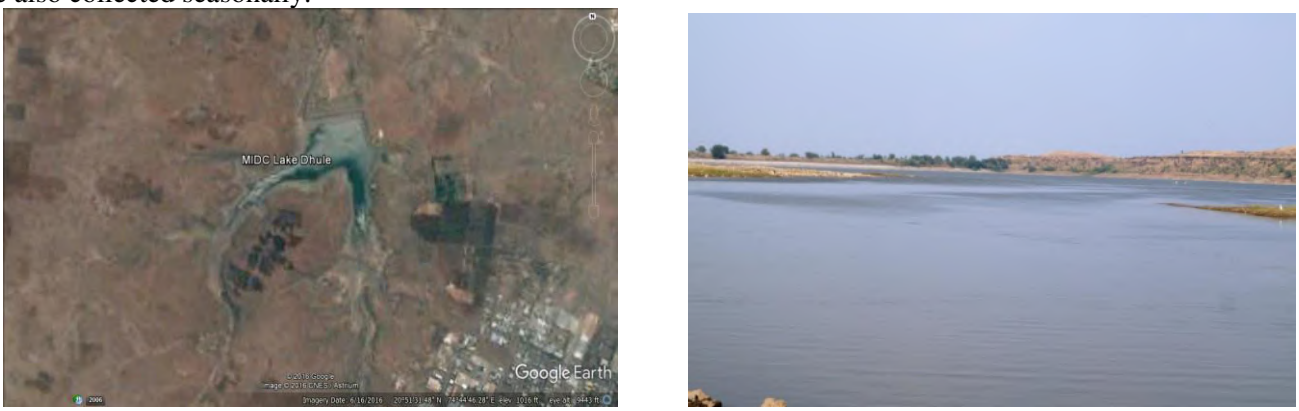
Parasite collection:-From the exposed digestive tract and other parts of the fish the worms which could be seen with the naked eyes were picked up with the help of a forceps and placed in a petri dishes containing distilled water. Parasites covered with mucus thoroughly washed with saline and then water.

Flattening: The collected cestode worms were cut in small pieces for convenience then they were flattened by using two glass slides and tied with the help of thread by gentle pressing and kept in 4% formalin overnight for fixation and flattening.

Preservation:-The flattened worms were stored in fresh 4% formalin formalin. The fixed worms were stored in fresh fluid of 70% alcohol, 5% formalin and 5% glycerine.

Preparation for Microscopic examination:-The preserved cestode first kept in water for some times to remove the formalin and then stained with Harris Haematoxylin / Delafield Haematoxylin. The stained cestode were passed through various alcoholic grades, cleared in xylols, mounted in DPX and whole mount slides were prepared for anatomical studies.

TOPOGRAPHY M.I.D.C. lake (20^0 51' 40.18"N and 74^0 44' 52.09"E) located near of Dhule city Maharashtra. Lake is basically utilized for supply of drinking water to M.I.D.C. Dhule and near by villages and irrigation, fisheries. Fish were also collected seasonally.



Satelite and photografic veiw of collection site

Mastacembellus armatus

3. OBSERVATIONS AND RESULTS:

Reports on the helminthes parasites of the alimentary tract and body cavity of the host are available from various countries like USSR, Poland, Bulgaria, Rumania, France, Australia and Hungary. Notable contributions were made by Elton C.S. (1927), Ferguson (1943), Cole (1954), Dobson (1961 and 1974), Thomas (1963), Dogiel *et. al.,* (1954 and 1969), Johnson (1964), Kennedy (1967, 1969, 1971, 1972, 1974, and 1975), Anderson (1974), Raghvender Rao (1978), William Dennis (1979), Rajeshwara Rao (1983 and 1984), Dhar (1992), Dobson and Roberts (1994 and 1995), Lee and Foster (1995), Moller *et al.* (1995), Mpoame and Agebede (1995) and Khan (2004) have contributed largely to this aspects of study.

During the last few years, moderate work was done in India on the population dynamics of helminth parasites in vertebrates. Valuable contributions were made in this field in homiotherms by R. P. Mittal (1980) on rats and mice in relation to incidence and intensity of nematode parasites. Aruna Kumari (1985) on birds and Susheela (1987) on parasites of rats, Raghavender Rao (1978) on snakes, Rama Reddy (1980) on garden lizards and V. Rajeshwaran Rao (1981) on amphibians.Significance of the annual seasons was first reported by Khovski (1929) who has studied the influence of various annual seasons on the infection of the trematoda in the Volga district USSR.Since, helminths are member of complex biota, an understanding of population structure and behavior has resulted in the emergence of population dynamics and community structure as major branches of animal Helminthology.

A) Population study of Cestode parasites in freshwater fishes from MIDC lake Dist. Dhule, M.S., India, During July 2016toMarch 2017 The study of parasites of fresh water fishes has been undertaken to investigate the phonological and innate factors such as seasons and their effects upon the incidence, intensity and density of cestode and nematode parasites of the hosts.

No attempt was made to study the nature of helminth population in a fresh water fish of MIDC lake district Dhule, M.S., India. An attempt was made on the suggestion of Prof. S.A. Patil to study the population dynamics of cestode parasites. Only statistical study of cestode and nematode parasites was undertaken with the freshwater fishes. and the period During July 2016 to March 2017 with special reference to incidence of infection, intensity density and Index of infection and its seasonal variation.

Formulae

$$\text{Incidence of infection} = \frac{B \times 100}{A}$$

$$\text{Intensity of infection} = \frac{C}{B}$$

$$\text{Density of infection} = \frac{C}{A}$$

$$\text{Index of Infection} = \frac{B \times C}{A^2}$$

Where A stands for the number of hosts examined, B for number of host infected and C for number of parasites collected.

I. Population study of cestode parasites in fresh water fishes during the Year july-2016to January-2017 from MIDC Lake Dist. Dhule, M.S., IndiaThe statistical data is purely related with the various places like local market of MIDC lake from Dhule District. M.S. of the year July-2016 to March - 2017 was collected.

Table shows the data of number of fish examines number of fish infected, number of cestode collected, their seasonal variation, incidence, intensity, density of infection and index of infection in the July -2016to January, 2017 from MIDC Lake Dist. Dhule M.S., India.Fresh water *Mastacembellus armatus* during july-2016 to Mar. 2017 in MIDC lake District Dhule M. S.

Month & Year	No. Of host intestine Examined A	No. Of Infected Intestine B	No. of Cestode collected C	Incidence (%)Of Infection Bx100/A	Intensity Of Infection (C/B)	Density of infection (C/A)	Index 0f infection BxC/A^2)
July.2016	10	05	12	50	2.4	1.2	0.6
Aug.2016	10	04	11	40	2.7	1.1	0.44
Sept.2016	10	04	09	40	1.5	0.9	0.36
Oct.2016	10	04	05	40	2.2	0.5	0.2
Nov.2016	10	03	05	30	1.7	0.5	0.15
Dec.2016	10	02	03	20	1.5	0.3	0.06
Jan .2017	10	02	05	20	2.5	0.5	0.10
Feb .2017	10	05	05	50	1.0	0.5	0.25
Mar.2017	10	06	09	60	1.5	0.9	0.54

TABLE- II: - Table shows Seasonal variation of, Incidence, Intensity& Density of Cestode infection in *Mastacembellus armatus* during july-2016 to Mar. 2017 in MIDC lake District Dhule M. S.

Sr. No.	Seasons`	Total intestine examine A	Total infected intestineB	No. of Parasites collected C	Incidence (%)Of Infection Bx100/A	Intensity Of Infection (C/B)	Density of infection (C/A)	Index 0f infection BxC/A^2)
1	July-Sep.	30	12	32	43	5.6	2.6	1.2
2	Oct.-Dec.	30	09	13	30	4.8	1.1	0.3

3	Jan.-Mar	30	13	19	43	4.3	1.3	0.5
Total		90	34	64	38.66	4.9	1.66	0.66

Chart Shows Recorded Data of Cestode parasites collected from Fresh water fish *Mastacembellus armatus* during February -2011 to January -2012 MIDC lake

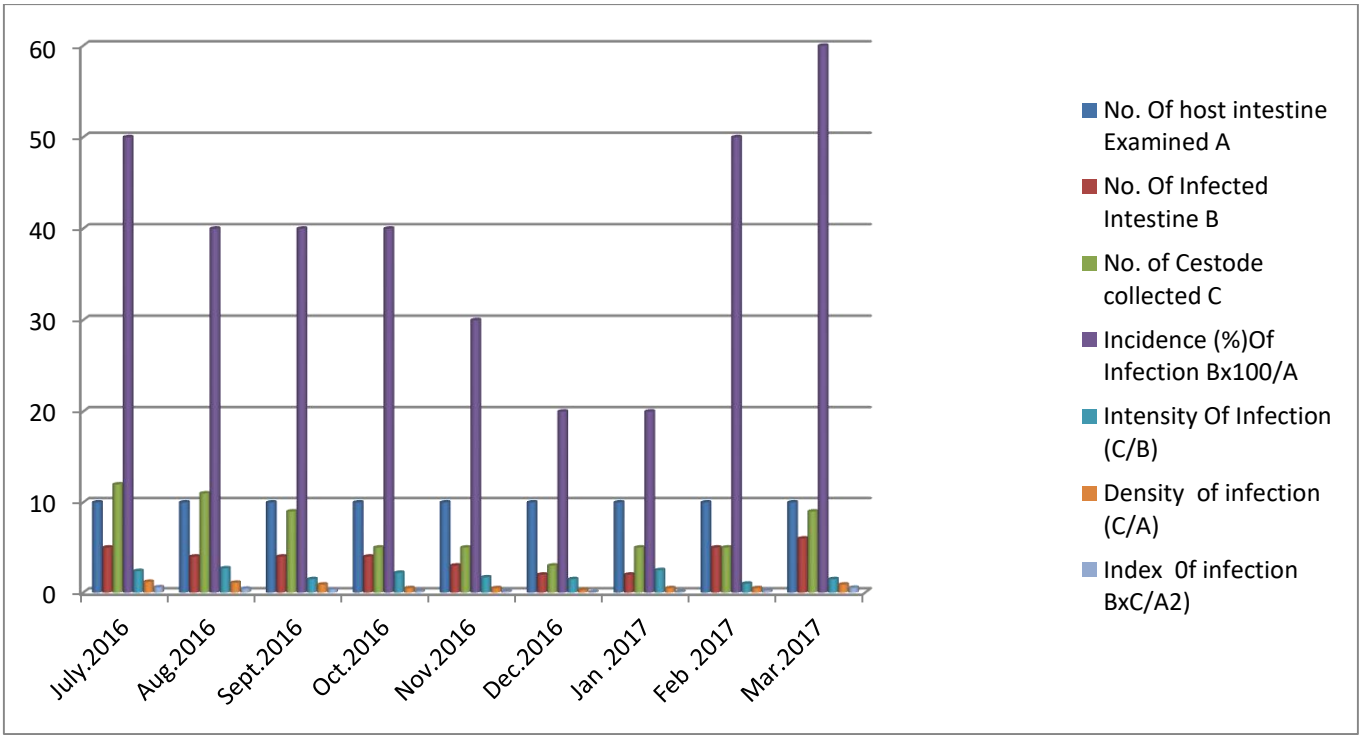


Chart shows Seasonal variation of Total intestine, infected intestine and Incidence of Cestode infection in *Mastacembellus armatus* during july-2016 to Mar. 2017 in MIDC Lake District Dhule M. S.

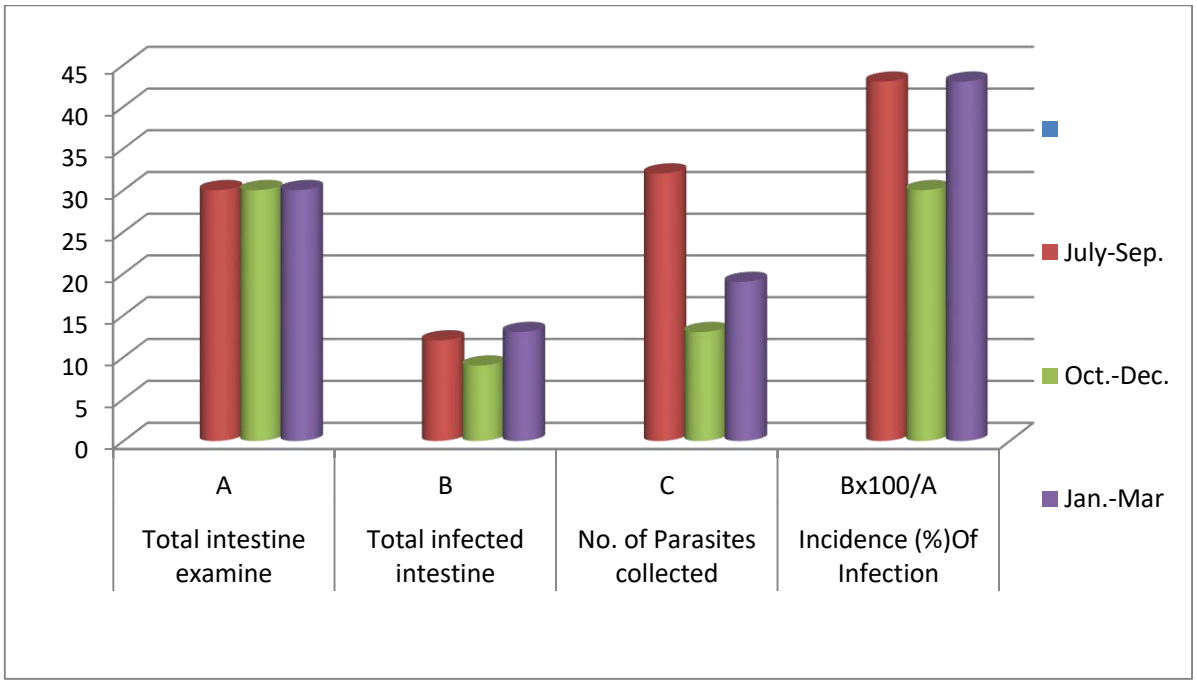
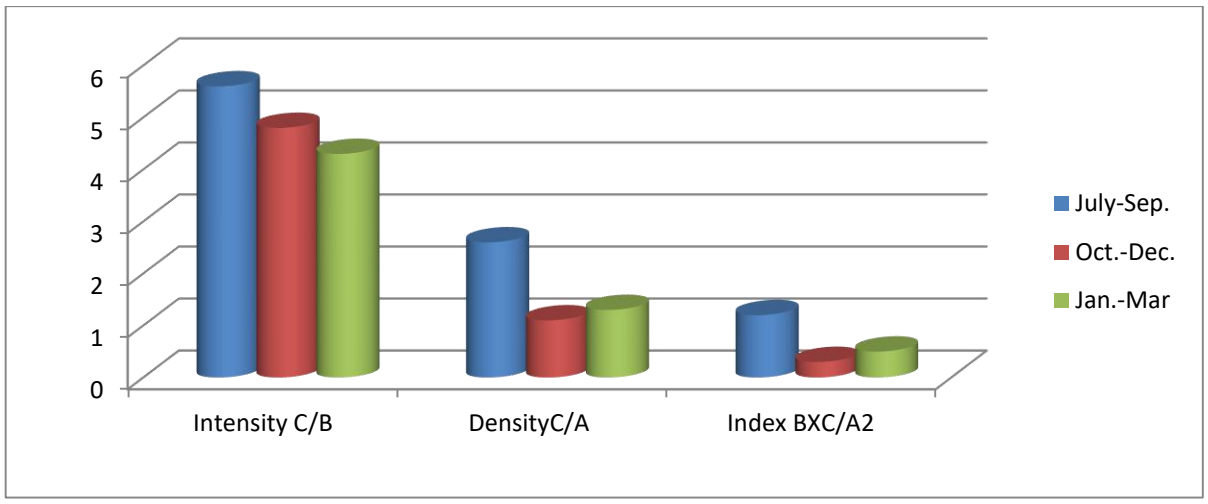


Chart shows Seasonal variation of Intensity Density and index of Cestode infection in *Mastacembellus armatus* during july-2016 to Mar. 2017 in MIDC lake District Dhule M. S.



4. CONCLUSION:

The infection of cestode parasites in fishes are heavy in post summer season and pre monsoon than winter from M.I.D.C. Lake Dhule during the year June 2016 to March 2017

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Critical Evaluation of *Lucknowia Mastacembeli* Bidyalakshmi and Gambhir, 2019

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Abstract: *A new Caryophyllidean Cestode Lucknowia mastacembeli was reported by Bidyalakshmi et al. (2019) which they claimed to have recovered from the intestine of Mastacembelus armatus (L.) a fish host at Moreh, Manipur. The description is too scanty and suffers from a number of lacunae such as demarcation line at the base of scolex, the commencement of testicular and vitelline follicles not shown in the camera lucida drawing, male & female genital openings not shown in the drawings as well as in photomicrographs, provided a table of comparison between Lucknowia fossilisi (Gupta, 1961) Ash et al. (2011); Lucknowia microcephala (Bovien,1926) Ash et al. (2011) and not with the original description of Lucknowia fossilisi described by Gupta (1961), vide. Hel. Soc. Washington vol.* ***28(1):*** *38-50. They failed to compare the claimed n. sp. Lucknowia mastacembeli with Lucknowia ovocompactum Singh, Sharma and Rastogi (2001).The present authors have critically assessed the placement of Lucknowia mastacembeli & suggested molecular characterization in addition to morphotaxonomy after studying large number of specimens.*

Keywords: *Lucknowia mastacembeli, status, critical review, synonym.*

1. INTRODUCTION:

Caryophyllaeids (Cestode) are unique in having a single set of reproductive organs within a non-segmented body, showing progenesis, using aquatic oligochaetes (tubificid annelids) as their intermediate host. Some authors considered that they originated from procestode stock (Freemann, 1973; Dubinina,1980). Kulakovaskaya and Demshin (1978) and considered them to have originated from acoelomate turbellarian larvae and branched out at the beginning of Paleozoic era as parasites of aquatic vertebrates.

Whatever the case it may be, these are interesting group of cestodes having unique morphology evolutionary status, genetic stability showing high degree of endemism. Only *Archigetes sieboldi* Leuckart (1878) and *Glaridacris catastomi* Cooper (1920) are represented from more than one geographical region.

Mackiewicz (1982) held that monozoic condition is an evolutionary dead end which has reached its full potential in Caryophyllaeids as a result, progenesis had played a major role in the evolution of Caryophyllaeids.

There are four families of Caryophyllaeids viz;

I. Caryophyllaeidae Leuckart (in Luhe, 1910)
II. Lytocestidae Wardle and McLeod (1952)
III. Capingentidae Wardle and McLeod (1952)
IV. Blanotaenidae Mackiewicz and Blair (1978)

Under the family Lytocestidae as many as twenty genera have been reported. These are:

1) *Lytocestus* Cohn (1908)
2) *Caryophyllaeids* Nybelin (1922)
3) *Balnotaenia* Johnston (1924)
4) *Monobothrioides* Fuhrmann and Baer (1925)
5) *Djombangia* Bovien (1926)
6) *Lytocestoides* Baylis (1928)
7) *Bovienia* Fuhrmann (1931)
8) *Stocksia* Woodland (1937b)

9) *Khawia* Hsu (1935)
10) *Notolytocestus* Johnston and Muirhead (1950)
11) *Atractolytocestus* Anthony (1958)
12) *Lucknowia* Gupta (1961)
13) *Crecentovitus* Murhar (1963)
14) *Markevitschia* Kulakovaskaya and Akhmerov(1965)
15) *Caryoaustralus* Mackiewicz and Blair (1980)
16) *Thallophylius* Mackiewicz and Blair (1980)
17) *Moravekia* Sahay (1979)
18) *Neolytocestus* Sahay (1979)
19) *Introvertus* Satpute and Agarwal (1980b)
20) *Lobulovarium* Oros *et al.* (2012)

A key to these genera have been provided by Singh and Sahay (2007) which excludes number 2, 14 and 20 out of the above genera, some have fell into synonymy (mentioned ahead). The genus *Balanotaenia* was raised to the family rank by Mackiewicz and Blair (1978).

The genus *Lucknowia* was established by Gupta (1961) for specimens of a Carypophyllid Cestodes which he recovered from the intestine of *Heteropneustes fossilis* of river Gomti, Lucknow, India. The species of *Lucknowia* being *L.fossilisi.*

Many of the cestodes described as independent species were later considered by Ash (2012) synonyms of *Lucknowia fossilisi* Gupta (1961). These are:

1) *Capingentoides singhi* Verma (1971)
2) *Pseodocapingentoides* Verma (1971)
3) *Capingentoides moghei* Pandey (1973)
4) *Capingentoides heteropnuesti* Gupta and Sinha (1979)
5) *Pseudocapigentoides cameroni* Gupta and Sinha (1984)
6) *Capingentoides fotedari* Gupta and Parmar (1985)
7) *Pseudocapingentoides gomatii* Gupta and Parmar (1990)
8) *Psuedocaryophyllaeus heteropneustus* Chandra and Khatum (1993)
9) *Pseudoadenoscolex fossilis* Mathur and Srivastava (1994)
10) *Pseudoheteroinvertati kamgarhensis* Srivastav and Khare (2005)
11) *Capingentoides vachai* Pandey, Dubey and Mittal (2007)
12) *Sukhpatae prithvipurensis* Srivastav, Khare and Sahu (2007)
13) *Pseudoneckinverta chirgaonensis* Srivastav, Narayan and Singh (2008)
14) *Crecentovitus biloculus* Murhar (1963)
15) *Lucknowia ovocompactum* Singh *et al.* (2001)
16) *Lytocestus heteropneustii* Tandon, Chakravarty & Das (2005)
17) *Lytocestus jagtai* Tripathi, Singh & Mishra (2007)

Ash (2012) did not forward any candid argument towards the above synonymy except for saying that in some cases "the newly proposed species is identical in its morphology with *Lucknowia fossilisi* Gupta (1961).

Or on the basic of "non recovery of the species from which it was recovered earlier by a particular host."

At present the authors do not agree with Ash (2012), synonymising above 17 species with *Lucknowia fossilisi* Gupta (1961).

In all probability, following are the species falling under the genus *Lucknowia*.

1) *Lucknowia microcephala* Bovien (1926)
2) *L.fossilisi* Gupta (1961)
3) **Lucknowia fossilis* Singh (1975)-originally described as *Lytocestus fossilis*.
4) *L.raipurensis* Satpute and Agarwal (1980b)
5) *L.indica* Niyogi, Gupta and Agarwal (1982) **-**considered by Ash (2012) to fall under *Bovienia* hence named *B.indica.*
6) ***L.ovocompactum* Singh, Sharma and Rastogi (2001)**-**kept by Singh, Mandal & Sahay (2020) as species under 'Incertae sedis'.
7) *L.mastacembeli* Bidyalakshmi and Gambhir (2019) under present discussion.
8) **L.jagtai* Tripathi *et al.* (2007)**-** originally described as *Lytocestus jagtai*.

It is to be noted that Mackiewicz (1981) has pointed out the error in the original description of *L.fossilisi* Gupta (1961) as he studied the slides provided by Gupta (1961) such as:

i) The tapeworm were contracted and their scolex were deformed
ii) Ovarian follicles were erroneously considered as vitelline follicles.
iii) A seminal receptacle was not observed.

iv) The eggs were incorrectly described to possess filaments which are absent.

Despite all these Ash *et al.* (2011) held *Lucknowia* a valid genus although Hafezullah (1993) considered *Lucknowia* to be synonym of *Lytocestus* and designated it *Lytocestus fossilisi* Gupta (1961)**.**

Although Agarwal (1985) opined that cortical post ovarian vitellaria in *Lucknowia fossilisi* Gupta (1961) is the characteristic of *Lucknowia.* Sadaf *et al.* (2011) agreed with Agarwal (1985).

It is to be noted that Ash *et al.* (2011) did forward some plausible reasons while considering *Crecentovitus biloculus* (Murhar,1963) a synonym of *Lucknowia fossilisi* Gupta (1961) as *C.biloculus* and *L.fossilisi* Gupta (1961) "Share the body of similar shape, digitiform scolex rounded as its anterior extremity with the anterior arms longer than posterior ones and a comparatively short neck region."

Hafezullah (1993) however, retained Murhar's species valid but under the genus *Bovienia* Fuhrman (1931) to which Ash *et al.* (2011) did not agree as *Bovienia* has vitelline follicles limited to lateral side of body where as in *C.biloculus* these are present also medially Ash *et al.* (2011).

*Since the validity of *Lytocystus fossilis* Singh (1975) &*Lytocestus jagtai* Tripathi *et al.* have been questioned by Tandon *et al.* (2005) & Sahay & Ekka (2019) respectively, hence not included here.

**Singh, Mandal & Sahay (2020)- Kept the species under Incertae sedis – The abstract of the paper has been sent to Patna University Conference which unfortunately could not be held due to lockdown.

Ash *et al.* (2011) also held *Lucknowia microcephala* Bovien (1926) valid.

Lucknowia indica Niyogi *et al.* (1982) was synonimized with *Bovienia serialis* Bovien (1926) by Hafezullah (1993). But the synonymy was held invalid by Ash *et al.* (2011) on the following grounds when compared with original description of *B.serialis* Bovien (1926). *B. serialis* Bovien (1926) differ from *B.indica* in:

i) Posterior extent of vitelline follicles, with follicles absent posterior to cirrus sac in *B.indica*, versus follicles reaching well posterior to the cirrus sac, near to the anterior arms of the ovary.

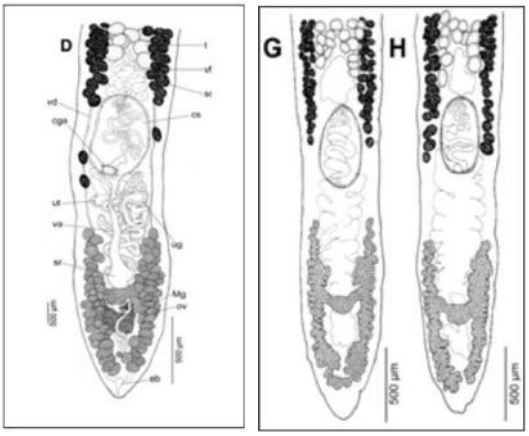

FIG.1. *B.indica* Posterior part of the body.
(from Journal Parasitology Vol. 97(3), 2011)

ii) Shape of the scolex which is widest in the middle part and is markedly wider than the neck in *B.serialis* whereas it has almost the same width throughout its length, being just slightly wider than the neck in *B.indica.*

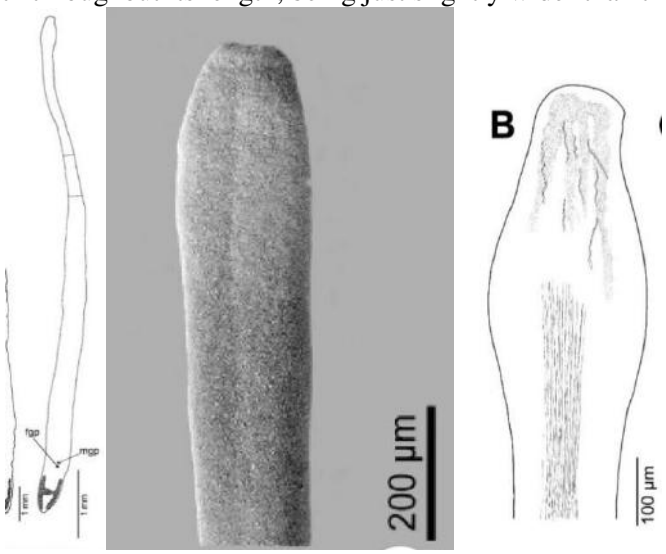

FIG.2. Scolex (Ref. ii above)

iii) Length of neck which is markedly longer in *B.indica* than in *B.serialis*

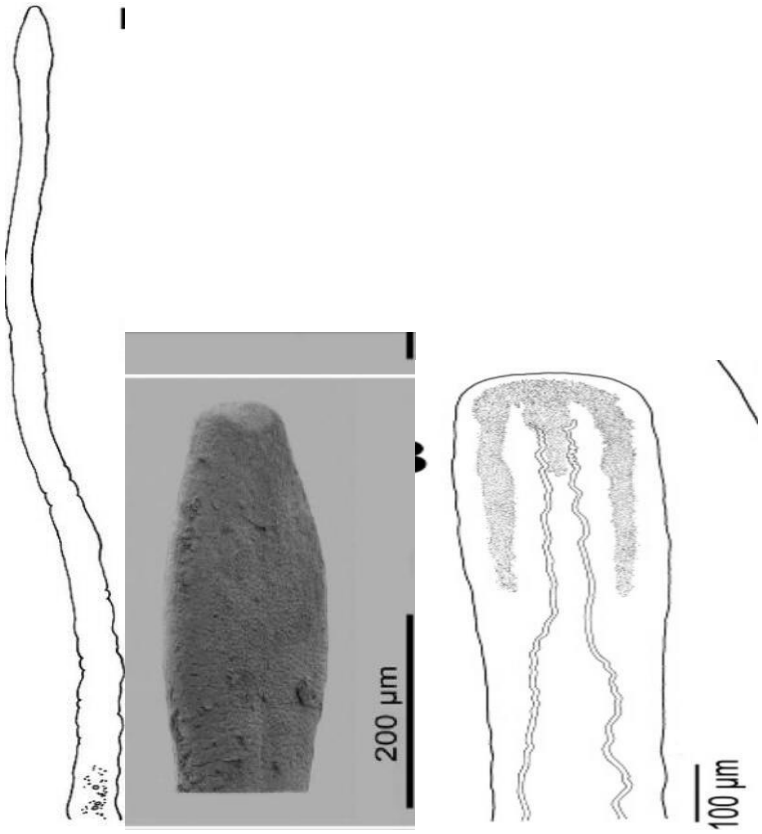

FIG.3. scolex (ref. iii above)

iv) Absence of a common genital atrium in *B.serialis*

However, Ash *et al.* (2011) seem to have agreed to the synonymy of all *Bovienia* species recorded of Indomalayan region to be conspecific with *B.indica* (=*Lucknowia indica*).

Similarly *Introvertus raipurensis* Satpute and Agarwal (1980) was also considered to belong to *Bovienia* by Hafezullah (1993) and Ash *et al.* (2011) most probably ignoring PAGE protein profile of *Lucknowia indica* and *Introvertus raipurensis*- a work done by Niyogi *et al.* (1985) following method of Ornstein (1964) and Davis (1964) Sadaf, Jha and Sahay (2011) held the genus and species of *Lucknowia* valid as they took the protein profile into cognizance.

2. MATERIAL AND METHODS:

Original research papers have been consulted & few slides observed.

The aim of the present author is to judge if the species described by Bidyalakshmi and Gambhir (2019) as *Lucknowia mastacembeli* is valid or not and point out the errors committed by these authors while describing the species from Manipur.

3. DISCUSSION & CONCLUSION:

Some errors inadvertently committed while describing *Lucknowia mastacembeli* are as follows:

1) A demarcation line has been shown at the base of the scolex. (vide Fig. 4)
2) Commencement of vitellarial follicles and that of testicular follicles not shown.
3) Male and Female genital openings not clear in photomicrograph and camera lucida drawings.
4) The table provided on page 30981 (*Int. jour. Recent Scientific Research)* 2019 shows a comparison of the specimens with that of *Lucknowia fossilisi* Gupta (1961) & *L.microcephala* Bovien (1926) Ash *et al.* (2011). The author have failed to compare the specimen with the original description of *Lucknowia fossilisi* provided by Gupta in (1961) published in [*Hel.Soc.Washington.***Vol.28(1)**:38-50] rather they compared their specimens with the description provided by Ash (2011).
5) A number of names of authors *viz*, Monticelli (1982); Southwell (1930); Ben in Olssen (1893); Leuckart (1878); Moghe (1925); Woodland (1926); Cohn (1908); Moghe (1931) have been mentioned in text of *Lucknowia mastacembeli* (?) but not included in the reference rather irrelevant references of Kundu (1992); Bindu (2009), Yamaguti (1959) have been given

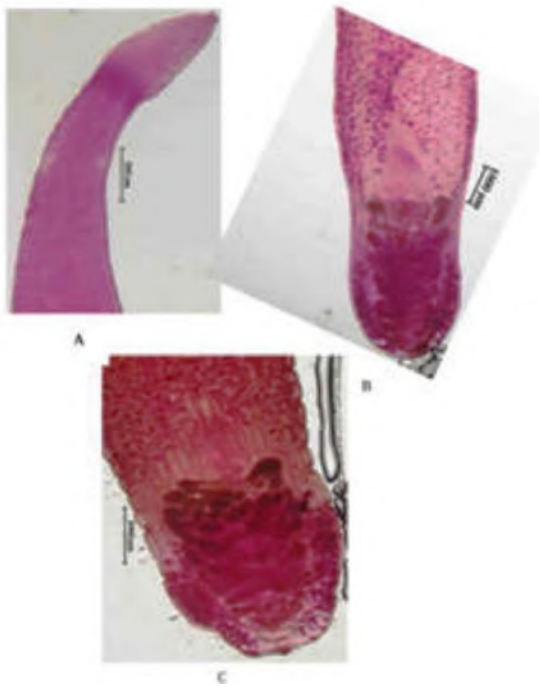

FIG. 1- *Lucknowia mastacembeli* Bidyalakshmi and Gambhir (2019)
(A) Anterior end with undifferentiated scolex, **(B)** Posterior end showing reproductive organs
(C) Posterior end of another specimen.
(taken from the research paper of Bidyalakshmi and Gambhir (2019)

Ash (2011) separated *Lucknowia* from *Bovienia* on grounds that in *Lucknowia* vitelline follicles gets intermingled with medullary testes & that Bidyalakshmi *et al.* (2019) took advantage of this character as an important one & placed their worms in *Lucknowia* where as intermingling of vitellaria with medullary testes is not the characteristics features of *Bovienia* (vide Ash,2011). **Only "one" character (cortical vitellaria intermingling with medullary testes separated the two genera *Lucknowia* Gupta (1961) and *Bovienia* Bovien (1926) becomes questionable.**

The authors feel that some other characters too such as ovary is H shaped in *Bovienia,* inverted A shaped in *Lucknowia,* cortical vitellaria extending upto post end in *Lucknowia fossilisi* supported by Agarwal (1985) etc should also have been given cognizance while separating the two genera. The best would be molecular characterization of the two.

The table provided by Bidyalakshami *et al.* (2019) shows that *L.fossilisi Gupta* (1961) [described by Ash (2011)] has previtelline part of the body long (represented 1/5th of the total body length), similar was the situation in their collection (*Lucknowia mastacembeli* ?), "Long-represent -1/4-1/5th of the total body length.

1. Body length of *L.mastacembeli* (?) 33-50 & that of *L.fossilisi* (Gupta 1961), (Ash (2011) is 15-45. The later range very well fits in the previous one. But in *L.microcephala* it is unusually large (60), body length can differ, as it is dependent on nutrition & various other factors.
2. Testicular follicles: In *L.fossilisi* (Gupta, 1961), (Ash *et al.* 2011), *L.microcephala* (Bovien, 1926) and in the specimens claimed to be *Lucknowia mastacembeli (*?) are medullary hence there is no difference.
3. Scolex in *L.microcephala* & *L.mastacembeli* (?) are lanecolate hence there is no difference.
4. Ovary shape: In all the cases in Tabular chart for *L.fossilisi* (Gupta, 1961), (Ash *et al.* 2011); *L.microcephala* (Bovien,1926), (Ash *et al.* 2011) & so called *L.mastacembeli (*?) is inverted 'A' shaped.
5. Posterior extent of vit. follicles in *L.microcephala* (Bovien,1926) (Ash *et al.* 2011) & that in claimed sps. are absent.

It is necessary to point out here that the present authors have not taken into consideration **Lucknowia ovocompactum* Singh *et al.* (2001) because the species has been kept by Singh *et al.* ***(*2020) under "Incertae sedis". Even then if it is compared with claimed new species of *Lucknowia mastacembeli* differences are too many.

Therefore, the authors are left with the following options:

1) Consider *Lucknowia mastacembeli* a synonym of *Lucknowia microcephala* (Bovien, 1926) (Ash *et al.* 2011).
2) Request the authors of the claimed new species *Lucknowia mastacembeli* to re-examine after collection of a large number of specimens from the host *Mastacembelus armatus,* provide cross section of the worm to assess the vitellarial position with respect to testicular follicles and for its correct placement. The cross section will provide information about vit. follicles intermingling with testicular follicles.
3) Undertake molecular characterization in order to correctly assess the position of the Cestode & its correct placement.

4) It is to be noted that in *Lucknowia fossilis* Gupta (1961), the vitelline follicles extends upon the posterior extent – characteristic of *Lucknowia,* the photomicrograph and camera lucida drawing provided by Bidyalakshmi & Gambhir of *Lucknowia mastacembeli* (?) does not show this character, and ovary is not 'A' shaped but similar to *L.indicus* (Moghe 1925) cortical in posterior position of the body in specimens of *Lucknowia mastacembeli.* These two characters drag the worm to be a synonym of *L.indicus* Moghe (1925).
The present authors support the last view.

*Kept under – Incertae sedis: In *L.ovocompactum* Singh *et al.* 2001 ovary is follicular, lobed & posterior in position just behind ootype but a compact mass: whether it is cortical or medullary has not been mentioned. Besides oviduct, common vitelline duct & ducts from receptaculum seminis open separately in ootype has been mentioned in *L.ovocompactum* which is against the character of Caryophyllaeid Cestode - Singh *et al.* argued.
** Under Print.

CHART: 1 Comparative chart of *Lucknowia* species described by Gupta (1961); Ash *et al.* (2011)

Parameters	***Lucknowia fossilis* Gupta (1961)**	***Lucknowia fossilis* Gupta (1961); Ash *et al.* (2011)**	***L.microcephala* Bovien (1926); Ash *et al.* (2011)**
Body	Elongated flat with no trace of internal or external segmentation	Long, slender, taper towards ant. end	Long, slender upto 60 mm x 1.8 - 2.5 mm) at the level of CS
Length x Breadth	5.8-6.78 x 1.13-1.3 wide in ant. region of CS	15-45 width upto 1.6 at CS level	-
Head	Stumpy, bluntly rounded & markedly narrower than body0.348-0.59 x 0.21-0.48 with neck like constriction 0.522-1.218x 0.365-0.73	Scolex-digitiform 278-527 x 210-480 not clearly distinguished from long neck, covered with capilliformfilitrichs (1.600 nm x 150 nm) with flexible cap longer than base (950 nm versus 650 nm)	Scolex-long, lanceolate 414-624 wide, slightly wider than long neck.inn. long mus well developed
Cylindrical body	4.35-5.22 x 1.13-1.3 posteriorly rounded	Bears filitrichs 1900 nm x 90 Nm	-
Excr. System	Posteriorly to form thick walled vesicle	Well-developed anastomosed mainly in post. part of body	-
Testicular follicles	Numerous 0.13-0.18 x 0.07-0.13 round or brodly oval, median bounded laterally by vit.follicles. Commence slightly posterior to ant.vit. follicles, upon caudal region of vesiculaseminalis	Medullary 167-209, spherical 65-148 x 50-140, position of ant. mostfolli. Variable 2.4-8.4 mm post. to first vit.follicle, pre test. region 1/4-3/5 i.e, 26-58%	Medullary 425 in number precise no. difficult to count follicles 73-196 x 69-149, commence at 0.1 to 4mm post to ant. most vit., testicular field reach vas def, rarely with 1-2 testes alongside and half of CS, pre test. region -1/3 of body length.
Vas differens	Loosly convoluted ant. to cirrus sac	-	-
Outer sem.vesicle	Absent	-	-
Cirrus Sac	Large ovoid placed medially 0.34-0.43 x 0.27-0.31	Large,oval 236-701 x 211-479	Large, oval 513-711 x 340- 530
Vesicula Seminalis Interna	Fills entire space of CS	-	-
Ovary	Transversely elongated extends laterally on to vit. glands	Follicular, close to post. Extremity, A shaped (inverted) post.arm. connected to each other, arms 1.1-3.5 mm x 111-444	Follicular, close to post. extremity H-Shaped with post arms bend inwards, A shaped with post arms connected, arms 1.6-2.7 mm x 203-506
Ov.isthmus	0.34-0.38	-	-
Ovarian follicles	0.2-0.25 x 0.15-0.17	-	-

Oviduct	Arise from left side of medium portion of ovary & open at ootype	-	-
Vit.glands/ follicles	Irregular, circular or oval, lateral extends at a distance of 1.04-1.91 from ant.end upto excr.bladder 0.06-0.14 x 0.05-0.1	Numerous 73-134 x 27-103, mostly cortical, some follicles penetrate ILM where as others present in medulla, ant. Most folli. Begin at 2.5-8.5 mm from ant. extremity of scolex, upto ant. most ovarian follicles Pre vit. part-1/8 i.e; 13-26% of total length	Numerous 48-121 x 40-84 mostly cortical penetrating between ILM, some even medullary. Ant. most foll. commence at 11.6-20.0 mm from ant.end of scolex extend upto 1/3 ant.part of uterus, previt. part 1/3 of total length. POV absent
Genital Aperture	At the beginning of last 7th of body	Separate, open to genital atrium	Separate open to shallow genital atrium
Cirrus opening	Separate from utero-vaginal pore but close to it	-	-
Uterovaginal pore	Common 0.09-0.1, below cirrus sac at 0.78-1.14 from post.end	-	-
Vagina	Straight, slightly convoluted extends from vag.poreupto a little anterior of ovary & open at ootype	Tubular slightly sinuous	Slightly sinuous
Rec.seminis	Absent	Oblong 78-143 x 40-67 dorsal to ovarian isthmus	Oblong 142-175 x 76-91 Dorsal to ovarian isthmus
Ootype	Oval, large on ventral side of ovary, receives opening of oviduct vit. duct & ducts of shell gland 0.13-0.18 x 0.11 x 0.12	-	-
Uterus	Arise from posterior side of ootype, compactly coiled, post to ovarian isthmus & run uptoexcr.bladder, never extend beyond CS, walls glandular, opening of uterus lies on left side of veginal opening in female GENITAL ATRIUM	Forms many loops between ovary and post margin of cirrus sac, pre ovarian part with numerous glands except for most distal (terminal) loops, uterine area 1.5-5.9	Forms many loops between ovary & post. margin of CS, pre ovarian part with numerous glands, uterine area long 2.0-3.4 mm
Eggs	Oval thick shelled 0.017-0.018 x 0.01-0.11 with polar filament 0.02-0.026 in length	Oval, unembryonated operculate 30-38 x 27-30	Oval, unembryonated operculate 38-42 x 29-33 (34-37 x 20-24)
Host	*Heteropneustesfossilis*	*H.fossilis, C.batrachus, Channastraita, E.vacha*	*Clarias (batrachus, gariepinus), Mystus cavasius*
Location	Intestine	-	-
Locality	Gomti River Lucknow, India	Gomti River Lucknow, India Assam, Maharashrta, U.P, Bangladesh, Nepal	W.Bengal, Balurghat, Malbazar, Siliguri, Jhargram, Java, Indonesia, Combodia and many other places.
Remarks – 1 nanometer – 0.0000010 mm			

Comparative chart of character of some genera of the family *Lytocestidae*

Parameters	**According to Yamaguti, 1959**		**According to Gupta**	**According to Ash *et al.*.2011**
	***Lytocestus* Cohn, 1908**	***Bovienia* Fuhrman, 1931**	***Lucknowia* Gupta, 1961**	***Lucknowia* (Gupta,1961), Ash *et al.*. 2011**
Body	Elongated tapering anteriorly	Elongated, flattened conical at two extremeties	-	Long & slender with maximum width at level

				of cirrus sac tapering towards anterior region
Scolex	Undifferentiated	Undifferentiated	Scolex unspecialized varying little in shape & not broader than remainder of the body	Long, digitiform to slightly lonceolate
ILM	In a ring around testis	-	-	Well developed formed by large bundles of muscle fibres
Testes	In broad median field of pre-uterine medulla	Numerous in median field of ant. part of body	-	Medullary
Vas deferens	Convoluted leading into a compact parenchymatous mass not sharply demarcated from surroundings and containing numerous dorso-ventral muscle fibres in which the thin walled wide ejaculatory duct is winding	Strongly convoluted behind testes	-	-
Cirrus	With strongly muscular wall opening into deep narrow mid ventral pit	Ductus ejaculatorious or (cirrus ?) thick walled winding covered inside with spines ♂ pore anterior to vaginal pore	Cirrus sac & uterovaginal canal open separately at beginning last 7th of the body	Large, oval
Ovary	Bilobed with lateral lobes outside of inner long muscle sheath	H-shaped large	Ovarian follicles cortical commissure / isthmus medullary	Conspicuously follicular close to posterior extremity with posterior arms shorter than anterior ones, H-shaped with post. arms bent inward or inverted A shaped with post . arms connected
Vitellaria	Surrounding inn. long muscle sheath in testicular zone	Extending from head end to near ovarian lobes	Cortical and extending upto Posterior end ofbody	Numerous, mostly cortical with few follicles medullary
Post.ov.vit. folli.	Absent	-	-	Absent
Uterus	Looped behind shell gland & then closely coiled between ovary and male terminalia where it is surrounded by tall radiating accompanying cells	Closely coiled between male aperture & ovarian complex	Uterine & vaginal pores common uterine coils much convoluted compactly coiled behind ovarian isthmus & not extending anterior to cirrus sac, uterine glands present	Forms many loops between ovary & post. margin of CS, preovarian loops surrounded by numerous glands except for most distal part uterine region long
Vagina	Provided with a layer of accompanying cells opening mid ventrally behind cirrus	-	-	Tubular, slightly sinuous

Receptaculum vaginis	-	Distinct	Absent	Present
Eggs	-	-	-	Oval, unembryonated, operculate
Excr. Bladder	-	-	Terminal	Excr. canals well developed, anastaomosed, broad & conspicuous, mainly in post. part of body
Parasitic in	Bigonoporate Mormyrid & Siluroid fishes	Bigonoporate	Bigonoporate	Bigonoporate, male & female Genital pore open separately in a shallow genital atrium

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Bio-Systematic Studies On *Cotugnia Kalpitae N. Sp.* (Cestoda: Davaineidae) From Songir, (M.S.)

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Abstract: *The genus Cotugnia was erected by Diamare (1893) with the speciesC.diagonopora collected from domestic fowl. Six specimens, of the cestode parasites, were collected from the intestine of a domestic fowl, Gallus gallus domesticus. The present cestode have medium scolex,quadrangular in shape.The rostellum is armed with numerous hooks, The testes 150 to 160 (155) in number,ovary multilobed, medium in size,ootype small,rounded.It was compared and differs from five species*

Key words: *Cotugnia, Gallus gallus domesticus, ovary.*

1. INTRODUCTION:

The genus *Cotugnia* was erected by Diamare in 1893, with its type species *C. digonopora* (Pasquale, 1890) collected from the domestic fowl, *Gallus gallus domesticus.* In 1909 Fuhrmann added *C. polycantha.In*1924 Meggitt added *C. cuneata tenuis, C. joyeuxi and C. parva was added by* Baer in 1925.*C. fleari was added by* Meggitt, 1927.*C. bahli, C. intermedia*, *C. noctua was added by* Johri, 1934.*C. magna by* Burt, 1940.*C. aurangabadensis and C. columbae was added by* Shinde, 1969. *C. shrivastavi by* Malviya and Datta, 1970. *C. satpulensis,* Malhotra and Kapoor, 1983. *C. yamaguti,* Shinde, Jadhav and Kadam, 1985. *C. rajivji,* Jadhav, Kadam, Bawane and Nanware, 1994. *C. kamatiensis,* Kharade and Shinde, 1995. *C. chengmaii,* Wongsawod and Jadhav, 1998. *C. manishae,* Shinde and Mahajan, 1999. *C. mehadii,* Mahajan, 1999 . *C. ganguae,* Shinde, Kolpuke and Begum, 1999. *C. alii,* Shinde, Pawar and Garud, 2002. *C. singhi,* Pawar, Shinde and Garad, 2004. *C. lohaensis,* Jadhav and Gore, 2004. *C. shillodensis,* Jadhav, Khadp and Thorat, 2004. *C. shankare,* Tat and Jadhav, 2005. *C. liviae,* Patil, Lakhe, Pawar and Shinde, 2005. *C. streptopelii,* Jadhav, Makne, Pawar and Pawar, 2009. *C. indiana,* Kasar, Bhure, Nanware and Sonawane, 2010. *C. hafeezi,* Nanware, Dhondge and Bhure, 2010. *C. tetragona,* Nanware, Dhondge and Bhure, 2011. *C. orientalis*, Nanware, Dhondge and Bhure, 2011. *C. murhari,* Sanap, Patil and Siddiqui, 2011.*C. mohekarii,* Shukla, Bhavare, Borde and Mohekar, 2012. *C. jadhavii,* Shukla and Bhavare, 2012. *C. diamarei*, Nanware and Bhure. 2013. *C. osmanabadensis*, Pathan, Bhure and Mule, 2014. C.gallusensis,Patil and Kalse,2017. C.gallusae by Shaikh,2018 and C.shindeae by Patil,Kalse and Patole, 2019.After that no one species are added under this genus.Following description deals with the new species Cotugnia kalpitae added under the genus Cotugnia,which was collected from the intestine of domestic fowl,Gallus gallus domesticus at Songir.(M.S.).

2. MATERIALS AND METHODS:

Six specimens, of the cestode parasites, were collected from the intestine of a domestic fowl, *Gallus gallus domesticus on the 16th* November, 2011.All these cestode were collected,flattened,fixed,preserved in 4% formalin and washed with the help of tap water,stained with Harris haematoxylene,dehydrated in various alcoholic grades,cleared in xylol and mounted in DPX. Drawings were made with the help of Camera Lucida and microphotographs were taken by digital camera.All measurements are in millimeters.The identification is made with the help of Systema helminthum.Slides are deposited in the research laboratory.

3. RESULTS AND DISCUSSION:

Description (Based on six specimens: Figs.A, B & C) All the cestode were long having the Scolex, it is medium in size, almost quadrangular in shape and measures 0.500 to 0.541 in length and 0.438 to 0.562 in breadth. The scolex bears an armed rostellum and four suckers. The rostellum is medium in size, oval in shape and measures 0.103 in length and 0.048 in breadth. The rostellum is armed with numerous hooks, which are arranged in a single circle. The four

suckers are medium in size, round in shape and are slightly overlapping each side and measure 0.192 to 0 .274 in diameters. The neck is short, square in shape and measures 0.233 to 0.247 in length and 0.171 to 0.199 in breadth. The mature segments are with double set of reproductive organs in each segment, which is large in size, broader than long, almost 2 to 3 times broader than long, with convex lateral margins, narrow anteriorly broad posteriorly, the segment measure 0.103 to 0.125 in length and 0.281 to 0.300 in breadths.The testes are 150 to 160 (155) in number, small in size, oval in shape, scattered in mid posterior side of the segment, evenly distributed, and measure 0.006 to 0.009 in length and 0.003 to 0.006 in breadth. The cirrus pouch on each side is medium in size, placed centrally in the middle of each segments narrow proximally, wide distally and measures 0.022 to 0.028 in length and 0.016 to 0.019 in breadth.The cirrus is thin, slightly contained within the cirrus pouch and measures 0.025 to 0.028 in length and 0.003 to 0.006 in breadth. The vas deferens is thick, long, curved and measures 0.062 to 0.072 in length and 0.003 to 0.006 in breadth.

