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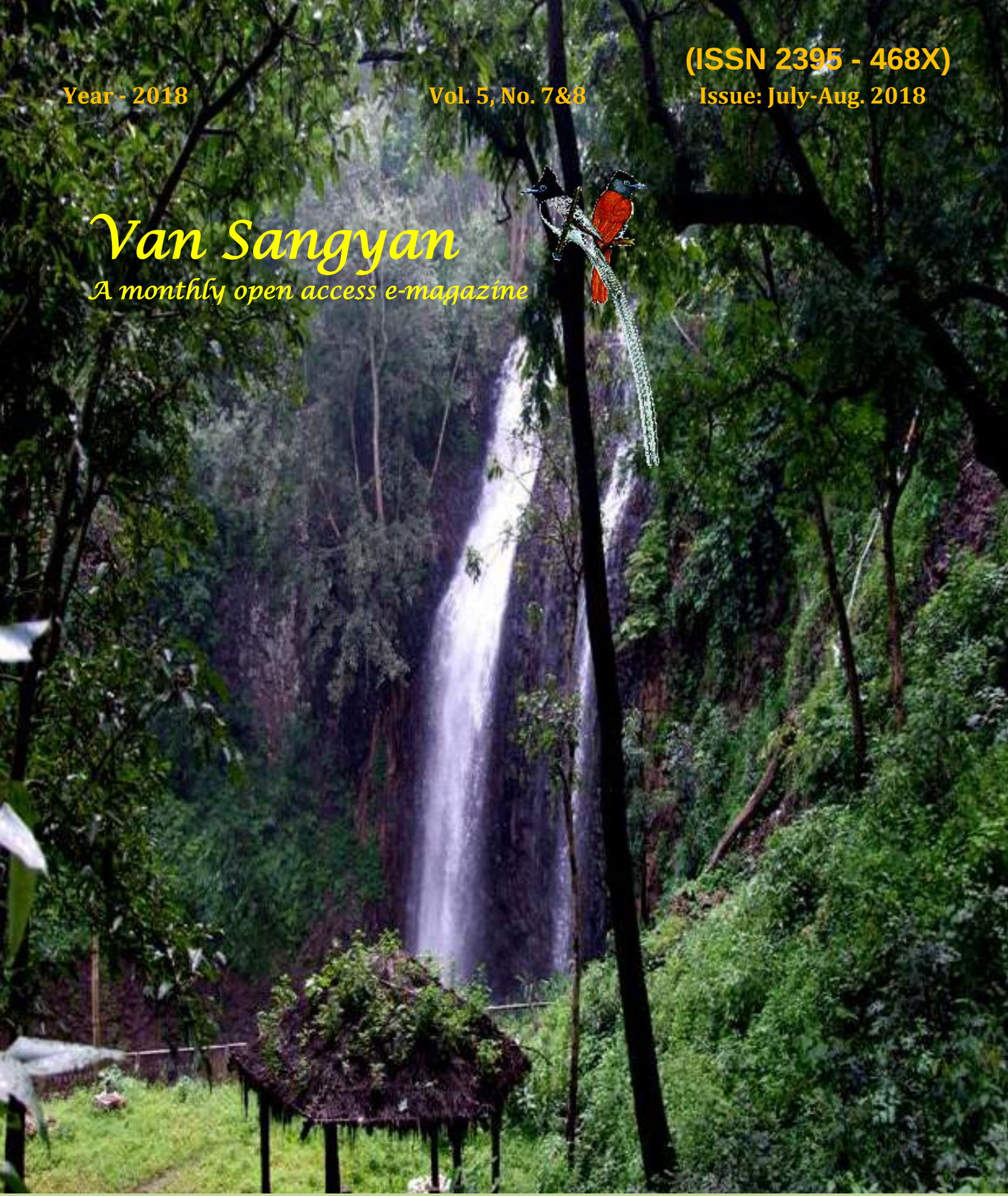

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Van Sangyan

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Note to Authors:

We welcome the readers of Van Sangyan to write to us about their views and issues in forestry. Those who wish to share their knowledge and experiences can send them:

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The articles can be in English, Hindi, Marathi, Chhattisgarhi and Oriya, and should contain the writers name, designation and full postal address, including e-mail id and contact number. TFRI, Jabalpur houses experts from all fields of forestry who would be happy to answer reader's queries on various scientific issues. Your queries may be sent to The Editor, and the expert's reply to the same will be published in the next issue of Van Sangyan.