The ovary on each side is multilobed, medium in size, lobes more or less equal in size and shape with irregular margin & are placed in the middle of the segments and measures 0.109 to 0.122 in length and 0.047 to 0.053 in breadth. The vagina is a thin tube, ventral to the cirrus pouch, start from the genital pore extends transversally, runs obliquely to anterior side, reaches and opens in to the ootype and measures 0.119 to 0.131 in length and 0.003 to 0.006 in breadth. The ootype is small in size, round in shape, anterior to the ovary and measures 0.003 in diameter. The genital pores are small in size, oval in shape, bilateral in arrangement, placed at anterior one third regions of the segment and measure 0.019 to 0.025 in length and 0.006 to 0.009 in breadth.

The gravid segments are large in size, broader than long, almost three and half times broader than long with convex lateral margin and measure 0.115 to 0.135 in length and 0.369 to 0.412 in breadth. The uterus is saccular, large, occupy middle portion of the segment and contain numerous eggs. The eggs are large in size, oval in shape and measure 0.068 to 0.082 in length and 0.041 to 0.055 in breadth.

The worm under discussion is having numerous number of hooks and the number of testes 150 to 160 comes closer to *Cotugnia digonopora*. (Pasquale, 1890), Diamare, 1893, *Cotugnia noctua* Johri, 1934, *Cotugnia magna* Burt, 1940, *Cotugnia aurangabadensis* Shinde, 1969, *Cotugnia mehadii* Mahajan, 1999, *Cotugnia ganguae* Shinde, Kolpuke and Begum, 1999, *Cotugnia hafeezi*, Nanware, Dhondge and Bhure, 2010 but differs from them, in many characters, as follows:

1. The present tapeworm, differs from *Cotugnia digonopora*,Pasquale, 1890, Diamare, 1893, in the diameter of scolex 1.5, diameter of rostellum 0.15, number of testes 100 to 150 and in the length of cirrus pouch 0.300.
2. The present cestode, differs from *Cotugnia noctua*, Johri, 1934 in the diameter of scolex 0.51, diameter of rostellum 0.225, in the number of testes 170 to 182, in the length of cirrus pouch 0.176 to 0.200 and reported from Columba intermedia.
3. The present tapeworm, differs from *Cotugnia magna*, Burt, 1940, in the length of scolex 0.58 to 0.62, in the length of rostellum 0.285 to 0.315, in the number of testes about 150, in the length of cirrus pouch 0.238 to 0.270 and reported in the host *Columba livia.*
4. The present worm, differs from *Cotugnia aurangabadensis*, Shinde, 1969, in the length of scolex 0.729 X 0.483, in the length of rostellum 0.419 X 0.300, in the number of testes 135 to 140, in the length of cirrus pouch 0.107 to 0.162 and reported in the host *Columba livia.*
5. The present cestode, differs from *Cotugnia mehadii*, Mahajan, 1999, in the length of scolex 0.985x1.516, in the length of rostellum 0.129x0.182, in the number of testes 140 to 150, in the length of cirrus pouch 0.530 and reported in the host *Gallus gallus domesticus.*
6. The present tapeworm differs from *Cotugnia ganguae*, Shinde, Kolpuke and Begum, 1999, in the length of Scolex 0.529 to 0.636, in the length of rostellum 0.189 to 0.216, in the number of testes 155 to 160, in the length of cirrus pouch 0.260 to 0.273 and reported in the host *Corvus splendens.*
7. The present cestode, differs from, *Cotugnia hafeezi*, Nanware, Dhondge and Bhure, 2010, in the length of Scolex 1.22-1.08, in the length of rostellum 0.395x0.32,in the number of testes 150-160 and reported in the host *Gallus gallus domesticus.*

The above noted characters are enough, to erect a new species, for these worms and hence the name *Cotugnia kalpitae* n. sp. is proposed after the locality.

Taxonomic summary

Type species:	*Cotugnia kalpitae* n. sp.
Host	*Gallus gallus domesticus(Linnaeus,1758)*
Habitat	Intestine
Locality	At. Songir, Tal. & Dist. Dhule, M.S., India
Holotype and paratype	Deposited in the Helminth Research Lab. Dept. Of Zoology, N.Y.N.Chavan ASC College, Chalisgaon, Dist. Jalgaon(M.S.)
Date of collection	16th November 2011

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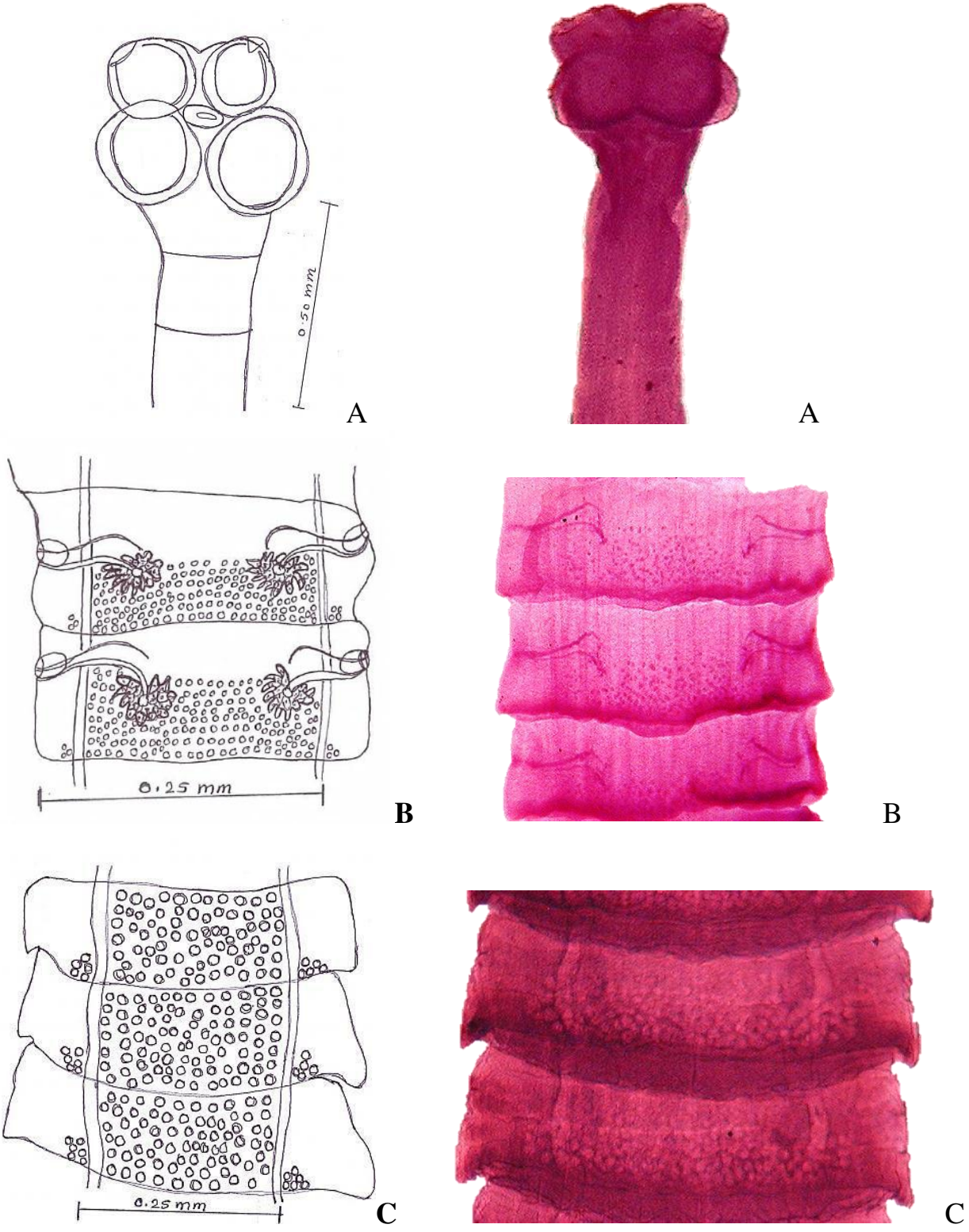

FIG: 1. Camera Lucida And Microphotograph Of *Cotugnia kalpitae* n. sp.

A- Scolex, B- Mature segment, C- Gravid segment

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Histopathological Study Of *Lytocestus* Species Infection In Host Intestine *Clarias Batrachus* (L) From Kham River, Aurangabad (M.S) India

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Abstract: *In the present investigation occurrence and pathological changes caused by cestode parasites Lytocestus Species in the intestine of fresh water fishes, Clarias batrachus (Linn.) from Kham river, Aurangabad (M.S) India are studied. The worm Lytocestus Sp. attached to the intestine of host Clarias batrachus. In T.S. of intestine of Clarias batrachus it has been observed that the cestode attached to the intestinal layer and slowly damaged the host intestinal villi, invaded deep and sucking the content in the region of villi.*
Keywords: *Clarias batrachus, Histology, Kham River, Lytocestus.*

1. INTRODUCTION:

The term 'host-parasites relationship' correctly designates an intimate interaction, between two or more distinct organisms, in which the one benefits while causing damage to the others. The study of parasites and parasitism is without an end. One could go on and on like this as the various aspects are not only important but quite interesting too. What about the host-parasites and parasites-parasites relationship as also the relationship between the definitive and intermediate hosts of the parasites.

The Caryophyllidean cestodes produce disease to the fishes by inducing mild irritation, inflammation between the folds, thinning of intestinal walls and sometimes death resulting from dysfunctioning of intestinal mucosa. The other remarkable feature of the Caryophyllidean cestodes is the presence of prominent secretary glands which are used by the parasites for establishment. The structure and function of scolex glands in different species of Caryophyllidean cestodes were studied in detail by Hayunga (1979) and Hayunga and Mackiewicz (1988). They reported that the scolex glands were more developed in those species, which lack attachment organs and suggested that the secretion of the glands was used by the parasite to adhere to the host intestine.

The host parasite relationship has studied by Mitra and Shinde, 1980 of *Amoebotaenia indiana* and *Hymenolepis nana* by Bailey, 1951. The establishment and distribution of *Raillietina cesticillas* in the fowl was by Foster and Daughtery, 1959, cestode relationship of hill stream, fishes was observed by Chauhan and Malhotra, 1981. Host various parasite responses were described Mitchell, 1981. Histopathological changes were also observed *Moniezia* from *Capra hircus* (L.) by Nanware and Jadhav, 2005, *Circumncobothrium* and *Senga* from *Mastacembalus armatus* by Fartade Asawari and Sunita Borde, 2011 and Marine Cestode from marine fish by Anarse Sandeep and Borde Sunita, 2012. Noteworthy work was carried out on histopathological changes caused by cestode parasites by Mackiewicz *et al.,* 1972, Molnar et al., 2003, Rubela et al., 2006, Williams, 2007, Jadhav et al., 2012, and Laxma Reddy and Benarjee, 2014.

The foregoing literature survey clearly reveals that Caryophyllidean parasites cause considerable damage and therefore great economic losses to the fishermen. Thus, these groups of parasites require attention of parasitologists to develop an integrated control programme.

The present communication deals with the study of histopathology of *Lytocestus* species infection in host intestine *Clarias batrachus* from Kham River, Aurangabad (M.S) India.

2. MATERIAL AND METHODS:

For the histopathological study, intestines of fishes were dissected to observe the rate of infection. Some fishes were found to be infected and some non-infected. Both infected and non-infected hosts intestine were dissected and

fixed in Bouin's fluid to study histopathological changes. The fixative inhibits the post mortem changes of the tissues. Then tissues were washed, dehydrated through alcoholic grades, cleared in xylene and embedded in paraffin wax (58-62°C).

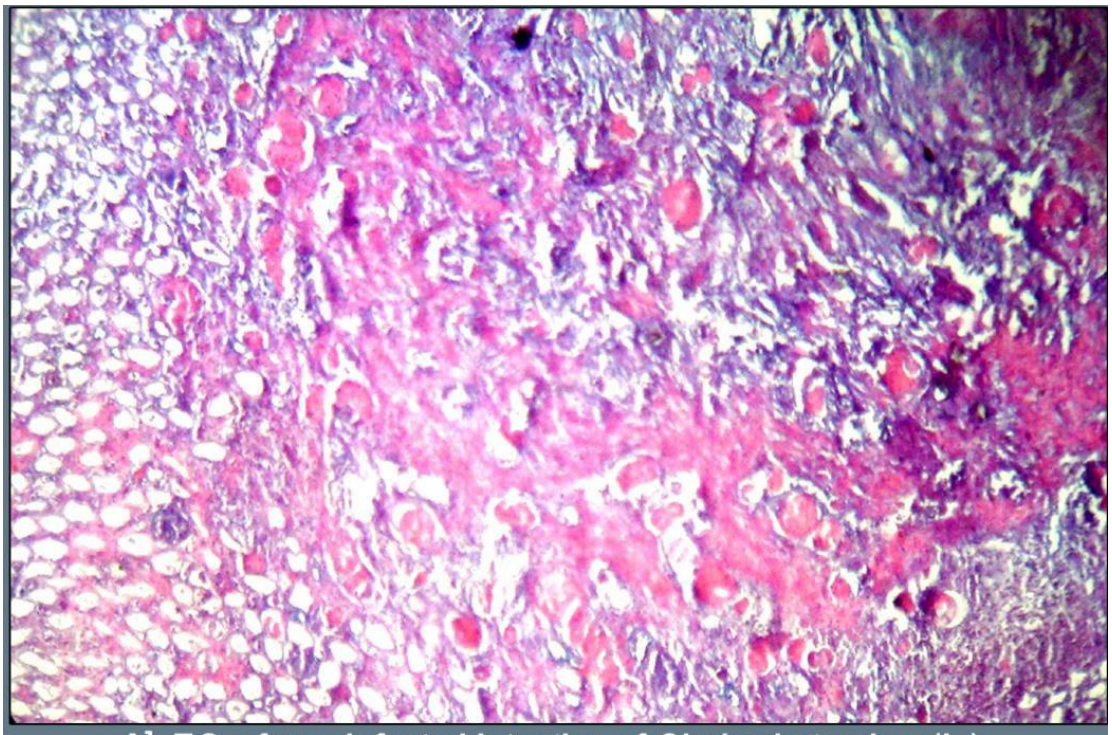
The blocks were cut at 7µ and slides were stained in Eosin haematoxylin double staining method. Best slides or sections were selected and observed under the microscope.

3. RESULT AND DISCUSSION:

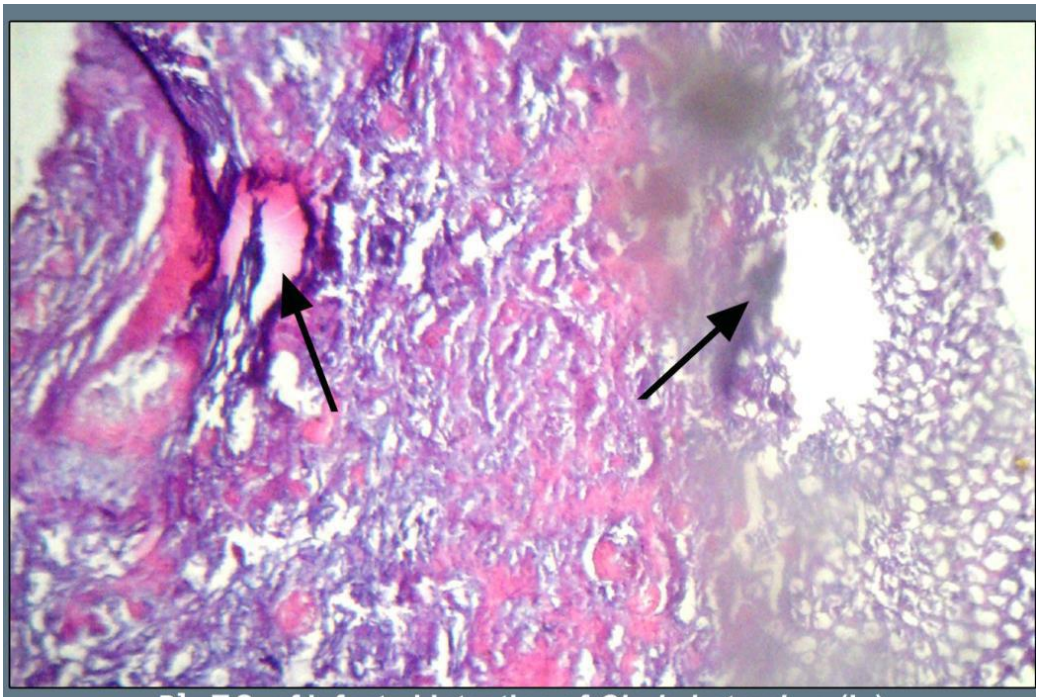
From the present communication the results indicate that some of the intestines were found to be infected with cestode parasite. In T.S. of non-infected intestine of *Clarias batrachus* (L.) it has been observed normal intestinal villi and other layers of intestine. In T.S. of infected intestine of *Clarias batrachus* (L.) has been observed that the cestode attached to the mucosal, sub-mucosal and muscularis mucosa of intestine and slowly damaged the hosts intestinal villi, invaded deep and forming the cyst like structure for sucking the content from the region of the intestine. Healthy intestine showed, healthy villi and all layers are clearly observed, whereas infected intestine has been observed that the worm attached to the mucosal layer of intestine and slowly invades to the deeper layers of the host tissue.

The worm *Lytocestus* Sp. attached to the intestine of host *Clarias batrachus.* In T.S. of intestine of *Clarias batrachus* it has been observed that the cestode attached to the intestinal layer and slowly damaged the hosts intestinal villi, invaded deep and sucking the content in the region of villi.

In the present study case the damage of *Lytocestus* sp. observed is similar to the damage reported by Satpute and Agrawal (1974) and A. S. Raipalli and A. L. Deshmukh (2018). However, the helminths crosses majority of the intestinal layers (internal epithelium, submucosa,muscularis layer) and come to lie near serosa suggesting that, it is very dangerous and destructive parasites to the definitive host (C. J. Hiware, 2008). The worm is not only successful to enter into the intestine forming the ulceration in the intestinal wall causing damage to the host tissue but the parasite may affect host physiology in many ways that induce stress in the host. The parasitic infection in turn disturbs the metabolic pathways (Esch GW et al., 1977).The intestinal cells of the host become stretched and distorted causing mechanical obstruction of the lumen of fish intestine (Bauer., 1968; Ahmad and Sanahullah, 1979; Scott and Grizzle, 1979). During heavy infection, the intestine gets blocked causing death of the host (Bauer et. al., 1981). In some cases, high number of parasites reduces the diameter of the lumen by more than 50% which affects the movement of the food through the intestine (Shostak and Dick, 1986). Marty, G. (2008) reported the Atlantic salmon (Salmo salar) had ananisakid larva partly embedded in the wall of an intestinal caecum.



A]. T.S. of non-infected Intestine of *Clarias batrachus* (L.)



B]. T.S. of infected Intestine of *Claris batrachus* (L.)

4. CONCLUSION:

From the above histopathological discussion it can be concluded that helminth parasites like *Lytocestus* Sp. finds the nutritive material from the intestine of hosts *Clarias batrachus* (L.) which is essential for their nourishment and growth. While taking nourishment parasites invade host tissue resulting tissue damage causing mechanical injury to the host at the attachment site.

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A Study On Non-Specific Enzyme in Relation to Glycogen Content in Three Nematodes Of Goats Of Jafrabad Region

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Abstract: *Nonspecific phosphoesterases (E.C. 3.1.3.1) enzyme activity and glycogen content have been observed quantitatively to be more in females as compare to male of Haemonchus contortus, Oesophagostomum columbianum and Trichuris ovis. The role of enzyme activity in relation to glycogen content is discussed.*

Keywords: *Non-specific enzyme, nematodes, Jafrabad region.*

1. INTRODUCTION:

The phosphateses (E.C. 3.13.1&3.2) have a significant role in carbohydrate metabolism and also in phosphorelated transfer mechanism of a number of helminthes parasites. The work on estimates of non specific phosphomonoesterases and glycogen content of different intestinal nematodes has been reviewed by VON Brand (1973) and LEE & Atkinson (1976). The present study gives a comparative account of the relation between non specific phosphomonoesterases and glycogen content in three goat nematodes Viz. stomach worm *Haemonchus contortus*, nodular worm *Oesophagostomum columbianum* and whip worm *Trichuris ovis.*

2. MATERIALS AND METHODS:

The parasites where collected from the intestine of slaughtered goat, obtained from Dhangarwada in Jafrabad. They were washed thoroughly with 0.85% NaCl. Males and the females of the said species were separated.

The estimation of non specific phosphomonoesterases was performed by taking a fixed number N (Table 1) of parasites of each species and sex. The parasites were wiped dry on filter paper, weighed and homoginised in chilled distilled water. Homogenate was centrifuged at 4 C and at 3000X g for 15 min. supernatant was taken and chilled distilled water added to give 10% (w/v) homogenate. The enzyme activity was measured at by the method of King & Wootton (1959), using 0.01M disodium phenyl phosphate as subtrate. Absorbance was measured at 680mm on Spectronic "20" spectrophotometer. The protein content was determine by the method of Lowry et al.(1951) using Bovines serum albumin as standard as alkaline phosphomonoestraseses activity was very low, acid phosphomonoesterases activity was calculated in K.A.U./mg Protein.

The glycogen content for the same number of parasites has already been estimated on fresh weight basis by Premavati & Chopra (1979).

3. RESULTS AND DISCUSSIONS:

The mean and standard deviation (S.D) of acid phosphomonoestraseses activity (K.A.U./mg Protein) and glycogen content (mg/g) on fresh weght basis in females and males of *Haemonchus contortus, Oesophagostomum columbianum* and *Trichuris ovis* are given in table 1.

TABLE-1. Acid Phosphomonoesterase enzyme activity and glycogen content in three goat nematodes. Values are mean ± S.D. of 5 observations.

Parasites	Number (N)	Fresh Weight (mg)	Acid phosphomonoesterase activity (K.A.U./mg Protein)	Glycogen content (mg/g fresh weight)
H. contortus :				
Female	90	160±7.74	0.87.00±0.067	13.65±3.05
Male	120	79± 5.65	0.50±0.075	7.86±2.13
O. columbianum:				
Female	70	267± 33.60	0.85±0.040	12.74±1.76
Male	70	135±13.70	0.69±0.048	13.65±3.43

T. ovis :				
Female	35	254±27.32	0.53±0.058	9.24± 0.65
Male	35	276± 29.43	0.50± 0.065	6.76 ±0.76

The predominance of the acid phosphomonoesterases activity in intestinal nematodes has been reported by Butterworth & Probert (1970) for *Ascaris suum*, Bolla et al. (1974) for *Nippostrongylus brasiliensis*; and Maki & Yanagisawa (1979) for *Angiostrongylus cantonesis*. During the present study it was also observed that alkaline phosphomonoesterases activity was very low in contrast to acid phosphomonoesterases activity in of *Haemonchus contortus*, *Oesophagostomum columbianum* and *Trichuris ovis*. The enzyme activity in each species was observed to be more in females as compare to their counterpart males. This finding is similar to that Butterworth &Probert (1970) for *Ascaris suum*.

The glycogen content has already been observed to vary not only in species but also in females and males nematodes of the same species. The difference among species has been discussed on the basis of niche of the parasites Premavati & Chopra (1979).

The maximum enzyme activity and glycogen content were observed to be maximum in females of *H. contortus* and minimum in males of *T. ovis*. In females of the three species enzyme activity and glycogen content were in the order of *H. contortus*> *O. Columbianum*> *T.ovis*. while in males they were in the order *of O. Columbianum*> *H. contortus* > *T.ovis*. Thus it was observed that in the said species, the more acid phosphomonoestersases activity, the more glycogen content.

4. CONCLUSION:

The present study confirms that the acid phosphomonoesterase enzyme activity has a definite role to play in carbohydrate metabolism in the time of need. The present study shows that both acid and phosphomonoesterases activity and glycogen content were more in females as compare to males the more enzyme activity in females may be because of additional stored glycogen in their reproductive organ required for their reproductive activity.

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Diversity Of Beetles (Coleoptera) Of Shahada Tahsil Dist. Nandurbar

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Abstract: *In the present investigation total 21 species belonging 19 genera under the 10 families of the coleoptera were recorded from Shahada tahsil of Nandurbar district. The family Viz, Scarabaedae (6 Genera, 6 Species), Gyrinidae (1 Genera, 1 Species), Coccinalidae (2 Genera, 2 Species), Tenebrionidae (2 Genera, 2 Species), Crysomelidae (1 Genera, 1 Species), Carabidae (1 Genera, 1 Species), Dyticidae (1 Genera, 1 Species), Buprestidae (1 Genera, 3 Species), Curculionidae (2 Genera, 2 Species), Meloidae(2 Genera, 2 Species) .*

Key words: *Coleoptera, Beetles, Shahada, Nandurbar.*

1. INTRODUCTION:

Beetles are insects of the order coleoptera. Their fronts pairs of wings are hardened called elytra are the distinguishing character from other insects. The members of Coleoptera may contain the largest number of described species of any insect order. They are found in almost every habitation, and range in size from 01 to 100mm. The beetles may contain the largest number of described species of any insect order. The beetles may comprise the major group of labelled species of any insect order. According to Hammond (1992), nearly 40% (4, 00,000) of beetles' species are described yet. While approximately 15,088 species were reported in India (Kazmi, 2004). Beetle is cosmopolitan insect feed upon fungi, dung, pollen, fruit, flesh etc. Beetles are pest damaging the agricultural crop plants, while some species of this group are beneficial (Ladybird) to mankind by controlling number of pests. They indicate disturbance in the environment and reflect response of other species (Rainio *et al.,* 2006). Kakkar and Gupta (2009) Stated, Dung beetles are taxonomically as well as functionally very important constituent of terrestrial ecosystem. The objectives of the present investigation were to assess the number of beetle morph species.

2. MATERIALS AND METHODS:

The study involved field visits to the different places of Shahada tahsil from July 2020 to October 2020 to evaluate their diversity. The photographs were taken with the help of camera and they were identified by the help of standard identification key of Bousquet (1990) and different literatures available on websites. The findings presented here are based on random survey and observations were made from 08 am 05 pm. The beetles were collected by physical method like, netting, hand picking and trapping. The preservation method was avoided.

3. RESULT AND DISCUSSION:

Shahada is a biodiversity rich area many are rare and endemic plant and animal species. In the present study 21 species belonging to 19 genera and 10 families namely Scaribidae, Gyrinidae, Coccinalidae, Tenebrionidae, Crysomelidae, Carabidae, Dyticidae, Buprestidae, Curculionidae, and Meloidae were recorded from Shahada tehsil (Table 1). *Adoretus lasiopygus* (Burm.), *Helicopris bucephalus* (Fabricius,1775), *Copris elphenor* (Klug 1855), Onthophagus lonicornis (Latreille, 1802), *Oxycetonia versicolor* (Fabricus, 1775), Catharisius (Catharsius sagax (Quenstedt,1806) belonging from scarabaedae family. Two species namely, Cheilomenes *sexmaculata, Coccinella septempuctata* are the members of Coccinalidae family. One species *Dineutus ciliates* belonging to Gyrinidae family. Two species belonging to the Tenebrionidae family namely, *Tenebroides corticalis, Tribolium castaneum. Callosobruchus maculates* is a member of Crysomelidae family. Carabus auroaitens is belonging to the family Carabidae. Cybister tripunctatus is contributed to Dyticidae family. Sternocera chrysis chrysidioides, Sternocera basilis and Sternocera aequisignata these three species are belongs to Buprestidae family. Sitophilus oryzae and Cosmopolites sordidus both are the membrs of Curculionidae family while Lytta vesicatoria and Mylabris postulata contributed in Meloidae family. Chandra and Gupta (2013), reported 43 species belonging to 25 genera, 16 Tribs and 8 subfamilies in

2 families. Arya *et al.,* (2016) represented 23 species, 18 genera and 6 families. Banerjee (2014) recorded 9 families of Coleoptera from Durgapur, west Bengal, India.

4. CONCLUSION:

The result of present study concludes that rich diversity of beetles (Coleoptera) in Shahada tahsil may be due to sufficient food resources, suitable environment and micro habitats. It provides useful information about diversity of beetles in the said area. Therefore, appropriate managing of such natural habitations is must because these ecological zones play a significant role in conservation of biodiversity.

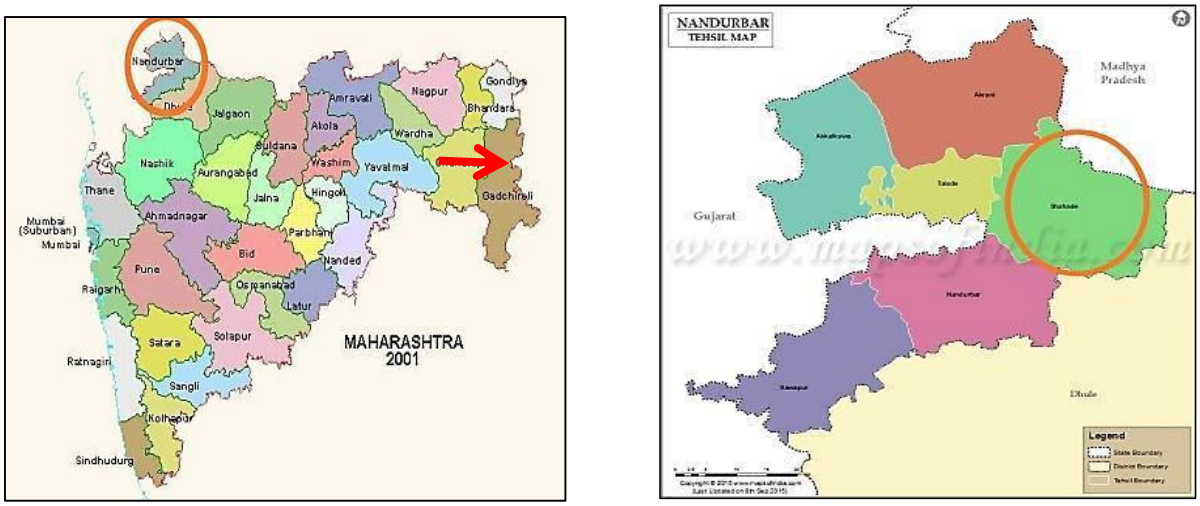

FIG.1. Map Showing Shahada Tahsil of Nandurbar district (Maharastra)

TABLE: 1. List of Beetle species found in Shahada tahsil of Nandurbar District.

	Family	Specific Name
01	Scarabaedae	*Adoretus lasiopygus* (Burm.)
		Helicopris bucephalus (Fabricius,1775)
		Copris elphenor (Klug 1855)
		Onthophagus lonicornis (Latreille, 1802)
		Oxycetonia versicolor (Fabricus, 1775)
		Catharisius (Catharsius sagax (Quenstedt,1806)
02	Gyrinidae	*Dineutus ciliatus* (Forsberg, 1821)
03	Coccinalidae	*Cheilomenes sexmaculata* (Fabricus, 1781)
		Coccinella septempuctata (Linnaeus, 1758)
04	Tenebrionidae	*Tenebroides corticalis* (Melsheimer,1844)
		Tribolium castaneum (Herbst,1797)
05	Crysomelidae	*Callosobruchus maculates*(Fabricus,1775)
06	Carabidae	*Carabus auroaitens* (Fabricius,1792)
07	Dyticidae	*Cybister tripunctatus*, Olivier,1795)
08	Buprestidae	*Sternocera chrysis chrysidioides* (Castelnau&Gory, 1837)
		Sternocera basilis (Castelnau&Gory, 1837)
		Sternocera aequisignata (Sunders,1866)
09	Curculionidae	*Sitophilus oryzae* (Linnaeus, 1763)
		Cosmopolites sordidus (Germer, 1824)
10	Meloidae	*Lytta vesicatoria* (Linnaeus,1758)
		Mylabris postulate (Thnberg, 1821)

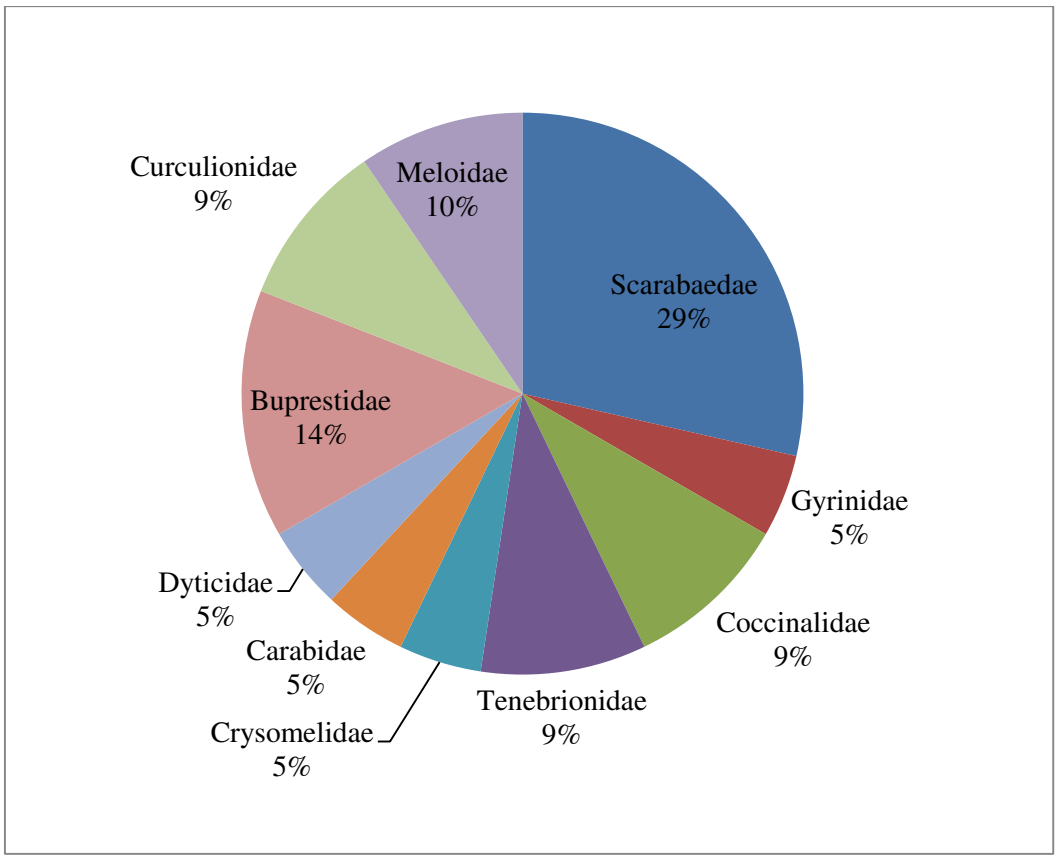

FIG.2: Pie chart showing distribution of beetle (Coleoptera) species from Shahada tahsil

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Toxic Effects of Pesticide Diafenthiuron on Wings of *Drosophila* Species

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Abstract: *A laboratory conditions were setup for fruit fly to evaluate the toxic effects of Diafenthiuron of various grades on adult Drosophila species in order to study the phenotypic changes. The adult flies randomly were subjected to toxicity effect up to two generations and the second generation fly wing was studied and the angle change in their venation pattern was noted. The variation was observed in wing venation pattern, which reveals that genomic changes might be there.*

Keywords: *Phenotypic, Venation, Toxicity, Diafenthiuron, Variation.*

1. INTRODUCTION:

Drosophila is a tool for genetics and evolutionary sciences since decades and the first preferred insect for critical analysis of human genome. This small creature shows 77% of similarity between its genome and human genome. This is a first line of preference by the researcher in order to study genotoxicity effects based on toxicology. Several *in vivo* wing somatic assays were also conducted in *Drosophila* based on the exposure of populations of mitotically growing cells in the wing imaginal disc of larvae (Cunha et al., 2001; Rodriguez Arnaiza, 2006).Various studies on natural *Drosophila* Species had shown that the morphology of wings is considered as a target for natural selection and act as identification model of morphological evolution. The other criterion for study of Genetics is conducted to compare the response curve of environment gradient of *Drosophila* population in relation with the shape of the reaction norms. Here an attempt has been made to investigate the effect of Diafenthiuron on the wing morphology.

2. MATERIALS AND METHODS:

Earlier the Two concentration grades of Diafenthiuron in water as a solvent were dissolved to make ppm doses, the high concentration like 2000ppm and 3000ppm were prepared, which will be used for studying phenotypic traits. The antifungal agent Propionic acid 0.5 ml was added in food while preparing, then the food was put in sterile bottles when it was warm upto 2 gm each, it was allowed to cool and solidify at room temperature. Diafenthiuron of 2000ppm and 3000ppm concentrations were added in each bottles. The bottles were shaked well. Healthy and random size male and female adult were transfer from culture bottles to toxicity doses bottles. 20 flies randomly were subjected to various toxicity concentration doses. The 24 hrs cycle is maintained at fixed temperature of 23° C in Biological Incubator in laboratory. Daily the mortality rate is counted along with the egg laying process and hatchability rate. The conversion rates of metamorphic stages are also noted in order to see the toxicological effects. The second generation adult flies were chosen in order to study the wing morphology and its plasticity effects by pesticide Diafenthiuron. The adult flies of second generations are isolated from the experimental bottles and the emergent Adult *Drosophila* flies randomly were anesthetized by chloroform fumes applied on bottle mouth till they fall down at the bottom of the bottles. With the help of small soft painting brush the flies were picked and kept on the glass slide for mounting of wings. With the help of needles and razor the wings are ablated and cover slip is applied after keeping DPX mounting liquid. The photographs are taken through microscope by applying the high definition cameras. Photomicrographs were taken and the images were sorted out for angle measurement and further analysis was done by using method described by Roberta and Jean (2008).

Wing measurements

The Left and Right wings from each fly was mounted on microscopic slide with 100 x magnification for its measurements. The *Drosophila wings* can be geometrically described by adjusting an ellipse to its contour (Klaczko and Bitner-Math´e 1990; Bitner-Math´e and Klaczko 1999 a, b) (Fig. ure 1). The picture of contour permits the definition of an overall ellipse with its major axis (*a*) and short axis (*b*).

TABLE 2 Mean values of the right wing traits measured

	RIGHT WING		
Parameters	**Control**	**2000ppm**	**3000ppm**
A	114.1±0.7731	91.63±0.5965***	117.8±0.5842**
B	57.18±0.6269	74.8±0.7312***	72.37±0.7588***
SI	81.12±0.5992	82.68±0.5987 ns	92.25±0.4958***

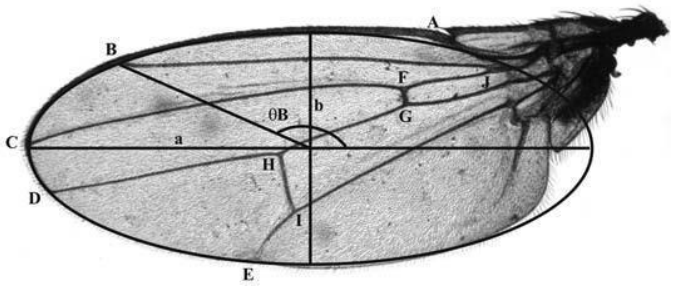

FIG. 1 Ellipse of *Drosophila spp.* wing blade

Here *a* and *b* represents the long and short axis of the ellipse, respectively. A – J represents the landmarks corresponding to insertion points of the wing veins. The angle θ*B* illustrates the position of landmark B with respect to the major axis of the ellipse. The size and shape information is provided by: *a*, parallel to wing length; *b*, parallel to wing width; $SI = \sqrt{(ab)}$, overall size.

3. DATA ANALYSIS:

Two lines of Concentration were taken, in which adults were measured, up to a maximum of 20 flies of single sex were analyzed. Further, the data obtained for each Concentration and its population was pooled into a single sample. The numbers of investigated individuals and of available lines are given in table 1, for a grand total of 20 wings. A statistical analysis was carried out by applying ANOVA test.

4. RESULT:

The length of Rightwing was significantly change in both treated groups (91.63±0.5965*** and117.8±0.5842**µm respectively) When compared with control group (114.1±0.7731).The same results were observed in Left wing (210.4±0.5737***) and (215.8±0.6009***) at both Concentration respectively as compared with Control (195.5±0.5965).Diafenthiuron affects width of wings of both side at both concentrations (74.8±0.7312***, 72.37±0.7588***) and (45.2±0.5489***,45.43±0.6344***respectively)When compared with control (57.18±0.6269, 51.9±0.7646).However, the overall size was not changed at 2000ppm concentration in both wings, whereas at 3000ppm concentration the width (92.25±0.4958***) was change significantly in Right wing and negligible in Leftwing (97.42 ± 0.7603*).

TABLE 3 Mean values of the left wing traits measured

	LEFT WING		
Parameters	**Control**	**2000ppm**	**3000ppm**
A	195.5±0.5965	210.4±0.5737***	215.8±0.6009***
B	51.9±0.7646	45.2±0.5489***	45.43±0.6344***
SI	100.5±0.7902	97.33±0.575*	97.42±0.7603*

a, Wing length (mm × 100); *b*, wing width (mm × 100); *SI*, overall wing size (=$\sqrt{(ab)}$mm × 100)
Values expressed as Mean ± S.E, n=20, ***p < 0.001

5. DISCUSSION:

The comparison of wing size, which was defined in about the same way in different laboratories, was more difficult to analyze and define, because various techniques have been used. As a rule, all these methods are designed to get rid at least in part, of size variations, and are generally expressed as ratios. Moreover, we observed that the second wing vein (landmark B) shifts towards a more proximal position at both extremes of the ppm concentration range. Another interesting observation, made on this species was that the reaction norms of the wing trait differed between the two populations and that these differences were usually greater at both Concentrations.

6. CONCLUSION:

The Studies have shown that there might be genes with more general control of the wing vein placement throughout the wing blade, while some other genes might control the positioning of the veins within a single compartment, or have vein-specific action. Genes involved in wing patterning may be affected by Concentration of Pesticide regimes during feeding and the phenotypic plasticity itself could have an adaptive nature.

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Impact of Anticancer Drug, Actinomycin On The Nucleolar Changes In The Developing Oocytes of Fresh Water Bivalve, *Lamellidens Marginalis (L).*

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Abstract: *Actinomycin drug has anticancer properties for chemotherapy against solid tumors. This drug exhibits effective chemoprevention in cancer therapy and most active cytotoxic agents in the treatment of cancer .The nucleus of the cell serves to maintain, regulate, and replicate the critical genetic information encoded by the genome. In present toxicity studies, sub-lethal dose of Actinomycin (LC50/10 for 96 hours) was given to an experimental model, the fresh water bivalve Lamellidens Marginalis for 45 days. The nucleoloar changes of developing oocytes from female gonads ovary were observed from control and treated bivalves by using Methyl green and Pyronin-Y stains. It was found that the chronic exposure of anticancer drug, Actinomycin (2.052 ppm) induced alterations in the structure of nucleolus and hence the nucleolus of developing oocytes showed condensation of the chromatin, aggregation of the nucleic acid such as DNA and RNA at certain locations, Overall result high dose of Actinomycin in the Lamellidens Marginalis production of multiple or overgrowth and induction of increased number of nucleoli. Extra nucleoli were more prominent in actinomycin treated bivalves after 45 days of exposure.*

Keywords: *Actinomycin, Anticancer drug, Developing Oocytes, Nucleolus, Bivalves.*

Abbreviations: *DNA- Deoxyribonucleic acid, RNA- Ribonucleic acid, MSL. Mean sea level, LC50 – Lethal concentration for neither 50% mortality, NOR- Nucleoli Organizer region.*

1. INTRODUCTION:

The nucleolus of eukaryotic cells is the site of ribosome biosynthesis; there rRNA is transcribed, modified, processed, and assembled in to the large and small subunits before export to cytoplasm .Transcription of RNA polymerase I yield a 45S (13.7 kb) primary transcript (pre-rRNA), which is processed in to the 28S, 18S and 5.8S rRNAs found in ribosomes. Nascent pre-rRNA transcripts formed are immediately bound by proteins, forming pre-ribonucleo protein particles, or pre-rRNPs. In cell nucleus, nucleolus is the site of the fast replication of DNA to form tandem repeats of DNA and the site for the transcription of the rRNA. The nucleolar activities are multiplied many fold in the developing oocytes & hence this can act as the best suitable marker to screen the anticancer drugs. Lodish etal, (2000), reported that approximately 80 % of the total RNA in rapidly growing mammalian cells is rRNA and 15 % is tRNA; protein encoding mRNA is thus constitutes very small quantity of the total RNA. During embryonic development i. e. cleavage, large quantity and number of proteins are needed. Since the DNA contents are actively involved in the process of replication for its rapid multiplication, most of the rRNA, mRNA and ribosomes required during the cleavage are synthesized during oogenesis and are stored in the ooplasm. Thus nucleoli of developing oocytes are actively involved in ribosome synthesis. The increased activities make nucleolus as a target to the anticancer drugs, as these drugs first attack and affect the cells of high metabolic rate or activities. The nucleolus is the most important and definitely differentiated nuclear sub component. The continued use of the term nucleolar organizer for the large heterochromatic knob in maize. (Gillies, 1973), must not be taken to mean that any ribosomal cistrons are located in it and may be misleading. It is very important nuclear structure, where the biosynthesis of ribosome takes place. It is also clear that the nucleolus also performs non ribosomal functions (Raska et al., 2006). The antitumor activities of actinomycin involves induction of inter and intra crosslinks that severely leads to distortion of the DNA helix and blocks its duplication. Repair of actinomycin -DNA adducts by mammalian excision nuclease (Zambale et al., 1996).

Actinomycin containing coordination complex. It is an effective antitumor agent used in the treatment of wide variety of human cancers (Rozeneweig M. et al.1977; Prestayko A.W. et al., 1979). Actinomycin is very effective anticancer drug widely used in the treatment of the bladder, testis, ovary and other solid tumors (Borch R.F.,1987). The present study will be useful to develop the simple model for the screening of the anticancer drugs and their effects at the primary level. This study can also help us to compare effectiveness and side effects of various anticancer drugs.

2. MATERIAL AND METHODS:

The fresh water bivalves, *Lamellidens Marginalis* were collected from Jayakwadi dam area near Paithan taluka (Latitude 200 33'N, Longitude 75010'E, 352 m MSL) which is 55 km away from Aurangabad District of Maharashtra State. Bivalves were collected and brought to laboratory in aerated container. They were maintained in a glass aquarium containing dechlorinated water for 3- 4 days at 23^{0}C to 28 ^{0}Ctemperature. The PH of water was in the range of 7.0- 7.5 and well acclimatized at laboratory conditions. The water in aquarium was changed regularly after every 24 hours. After acclimatization, healthy full size bivalves of 2.8-3.00 cm height X 4.8- 5.5 cm length were selected from the aquarium and used for the experiments. The well acclimatized bivalves *Lamellidens Marginalis* were divided into two groups with equal number of animals. They were kept in separate aquarium for 45 days. Bivalves from one group were maintained as a control and one group was treated by chronic concentration (LC50/10 value of 96 hours) of Actinomycin (2.052 ppm). On 15th, 30th and 45th day of exposure, bivalves from control group and experimental group were sacrificed and their gonads were removed and fixed in Carnoy's fluid for 25 to 30 minutes only, as it is a rapid nuclear fixative. Then gonads were dehydrated in alcohol grades, cleared in xylene and embedded in paraffin wax (56 to58^{0}C). Then, prepared blocks of the gonads, trimmed and attached to microtome pegs and were then cut with the thickness of 07 µ (micron), arranged ribbons of the section on the glass slides smeared with thin film of egg albumen and affixed for 24 hours, and stained with Methyl Green Pyronin-Y stain. So as to observe the DNA and RNA specific areas in the nucleolus, the sections were also stained by Methyl Green and Pyronin-Y stains. Among sections some oocytes were without nucleus or nucleolus on the basis of path through which the sections of oocytes were taken. The oocytes in section with prominent nucleus and nucleolus were selected for the study. The characteristic features of the nucleolus and their number were counted, measured and photographed. The photographs are presented in the plates.

3. OBSERVATIONS AND RESULTS:

Fresh water bivalve, *Lamellidens Marginalis* is hermaphrodite animal. The gonads are composed of different follicles such as male and female, Ovarian follicles with four to six developing oocytes with size measures from 225 µm to 345 µm in diameter.and in the follicles, the female follicles shows developing ova of varying sizes. The size of the oocytes measures from 40 µm to 230 µm in diameter, the size of the nucleus varies from 20 µm to 64 µm in diameter while the size of the nucleolus varies from 05 µm to 28 µm in diameter. Majority of the ooctes were between 60 µm to 180 µm in diameter. The oocytes of different stages of development such as oogonia, primary oocytes, vitellogenic oocytes, mature oocytes and degenerative oocytes are also found among female gonads. The 6 micron thick sections were stained by Methyl green-Pyronin Y stain to study the changes in nucleolar structure. But, due to high rate of transcription of rRNA copies on each gene, the staining of DNA by methyl green become poor and methyl green pyronin Y stain could not differentiate the DNA and rRNA rich areas in the nucleolus. Different photomicrographs of control and treated bivalve's oocytes are given in the Photo plates I shows the normal oocytes from control bivalves, stained by Methyl green-Pyronin Y stain; Mehyl green stain and Pyronin Y stain respectively. Micrometer scale measures 16 µm per ocular division at 100x magnification and 04 µm per ocular division at 400x magnifications. Each oocyte shows large nucleus and a single large nucleolus.shows the oocyte containing nucleus with single nucleolus and nucleus.

Figures 2 in plate II shows the oocytes stained by Methyl green-Pyronin Y stain from the bivalves exposed to chronic dose of Actinomycin (2.052 ppm) for 45 days. Plate II shows two or more nucleoli with extra outgrowhs and condensed chromatin. shows the oocytes stained by Methyl green-Pyronin Y stain from the bivalves exposed to chronic dose of actinomycin (2.052 ppm) for 45 days also shows oocyte containing nucleus with three nucleoli with extra outgrowths. . Most of the oocytes are large, spherical, and subspherical in shape, and their size measures from 48 µm to 224 µm in diameter, the size of the nucleus varies from 24 µm to 64 µm in diameter while the size of the nucleolus varies from 04 µm to 24 µm in diameter. Majority of the oocytes were between 56 µm to 160 µm in diameter. The present investigation study clearly indicates that the nucleolus can be used as a biomarker for the primary screening of the DNA replication and transcription inhibitors for development of new anticancer drugs. Due to high amount of nucleic acids (i.e. DNA and RNA), nucleolus is stained darkly as per the stain used.

FIGURES 1: (Photomicro plates I)

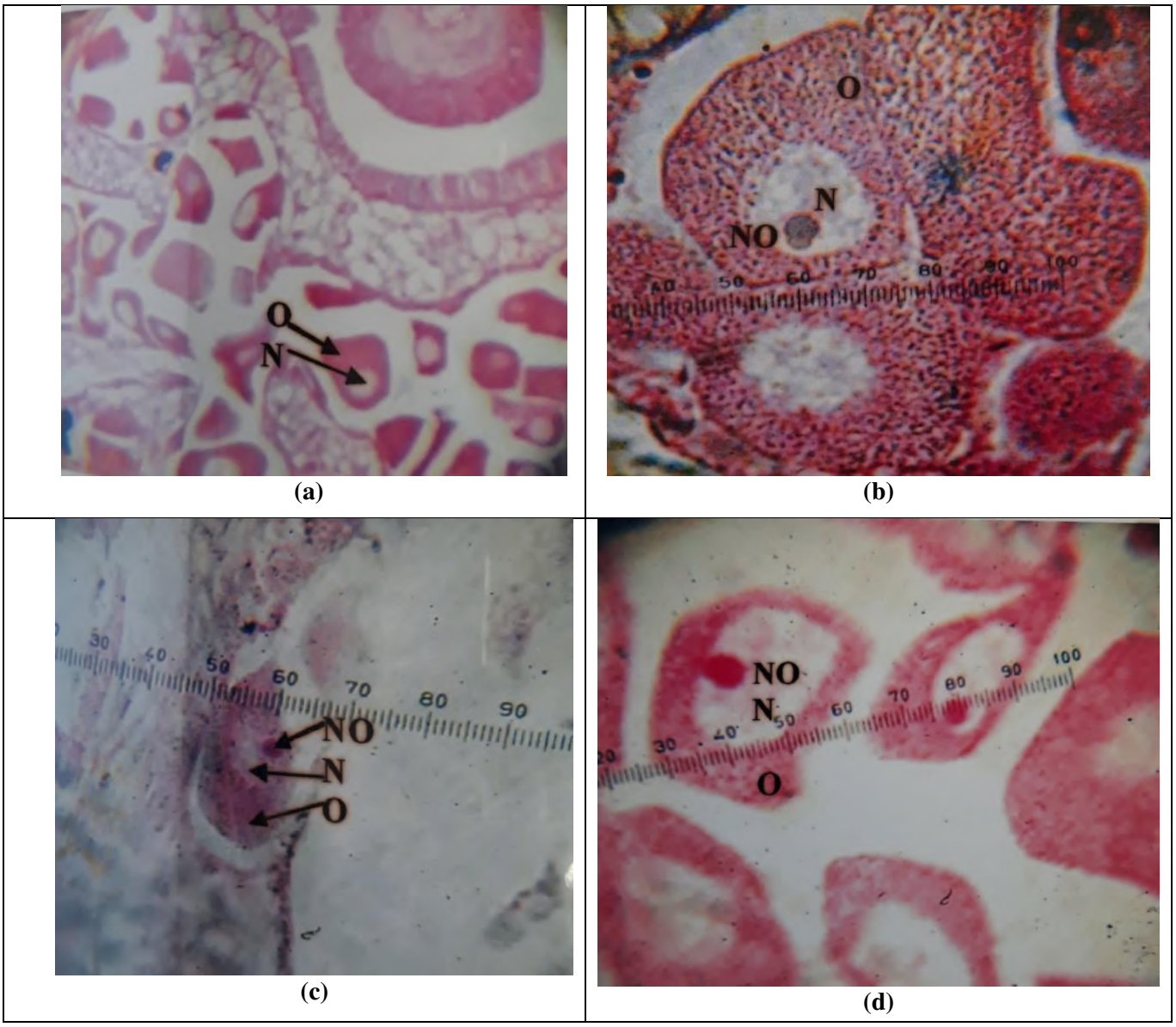

FIG.1. Photomicrographs of Normal histological structure of Oocytes of *Lamellidens Marginalis* stained by methyl green pyronin (Magnification a to d =400X).
(N=Nucleus, NO-II=Nucleolus, O=Oocytes).

FIGURES 2 :(Photomicro plates II)

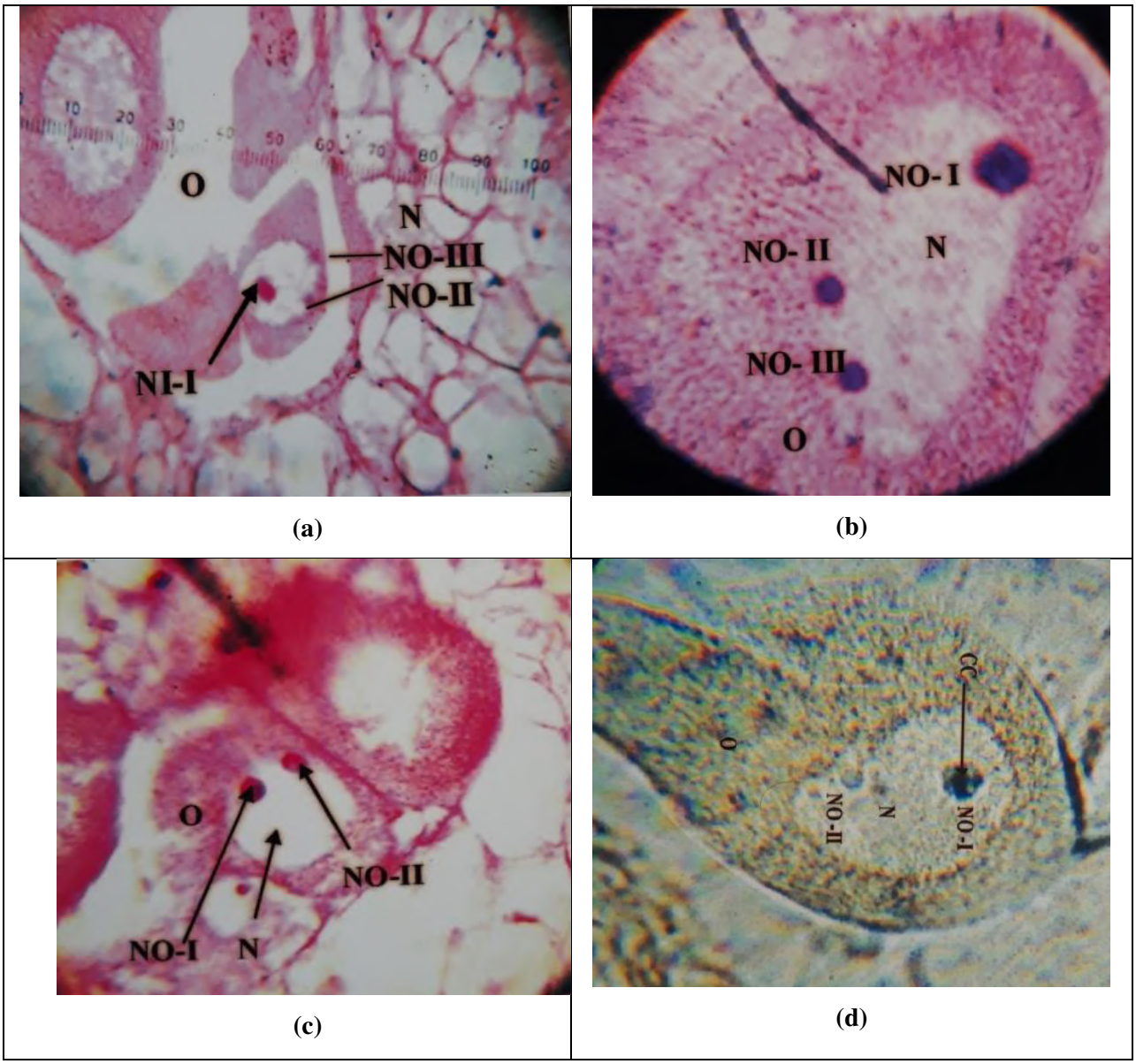

FIG.2. Photomicrographs of histological structure of Oocytes stained by Methyl green pyronin after exposure of *Lamellidens Marginalis* to Actinomycin for 45 days.
(N=Nucleus, O=Oocytes, NO-I =Nucleus, NO-II=Nucleolus,CC=Condensed chromatin)

4. DISCUSSION:

The change in position of this nucleoloar zone is an exact reversal of the stages seen during activation of cells from dormant plant storage tissue (Jordan & Chapman, 1973). Although the nucleolus organizers of meiocytes have been identified at the electron-microscope level before (Williams et .al., 1973.These findings of Gray et .al., (1998) strongly suggest a conserved mechanism of cellular aging that involves nucleolar structure and function. Since the nucleolus is the site of speedy replication and transcription, any blockage or inhibition of these mechanisms reflects on its size, as there is single large nucleolusin the oocytes of the *Lamellidens Marginalis.* Nucleolar organizer region of the chromosomes is responsible for the development of nucleolus after mitotic phase of cell division, since nucleolus disappears during cell division. There may not be more NOR regions in a cell or chromosomes, but the number of nucleoli is specific to the cell type and species. However, when is demand more NOR may be involved in the formation of additional nucleoli. At the time of replication and transcription inhibition in the nucleolus, due to increased need of ribosomes, additional nucleoli can be derived from other NOR, and it can thus act as a biomarker for the indication of toxicant, if it is transcription or replication inhibitor. The present work is concerned with the nucleolar changes in the vitellogenic oocytes. Zambare (1991) reported his primary studies during the reproductive cycle in *Lamellidens Marginalis.* and revealed that single nucleolus grows in size from 2.27 microns to 18.16 microns and showed differential staining, thus it is the best study material to show the intra-nucleolar organization and its interaction with the growing oocytes. It can thus act as the best biomarker for the screening of the anticancer drugs. Actinomycin crosslinks DNA material and resulting into DNA adducts that interacts with proteins containing high mobility group domains like

upstream binding factor, which is transcription factor that binds with the promoter of rRNA genes thereby supporting inhibition of transcription by enzyme RNA polymerase-I. Actinomycin causes a redistribution of upstream binding factor in the nucleoli of human cells, similar to that found after inhibition of rRNA synthesis. Similar redistribution was found to be observed for the major components of the rRNA transcription machinery. Jordan and Carmo-Fonseca (1998) also provided for the first time direct in vivo evidence regarding the action of 5-fluorouracil that they block the synthesis of rRNA, while activity of RNA polymerase-II continues to be detected through the nucleus. The clinically ineffective trans-isomer does not change the localization of upstream binding factor or other components of the RNA polymerase-I transcription machinery. These results indicate that there is disruption of rRNA synthesis, which is induced in rapidly proliferating cells, thus exhibit an important role in the clinical success of Actinomycin chemotherapy (Jordan and Carmo-Fonseca, 1998). The results of histopathological studies to study nucleolar changes in developing oocytes of Lamellidens Marginalis shows the condensation of chromatin material in nucleus, condensation of nucleoli, change in the shape of nucleoli, extra growth of the nucleoli, induction and formation of the supernumerary nucleoli after the exposure to the anticancer drugs, Actinomycin indicates the biomarker capacity of nucleolus. Effect of Actinomycin after chronic exposure of Lamellidens Marginalis for 45 days, has showed increased number of nucleoli in developing oocytes. The results shows that the binding of Actinomycin with the DNA molecule, which can inhibit the replication of the DNA from their binding sites. Since the oocytes are highly active in the process of protein, ribosome synthesis because most of the ribosomes required during cleavage, are synthesized and stored in the ooplasm. As cleavage involves repeated process of cell division, there is no time for the synthesis of required protein synthesis machinery. Increased demand of more ribosomal rRNA may leads to increased number of the tandem repeats from the nucleolus organizer region seems to be increased and hence an extra growth on some sides of the nucleoli were found. This can also be the reason for the induction and formation of the supernumerary nucleoli. Thus present work clearly proves the biomarker potential of the nucleolus of the developing oocytes of Lamellidens Marginalis and nucleolus as an indicator of both replication and transcription.

5. CONCLUSION:

The chronic exposure Actinomycin (2.052 ppm) induced alterations in the structure of nucleolus and hence the nucleolus of developing oocytes showed condensation of the chromatin, aggregation of the RNA at certain locations, overgrowth of the nucleolus and induction of increased number of nucleoli. Extra nucleoli were more prominent in actinomycin treated bivalves after 45 days of exposure. The results also indicates that nucleolus of developing oocytes is the best biomarker, as it shows the changes on exposure to replication and transcription inhibitors. The nucleolus thus can be used as biomarker for the primary screening of anticancer drugs reacting at replication and transcription level. There may be signals from the ooplasm to the nucleus, more specifically to the NOR regions to replicate the rDNA genes for the formation of the nucleolus.

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Bird Species Account Near Kawalewada Dam from Gondia District of Maharashtra, India

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ABSTRACT: *Kawalewada dam is constructed on Wainganga river near Tirora tehsil in Gondia district of Maharashtra State of India. For the survey of birds, three sites Kawalewada dam, Kawalewada talav and Ramsagar talav were selected near the study area. The survey was conducted with fortnightly visits from February 2020 to January 2021 near and in the surrounding area of Kawalewada dam in Gondia district of Maharashtra State for the bird species account. Total 76 bird species including water birds and land birds were observed belonging to 38 families from the study area. Out of recorded 76 bird species, 09 species (12%) were occasional (O), 37 species (49%) were common (C) and 30 species (39%) were very common (Vc). Out of 38 families, the family Ardeidae was dominant with seven bird species. The availability of aquatic flora, flowering plants, large trees and fauna including fishes as the food for the birds which still supports the bird diversity near the selected study area. Some anthropogenic activities like daily clothe washing, direct bathing, cattle washing, irrational practices of fish catching in the water and continuous cattle grazing, changing climate and many other factors near the study area affecting the bird diversity.*

Keywords: *Bird species account, Kawalewada Dam, Gondia.*

1. INTRODUCTION:

Birds are the animals having feathers which keep them warm, protected from the weather and allow them to fly. As we knew that there is the important role of birds in the environmental ecosystems and the human life, hence there is need of their conservation. A total 1375 bird species were listed from Indian subcontinent (Grimmett *et al*., 2014). Out of these species more than 577 species from Maharashtra State (Kasambe, 2016) and 417 species from Vidarbha region (Anon, 2009) were recorded. Some part of the area of Gondia district was monitored by different researchers; Chitampalli (1976) have recorded 209 species, Chinchkhede and Kedar (2013) have recorded 126 species from Navegaon National park. Bhandarkar and Paliwal (2014) have recorded 52 species from Shrungarbandh lake; Puri (2015) have recorded 27 species from Zaliya lake of Gondia district. Gorghate *et al.* (2015) have recorded 52 bird species from Khajri lake of Gondia district. Roy and Jha (2017) recorded 30 species from *Nav Talav* Amgaon; Puri (2020) have recorded updated list of 43 waterbird species from Bodalkasa, Chorkhamara and Khairbandha lakes of Gondia district, Maharashtra State.

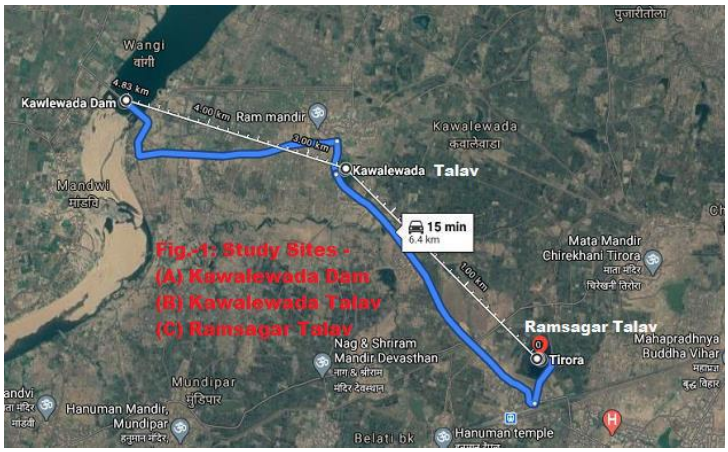
Gondia district comprises so many lakes and dams like Bodalkasa, Chorkhamara, Chulbandh, Itiyadoh, Khairbandha, Katangi, Kalisarad, Managad, Navegaonbandh, Pujaritola, Sirpur, Kawalewada dam. Out of these, only some sites of Gondia district were monitored by different researchers and remaining sites are awaiting still. As per review, no one yet done study of bird diversity from the selected study area. Hence, the present study was carried out during the pandemic for the proper documentation of the bird species from Kawalewada dam and its surrounding area from Gondia district, Maharashtra State, India.

2. MATERIALS AND METHODS:

STUDY AREA

Kawalewada dam is constructed on Wainganga river near Tirora tehsil in Gondia district of Maharashtra State of India. For the survey of birds, three sites were selected near the study area with their geographic coordinates of Kawalewada dam (21°.44' and 79°.88'), Kawalewada *talav* (21°.43' and 79°.90') and Ramsagar *talav* (21°.41' and 79°.91'). The distance of Kawalewada dam from Gondia is near about 35 Km and from Tirora about 05 Km. The inter distance between Kawalewada dam and Kawalewada *talav* is 02 Km and the distance between Kawalewada *talav* and

Ramsagar *talav* is 03 Km. The main purpose of the dam is to supply water to the farmers for irrigation and water used by Adani Thermal Power Station at Tirora (https://villageinfo.in/maharashtra/gondiya/tirora/kawalewada.html).
There is great vegetation in the surrounding area of Kawalewada dam with flowering plants and other large trees. The Kawalewada *talav* is with aquatic plants and some trees near to the *talav*. The Ramsagar *talav* is also having large quantity of aquatic food including flora, fauna and fishes for the birds. All these conditions are favourable to the arrivals of the birds towards the selected study area.



BIRD SURVEY

The survey was conducted with fortnightly visits from February 2020 to January 2021 near the selected study area for the bird species account including Kawalewada dam, Kawalewada *talav* and Ramsagar *talav*. The birds were observed directly by walking along the bank of the study sites at morning and evening timings of the day when the birds were most active and depending on the light conditions (Namgail *et al.,* 2009). The Olympus binocular was used for the observation and Nikon camera was used with different lenses for capturing the photographs of the birds.

The survey was just started in the month of February 2020 and there was lock down was declared in the month of March 2020 by the Maharashtra Government due to COVID-19 pandemic. The bird observation was stopped from 15th March 2020 to 15th June 2020 due to strict lock down period of COVID-19. Again the bird survey restarted from 15th June 2020 to January 2021 continuously with taking precautions about COVID-19 by fortnightly visits to the study sites and data was recorded.

After detection, specimens were identified with the help of visible structural features (Ali, 2002 and Grimmett *et al.*, 2011). A systematic bird species account from three sites was prepared on the basis of observations. The scientific names, common names and family sequence were ascertained as per BirdLife International (2020 version 5). The abundance status of the bird species was analysed as occasional (O), common (C) and very common (Vc) on the basis of the encounter rates of sightings as per the techniques by Tak *et al.* (2010) and Priyanka (2012).

3. RESULTS AND DISCUSSION:

Total 76 bird species including water birds and land birds were observed belonging to 38 families from three study sites near Kawalewada dam and its surrounding area from Gondia district, Maharashtra State (India). The recorded data is presented in table-1 and also the occurrence site is shown where the bird species observed.

TABLE 1: Bird Species Account near Kawalewada Dam from Gondia district (MS)

Family	Sp. Sr. No	Scientific Names	Common Names	* Abundance Status	# Occurrence Site
	1	*Tadorna ferruginea*	Ruddy Shelduck	**C**	KT, RT
	2	*Nettapus coromandelianus*	Cotton Pygmy-goose	**Vc**	KT, RT
	3	*Anas strepera*	Gadwall	**C**	KT, RT
	4	*Anas acuta*	Northern Pintail	**C**	KT, RT
	5	*Netta rufina*	Red-crested Pochard	**C**	RT
1) Anatidae	6	*Aythya farina*	Common Pochard	**C**	KT, RT
2) Podicipedidae	7	*Tachybaptus ruficollis*	Little Grebe	**C**	KT, RT
	8	*Anastomus oscitans*	Asian Openbill	**C**	KD, KT, RT
3) Ciconiidae	9	*Ciconia episcopus*	Woolly-necked Stork	**O**	KD, RT
4)Threskiornithidae	10	*Pseudibis papillosa*	Red-naped Ibis	**O**	KD, KT
	11	*Ardeola grayii*	Indian Pond Heron	**Vc**	KD, KT, RT
	12	*Ardea cinerea*	Grey Heron	**O**	KT, RT
	13	*Ardea purpurea*	Purple Heron	**C**	KT, RT
5) Ardeidae	14	*Bubulcus ibis*	Cattle Egret	**Vc**	KD, KT, RT

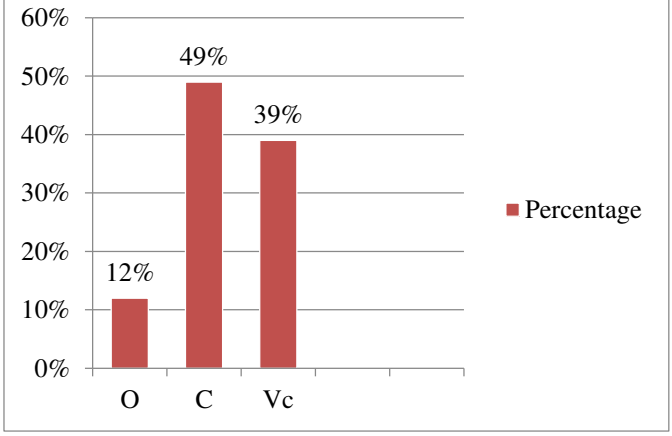
	15	*Casmerodius albus*	Great Egret	**C**	KD, KT, RT
	16	*Mesophoyx intermedia*	Intermediate Egret	**C**	KD, KT, RT
	17	*Egretta garzetta*	Little Egret	**Vc**	KD, KT, RT
6) Phalacrocoracidae	18	*Phalacrocorax niger*	Little Cormorant	**Vc**	KD, KT, RT
	19	*Porphyrio porphyrio*	Purple Swamphen	**Vc**	KT, RT
	20	*Gallinula chloropus*	Common Moorhen	**Vc**	KT, RT
7) Rallidae	21	*Fulica atra*	Common Coot	**Vc**	KT, RT
8) Recurvirostridae	22	*Himantopus himantopus*	Black Winged Stilt	**O**	KD, KT, RT
9) Glareolidae	23	*Glareola lactea*	Small Pratincole	**C**	KD
	24	*Vanellus duvaucelii*	River Lapwing	**O**	KD
	25	*Vanellus indicus*	Red-wattled Lapwing	**Vc**	KD, KT, RT
10) Charadriidae	26	*Charadrius dubius*	Little Ringed Plover	**C**	KD, KT, RT
	27	*Hydrophasianus chirurgus*	Pheasant-tailed Jacana	**Vc**	KT, RT
11) Jacanidae	28	*Metopidius indicus*	Bronze-winged Jacana	**Vc**	KT, RT
	29	*Tringa stagnatilis*	Marsh Sandpiper	**C**	KD, KT, RT
12) Scolopacidae	30	*Tringa glareola*	Wood Sandpiper	**C**	KD, KT, RT
	31	*Columba livia*	Rock Pigeon	**Vc**	KD, KT, RT
	32	*Streptopelia decaocta*	Eurasian Collared Dove	**Vc**	KD, KT, RT
	33	*Stigmatopelia chinensis*	Spotted Dove	**Vc**	KD, KT, RT
13) Columbidae	34	*Stigmatopelia senegalensis*	Laughing Dove	**Vc**	KD, KT, RT
	35	*Cuculus varius*	Common Hawk Cuckoo	**O**	KD
	36	*Eudynamys scolopaceus*	Asian Koel	**C**	KD, KT, RT
14) Cuculidae	37	*Centropus sinensis*	Greater Coucal	**Vc**	KD, KT, RT
15) Coraciidae	38	*Coracias benghalensis*	Indian Roller	**Vc**	KD, KT, RT
	39	*Halcyon smyrnensis*	White-throated Kingfisher	**Vc**	KD, RT
	40	*Alcedo atthis*	Common Kingfisher	**Vc**	KD, RT
16) Alcedinidae	41	*Ceryle rudis*	Pied Kingfisher	**Vc**	KD, KT, RT
17) Meropidae	42	*Merops orientalis*	Little Green Bee-eater	**Vc**	KD, KT, RT
18) Upupidae	43	*Upupa epops*	Common Hoopoe	**Vc**	KD, KT, RT
19) Ramphastidae	44	*Megalaima haemacephala*	Coppersmith Barbet	**Vc**	KD, KT, RT
20) Picidae	45	*Dinopium benghalense*	Black-rumped Flameback	**C**	KD, RT
21) Aegithinidae	46	*Aegithina tiphia*	Common Iora	**C**	KD
22) Laniidae	47	*Lanius schach*	Long-tailed Shrike	**C**	KT, RT
23) Oriolidae	48	*Oriolus oriolus*	Eurasian Golden Oriole	**C**	KD, RT
24) Dicruridae	49	*Dicrurus macrocercus*	Black Drongo	**Vc**	KD, KT, RT
	50	*Dendrocitta vagabunda*	Rufous Treepie	**C**	KD, KT, RT
	51	*Corvus culminatus*	Indian Jungle Crow	**C**	KD, KT, RT
25) Corvidae	52	*Corvus splendens*	House Crow	**C**	KD, KT, RT
26) Hirundinidae	53	*Hirundo rustica*	Barn Swallow	**O**	RT
	54	*Ammomanes phoenicura*	Rufous tailed lark	**C**	KD
27) Alaudidae	55	*Eremopterix griseus*	Ashy-crowned Sparrow Lark	**C**	KD
28) Pycnonotidae	56	*Pycnonotus cafer*	Red-vented Bulbul	**Vc**	KD, KT, RT
29) Sylviidae	57	*Orthotomus sutorius*	Common Tailorbird	**C**	KD, KT, RT

30) Timaliidae	58	*Turdoides striata*	Jungle Babbler	**Vc**	KD, KT, RT
31) Zosteropidae	59	*Zosterops palpebrosus*	Oriental White-eye	**C**	KD, RT
	60	*Acridotheres tristis*	Common Myna	**Vc**	KD, KT, RT
	61	*Sturnus contra*	Asian Pied Starling	**C**	KD, KT, RT
32) Sturnidae	62	*Sturnus pagodarum*	Brahminy Starling	**C**	KD, KT, RT
	63	*Copsychus saularis*	Oriental Magpie Robin	**C**	KD, KT, RT
33) Muscicapidae	64	*Saxicoloides fulicatus*	Indian Robin	**C**	KD, RT
	65	*Nectarinia zeylonica*	Purple-rumped Sunbird	**C**	KD, KT, RT
34) Nectariniidae	66	*Nectarinia asiatica*	Purple Sunbird	**C**	KD, KT, RT
35) Passeridae	67	*Passer domesticus*	House Sparrow	**Vc**	KD, KT, RT
	68	*Ploceus benghalensis*	Black-breasted Weaver	**C**	RT
36) Ploceidae	69	*Ploceus philippinus*	Baya Weaver	**Vc**	KT, RT
	70	*Amandava amandava*	Red avadavat	**O**	RT
	71	*Lonchura punctulata*	Scaly-breasted Munia	**C**	RT
37) Estrildidae	72	*Lonchura malacca*	Black-headed Munia	**O**	RT
	73	*Motacilla flava*	Yellow Wagtail	**C**	KD
	74	*Motacilla alba*	White Wagtail	**C**	KD
	75	*Motacilla maderaspatensis*	White-browed Wagtail	**C**	KD
38) Motacillidae	76	*Anthus rufulus*	Paddyfield Pipit	**Vc**	KD, KT, RT

*** ABUNDANCE STATUS: O -** Occasional (1-24%), **C -** Common (25-74%), **Vc -** Very common (75-100%).
 # OCCURRENCE SITE: KD - Kawalewada Dam, **KT** - Kawalewada Talav, **RT** - Ramsagar Talav

Out of recorded 76 bird species, 09 species (12%) were occasional (O), 37 species (49%) were common (C) and 30 species (39%) were very common (Vc). Out of 38 families, the family Ardeidae was dominant with seven bird species. Red-crested Pochard, Barn Swallow, Black-breasted Weaver, Red Avadavat, Scaly-breasted Munia and Black-headed Munia were occurred only at Ramsagar *talav* near Tirora and not at other two sites. Small Pratincole, River Lapwing, Common Hawk Cuckoo, Common Iora, Rufous-tailed Lark, Ashy-crowned Sparrow Lark, Yellow Wagtail, White Wagtail and White-browed Wagtail were observed only at Kawalewada dam and not at other two sites.

Fig.-5: Abundance status of Birds



The availability of aquatic flora and fauna including fishes as the food for the birds which still supports the bird diversity near the selected study area. Also there is presence of vegetation including flowering plants and large trees in the surrounding study area that also support to the birds. At the upper side of dam there is less occurrence of avifauna due to presence of continuous stored water which submerges the habitat, hence, there is less availability of food for the birds. But at lower side of the dam there is somewhat more quantity of avifauna was seen due less water due to closing of doors of the dam which supports for the availability of food in the habitat.

As the Kawalewada *talav* is very close to Kawalewada village having near about 4000 human population and the Ramsagar *talav* is close to Tirora city near Railway station, hence there is human interference. Some anthropogenic activities like daily clothe washing, direct bathing, cattle washing, irrational practices of fish catching in the water and

continuous cattle grazing, changing climate and many other factors near the study area affecting the bird diversity. Loss of habitat is one of the reason for the disturbance in bird diversity at selected study area. Hence, there is need of strong conservative strategies to implement at the study area for the protection of the birds. Search is going on continuously and we hope that the situation will be under control after this research publication.

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Study of Diversity of Mosquitoe's from Parbhani City (M.S.) India

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Abstract: *Insects show greater diversity due to their ability to adapt to the changes in the environment. Among all insects, diversity of mosquitoes is of greater importance in terms of public health. Mosquitoes that inhabit water habitats play an important role in the ecological food chain, and many of them are biters and transmitters of human and animal diseases. Except these roles today we don't know the role of mosquito in an ecosystem concern to these roles it is very important to study the distribution and diversity of mosquito in these ecosystem as it is very important in concern with development and human health. Mosquito diversity was studied in 21 spots from parbhani city during repeated visit to same collection spots. These spot chosen from the view of Residential, Educational and public places where more chances to mosquito born disease transmitted from July 2016 to June 2017. Seven species of mosquito's belonging to 3 genera were collected and identified as Anopheles.stephensi, An. culicificies, An. subpictus, An. Sephetes.. Culex fatigens, Culex argimerges. And Aedes aegypti. In the present study the intensity and density of different mosquitoe's at different localities of Parbhani is also recorded.*

Key Wards: *Mosquitoes, Diversity, Intensity, Density, Parbhani.*

1. INTRODUCTION:

India is largest mega diverse developing country. It is well known for its biodiversity in plants, animal as well as culture. Due to the tropical location it shows three seasons like summer, mansoon and winter. It is also 2nd largest populated country in the world and definitely these populations effects on environment as well as development. Among the insects, mosquitoes are most important since they are related to health & survival of man. There is about 2400 described species of mosquitoes in the world. Basically class insects of Arthopoda are distinguished into two categories i.e. social and non-social.

Mosquito belongs to non-social categories, but definitely it play an role in ecosystem like food for aquatic organisms and next they are carrier of various diseases.

Mosquito belongs to the class insecta, order Dieptera and family – ***culicidae*** . The family *culicidae* contains about 3,500 species in three subfamilies *Anophelinae* (3 genera), and *culicinae* (at least 37 genera), and the Toxorhynchitinae (1 genus). The genera include *Anopheles, Culex, Psorophora, Ochlerotatus, Aedes, Sabethes, Wyeomiya, Culiseta* and *Haenagoggus* within the sub family *Anophelinea* six subgenera are recognized:- *Stethomiya*, *Lophopodomyia, Kerteszia, Nyssorhynchus* (all south American), *Cellia* (Old world only) and *Anopheles* (worldwide). ***http://en.wikipedia.org/wiki/Mosquito.***

Near about 3500 species of mosquitoes are found world wide except Antarctica (Lehane 1991) .The genus *Anopheles* is known by about 455 species from the world and distributed from tropical to temperate regions. There are about 70 anopheline species of mosquitoes which are malaria vectors of man and animals. of which Anopheles 422, culex 715, Mansonia 23 and Aedes are 88. In India 230 species of mosquitoes are found in which genus Anopheles contain 58 no. of species genus Aedes contain 111 no of species, genus culex contain 57 no. of species and genus Manosonia contain 04 no. of species (www.mrcindia.org) out of 59 species of Anopheles 8 are act as vectors for malaria in India. While only 03 species of Anopheles acts as vector for malaria disease in Maharashtra. Among 57 culex in India 04 no. of mosquito acts as vectors for diseases Among 4 species of Manosonia only one species acts as vector for encephalitis disease and among 111 species of Aedes only one act as vector for dengue disease in Maharashtra State (Department of Malaria Aurangabad).

In the urban area of Parbhani development is not suitable for natural ecosystem and good health. The city having no proper attention towards sanitation, drainage and damping (open) provide breeding bed for mosquitoes.

Poorly designed hand pumps leave open water collections that breed thousands of mosquitoes. Intermittent tap-based water supply which is now becoming a feature in may areas of cities, is furling people to store water in large containers, where mosquitoes can breed. Poorly organized road construction can also lead to mosquito breeding. Burrow pits accumulate water and serve as temporary breeding sites for mosquito.

That's why this study is done to identify the different species of mosquitoes and its distribution diversity from parbhani city and create awareness in people.

2. MATERIAL AND METHODS:

The survey of mosquitoes was made from Parbhani city from July 2016 to June 2017 from twenty one fixed spots these spot were chosen from the view of Residential, Educational and public places where their is more chances to transmits mosquito born diseases. Larvae and adult mosquitoes were collected from these spots and each spot is sampled at least once in each month

Mosquito sampling

1) The Adult mosquitoes were collected using aspiratory, flash light, mosquito repellent, insecticide like coil, net, liquid etc. for indoor and aspirator flash light for outdoor during morning hours (06.00 – 08.00 a.m.) randomly. Collection of immature mosquitoes was also made on the same day by dipping and netting methods as per WHO (1975) guidelines.
2) Species were confirmed from adults that emerge in the laboratory and some of them are preserved in insect preservative at laboratory.

Identification of Mosquitoes

Identification is based on larva and adult characters using standard taxonomic keys and catalogs (christophers 1933, Nagpal and Sharma 1995), Ramchadnra Rao (1974), Renert (1974), Sirivanakarn (1976) and Huang (1979).

Data analysis-

The analysis of data i.e. Intensity of mosquitoes were calculated using stastical method as follows

$$\text{Intensity of Mosquitoes} = \frac{\text{Total no. of mosquitoes collected (specific species)}}{\text{No. of spots from where species collected}}$$

3. DESCRIPTION:

Ever increasing population and lack of adequate health care facilities particularly for the urban masses are a matter of concern for India while on one side the country is proud of major achievements in science and technology including space and our march towards a knowledge, it is true on the other side that a large proportion of our population has no access to even safe drinking water, sanitation, health are like other major problems facing the country.

Yet another area of concern to the country is the spread of vector borne disease (VBDs) such as malaria, Filariasis, Japanese encephalitis and dengue to newer areas with mosquitoes, the vectors caring. These diseases, breeding in water bodies. The World Head Organization (WHO) and other international bodies highlights the threat posed by these VBDs to the world's population, in general and to India in particular.

Parbhani, is one of the eight district in the Marathwada region of Maharashtra state of India.Parbhani district lies between 18.45 and 20.15 North latitudes and 76 13 and 73 39. East longitudes. The maximum temperature of Parbhani is 45 and minimum 10.6. The avarage rainfall is 957.2 mm and the total area under horticulture is 35,000 hectors. The district is at an average height of 357 mtr.from mean sea level.The urban area of Parbhani development is not suitable for natural ecosystem and good health.

The city having no proper attention towards sanitation, drainage and damping (open) provide breeding bed for mosquitoes. When natural ecosystem disturbs their structure gets complexes and they will harmful for human being wide spread poverty, year round tropical climate environmental disturbance due to war or natural disaster and lack of public health infrastructure are all factors that promote uncontrolled mosquito breeding and are conductive to outbreaks of mosquito born diseases. The continued practice of open drainage system, indiscriminate disposal of water and industrial effluents into water bodies and added to this, the increased migration from rural areas have resulted into large slums in Parbhani city creating an environment unsuitable for healthy living.In the urban area of Parbhani development is not suitable for natural ecosystem and good health. The city having no proper attention towards sanitation, drainage and damping (open) provide breeding bed for mosquitoes.Poorly designed hand pumps leave open water collections that breed thousands of mosquitoes. Intermittent tap-based water supply which is now becoming a feature in many areas of cities, is furling people to store water in large containers, where mosquitoes can breed. Poorly organized road construction can also lead to mosquito breeding. Burrow pits accumulate water and serve as temporary breeding sites for mosquitoes.

4. RESULT AND DISCUSSION:

Worldwide urbanization, Industrialization and agricultural development is a growing phenomenon, it causes change in life style and adverse effects on natural ecosystem. When natural ecosystem disturbs their structure gets

complexes and they will harmful for human being widespread poverty, year round tropical climate environmental disturbance due to war or natural disaster and lack of public health infrastructure are all factors that promote uncontrolled mosquito breeding and are conductive to outbreaks of mosquito born diseases.

Altogether 6745 mosquitoes were sampled for this project. This collection included 21 spots from parbhani city during repeated visit to same collection spots. . All urban areas of Parbhani comprises mainly three genus like ***Anopheles, culex and Aedes***. No new species was reported from the study area. This results dependent on area-to-area and climatic condition. Our Marathwada region having very changeable climatic condition and suitable for mosquito development.

The urban areas show more dominate to ***Anopheles***, ***culex*** *and* then ***Aedes***. Simultaneously survey also carried out regarding mosquito born diseases from residential areas, that time It was found that 45.25% people were aware about mosquito born diseases and they take care to avoid mosquito population in their surrounding. This study area provide*s* 100% breeding beds for mosquitoes. In the sense of mosquito diversity study places spots shows different size of population of mosquito regarding genus and species diversity.

Table: - 1: Comparative Intensity Of Mosquitoes From July 2016 To June 2017 Months

Sr. No.	Month	Name of mosquitoes						
		Anopheles stephensi	*Anopheles culcifacies*	*Anopheles subpictus*	*Anopheles sephestes*	*Culex fatigens*	*Culex armigeres*	*Aedes acgypti*
1	**July**	15.90	11.07	16.66	15.1	10.4	5.44	2
2	**Aug.**	12.23	6.11	15.64	16.62	11.07	4.88	2
3	**Sept.**	15	11.72	12.75	2	9.33	5	1.5
4	**Oct.**	12.18	11	8.6	13.09	6.83	5.11	2.25
5	**Nov.**	8.54	3.68	8.90	10.91	6.38	5.33	5
6	**Dec.**	9.68	9.36	6.18	6.33	5.86	4.6	6
7	**Jan-**	10.26	4.05	5.83	4.7	6.08	4.8	1
8	**Feb.-**	13.38	10.57	6.85	6.41	5.14	6.42	Nil
9	**March**	10.47	7.58	7	7	5.58	5.87	8
10	**April**	8.22	7.56	1.13	5.85	5.46	4.87	Nil
11	**May.**	6.5	5.27	6	6.33	4.64	3.87	Nil
12	**June**	7.75	10.68	6.92	6.66	6.2	5.25	2

5. CONCLUSION:

Taxonomy plays a crucial role in the field of applied biology including public health, national defense, pest management, environmental problem, wildlife management, nutritional science, forensic science and several other fields in identifying the species. Human health is affected by variety of organisms which include insects, other arthropods, nematodes, protozoans etc

Among the insect's vectors, mosquitoes play an important role since they cause fetal diseases like malaria, filariasis, dengue, yellow fever, chikungunya etc.

The study has following **conclusion**

- There is need to action properly towards planned development of city
- Reduce breeding sites of mosquitoes.
- Prevention is better than cure for mosquito borne diseases.
- To do more work on life cycle, prevalence, population development, diversity, its control etc.
- Any way i.e. biologically or ecofriendly controlled the mosquito population, it is very important strategy for mosquito born disease free city.
- Definitely in future it will be big problem for urban people.
- It is right time to take action towards control of Malaria.

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Web sites

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- http://www.anobase.org/

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Seasonal Analysis of Fish Diversity from Rural Ponds Of Bhopal District, MP, India

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Abstract:
Background: *In all water bodies ponds help to protect a variety of fish species that support commercial fish production. The aim of this study is to provide information on fish diversity in two rural ponds and take steps to increase sustainable fish production by regulators.*
Method: *The present investigation was conducted on two ponds of Berasia Block of Bhopal District (M.P.) for one year from April 2018 to March 2019.The fish fauna diversity were collected on the seasonal basis.*
Result: *In the Joonapani pond 16 fish species in pre-monsoon season, 6 species in monsoon season and 12 species in post monsoon season were recorded. In the Bhojapura pond 11 fish species in pre-monsoon season, 4 species in monsoon season and 7 species in post monsoon season were recorded. The fish fauna diversity was higher in pre-monsoon season followed by post monsoon season and was least in the monsoon season. The order Cypriniformes has shown the major Ichthyofaunal diversity in the three seasons in the two selected ponds.*
Keywords: *Berasia block, Bhojapura pond, Joonapani pond, Fish diversity, Ichthyofaunal.*

1. INTRODUCTION:

Fish constitute practically half of the entire vertebrates (Nelson et al.2016).). They live together all aquatic surroundings (Arthington et al. 2016). They live in all aquatic surroundings (Arthington et al. 2016). Fisheries assume a significant part in the financial advancement of the country. It gives significant source for occupation (Devi et al. 2012). Fishes have significance and medicinal benefit just as one of main food sources (Ullah et al. 2014). It gives substitute source of employment and advances development of new ventures. (Kumar et al. 2018). Fishes are additionally the acceptable good source of protein supply (Mohanty et al. 2019).

On the Earth 21,723 living kinds of fish have been recorded out of 39,900 sorts of vertebrates (Jayaram, 1999) of which 8411 are freshwater species and 11,650 are marine. India additionally has enormous assortments of fish species. It has ninth position in fresh water Mega biodiversity (Mittermeier et al.1997). There are 2500 fish species out of which 930 live in new water and 1570 are marine (Kar, 2003).

In India, Madhya Pradesh likewise has large area of aquatic system. Madhya Pradesh covers 3.0 lakh hectare water areas as various ponds and lakes (Directorate of Fisheries, Madhya Pradesh) henceforth it is rich in fish variety. Hence, it has enormous scope for fish production.

In Madhya Pradesh numerous examinations have been directed identified with fish variety. Solanki et al. (2015) have shown an investigation on variety of Satpura dam of Sarni of Betul District. Saini et al. (2017) led concentrate on fish variety of River Narmada, Jabalpur Region. Ghulam et al. (2017) conveyed. Ichthyofaunal variety of Halali supply of Vidisha region. Kakodiya et at. (2018) have shown fish variety of Narmada waterway at Hoshangabad district. Sharma et al. (2018) have studied fish variety of Mansarovar Talab of Jerrapur, Dhar District. Narway et al. (2019) announced fish variety of Kotwal reservoir, Morena area. All these proposed investigations have shown that regions of Madhya Pradesh are rich in fish variety. The current examination will be useful to convey the fish variety on seasonal basis of Bhopal district.

In Bhopal region numerous investigations have been done at singular water bodies to discover heterogeneity of fish fauna. Sharma et al. (2014) built up an investigation on biodiversity of ornamental fish fauna at upper Lake of Bhopal. Bhargava et al. (2014) directed investigation on rdiversity of fish fauna of Shahpura Lake with connection of Physico-Chemical boundaries. Rana et al. (2015) have shown a similar investigation of variety lists of lower and upper Lake of Bhopal. Meena et al. (2016) researched fish biodiversity of District Bhopal at Phanda and Baresia block of

Bhopal district. They included seven rural ponds of Berasia block for fish assortment however excluded ponds of Joonapani and Bhojapura. Various studies have been conducted on fish fauna of Bhopal area however selected ponds of present examination have not been covered. Keeping this lacuna the current investigation has been led to discover the fish fauna variety on seasonal basis in rural ponds of Berasia block of Bhopal District in Madhya Pradesh.

The current investigation focused in on two rural ponds these are considerable and significant reservoirs. The Joonapani pond is managed by Janpad Panchyat Berasia and Bhojapura pond is managed by Gram panchayat Ramgarha.

The current investigation was conducted to discover the fish variety in three seasons. Study also highlighted idea about dominant, common, rare and absent fish species in particular season. The outcome of present study will be extremely productive for outline regulation plans for the conservation of fish diversity and their natural surroundings. The proper reporting of fish diversity also useful to develop statistics about fish diversity and to investigate the fish fauna in rural ponds of Berasia block of Bhopal district (MP).

2. MATERIAL AND METHODS:

Bhopal is a district as well as capital of Madhya Pradesh. It has two blocks Berasia and phanda. Berasia is 43 km away from Bhopal city at latitude 23.6279 N and longitude of 77.4314 E. In Berasia block, two rural and managed ponds were selected for present investigation. These are Joonapani pond (10 Hectare) and Bhojapura pond (5 Hectare). The Joonapani 14 km away and Bhojapura pond is 13 km away from Berasia Town. These ponds are constructed for irrigation and fish culture. The Joonapani pond (Figure 1) is perennial and have shown proper water level in present study period. The Bhojapura pond (Figure 2) is also perennial but during present study it has shown low water level at the end of April-May months. There was no control on cattle entry in these two ponds. In Joonapani pond sewage water was mixing from nearby villages. The bottom of ponds holds clay and collects direct sunlight.

Fishes were observed and collected on seasonal basis. These were pre-monsoon from February to May, monsoon from June to September and post monsoon from October to January for time period of one year April 2018 to March 2019.In two months of monsoon season, fishing was banned. It implements from 16 June and ends on 15 August every year (M.P. Fisheries Act, 1948). During these two months fish diversity data was not collected.

Fishes were collected with the help of native fishermen by using differing types of nets together with gill nets, cast net and hand nets etc. Fishes specimens were collected from separate fish landing sites. Unidentified fishes were preserved in 4% formaldehyde solution at the field. Later on these fishes specimens dropped at Biotechnology & Bioscience laboratory, Saifia College Bhopal were preserved in 10% formalin solution in distinct specimens jar accordant with the scale of specimen.The fish species were investigated by customary keys of Jayaram (1981) Qureshi & Qureshi (1983), Jhingran (1991) and Shrivastava (1998).Visual examination were conjointly administered if the water was clear, to grasp the distribution of fish species. The fishes abundance were categorized into three classes particularly dominant (76-100% of total catch), common (51- 75% of the total catch) and rare (below 50% of total catch), assumptive that fishing efforts were constant for every catch.

The Ethical Committee for Animal Experimentation and Research, Saifia College of Science, Bhopal, India affirmed the utilization of creatures (approval number SSC/06-06-22/, dated October 26, 2006). The exploration work of the institution is done in exacting consistence with the Guidelines for Use of Laboratory Animals in Medical Colleges (2001) of the Indian Council of Medical Research, just as with the Breeding of and Experiments on Animals Amendment Rules (2001) and the Prevention of Cruelty to Animals Act (1966).

3. RESULT AND DISCUSSION:

1) JOONAPANI POND-

PRE-MONSOON SEASON-

In this season *Catla catla,Labeo calbasu,Hypophthalmichthys molitrix* and *Channa marulius* were dominant species.*Cirrhinus mrigala,Labeo rohita,Channa punctata,Oreochromis mossambicus* and *Notopterus notopterus* were found common species in pre monsoon.*Ctenopharyngodon idella,Mystus seenghala,Wallago attu,Claris batrachus,Mystus bleekeri,* Heteropneustes fossilis (Bloch) and *Mastacembelus armatus* (Lacepede) were found rare species in pre-monsoon season (Table 1).

In pre-monsoon season total 6 fish species were belonged to order Cypriniformes which constitute 37.5%, 5 species were belonged to Siluriformes which constituet 31.25%, 3 species were belonged to Perciformes which constitute 18.75% and 2 species were belonged to order Osteoglossiformes which constitute 12.5% of total fish species (Figure 3)**.**

The fish species belong to family Cyprindae were 6 and constitute 37.5%, 3 species belonged to the Chandidae family which was 18.75%, 2 species belong to both Bagridae and Clariidae family which were 12.5%, only 1 species belonged to Heteropneustidae hora, Mastacembelidae and Notopteridae families which were constitute 6.26% for each (Figure 4)**.**

MONSOON SEASON-

Catla catla, Labeo calbasu and *Hypophthalmichthys molitrix* were dominant species in monsoon season. *Labeo rohita was* only common species in monsoon season.*Cirrhinus mrigala* and *Ctenopharyngodon idella* were rare

species in monsoon season.*Mastacembelus armatus* (Lacepede),*Notopterus notopterus,Mystus seenghala,Wallago attu,Claris batrachus, Mystus bleekeri,*Heteropneustes fossilis (Bloch), *Channa punctata,Channa marulius* and *Oreochromis mossambicus* were found absent species in monsoon season(Table 1).

In monsoon season total 6 fish species were found belonged to order Cypriniformes which constitute100%, no species was found of Siluriformes, Perciformes and Osteoglossiformes (Figure 3).The fish species belong to family Cyprindae were 6 and constitute 100%, no species was found of the families Chandidae, Bagridae, Clariidae ,Heteropneustidae hora, Mastacembelidae and Notopteridae (Figure 4).

POST MONSOON SEASON-

Catla catla,Labeo calbasu and *Hypophthalmichthys molitrix* were dominant species. *Labeo rohita, Mystus seenghala* and *Channa marulius* are common species in post monsoon season.*Cirrhinus mrigala,Ctenopharyngodon idella,Mystus bleekeri, Claris batrachus,Channa punctata,Oreochromis mossambicus* and *Notopterus notopterus* were rare species in post monsoon season.*Wallago attu,*Heteropneustes fossilis and *Mastacembelus armatus* (Lacepede) were absent in post monsoon season (Table 1).

In post this season 6 fish species were belonged to order Cypriniformes which constitute 50%, 3 species were belonged to order Siluriformes which constitute 25%, 2 species were belonged to Perciformes which constitute 16.67% and 1 species were belongs to order Osteoglossiformes which constitute 8.33% of total fish species (Figure 3).

The fish species belong to family Cyprindae were 6 and constitute 50%, 2 species belonged to the Chandidae and Clariidae families which were 16.67%, only 1 species belonged to Bagridae and Notopteridae which constitute 8.33%. No species were found of Heteropneustidae hora and Mastacembelidae families (Figure 4).

2) BHOJAPURA POND

PRE-MONSOON SEASON-

Hypophthalmichthys molitrix was only dominant species.*Catla catla,Labeo calbasu,Labeo rohita* and *Channa marulius* were common species.*Mystus seenghala,Wallago attu,Claris batrachus,Channa punctata, Notopterus notopterus* and *Oreochromis mossambicus* were rare species (Table 2).

In pre-monsoon season total 4 fish species were belonged to order Cypriniformes which constitute 36.36%, 3 species were belonged to order Siluriformes and Perciformes which constitute 27.27% for each, 1 species was belonged to order Osteoglossiformes which constitute 9.09% of total fish species (Figure 5).