Cover Photo: Panoramic view of Achanakmar-Amarkantak Biosphere Reserve
Photo credit: Dr. N. Roychoudhury and Dr. Rajesh Kumar Mishra, TFRI, Jabalpur (M.P.)

From the Editor's desk

The most basic cause of root rot, whether in bamboo or any other species, is soil that is too wet. Another way of saying this is there is too much water around the roots.Roots require air to live, and if there's too much water, they can't breathe, in which case they die. In addition, the water-logged conditions foster the development of anaerobic bacteria, which can attack the root tissues. Beyond those, there are certain types of fungi that inhabit extremely moist spaces, which also attack plant roots.

Bamboos are vulnerable to various diseases and disorders, which affect them in nurseries, plantations as well as in natural stands. About 170 species of bamboos belonging to 26 genera are reported to be affected by various diseases and disorders. Bamboos in natural stands, plantations, homesteads, village groves, etc. are vulnerable to various diseases at their different stages of growth. Newly emerging and growing supple culms are generally susceptible to diseases. Among large number of diseases recorded on bamboos, potential diseases affecting the stand productivity Diseases of Bamboos and Their Management include rot of emerging and growing culms, bamboo blight, thread blight, witches' broom, little leaf disease and culm basal rot.

Bambusa balcooa, B. bambos, B. polymorpha, B. vulgaris, D. longispathus, D. strictus, Thyrsostachys oliveri are the most severely affected bamboos species. Severe infection and culm mortality were recorded in bamboo stands in high rainfall areas in the Kerala and Karnataka states. The disease manifests as dark brown lesions on the outermost culm sheath of the emerging culm (15-20 cm height), near the soil level.

Cultural control measures, such as removal debris around the clumps before the onset of monsoon, light burning of the debris over the ground, loosening the soil around the clump before the culm emergence, pruning and removal of branches from the basal part of the older culms during the dry period (March-April) are suggested to minimize the disease incidence. To avoid mechanical damage to the emerging culms caused by cattle and other animals, clump tending and cleaning operations are recommended only in well-protected stands.

In bamboo stands, rot of emerging and growing culms, bamboo blight, thread blight, witches' broom, little leaf, culm basal rot are the potential diseases affecting the stand productivity. The disease incidence, spread and severity depend on prevailing microclimatic conditions as well as stand management practices. A close monitoring of the stands, especially during the culm emergence and elongation period is warranted to adopt appropriate control measures and, thereby, reducing the impact of the diseases. Most of the diseases can be controlled by adopting appropriate cultural measures before the onset of monsoon or by prophylactic fungicidal treatments. The nursery diseases can be managed by following good nursery management practices like regulation of shade, water regime as well as reducing sowing density in the case of bamboos raised in conventional nursery. Application of appropriate fungicides at appropriate dosage is also required to combat the disease outbreak. More importance should be given for selection of bamboo species suitable for the locality and also selection of planting materials prepared from disease free clumps/areas.

In line with the above this issue of Van Sangyan contains an article on Diversity of macro-fungi in Central India-XIV: Amylosporus campbellii causing root and rhizome rot of bamboo (Dendrocalamus strictus). There are other useful articles viz. Impact of abiotic stress in Madhya Pradesh, Bremia lactucae causing leaf spot in Euphorbia heterophylla: a new host record, देश में घटते वन क्षेत्र तथा संरक्षण में हमारी सहभागिता, Curry leaves (Murraya koenigii Spreng.), Carnivorous plants: Amazing to know.

I hope that readers would find maximum information in this issue relevant and valuable to the sustainable management of forests. Van Sangyan welcomes articles, views and queries on various such issues in the field of forest science.