The fish species belong to family Cyprindae were 4 and constitute 36.36%, 3 species were belonged to the Chandidae family which was 27.27%, 2 species were belonged to Bagridae which constitute 18.18%. Only 1 species was belonged to Clariidae and Notopteridae families which constitute 9.09% for each (Figure 6).

MONSOON SEASON-

Hypophthalmichthys molitrix was a dominant species. *Catla catla, Labeo calbasu* and *Labeo rohita* were common species. No species were found rare in monsoon season. *Mystus seenghala, Wallago attu, Claris batrachus,Channa punctata,Channa marulius,Oreochromis mossambicus* and *Notopterus notopterus* were absent in monsoon season (Table 2).

In monsoon season total 4 fish species were belonged to order Cypriniformes which constitute 100%, no species were found of Siluriformes, Perciformes and Osteoglossiformes in monsoon season (Figure 5).

The fish species belong to family Cyprindae were 4 and constitute 100%, no species was found of the families Chandidae, Bagridae, Clariidae and Notopteridae (Figure 6).

POST MONSOON SEASON-

Hypophthalmichthys molitrix was a dominant species. *Catla catl,Labeo calbasu* and *Labeo rohita* were common species. *Mystus seenghala, Claris batrachu,Channa marulius* and *Oreochromis mossambicus* were rare species.*Channa punctata* and *Notopterus notopterus* were absent in post monsoon season (Table 2).

In post monsoon season 4 fish species were belonged to order Cypriniformes which constitute 57.14%, 2 species were belong to order Siluriformes which constituet 28.57%, 1 species was belonged to order Perciformes which constitute 14.29% and no species was found of order Osteoglossiformes (Figure 5). The fish species belong to family Cyprindae were 4 and constitute 57.14%,1 species belonged to the Chandidae, Bagridae and Clariidae family which was 14.29% for each; no species was found of the family Notopteridae (Figure 6).

The current investigation shows that the variety of fish fauna was higher in pre-monsoon season. Comparable finding was accounted for by Narway et al. (2019) at Kotwal reservoir,, Morena district. In present examination Order Cypriniformes was predominant. A similar finding has announced by Meena et al. (2016) on fish diversity at Phanda and Berasia Block of Bhopal district of 18 water bodies. Similar finding has been reported by Ahad et al. (2019) at Harsi Reservoir, Ghulam et al. (2017) at Halali Reservoir, Saini et al. (2017) Narmada River at Jabalpur district, Sharma et al. (2018) at Mansarovar Talab of Jeerapura, Dhar. Beforehand, we have announced 16 fish species in Joonapani pond and 11 fish species in Bhojapura pond however not classified on seasonal basis (Ahirwar and Ali, 2020). Yet, it has been seen that the varieties in fish variety can be seen on seasonal basis which may be due to physico-chemical parameters of water. Henceforth, the current investigation has been taken to find the variety of fishes in Joonapani pond and Bhojapura pond of Berasia block of Bhopal district (M.P.) on seasonal basis.

4. CONCLUSION:

The present investigation shown that pre-monsoon season has maximum fish species variety followed by post-monsoon season. Monsoon season has shown least fish species variety in present investigation. The results also show that selected ponds are rich in fish diversity which indicates the Berasia block is rich in fish diversity. The fishermen of nearby villages sold collected fish in Berasia and Bhopal market for their earning. This research would open new ways for moving toward Ichthyofaunal research in rural areas of the country. For Sustainable fish production, it is essential to monitor these rural ponds of Berasia block. Chourey et al., (2015) has pointed issue of pond fish culture in Bhopal region like bathing and washing of cloths in ponds, water contamination and upkeep of ponds. Some essential steps should be taken by concern authority to forestall combination of sewage water from close by villages and to prevent cattle entry. Farmers should to be made aware of using chemical fertilizers and pesticides in proper sum in their farming grounds so the normal natural surroundings of these ponds stay unaffected.

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CONFLICT OF INTEREST:

The authors declare that they have no conflict of interest.

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FIG. 1: Satellite view and on-site view of Joonapani Pond

FIG. 2: Satellite view and on-site view of Bhojapura pond

TABLE 1: List Of Fishes Identified From Joonapani Pond Of Berasia Block Of Bhopal District During April 2018-March 2019 On The Seasonal Basis

S.No	Order	Family	Scientific name	Common name	Pre monsoon	Mon soon	Post monsoon
1	Cypriniformes	Cyprindae	*Catla catla*	Catla	+++	+++	+++
			Cirrhinus mrigala	Mrigal	++	+	+
			Labeo calbasu	Kalaunt	+++	+++	+++
			Labeo rohita	Rohu	++	++	++
			Ctenopharyngodon idella	Grasp carp	+	+	+
			Hypophthalmichthys molitrix	Vikit	+++	+++	+++
2.	Siluriformes	Bagridae	*Mystus seenghala*	Singhara	+	-	++

			Wallago attu	Padhin	+	-	-
		Clariidae	*Claris batrachus*	mangur /cat fish	+	-	+
			Mystus bleekeri	(Kittu, Kaitiya)	+	-	+
		Heteropneustidae Hora	Heteropneustes fossilis (Bloch)	Singhi	+	-	-
3	Perciformes	Chandidae	*Channa punctata*	Gaidiya	++	-	+
			Channa marulius	Sawal	+++	–	++
			Oreochromis mossambicus	Tilapia	++	–	–
4	Osteoglossiformes	Notopteridae	*Notopterus notopterus*	Patola	++	–	+
		Mastacembelidae	*Mastacembelus armatus* (Lacepede)	Bam	+	–	–

+++ = Dominant, + + = Common, + = Rare, _ = Absent

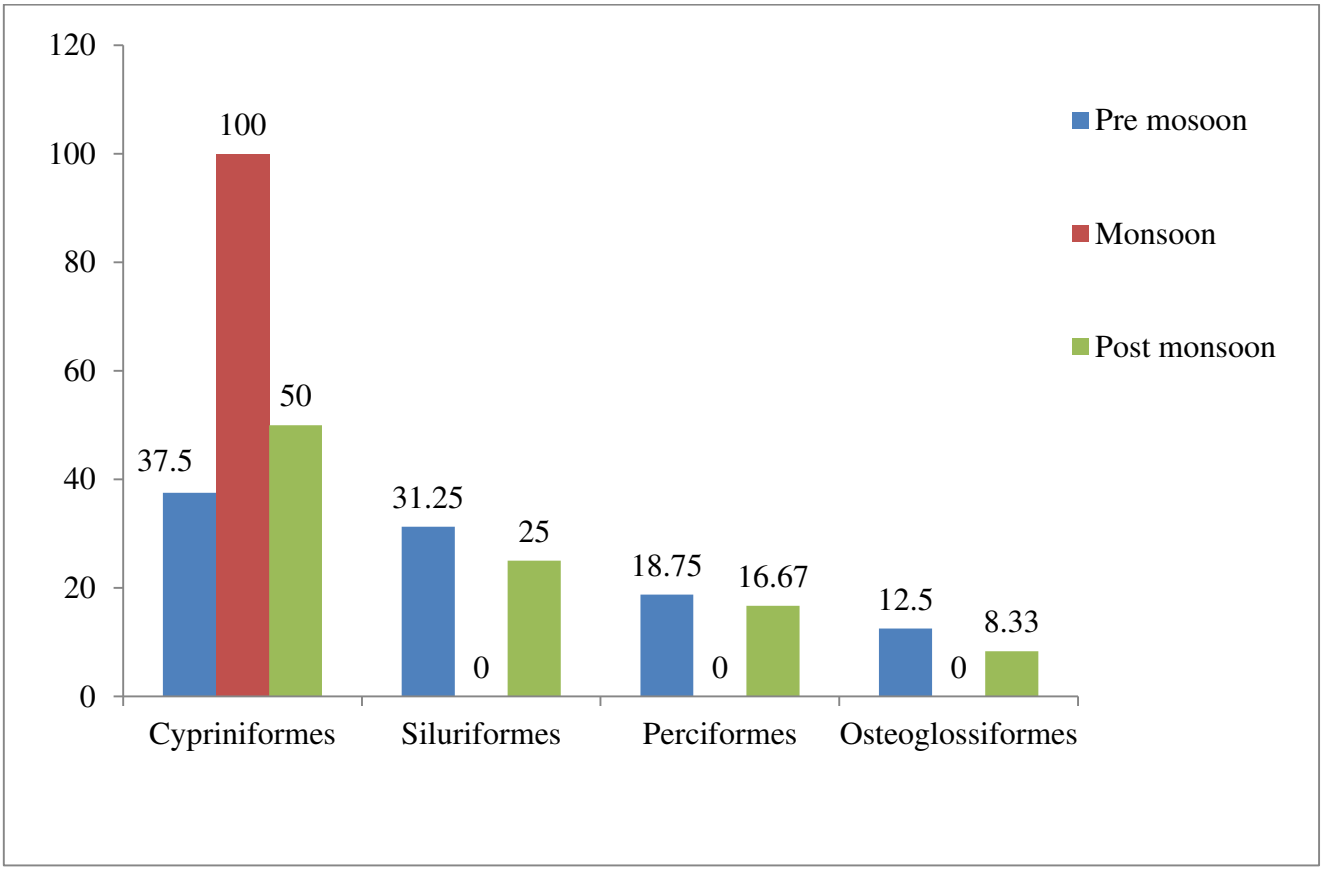

FIG.3: Percentage of fish species in an Order

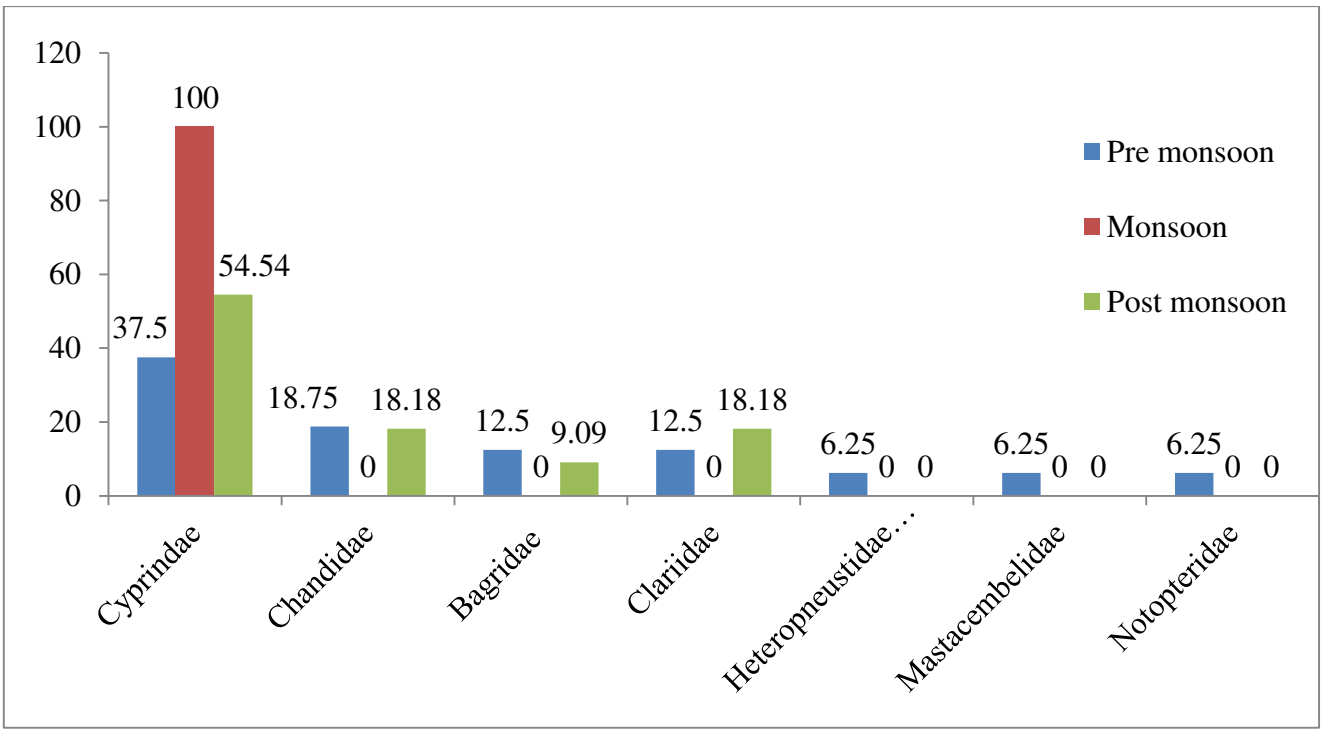

FIG.4: Percentage of fish species in a family

TABLE 2: List Of Fishes Identified From Bhojapura Pond Of Berasia Block Of Bhopal District During April 2018 To March 2019 On The Seasonal Basis

S.No	Order	Family	Scientific name	Common name	Pre monsoon	Mon soon	Post monsoon
1	Cypriniformes	Cyprindae	*Catla catla*	Catla	++	++	++
			Labeo calbasu	Kalaunt	++	++	++
			Labeo rohita	Rohu	++	++	++
			Hypophthalmichthys molitrix	vikit	+++	+++	+++
2.	Siluriformes	Bagridae	*Mystus seenghala*	Singhara	+	–	+
			Wallago attu	Padhin	+	–	–
		Clariidae	*Claris batrachus*	mangur /cat fish	+	–	+
3	Perciformes	Chandidae	*Channa punctata*	Gaidiya	+	–	–
			Channa marulius	Sawal	++	–	+
			Oreochromis mossambicus	Tilapia	+	–	–
4	Osteoglossiformes	Notopteridae	*Notopterus notopterus*	Patola	+	–	–

+++ = Dominant, + + = Common, + = Rare, _= Absent

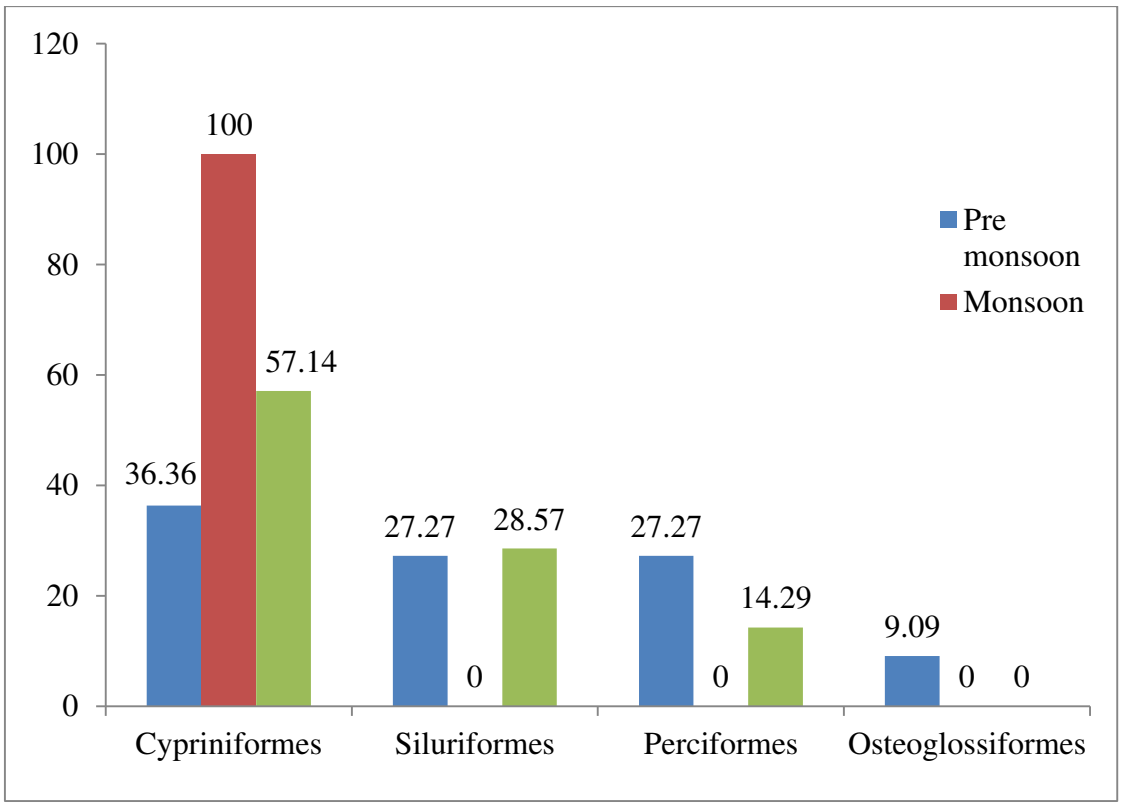

FIG.5: Percentage of fish species in an order

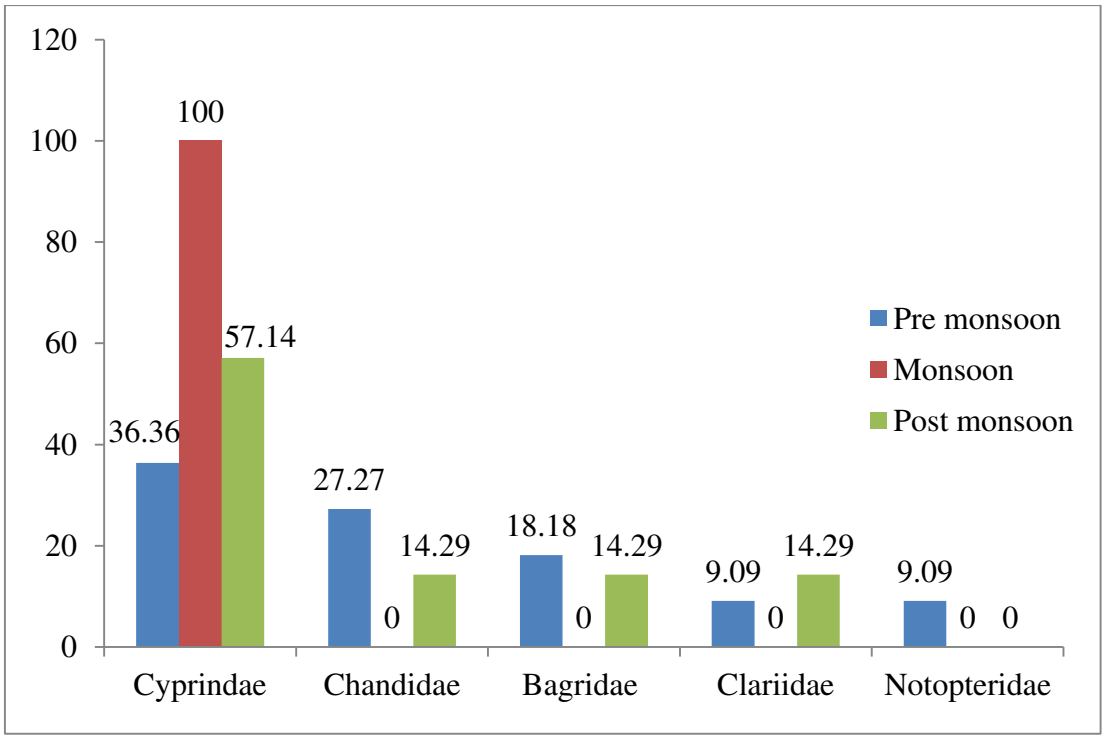

FIG. 6: Percentage of fish species in a family

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Effects of Dietary Bitter Gourd (*Momordica Charantia*) On Growth Performance of Indian Major Carp (*Labeo Rohita*) Fingerlings

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Abstract: *In this experimental study we were designed five experimental diets with containing changeable concentration of five experimental diet was prepare by various concentration of Bitter gourd (Momordica charantia) powder as.25g/kg(D2), 50g/kg(D3), 75g/kg (D4) and 100g/kg(D5). with full fat soybean diet D1 used as control where no Bitter gourd were used.at the end of the experiment we were note that Initial weight, final weight, weight gain, specific growth rate and survival rate of labeo rohita fingerlings were significant . The highest weight gain and specific growth rate values, at the end of the experiment. FCR and PER values were also recorded in fish fed D3 (50g/kg of diet) and D4 (75g/kg of diet). Fish fed Bitter Grout significant differences were recorded in the survival rate among groups best survival rate was found at D3 and D4 followed by D5 ($p > 0.05$).it clearly indicates that from 50 to 75 gram per kilo gram of bitter gourd work better than full concentration i.e.100 gram per kilogram of diet. Energy utilization (EU, %) were noted significantly good at D3 and D4 followed by D5 D2 and control D1 which shows fishes respond well to dietary bitter gourd as supplement.*

Key words: *Bitter gourd (Momordica charantia), Growth performance, Indian major carp (labeo rohita) fingerling.*

1. INTRODUCTION:

Now a day's many commercial diets come in market for fishes but most of diet had been made with routine formulation .which fulfill minimum body requirement in fishes. Mineral elements play important role for fish body. They are calcium, phosphorus, sodium, molybdenum, chlorine, magnesium, iron, selenium, iodine, manganese, copper, cobalt and zinc.(1) .when we tally various research article we find that least attempt carried out in terms of calcium need for labeo rohita.also next side is that no attempt had been carry out use of bitter grout in diet. Many study related its mineral composition shows that One cup (94 grams) of raw bitter melon provides **Carbohydrates:** 4 grams, **Fiber:** 2 grams, **Vitamin C:** 93%, **Vitamin A:** 44% of the RDI, Folate**:** 17% of the RDI, Potassium**:** 8% of the RDI, **Zinc:** 5% of the RDI, **Iron:** 4% of the RDI. Bitter melon is especially rich in vitamin C, an important micronutrient involved in disease prevention, bone formation, and wound healing .It's also high in vitamin A, a fat-soluble vitamin that promotes skin health and proper vision .(2).so in present investigation fish diet is formulating to check its effect on fish health status.

2. MATERIALS AND METHODS:

Labeo rohita fingerlings were obtained from local fish supplier Latur . Fish were acclimatized to the laboratory conditions for 20 days. Water quality parameters were monitored on a weekly basis throughout the experimental period using the standard APHA methodology (3.) By the mean of multi-purpose water meter (YSI 600 XL, Xylem Inc., USA). The parameters are; water temperature (21 °C ± 0.2), dissolved oxygen (6.1 ± 0.2 mg/l) and pH (7.5 ± 0.4). Fish were fed the test diets until visual apparent satiation, 7 days a week for 60 days. Fish in each aquarium were counted and weighed biweekly throughout the experiment. Total amount of feed consumed by the fishes in each aquarium, during the study, after that feed consumed for each individual fish was calculated consequently.

1. Preparation of experimental diet:

Bitter gourd was obtained from the local market. Dried and made it to convert powder form. After that five experimental diet was prepare by various concentration as. 25g/kg (D2), 50g/kg (D3), 75g/kg (D4) and 100g/kg (D5). With full fat soybean diet D1 used as control where no Bitter gourd were used. Ingredients of the diet shown in table 1

collection of data and analysis of sample

After 60 days, the fishes of each aquarium were weighed collectively and average final weight (g/fish) was calculated.

2. Determination of some Growth Parameters:

Table 1. Fish Feed Formulation

ingredients	Experimental diets				
	Diet 1	Diet 2	Diet 3	Diet 4	Diet 5
Groundnut cake	65.0	65.0	65.0	65.0	65.0
Rice bran	4.20	4.20	4.20	4.20	4.20
Wheat flour	3.20	3.20	3.20	3.20	3.20
Processed soybean[a]	26.60	26.60	26.60	26.60	26.60
Bitter grout	……..	25g*	50g*	75g*	100g*
	g* Grams per 1 kg of diet				

Total length, and weight, liver and viscera weights and gut length were recorded for the purpose of determining growth parameters viz HIS- hepatosomatic index, VSI- viscerosomatic index, CF-condition factor and RIL-relative intestine length.

Hepatosomatic index (HSI) was determined according to Busacker (4) as using formula: HSI = 100 [liver weight (g)/ total body weight (g)]; Viscerosomatic index (VSI) was estimated according to Ricker (5) as using formula: VSI = 100 [viscera weight (g)/ total body weight (g)], CF was estimated according (6); CF = 100 * (TW/TL^3) where; TW: Total fish weight (g); TL: Total fish length (cm). Relative intestine length (RIL) was determined according (7) as using formula: RIL = absolute intestine length (cm)/ TL (cm).

3. RESULTS:

Initial weight, final weight, weight gain, specific growth rate and survival rate of labeo rohita fingerlings are presented in Table 2. The highest weight gain and specific growth rate values, at the end of the experiment . FCR and PER values were also recorded in fish fed D3 (50g/kg of diet) and D4 (75g/kg of diet) . Fish fed Bitter Grout significant differences were recorded in the survival rate among groups best survival rate was found at D3 and D4 followed by D5 ($p > 0.05$).it clearly indicates that from 50 to 75 gram per kilo gram of bitter gourd work better than full concentration i.e.100 gram per kilogram of diet.

Energy utilization (EU, %) were noted significantly good at D3 and D4 followed by D5 D2 and control D1 which shows fishes respond well to dietary bitter gourd as supplement.

Growth performance and feed utilization efficiency

Table 2. Effect of different levels of Bitter gourd (*Momordica charantia*) on growth performance of *labeo rohita* fingerlings under laboratory condition

ingredients	Experimental diets				
	Diet 1	Diet 2	Diet 3	Diet 4	Diet 5
Initial body weight (IW, g/fish)	1.51 ± 0.1	1.78 ± 0.1	1.98 ± 0.1	1.79 ± 0.1	1.99 ± 0.1
Final body weight (FW, g/fish)	7.25±0.05b	7.31±0.05b	7.11±0.19b	8.60±0.36a	8.2±0.52ab
Total weight gain (TWG, g/fish)	5.14±0.51b	5.43±0.51b	5.3±0.19b	6.70±0.37a	6.31±0.52ab
Specific growth rate (SGR, %/d)	1.14±0.01b	1.15±0.01b	1.29±0.04b	1.31±0.07a	1.29±0.09ab
Feed conversion ratio (FCR)	2.02±0.06a	2.02±0.06a	1.79±0.03b	1.41±0.07b	1.71±0.14b
Protein efficiency ratio (PER)	1.02±0.03b	1.04±0.03b	1.29±0.01ab	1.26±0.05a	1.31±0.1a
Protein productive value (PPV)	19.15±0.63b	20.18±0.63b	30.60±0.49a	33.67 ± 1.03a	29.06 ± 2.26a
Energy utilization (EU, %)	10.11±0.33b	11.09±0.33b	9.20±0.16c	11.74±0.47a	9.81±0.71b
Survival rate (SR, %)	90 ± 2.08	95 ± 2.08	100 ± 0	100 ± 0	99 ± 2.08
Initial body weight (IW, g/fish)	1.62 ± 0.1	1.88 ± 0.1	1.88 ± 0.1	1.89 ± 0.1	1.89 ± 0.1

4. DISCUSSION:

Using of natural feed additive is becoming useful for fish feeding rather than classic chemical feed additives due to the accumulative effect of the chemical components induced deterrent effects on consumer health. The use of medicinal and aromatic plants in fish diets is still limited, this being expert only at experimental scale.

In the present study an improvement in labeo rohita fingerlings growth and feed utilization index was recorded when fish fed diet containing Bitter Grout seed when compared with either Bitter Groutleaves or control diet but survival rates were insignificantly affected among groups. Superiority of using seeds rather than leaves in growth performance may be explained by that seeds contain much higher content of protein and lipid relative to leaves and also Bitter Grout seeds contain active compounds such as planteose, mucilage, polysaccharides and fixed oil that consists of linoleic acid (50%), linolenic acid (22%), oleic acid (15%) as well as 8% unsaturated fatty acids (8).,Bitter Grout leaves extract improves growth and specific growth rate and lowers FCR of common carp (*Cyprinus carpio*) at 4% and 8% inclusion levels in fish diet, however, the survival was not affected ($P > 0.05$) by basil-supplemented diets (9.). Also incorporation of driedBitter Groutleaves in Hybrid Tilapia, *Oreochromis niloticus* X *Oreochromis aureus*, fingerling diets improved growth rate significantly ($P < 0.05$) than the control diet especially at 2% dried basil leaves which achieved the best inclusion level (10.). Reported that chicks fed diet supplemented with Bitter Grout at 3 g/kg diet had the best FI, FCR, live body weight and feed efficiency. In European sea bass *Dicentrarchus labrax* species after the administration of 1% thyme in fish diet.no attempt was found related dietary use of bitter grout.

Above research noted the utilization of dietary Bitter Grout is not only useful for fish but all animals. Utilization of natural content in diet is needful for recent period.

5. CONCLUSION:

The present investigation showed a significant improvement of fish growth, feed utilization and digestive activities by the administration of Bitter Grout to labeo *rohita* fingerlings diet as compared to the control. The beneficial effects of using Bitter Grout on fish growth appear to be associated with significant growth parameter. More research is necessary to evaluate Bitter Grout supplementation in *labeo rohita* fingerlings diet according to its digestibility, amino acid profile and content of anti-nutritional factors.

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Biodiversity: Management and Conservation

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Abstract: *India is one of the mega-biodiversity countries of the world. Biodiversity play an important role because, it is the most fundamental level, and provides the basis for all life on earth, ensuring clean air and water, fertile soils and healthy, functioning ecosystems necessary to maintain sustainability. Management of all of the natural resources is also important to maintain a balance in the natural ecosystem. Biodiversity conservation is the protection and management of biodiversity. Conservation includes both the protection and rational use of natural resources Humans affect biodiversity due to population explosion, over exploitation of natural resources and unhealthy lifestyles, causing damage to habitats for species. Through proper education, implementation and decisions we can preserve biodiversity, and the human population will be able to sustain life on earth longer. Resource conservation and management provide the maximum benefit to current generation while maintaining capacity to meet the needs of future generations.*

Key Words*: Mega-Biodiversity, Sustainability, Management, Conservation, Resources.*

1. INTRODUCTION:

Biodiversity is the variety of life. "Biodiversity" is common term used instead of, clear established terms, species diversity and species richness (Walker 1992). Biodiversity is the biological varieties on earth. . Biodiversity is measured by variations at the genetic, species and ecosystem levels. Any of the type of biodiversity is not distributed evenly. Biodiversity generally tends to cluster in hotspots (*Myerset etal 2000*) and is been increasing with the time (*McPeek etal* 2007 and *Peters etal 2013).*

Conservation of biodiversity refers to the protection, up liftment, and management of biodiversity in order to have sustainable environment and other benefits for present and future generations. It is always claimed that the necessity of biodiversity by considering our degree of dependency on the environment. We depend directly on various species of plant for our various needs as well as we depend on various species of animals and microbes for different reasons. The participation of women in environmental awareness programmes is very essential because they spends a great part of their life in arranging fuel, fodder, water for family, and are actively involved in sustainable use of resources. (Puja 2021,Wen Hua Zhanh 2013). Natural Resource Management (NRM) refers to the sustainable utilization of major natural resources. Humans affect biodiversity by population explosion and by unethical use of natural resources, and their lifestyles, causing damage to habitats for species.

2. METHOD:

Survey of literature was made by using online publication, and literature reviewed. Mouth to mouth interaction was also made in age groups.

3. RESULT:

By adopting mouth to mouth interaction method, in different age groups, some of the points came forward, for betterment of Biodiversity: Management and Conservation. These points are given in table.

S. No.	Point which has been presented by different persons with author during mouth to mouth interaction
01	All the species should be conserved with proper identification.
02	Poaching and hunting animals should strictly be prevented.

03	All the economically important organisms should be identified and conserved properly with well documentation.
04	All of the resources should be utilized precautionary, their conservation and management is equally important.
05	Introduce the 3 R's: Reduce waste, Reuse resources, and Recycle materials.
06	The protected areas should be well developed carefully.
07	All types of pollutants should be reduced in the environment.
08	Deforestation should be strictly prohibited.
09	Environmental laws and Acts should be implemented strictly.
10	The useful and endangered species should be conserved in their natural as well as in artificial habitats.
11	Public awareness is very essential regarding biodiversity conservation, management and its importance.
12	Role of Public participation in biodiversity conservation, management and its importance is required.
13	Syllabus of all the streams must contain this type of issues.
14	Encourage persons to switch off all the appliances and lights when not in use.
15	Buy the things only what we need.
16	Buy things with less packing material.
17	Use of public transport.
18	Use of solar energy as for as possible.
19	Protected areas should be developed for animals where no human activities are allowed
20	National parks and wildlife sanctuaries should be developed.

4. CONCLUSION:

Nature is always beautiful and needs to be preserved. The need to spread environmental awareness is enormous in the context of successfully addressing environmental problems. It is linked to environmental education (Sinha 2021). It is well known fact that a **healthy ecosystem has a rich level of biodiversity**. The final aim of biodiversity management is to determine the actual impact of biodiversity. And once the impact has been evaluated, preventive measures can be taken.

Biodiversity is being lost due to the loss of habitat, over-exploitation of resources, climatic changes, pollution, diseases, hunting, and so many other causes. Since biodiversity provides us several economic and ethical benefits and adds aesthetic value, therefore conservation and management of biodiversity becomes very important.

We can further claim the necessity of biodiversity by considering our degree of dependency on the environment. We depend directly on various species of plant for our various needs. Similarly, we depend on various species of animals and microbes for different reasons. Our Natural Resources should be conserved because it is the main source of our daily needs and are limited.

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Diversity of Molluscs and Their Correlation with Physico-Chemical Parameters Of Londhare Dam Shahada Taluka District Nandurbar (M.S.), India

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Abstract: *Molluscs are considered the most diverse and dominant benthic fauna both from lentic and lotic ecosystem. The diversity, seasonal variations and their correlation with the physicochemical parameters of Londhare dam have been studied during June 2012 to May 2014. A correlation between Molluscs collected by using unit cover method and water samples collected from three points from reservoir have been attempted. The biotic samples and water samples carried to laboratory for qualitative and quantitative evaluation with respect to Molluscan density and species richness while abiotic components of water have been analyzed over three seasons' monsoon, winter and summer. In Londhare dam total ten species and eight genera were recorded. Of these ten species eight belongs to class gastropod and two species of class bivalvia The value thus obtained have been used to find out correlation between water parameters and density and species richness of mollusc by keeping molluscs as dependent variables and abiotic factors as independent variables. Maximum density in monsoon and minimum in winter. The positive or negative significant or non-significant correlations of Molluscan density and species richness with physicochemical parameters of water that produce cumulative effect are discussed.*

Keywords: *Mollusc, Diversity, Density, Species richness, Physico-chemical parameters and Londhare dam.*

1. INTRODUCTION:

Biodiversity is one of the important lives supporting system on the earth. Molluscs are found in various habitats and are divided in to freshwater, marine and terrestrial forms. The freshwater Molluscs play an important role in water ecosystem (Kamble V.S.). The phylum Mollusca have a large group of animals having varied size, shape, habits and occupy different environment (Subba Rao1993). The freshwater molluscs have a shell, in which the soft parts are enclosed. Most species can be suitably recognized by their shell characters. However in some groups the conchological characters have to be complemented by their structural characters which are used for study of molluscan taxonomy (Kamble V.S.). The Phyla Molluscs constitute dominant group animals belonging to the seven classes namely Aplacophora, Monoplacophora, Polyplacophora, Bivalvia, Gastropoda, Cephalopoda and Scaphopoda. Among these classes, Gastropods, Bivalvia and Cephalopod are considered as major and important ones. Molluscs are extremely important communities among other ecological communities. They constitute the second largest invertebrate and most successful group next only to insects. Abbott (1989) Bouchet (1992).

Biodiversity is the biological variety and variability of life on earth. An attempt to address the diversity, endemism and geographical distribution patterns of land snail of Western Ghats, has been made by Arvind *et al.,* 2005. Till date 1487 species of land snails belonging to 32 families and 140 genera have been reported in India (Ramakrishna and Mitra 2002). Recently, the checklist of terrestrial gastropods of Karnataka (Mavin Kurve *et al.,* 2004) and land and freshwater molluscs of Maharashtra state have also been published by Patil and Tamale (2005), Magare (2007,2012) and Magare and Valvi (2013). Diversity of freshwater molluscs of Satpuda Mountains of Gujarat is carried by Magare and Valvi. Many other workers make survey and diversity of molluscs from freshwater bodies of different geographical regions like Rajasthan. Ray and Mukherjee L. (1963) reported various snail species. Chubisia (1992) and Magare S. R. (2012) reported gastropods of both lotic and benthic ecosystems. These results promoted us to make survey of fauna of freshwater molluscs from Londhare dam Shahada Taluka Dist. Nandurbar. Freshwater molluscs are known to play significant role in the public and veterinary health and therefore needs to explore the diversity. Considering the role of

molluscs in maintaining the overall environmental conditions, the conservation of this group is of urgent need. It requires multiple approaches including research (systematic, ecology etc.) inventories (distribution, population size) migration of human impact and active intervention to promote recovery (Lydeard *et al.,* 2004; Seddon 1998).

2. STUDY AREA:

LONDHARE DAM: Londhare dam is build up during the decade of 1990 near the Londhare village in Shahada Taluka of Nandurbar district (Maharashtra). This dam is constructed on Mhais River which originates from Satpuda mountain range and flows towards south and merges to the Tapi River. The geographical location is $21^{0}31^{'}$ North latitude and $74^{0}36^{'}$ East longitude. This is earthen dam having catchment area of 21.00sq.miles and maximum height of dam is 20.48 meter. The water of the dam is used for drinking, irrigation, and pisciculture.

FIG. 1 Satellite image and Panoramic view of Londhare dam.

3. MATERIAL AND METHODS:

The molluscs of Londhare dam were studied during two year period from June 2012 to May 2014. Benthic molluscs were collected monthly from three selected sites of the dam. It is a muddy and rocky shore with least macrophytes. For collection of molluscs a unit core with corer with 10cm height and 8cm radius was inserted 5 to 6 spots at each field station. The soil collected was sieved and the molluscs were collected in a separate sample bottle as described by Micheal (1984). An average of this was considered as a unit for the site per visit. Some sites of the dam, where more macrophytes were present net was directly dipped in the water and swept to collect molluscs with vegetation. The collected molluscs were preserved in 4% formalin and carried to the laboratory for quantitative and qualitative estimation. The collected molluscs were identified as per the key provided by Subba Rao (1989).

To find out correlation of molluscs density with their habitat and physico chemical parameters of water samples were analyzed by using standard methods as per APHA (1998) and Michael (1984). The data for four months were pooled into three seasons. Monsoon (June, July, August and September), winter (October, November, December and January) and summer (February, March, April and May). The densities of molluscs were calculated on the basis of the volume of the cover used for the collection of soil samples using following formula:

$$Density = \frac{Number\ of\ molluscs}{Volume\ of\ the\ cover}$$

Further, the mean and standard error of mean (SEM) were used for performing one way ANOVA (Fowler J. and Cohen L. 1987) with no post- test for analyzing seasonal variations in density of molluscs across three seasons using graph pad prism version 3.00 for windows (Graph pad software San Diego California USA). The P value for ANOVA is non- significant if P> 0.05(ns) significant if P< 0.05(*), significantly significant (**) if P< 0.001 and highly significant (***) if P< 0.0001.

To find out the relation between the Molluscan density and various abiotic and biotic parameters. Pearson correlation test of statistics was carried out using SPSS 7.5 software for windows. Where ** correlation is significant at the 0.01 level (two tailed) and * correlation is significant at the 0.05 level (two tailed). The percentage density of each species was calculated as domination index (Iga and Adam, 2006) as follows:

$$DO = \frac{na}{N} \times 100$$

Where, na= the number of individuals of species a.

N= the total number of individuals in a sample.

The value of the domination index 'Do' was divided into five classes according to Gormy and Grum (1981) as eudominant > 10.0% of sample, dominant 5.1- 10% of sample, subdominant 2.1- 5.0% of sample, recedent 1.0- 2.1% of sample, subrecedent < 1.0% of the sample.

4. RESULT AND DISCUSSION:

In Londhare dam total ten species and eight genera of aquatic molluscs were recorded. These molluscs include eight species of gastropods and two bivalvia. The gastropod species found were *Lymnaea accuminata, Lymanea luteola, Bellamya bengalenesis (F.) bengalenesis ,Bellamya bengalenesis (F.) annandalai, Thiara tuberculata, Indoplanorbis exustus, Gabbia orcula* and *Tarebia granifera*. The bivalvia species found were *Lamellidens marginalis* and *Parreysia corugata*.

DENSITY AND SPECIES RICHNESS: (TABLE1 FIG.2, AND 3)

LONDHARE DAM :- At Londhare dam maximum density was observed in monsoon (1228 ± 37.83 individuals /m^3) while minimum in winter (626.3± 59.52 individual /$m^{3)}$ the values were moderate in summer (930 ± 44.48 individuals /m^3) similarly, maximum species richness was noted in monsoon with 5.0 ± 0.26 species and minimum in winter 2.75 ± 0.31 species. The species richness was 3.37 ± 0.18 species in summer. Both density and species richness showed significant seasonal variation ($P < 0.0001\ F_{2\ 21}\ 39.0$) for density and ($P < 0.0001\ F_{\ 2\ 21}\ 19.92$) for species richness.

RELATIVE ABUNDANCE OF AQUATIC MOLLUSCS (TABLE 2):

The relative abundance of molluscs showed variation in Londhare water reservoirs (dam).At Londhare dam *Thiaria tuberculatus* appeared most dominant (17.2%) while *Gyraulus* was least abundant (0.0%).The Pearson correlation (Table-3) of different factors with density and species richness of aquatic molluscs revealed significant positive correlation at the level of 0.01 at Londhare dam with AT, WT, NO_3^-, TS and TSS. While negatively significant with DO, pH and Transparency at the same level. In Londhare dam Molluscan density were positively correlated at AT, TS, TSS, and WT, at 0.01 level, and negatively with DO, pH and Transparency at 0.01 level.

Present study was carried out at higher altitude at Londhare dam area in Satpuda mountain range; low species richness of molluscs was observed. Different species of molluscs occur in Lacustrine and Riverine habitats (Subba Rao 1989). Recently Magare (2007) also studies the biodiversity of fresh water molluscs from Satpuda Mountain and Tapi River with reference to vector snails and reported 15 species of molluscs from which 12 species are from Gastropoda and 3 species from pelecypoda. In the Londhare dam 10 species recorded. At Londhare dam though only 10 Species were reported their density was always high. The highest density of Londhare water reservoirs were observed during the monsoon. Thus indicates that the high water level, moderate photoperiod and temperature favor the growth of the macrophytes which provide food and shelter, the two basic needs of life and thus probably enhance the breeding performance of molluscs. Monsoon is one of the determinant factor in regulating density and distribution of plant (the macrophytes) as it influences the physical and chemical characteristics of the dam. Freshwater Molluscan species found on every continent and in all aquatic habitats. (Strong *et al.,* 2008) morphological assessment of molluscs became fundamental part of biological research and found suitable technique in the identification of species (Adams, *et al.,* 2004). Freshwater molluscs play a massive role in nature and help in assessment of ecological status of the water bodies.

In the present study of molluscs significant seasonal variation were recorded in density and species richness of Londhare water dam are dependent on the surrounding area. The seasonality of molluscs may be correlated with temporal variation of biotic and abiotic parameters. Maximum density and species richness of aquatic molluscs were recorded in monsoon. When weather is moderate. When various physico-chemical parameters are considered with respect to overall Molluscan density and species richness. In present study also the significant positive correlation is established (Table-3) between temperature and density as well as species richness for molluscs at Londhare dam. Further increase in temperature in observed range may favours the growth of molluscs (Ekhande et al.,2010, Patil J.V. 2011) have also shown positive correlation between temperature and molluscan density. Though a negative correlation

between temperature and Molluscan was recorded in some North Indian lake and ponds (Vasisht, and Bhandal 1979). One of the parameters influenced by rainfall is water cover which was also significantly positively correlated with their density and species richness of the molluscs.

TABLE: - 1 Seasonal variations in density (no/m^3) and species richness (No. of. Species) of Aquatic molluscs at Londhare dam (LD).

Parameters	F value	Monsoon	Winter	Summer
Total Density (LD)	$F_{2\ 21}$ 39	1228	626.3	930
Species Richness(LD)	$F_{2\ 21}$ 19.92	5.0	2.75	3.375

TABLE: 2 Molluscs Species and their relative abundance (%) recorded in the wetlands Londhare Dam during Study period June 2012 to May 2014.

Sr. No	Molluscs		Percentage (%)
	Species	Occurrence	Ranipur
1	*Lymnaea accuminata*	VC	9.4
2	*Lymnaea luteola*	C	12.1
3	*Bellamya bengalensis* (F.) *bengalensis*	VC	14.3
4	*Bellamya bengalensis* (F.) *annandalai*	C	11.5
5	*Thiara tuberculate*	VC	17.2
6	*Indoplanorbis exustus*	VC	14.7
7	*Lamellidens marginalis*	VC	9.2
8	*Parreysia corugata*	R	1
9	*Gabbia orcula*	R	0.9
10	*Tarebia granifera*	VC	9.7

VC= Very Common, C= Common, R= Rare.

Pearson Correlation-Physicochemical Parameters and Molluscs of Londhare Dam

	Molluscs Density	Molluscs Sp. Richness
AT	.581**	.413*
CA	-.286	-.495*
CL	-.282	-.509*
CO2	.490*	.255
DO	-.508*	-.275
MG	-.119	-.341
MOLDEN	1.000	.912**
MOLSPR	.912**	1.000
NO3	.549**	.617**
PH	-.499*	-.636**
PO4	.414*	.589**
SO4	-.232	-.370
TDS	-.120	-.373
TH	-.285	-.457*
TRANS	-.932**	-.846**
TS	.762**	.592**
TSS	.824**	.880**
WC	.200	.432*
WT	.573**	.400

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

TABLE: - 3 Pearson correlations: Aquatic molluscs density and species richness with Abiotic and Biotic parameters in Londhare Dam (LD) during June 2012 to May 2014.

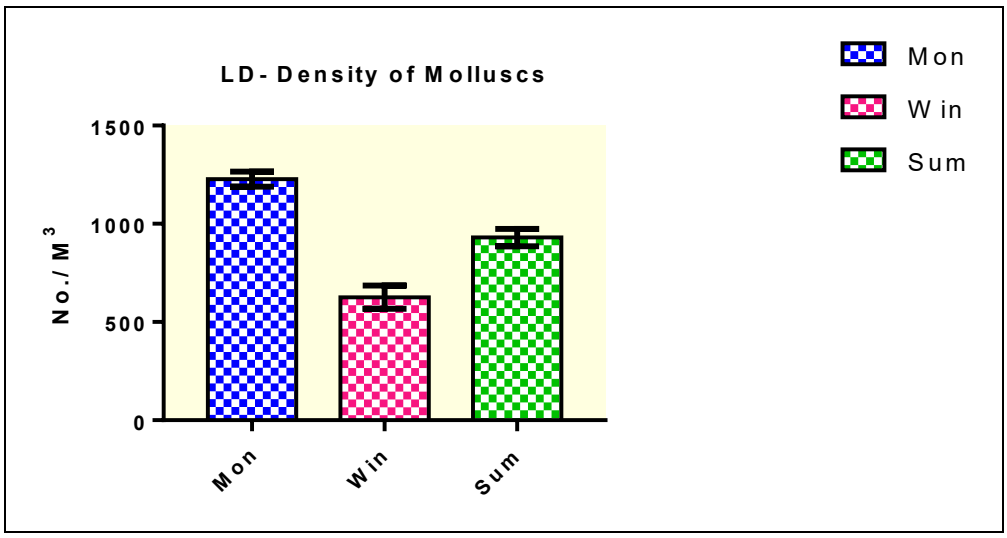


FIG: 1 Seasonal variations in Density and Species richness of Molluscs at Londhare Dam (LD), during the study period June 2012 to May 2014.

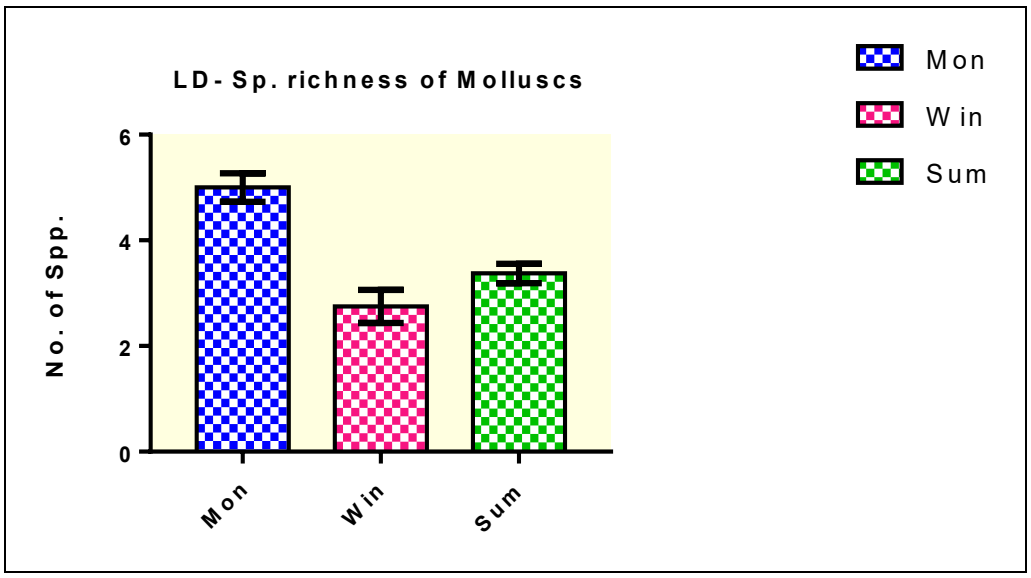
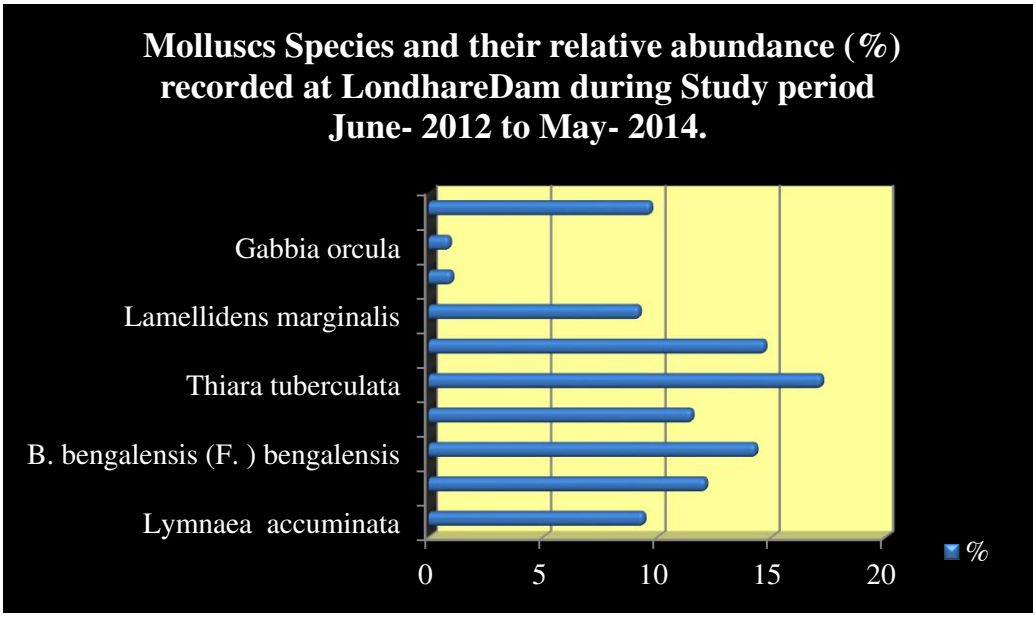


FIG: 2 Molluscs species and their relative abundance (%) recorded at Londhare Dam (LD), during the study period June 2012 to May 2014.



5. CONCLUSION:

In conclusion it may be said that the Londhare dam altogether 10 species of molluscs belonging to 08 genera were recorded. Londhare dam are the rain deficient regions of North Maharashtra supports good density and diversity of molluscs.

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Department of Zoology R.S.S.P. Mandal's Nanasaheb Y. N. Chavan Arts, Science and Commerce College Chalisgaon, Dist. Jalgaon (M.S.) India.

Effect Of Abiotic Components On Fish Farming Near Sillod Town; District Aurangabad From Marathwada Region Of Maharashtra State.

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Abstract: *The present investigation deals with the effect of some abiotic factors on fish farming in Sillod tehsil from Aurangabad district of Marathwada region. Freshwater reservoirs in and around Sillod tehsil were used by the farmers for the purpose of fish farming as allied agricultural business. For this study small scale fish farming were selected randomly for collection of relevant information about the abiotic factors like temperature, light, humidity etc. and its effects on freshwater reservoir fish farming. From the above study it revealed that most of the fish farmers are aware about variation occurred in the abiotic factors, fish farmers of the study area agreed that fluctuation occurred in temperature, increased in light intensity and humidity has a negative effects on fish farming, some of the fish farmers agreed that changes in abiotic factors has also affect the food material available in the study area, ultimately it affects the growth performance of fish. General economy of fish farming in the study area also affected due to the high temperature. Farmers agreed that abiotic factor moisture or humidity encouraged the distribution and development of diseases in fishes. From the above observations it is recommended that there is need to create the awareness among the fish farmers about the effects of abiotic factors on fish farming and improving the production of fish farming and the economic status of fish farmers in the study area.*
Key words: *Abiotic Components, Fish Farming, Aurangabad, Marathwada.*

1. INTRODUCTION:

Fishes have been pursued by man from the times immortal. It has currently become very popular because the fish have been found to be excellent food and fisheries can be considerably contribute to the solution of our national problems such as self-sufficiency in food and unemployment. Fish resources from the natural water are limited. There is a need for protected water to conserve the fish wealth. Fisheries suffered a setback in a middle of the 19th century due to rapid progress in agriculture with application of science. However, fishery was put back on the rails by application of science to it in the present century. It has made a tremendous progress in the last few decades. India is the second-largest producer of fish in the world, contributing to 5.43% of global fish production. Apart from nutritional security, Indian fisheries also provide livelihood support to over 14 million (1.4 crores) people, Kapil Kajal (2020). Fisheries primarily started as capture fisheries in natural water, seas, rivers and lakes. Fish culture is the recent additional to fisheries, but it has acquired a great significance on account of the great prospectus it holds. Fisheries helps to national economy as well as helping as food resources of all over the countries. Fisheries is fast emerging as an important industry with immense job potentials. Freshwater reservoir small-scale fish farmers are the main producers of the fishery industry in many developing countries. The fish farming provides employment at the village level. It provides protein rich food for deadly growing poor population. It has higher nutritive and biological value, it contains only 1-2% fat, it does not contains carbohydrates, it carries good deal of vitamins as A, D, B, C, E and K that are necessary for good health.

Maharashtra has the largest number of manmade water bodies in the country and is geared up to expand its fisheries and aquaculture. The systematic structuring of policies and rigid implementation of the regulations for sustainable utilization of the available water resources for fisheries and aquaculture development should be given more attention to achieve the exemplary growth similar to Chhattisgarh State, Bhendarkar, *et al.,* (2020). The major environmental impacts on fisheries are due to change in land use pattern, transformation in river flow regime, riparian habitat loss, invasion of exotic species, over fishing and agricultural expansion, Mohite S. A. *et al.,* (2013). Freshwater aquaculture related environmental issues are analyze for formulating guidelines for the development of the fishery

sector, S. Ayyapan *et. al.* (1999). Different stress factors such as inadequate physicochemical and microbial quality of culture water, poor nutritional status and high stocking density can cause infection by opportunistic pathogens, Mishra S. S. *et al.,* (2017). Primary fish production in ponds is affected by the influence of environmental factors and management practices. Seasonal variations in the environmental factors have to be matched with effective management practices for optimum fish production, Sonia Bajaj (2017). Inland fishery productivity will also be affected by increased water temperatures, variability in water availability, eutrophication, stratification, and toxicity of pollutants. In addition, reduced habitat quality and availability of dissolved oxygen will affect productivity and the nutritional value of aquatic products, FAO (2014). The effects related to climate change involving freshwater ecosystems, are bound to affect fisheries and habitats together with the composition and location of production and will have major impacts on aquaculture productivity and livelihood security of fishers. In freshwater systems, ecosystem health and productivity is linked to water quality, NABARD (2018). The growth of mariculture is dependent on the availability of suitable farming areas for new facilities, particularly for open farming practices that realy on the natural oceanic environmental parameters such as temperature, oxygen, chlorophyll etc. Oyinlola M. A, *et al.,* (2018). Changes in fish population and ecosystem from climate change are likely to have resulting impacts on fisheries sector and national economics. Climate change may also directly affect fishing operations and fishing communities independently of impacts on fish and ecosystem, Sandhya Kupekar *et al.,* (2013). Fish farming has seriously influenced the aquatic environment, fish farming impacts phosphorus dynamics in lake sediments and important mechanisms for phosphorus immobilisation with low fish farming activities, Binyang Jia, *et al.,* (2015). Comparison of abiotic and biotic components of an aquaculture showed better DO and average salinity and gave better fish yielding, Virkar *et al.,* (2004). Due to the changes in abiotic variables its effects on the composition and structure of fish assemblages The composition and structure of fish assemblages showed significant differences, Abiotic variables, such as total phosphorus, dissolved oxygen, and conductivity, determined the distribution of fish assemblages, low species richness, species loss and diversity reduction, Daga, Vanessa Salete, *et. al.* (2012). Role of major abiotic factors such as water pH and hardness on the biological processes of fish like growth, survival, reproductive performance, pH as well as hardness plays an important role on the physiological as well as reproductive behaviour of the fish, Sambid Swain *et. al.* (2020). Fish production in reservoir is directly or indirectly dependent on the abundance of planktons, Makode, P. M. *et al.* (2010). The high value of dissolved oxygen coupled with low biochemical oxygen demand and other nutrient levels indicate that the water body is moderately oligotrophic in nature, these factors responsible for declining population of fish species, Thirumala. S, *et al.,* (2011).

Fish farming plays an important socio-economic and nutritional role in the livelihood of rural households in many developing countries. The fish farming can provide an alternate income source to the farmers in this region. It intends to create an opportunity for small farmers specially in the weaken sections of the society. Fishes are efficient converters of feed to meat within a short period of time. Fish farming provide source of income and employment to people compared to other allied agribusiness. The aim of the study was to analyze the variation in abiotic factors in the study area and its effects on fish farming in Sillod tehsil from district Aurangabad of Marathwada region. The main objective of the study includes level of awareness among the fish farmers about abiotic factors and obstacles occurred in fish farming due to the abiotic factors.

2. MATERIALS AND METHODS:

The study was conducted in Sillod tehsil from Aurangabad district of Marathwada region. The climatic condition of the study area has broadly classified in to three main seasons summer, winter and rainy season. Summer season starts from February to May, winter season between the month of October to January and rainy season during the month of June to September. Most of the people in the study area are the land farmers as India is the agricultural country. The environmental condition in the study area is favorable for certain agricultural activities and rearing of domestic animals, such as small scale fish farming, poultry farming and dairy. The small scale fish farming were randomly selected as sample for this study. To collect the relevant information, a semi-structured questionnaire was prepared. The information of variation in the abiotic factors and its effects on fish farming is also collected from selected fish farming through personal interview at the farming sites during the study period at different intervals. Information was obtained about variation in abiotic factors and its effects on fish farming, to evaluate the knowledge level about abiotic factors among the fish farmers. The detailed studies were undertaken with a view to find out the changeable condition in the form of abiotic factors and its effects on fish farming and awareness among the fish farmers and fisherman's.

3. RESULTS AND DISCUSSION:

During the study period it was observed and found that most of the farmers have ability to adequate knowledge about keep the record and make observation about variation in abiotic factors and it influences their fish farming, Fish farmers with sufficient educational background are most likely to have better ability to keep records and make observation on effects of abiotic factors on their fish farming than the poor educational background. Majority of fish farmer have good years of farming experience and this may influence their level of performance and observation of

abiotic factors and its effects on fish farming. This indicates that the majority of the fish farmers in the study area agreed that they are aware of climate change in the form of abiotic factors and have noticed the effect and the rate of survival and performance of their fish farming.

During the study period it was observed that farmers agreed that high temperature and low rainfall have resulted to obstacles in availability of food. Majority of the farmers agreed that the food material are usually high during winter followed by rainy season as compare to the summer season which may significantly influence the cost production as well as the number of fishes reared by the farmer in his farming. From the data and information by the different sources majority of the fish farmers reported that occurrence of fish diseases only due to the variation occurred in the abiotic factors, particularly humidity and moisture. From the above observation it reveals that majority of the fish farmers agreed that moist climatic conditions encouraged the distribution and development of diseases in fishes in the study area. The abiotic factors affecting the performance and health productivity of fishes that include temperature, relative humidity, light, sunshine prevailing at a given time, These findings are more or less correlated to the findings of Sambid Swain *et. al.* (2020). During this study they also reported that high rainfall and relative humidity leads the infection of parasites that causes outbreak of diseases which invariably reduces fish production. They further reported that increase temperature reduces the feed intake capacity of fishes because more energy is needed to conserve the heat caused by high temperature, hence, a decreased in the rate of feed intake. Variations in the abiotic factors alters global disease distribution, affects feed intake, encourage outbreak of diseases which invariably affects fish production ultimately on the economy of fish farming, such type of findings are reported by Mishra S. S. *et al.* (2017). Temperature fluctuation and increased sunshine intensity has negative consequence on fish production resulting low production of fish farming, these reports are more or less correlated to the report of FAO (2014).

4. CONCLUSION:

From the above study and observations it can be concluded that most of the fish farmers are aware about variation occurred in abiotic factors and hence, most of the farmers observed how it effect on fish farming. The study further revealed that variation in the abiotic factors influence the emergence of new health disorders in fishes and increased its distribution. There is need to intensify awareness among the fish farmers about how to tolerate such type of effects of these abiotic factors on the fish farming. Fishery development agencies need to create the awareness among fish farmers and more about the effects on fish farming due to variation in abiotic factors. It also helpful to improve the status of fish farming as well as health status of fish and improve the socioeconomic status of the farmers of fish farming practices in the study area.

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Department of Zoology R.S.S.P. Mandal's Nanasaheb Y. N. Chavan Arts, Science and Commerce College Chalisgaon, Dist. Jalgaon (M.S.) India.

Diversity and Ecology of the Arboreal Ants (Insecta: Hymenoptera: Formicidae) In Chalisgaon Region, Maharashtra, India

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Abstract: *Arboreal ant diversity and their varied ecological roles make them influential in many ecosystems including agricultural and forest. During a survey of three years (2017 to 2020), 19 species of arborial ants from four subfamilies were notified in and around the Chalisgaon region, Maharashtra, India. As per the distribution of studied ants, subfamily Myrmicinae and Formicinae, represented by 8 species each followed by Pseudomyrmecinae (2 species) and Dolichoderinae (1 species).*

It was noticed that all the arboreal ants use different plants for nesting or/and foraging purposes. Oecophylla smaragdina and Crematogaster sp. were completely rely on the living plants to fulfil the nesting and foraging activities. While around 80% ant species (15 species) were used the plants only for the forage where they construct nest at the base or nearby area of the foraging plants. They were feeds on the dead or live insects and other invertebrates and plant originated food assets as nectar, pollen, rotting fruits and seeds showing omnivorous feeding nature. The predaceous nature of arboreal ants may acts as a biocontrol agents against many insect pest which decline the agriculture productivity. It was also observed that 11 ant species maintain the mutualistic relationship with the plants and many honeydew producing insects including aphids, scale insects, mealy bugs and lycaenid caterpillars.

Our main goal was to collect baseline data of arboreal ants and their nesting and foraging and tending behavior that will be able to be compared with future studies conducted at the Chalisgoan region, Maharashtra, India.

Key words: *Arboreal ants, diversity, ecology, Chalisgaon (Maharashtra).*

1. INTRODUCTION:

Globally, ants are one of the most ecologically important fauna in many terrestrial ecosystems. They maintain popularity due to their diversity, abundance and ecological performance as herbivores, predators, decomposer, parasites and biocontrol agent. (Hölldobler and Wilson, 1990). Accordingly, they play vital roles in sustaining the interaction with plant as well as many invertebrate animals and also effectively involved in the food chain, soil aeration, seed dispersal and plant protection. Overall they display a remarkable range of evolutionary and ecological behavior (Philpott and Armbrecht, 2006; Moreau et al. 2006).

Despite their significant importance in the terrestrial ecosystem, inadequate information is on the diversity and distribution of arboreal ants (Floren et al., 2014; Schonberg et al. 2004). In tropical forests, arboreal ant fauna is less diverse in their diversity and species richness composition but around 50% of ant species partially associated with tree canopies has recently been estimated (Floren et al., 2014). Many ecological factors influence the nesting and foraging behavioural pattern of arboreal ants and express symbiotic relationship with the plant and many insect (Powell et al. 2011). They supplements its diet with plant material either feed directly on nectar and pollen of host plant or while tending herbivorous insects that releases sugary honeydew secretion or other nutrients on which the ants feed (Hölldobler and Wilson, 1990; Bluthgen and Fiedler, 2002; Phillips and Willis, 2005; Bluthgen et al., 2006; Sawarkar, 2018).

Recently, weaver ants (*Oecophylla spp.*) are utilize as effective biocontrol agent against many agriculture pest have been recognized on host plants as cashew, citrus and mahogany, mango (Bluthgen and Fiedler, 2002; Lim and Kirton, 2003; Mele et al., 2007).

Day by day the arboreal ant richness severely influence by the activities such as wood extraction, agriculture, pasture, deforestation, mining practices and urbanization processes have severely disturbed (Floren et al., 2001; Dejean

and Corbara, 2003; Queiroz and Ribas, 2016). As the loss of natural habitat of ant species in different ecosystem, it is necessary to recognized their multiple habitats and conserve them effectively.

The surrounding vegetation in Chalisgaon region ($20^0$47' N, $75^0$02' E) includes agriculture field, riverine area, urban and rural areas with tropical dry deciduous forest which indicates the biologically diverse habitat for arboreal ants. **The richness and diversity of ant fauna in different habitats of this region till unexplored and was initiated at preliminary level by Sawarkar, 2018.** The main focus of this investigation was to study the diversity of arboreal ants and their ecological nature as nesting, feeding and mutualistic behavior with honeydew producing insects. It may afford a basic platform for further myrmecological research at different habitat levels in Chalisgaon region.

2. MATERIAL AND METHODS:

In the present study, the ants were noted from different plants located in and around the Chalisgaon region. Ants were surveyed weekly during daylight between 8:00h and 18:00h **from** agriculture field, forest, grasslands, gardens, houses, open spaces, riverine area and road sides **during 2017 to 2020. For the present study, the ants were collected at known habitats along the branches and trunk by** using standard methods as **hand collecting** and bait kept in small plastic vials containing 80% alcohol for identification. The ants were **identified by using standard taxonomic keys** (Hölldobler and Wilson, 1990; **Bingham, 1903; Bolton, 1905) and myrmecology experts.**

RESULT AND DISCUSSION:

The study site was surrounded by agriculture, industries, riverine belt and tropical dry deciduous forest where we observed arboreal ants with their nesting and foraging behavior and mutualistic relationship with other insects within same geographical region.

During the study, 19 ant species belonging to 14 genera and 4 subfamilies were recorded from 271 trees located at different habitats in the Chalisgaon region. Among the 4 subfamilies, there were 08 species in 5 genera of subfamily Formicinae, 08 species in 6 genera of subfamily Myrmicinae, 1 species of a genera of subfamily Dolichoderinae, 2 species in 1 genus of subfamily Pseudomyrmecinae (Table 1). Sawarkar (2018), reported 27 ant species belonging to 19 genera and 5 subfamilies from five different habitats i.e. agriculture field, trees, grasslands, houses and roads and pavements indicates the vegetation in Chalisgaon is rich in biologically diverse habitat for ant fauna.

Camponotus sp. Solenopsis geminata, Tetraponera sp., Crematogaster sp., *Myrmicaria brunnea,* and *Tapinoma melanocephalum* were the most dominant species observed on most of the plants. *Crematogaster sp.* generally were behaviourally aggressive and monopolized baits in most of the plants (Yanoviak et al., 2007). It was noticed that *Camponotus, Tetraponera sp.* and *Paratrechina longicornis* build small nests by forming the holes in soft wood of live or dried part of trees, rotten wood or even in soil. *Tapinoma melanocephalum* and *Tetramorium caespitum* make their nest in the ground, stones or dead tree branches where seeds of various herbs and grasses were observed into the nest. Many arboreal ants build their nests under rocks, epiphytes, organic matter, but rarely in the soil (Hölldobler and Wilson, 1990; Floren et al., 2014).

S H O R T C O M M U N I C A T I O N

Landscape context affects trap-nesting bees, wasps,
and their natural enemies

I N G O L F S T E F F A N - D E W E N T E R

Different behavioural patterns were noticed in the arboreal ants as nesting, foraging or even both. Among the collected species, more than 70% ant species (13 species) were used different plants species only for the foraging. They feeds on insect pest and other invertebrates and plant derived food resources as nectar, pollen, rotting fruits and seeds.

Out of 19, 11 ant species were noticed to form mutualistic relationship with the plants and insects like honeydew producing homopteran bugs and catterpillars of Lycaenid butterflies. *Camponotus sp.*, *Solenopsis geminata, Tetraponera sp., Crematogaster sp.*, *Myrmicaria brunnea,* ***Pheidole woodmasoni, Lepisiota sp.*** and *Oecophylla smaragdina* were the most dominant ant species and maintain the relationship with tending herbivorous insects. These ant species protect such insects from predators and parasitism while they get benefit from the energy-rich sugary secretions or other nutrients secreted by that tending insects (Bluthgen and Fiedler, 2002; Bluthgen et al, 2006).

The colonies of Weaver ant, *Oecophylla smaragdina* were observed on *Mangifera indica, Ficus religeosa, Acacia sp., Eucalyptus sp., Casia fistlua* and *Caesalpinea sp.* where they construct their nests with the help of larval silk. They protect many fruits and crops as Mango, Cotton, *Cajanus cajan, Citrus* against associated insect pests and worked as biocontrol agent (Bluthgen and Fiedler, 2002; Lim and Kirton, 2003; Mele et al., 2007; Sawarkar, 2018). Thurman *et al* (2019) also noted that *Oecophylla* spp. worked as the major predators of several economically damaging pest insects of agriculture field and provide benefits of using these ants as biocontrol agents.

All the three *Crematogaster sp.* were observed on *Casia fistlua* to maintain mutualistic relationship with the caterpillars of Lycaenids where the caterpillars secrete a nectar-like substance from special glands which attract ants. More than 50% of lycaenid species of butterfly forms mutualistic or parasitic association with ants during their life cycle. The caterpillars developed special organs to attract ants to tend either by providing food resources (Lin et al., 2019; Fiedler, 1991; Pierce, 2002).

3. CONCLUSIONS:

We have concluded that Chalisgaon **region** is highly **rich in the diversity of arboreal ant where recorded** 19 ant species belonging to 13 genera and 4 subfamilies. Majority of the ant species observed on individual tree is recognized as forage species than nesting in trees.

It is determine that arboreal ant species maintain different ecological patterns as herbivores, parasites, predators, bioindicators, destructor and scavenger and even though observed to maintain mutualistic relationship with honeydew producing insects. As the variable and huge ecological importance in various fields, it is necessary to interpret and conserve them carefully.

Our study demonstrates the conservation of native ant species especially forager ants is depends on the vegetation located in the selected area i.e. agriculture and forest. But massive application of agro-practices by the farmers, adverse human activities, wood extraction and urbanization may influence the vegetation with ant species richness and their dominance.

We believe that the results of this study justify the launching of more detailed investigations on the role of ants in different ecological habitat.

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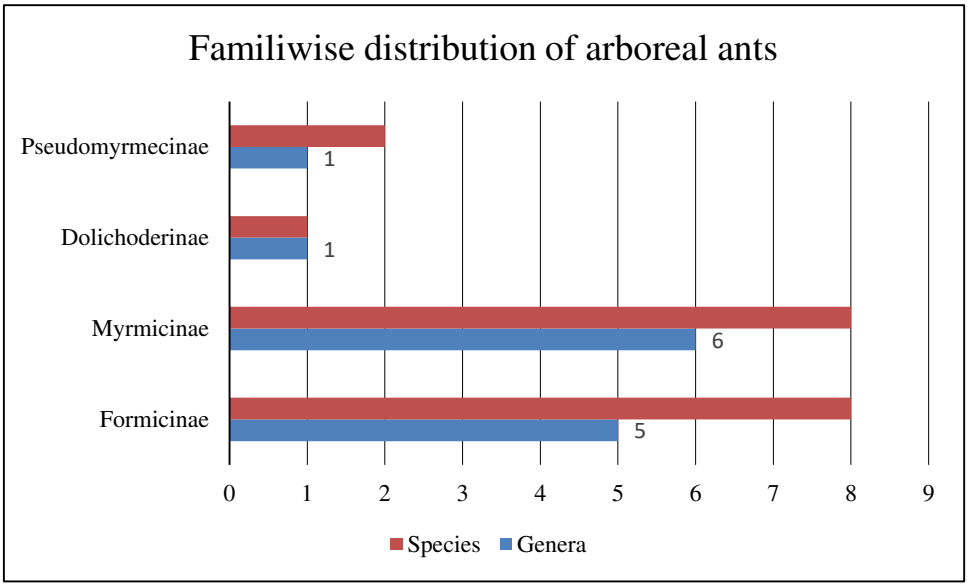
TABLE 1 Frequency of Arboreal ants and nesting and foraging behavior

Sr. No.	Species	Frequency	Nest	Forage
Subfamily: Formicinae				
1	*Camponotus compressus* (Fabricius, 1787)	19	G	GT
2	*Camponotus sericeus* (Fabricius, 1798)	12	G	GT
3	*Camponotus parius* (Emery, 1889)	7	G	GT
4	*Oecophylla smaragdina* (Fabricius, 1775)	3	T	T
5	*Paratrechina longicornis* (Latreille, 1802)	4	G	GT
6	*Plagiolepis jerdonii* (Forel, 1894)	2	GT	T
7	***Lepisiota capensis* (Mayr,1862)**	8	GT	T
8	*Lepisiota opaca pulchella* (Forel, 1892)	6	GT	T
Subfamily: Myrmicinae				
9	*Crematogaster brunnea contemta* (Mayr, 1879)	29	T	T
10	*Crematogaster artifex* (Forel, 1902)	22	T	T
11	*Crematogaster subnuda*	18	T	T
12	*Monomorium destructor* (Jerdon,1851)	23	GT	T
13	*Solenopsis geminata* (Fabricius, 1804)	11	G	GT
14	***Pheidole woodmasoni*** (Forel,1885)	9	G	GT
15	*Myrmicaria brunnea* (Saunders, 1842)	4	GT	T
16	*Tetramorium caespitum*	26	G	T
Subfamily: Dolichoderinae				
17	*Tapinoma melanocephalum* (Fabricius, 1793)	33	G	T
Subfamily: Pseudomyrmecinae				
18	*Tetraponera nigra* (Jerdon, 1851)	4	G	T
19	*Tetraponera rufonigra* (Jerdon, 1851)	2	G	T

Abbr. G- ground; T- tree; GT- Nesting and foraging behviour observed in both ground and tree.

Table 2 Diversity of arboreal ant indices from different habitats



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Study Of Fresh Water Fish Diversity Of Dhondwadi Dam At Borana River, Tq. Paril Vijanath Dist. Beed (M.S.) India

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Abstract: *COVID 19 pandemic duration affects adversely to human life and their activities that contributed to environment directly or indirectly. But as par for Biodiversity and Conservations of organisms are not so for affected because of decline in pollution by human activity to urban and rural area. Present study was done on biodiversity of fresh water fish of Dhondwadi Dam. Dhondwadi Dam is perennial water resource for human consumption and also helpful for the agriculture and fisheries in Borana River Tal. Paril Vijanath Dist. Beed. Keeping a view that Fish diversity of Dhondwadi dam is correlated to aquatic ecosystem, it was observed that the Fish diversity belongs to 03 orders 03 families 11 genus and 11 species while Cypriniformes family is dominant over other families. Finally it may be concluded that Dhondwadi dam is rich of fish diversity.*
Keywords: *Fish diversity, Dhondwadi Dam, Borana River, Fresh water fish.*

1. INTRODUCTION:

The species diversity of an ecosystem is often related to the amount of living, nonliving and organic matter present. In the field of ichthyology there is valuable were given an incision in their5 abdomen and preserved. As per economic importance and scope of fish and fisheries especially in Maharashtra, but it is natural to study the distribution and availability of fish from fresh water [4]. Fish constitutes half of the total number of vertebrates in the world. They live in almost all conceivable aquatic habitats; 21,723 living species of fish have been recorded out of 39,900 species of vertebrates out of these 8,411 are freshwater species and 11,650 are marine India is one of the mega biodiversity countries in the world and occupies the ninth position in terms of freshwater mega biodiversity [1] India there are 2,500 species of fishes of which 930 live in freshwater and 1,570 are marine [2]. Ichthyodiversity refers to variety of fish species; depending on context and scale, it could refer to alleles or genotypes within fish population to species of life forms within a fish community and to species or life forms across aqua regimes [3].

2. MATERIALS AND METHODS:

Fishes were collected from Dhondwadi dam at Borana River Tal. Paril Vijanath Dist. Beed (M.S.) India with the help of local fishermen using different type of nets namely gill nets, cast nets, dragnets. Immediately photographs were taken with help of digital camera. Fishes brought to laboratory were preserved in 10% formalin solution in separate specimen jar according to the size of species. Small fishes were directly placed in the 10% formalin solution. While large fishes were given an incision in their abdomen and preserved. The Meristic and morphometric characters measured and fishes were identified up to the species level, with the help of standard keys and books [1-2].

OBSERVATION:

Table: 1. The Fresh Water Fish diversity of Dhondwadi dam Borana River Tal. Paril Vijanath Dist. Beed (M.S.) India

Order	Family	Scientific Name	Common Name	Groups of food fish
Cypriniformes	Cyprinidae	*Catla-catla*	Catla	Carps
		Labeo-rohita	Rohu	Carps
		Cyprinus carpio	Common carp	Carps
		Cirrhinus mrigala	Mrigala	Carps
		Hypothalmichthys molitrix	Silver carp	Food fish
		Puntius ticto	Ticto	Miscellaneous

		Puntius stigma	Stigma	Miscellaneous
Perciformes	Channidae	*Channa punctatus* *Oreochromis mossambica* *Channa striatus*	Spotted snake head Tilapia Banded snake head	Live fish Food fish Live fish
Siluriformes	Clariidae	*Claris batrachus*	Mangur /Cat fish	Live fish

PHOTOPLATE:

Catla catla

Labio rohita

Cirrhinus mrigala

Cyprinus carpio

Oreochromis mossambica

Claris batrachus

Channa punctatus

Hypothalmichthys molitrix

Channa striatus

Puntius ticto

3. RESULTS AND DISCUSSION:

In the present fish diversity study, species of 11 different genera belonging to 03 families and 03 orders recorded from the Dhondwadi dam Borana River Tal. Paril Vijanath Dist. Beed (M.S.) India. The members of Order Cypriniformes were dominated by 07 species followed by Perciformes with 03 species, Siluriformes 01 Species, with 11 species was domionant group in the assemblage composition in which *Catla-caltla, Lebeo rohita, Cyprinus carpio, Cirrhinus mrigala* and *Hypothalmichthys molitrix* were found most abundant. Fishing operations were carried out for

nine months with low in monsoon compared to high in post monsoon. It is suggested that the fishery authorities should investigate and practice the proper exploitation and management of this spot fishery resources according to ecological principles [3]. It was concluded that further studies may be done to develop techniques for fish culturing. The use of illegal methods to catch fish should be banned in this area to prevent further depletion of freshwater fish resources. The fisherman's should make aware about fishing, scientific training and facilities should be made available to the fish farmers fishing of the spawn, larval fish [3]. The work will provide future strategies for development and fish fauna conservation at Dhondwadi dam Borana River Tal. Paril Vijanath Dist. Beed (M.S.) India.

4. CONCLUSION:

COVID 19 pandemic duration affects adversely to human life and their activities that contributed to environment directly or indirectly. But as par for Biodiversity and Conservations of organisms are not so for affected because of decline in pollution by human activity to urban and rural area. Dhondwadi Dam is perennial water resource for human consumption and also helpful for the agriculture and fisheries in Borana River Tal. Paril Vijanath Dist. Beed. Keeping a view that Fish diversity of Dhondwadi Dam is correlated to aquatic ecosystem, it was observed that the Fish diversity belongs to 03 orders 03 families 11 genus and 11 species while Cypriniformes family is dominant over other families. Finally it may be concluded that Dhondwadi dam is rich of fish diversity.

RECOMMENDATION:

1) Next study can be proceed for modern classification of using technique like DNA Bar-coding
2) It was concluded that further studies may be done to develop techniques for fish culturing.
3) The use of illegal methods to catch fish should be banned in this area to prevent further depletion of freshwater fish resources. The fisherman's should make aware about fishing, scientific training and facilities should be made available to the fish farmers fishing of the spawn, larval fish [3].
4) The work will provide future strategies for development and fish fauna conservation at Dhondwadi dam Borana River Tal. Paril Vijanath Dist. Beed (M.S.) India.

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Study of Haemoglobin Level in The Group Of 18-24 Year in Boys and Girls

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ABSTRACT: *In the survey we determined the quantity of Hb (8/dl). We divided the the subjects into different groups, based on age and sex. We make a comparison about percentage of haemoglobin between the College Students and between Boy's and Girl's. We divide the subjects into the age groups i.e. 20-24 (15 Subjects) in Girls and 18-24 (15 Subjects) in Boy's. In girls between 18 and 24 years of age the haemoglobin values decreased slightly, reaching about 11.36 gm/100 ml. In boys of corresponding ages there was an increase to about 16.10 gm. The quantity of the haemoglobin is very important in the diagnosis of the anaemia. Anaemia is a normal quantity of Haemoglobin present in the blood. To compare the percentage of Hb, we take the mean Hb (gm/dl) of male and females as well as of the four age groups. The mean Hb of the male was 12.83 gm/dl and for the female it is 11.83 gm/dl and for the female it is 11.93 g/dl male subjects have more amount of HB (12.83gm/dl) that the female subsets (11.93 gm/dl). By this we said that bared on the sex percentage of Hb varies, the male subjects having more amount of Hb than the female subjects.*

1. INTRODUCTION:

Haemoglobin is the most familiar, most efficient respiratory pigment. It is a crystallized, Conjugated protein consisting of an iron – containing pigment and a simple protein, globin. It occurs in majority of vertebrate and invertebrates. In invertebrates is found dissolved in plasma, whereas in vertebrate it is contained in the special cell called red blood corpuscles. Each Haemoglobin molecule is made up of four heme groups. Surrounding a globin groups forming tetrahedral structure.

Haemoglobin is involved in the transport of other gases it carries some of the body's respiratory carbon dioxide about 10 % of the total as carbanion haemoglobin in Which O2 is bound to the globin protein. The molecule also carrier the important regulatory molecule nitric oxide bound to a globin protein thiol group releasing it at the same time as oxygen. Haemoglobin is also found outside red blood cells and their progenitor lines. Other cells that contain haemoglobin include the A9 dopaminergic neurons in the substantiate nigra, macrophage and meningeal cells in the kidney in these tissues haemoglobin has a non – oxygen Carrying function as an antioxidant and regulator of iron metabolism.

2. MATERIALS AND METHODS:

Material Used in Estimation of haemoglobin percentage with the help of haemometer are as follows

Haemometer (Sahli's Haemometer)

Decinormal (N/10) HCl (1.2 CC Of Conc. HCl Dissolved in 100 cc of distilled water), Distilled water, own blood Sample, Pricking needle, spirit lamp, Cotton and beaker.

Fig. No.1:- Haemometer

Apparatus: The Haemometer consists of two sealed lateral comparison tube containing a suspension of acid haematin. This are held in a black frame against a white back round glasses Besides, a graduated test tube of the same diameter is also provided which can fit in the haemometer in between the two side tubes for comparison. A micropipette of 20 cm is also provided thither things provided are a small glass rod, a small bottle to contain the decinormal acid solution.

Fig. No. 2 Apparatus

3. METHOD:

- The Graduated tube is first Clean with distilled water and then with methylated spirit or 90% alcohol.
- It is thoroughly dried up before being used.
- Now with the help of dropper. Then 10N HCl Solution is filled is graduated tube up to 2gms mark.
- Micropipette is now filled up by sucking fresh blood of the vertebrate under experimentation up to the mark of 20 cm.
- The small amount of blood adhering to outside of micropipette should be aspired off by sterilized cotton.
- The blood of micropipette is now added to n/10 HCl solution in the graduated tube.
- The Pipette should be introduced carefully into tube and its lower mouth should. Pass right up to the bottom into HCl solution.
- When blood has been expelled pipette is rinse by distilled water,
- Every time the content of micropipette should be expelled into graduated tube.
- The acid haematin solution is now thoroughly, Stir with the help of glass rod and then allow to stand at least for 10 min.
- Afterwards the acid haematin solution is gradually diluted by adding distilled water in a drop wise manner with addition of each drop of distilled water the solution should be stirred and it's colour match with that standard sealed tube.
- This should continue till the colour of acid haematin solution just feds away as compared to that of standard comparison tube.
- The reading before the colour just fed's taken as correct and final reading.

4. OBSERVATIONS AND RESULTS:

In the survey we determined the quantity of Hb (8/dl). We divided the subjects into different groups, based on age and sex. We make a comparison about percentage of haemoglobin between the College Students and between Boy's and Girl's. We divide the subjects into the age groups i.e. 20-24 (15 Subjects) in Girls and 18-24 (15 Subjects) in Boy's.

Table No. 1 :- Mean Hb (g/dl) based on the age and sex.

Age groups (years)	Sex	Mean HB (g/dl)
18 – 20	Boy	15.50
	Girl	10.21
21 -22	Boy	14.50
	Girl	8.15
23 -24	Boy	16.10
	Girl	11.36

Normal Haemoglobin levels according to the world health Organization (WHO) is a healthy haemoglobin level depends on maintaining good nutrition and regular physical exercise. Haemoglobin helps you stay active by transporting oxygen through your blood stream around your body and by removing poisonous carbon dioxide. But in our survey of the college students shows the boy's Hb percentage. It is because of the reason of good nutrition, habits and regular diet. Normal Hb levels depends on your sex, age and health status.

Table No. 2 :- Normal HB (g/dl) level given by WHO

Groups (years)/Gender.	Normal HB level (g/dl)
0.6-4	11 g/dl
5-12	11.s g/dl
12-15	Equal or above 12 g/dl
Adult male	13.8 -17.2 g/dl
Adult Female	12.1 1s.1 g/dl
Pregnant women	Equal or above 11 g/dl

5. DISCUSSION:

The quantity of the haemoglobin is very important in the diagnosis of the anaemia. Anaemia is a normal quantity of Haemoglobin present in the blood. To compare the percentage of Hb, we take the mean Hb (g/dl) of male and females as well as of the four age groups. The mean Hb of the male was 12.83 g/dl and for the female it is 11.83 g/dl and for the female it is 11.93 g/dl. Male subjects have more amount of HB (12.83g/dl) That the female subsets (11.93 g/dl). By this we said that bared on the sex percentage of Hb varies, the male subjects having more amount of Hb than the female subjects.

The main reason for having less amount of Hb due to by taking important diet and some habits, like smoking. Because iron is an important component of Haemoglobin, consuming iron-rich component foods, like fortified foods, (these products include breakfast cereals, Pasta, bread, malted drinks and grits . The food and nutrition board recommends 18 mg of iron for women and 8mg for men), animal sources (seafood, Poultry, eggs and beef), plant sources (Red Kidney beans , lentils, Soybeans, black, beans, white beans and Cowpeas).

6. SUMMARY AND CONCLUSION:

HB is a very important metal -protein in the blood. By find out amount of hb present in the blood, we diagnosis that whether the patient is suffering with anaemia or not by our survey we conclude that the maximum peoples are having healthy amount of Hb (g/dl) the limits which is given by the who. Some of the people are having very less amount of Hb they consider as a anaemia patients, there is a significant difference between the amount of Hb present in the male and female subjects and the difference is age groups by this we said that the amount of Hb on the blood varies depends on age and the sex.

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Measurement of Diversity Indices of Aquatic Insects in Lower Panzara Reservoir at Akkalpada, District Dhule, Ms, India

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Abstract: *Insects play important role in ecosystem functioning viz. nutrient cycling, primary production, decomposition and materials translocation. This study deals with diversity and distribution of aquatic insects from five stations in the Lower Panzara reservoir at Akkalpada, District Dhule, MS, India. The aquatic insects were sampled systematically and randomly in station-wise habitats, using standard protocols. The insect diversity varied from station to station. Dragon flies, May flies and beetles are indicative of good water quality were most diverse. The study was conducted to measure aquatic insect species diversity at Lower Panzara reservoir at Akkalpada. The objective of the study was to identify aquatic insect species diversity and main threats to them in the Lower Panzara reservoir. Data were collected by direct census method. In total, 735 aquatic insects belonging to 07 Orders and 27 species were recorded. Density of the insects was 27 per quadrate. Shannon-Weiner Diversity Index (H´) was -2.84, whereas Simpson's Diversity Index was 0.06, Simpson index of diversity was 0.939, Simpson reciprocal index was 16.7 and Species richness (Menhinick's Index) was 0.936. According to local occurrence status, there were 25 species ranked as very abundant and 02 are fairly common. There were, however, 02 species, in each category, recorded as threatened. Seasonal occurrence observed for different aquatic insect species revealed. In regression analysis, an increasing population trend observed during Winter while decreasing during Summer. The said water body is newly constructed reservoir on the Lower Panzara river. The species richness and composition are important parameters for stability and functioning of an ecosystem, therefore, there is urgent need to protect aquatic insect faunal diversity by protecting natural habitat of the area.*

Key Words: *Aquatic insect fauna, diversity indices, Lower Panzara reservoir.*

1. INTRODUCTION:

Species diversity is measured by Shannon's (1948) and Simpson's (1949) diversity indices which provide us to know how many species and how they are distributed in a diverse community. Shannon's diversity index and Simpson's diversity index are very useful tools to analyse and determine the species diversity or biodiversity. Both of these are the correct measures that deal with species richness and evenness (Hallenback & Ripple, 2007). This is considered to predict the rareness of species or addition of rare species (Krebs, 1989). Species diversity provides information about the rarity or commonness of individual species and refers to the various kinds of species found in the community. Species diversity assessment is useful in understanding the predominant ecological conditions of the area. The present study has been undertaken to determine, Shannon's diversity index and Simpson's index to calculate the diversity of species present in the area. Species diversity increases with the complexity of habitat. This diversity considers both the richness and evenness of species. Evenness is a measure of the relative abundance of different species making up the richness of an area. This evenness is an important component of diversity indices (Hill, 1973; Turchi *et al*., 1995; Leinster and Cobbold, 2012) and expresses evenly distribution of the individuals among different species.

Species evenness, richness, and diversity indices as Shannon-Weiner (Shannon and Weaver, 1949) and Simpson Index (Simpson, 1949) were used to evaluate the bird species diversity. Shannon- Weiner Index assumes that individuals are randomly sampled from an independent large population and all the species are represented in the sample. Shannon diversity is very widely used index for comparing diversity between various habitats (Clarke and Warwick, 2001).

2. MATEIRAL AND METHODS:

The data was collected from different sites at Lower Panzara reservoir at Akkalpada, Dist. Dhule, during the year 2014-16. The data is analyse to calculate diversity indices in order to know the species diversity in different habitat (Hutchison, 1970) based on the abundance of the species by the following formula:

1. **Shannon – Wriner diversity index = H = $\sum[(P_i) \times \ln(P_i)]$**

Where H = Shannon's Weiner Diversity Index
ln = Natural log of the numbers.
P_i = Proportion of total sample represented by species.
i= Divide number of individuals of species i by total number of samples
S = Number of Species
H_{max}= ln(S) = Maximum diversity possible.
H = Shannon Diversity Index
E = Evenness = H/Hmax.
ΣS= Number of species in a community.

The presence of one individual of a species isnot necessarily indicative of the species being present in alarge number. The value of Shannon Weiner Diversity Index usually falls between 1.5 and 3.5, only rarely it surpasses 4.5. A value near 4.6 would indicate that the numbers of individuals are evenly distributed between all the species.

2. ***Simpson's Index: (D)***

$D = [\sum n(n-1) / N(N-1)]$

Where:
n = The total number of individuals of a species. N = The total number of individuals of allspecies.

3. **Simpson Index of diversity:** It measures the probability that two individuals randomly selected from a sample will belong to the same species. Simpson gave the probability of any two individuals drawn from noticeably large community belonging to different species. It has been measured by the given formula:

Simpson Index of diversity = $1-[\sum n\,(n-1)\ /N\,(N-1)] \quad = 1- D,$

4. **Simpson's Reciprocal Index: = 1 / D**
5. **Species Richness (Menhinick's Index) R = S/√N**

Where:

D = Simpson's Index.

S = Number of different species found in a reservoir

N = Total number of individuals in a reservoir

6. **Pielou's index for species evenness. J = H / ln(S)**

Where:
H= Shannon Diversity Index
S = Number of different species found in a reservoir

Table 1 : Diversity indices at different sites of Lower Panzara reservoir at Akkalpada

Name of Site	N	N(N-1)	Shannon Wiener Diversity Index (H)	Simpson's Index (D)	Simpson's Index of Diversity (1-D)	Simpson's Reciprocal Index (1/D)	No. of Species Found in Sample (S)	Species Richness (Menhinick's Index) D=s/√N	Pielou's evenness Index J = H / ln(S)	H_{max} = ln(S)
Site I-Chinchkheda	170	28730	-2.930	0.059	0.941	17.081	26	1.994	-0.899	3.258
Site II- Dam site	46	2070	-2.786	0.051	0.949	19.528	18	2.654	-0.964	2.890
Site III- Ichchhapur	209	43472	-2.815	0.064	0.936	15.694	23	1.591	-0.898	3.135
Site IV- Sayyaidnagar Settlement	155	23870	-2.818	0.068	0.932	14.680	24	1.928	-0.887	3.178
Site V- Backwater	155	23870	-2.883	0.060	0.940	16.530	24	1.928	-0.907	3.178
Average	**147**	**24402**	**-2.846**	**0.060**	**0.940**	**16.703**	**23**	**2.019**	**-0.911**	**3.128**

Shannon wiener Diversity Index, Simpson Diversity Index, Simpson's reciprocal index, Menhinick's index and Pielous Evenness Index has been worked out to find out the species diversity in terms of species-richness and evenness in an area.

3. OBSRVATION AND RSESULT:

From the Table 1 it can be observed that the Shannon Index (H) for various localities is variable. Shannon's index can be observed from the Table- 1 that study area Site :1 Chinchkheda, it is 2.930 followed by Site :2 Dam site -2.786, Site :3 Ichchhapur -2.815, Site :4 Sayyadnagar Settlement -2.818 and Site: 5 Back water -2.883. The highest Shannon Diversity Index is -2.786 for Site: 2 Dam site and the lowest is -2.930 for Site: 1 Chinchkheda

Similarly Hmax (maximum diversity possible) is also recorded. It is highest for various localities is variable. Hmax (maximum diversity possible) be observed from the Table- 1 that study area Site :1 Chinchkheda, it is 3.258 followed by Site: 5 Back water 3.187 then Site :4 Sayyadnagar Settlement, 3.178; Site :3 Ichchhapur 3.135 and Site :2 Dam site 2.890,

The maximum Shannon Diversity Index (H_{max}) is 3.258 for Site: 1 Chinchkheda and the lowest is for Site: 2 Dam site 2.890. Whereas for others the Hmax is varies from 3.178 to 3.135. The evenness of species is also recorded. From the table 1, it can be observed that evenness is not much variable but almost similar. It was found in the range of -0.964 to -0.887.

SIMPSON'S INDEX: There are several methods under Simpson's indices such as Simpson Index (D), Simpson diversity index (I-D), Simpson's reciprocal index (I/D) and species richness (Menhinick's index) D=S/√N. Simpson's criteria is applied in the present study.

From the table 1, it can be observed that Simpson's Index (D) reveals that the value D ranges below 0 and therefore diversity of all ranges are uniform and higher. Similarly, Simpson index of diversity (I-D) was found in the range of 0.941 to 0.932. In all sites, the diversity is quite higher. From Simpson's reciprocal index (I/D) it can be predicted that the value of this index if it is 1 as the lowest the stand has very less diversity, however, from the table it can be observed that the range of Simpson's reciprocal index (I/D) is between 14.680 (Site 4), 15.694 (Site 3), 16.530 (Site 5), 17.081 (Site 1) and 19.528 (Site 2). The Site 2 has less number of species whereas Site 4 has the highest number of species. So we can conclude that the Site 04 and 05 have maximum species diversity.

SPECIES RICHNESS AND EVENNESS

The number of species in a sample indicates the richness and the abundance of different species makes the reservoir rich and even in number of species. From the table 1 , it can be observed that the richest in species at Site 2 (Dam site) having 2.654 and Site 1 (Chichkheda) having 1.994; Site 4 and 5 (Sayyadnagar and Back water) hving 1.928. The lowest species richness is at Site 3 (Ichchhapur) i.e. 1.591.

Evenness is a measure of the relative abundance of different species making up the richness of an area. This evenness is an important component of diversity indices (Hill, 1973; Turchi *et al*., 1995; Leinster and Cobbold, 2012) and expresses evenly distribution of the individualsamong different species It is found maximum at Site 4 (Sayyadnagar settlement) = -0.887 whereas minimum at Site 2 (Dam Site), -0.964.

LOWER PANZARA RESERVOIR AT AKKALPADA AS A WHOLE:

Shannon's maximum diversity index (H_{max}) shows in Table 1 and Figure 1 and 2., was found 3.128. Simpson's index of Diversity showed that 0.940 and Simpson's reciprocal index was 16.703. Species Richness and evenness indices was found 2.019 and -0.911 respectively.

4. DISCUSSION AND CONCLUSION:

Species diversity has been studied by applying Shannon's-Weiner index of diversity and Simpson's indices. which is a qualitative measure that reflects many types of species found in the reservoir. The relationship between individual species distributed there may be found in different relationships such as richness or evenness. Such relationship can be studied through diversity indices. Richness qualifies how many different types of species are found there. On the contrary abundance of the types of species observe there, is evenness.

The Shannon's index study indicates that almost all the Sites in the study area shows quite richness as well as evenness of species. Diversity index is higher and both Shannon's Weiner diversity index as well as Maximum diversity index (H_{max}) are high in all the Sites. The presence of one individual of a species isnot necessarily indicative of the species being present in alarge number. The value of Shannon Weiner Diversity Index usually falls between 1.5 and 3.5, only rarely it surpasses 4.5. A value near 4.6 would indicate that the numbers of individuals are evenly distributed between all the species. (Clarke and Warwick, 2001, Hutchison, 1970)

The evenness of species is also recorded as uniform. The species richness in within the range of 1.591 to 2.654 which is within the reported range (Clarke and Warwick, 2001, Hutchison, 1970).

Shannon's index for whole of the area is higher and Simpson's index near to 0 values indicating higher values. Simpson's reciprocal index is indeed less for whole area. Both Shannon's and Simpson's indices show that the species richness as well as species evenness is throughout the study sites. (F. Bibi and Z. Ali, 2013; Morten et.al ,2016)

The result showed that the Lower Panzara reservoir is newly construncted on the river Panzara (completed in year 2016) at Akkalpada and the running water stored in reservoir. It showed the developing stagnant water ecosystem from the running water ecosystem. The population of aquatic insect though low in number but it showed developing trends. If the physiochemical conditions stabilizes, it will flourished the aquatic insect fauna at Lower Panzara reservoir at Akkalpada.

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FIGURE 1: Graph showing Mean Diversity indices at Lower Panzara Reservoir of Akkalpada dam.