Looking forward to meet you all through forthcoming issues

Dr. R. K. Verma
Scientist 'G' & Chief Editor

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Contents **Page**

Diversity of macro-fungi in Central India-XIV: *Amylosporus campbellii* causing root and rhizome rot of bamboo (*Dendrocalamus strictus*)

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Abstract

In the present article reports root and rhizome rot of bamboo (*Dendrocalamus strictus*) caused by a basidiomycetous macro-fungus, *Amylosporus campbellii*. The fungus is recorded from Panna, Madhya Pradesh.

Introduction

Genus *Amylosporus* Ryvarden belong to family Bondarzewiaceae, basidiomycete. The type species is *Amylosporus graminicola* (Murrill) Ryvarden. The genus contains 12 species that are widely distributed in tropical regions (Kirk et al., 2008). Out of them 6 species namely, *Amylosporus auxiliadorae* Drechsler-Santos & Ryvarden, *Amylosporus casuarinicola* (Y.C. Dai & B.K. Cui) Y.C. Dai, Jia J. Chen & B.K. Cui, *Amylosporus efibulatus* (I. Lindblad & Ryvarden) Y.C. Dai, Jia J. Chen & B.K. Cui, *Amylosporus guaraniticus* Campi & Robledo, *Amylosporus rubellus* (Y.C. Dai) Y.C. Dai, Jia J. Chen & B.K. Cui and *Amylosporus succulentus* Jia J. Chen & L.L. Shen were recently reported (Indexfungorum page visited on 09/07/2018).

Recently *Amylosporus campbellii* was reported on teak from Jabalpur (Verma ety al., 2016). In the present article this macro-fungus is reported from central India causing rhizome rot in *Dendrocalamus strictus* at Panna Tiger Reserve, Panna, Madhya Pradesh.

Materials and methods

Specimens were collected from Panna Tiger Reserve area, Panna, Madhya Pradesh, India. The slides were prepared in lactophenol and cotton blue and observed under advance Research Microscope, make Leica, Germany and photomicrographs were taken with the help of digital camera attached to the microscope. Identification of fungi was done with the help of literature (De 1991; Mohanan 1997; Tahir et al., 1992a, b; Tarafder et al., 2017; Tiwari et al. 2013; Verma ety al., 2016). The specimens were deposited in the Mycology Herbarium, Tropical Forest Research Institute, Jabalpur and got accession numbers.

Results and Discussion

***Amylosporus campbellii* (Berk.) Ryvarden** (Figures 1-7)

(Bondarzewiaceae, Russulales, Incertae sedis, Agaricomycetes, Agaricomycotina, Basidiomycota, Fungi)

=*Amylosporus graminicola* (Murrill) Ryvarden, *Norw. Jl Bot.* **20**: 1 (1973)

=*Polyporus anthelminticus* Berk., *Gard. Chron.*, London: 753 (1866)

=*Polyporus campbellii* Berk., *Hooker's J. Bot. Kew Gard. Misc.* **6**: 228 (1854)

=*Polyporus graminicola* (Murrill) Murrill, *Mycologia* **7**(4): 215 (1915)

=*Polyporus mollitextus* Lloyd, *Mycol. Writ.* **6**: 880 (1919)
=*Polyporus popanoides* Cooke, *Grevillea* **9**(no. 51): 97 (1881)
=*Polyporus propinquus* Lloyd, *Mycol. Notes* (Cincinnati) **7**: 1109 (1922)
=*Polyporus tisdalei* (Murrill) Murrill, *Lloydia* **6**: 228 (1943)
=*Scutiger tisdalei* Murrill, *Lloydia* **6**: 227 (1943)
=*Tyromyces graminicola* Murrill, *Tropical Polypores*: 21 (1915)
=*Wrightoporia campbellii* (Berk.) Teixeira, *Revista Brasileira de Botânica* **15**(2): 127 (1992)