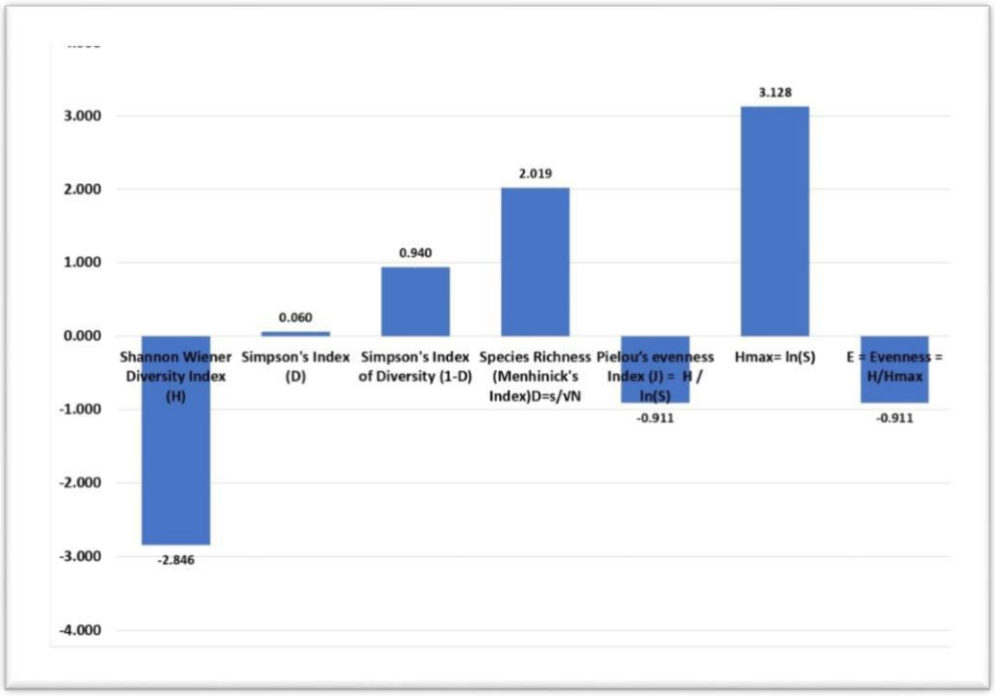
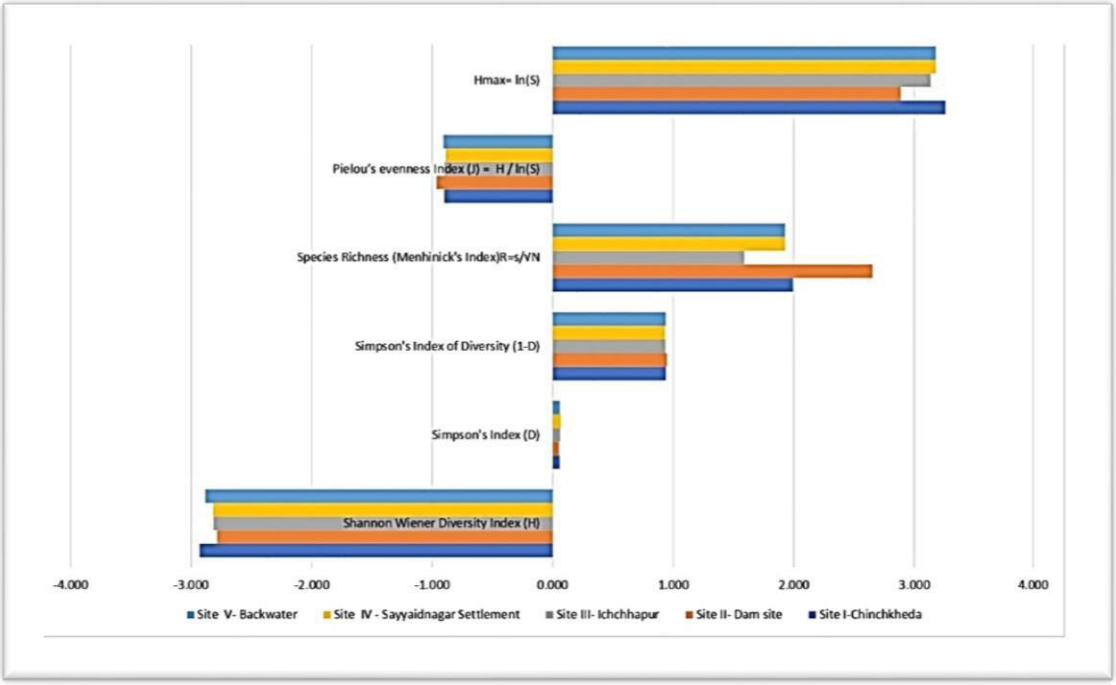


Figure 2 : Graph showing Mean Diversity indices at different sites of Lower Panzara Reservoir of Akkalpada dam



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A Case of Leucistic Frogs from Chalisgaon, District Jalgaon

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Abstract : *Euphlyctis cyanophlyctis (Schneider) is commonly called as Indian Skipper Frog or Skittering Frog. It's habitat include marshes, pools and various other wetlands. The partially lossed pigmentation was observed in Euphlyctis cyanophlyctis (Schneider) species of amphibian near the Chalisgaon region, Dist Jalgaon. The present individuals were found during a survey of amphibians in rainy season. However, the cytological analysis was not done but we can predict that this is a case of leucism.*

Keywords: *Leucism in frog, Euphlyctis cyanophlyctis (Schneider).*

1. INTRODUCTION:

Leucism is an unusual coloration pattern caused by developmental anomalies in the differentiation of the pigment cells, usually due to genetic mutations or environmental factors that cause deficit in the metabolism of dermal pigmentation, restricted to specific body region or throughout the entire body. Leucistic individuals are rarely found in the wild, as they are easily sighted by their prey and predators and thus have a considerably less chance to survive.

Though this phenomenon has been reported to occur in many other vertebrates it is rarely described in amphibians. In vertebrates, leucism doesn't happen every now and again in nature, yet it has been recorded in amphibians (Keely and Maldonado, 2013; Moraes and Kaefer, 2015). Also Albinism in *Rana pipiens* (Federighi H 1938), *Rana catesbiana* (Mitchell 2005) and in *Ambistoma opacum* (Michell and Church 2005) are a few reports of albinism in amphibians. Through this manuscript authors attempt to report a case of leucism in skittering frog, *Euphlyctis cyanophlyctis(Schneider).*

2. MATERIAL AND METHODS:

Study area: The Bilakhed village is situated in the outskirts of Town Chalisgaon, District Jalgaon. The Town Chalisgaon is located at coordinates 20028'00"N & 75001'00" E with an altitude of 343 M ASL, the climate is hot and dry with approximately 80 cm. of rainfall. The thorny and grass vegetation is dominant with plants like *Typha domingenesis, Acacia nilotica, Senna auriculata, Senna tora, Polygonum glabrum, Prosophis julifera* and *Alternanthera sessilis* are present.

On 10th October 2013 at.08:09 pm we have found two *Euphlyctis cyanophlyctis(Schneider)* with partial loss pigmentation but retention of eye color, configuring a case of leucism. For closer observation we were able to catch one individual, which was released after taking photographs.

3. OBSERVATION AND DISCUSSION:

The specimens showed loss of normal colored pigmentation compared to normal specimen. The specimen caught has SVL 2.5 cm. and its eyes have normal coloration and groin region was light green in color, whereas all other body parts were creamy white in color. It can be concluded that it is a case of leucism.

Fig. 1

Fig. 2

FIG. 3

FIG. 4

Fig. 1, 2, 3: Specimen 1 with different angles showing normal eyes and light green coloration on sides of abdomen.
Fig. 4: Specimen 2 showing brown bars on the dorsal parts of the body. The second individual had creamy white body with light brown bars on its dorsal.

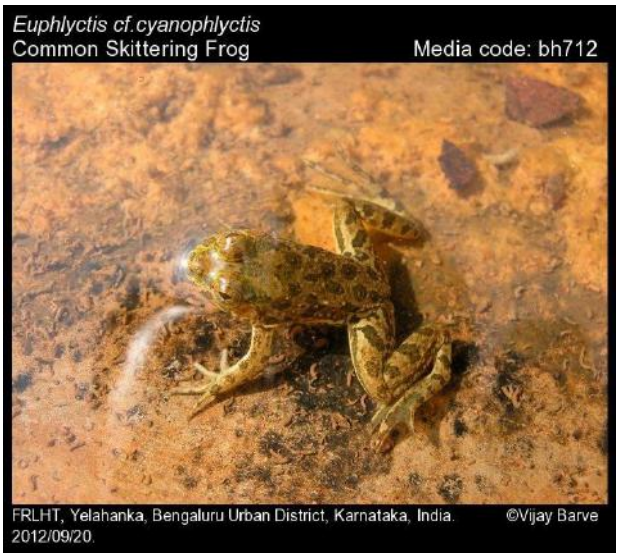

FIG. 5: Individual of skittering frog *Euphlyctis cyanophlyctis (Schneider)* showing normal coloration.

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Review On Fish Diversity in India

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Abstract: *In India, fish diversity studies in various region, like riverine fish diversity, dam fish diversity, lake fish diversity were studied throughout the India. We were reviewed on fish diversity from India. Freshwater ecosystem extremely changes their habitat, exploitation of fish species for human welfare, climate changes, Annual Rainfall in Indian region due to this factor fish diversity affected more in Indian region. Fish diversity mostly affected on endemic fishes, medicinal important fishes, migrated fishes those are present at specific region of the country. In India limited and scattered Research works on fish diversity and conservation status from different region of the country. Present review article on fish diversity and their conservation status in India.*

Key words: *fish diversity, endemic, habitat, Conservation.*

1. FISH DIVERSITY STATUS:

Freshwater ecosystems might be the most vanishing ecosystems in the world. Declines in biodiversity are far greater in fresh waters than in the most affected terrestrial ecosystems (Sala et al., 2000). Human activities and human population effects on natural habitat, environmental changes by human activities arises pressure on Biotic and abiotic factors freshwater ecosystem. The main reason is the unequal richness of inland waters as a habitat for plants and animals. Over 10,000 fish species live in fresh water (Lundberg et al., 2000); approximately 40% of global fish diversity and one quarter of global vertebrate diversity. When amphibians, aquatic reptiles (crocodiles, turtles) and mammals (others dolphins, and platypus) are added to this freshwater-fish total, it becomes clear that as much as one third of all vertebrate species are confined to fresh water. Yet surface freshwater habitats contain only around 0.01% of the world's water and cover only about 0.8% of the Earth's surface (Gleick, 1996). Another way of looking at this is to ask: how many of the species described by scientists live in fresh water? The answer is around 100,000 out of approximately 1.75 million (Hawksworth and Kalin-Arroyo, 1995): almost 6%, and an additional 50,000 to 100,000 species may live in ground water (Gibert and Deharveng, 2002).

Studies of freshwater fishes in the Indian Region have been limited to scattered works on profitable fisheries and even these have been largely restricted to some of the major river systems like the Ganga and the Yamuna. Out of the 2,500 species of freshwater fishes that have been recognized in the Indian region, 930 are categorized as freshwater species (Jayaram, 1999). Much of the early study on the freshwater systems of the Indian subcontinent started with the works of British officers working for the East India Company, who took great interest in the natural history of the region. Some early contributions were those of Hamilton-Buchanan (1822) in 'The Fishes of the Ganges' and by others like McClelland (1839) and Jerdon (1849). Some of the most important contributions to such studies were made by Francis Day in his Fishes of India (1875–1878). Substantial literature is now available on the identification and systematic of freshwater fishes of India, starting with Hora's contributions between the 1920 -1950s and the most recent texts by Talwar and Jhingran (1991), and Jayaram (1999). Day (1889) described 1418 Species of freshwater fishes under 342 genera from the British India. Talwar (1991) observed 2546 fish species represented 969 genera, 254 families and 40 orders. Jayram (1981) were investigation 742 freshwater fishes recorded.

Diversity of freshwater is unhappy and incomplete specially in invertebrates and microbes and somewhat in fishes also and especially in tropical latitudes that support most of the world's species. Even vertebrates are incompletely known, including well-studied taxa such as fishes (Stiassny, 2002). Between 1976 and 1994, an average of 309 new fish species, approximately 1% of known fishes, were formally described from synonymy each year (Stiassny, 1999) and this trend has continued (Lundberg et al., 2000). Among amphibians, almost 35% of the global total of 5778 species has been described during the last decade (AmphibiaWeb, 2005). Regional discovery rates of new freshwater species vary: for example, Rainboth (1996) estimates that the Mekong drainage may support as many as 1000 fish species,

more than twice the total given by earlier researchers, placing it third in the global ranking of rivers according to fish species richness. A more recent figure puts Mekong fish richness in the order of 1700 species (Sverdrup-Jensen, 2002). Clearly, the Mekong is one of a number of global 'hotspots' for river fish biodiversity (others include the Congo and Amazon) but, in general, freshwater hotspots receive less attention than their terrestrial counterparts (Myers et al., 2000).

Day (1875-1878) was the first to give an account of fresh water fishes of Western Ghats, form his comprehensive work on the fishes of Asia, he opined that the Indian fresh water fish fauna resembles more closely with that of Eastern countries like Burma, China and Malayan archipelago (Day, 1889). It is suggested that Western Ghats region, approximately, 231 species of freshwater fish species and 102 species are presently listed from Western Ghats water bodies between 750 and 2000 meters of altitude. Boote (1979) studied the freshwaters of Western Ghats and concluded that the streams lack large sized fishes. Kharat et al., (2003) studied the changes in the freshwater fish fauna of Mula-Mutha river system of Western Ghats of Maharashtra and observed that besides species richness the characteristic of fish fauna has also undergone change in terms of feeding habits. Recent studied have shown that increase in small and medium sized fish species, while proportion of very small, large and very large fish species has not changed significantly.

Jhingran and Talwar (1991) gave an account of inland fishes of India and its adjacent countries which included 930 species of fishes. Bhuiyan et al., (1992) published a checklist of the fishes of Rajshahi, which included 133 species. Islam and Hossain (1983) provided an account of the fishes of the river Padma near Rajshahi and mentioned 110 species of fishes.

In Maharashtra some places were studied for fish diversity; this explores the deplorable condition of fish fauna of Pune urban area that once revealed 25 species new to science out of total 26, described by Sykes in 1841 during his study on the fish fauna of Deccan (Tilak and Tiwari, 1976). After a silent century, there was a sudden spurt of publications. The huge collection of fishes made by Fraser (1942) from Pune area was investigated by Hora and Misra (1942) recording 54 fish species. Suter (1944) added 17 species to Pune list. Tonapi and Mulherkar (1963) recorded 60 fish species from Pune, 25 being new local records. Yazdani and Mahabal (1978) recorded 34 fish species from Indrayani River.

A comparative account of fish fauna covering 12 river basins representing the state of Karnataka, Kerala and Tamil Nadu part of Western Ghats revealed that, there were about 85 species of fishes belonging to 8 orders and 16 families (Arunachalam, 2000). Unnithan (2000) reported the decline in the endemic fish species in the reservoirs of Western Ghats. Raghunathan and Rema Devi (1999) have reported an record of biodiversity of freshwater fishes.

A detailed account on Cauvery river systems and pattern of fish distribution has been studied by Jayaram (1982). The same author worked on bio-resource of Krishna River along with tributaries and provided excellent information on physic-chemical parameters and fish fauna. A total of 142 species under 27 families have been reported. Mirza (1975) has listed 156 species of freshwater fishes, belonging to 58 genera from Pakistan. Almost all of the species of fish form Pakistan have been reported in India too (Talwar and Jingran,1991). Ramachandran (1973) made attempt to prove an illustrative list of local and scientific names of fishes of Karnataka region of Western Ghats.

Hamilton-Buchanan (1822) described numerous freshwater fishes from Gengetic systems and synthesis of this work and subsequent studies in the Ichthyofauna of Ganga is detailed by Jhingran and Talwar (1991). Sykes (1838) described 46 species from fresh waters of south India. Comprehensive accounts of south Indian freshwater fishes were compiled by Jerdon (1849). He listed 11 fishes from Canara district of Karnataka both in rivers and tanks (Hora and Law, 1941)

The Western Ghats biogeographic region of India is home to a highly diverse fish fauna, consisting of 288 known species belonging to 12 orders, 41 families and 109 genera (Dahanukar et al., 2004), of which 116 (53%) species are endemic to this region (Daniels, 2001). The species richness of river fauna may be dependent on the accessibility of streams (Horwitz, 1978). The high species richness streams of Thalayanai and Achankoil are located in well protected areas and less accessible to people. In addition to the stream accessibility, diversity and distribution patterns of freshwater fishes are associated with different sets of environmental gradients that have been well studied in streams of the Western Ghats (Johnson 1999; Arunachalam 2000; Bhat 2003 & 2004).

Hossain, et al., (2005), studied the fish diversity from Padma River; in order to explore the existing fish fauna of the Padma River near Rajshahi (Godavari to Charghat) and found 135 species of fishes under 77 genera, 33 families, 14 orders and two classes. It was also found that more than 50 species have become rare, which were found abundantly in the research-covered areas during last two decades.

Ogale (1997) studied Western Ghats fish diversity and found 102 species of fish situated between 750 and 2000 m altitude. The Western Ghats ranges in western India run for about 1600 km and have an average altitude of 1200 m (max. 2339 m). These important mountain ranges attract precipitation, which is then drained east and west. The three major rivers draining towards west are Godavari, Krishna and Cauvery, the last river being famous for its sport and recreational fishing for Mahseer (*Tor khudree*).

Bhat (2004) studied Western Ghats and recorded 288 species belonging to 12 orders, 41 families and 109 genera, of which 118 species are endemic and 51, are unique to this region. An analysis of the distribution pattern of fishes in the Western Ghats suggests that the southern region is more diverse than the northern and central regions. The

southern region shows high endemism and high uniqueness while the northern region shows high endemism but less uniqueness. The similarity index between the zones indicates that as the distance between the zones increases similarity decreases. The status of 105 of 288 species was not known due to data deficiency but among the remaining 183 species, 58 species were categorized as least rare, 41 as Vulnerable, 54 as Endangered, 24 as Critically endangered while the remaining six species were introduced. The threat status of fishes found in Western Ghats suggests that at least 41% of fish fauna is threatened by either being vulnerable, endangered or critically endangered. Implication of strong conservation measures is necessary to conserve the fish fauna of Western Ghats.

On similar agro-climatic zone to adjoining countries like Bangladesh and Pakistan fish diversity studies shows variation in species diversity and same threats like India. Ahmed (1953) who included 107 freshwater species from the East Pakistan. Bhuiyan (1964) recorded 71 species from fresh water area of Dhaka district in Bangladesh. Qureshi (1965) in his monograph of common freshwater fishes of Pakistan included 133 species, most of which occurred in Bangladesh. Doha (1973) published a list of 106 species from waters of Mymensingh and Tangail districts. Rahman (1989) first made a complete list of 257 species inhabiting the fresh water areas in Bangladesh, many of them are also found in marine and estuarine areas. Ahmed and Hasan (1981) published a list of 69 species inhabiting in the Karnaphuli Reservoir.

In fish diversity exotic fish also impact in various rivers. Several cases of fish species decline from various water bodies in India including reservoirs and rivers due to proliferation of tilapia have been documented (Jhingran, 1984). The presence of a well-established population of tilapia in the Chalakudy River will invariably cause negative effects on the native fish fauna of the region. An important native ornamental fish of River Chalakudy, *E. maculatus* shares more or less the same resources as that of *O. mossambicus* and so the proliferation of the former will invariably harm the native stocks of *E. maculatus*. (Raghavan et al., 2008)

2. DISCUSSION AND CONCLUSION:

Freshwater ecosystems may be the most endangered ecosystems in the world. Studies of freshwater fishes in the Indian subcontinent have been limited to scattered works on commercial fisheries and even these have been largely restricted to some of the major river systems.

The major reason for native species extinction is habitat destruction followed by biological invasions (Casal 2006; Leprieur et al. 2008; Vitousek et al. 1997). In India increasing human population growth and high demand for fish protein, humans developed fishing techniques and aquaculture techniques for commercially fishes continuously exploiting fishes from natural environments, these activities effects on endemic species and they were rare fish species from natural environments and its directly effect on fish diversity.

In India fish diversity were effect by exotic fish like *O. mossambicus* (Tilapia), Cyprinous Carpio Carpio (Common Carp) and *E. maculatus* (Raghavan et al., 2008) also impact in various rivers. Several cases of endemic fish species decline from various water bodies of Indian Region.

Constructed Dams also affects the fish diversity, those are migratory fishes, migrated from river to marine or vice versa, these fishes were extinct and some were threatened from natural habitat due to dam construction.

Agro-Climatic zone were also affecting the fish diversity from Indian Region, Human population increases and its more demands Agri-foods due to different types of pesticides and herbicides are used for more production in agriculture. These pesticides herbicides assortment into natural aquatic ecosystem and forest converted in Agri-Zone, all factors responsible for freshwater ecosystem were vanishing and effect on fish diversity.

Present review Indian region fish diversity were frequently found fish species of order Cypriniformes as compare to others fish species order. Some other order followed by Perciformes, Siluriformes, Synbranchiformes, Beloniformes etc. Cyprinids family were one of the largest family and huge number represented in India.

Out of the 2,500 species of freshwater fishes that have been recognized in the Indian region, 930 are categorized as freshwater species (Jayaram, 1999). 994 species currently present in the country include island which were include all type of fishes such as endemic, native, introduced and reintroduced fishes in the country. (fish base 2020) Mostly 234 fish species currently endangered form country (IUCN Red List data 2020).

Fish diversity condenses the endemic fishes due to all aspect were responsible such as Invasive exotic Species, Habitat destruction, Agro-climatic zone, Dam and pollution. Further proportion of endemic fishes threatened and some are extinct from the natural environment.

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Global Warming and Its Impact On Life

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Abstract : *Since many decades the whole world is facing seviere problem of heating of earth. This heating of earth day by day since the origin of earth tremendously increasing. This seviere threat created is Global Warming. The concept of Global Warming is now well known for us. The protective layer of earth is ozone layers which protect the earth from harmful ultraviolet rays. The Ozone layer is depleting. The main reason is pollution & the main cause are greenhouse gases . The effect causing by greenhouse gases called as Greenhouse effect. The greenhouse gases easily emitted in atmosphere. These greenhouse gases trapped between the ozone layer and the surface of earth creating more heat. Global Warming is now become a worldwide problem. We have seen various threats caused by Global Warming. One of the main impact is Climate change. The effect of climate change is seasonal variation which had greater impact on the life. Natural calamities like Flood, Cyclones, Eathquake happened. Totally Global Warming causes long life effects and greater impact on life of not only on human but also the whole biosphere. It is now become the question of existence. The problem of Global Warming cannot solved by a single country but it is a community work by helping hands together. Various efforts taken at national & international level but it is necessary for implementation of necessary activities otherwise our earth will get destroyed.*

Key Words: *Threat, Greenhouse effect, Natural calamities, Climate change, Seasonal variation.*

1. INTRODUCTION:

Global Warming is not a new concept but arise since from origin of earth. First sensation of Global warming arise in 1896. Concept of Global Warming put forth in 1957. Since from fifty years the average global temperature has increased at the fastest rate. The trend of global warming is accelerating. Nasa recorded 16 hottest years in 134 year record since 2000.

First earth summit was held in 1992 at Reo de Janerio. In earth summit Quoto agreement was put forth and objectives given to each develop country to control pollution. Carbon Trading concept also put forth by Quoto agreement.

2. MATERIALS AND METHODS:

Man is main pollutant and pollution is the main cause of Global Warming. Pollution cause by combustion of fuel such as Coal, Petrol and Natural gases. Global warming occurs when carbon dioxide (CO2) and other air pollutants and greenhouse gases like methane, nitrogenoxide release in the atmosphere and absorb sunlight and solar radiation that have bounced off the earth's surface. Normally, this radiation would escape into space but these pollutants, which can last for years to centuries in the atmosphere, trap the heat and cause the planet to get hotter. This is known as the greenhouse effect.

1.CO 2 : Release through combustion of coal, petrol, Diesel.
ii. The amount of CO 2 release from industries is 5.66 billion tone and it is much more due to industrialization.
iii. Destruction & burning of forest release 1.2 billion tone CO2 in air & about 65 % CO2 is produced by burning of savanna grass & forest.
iv. CO2 release through generating electrical energy by burning coal.
v. CO2 also release by natural activity such as respiration of human being.

vi. Australian Scientist Prof. Ronner Short suggest that tradition of burning of body according to Hindu mythology is very harmful as burning of only one dead body release 50 tone CO_2 in air.

2. Methane (CH_4) : It release by microbial decomposition of waste matter & also through sugar & wine industries & it is responsible to increase temperature.

3. Chloroflurocarbon (C.F.C) : Act as a coolant in ACs, sprays, refrigerators etc.

Life span of C.F.C. is more than 100 years & it act as villain which break protective ozone layer around earth. Due to release of C.F.C. in air it breaks chlorine & one atom of chlorine destruct one lakh atoms of ozone.

4. Nitrous Oxide (N_2O) : As this gas persist up to 170 years after its production the global temperature increase very fastly & since some past years the amount of N_2O increase by ten percent.

3. RESULT AND DISCUSSION:

Impact:

A.Climate change:

i.It has been cleared that global temperature show variation relating to climate.

ii.Climate become insignificant & may cause conditions like high drought or sometimes heavy rain.

iii. Changing climate affect on crops.

iv. Directions of climate change also cause change in distribution of rainfall

v. Seviere climatic accidents may happen.

B.Extreme Weather: Global Warming increase earth's temperature which causes longer & hotter heat waves, more frequent droughts, heavier rainfall and more powerful hurricanes in 2015. Scientists have found that the frequency of North Atlantic hurricanes has increased since the early 1980s, as well as the number of storms also increased. In 2005, Hurricane Katrina, the costliest hurricane in U.S. history struck New Orleans. The second-costliest, Hurricane Sandy, hit the East Coast in 2012.

The impacts of global warming occur all over the globe. Extreme heat waves have caused tens of thousands of deaths around the world in recent years. Antarctica has been losing about 134 billion metric tons of ice per year since 2002. This rate could increase if we keep burning fossil fuels at our current rate, causing sea levels to rise several meters over the next 50 to 150 years.

Other impacts: Each year, scientists search about the consequences of global warming, and many agree that environmental, economic, and health problems are likely to occur if current trends of global warming continue.

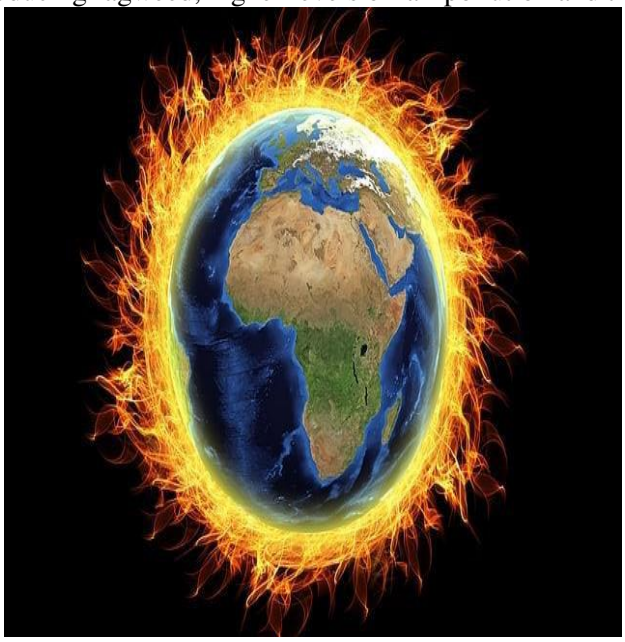
i.Melting glaciers, early snowmelt, and severe droughts will cause more dramatic water shortages and increase the risk of wildfires in the American West.

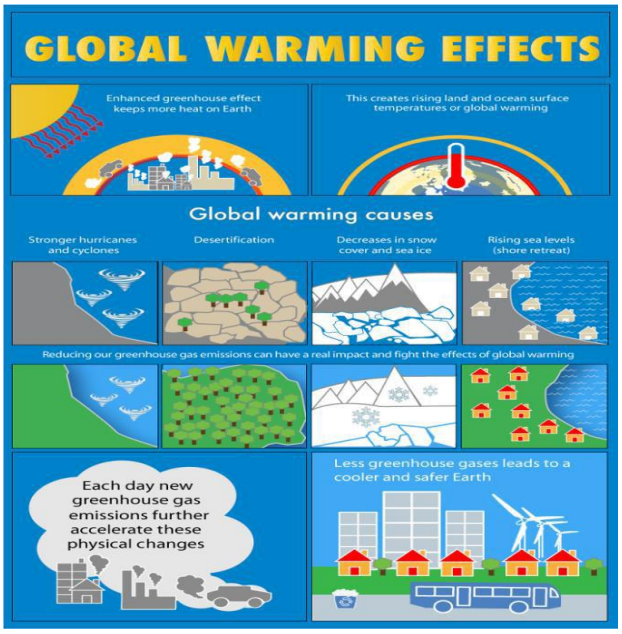
ii. Rising sea levels will lead to coastal flooding on the Eastern Seaboard, especially in Florida, and in other areas such as the Gulf of Mexico.

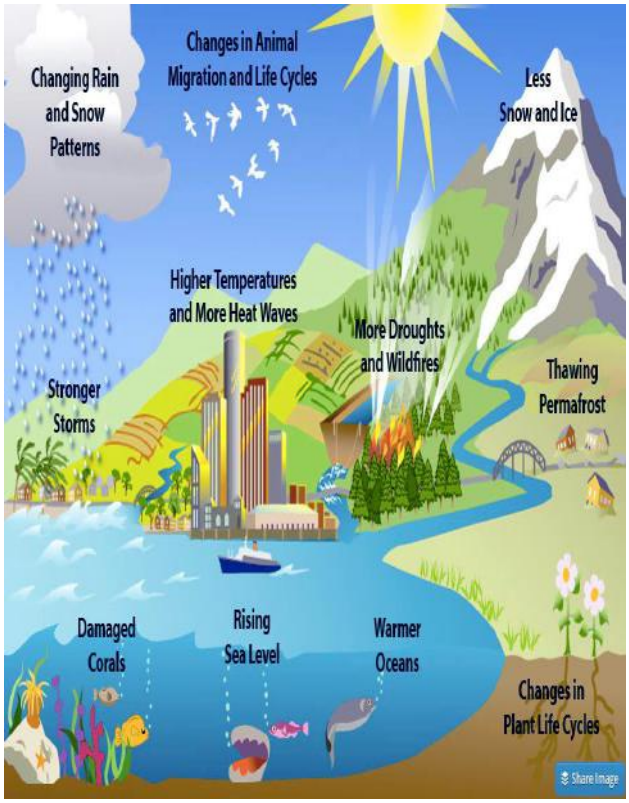
iii.Forests, farms, and cities will face harmful new pests, heat waves, heavy downpours, and increased flooding. All those factors will damage or destroy agriculture and fisheries.

iv.Destruction of habitats such as coral reefs and Alpine meadows could drive many plant and animal species to extinction.

v.Allergies, asthma, and infectious disease outbreaks will become more common due to increased growth of pollen-producing ragweed, higher levels of air pollution and the spread of pathogens and mosquitoes.







4. CONCLUSION:

Global Warming is a big challenge in front of human being. It is necessary to think about our physical life style. These are essential requirements Use of Clean Technology or Green Technology, Rainwater harvesting, use of Renewable sources like solar energy, wind energy, Growing petrocrops, energy crops, Tree Plantation and Tree conservation, Recycling of solid waste. To avoid the worst consequences of climate change, we'll need to reach "net zero" carbon emissions by 2050 or sooner. Due to global-warming emissions, average U.S. temperatures could increase by up to 10 degrees Fahrenheit over the next century. Seviere climatic change requires reduce emissions, & the use of alternatives to fossil fuels worldwide. CO2 emissions in the United States actually decreased from 2005 to 2014, energy-efficient technology and the use of cleaner fuels. and scientists continue to develop new ways to modernize power plants, generate cleaner electricity, and burn less gasoline while we drive. To avoid the worst effects of climate change, we need to do a lot more together with other countries reduce our dependence on fossil fuels and start using clean energy instead. In 2015, the U.S. Environmental Protection Agency pledged to reduce carbon pollution from our power plants by nearly a third by 2030, relative to 2005 levels, through its Clean Power Plan. Fortunately, state leaders including in car country itself recognize that clean transportation must remain a priority to avoid climate change and protect public health and regional efforts around the country are helping to increase electrical car market, there is an increase in sales for 2017 over 2016. Our clean energy economy is growing too. In 2016, wind employment grew by 32 percent and solar jobs increased by 25 percent. The problem of Global Warming can not solved by a single country but it is a community work by helping hands together.

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Positive effect of *Apis mellifera* on Pomegranate cultivation

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Abstract: *Apis mellifera is also called western honey bee which pollinates many different plants world over. In Marathwada, it has been recorded pollinating pomegranate, onion, oil seed plants, maize, cucumber, sunflower plants. Aim of present study is to make farmers aware of positive effects of Apis mellifera on cultivation and also other native plants. The study also points out the importance of marginal plants on fields for growth of other friendly insects which also aid in pollination and collection of honey consequently.*

Keywords: *Apis mellifera, oil seed plants, marginal plants.*

1. INTRODUCTION:

Apis mellifera is one of the most common species of bees found worldwide is also called European honey bee or western honey bee Except Antarctica it has occupied every continent. It is one of the first domesticated insects. The bee has adapted itself to the local environments (Whitfiled C. W. et al. 2006). In all it is the species of economic, agriculture and environmental importance (Han F. et al. 2012). Along with *A.mellifera*, the other species include *A. cerana, A. koschevnikovi, A. nulensis*, giant bees *A. dorsata, A. laboriosa, A. binghami, A. nigrocincta* and dwarf bees *A. florea, A. andrenifor- mis* are found confined to Asia (Han F. et al. 2012). The bees have evolved barbs to catch before stinging probably to overcome being eaten by vertebrates (Caron D. 2013).

The bee *Apis mellifera* has been found to be regularly foraging itself several kilometres from its nest (Visscher & Seeley 1982). In Marathwada, the bee *Apis mellifera* has been recorded pollinating pomegranate, onion, oil seed plants, maize, cucumber, sunflower plants. However the other friendly insects also aid the farmers in doing the same. The present study has documented such friendly insects which aid the farmers in pollination of pomegranate and their role in ecosystem. The present study also documents the role of marginal plants and importance of mixed cropping patterns.

2. MATERIAL METHODS:

There were 10 pomegranate cultivating farmers questioned during the present study from Sengaon tahasil. They were questioned about

1. The pest control techniques they have been using in pomegranate cultivation.
2. Integrated pest control techniques adopted.
3. The friendly insects in pomegranate cultivation
4. By products of pomegranate farming.
5. The benefits of *Apis mellifera* on other plants growth.

3. RESULTS:

During the study it was found that the farmers used the bactericides like Bromopol, insecticide like Chlorpyrifos and carbaryl. However it was found that the insecticide Chlorpyrifos is not insect specific consequently killing both parasitoid and friendly insect's female flies (Rafalimanane H. et al., 2002) thus control their population. The insecticide carbaryl was although found to be controlling *Diabrotica virgifera* was not insect specific and killed many friendly insects.

4. DISCUSSION:

It was found that almost all farmers were aware about the positive effects of *Apis mellifera*'s rearing on pomegranate plants however, the hazardous effects of insecticides were rarely known. The farmers were also made

aware about the famous statement "If all bees died off there will be major rippling effect throughout the ecosystems." To survive the honey bees when main crop of Pomegranate is not being cultivated the other alternative plants are also needed was one of the conclusions of the present study. Or it can also be related to abundance of Mustard plants grown in North India compared to South India. Thus growing marginal plants in the farms is one of our main suggestions to farmers so as to ensure usual flowering throughout the year.

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Antioxidants: A Gift from Plants to Reduce Free Radical

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Abstract: *Antioxidants are the substances which can prevent the damage to our cells, which is caused by free radicals. During the process of oxidation, our body produces some unstable chemicals which are called as free radicals. Oxidation process in our body takes place by stress, alcohol intake, smoking, pollution, U.V. light etc. Antioxidants are the compounds in our body, which neutralise free radicals and protect us from different diseases. Due to this our immunity decreases and degeneration of body starts. Our life style is the main reason to increase the rate of production of free radicals. Oxidative stress is most important reason for disease causing. Fresh fruits and fresh vegetables are very good source of antioxidant, vitamin C, vitamin E & beta carotene, lycopene, selenium, manganese. Some antioxidants are not obtained from our food, but they are prepared in the body. Food with rich and dark colour contains high antioxidants. Antioxidant generally found in plant food material especially fresh fruits and vegetables, which neutralises the effect of free radicals and prevent us from variety of diseases. When there is age related degeneration in the body, then there is very essential to use supplements of antioxidants. People have to eat variety of fresh fruits and vegetables, milk, eggs, fish and whole grains. Our diet should include five servings of a medium sized fruit or half cup of cooked vegetables.*

Key Words: *Antioxidants, free radicals, Oxidative stress, immunity, degeneration..*

1. INTRODUCTION:

Antioxidants are substances, which inhibits oxidation process. Oxidation is a chemical process, where chemical reaction takes place and free radicals are produced. Free radicals may damage the cells of an organisms. Antioxidants such as thiols or ascorbic acid stops this chemical oxidation process. Vitamin C & E (dietary antioxidants) that removes oxidizing chemicals from the body of living organisms.

So the antioxidants are the substances which can prevent the damage to our cells, which is caused by free radicals. There are two types of antioxidants, endogenous and exogenous. Antioxidant that comes externally to the body from our diet is called as exogenous antioxidants. And some antioxidants that are produced inside our body called as endogenous antioxidant.

2. FREE RADICALS:

During the process of oxidation, our body produces some unstable chemicals which are called as free radicals. Free radical destroys our cell membrane, protein structure and DNA structure. This unstable free radicals steal one electron from other molecule to become stable, but causing damage to genetic structure and cell structures.

Oxidation process in our body takes place by stress, alcohol intake, smoking, pollution, U.V. light etc. Number of free radicals in our body increases, which leads to many harmful diseases including liver diseases, kidney diseases, even some time cancer also. Antioxidants are the compounds in our body, which neutralise free radicals and protect us from different diseases.

Free radicals causes following conditions in our body.

- Increased the chances of heart diseases because due to free radicals level of LDL cholesterol increases.
- Due to cell DNA damage, increased the risk of cancer.
- Ageing process is very faster.
- In our joints Inflammation increases, called arthritis.
- Free radical damages the nerve cells of the brain, so some brain related diseases like Alzheimer and Parkinson's may diagnose.
- Deterioration of the eye cells, follows may be some times blindness.

When the body age increases, reduces the ability to fight the effects of free radicals. So more number of free radicals form, more oxidative stress and it shows more damage to cells & DNA. Due to this our immunity decreases and degeneration of body starts.

3. DISCUSSION:

CAUSES OF FREE RADICALS:

Free radical theory of ageing is the perfect answer for the question in our mind that why some people age more slowly than other people.

Our life style is the main reason to increase the rate of production of free radicals. Some examples are exposure to pesticides, insecticides, pollution and some toxic chemicals. Smoking, drinking and intake of fried food also a cause of some diseases. Oxidative stress is most important reason for disease causing.

ANTIOXIDANT LEVELS IN FOOD:

Fresh fruits and fresh vegetables are very good source of antioxidant, vitamin C, vitamin E & beta carotene, lycopene, selenium, manganese. They are also found in legumes, nuts and eggs. Long term storage or cooking for longer time may destroys this vitamins. The various effects of food processing and cooking are not so simple. Because this process sometimes increases the bioavailability of antioxidants like carotenoids in vegetables, processed and packed food contains lower antioxidants and vitamins than fresh and uncooked food, because during food preparation food exposes to heat.

Antioxidant Content in Herbs & Spices	
Food	**Antioxidant Content mmol/100g**
Cinnamon Sticks	26.5
Ginger dried	20.3
Cinnamon dried	77.0
Clove dried, whole	277.3
Saffron dried	44.5
Mint leaves dried	116.4
Basil dried	19.9

Vitamin C (ascorbic acid) present in high level in fresh vegetables and fresh fruits. Vitamin E present in different nuts, seeds and vegetable oils. Carotenoids or vitamin A present in eggs, fresh fruit and vegetables.

Some antioxidants are not obtained from our food, but they are prepared in the body. For eg. Ubiquinol, glutathione.

All this exogenous antioxidants are found in plant based foods. It is very important to have a variety of diet, because each antioxidants serves a different function. The food material which contain high level of antioxidants is called as super food or functional food. Food with rich and dark colour contains high antioxidants.

Antioxidant Content in Fruits , Vegetables & Berries	
Food	**Antioxidant Content mmol/100g**
Strawberries	2.1
Apricot, dried	3.1
Papaya	0.6
Mango	1.7
Moringa, leaves, Stem	11.9
Pomogranate	1.8
Plums	3.2
Amla dried	261.5
Dates	1.7

EFFECT OF COOKING:

Cooking of any food material may increases or decreases antioxidant levels. Tomato get rich red colour due to antioxidant lycopene. When tomatoes are given heat treatment, the lycopene becomes easier to our body to use and digest. However some vegetables like peas and cauliflower reduces antioxidant levels during cooking process. So we should have to eat variety of antioxidant rich fruit, raw and cooked.

4. RESULT:

Statistical data of the Antioxidant Food	
Food	**Antioxidant Content mmol/100g**
Plant based food	1943
Mixed Food	854
Animal based products	211
Fruits & Fruit Juice	278
Beverages	283
Dairy Food	86

Chocolates & Sweet	80
Legumes	69
Berries & Berry Product	119
Eggs	12
Fish & Sea Food	32
Cereals	90

5. ROLE OF ANTIOXIDANT TO REDUCE THE EFFECT OF FREE RADICAL:

Antioxidant generally found in plant food material especially fresh fruits and Vegetables, which neutralises the effect of free radicals and prevent us from variety of Diseases. Antioxidant such as Vitamin A, E & C, some minerals like Zink, copper, Selenium and some nutrient antioxidants.

Phytochemicals which are present in the plant are good effective than vitamins and minerals. They are called as non-nutrient antioxidant. Those phytochemicals such as lycopene present in high quantity in tomatoes and anthocyanin which is found in berry fruits specially in cranberries. Lutein found in spinach and corn.

So our diet including antioxidants prevent us from the risk of many diseases, also reduced the damage caused by oxidation. Flavonoids found in green tea lowers the risk heart diseases. Antioxidants are more powerful and effective when consumed in the form of whole food, than in the tablet and supplementary form.

Healing power of pomegranate is very high to fight the diseases caused due to free radicals, which is full of antioxidants & vitamin C. Polyphenol found in plants including phenolic acid and flavonoids are very beneficial to fight against diseases.

6. CONCLUSION:

So to reduce the free radicals from our body, we have to drink a cup of green tea every day, for health benefits due to antioxidants. Look at the colours of your food. A food with rich colour is having high oxygen content. Use ginger, garlic, cinnamon, turmeric, and clove, and oregano, cumin seeds, for spicy flavour and to increase antioxidant content of your food. Everyday have some dry fruits, nuts, sunflower seeds in diet. RDA – recommended daily allowance of antioxidants is not set but intake of fresh and plant based food is very healthful.

When there is age related degeneration in the body, then there is very essential to use supplements of antioxidants. Artificial source of high antioxidants may increase the risk of some health problems. So it is very important to have an antioxidant in the form of healthy diet. Eat fresh fruit and vegetables every day, it will provide significant benefits of antioxidants. Oranges have high content of antioxidant, so they help to reduce stroke risk of heart, also beneficial to improve the tone of skin. Tomatoes also having high power of nutritious antioxidants substances, which gives strengthens to heart, prevention against cancer, and also prevents from constipation. Lipoic acid, an antioxidant also help to improve whole brain function in some patients. Person interested in fighting ageing problem related to free radical should 100 % avoid common sources of free radical such as fried food and pollution. We have to eat healthy and balanced diet.

So in this way our daily food material with high antioxidants and vitamins minimize the cell damage and reduced the free radicals from our body, and lower the risk of certain diseases. A complete balanced diet, including antioxidants is best for our body. Antioxidants supplements don't give us some health benefits like antioxidant present in plant food material. So people have to eat variety of fresh fruits and vegetables, milk, eggs, fish and whole grains. Our diet should include five servings of a medium sized fruit or half cup of cooked vegetables.

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Studies On Effect Of Yoga Practices On Obesity and Lipid Profile Of Rural People

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Abstract:
Background: *As an Americans in Indians obesity is the burning issue as health problems particularly in urban areas. About 30-70 % of urban people is either overweight or obese or has abdominal obesity. If BMI of the person is between 25 and 29.9 you are considered overweight and if BMI is 30 or over you are considered as obese. Generally body fat is accumulated on abdomen, thighs, buttocks and breasts may generate metabolic syndrome, diabetes, hypertension, arthritis and CVD.*
Objectives: *The main aim of this study was to observe the effect of yogic practices like yogic jogging, suryanamaskar, asanas and pranayama help to reduce BMI- obesity and correct the lipid profile with considerable health benefits.*
Method: *In this study 50 subjects between age of 20-60 years, of both sexes having overweight and obese were selected by Yoga Committee and Department of Zoology, Pimpalner. These were divided in to two group viz. yoga group and non-yoga group, 25 in each group.*
Time Line- *The yogic intervention consisted of 80-90 minutes daily, 3 months at Maratha Mangal Karyalaya, Pimpalner, Dhule (MH). BMI and lipid profile were observed prior to initiation yoga training and after 3 month of yoga training.*
Result: *It was found that there was significantly fall in BMI, total cholesterol (TC), low density lipoprotein (LDL), Very low density lipoprotein(VLDL), triglycerides (TG) and significant rise in high density lipoprotein (HDL) in both men and women.*
Conclusion: *Our finding indicates that yoga practices along with diet restriction is more beneficial in recovery of obesity/ BMI and lipid profile.*
Keywords: *Lipid profile, Obesity, Rural people, Asanas, Pranayama, Yoga Practices.*

1. INTRODUCTION:

Presentday is age of competition and speed has increased the stresses and strains. It is resulting change in life style and health problems such as obesity, diabetes, hypertension and cardiovascular diseases.

Obesity is the burning issue as an important health problem particularly in urban areas. About 30-70 % of adult urban is either overweight or obese or has abdominal obesity. If the BMI is between 25 and 29.9 you are considered overweight and if BMI is 30 or over are considered obese. Generally body fat is accumulated on abdomen, thighs, buttocks and breasts it may generate metabolic syndrome, diabetes, hypertension, arthritis and CVD (Shukla Ravi, et al., 2016). Yoga is the best solution to solve the above problems by free of cost, without any side effects (Bhaskar and Srinivasan 2015). A recent survey has suggested that 15 million Americans have practiced yoga at least one in all life. Yoga is a way of life and an ancient discipline designed to bring parlance and health to the physical, mental, emotional and spiritual dimension of individual which corroborates well with the WHO definition of health. Yoga comprises eight aspects as *Yam, Niyama, Asana, Pranayama, Pratyhara, Dharma, Dyane* and *Samadhi (*Daljeet Singh, et al., 2014 and Meher Arati, et al., 2015). Hence yoga and pranayama has been incorporated in to modern medicine during recent decades. Yoga is the best life style modification which aims to attain the unity of body mind and spirit through the yoga practices and meditation (Ankad, et al., 2011).

The some studies stating that there have been improvements as a result of long term exercises (Archana Mandape, et al., 2015, Daljeet Singh & Monika Verma, 2014, Bhaskar and Srinivasan 2015, Maini S, et al., 2014, Seema Patel & Kamakhya Kumar, 2016, Abhishek Chaturvedi, et al., 2015).

Among the various approaches to prevent and manage the obesity and lipid profile level yoga as a physical and mental activity conveys multiple well established health benefits (Shete Sanjay Uddav, et al., 2012). The previous

studies reported outcomes of yoga intervention for at least four weeks or more on civil population has got a significant results but some studies which are short term yoga intervention has not got a significant results (Balginder Singh 2015).

Studies by Jayaram Gadham et al., (2015) and Vijay Tundwala (2012) found that the BMI and lipid profile can be managed in the body with the help of yogic life style intervention. In the field of physical fitness the latest research have recommended that the yogic practices have very positive effects on the physical and physiological variables of layperson. Therefore this study was carried out to find the effects of yoga practices on physical-BMI and physiological variables-lipid profile of general obese people of rural background.

2. MATERIAL AND METHODS:

STUDY DESIGN:

In this study 50 subjects between the age of 20-60 years, of both sexes having overweight and obese were randomly selected by Yoga Committee and Department of Zoology, KNKP Sci. College, Pimpalner, Dhule (MH). Consent from subjects and ethical clearance was taken. Subjects were divided into two group viz. Yoga group and Non-Yoga group, 25 in each group.

EXCLUSION CRITERIA:

We excluded the subjects with smoking, alcohol consumption, suffering from any endocrine, hepatic, renal disease, hypertension, diabetes, lipid metabolism disorders, CVD and heavy exercises.

YOGA TRAINING:

All subjects were asked to practice same yoga and pranayama training for a period of 3 month. The Yoga intervention consisted of 80-90 min/day, 5 days in a week in Maratha Mangal Karyala, Pimpalner, Dhule (MH), India.

YOGA PROTOCOL:

In pranayama they were practicing Bhastrika, Kapalbhati, Bahya, Anulom-vilom, Brahmari, Udgeeth and Ujjayee. Asanas including Suryanamaskar and microexercises. Each class was started with Omkar chanting and other mantras for 5 min followed by Yogic jogging, 2-3 standing asanas like Tadasana, Konasana, Vrikshasana, Virbhadrasana, Katichakrasana and Suryanamaskar for 20 min. Again followed by Shavasana for 5 min.

Then all subjects were practicing Pranayama Bhastrika for 5 min, Kapalbhati for 5 min followed by Asanas like Shalabhasana. Bhujangasana, Dhanurasana for 5 min.

Again they were practicing Anulom-vilom for 5 min followed by Asanas like Markatasana, Uttanpadasana, Pavanmuktasana, Setubandhasana, Halasana, Servangasana for 10 min.

Again pranayama Bahya 2-3 min, Ujjayee 2-3 min, followed by microexercises and sitting asanas like Mandukasana, Shasakasana, Ardhachandrasana, Ustrasana for 15 min.

Brahmri 2-3 min, Udgeeth 2-3 min followed by Sihasana, Hashyasana 2-3 min and finally one day class was completed with 5 min Shavasana at the end.

SAMPLE COLLECTION:

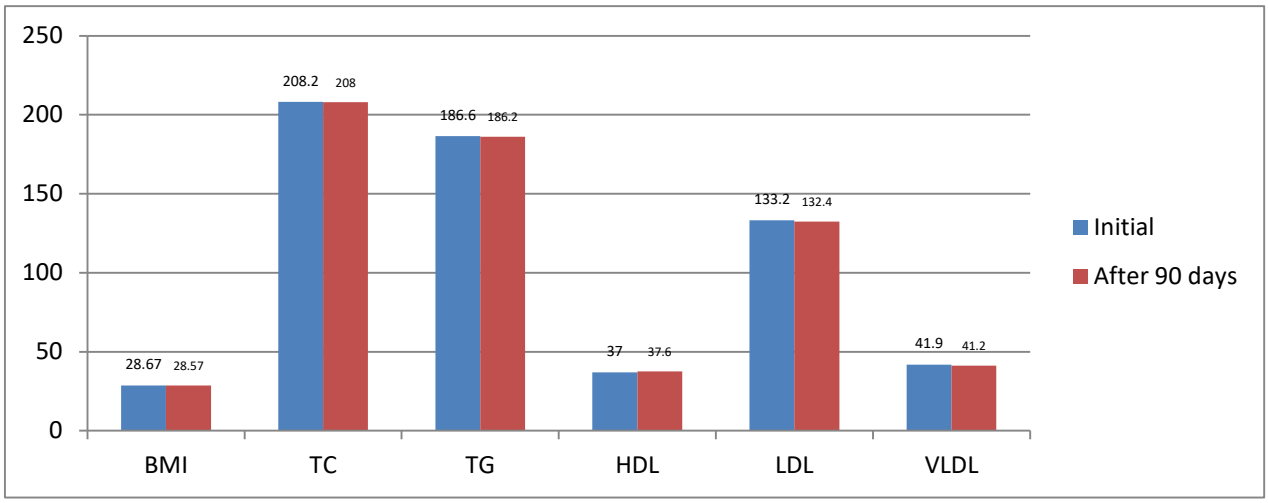
Weight and height for BMI and estimation for lipid profile were observed prior to initiation yoga training and after 3 month of yoga training. The fasting venous blood samples were drawn from the study subjects at the beginning and after 90 days of yoga training for analysis of lipid profile.