Taxonomic Description

Fuitbody, annual, pileate, centrally to laterally stipitate, fan shaped, fleshy and more or less watery when fresh, becomes spongy, brittle and become light in weight on drying, 4-12 x 10-15 x 1.0-2.5cm. Pileus semicircular, velutinate, soft to touch, upper surface whitish with pink tint towards the base when fresh turn buff to ochraceous on maturity or drying, azonate, uneven, smooth. Margin whitish to cream, entire, thick. Context white to ochraceous homogeneous, soft, 15mm thick. Hymenium creamish white to ochraceous-buff, poroid, pores, 2-4/mm, round to angular. Hyphal system dimitic, generative hyphae with wide lumen, thick walled, 1.5-3.0µm wide, hyaline, mostly with simple septa, thin walled, 3.0-5.0µm wide, skeletal hyphae pale golden yellow, unbranched, gleoporus hyphae mostly confined to the context almost hyaline to yellowish with an oily to granular content 3.0-6.5 µm wide. Basidia: hyaline, clavate, with a basal clamp and four sterigmata (1-2.5µm long), 12.5-22.5 x 4.0-6.5µm. Basidiospore: ellipsoid to ovoid, thin-walled, smooth or with very fine warts, 2.5-5.0 x 1.5-3.0µm.

Collection examined: On living bamboo (*Dendrocalamus strictus*) clump and rhizome, Karnavat, Rest House, Panna Tiger Reserve, Panna, Madhya Pradesh, 20/7/2018, R.K. Verma, TF 4045.

Figure 1 ***Amylosporus campbellii*****:** habit, developing young fruit-body

Figure 2-3 *Amylosporus campbellii*: mature fruit-bodies in habit

Discussion

Amylosporus compbelli was reported on 4 bamboos, *Bambusa bambos, Dendrocalamus longistachys, D. strictus* and *Thysrostachys olivani* from southern India (Mohanan 1997). It was also reported from Odisha (on ground from Puri), Tamil Nadu (on ground from Coimbatore), West Bengal (on ground and dead bamboo from Hooghly, 24 Parganas, Santiniketan and Burdwan) and Maharashtra (on ground, Pune) (De 1091). Root and rhizome rot caused by *A. campbelli* growing on rhizome of *Dendrocalamus strictus* at Pariyat, Jabalpur, Madhya Pradesh was reported (Tahir at al., 1992a, b). It was also recorded growing solitary or in groups, on buried plant debris, on soil or upon cut stumps/ injured base of bamboos, at Tumbani, Birbhum, in West Bengal (Tarafder et al., 2017).

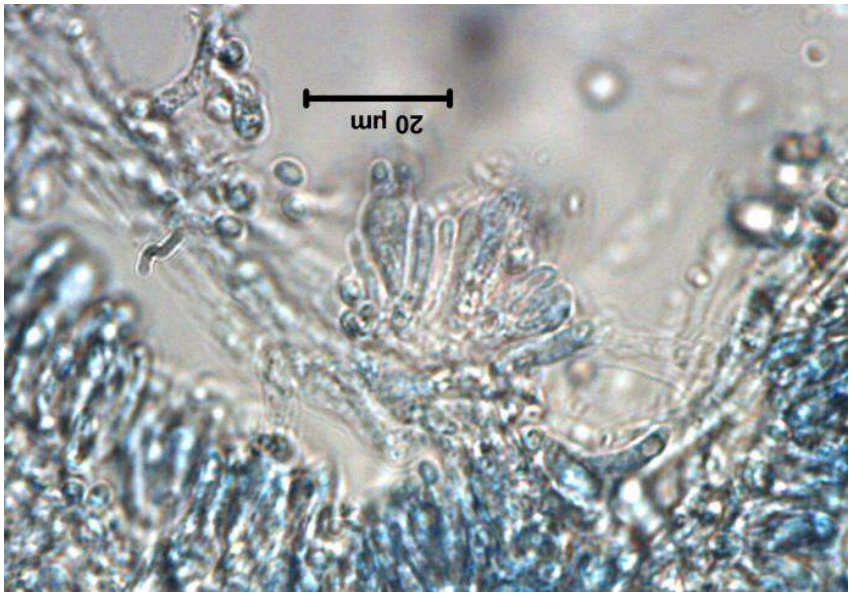

Figure 4 *Amylosporus campbellii*: hyaphae and basidia attached with developing basidiospores

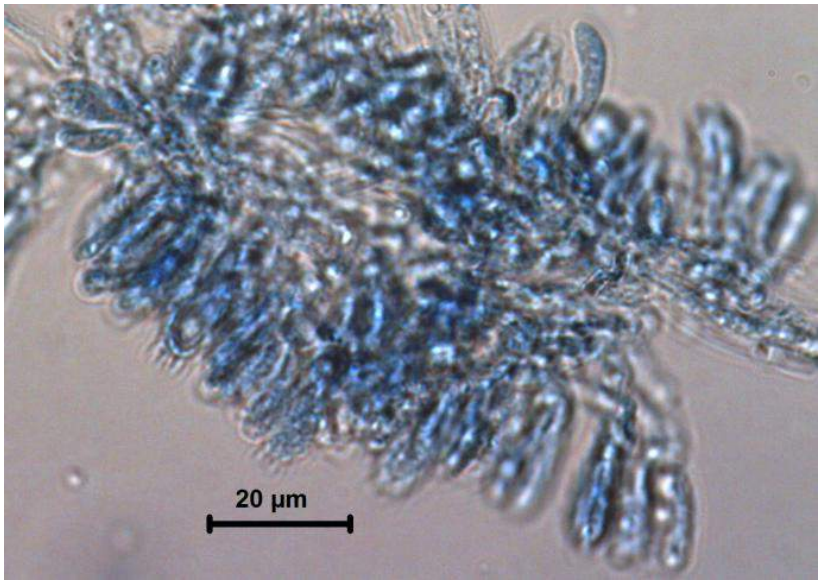

Figure 5 ***Amylosporus campbellii*****:** hyaphae and basidia with sterigmata

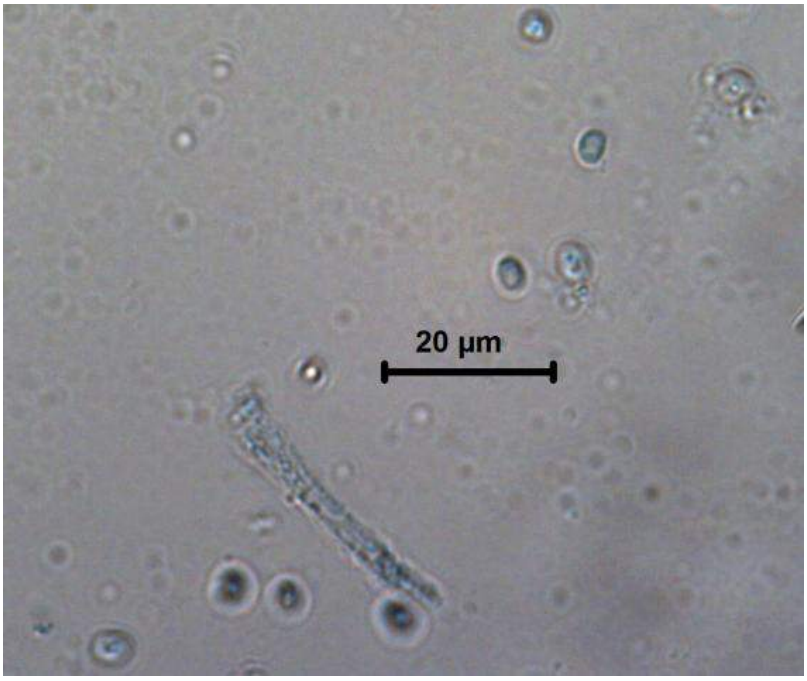

Figure 6 ***Amylosporus campbellii*****:** basidiospores

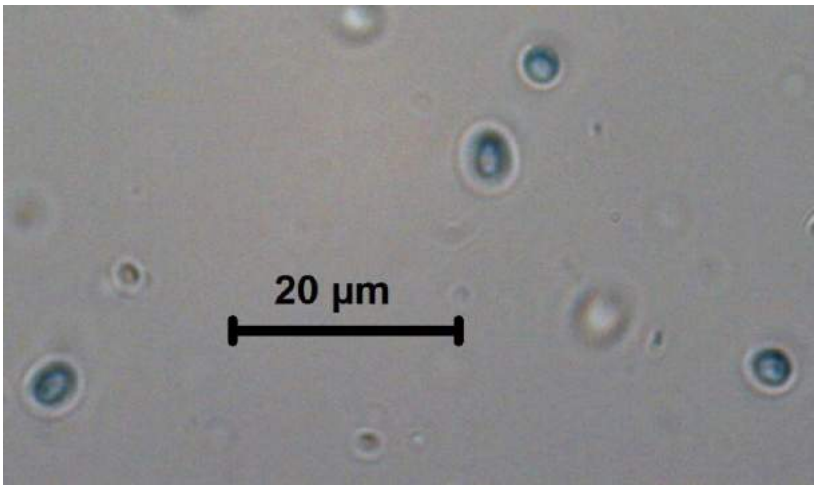

Figure 7 ***Amylosporus campbellii*****:** basidiospores (enlarge)

Acknowledgement

Authors are thankful to Dr. G. Rajeshwar Rao, Director, Tropical Forest Research Institute, Jabalpur for providing necessary facilities and Indian Council of Forestry Research & Education, Dehradun for financial assistance under project ID No. 224/TFRI/2016/Patho-1(22).

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Impact of abiotic stress in Madhya Pradesh

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The world is facing severe and unpredictable challenges due to increasing abiotic stresses as a consequence of Earth's changing climatic conditions. Abiotic stress is said to be the stress condition caused by physical or chemical factors like heat, cold, drought, salinity, wounding, heavy metals toxicity, excess light, flooding, high-speed winds, nutrient loss, anaerobic conditions, and radiation. Madhya Pradesh, the second largest Indian state with the total geographical area 30.82 mha, covering 9% of the land area and 6% of the population of the country, rich in biodiversity with 25.13% forest cover, 9 National Parks and 25 Wildlife Sanctuaries is also not detached from the current scenario of abiotic stress.

The green wealth of state is facing problems as a consequence of increasing various abiotic stresses. Madhya Pradesh is currently exploiting 46% of the available groundwater. The majority of the districts experienced a decline in the monsoon season precipitation during the period of 1951-2013 due to which frequency of severe, extreme, and exceptional droughts have increased in Madhya Pradesh. Among the 48 districts of the state, current groundwater condition is semi-critical in 21 districts, critical in 7 districts and over-exploited in 8 districts. As a result, various regions *viz.* Betul, Datia, Dewas, Dhar, Jhabua, Khandwa, Khargaon, Shahdol, Shajapur, Sidhi and Ujjain are frequently affected by drought. Droughts in the recent years have become severe and wide-spread. The number of hot days has increased state. Simultaneously, 0.01% area of major and medium commands is waterlogged (Both perennial and seasonal) and 0.09% is salt-affected in Madhya Pradesh.