3. RESULTS AND DISCUSSION:

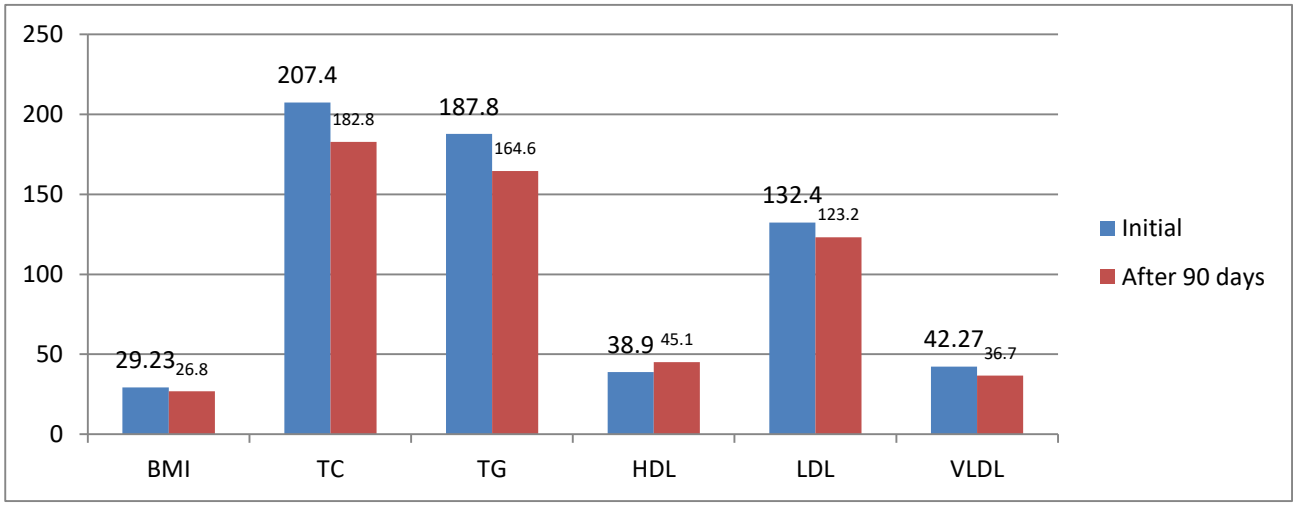
Table -I Effect of Yogic practices in Pre-obese and Obese rural subjects on BMI, TC, TG, HDL, LDL and VLDL.

Variables	Mean Values					
	Control Group-1 (n=20)			Yoga (Expt.) Group -2 (n=20)		
	Initial	Final (After 90 days)	% Relief	Initial	Final (After 90 days)	% Relief
BMI	28.67	28.57	0.34 % NS	29.23	26.8	2.83 % *
TC	208.2	208.0	0.1o % NS	207.4	182.8	11.86 % *
TG	186.6	186.2	0.21 % NS	187.8	164.6	12.35 % **
HDL	37.00	37.6	-1.62 % NS	38.9	45.1	15.93 % **
LDL	133.2	132.4	0.60 % NS	132.4	123.2	6.94 % *
VLDL	41.9	41.2	1.90 % NS	42.27	36.7	13.17 % **

NS (Non significant), * (Significant), ** (Highly Significant), BMI (Body Mass Index), TC (Total Cholesterol), TG (Triglycerides), HDL (High Density Lipoprotein), LDL (Low Density Lipoprotein). VLDL (Very Low Density Lipoprotein)



Control Group - 1st Graph 1st represents non yogic subject



Yoga (Expt.) Group -2nd Graph 2nd represents effects of yogic practices after yoga

The results of pre-obese and obese rural subjects on BMI, TC, TG, HDL, LDL and VLDL of control and experimental groups are represented in Table-1. Their values are represented in Graph-1 (Control Group) and Graph-2 (Experimental group).

This study show improvement in BMI in the study group which was at pre yogic treatment 29.23 and after 3 month of yoga therapy was 26.8 (2.83 % *) it was statistically significant. The results of this study are consistent with Shukla Ravi et al; (2016) they had observed BMI reduction from 31.54 to 30.77 ($p<0.001$) after yogic life style in pre-obese and obese subjects.

Similarly Nandre Y. M. et al., (2018), Seema Patel and Kamalhya Kumar (2016), Jayaram Gadham et al., (2015)and Vijay Tundwala et al., (2018). Studied effect of yoga asanas including pranayama by conducting 6 weeks to 12 weeks yoga training program and they observed significant reduction in body mass index, reduction in the blood serum level on TC, TG, LDL, VLDL.

In this study lipid profile i.e. total cholesterol decreased from 207.4 mm/dl to 182.2 mm/dl (11.86% *) triglycerides decreased from 187.8 mm/dl to 164.6 mm/dl (12.35% **), HDL increased from 38.9 mg/dl to 45.1 mg/dl (15.93% **), LDL decreased from 132.4 mg/dl to 123.2 mg/dl (6.94 % *), VLDL decreased from 42.27 mg/dl to 36.7 mg/dl (13.17% **). All the above results in the study group after 3 months are significantly improved. Pai A et al., (2011) also have observed a significant reduction in BMI ($p<0.04$) after 6 months of yoga intervention and observed the significant decreases in TC, TG, LDL and also Body fat, SBP and DBP.

Result of this study consistent with following studies, Abhishek Chaturvedi et al., (2015) observed the biochemical profile in perimenopausal in women that significant decreases TC ($p=0.06$), LDL ($p=0.04$), Fasting blood sugar ($p=0.05$) and significantly increases TC/HDL ratio ($p=0.002$) and TSH. Similarly BV Surendra (2014) also found statistical significant improvement in lipid profile that was reduction in TC, TG, LDLand VLDL and significant elevation of HDL in 3 months study.

The short term study (30 days) of P. Leela et al., (2013) also showed improvement in lipid profile as TC, TG, LDL decreased and HDL increased. The long term study (2 Years) of Meher Arati et al., (2015) also found that there was significant rise in HDL and significant fall in TC, TG, LDL, and VLDL in both men and women.

3. CONCLUSION:

In nutshell, the study showed that there is significant benefit on the risk factors of obesity, dyslipidemia. Therefore this type of old but as gold Indian life style modification if properly practiced definitely that would be a boon for human society. These life style modifications will be also encouraging in the decline of the complications of the obesity and dyslipidemia.

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Studies On Antibacterial Activity Of Different Extracts Of *Azadirachta Indica* And *Annona Squamosa*

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Abstract: *Medicinal plants are widely used throughout worldwide and use of these material had tremendously increased in past few days as world suffered from pandemic. Each part of the tree of medicinal and herbal plants having biological compounds responsible for antimicrobial activity. In the present study antibacterial activity of extract of leaves, wet bark and dry bark of Azadirachta indica and Annona sqamosa carried out on S.typhi, E.Coli, S.Aureus, andB.subtilis. Ethanolic and Methanolic extracts of the different parts of the plants were used for antibacterial activity. As per concern of standard antibiotics both the extracts shows maximum inhibition of these organisms. Hence the article aims to utilize the medicinal properties of whole parts of Azadirachta indica and Annona sqamosa for human welfare.*

Keywords: - *Antibacterial activity, Annona sqamosa, Azadirachta indica, biological compounds.*

1. INTRODUCTION:

Since the beginning of the 19th century, a large number of secondary metabolites of plant origin have been found commercial application as drugs, pesticides and other types of chemical sources. Medicinal plants are rich source of novel drugs that form the ingredients in traditional system of medicine, modern medicines, nutraceuticals, food supplements, folk medicines, pharmaceutical intermediates and leading compounds in synthetic drugs. (De N et al., 2002 and Ncube N S et al., 2008)

In recent years multiple drug resistance in both human and plant pathogens has developed due to indiscriminate use of synthetic drug. Plant based products extract are cheaper alternative to the development of synthetic drug this drives the need to screen medicinal plant for novel bioactive compounds as a plant based drugs are biodegradable safe and have fewer side effects that means use of this medicinal plants are already known to the peoples of ancient time but it is true scientifically now a days. There are several reasons that people use plans for medicinal purpose this includes improvements of health after herbal treatment low cost of the drug non availability of synthetic drug particularly in the rural areas available were false or expired drugs and in some cases the people are more accustomed and comfortable with traditional healing. (Montefore et al., 1989)

At international level salimuzzaman siddhiqui(1942) was the first scientist to bring the antihelmintic, antifungal, antibacterial and antiviral constituents of the neem tree. He extracted three bitter compounds from neem oil,which he named as nimbin, nimbinin, and nimbidin respectively. Siddiqui (1942) identified nimbidin as the main active antibacterial ingredients. Leaves of *Azadirachta* india also removes toxins from the body, neutralize the free radicals present in body and used as blood purifier. Recently it is used as anti-cancer and also reported as heptorenal protective activity and hypolipidemic effect (Kumar and Gupta et al.,2002)

Neem (*Azadirachtaindica* A. Juss.) is perhaps the most useful traditional plant in India. Each part of the neem tree has some traditional property and is thus commercially exploitable. *A. indica* (Neem - leaf, bark and seed) are known to contain antibacterial, antifungal activities against different pathogenic microorganisms and antiviral activity against vaccinia, chikungunya, measles and coxsackie B viruses (Biswas et al., 2002; Talwar et al., 1997). Aqueous extract of Neem leaf extract has a good therapeutic potential as anti hyperglycemic and anti inflammatory agent (Bajaj and Srinivasan, 1999; Abu et al., 2008).

The great potential neem aqueous extracts as powerful chemotherapeutic and viral agents (Hassan amer et al., 2010). Neem leaves has antibacterial properties and could be used for controlling airborne bacterial contamination in the residential premises(Saseed and Aslam, 2008; El- Mahmood et al., 2010).Many of the existing synthetic drugs cause various side effects. Hence drug development plant based compounds would be useful in meeting this demand for newer drugs with minimal side effects (Srivastava et al.,2000)

In an account about *Annona squamosa*it is found to be used in medicine for treatment of several disorders and beneficial for cardiac diseases, diabetes, hyperthyroidism and cancer (shirwaikar et al). It also shows antifertility, antitumour activities in mice and rat (Rao and Shah 1988;gupta et al.,2005).*Annona* squamosa is traditionally used for treatment of epilepsy, dysentery, worm infestation, constipation, hemorrhage, fever thirst, ulcer (Vohora et al.,1975; Asolkar et al.,1992; Yoganarsimhan 2000). Alkaloids present in *Annona squamosa* leaves have proved to have antioxidant activity (Raj et al.,2009).

In view of this, there is an urgent need to find the alternative to chemotherapeutic drugs in disease treatment particularly those of plants origin which are easily available and have considerably less side effects (khulbe and Sati, 2009). Screening medicinal plants for biologically active compounds offers clues to develop newer antimicrobial agents. These compounds after possible chemical manipulation provides new and improved drugs to treat the infectious diseases (Natrajan et al.,2003 and Shah et al.,2006)

According to WHO survey 80% population living in the developing countries believed exclusively on traditional medicine for their primary health care needs. In addition herbs provided us some important life saving drugs used in the armamentarium of modern medicine. However among the estimated 250000 to 400000 plants species, only 6% have been investigated phytochemically. (WHO global report 2012)

The use of crude extracts of plants parts and phytochemicals of known antimicrobial properties can be of great significance in the therapeutic treatments. Many plants have been used because of their antimicrobial traits, which are due to the secondary metabolites synthesized by the plants. These products are known by their active substances like, phenolic compounds which are part of the essential oils, as well as in tanning. (De and Ifeoma, 2002; Ncube et al., 2008).

In the present study we focused on Antimicrobial activity of *Azadirachtaindica* and *Annona squamosa* against *S. typhi*, *E. coli, Staphylococcus aureus* and *Bacillus subtilis* by using agar disc diffusion assay.

2. MATERIAL:

Selection and collection of plants

Azadirachta indica and *Annona squamosa* were two plants selected for purpose of study. The species confirmed by botanist. Leaves, dry bark, wet bark were collected from Zharali village belongs to District Nandurbar (MS), India.

PLANT MATERIALS:

Azadirachta indica is a well known plant in India which belongs to the family Maliacea and commonly known as Neem. This family comprising about 50 genera and 550 species. *Azadirachta indica* is a big tree reaching up to 15-20 meters (49-66 f). Commonly grow in tropical and subtropical region. *Azadirachta indica* and *M. azedarch* are two closely related species of Maliacea. Former is popularly known as Indian Neem (Margosa tree) or Indian Lilac and the letter as the Persilal lilac. Almost all parts of the *Azadirachta Indica* posses medicinal values. Neem has extensive utilization in Ayuraveda, Unani and Homeopathic medicine (Kausik et al, 2002 and Girish shankara 2008). Neem and Its various parts i.e. leaves, Bark, seeds are use for the treatment of various diseases including eczema, ringworm, anti-inflammatory activities, anti-hyperglycemic and also treat chronic wounds, diabetic food and gangrene. Hot water extract of the flower and leaf is taken orally as an anti hysteric remedy and used externally to treat wound. Hot water extract of the entire plant is used as anti nasal drop to treat worm helmintic and an insecticide. Leaf juice is used infestation in nose. Neem leaves are dried and burnt in the tropical region to keep way mosquitoes. These flowers are also used in many Indian festivals like Ugadi.(Kausik et al, 2002 and Girish shankara 2008).

Annona squamosa is also well known plant which belongs to the family Annonaceae and commonly known as "Custard apple" in English and "Sharifa Hindi. It is native of West Indies and cultivated and grown as a wild plant throughout India, mainly for fruit. (Morton 1987). Annonaceae is one of the biggest family which consists of 130 genera over 2000 species. *Annona squamosa* is a small evergreen tree reaching up to 6-8 meters (20-26 ft) tall and commonly found in deciduous forest. The bark of *Annona squamosa* can be used to stop diarrhea in children's and adults. It can treat burning sensation as it is an effective coolant.

TEST MICROORGANISM

The antibacterial activities were individually tested against 4 bacteria viz. *Salmonella typhi, Escherichia coli, Staphylococcus aureus* and *Bacillussubtilis.* The bacterial strains were maintained in Muller Hinton Agar (MHA, pH 7.2) at 37±1^{o}C and fungi were maintained in Sabouraud dextrose agar (SDA, pH 5.4) at 25±1^{o}C the stock culture slants were maintained at 4^{o}C

3. METHODS:

Plant materials were kept at 45^{o}C in oven for 4 hours to obtain dry material of *Azadirachta indica* and *Annona squamosa.* Dried materials grind in grinder mixture to assure uniformity of material as powder from.

EXTRACTION OF PLANT MATERIALS

i) METHANOL EXTRACTION

30gm dried powder of leaves, dry bark, wet bark were taken in a separate container. To this 150 ml of methanol were added and kept for 24 hours with periodic shaking then filtered with the help of whatman filter paper No.1, filtrate was collected. Filtrate was proceeding through rotary evaporator equipment and hence methanol was separated and extracted components were collected in small bottle which kept in freezer for further antibacterial assay.

ii) ETHANOL EXTRACTION

30 gm dried powder of leaves, dry bark, wet bark were taken in a separate container. To this 150 ml of ethanol were added and kept for 24 hours with periodic shaking then filtered with the help of whatman filter paper No.l, filtrate was collected. Filtrate was proceeding through rotary evaporator equipment and hence ethanol was separated and extracted components were collected in small bottle which kept in freezer for further antibacterial assay.

iii) DISC DIFFUSION METHOD

The disc diffusion methods were used to determine the growth inhibition of bacteria by the plant extract. Disc containing different plant extract and prepared by using sterile whatman filter paper No. 1 (6 mm in diameter). The discs were dried at 50^{0}C. nutrient agar medium was prepared, sterilized, cooled, and poured into a sterile Petri dishes to a depth of 4 mm about 25ml/plate to solidify pure culture of the test organism were used to incubate the Petri dishes. This was done by spreading the inoculation on the surface of the prepared nutrient agar plate using sterile cotton swab which have been deeped in the diluted suspension of the organism. The discs were aseptically placed evenly on the surface of the inoculation and gently pressed down to ensure contact using a pair of forceps. The plates were finally incubated at 37^{0}C for 24 hours for clear zone of inhibition. All measurements were taken in mm.

4. RESULT:

We conducted a prospective observational study of antibacterial activity of Methanolic and ethanolic extraction of leaves, dry bark and wet bark of *Azadirachta indica* and *Annona squamosa* trees. In present study we screened the above extraction against *Salmonella typhi, Escherichia coli, Staphylococcus aureus* and *Bacillus subtilis* by using agar disc-diffusion assay are shown in table 1-6 respectively and represented by selected photoplates (Plate -1 to Plate -5) which including high antibacterial activity.

A) In our study zone of inhibition of methanolic extraction of leaves of *Azadirachta indica* shows 2.5mm, 3mm, 2.4mm, 3mm antibacterial activity respectively against *Salmonella typhi, Escherichia coli, Staphylococcus aureus* and *Bacillus subtilis* (Table no. 1)

B) Zone of inhibition of methanolic extraction of dry bark of *Azadirachta indica* shows 1mm, 1.5mm, 2mm, and 1.3mm antibacterial activity respectively against *Salmonella typhi, Escherichia coli, Staphylococcus aureus* and *Bacillus subtilis*. (Table no.2)

C) Zone of inhibition of methanolic extraction of wet bark of *Azadirachta indica* shows 3mm, 2mm, 2mm, and 3mm antibacterial activity respectively against *Salmonella typhi, Escherichia coli, Staphylococcus aureus* and *Bacillus subtilis*. (Table no.3)

D) Zone of inhibition of methanolic extraction of leaves of *Annona squamosa* shows 2mm, 1.mm, 1.8mm and 2.5mm antibacterial activity respectively against *Salmonella typhi, Escherichia coli, Staphylococcus aureus* and *Bacillus subtilis*. (Table no.1)

E) Zone of inhibition of methanolic extraction of dry bark of *Annona squamosa* shows 1mm, 3mm, 1mm, and 1mm antibacterial activity respectively against *Salmonella typhi, Escherichia coli, Staphylococcus aureus* and *Bacillus subtilis*. (Table no.2)

F) Zone of inhibition of methanolic extraction of wet bark of *Annona squamosa* shows 2mm, 1.5mm, 3mm, and 1mm antibacterial activity respectively against *Salmonella typhi, Escherichia coli, Staphylococcus aureus* and *Bacillus subtilis*. (Table no.3)

G) Zone of inhibition of ethanolic extraction of leaves of *Azadirachta indica* shows 2.5mm, 2.7mm, 1mm, 2mm antibacterial activity respectively against *Salmonella typhi, Escherichia coli, Staphylococcus aureus* and *Bacillus subtilis*.(Table no.4)

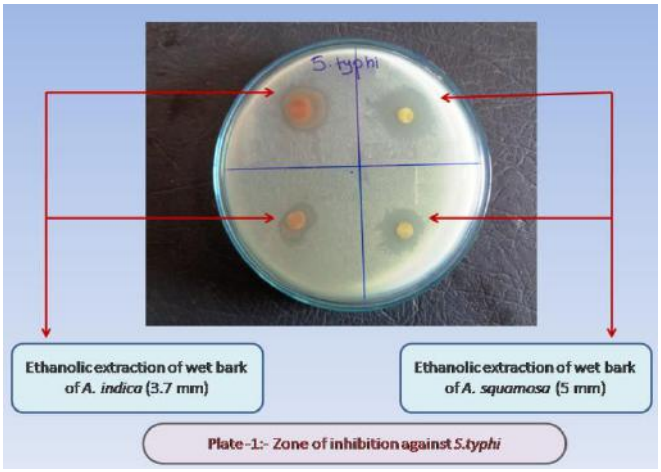
H) Zone of inhibition of ethanolic extraction of dry bark of *Azadirachta indica* shows 3mm, 2mm, 4mm, and 1mm antibacterial activity respectively against *Salmonella typhi, Escherichia coli, Staphylococcus aureus* and *Bacillus subtilis.* (Table no.5)

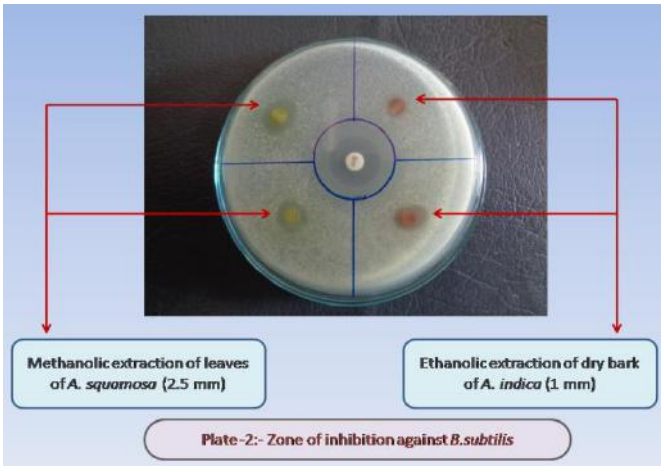
I) Zone of inhibition of ethanolic extraction of wet bark of *Azadirachta indica* shows 3.7mm, 2mm, 3mm, and 2mm antibacterial activity respectively against *Salmonella typhi, Escherichia coli, Staphylococcus aureus* and *Bacillus subtilis*. (Table no.6)

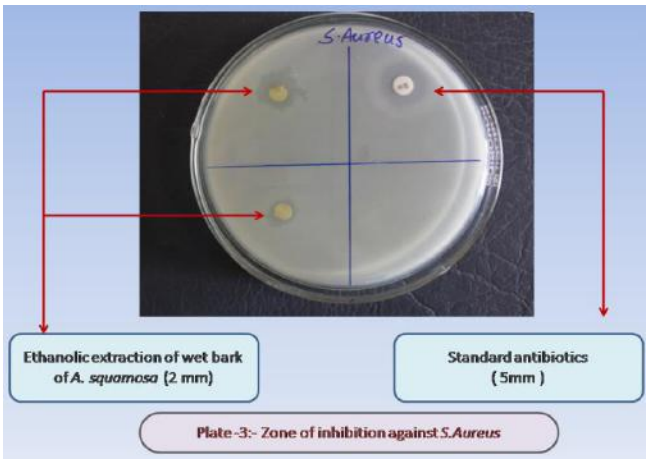
J) Zone of inhibition of ethanolic extraction of leaves of *Annona squamosa* shows 1mm, 2mm, 1mm, and 1.7mm antibacterial activity respectively against *Salmonella typhi, Escherichia coli, Staphylococcus aureus* and *Bacillus subtilis*. (Table no.4)

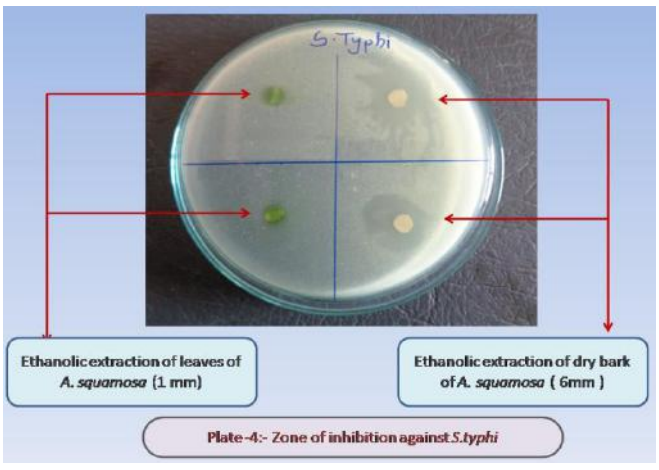
K) Zone of inhibition of ethanolic extraction of dry bark of *Annona squamosa* shows 6mm, 2mm, 1mm, and 2mm antibacterial activity respectively against *Salmonella typhi, Escherichia coli, Staphylococcus aureus* and *Bacillus subtilis*. (Table no.5)

L) Zone of inhibition of ethanolic extraction of wet bark of *Annona squamosa* shows 5mm, 2mm, 2mm, and 1mm antibacterial activity respectively against *Salmonella typhi, Escherichia coli, Staphylococcus aureus* and *Bacillus subtilis*. (Table no.6)









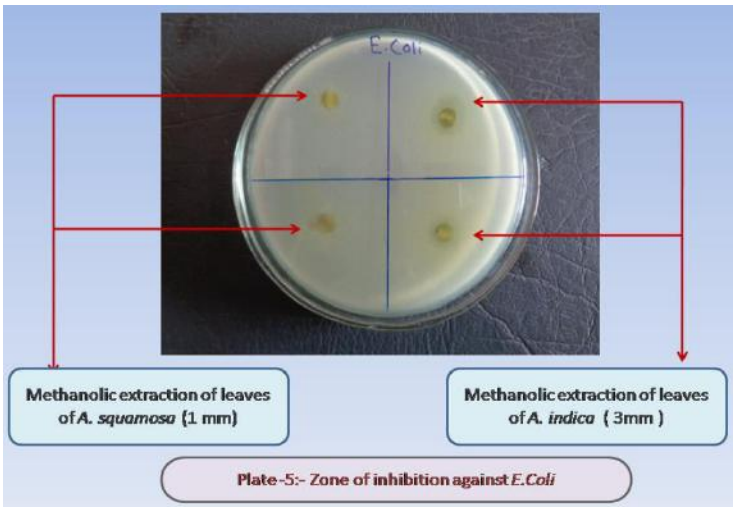


Table 1. Zone of inhibition of methanolic extraction of leaves

BACTERIAL STRAIN	ZONE OF INHIBITION (IN mm)	
	A.indica	*A.Squamosa*
S. typhi	2.5	2
E. coli	3	1
S. aureus	2.4	1.8
B. subtilis	3	2.5

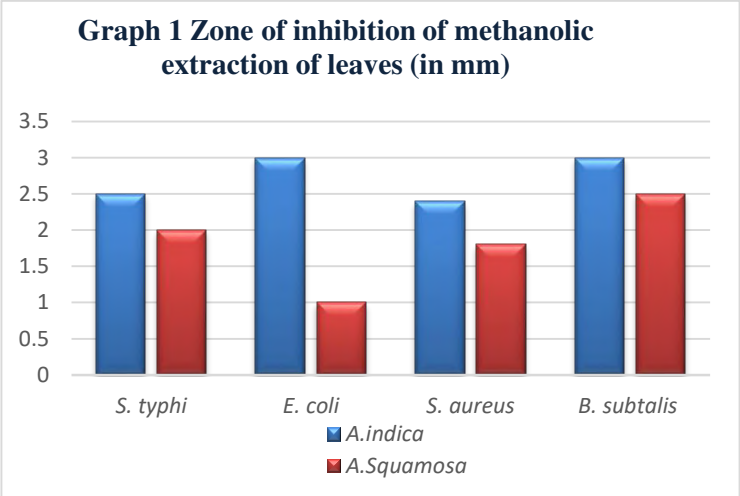


Table 2. Zone of inhibition of methanolic extraction of dry bark

BACTERIAL STRAIN	ZONE OF INHIBITION (IN mm)	
	A.indica	*A.Squamosa*
S. typhi	1	1
E. coli	1.5	3
S. aureus	2	1
B. subtilis	1.3	1

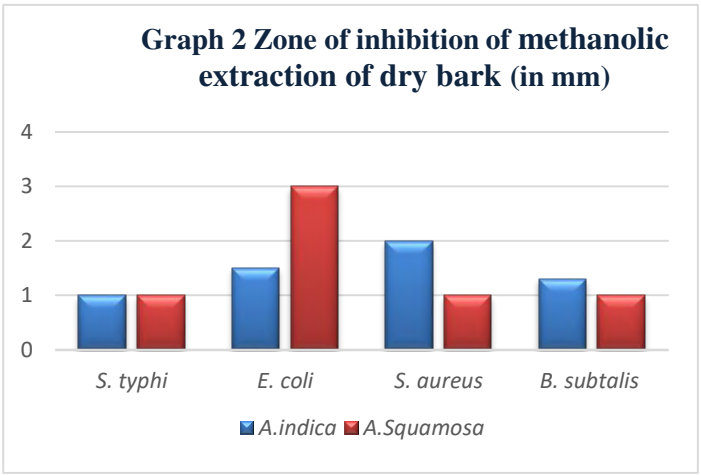


Table 3. Zone of inhibition of methanolic extraction of wet bark

BACTERIAL STRAIN	ZONE OF INHIBITION (IN mm)	
	A.indica	*A.Squamosa*
S. typhi	2.5	1
E. coli	2.7	2
S. aureus	1	1
B. subtilis	2	1.7

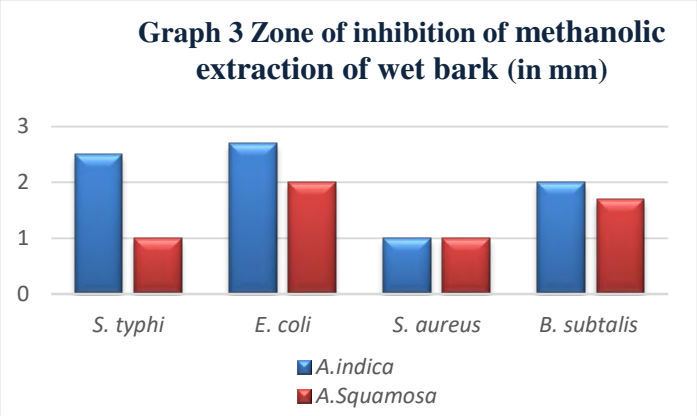


Table 4. Zone of inhibition of ethanolic extraction of leaves

BACTERIAL STRAIN	ZONE OF INHIBITION (IN mm)	
	A.indica	*A.Squamosa*
S. typhi	3	6
E. coli	2	2
S. aureus	4	1
B. subtilis	1	2

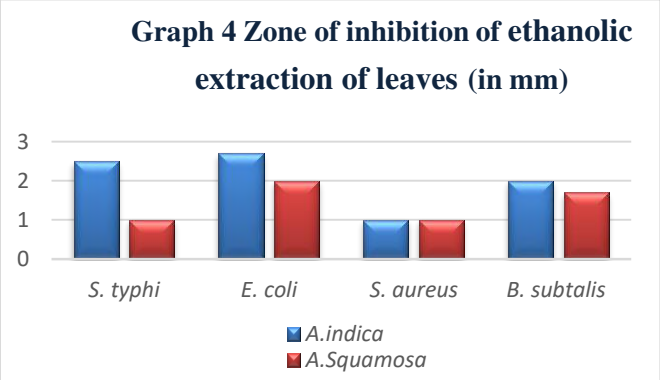


Table 5. Antibacterial activity of ethanolic extraction of dry bark

BACTERIAL STRAIN	ZONE OF INHIBITION (IN mm)	
	A.indica	*A.Squamosa*
S. typhi	3	2
E. coli	2	1.5
S. aureus	2	3
B. subtilis	3	1

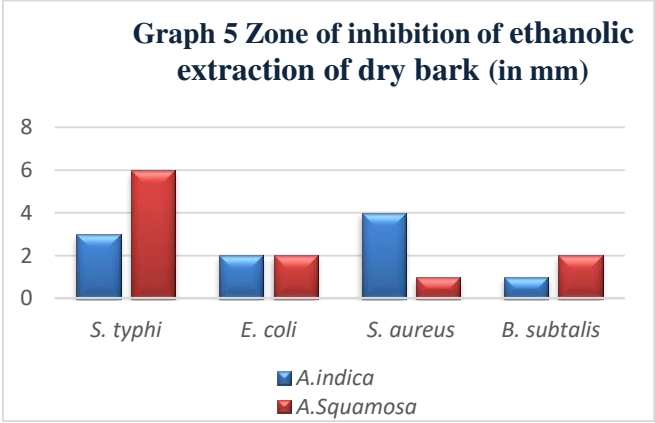
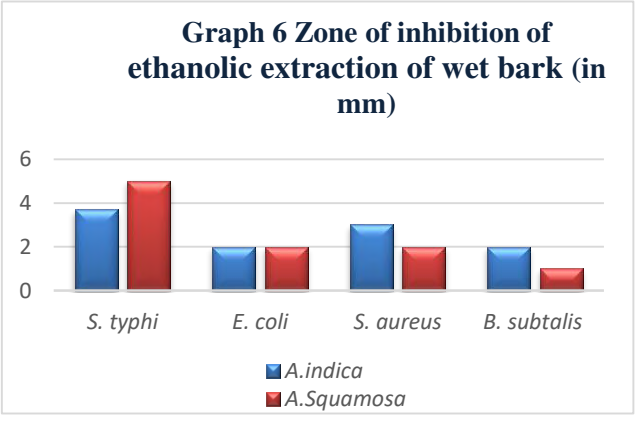


Table 6. Antibacterial activity of ethanolic extraction of wet bark

BACTERIAL STRAIN	ZONE OF INHIBITION (IN mm)	
	A.indica	*A.Squamosa*
S. typhi	3.7	5
E. coli	2	2
S. aureus	3	2
B. subtilis	2	1



5. DISCUSSION:

Azadirachta indica leaves possessed good antibacterial activity, containing the great potential of bioactive compounds and is useful in rationalizing the use of this plant in primary health care (Shraddha jyoti, Subbarao, 2011). In our study not only leaves but also dry and wet bark from methanol and ethanol extraction of *Azadirachta indica* shows antibacterial activity.

Salimuzzaman siddhiqui (1942) identified Nimbidin as the main active antibacterial ingredient which exactly co-related with our study in which neem leaves, dry bark and wet bark also shows antibacterial activity. (Srivastava et al 2000) antibiotic resistance is a major concern and development of new agents from plant could be useful in meeting the demand for new antimicrobial agents which improve safety and efficacy. Hence our study shows same results in which antibacterial activity of *Azadirachta indica* and *Annona squamosa* was observed. Medicinal plants constitute an effective source of both traditional and modern medicines, herbal medicines has been shown to have genuine utility and about 80% of rural population depends on as primary health care Over the years, the WHO advocated that countries should interact with traditional medicines with a view to identity and exploiting aspects that provide safe and effective remedies (WHO global report-2012). We discuss that earlier people from ancient life already known medicinal importance of those plants, hence our study can be helpful to show exact antibacterial activity against different pathogens We studied two types of bark from the same plants but the zone of inhibition ad an antibacterial activity of wet bark and dry bark significantly different that means bioactive compound differ within parts of the same species. This study helps to understand the exact importance of the parts of the plants.

Screening medicinal plants for biologically active compounds offer clues to develop newer antimicrobial agents. These compounds after possible chemical manipulation provide new and improved drugs to treat the in infectious disease.(Natrajan et al. 2003, Shah et al. 2006) In our experiment leaves, dry bark and wet bark of *Azadirachta indica* and *Anmona squamosa* were screened against pathogens hence antibacterial activity is shown, these results can be utilize on a big scale at pharmaceuticals companies.

The present study highlights the possible use of extracts of leaves, dry bark and wet bark of *Azadirachta indica* and *Annona squamosa* as a source of antioxidants and as antibacterial agents that can be used to prevent enteric diseases. Ethanolic extraction of leaves, dry bark and wet bark shows more antibacterial activity as compared to methanolic extraction Dry bark of *Azadirachta indica* and wet bark of *Annona squamosa* from ethanolic extraction shows high antibacterial activity 3mm and 6mm respectively against *S.typhi*

Studies shows that wet bark and dry bark of *Azadirachta indica* were frequently act as antibacterial compound. Leaves of *Annona squamosa* showing less significant antibacterial activity from both extractions against both pathogens.

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Allied Toxicity Properties of Methanolic Extract Of *Eulophia Herbacea* and *Eulophia Ochreata*

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Abstract: *Orchids Eulophia herbacea and Eulophia ochreata have been prooved effective in antibacteri antiprotozoal and anthelmintic activity. Before application in the field its toxicity effect on insects and fishes mu be evaluated, so in the present study the allied toxicity such as insecticidal, repellent and piscicidal evaluation Eulophia herbacea and Eulophia ochreata was executed. Insecticidal and repellent activities were carried o against Tribolium castaneum, while piscicidal activity was conducted on Gambusia spp. Methanolic extract tubers of E. herbacea and E. ochreata (Family Orchidaceae) were used for these investigation. Five differe concentrations of each test plant were taken for these studies. Ten adult red flour beetles (either sex) for ea concentration and ten fishes were exposed to each concentration in triplicates for insecticidal, repellent a piscicidal activity respectively. The test solutions and control were renewed after 48 h in each bioassay. insecticidal activity, Whatmann filter paper dipping method and for repellent activity glassplate method was use In Insecticidal, the mortality was negatively correlated with extract concentration, in piscicidal, mortality vari from 2.5 to 7.5 in case of E. herbacea and is also true for E.ochreata. In repellent activity all treatments at high concentrations were significantly superior over control. Based on results it was found that both the orchids ha no insecticidal, strong repellent and almost negligible piscicidal effect.*

Keywords: *Gambusia, Tribolium castaneum, methanolic, mortality, repellent, Eulophia herbacea, Eulophia ochreata.*

1. INTRODUCTION:

Toxicity is the degree to which a chemical substance or a particular mixture of substances can damage an organism. Toxicity can refer to the effect on a whole organism, such as an animal, bacterium or plant. Because interspecies typically have different levels of response to the same dose of a toxic substance, after proving orchids *Eulophia herbacea* and *Eulophia ochreata* effective in antibacterial, antiprotozoal and anthelmintic activity, the present study is planned to label the test plants as repellent, insecticidal and piscicidal against *Tribolium castaneum* (Red flour beetle) and *Gambusia spp*. respectively.

Synthetic insecticides have been widely developed and are extensively used because of their effectiveness and easy application and storage. However, their extensive use has brought about severe disadvantages, like environmental disturbances, pest recovery, pest resistance, lethal effects on non-target organisms, and toxicity to users and consumers (Prakash and Rao 1997). Evaluating and using botanical pesticides, either as crude or formulated extracts, is an alternative strategy. The root powder of *Dioscorea pentaphylla* and *Eulophia ochreata* is used to cure asthma and acute bronchitis. This extract is also given by the tribal as antidote in snake bite. Tuber powder of *Eulophia ochreata* is also useful to cure leukaemia (Jain et al., 2005a), diarrhoea (Swarnkar and Katewa, 2008). *Eulophia herbacea* and *Eulophia ochreata* are wild sourced plants and very little research is done on it so far. Apparent androgenic as well as oestrogenic property of *Eulophia* species especially *E. ochreata* has been a crucial finding of our study (Patil et. al., 2017). Various *Eulophia* species have often been used in traditional medicines (Patil and Mahajan, 2013) and therefore studied for their allied toxicity.

Insect pest damage to stored grains result into major economic losses caused by insect damage and other bio agents vary from 10-40% (Raja et al., 2001; Papachristos and Stamopoulos, 2002). The extent of stored grain losses differ according to insect species serious economic consequences, thus threatening food security. Darkling beetles (Coleoptera: Tenebrionidae) are a large group of insects comprising more than 10,000 species. Among darkling beetles, *Tribolium spp*., are famous for producing toxic quinines which contaminate flour products (Raja et al., 2001;

Papachristos and Stamopoulos, 2002). Red flour beetle, *Tribolium castaneum* (Herbst) (Coleoptera: Tenebrionidae), reduces the quantity and quality of grain-based products and can be a major pest in stored products. It has been found in a wide range of dried materials of animal and plant origin, especially beans, dried fruits, flour, grains, nuts, peas and spices and even dried museum specimens (Rees, 2007; Caballero-Gallardo et al ., 2011; Khan et al ., 2014). *T. castaneum* causes substantial loss in storage because adult stage of it is very active and breed throughout the year in warm area (Pugazhvendan et al., 2009). They live for two years or more, during which each female produces nearly 1000 eggs (Shukala et al., 2010). The continuous increasing human population created a critical problem of food scarcity. As a measure to tackle the problem of the infestation of stored products by insect pests, exploration of eco-friendly pesticides is necessary because of the side effects of synthetic chemicals such as environmental hazards, pest resistance and toxic effects on non-target organisms. allied toxicity of plants must be studied for their efficiency and efficacy.

Piscicidal plants contain different active ingredients known as alkaloids such as resin, tannins, saponins, nicotine and diosgenin. However, these alkaloids are toxic to fish at high concentrations and wear off within a short time (Singh et al., 2010). A large number of compounds of various classes have insecticidal, piscicidal and molluscicidal properties (Singh and Singh, 2005b; Srivastav et al., 2003; Selvarni and Rajamanickam, 2003). To eliminate the predatory and weed fish in cultured pond is a serious problem for culturing edible freshwater fish. For eliminating the unwanted population of *Gambusia affinis* from cultured ponds, fishfarmers need a better alternative, environmentally safe plant origin piscicides which are less expensive, biodegradable, easily available, easy to handle and safe to mankind and environment (Ambedkar and Muniyan, 2009). To study aquatic toxicity this model is most useful and thereby to evaluate the selected *Eulophia* species for aquatic toxicity is the purpose of this study.

2. MATERIAL AND METHODS:

The tubers of *E. ochreata* and were purchased from local market from Vani (District Nasik) and Manudevi (Taluka Yawal, District Jalgaon. The tubers were identified and authenticated by Dr. V. V. Bhadane. Voucher specimens (PCA/ BOT H.S.1641 and PCA/ BOT H.S. 1642) were deposited at the herbarium of Department of Botany, Pratap College, Amalner. The shade dried tubers of *E. ochreata* were pulverized to form coarse powder and extracted with methanol (65^{o}C) in a Soxhlet extractor. This methanolic extract of *E. ochreata* was screened for its biological activities.

INSECTICIDAL ACTIVITY

Acute toxicity of *E. herbacea* and *E. ochreata* was tested by using dipping method described by De-Petro and De-Petro (1994). Whatmann filter paper No. 1 was dipped into the MEEH and MEEO at various concentrations. Dipping time was maximum 5 seconds and maintained throughout experiment. Excess solution was removed and the paper was dried at 40^{0} in oven for 30 min. For acute toxicity test, each filter paper was placed at the bottom of glass petriplate, 10 adult red flour beetles, *T. castaneum* of 1-2 days old (either sex) released with a normal food and replicated thrice. Insect mortality was observed at 48 h after treatment. Control was run simultaneously in which paper was soaked with DW. The data for per cent mortality is corrected by Abbott's (1987) formula.

EXPERIMENTAL PROTOCOL

i. Size of glass petridish (diameter): 9 cm
ii. Size of Whatmann filter paper: 9 cm
iii. Volume required for soaking of paper: 1ml
iv. Weight of wheat flour: 25 g (Monolayer)
v. Concentrations of MEEH: 20, 40, 60, 80 mg/ml
vi. Concentrations of MEEO: 20, 40, 60, 80 mg/ml
vii. Number of adult red flour beetles released: 10 of either sex
viii. Number of sets: triplicates
ix. Per cent mortality and time of exposure: 48 h after treatment.

All data were expressed as mean ± SE and the ANOVA followed by Bonferroni's Multiple Comparison Test by using Graph Pad software.

REPELLENT ACTIVITY

Repellence experiment was carried out in 80 mm glass petriplate by modifying the method described by Dwivedi and Kumari, (2000). Test solutions were prepared by dissolving different concentrations of MEEH and MEEO in 1 ml methanol. Whatman No. 1 filter paper was cut into two equal halves and each solution was applied to half of the filter paper as uniform as possible by using micro pipette. The other half of the filter paper was treated with methanol alone. The test solution treated and methanol treated halves were dried to evaporate the solvent completely. Treated and untreated halves were attached with cellophane tape and placed in the glass Petri dish. Ten adult flour beetles (4-6 days old) were released at the centre of the filter paper disc and then sealed tightly. Six replicates were set for each concentration. Observation of the number of insects present on both the treated and untreated halves was recorded at 2nd and 4th hrs of experiment setting. For calculation insect were finally counted as repelled and unrepelled.

STATISTICAL ANALYSIS

The experimental data was statistically analyzed by CRD method.

PISCICIDAL ACTIVITY

Piscicidal activity of MEEH and MEEO was evaluated as described by Patole, (2007). Fingerlings of *Gambusia sp*. of either sex (weight 2.07 ± 1.80 gm) were collected from Malaria Department, Jalgaon District, Maharashtra state, India. The fish were acclimatized for one week in a water trough of dimension 0.3 m x 1 m x 0.61 m and were fed twice a day (8.00 h and 15.00 h) with a crude protein prepared pebbled feed at 3% of their body weight. The fishes were not fed for 48 h prior to the exposure period, which lasted for 96 h. Five concentrations of MEEH and MEEO each were prepared and delivered into experimental jars. The eleventh treatment of D.W. only was used as control. Ten fish were exposed to each of the ten concentrations in triplicates. The toxicant solutions and control were renewed after 48 h in each bioassay. Water quality parameters namely temperature and pH were monitored every day by using methods described in APHA/AWWA/WEF (1998). Mortality was recorded every 3 h and dead fish were immediately removed. This experiment is planned to test aquatic toxicity of test plant extract.

3. RESULT:

Results obtained on insecticidal study of MEEH and MEEO against *T. castaneum* is given in **Table 1**. Both the extracts (MEEH and MEEO) were found less effective against
T. castaneum at all concentrations studied.

TABLE-1. Insecticidal studies of MEEH and MEEO against *T. castaneum*

Per cent mortality within 48 h at various concentrations (mg/ml)			
Concentration (mg/ml)	**Control (DW)**	**MEEH**	**MEEO**
20	-	15.00±3.65	10.83±3.07
40	-	28.33±2.1	17.50±2.23
60	-	31.66±2.1	27.50±2.23
80	-	35.83±1.66	31.66±2.3
100	-	39.17±1.66	36.83±2.4

MEEH showed 15.00- 39.17% range of mortality while MEEO showed 10.83-36.83% range. In biological assay 50% activity is considered to be effective, hence at all concentrations of MEEH and MEEO, the mortality was found to be negatively correlated with extract concentrations.

Data concerning repellent activity at 2nd and 4th h of the MEEH and MEEO against *T. castaneum* has been presented in **Table 2**. The repellence of *T. castaneum* increased according to concentration of MEEH and MEEO at 2nd as well as 4th h. At 2nd h, MEEH exhibited maximum (4.16 numbers) repellence of adult beetles and was significantly superior over rest of the treatments and was at par with 0.6% of MEEH at 4th h while, repellence of 0.4% MEEH at 2nd h was at par with 0.2% of MEEH at 4th h.

The average number of adult beetles repelled at 2nd h at various concentrations (0.2, 0.4, 0.6, 0.8 and 1% respectively) of MEEH was 2.83, 3.5, 4.16, 4.50 and 5.16 respectively while, the average number of adult beetles repelled at 4th h at various concentrations (0.2, 0.4, 0.6, 0.8 and 1% respectively) of MEEH was 2.5, 2.83, 3.67, 4.00 and 4.16 respectively.

TABLE-2. Repellant effect of methanolic extract of *E. herbacea* and *E. ochreata* on adults of *T. castaneum*

Time(hr) / (%) Treatment	Avarage number of adults repelled (h)			
	MEEH		**MEEO**	
	2	**4**	**2**	**4**
Control	0.83	1.0	0.83	1.0
0.2	2.50	2.83	2.67	3.16[a]
0.4	2.83	3.50	3.00	3.67[b]
0.6	3.67	4.16[c]	3.67[b]	4.5
0.8	4.00	4.50	4.33	4.83
1	4.16*	5.67**	4.50*	5.83**
Mean±SE	3.43±0.97	3.93±1.036	3.83±1.043	4.2±1.097

***p**p<0.05; **p<0.01 as compared to control

Almost similar trend was recorded at 4th h of treatment. MEEO at 0.2% repelled 2.67 and 3.16 adult red flour beetles at 2nd and 4th h respectively. The repellence of red flour beetles at 0.4, 0.6, 0.8 and 1% of MEEO at 2nd h was 3.00, 3.67, 4.33 and 4.5 respectively. Whereas, the repellence in MEEO at 4th h was 3.67, 4.5 and 4.83 at 0.4, 0.6 and

0.8% respectively. The repellence in MEEO at 0.8% was at par with 1% of MEEO and was the maximum repellence among all. All the treatments at higher concentration were significantly ($p<0.05$ and $p<0.01$ at 2nd and 4th h respectively) superior over the control.

TABLE-3. Piscicidal activity of the MEEH and MEEO of *Eulophia* species in fish *Gambusia sp.*

	Conc. (mg/lit)	Log Conc. (mg/lit)	Mortality %
Control	-----	-----	-----
Standard (Saponin)	10	1.00	96
MEEH	20	1.3010	2.5±1.61
	40	1.6021	4.17±1.52
	60	1.7782	5.17±0.87
	80	1.9031	6.33±1.17
	100	2.0000	7.5±0.43
MEEO	20	1.3010	1.33±0.67
	40	1.6021	2.33±1.2
	60	1.7782	3.97±2.22
	80	1.9031	5.83±1.54
	100	2.0000	7.13±0.71

The water quality parameters in each treatment during the exposure period were recorded. Mean temperature varied from 25.0^{0}C to 31.0^{0}C and pH ranged from 6.6 to 7.2 for all concentrations.

In all cases mortality is less than 50%. Eventually on normal dose from 50 to 100 mg/L. The mortality varies from 2.5 to 7.5 in case of MEEH. What we have seen in MEEH is also true for MEEO. For example we consider effectiveness of plant if the activity is more than 50% which is 96 % in case of standard (**Table 3**). The MEEH and MEEO both have almost negligible piscicidal activity (<8%).

4. DISCUSSION:

In the present study, the MEEH and MEEO have proved ineffective to arrest the *T. castaneum* damage in stored grains. MEEH and MEEO have not shown insecticidal effect against *T castaneum*, may be due to presence of steroids or absence of alkaloids.

Most plants contain compounds that they use in preventing attack from phytophagous (plant eating) insects. These chemicals fall into several categories, including repellents, feeding deterrents, toxins, and growth regulators. Insects detect odours when that volatile odour binds to odorant receptor (OR) proteins that are exposed to the external environment, often on the antennae and maxillary palps of the insect (Maia and Moore, 2011).

In our study, the strongest repellency effect of MEEO and MEEH against *T. castaneum* shows similar effect as the powder extract of *Curcuma longa*, the oils of *Cinnamomum zeylanicum* (96.2%) and *Azadirachta indica* (89.4%), protein -enriched bean flour (91.2% repellency of 1% of extract) against three stored product pests including *Sitophilus granarius* and *Sitophilus oryzae* (Viglianco et al., 2008).

The MEEH and MEEO both have poor piscicidal activity. The best interesting part to be noted is that, saponins have always been toxic to cold-blooded creatures like snake and/or fish. Saponin is not present in the studied plant extracts. It is well established fact that saponin induce stupefying activity and ultimately cause death in fish (Bradley, 1956; Cannon et al., 2004; Patole and Mahajan, 2004). In some monocotyledonous and dicotyledonous plants the saponin obtained is of steroidal type. This may be true for the test plants, as very high percentage of β-sitosterol is reported (79.7% in MEEH and 94.6%in MEEO) in them. The saponins may also interact with steroidal receptors in the target tissues. As a result, this has added to the commercial interest for the synthesis of contraceptive hormones like medicine from saponin and is probably satisfied the answer for safeness in aquatic animals.

5. CONCLUSION:

Methanolic extract of E. herbacea and E. ochreata are devoid of insecticidal activity but having strong repellence activity. E. ochreata is best repellent than E. herbacea. Both have poor piscicidal activity. Many more experiments on anabolic /probiotic activity of *Eulophia* species on fishes are yet to be carried out. A huge scope for the researcher to reveal the mystery of these medicinal orchids.

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Effect of Integrated Doses of Nitrogen Fertilizer and Bio Fertilizer On Yield Potential of Fodder Crop Sorghum (Cv. Ruchira)

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Abstract: *Use of inorganic fertilizer has become essential part of the crop production and a balance form of fertilizer use is always a prerequisite to obtain the higher yield. However, these fertilizers are costly and also pollute the environment through the process of denitrification and volatilization and soil water through leaching wherein only 50 percent of available nitrogen is being used and rest 50 percent goes as waste and is an environmental hazzard. Hence, a strategy for integrated nutrient supply is evolved by using judicious combination of chemical fertilizer, organic manure and biofertilizers (Panwar, et al 2001). Therefore a combine effect of chemical fertilizer along with biofertilizer on percentage increase in yield of fodder crop sorghum (cv.Ruchira) and saving of nitrogenous fertilizer due to the use of biofertilizer was studied under present investigation.*

Key Words: *Nitrogen fertilizer, Biofertilizer, Yield potential , Sorghum , Integrated dose.*

1. INTRODUCTION:

Fertilizer used to supply N, P and K play crucial role in plant production. Proper soil and crop husbandry linked up with input of chemical fertilizer is a common practice to push up and stabilize yield of crop plants (Wasnik, 1992 and Umesha and Purushottam, 1996 Singh et al., 1998).

In recent time fertilizers are responsible for 50 percent increase in crop yield. Due to progressive intensification of agriculture and production of high yielding varieties fertilizer consumption has increased very much accounting to 23.6 metric tonnes of nutrients every year through crop removal. Over use in certain potential areas and suboptimum use in large areas are crucial issues; and indiscriminate use of chemical fertilizer is creating lots of problems essentially soil degradation and pollution. Therefore emphasis should be to reduce the use of inorganic fertilizers and to improve fertilizers use efficiency. Hence, come the integrated concept of nutrient supply, where efficient use of chemical organic and biological source is practiced (Surekha and Rao 1995). Use of inorganic fertilizers has become esential part of the crop production and a balance form of fertilizer use is always a prerequisite to obtain higher yield. However, these fertilizers are costly and also pollute the environment, hence a strategy for integrated nutrient supply is evolved by using judicious combination of chemical fertilizer, organic manure and biofertilizer (Panwar et al 2001). A combine effect of chemical fertilizer along with biofertilizer was studied by several workers (Mohan and Pradhan 2001, Gautam and Pant 2002, Mahajan et al 2002). Hence attempts were made during present study to observe the effect of integrated fertilizer dose (nitrogenous fertilizer along with biofertilizers) on productivity of forage crops sorghum (cv. Ruchira). This study also includes investigation on percentage increase in the yield of fodder crop and saving of nitrogenous fertilizer due to the use of biofertilizer.

2. MATERIALS AND METHODS:

During present investigation, the fodder crop Sorghum (cv. Ruchira) recommended by Mahatma Phule Krushi Vidyapith Rahuri, Maharashtra was selected for treatment with integrated dose of nitrogenous fertilizer and biofertilizers. The fodder crop was cultivated at Maharashtra Sheli va Mendhi Vikas Prakshetra Bilakhed Chalisgaon (MS) during summer season in 2000-2001. The soil was analysed by government soil analyzing laboratory, Jalgaon (2000) of its nutrient content before sowing. The soil was poor in phosphorous, moderate in nitrogen and potash with a normal pH 7.8.

A piece of land measuring about 360 sq. m. (15m x 24m) was prepared by plougging and cross ploughing while preparing the land compost prepared on farm was added at the rate 3000 kg/ ha. The land was then divided into 24 plots each with an area of 15 sq m for sowing the crop. The plots were arranged in randomized block design. The crop sown

in rows by hand. Each plot bearing 10 rows spaced 30.5 cm apart. All crops were raised under irrigated condition. The seed rates were used as per the recommendations. Nitrogenous fertilizer was used in the form of urea while biofertilizer Azospirillum.

Crop received eight fertilizers treatment through urea and biofertilizers alone or in combination were N0, N30, N60, N90 N120 i.e. 0,30,60,90,120 kg/ha BF (biofertilizer alone), Bf + N30 and Bf+N60 kg/ha. The plot which did not receive fertilizer was treated as control plot. The biofertilizers were used at a rate of 2 kg./ha fifty percent of the dose of fertilizer nitrogen was applied as basal dose and remaining half after a month of crop growth, while biofertilizer (Bf) were applied directly to the seeds at a rate of 2 kg/ha the crop were cultivated under irrigated condition and the use of insecticide and pesticide were evolved.

The crops were harvested from three replica every time at preforming stage from the net size of plot harvested was 13.72 m2. The weight of the green fodder obtained from each plot was measured and the samples of green fodder were immediately brought to the laboratory for analysis. The sample were chopped into 2 to 3cm pieces and dried in an electric oven at 75± 5^0c till constant weight for dry matter (DM) determination. Dried sample were ground to a fine powder and are used for estimation of crude protein (CP). Nitrogen (N) content was determined in duplicate by Microkjeldahl method (Bailey, 1967). The value of crude protein (CP) was expressed as N x 6.25.

3. RESULT AND DISCUSSION:

Ruchira variety of sorghum which was cultivated during this yield trial grew luxuriously with abundant foliage fertilizer nitrogen (N) application produced succulents in plants with lushness in the foliage. Azospirillum was used as a biofertilizer and as a source of nitrogen was used during present study to test its efficacy when applied alone and in combination with nitrogenous fertilizer (Urea) so as to harvest maximum green fodder over control. Application of azospirillum promote root growth and nitrogen fixation in soil which helps in increasing fodder yield. (Tomar and Agrawal 1993).

The precent dry matter in foliage was 23.4% on plants which received 30 kg N/ha. It decreased to 21.7% due to the application of 120 kg N/ha. Maximum percent dry matter (23.7%) was observed when the crop received in N30+Bf combination. Application of fertilizer nitrogen alone and in combination of biofertilizer (Bf) increased N content in foliage from 1.72% on control plots receiving no fertilizer to 2.52 on plots which received maximum fertilizer nitrogen (120 kg/ha) and 2.27% on plots which received integrated doses of N60+ Bf (Table 2).

Table 2 also gives the yield of green fodder, dry matter and crude protein under the influence integrated fertilizer dose treatments. Application of nitrogen significantly increased the yields. On control plots the crop yielded 35055, 9434 and 1142 kg/ha Gf, DM and CP respectively. The yields gradually increased with application of fertilizer N and reached to as high as 68346, 17357 and 2986 kg/ha respectively. Application of biofertilizer alone yielded 39238, 10874 and 1393 kg/ha GF, DM and CP respectively while it gradually increased in combination with fertilizer nitrogen to 54780, 14883 and 2325 kg/ha respectively. This was also evident from value of 'F' given in table 2. Increase in forage production of maize and *Sorghum* due to the application of two biofertilizers i.e. Azotobactor and Azospirillum along with different levels of nitrogen was observed by Singh et al (1989) and Sadhu et al (1991).

Table 3 gives an account of the effect of integrated dose on percent increase in yield over control and over respective nitrogen level. It was found that minimum 13 percent increase in yield over control was recorded from plots which was provided biofertilizer alone and maximum 86 percent increase in yield over control in plots of which received 120 kg/ha nitrogen fertilizer. The results are comparable to those reported by Biswas, et al (2001). The results in percent increase in the yield over respective nitrogen level accounted to 13 percent for the biofertilizer (Bf) plots and maximum 26 percent in the plots provided N60 + Bf fertilizer dose. The above results indicate that the green fodder yield obtained at 90 kg/N/ha (55320 kg/ha) was at par with that recorded with integrated dose N 60 + Bf (54780 kg/ha). Thus saving of 30 kg/ha of fertilizer nitrogen could be achieved through the use of biofertilizer. This fact supported the findings by Dalavi et al (1993) and Kalaghatagi et al (1996).

Table 1.Details Of The Cultivation Practices And Harvesting Of Fodder Crop Sorghum (Cv. Ruchira) During 2002-2003

Crop	Cultivar	Duration	Seed rate (Kg/ha)	No of harvest	Fertilizer treatment (kg/ha)
Sorghum	Ruchira	20 jan. 2003 to 10 april 2003	70	1 cut	N0, N30, N60,N90, N120, Bf, N30+Bf, N60+Bf.

Table 2. Effect Of Integrated Fertilizer Dose On The Yields Of Green Fodder, Dry Matter And Crude Protein From Sorghum (Cv. Ruchira) Duration 20 Jan. 2003 to 10 April 2003

Date of Harvest	Type of cut and age of the crop (in days)	Fertilizer treatment (Kg/ha)	Green Fodder		Yield (Kg/ha)		
			% DM	N% of DM	Green fodder	Dry matter	Crude protein
10 April 2003	1 cut (80)	N0	22,8	1.72	35055	9434	1142
		N30	23.4	1.78	40360	11529	1437
		N60	22.4	1.93	42513	11581	1558
		N90	22.0	2.14	55320	14457	2137
		N120	21.7	2.52	68346	17357	2986
		Bf	22.6	1.83	39238	10874	1393
		N30+Bf	23.7	2.04	47824	13590	1922
		N60+Bf	22.9	2.27	54780	14883	2325
C.D.(P= 0.05)					1422	1690	193
F value	Replicate				NS	NS	NS
	Treatment				565.34*	17.90**	69.82**

*Significant ** Highly significant NS – non significant

Table 3 Effect Of Integrated Fertilizer Doses On Yields From Sorghum (Ruchira)

Treatment	Green fodder yield (kg/ha)	% increase in yield		Dry matter yield (kg/ha)	Crude protein yield (kg/ha)
		Over control	Over respective N level		
N0	35055	-	-	9434	1142
N30	40360	16	-	11529	1437
N60	42513	21	-	11581	1558
N90	55320	53	-	14457	2137
N120	68346	86	-	17357	2986
Bf	39238	13	13	10874	1393
N30 + Bf	47824	34	14	13590	1922
N60 + Bf	54780	52	26	14883	2325

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Assessment of Thiamethoxam induced toxic effect on glycogen content of the freshwater bivalve, *Lamellidens marginalis* (Lamarck)

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Abstract*: Pesticides due their environmental persistence cause pollution of aquatic bodies. They also have the tendency to bioaccumulate into aquatic organisms and lead to an adverse effect on them by changing their physiological as well as biochemical processes. The present investigation was carried out to study the alterations in the glycogen content in different body parts i.e. gills, gonads, digestive glands, foot, and mantle tissues of the freshwater bivalve, Lamellidens marginalis after chronic exposure to the Thiamethoxam.*

The obtained results clearly revealed decreased glycogen content in all the tissues of bivalves after chronic exposure as compared to the bivalves maintained as control. The highest depletion in glycogen content recorded in the gill tissue as compared to the gonads, digestive glands, foot, and mantle in bivalves exposed to the pesticide. The substantial decline in the glycogen contents in the gill tissue might be due to greater glycolytic activity to meet the enhanced energy demands in pesticide treated animals. Thus, alterations in glycogen content can be used as biomarker of thiamethoxam induced stress in the freshwater bivalve L. marginalis.

Key words: *Thiamethoxam, Lamellidens marginalis, chronic, gills.*

1. INTRODUCTION:

Pesticides such as herbicides, insecticides, fungicides etc. used in agricultural practices are entered into the aquatic ecosystemsthrough surface runoff from treated areas significantly contributing to water pollution. Pesticides became one of the main stressors in aquatic ecosystems due to their widespread use in agriculture for pest control (Pathiratne and Kroon, 2016). They are persistent and pervasive in aquatic environments and contaminate both surface water and groundwater (Rodrigues et al., 2018). Majority of the pesticides have prone to bioaccumulate in tissues of aquatic animals over a period of time and may adversely affect the life of aquatic biota (Davoodi and Gholamreza, 2012). Pesticides are not highly selective but are generally toxic to many macrophytes as they enter in non-target organisms (Ayoola, 2008; Franklin *et al.,* 2010) like bivalves via food chain and increased toxicity risk by interfering with the normal metabolism and threatening the ecological balance and biodiversity of the nature. Thus, the assessment of effects on such organisms is very difficult.

Bivalves are suspension feeders, have sedentary lifestyle, long life span and resistance to stress, distributed in a variety of habitats also play an important role in the ecosystem equilibrium and are an important link in the aquatic food chain. As they are filter feeding organisms and therefore, may be exposed to large amounts of chemical pollutants (Marigómez et al., 2013). Freshwater bivalves have also proved their role to be useful as bio-indicators for pollution monitoring studies (Waykar and Shinde, 2011).They are known to accumulate a significant amount of pesticides (Jadhav, 1993)in their tissues which causes adverse effects on them thus they are at the greatest risk(Chmist et al., 2019).

The biochemical changes occurring in the body of the organism gives first indication of stress. In non-target organisms such as bivalves biochemical composition has been employed as biomarker in several studies throughout the world that aimed to assess their health and to evaluate the impact of anthropogenic activities on the environment (Nahrgang et al., 2013). Thus, biochemical evaluation of bivalve is needed to indicate the effect of the toxicants on the condition of the cell and its content.

Alterations in the glycogen content were studied by several researchers in various molluscsafter exposure to different pollutants.Nagpure and Zambare (2003) have studied alterations in the glycogen level of various tissues of freshwater Bivalve, *Parreysia cylindrica* when exposed to tetracycline and chloramphenicol. Mahajan and Zambare

(2003a) studied the effect of caffeine on mercury induced alterations in the glycogen contents of freshwater gastropod snail, *Bellamya bengalensis* (Lamarck). Singh and Gupta, (2007) evaluated the acute and chronic effects of cotton azodyes on two important carbohydrate constituents (glycogen and glucose levels) of the foot, mantle, and hepatopancreas of the freshwater snail, *Pila globosa*.

In the perspective of the present study, *Lamellidens marginalis* was selected as an experimental organism as it is known to accumulate substantial amounts of contaminants because of its sedentary lifestyle and long life span. In the present work we focused to determine the effect of toxicity of the individual pesticide thiamethoxam on the glycogen contents at the different tissue level of the freshwater bivalve, *L. marginalis* after chronic exposure.

2. MATERIALS AND METHODS:

The bivalves, *L. marginalis* were collected from the Hatnur dam situated on Tapi River near Hatnur nearly 35 kms away from Bhusawal, (MS) India. The bivalves were acclimatized to laboratory conditions for 5-6 days prior to subjecting them to experiments. Only healthy and active bivalves were chosen for experiments. Bivalves were divided into two groups (I) Control and (II) Experimental. The control group was treated without pollutants. The experimental group was exposed to chronic concentration of Thiamethoxam (2.579 ppm) for 7 and 14 and 21 days. $LC_{50/10}$ values of 96 hours were used for chronic exposure to Thiamethoxam. The bivalves were dissected and their tissues like gill, gonads, digestive glands, foot, and mantle were excised. All tissues were dried at 80^0C in an oven till constant weight was obtained. The dried powders of different tissues of control and experimental animals were used for estimation of glycogen. Total glycogen was estimated by using the Anthrone reagent method given by De zwaan and Zandee (1972).

3. RESULTS AND OBSERVATIONS:

Table 1: Glycogen contents in different tissues of the freshwater bivalve, *L. marginalis* after chronic exposure to Thiamethoxam (values are in mg/100mg dry weight).

Sr. No.	Tissue	Control			Thiamethoxam (2.579 ppm)		
		7 days	14 days	21 days	7 days	14 days	21 days
1	Gills	7.72±0.89	7.29±0.42	6.88±0.46	6.23±0.29** (-19.23)	5.21±0.22** (-28.55)	4.62±0.40** (-32.85)
2	Gonads	15.49±0.35	14.85±0.53	13.66±0.99	13.41±0.95* (-13.43)	11.26±0.01** (-24.16)	9.85±0.33** (-27.84)
3	Digestive gland	10.58±0.97	9.45±0.65	8.65±0.52	9.24±0.21^{NS} (-12.67)	8.11±0.45** (-14.18)	6.25±0.46** (-27.74)
4	Foot	8.56±0.57	8.42±0.94	8.02±0.67	7.2±0.41** (-15.89)	6.45±0.34* (-23.40)	5.46±0.43** (-31.55)
5	Mantle	12.47±1.06	11.45±1.45	10.26±1.06	10.15±1.11** (-18.61)	9.64±0.46* (-15.81)	8.13±1.46* (-20.75)

1. Values are expressed as mg/100 mg of dry weight.
2. ± indicates S. D. of three observations.
3. NS = Non significant, * = P < 0.05, ** = P < 0.01
4. (+) / (-) indicate % variation over control.

The alterations in glycogen content recorded during the present study in different soft tissues of the freshwater bivalve, *L. marginalis* after exposed to chronic concentrations of thiamethoxam is given in table 1. In the Present study the glycogen content was depleted in the studied tissues of the in treated animals when compared with control. The results indicated that, in almost all the tissues gills, foot, gonads, digestive glands, and mantle were affected by thiamethoxam at chronic exposures. It has been also observed that, severity of depletion in glycogen contents was more prominent as the period of exposure increased.

4. DISCUSSION:

The pollutants act as one kind of stress on an organism and organisms respond to it by developing necessary potential to counteract that stress. In aquatic organisms, the pollutants percolate up to the cellular level through the cell membrane and interact with the cellular macro molecules to inhibit the essential cellular metabolism (Siroka and Drastihova, 2004). The biochemical constituents of the tissues like the foot, digestive gland and mantle are of vital and metabolic importance and any stress on the animal is depicted by the changes in the constituent in the tissues. An

organism needs sufficient energy during stress which is supplied from reserve material i.e. Protein, lipid, glycogen etc. If stress is mild, the stored glycogen is used as a source of energy. Since, the stress conditions caused alteration in metabolic cycles, it is necessary to understand the significance of these variations in the organic components of tissue.

Glycogen is a water-soluble polysaccharide and the main form of energy storage in the animal bodies along with body fat. It is also considered to be the immediate source of energy for animals to adapt to the environmental conditions (Kharat *et al.,* 2009). The stress condition depletes the glycogen depots for the energy purpose.

The mode of action of pollutant may be responsible for cellular disorganization affecting the storage and metabolism of the glycogen. Pesticides are known to inhibit energy production by suppressing aerobic oxidation of carbohydrates leading to energy crisis in animals (Kohli et al., 1975). Thus, the observed decrease in glycogen content in pesticide treated animals indicates the greater utilization of stored glycogen possibly through anaerobic glycolysis or hexose monophosphate pathway to meet the extra energy requirement under hypoxia or to combat with the stress caused by pesticide (Tendulkar and Kulkarni, 2012; Pandit and Mundhe, 2013).

Satyaparmeshwar et al., (2006) observed decrease in carbohydrate metabolism in freshwater mussel, *L.marginalis* exposed to copper sulphates and observed decrease in carbohydrate content level in labial palp, gill and mantle. Kulkarni *et al.,* (2010) studied the effect of acute toxicity of imidacloprid on glycogen metabolism in estuarine clam, *Katelysia optima* (Gmelin) and observed decreasein glycogen content in various tissues as compared to control. Significant depletion in glycogen content of freshwater bivalve, *L. marginalis* after acute & chronic treatment with mercuric chloride was recorded by Sonawane and Sonawane (2019). Shaikh (2019) reported depletion in glycogen content in different body parts i.e. Mantle, gill, gonad, hepatopancreas, siphon, foot, anterior adductor muscle and posterior adductor muscle of freshwater bivalve molluscs *Lamellidens marginalis* after exposed to lethal concentrations of cadmium chloride.

5. CONCLUSION:

The results obtained in the present study revealed that, the pesticide thiamethoxam induced toxic responses by altering the levels of glycogen content in different soft tissues of freshwater bivalve, *Lamellidens marginalis* after chronic exposure. This proves that, this species can be used as bio-indicator organisms for the estimation of the effects of agricultural pollution in freshwater ecosystem. In addition, gill which is in direct contact with thiamethoxam appeared to be the most sensitive tissue.

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Statistical Analysis Of The Zooplankton Biodiversity In Baangaon Lake, Chalisgaon (M.S.) India

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Abstract: *The present paper deals with the statistical analysis of zooplankton composition, biodiversity population and their seasonal fluctuation of the fish rearing Lake, which is situated near Baangaon village at Chalisgaon, tehsil in dist Jalgaon M. S. India.The current analytical study shows that miscellany information about zooplankton abundance in the biological environment of the Baangaon lake. The species biodiversity of zooplankton was calculated as per the formula which is given by Shannon and Wiener (1949) and Odum (1971).*

Keywords: *Zooplankton, fish rearing lake, species diversity and Shannon,-wiener species diversity index.*

1. INTRODUCTION:

Fresh water zooplankton is an important organism in water ecosystem they play a significant role in food chain which is predominantly consumed by fishes and other higher organisms therefore Biodiversity of zooplankton is essential to keep any water ecosystem healthy because each zooplankton species play an important key role in recycling in nutrient's food for another and maintaining soil fertility in the ecosystem and some species may allow natural ecosystem to functional a healthy manner (Jeelani *et .,al* 2007). Zooplankton density has also been reported to vary depending on the availability of nutrients and stability of water (Redmond 2008). The diversity and density of zooplankton depends upon the nutrient condition of water body, abiotic factors, dissolved oxygen food chain, soil-water chemistry and stated that to monitor the aquatic ecosystems and integrity of water the zooplankton has been used as bio indicators (Dhembare, 2011). Zooplankton species have sensibility to environmental changes and impact leading to shifts in composition and diversity of the communities associated to increases biodiversity with high potential to endemism (Caroni and Irvine 2010,). The zooplankton inhabiting a freshwater responds quickly to environmental changes and hence their species indices fluctuate Chattopadhyay (2007).Hence, there is need to evaluate the species diversity indices which is lacking. However, present investigation is made an attempt to evaluate the species diversity indices in zooplankton species, inhabiting in the given lake, with particular focus on the seasonal and spatial difference Zooplankton composition and abundance of zooplankton population it will provide a basis for sustainable development of fisheries resources and water quality, no systematic work has been carried out regarding potential of zooplankton in Baangaon lake area of Chalisgaon

2. MATERIALS AND METHODS:

During the study period monthly samples of zooplanktons were collected from different sides of lake at Baangaon town in Chalisgaon tehsil M.S. India during the year 2019 to 2020 and samples were analyzed as per standard methods of Adoni (1985), and (APHA 1988) Zooplankton species were identified by drop count Methods. Species diversity of zooplanktons was calculated with the help of formula which is given by Shannon and Wiener (1949) and Odum (1971).

Formula of Shannon – Wiener Species diversity index:

This index was proposed by Shannon and Wiener in (1949) as measure of content of code this index serves as a statistical measure of the probability of guessing identity of an individual taken from a sample at random
As per the Formula given by Shannon. And Wiener (1949).

$H = - \sum (ni/N) \text{ Log } (ni/N)$ or $H = \sum (Pi/P) \text{ Log } (Pi/P)$

Where

H = Shannon's – Wiener index of species diversity in individual.

ni = Numbers of individuals of each species.

N = Total numbers of individuals.
Pi = Importance probability for each species. (ni/N)

3. RESULT AND DISCUSSION:

During the study period seasonal quantitative and qualitative fluctuations of Baangaon lake fauna were observed shown in Table 2 the higher number of zooplanktons were found and reported during monsoon and summer while lower zooplankton biodiversity were observed in winter season as compare to both seasons. In the present study.16 species of Rotifera 5 species of Cladocera 7 species of copepod and only 2 species of ostracod were observed, which is shown in Table 1. Present study reveals that Rotifera species are dominantated among the all zooplanktons.

In the present study species diversity index value ranged between (-3.081), in Monsoon, **(-**2.3) in winters and (-2.152) in summers respectively, during the study period. The biodiversity of Zooplankton was recorded higher during monsoon and summer while nearest value in winter season which is shown in Table 2**.** Similarly several researchers also observed and reported the season wise zooplankton analysis; number of population was highest during summer, followed by monsoon and lowest during winter Pawar (2016). Higher Zooplankton biodiversity was observed during summer followed by monsoon and lowest in winter. Abundance has been earlier reported in summer in thigra Gwalior M. P. Dushyantkumar Sharma and R.P. Shingh (2012). Kakulte and Bhavare (2018), seasion wise zooplankton analysis showed an average abundance of species in winter seasion, lower in monsoon and maximum in occueence in summer season due to different environment condition of aquatic ecosystem. Anita *et al.,* (2019) reported rotifer was the dominant group throught the study period among the group of Zooplankton from Nagaral dam.

4. CONCULUSION:

In this study it can be concluded that Rotifera community are most dominant throughout the study period than other copepod, Cladocera and ostracod. The study of zooplankton diversity index clearly shows high zooplankton diversity in Baangaon Lake and indicates that this water ecosystem neither highly polluted nor highly non polluted. The biodiversity index creates a good signal about the good health of aquatic environment. But recent information contributed by this study will be highly significant and useful in order to create general awareness in the people to prevent further water pollution and to improve the fish culture, rearing activity and other use of such valuable water lake in feature.

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TABLE -1 Seasonal variation in biodiversity and number zooplankton for each species as organism /liter (ni), n/N Value and log ni/N value of zooplankton in Baangaon fish culture lake of Chalisgaon tehsil

Sr. no.	Zooplankton species	Monsoon	Monsoon	Monsoon	Winter	Winter	Winter	Summer	Summer	Summer
		(ni)	**(ni/N)**	**Log ni/N**	**(ni)**	**(ni/N)**	**Log ni/N**	**(ni)**	**(ni/N)**	**Log ni/N**
	Rotifers									
1	*Brachionus forficula*	6	0.01	-2	41	0.2	-1.609	82	0.18	-744
2	*Brachionuscalyciforus*	42	0.10	-1	35	0.18	-0.744	76	0.16	-0.795
3	*B. quadridentatus*	38	0.09	-1.04	33	0.17	-0.769	0	0	0
4	*B.caudatus*	25	0.6	-0.221	10	0.05	-1.301	0	0	0
5	*B.kostei*	28	0.07	-1.154	1	0.005	-2.301	03	0.00	0
6	*B.rubens*	35	0.08	-1.096	0	0	0	10	0.02	-1.698
7	*Asplancha brightwelli*	10	0.02	-1.698	2	0.01	-2	153	0.33	-0.481
8	*A.priodonta*	19	0.04	-1.397	5	0.02	-1.698	0	0	0
9	*Filinia longiseta*	45	0.11	-0.958	9	0.04	-1.397	0	0	0
10	*Keratalla tropica*	42	0.10	-1	20	0.10	-1	0	0	0
11	*K. cochlearis*	37	0.09	-1.045	12	0.06	-1	0	0	0
12	*Euchanis oropa*	16	0.04	-1.397	02	0.01	-2	1	0.00	0
13	*Horaella*	08	0.02	-1.698	0	0	0	126	0.27	-0.568
14	*Lepadella*	31	0.07	-1.154	15	0.07	-1.154	0	0	0
15	*Monostyla*	05	0.01	-2	0	0	0	0	0	0
16	*Lecane*	12	0.03	-1.522	06	0.03	-1.522	2	0.00	0
	Total	**399**			**191**			**453**		
	Cladocera									
1	*Macrothrix laticornis*	125	0.30	-0.522	2	0.04	-1.397	1	0.33	-0.481
2	*Daphina pulex*	78	0.19	-0.721	38	0.86	-0.065	0	0	0
3	*Rotaria*	81	0.19	-0.721	0	0	0	0	0	0
4	*Moina brachiate*	45	0.11	-0.958	1	0.02	-1.698	0	0	0
5	*Moinodmacropa*	80	0.19	-0.721	3	0.06	-1.221	2	0.66	-0.180
	Total	**409**			**44**			**3**		
	Copepoda									
1	*Nauplius*	81	0.18	-1.714	80	0.19	-0.721	152	0.24	-0.619
2	*Cyclops*	79	0.17	-0.769	77	0.18	-0.744	240	0.38	-0.420
3	*Mesocyclopsleuckarti*	40	0.09	-1.045	38	0.09	-1.045	120	1.93	0.285
4	*M.hyalinus*	42	0.09	-1.045	40	0.09	-1.045	24	0.03	-1.522
5	*Diaptomus*	40	0.09	-1.045	40	0.09	-1.045	25	0.04	-1.397
6	*Neodiaptomusstrigilipes*	80	0.18	-0.744	79	0.18	-0.744	42	0.06	-1.221
7	*Eucyclopes*	79	0.17	-0.769	67	0.15	-0.823	18	0.02	-1.698
	Total	**441**			**421**			**621**		
	Ostracoda									
1	*Spirocypris*	48	0.52	-0.283	**60**	0.54	-0.267	**2**	0.66	-0.180
2	*Cycpris*	43	0.47	-0.327	**51**	0.45	-0.346	**1**	0.33	-0.481
	Total	**91**			**111**			**3**		

TABLE: 2 Seasonal variations in species diversity index values of zooplankton in baangaon lake, Chalisgaon

Sr. no.	Zooplankton species	Monsoon (ni/N) Log(ni/N)	Winter ni/N) Log(ni/N)	Summer (ni/N) Log(ni/N)
	Rotifers			
1	*Brachionus forficula*	-0.02	-0.321	-0.139
2	*Brachionuscalyciforus*	-0.1	-0.133	-0.127
3	*B. quadridentatus*	-0.09	-0.130	00
4	*B.caudatus*	-0.132	-0.06	00
5	*B.kostei*	-0.080	-0.011	00
6	*B.rubens*	-0.087	00	-0.033
7	*Asplancha brightwelli*	-0.033	-0.02	-0.015
8	*A.priodonta*	-0.055	-0.033	00
9	*Filinia longiseta*	-0.105	0.055	00
10	*Keratalla tropica*	-0.1	-0.01	00
11	*K. cochlearis*	-0.094	-0.06	00
12	*Euchanis oropa*	-0.055	-0.02	00
13	*Horaella*	-0.033	00	-0.153
14	*Lepadella*	-0.080	-0.080	00
15	*Monostyla*	-0.02	00	00
16	*Lecane*	-0.045	-0.045	00
	Total	**-1.129**	**-0.978**	**-0.467**
	Cladocera			
1	*Macrothrix laticornis*	-0.156	-0.055	-0.158
2	*Daphina pulex*	-0.136	-0.055	00
3	*Rotaria*	-0.136	00	00
4	*Moina brachiate*	-0.105	-0.033	00
5	*Moinodmacropa*	-0.136	0-0.073	-0.118
	Total	**-0.669**	**-0.216**	**-0.276**
	Copepoda			
1	*Nauplius*	-0.308	-0.136	-0.148
2	*Cyclops*	-0.130	-0.133	-0.159
3	*Mesocyclopsleuckarti*	-0.094	-0.094	0.550
4	*M.hyalinus*	-0.094	-0.094	-0.045
5	*Diaptomus*	-0.094	-0.094	-0.055
6	*Neodiaptomusstrigilipes*	-0.133	-0.133	-0.073
7	*Eucyclopes*	-0.130	-0.123	-0.033
	Total	**-0.983**	**-0.807**	**-1.063**
	Ostracoda			
1	*Spirocypris*	-0.147	-0.144	-0.118
2	*Cycpris*	-0.153	-0.155	-0.158
		-0.3	**-0.299**	**-0.346**
	H= -∑(ni/N) Log (ni/N)	**-3.081**	**-2.3**	**-2.152**

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26 & 27 March, 2021
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Effect of pyrethroids on lipid content of crab *Barytelphusa cunicularis*

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Abstract: *Lipids are of immense nutritional importance from the stand point of both quality and quantity. They provide maximum energy, besides providing vitamins like A,D,E and K. Crabs are used as a nutritional source. Because of indiscriminate use of pyrethroid pesticides, it was mixed in to freshwater via surface rain runoff. In this paper an attempt has made to study the effect of pyrethroids on lipid content of freshwater crab Barytelphusa cunicularis.*

1. INTRODUCTION & OBJECTIVES:

Lipids play an important role in energy metabolism and provide energy to metabolic processes. They are also important for the cellular and subcellular membranes. Lipids are used as energy reservoir and are stored and transported in the form of glycerol and esters. Cholesterol is one of the important sterols which acts as precursor for the steroid hormones. Most of the pesticides are known to be cholinesterase and hydrolyse inhibitors, some of which can play an important role in lipid metabolism (Coppage *et.al.,* 1975)

Environment being an integrated system, any change in its components will certainly disrupt the homeostasis. Almost all major environmental issues owe their origin to pollution. A fundamental contributor to the green revolution has been the development and application of pesticides for the control of a wide variety of pests.

Pyrethroids are fairly new class of pesticides that are widely used in agriculture but whose environmental impacts are less known. Examples – Cypermethrin and Fenvalerate or Fen-fen.

Objectives of the study were- to study the effect of pyrethroids like cypermethrin and fenvalerate on crabs. Analysis of biochemical contents like lipids. Toxicological issues of greatest concern and in greatest need of further research.

2. METHODOLOGY:

The freshwater crab *Barytelphusa cunicularis* was selected for the present study in tissues like ovary, hepatopancreas, intestine, gill and thoracic muscle. They were exposed to sublethal concentrations of cypermethrin (0.000382ppm) and fenvalerate (0.000141ppm). The lipid content in the tissue extracts was estimated by Barnes and Blackstoch (1973) method using Vanillin reagent and expressed in mg percent. The obtained data were statistically analyzed by using student 't' test (Mungikar, 2003)

3. RESULT & ANALYSIS:

In the crab *Barytelphusa cunicularis* both cypermethrin and fenvalerate produced a significant decrease in the lipid content of all tissues. The calculated values of total lipids with percentage change over the control in different tissues namely ovary, hepatopancreas, intestine, gill and muscle of the crab, *Barytelphusa cunicularis* (Westwood) after ten days exposure period are given in graph 3.6.

In the ovary of control crab the lipid was found as 74.7mg%, whereas in the cypermethrin and fenvalerate treated crabs the lipid content of ovary was found significantly ($P<0.001$) decreased by 21.4% and 24.% respectively.

In the hepatopancreas of control crab the lipid was found to be 87.02mg%, whereas 37.2% and 33.12% decrease was found in the cypermethrin and fenvalerate treated crabs respectively.

In the intestine of control crab 32.3mg% lipid was found. In the cypermethrin and fenvalerate treated crabs a significant ($P<0.001$) decrease of 30.14% and 18.7% was found respectively.

In the gills of control crab the lipid content was 19.5mg%, whereas a significant ($P<0.01$) decrease of 28.3% and 15.8% ($P<0.05$) was found in cypermethrin and fenvalerate treated crabs respectively.

In the muscle of control crab 22.7mg5 lipid content was found, whereas significant ($P<0.01$) decreases of 32.14%and 13.8% ($P<0.05$) were observed in experimental crabs exposed to cypermethrin and fenvalerate respectively.

4. DISCUSSION & CONCLUSION:

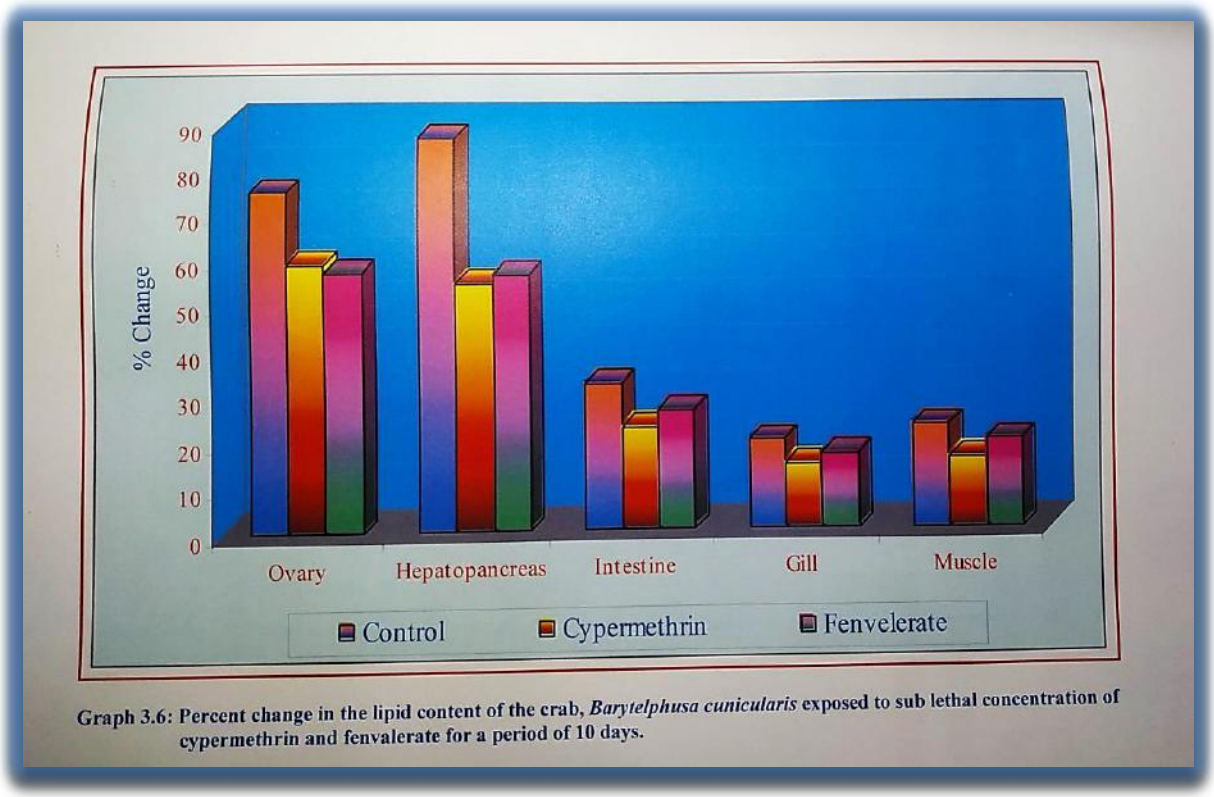
In the recent years the pollution of aquatic environment has become a serious problem with increasing agricultural and industrial operations, as a consequence of which the non-target organisms are perishing in the process. The waste contains toxic substances in the form of pesticide residues, heavy metals salts, and oil, radioactive substances etc.

Biochemical changes are better indices of damage by pollution than the conventional pathophysiological changes. Bhawan and Geraldine (1997) showed depletion in lipid content in the prawn, *Macrobrachium malcolmsoni* on exposure to sublethal concentrations of endosulfan. Ahirrao (2002) observed significant depletion in the lipid content of freshwater snail, *Bellamya bengalensis* on exposure to fenvalerate and cypermethrin for period of 15 days.

In the present study maximum decrease was found in the hepatopancreas of cypermethrin treated crab and also in hepatopancreas of fenvalerate treated fish when compare with other tissues (Fig1). The percent decrease of total lipid content was in the order of:

Cypermethrin: Hepatopancreas>Muscle>Intestine>Gill>Ovary

Fenvalerate: Hepatopancreas >Ovary>intestine> Gill>Muscle



Graph 3.6: Percent change in the lipid content of the crab, *Barytelphusa cunicularis* exposed to sub lethal concentration of cypermethrin and fenvalerate for a period of 10 days.

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Effect of Temperature On Survivality Of Earthworm, *Eisenia Fetida*

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Abstract: *Earthworm is a beneficial organism and commonly called as "the farmer's friend". They are of enormous ecological importance to mankind, particularly in his agricultural endeavours, as witnessed by the effects of common earthworms on soil fertility and probably because of this they have received appreciations about their bioecology from the stalwarts like Aristotle and Darwin. The present work are designed to determine the effect of environmental factor such as temperature on survivality percentage earthworms, Eisenia fetida. Determined lower, higher and optimum conditions. The effect of temperature on the survivality of earthworm, Eisenia fetida. During the experimental period groups of earthworm, Eisenia fetida were kept in various temperatures like 14^{0}C, 20^{0}C, 26^{0}C, 32^{0}C, and 38^{0}C the result were 35%, 95%, 100%, 90%, and 40% respectively observed the percent survivality after 8 days.*

Key words: *Temperature, survivality, Eisenia fetida.*

1. INTRODUCTION:

Temperature is a strong important factor (Atlas and Bartha, 1981). Hand, (1988) reported temperature of 20^{0}C to 25^{0}C is optimum for good worm function and earthworms multiply very rapidly; temperature (20-30^{0}C) for vermiprocess (Visvanathan, *et al*., 2005). Temperature plays an important role in the earthworm, therefore in this investigation the optimum temperature 20^{0}C to 25^{0}C for survival. The recent findings by Musaida, *et al.,* (2012) reported temperatures ranged between 19^{0}C to 25^{0}C and these temperatures are good for optimum vermicomposting and earthworm growth (Palsania, *et al.,* 2008 and Edwards, *et al.,* 1998).

Increasing global temperatures will change the composition and functioning of ecosystems (Harte and Shaw, 1995; Melillo, *et al*., 2002; Lambrecht, *et al*., 2007). Earthworms are known to constitute more than 80% of the soil invertebrate biomass in subtropical and tropical, as well as in temperate zones (Kale, 1997; Nainawat and Nagendra, 2001). Earthworms have the ability to improve soil physical structure, contribute to the breakdown of organic matter and release plant nutrients (Edwards and Bohlen, 1996).

Earthworm's cold blooded invertebrates. They can live in cold temperatures by hibernating or burrowing deeper into soil. Earthworms often lose weight or enter diapause when soils are too dry (Booth, *et al*., 2000; Holmstrup, 2001). The activity, metabolism, growth, respiration, reproduction and regeneration of earthworms are greatly influenced by temperature. Earthworms can be killed by temperatures outside their survival limits. It has been suggested that earthworm populations in soils can be destroyed by frost in the absence of ground cover, and high surface temperature and dry soils are much more limiting to them than low temperatures and waterlogged soils (Edwards and Bohlen, 1996).

Earthworms occur in diverse habitats specially those, which are dark and moist. Variation of earthworm respiration with temperature (especially its diurnal fluctuations), developmental stage and population density is still little studied. Some workers studied the upper and lower lethal temperatures for earthworms and found that the upper lethal temperature for earthworms is lower than for many other invertebrates, although there is considerable variation in estimates of these temperatures by different workers. Edwards and Bohlen (1996) reported median upper lethal temperatures of 37.0 to 37.5^{0}C for *Pheretima californica* and 39.55 to 40.75^{0}C for *Allolobophora calignosa*, 25^{0}C for *Eisenia fetida* and 29.7^{0}C *for Aporrectodea rosea.* Edward (1998) evaluated the optimal conditions for breeding *Eisenia fetida* in a range of animal and vegetable waste under aerobic condition with temperature from 15-20^{0}C. He found that the population density of worms per unit volume or weight of a waste was very important in affecting rate of growth and reproduction. Species *Eisenia fetida* gained weight maximally, survived best at temperatures between 20 and 29^{0}C and moisture content between 70% and 85% in horse manure, and activated sludge (Loehr, *et al*., 1985). According to Edwards (1998) the optimum growth of *Eisenia fetida* in different animal and vegetable waste was at temperatures of 25–30 °C and at a moisture content range of 75–90%, but these units could vary in different substrates. *Eisenia fetida*is an iteroparous earthworm, with continuous and high reproduction rates, and it should respond to adverse environmental conditions modifying those rates.

Hait and Tare (2011) reported that an environmental condition that is temperature; (10-30^{0}C) had profound effects on the biology of the earthworm *Eisenia fetida.* No comprehensive work has been carried out on their survival. In this study to investigate the process of temperature tolerance.

2. MATERIALS AND METHOD:

The experiment was conducted to see the effect of temperature on survivality of earthworms, *Eisenia fetida*. Earthworms were kept in laboratory for three days before using for the acclimatization. The wet soil collected from garden and used for experiment. The experiments were maintained in beakers and kept in B.O.D. incubator. The beakers were kept in different temperature 14^0C, 20^0C, 26^0C, 32^0C and 38^0C. Initially experimental group was maintained in beakers. 200 gm wet garden soil was filled in the beakers for group (1) 14^0C, (2) 20^0C, (3) 26^0C, (4) 32^0C and (5) 38^0C temperature. Acclimatized 20 earthworms looking healthy and having approximately equal size and weight were selected and inserted in beakers for the experiment. To avoid any escape of worms, to prevent the entry of other organisms in the beaker was sealed with transparent and small mesh size cotton cloth covered on a beaker with small holes to allow exchange of air. A strip was stuck on each beakers and marked as experimental group, temperature, date of experiment, weight of substrate used, size and number of earthworm loading, and days. Record of progress in each beakers was thus maintained daily. The experimental beakers were kept in B.O.D. incubator at respective temperatures and provide cold and hot temperature conditions.

3. OBSERVATIONS AND RESULT:

In the present work effects of temperature on earthworm, *Eisenia fetida* were studied. Differences between control and experimental groups of earthworms are compared and conclusion is drawn. During the experimental period earthworms showed progressive signs and symptoms and mentioned.

Soil temperature significantly affected the survivality on earthworms, *Eisenia fetida*. This work aims to assess the effects of temperature on earthworms, *Eisenia fetida* for survival. To obtain information on the optimal temperature ranges for this earthworm, choose to survival the data for temperature. During the experimental period percent of survivality was recorded after every 24 hrs. The observed results were presented in (Table-1 and Graph-1). In about the first day, no difference was observed in the survival of the worms except 14^0C temperature. Some of the worms that were not exposed to temperatures greater than 38^0C and less than 14^0C did not survive 50% during the experimental period. Worms that were exposed to 26^0C survived 100% for about 8 days and survival at 26 ± 6^0C was reduced to 8 days. In the temperature at (1) 14^0C, (2) 20^0C, (3) 26^0C, (4) 32^0C and (5) 38^0C the result were 35%, 95%, 100%, 90%, and 40% observed after 8 days respectively. The group of worms conditioned at temperature 20^0C - 32^0C good for survival. The survivality of worms were recorded after each 24 hours viz., 1, 2, 3, 4, 5, 6, 7 and 8 days. The result presented in (Table-1 and Graph-1).

Table-1: Effect of temperature on survival of earthworm, *Eisenia fetida*.

Sr No.	Temperature	No. of worms used	Survival after hrs/ days								Survival % after 8 days
			24 hrs	48 hrs	72 hrs	4 days	5 days	6 days	7 days	8 days	
1	14^0C	20	19	17	14	12	11	10	08	07	35
2	20^0C	20	20	20	20	20	20	20	19	19	95
3	26^0C	20	20	20	20	20	20	20	20	20	100
4	32^0C	20	20	20	20	20	20	20	19	18	90
5	38^0C	20	20	18	16	14	12	10	08	08	40

Graph– 1:- Showing the effect of temperature on the survivality of earthworm, *Eisenia fetida*.

4. DISCUSSION:

Temperature is a key factor in the environmental study of earthworms, *Eisenia fetida* for survival and regeneration purposes. In the present study, temperature greater than 32^0C and less than 20^0C were detrimental to earthworms, *Eisenia fetida*. Temperature is a strong important factor (Atlas and Bartha, 1981). Temperature plays an important role in the earthworm. Therefore, in this investigation the effect of temperature on survival and regeneration were studied. The temperature of 25 to 30^0C were optimum for good survival and regenerating the lost segment of earthworms, *Eisenia fetida* data presented in Table– 1 included both cold and hot temperature adversely affected on survivality and regeneration on earthworms, *Eisenia fetida*. Eriksen-Hamel and Whalen (2006) pointed out that increased soil moisture, temperature and microbial activity result insignificant increase in growth rate of earthworms.

Initially observed the various temperatures for survival to the earthworms, *Eisenia fetida* and the data tabulated in Table-1. After 8 days 100% worms survival in temperature 26^0C. Similarly correlated observations by Edwards (1988) studied the life cycle and optimal conditions for survival and growth of *Eisenia fetida*, *Dendrobaena veneta*, *Eudrilus eugeniae*, and *Perionyx excavatus*. Each of these four species differed considerably in terms of response and tolerance to different temperatures. The optimum temperature for *Eisenia fetida* was 25°C, and its temperature tolerance was between 25°C and 30°C. *Dendrobaena veneta* had a rather low-temperature optimum and rather less tolerance to extreme temperatures. The optimum temperatures for *Eudrilus eugeniae* and *Perionyx excavates* were around 25°C, but they died at temperatures below 9°C and above 30°C. The range of temperatures 20^0C to 32^0C were good for earthworms, *Eisenia fetida* showed in (Table-1 and Graph-1). The recent findings by Musaida, *et. al.,* (2012) reported temperatures ranged between 19^0C to 25^0C and these temperatures are good for optimum vermicomposting and earthworm growth (Palsania, *et. al.,* 2008 and Edwards, *et. al.,* 1998). Similar observations by Miles (1966) found the upper lethal temperature of 33.3^0C for *Eisenia fetida* and 25.7^0C for *Lumbricus terrestris*, which were acclimated to 15^0C for few weeks. Hanumante (1975) has reported the upper lethal temperature of 39^0C for 24 h for *Perionyx excavates*. *Lumbricus rubellus* (an endogeic species) prefer temperatures ranging between 15°C and 20°C and *Eisenia fetida* (an epigeic species) prefer 25°C (Lee, 1985). Berry and Jordan (2001) found that *Lumbricus terrestris* experienced mortality at temperatures of 10°C and

temperature over 20°C and experienced the best growth rates at 25% and 30% soil moisture. Timmerman *et al.,* (2006) also reported low earthworm abundance during winter due to low temperatures.

Various researchers reported the life cycle and population biology of *Eisenia fetida* and *Eisenia andrei* in different organic wastes have been investigated by several authors (Watanabe and Tsukamoto 1976; Hartenstein, *et al*., 1979; Edwards 1988; Reinecke and Viljoen 1990; Dominguez, *et al*., 1997; Dominguez and Edwards 1997; Dominguez, *et al*., 2000). The optimum temperature for growth of both species is 25°C. After conducting a series of experiments, (Reinecke and Kriel, 1981; Reinecke and Venter, 1987; Reinecke, *et al.*, 1992) concluded that *Eisenia fetida* could survive well even in harsh environmental conditions, especially temperature (5 to 43^{0}C) and fluctuating moisture conditions.

In extreme temperature conditions earthworms tend to hibernate and migrate to deeper layers of the windrow for protection. Earthworms can also acclimate to temperature in autumn and survive the winter, but they cannot survive long periods under freezing conditions unless they are in protective cells. The unfavorable effect of high temperatures (above 30°C) on most species of earthworms is not entirely a direct effect because these warm temperatures also promote chemical and microbial activities in the substrate, and the increased microbial activity tends to consume the available oxygen, with negative effects on the survival of earthworms. In the present study observed the various temperatures on survival and found the good range for survival to earthworms, *Eisenia fetida* and the data tabulated in Table–1.

5. CONCLUSIONS:

In conclusion, the present study provides some evidences such as sluggish movement's and bloody lesions are due to the changes of temperature that affects earthworms. Fluctuations of environmental temperature the activity of the earthworms is impaired. The earthworms, *Eisenia fetida* were prefer favorable conditions for their normal functions. Their lethal temperatures and influence of thermal acclimation on hot and cold tolerating ability studied temperature relations of the earthworms, *Eisenia fetida*. In the cold and hot tolerance temperature at 14^{0}C, 20^{0}C, 26^{0}C, 32^{0}C, and 38^{0}C the result were 35%, 95%, 100%, 90%, and 40% respectively observed after 8 days. The group of worms conditioned at temperature 26^{0}C good for 100% survival.

The earthworms, *Eisenia fetida* were 100% survival in 26^{0}C. Temperature relations of the earthworm *Eisenia fetida*, were studied by their lethal temperatures and influence of thermal acclimation on heat and cold tolerating ability. Earthworms conditioned at the laboratory temperature (20^{0}C – 32^{0}C) and exposed to 20^{0}C – 26^{0}C temperature survived for about 8 days.

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