The salinization condition, changes in water resources, temperature and precipitation patterns and amount influences soil water content, run-off and erosion and organic carbon and nitrogen content which in turn affects soil fertility. The occurrence of wastelands which corresponds to 1.22% (40,042.98 sq. km) of the geographical area of the state is the outcome of global climate change and abiotic stress. Land with open scrub is the major wasteland category in the state, accounting for an area of 16231.47 sq. km. Shyopur district of Madhya Pradesh recorded the maximum (28.44%) area under wastelands and Hoshangabad, the least (3.13%).

The spatial and temporal rainfall variability, availability of irrigation, frequency and intensity of inter- and intra-seasonal droughts and floods, soil organic matter transformations, soil erosion, change in pest profiles, a decline in arable

areas due to submergence of coastal lands, and availability of energy. All these can have tremendous impact on agriculture, forestry and fisheries sectors hence, the food security of any region. Madhya Pradesh is known for agriculture, the increase in growth rate of which was observed to be 33% during 2012-13. Wheat, rice, soybean and pulses are the major crops in the state. Madhya Pradesh has produced 19.3 million tones of wheat, 50 lakh tones of soybean and 6.9 million tones of rice in 2013-2014. Madhya Pradesh also produces nearly 5 million tones of pulses, of which Bengal gram and red gram are the most important. The State of Madhya Pradesh has distinguished itself as a 'Soya State' on account of its largest share in (61%) and production (70 %) for soybean in India.

Abiotic stresses have become the principal cause of decreasing the average yield of major crops by more than 50% worldwide, causing losses worth hundreds of millions of dollars every year. The effect on wheat crop pronounced in Madhya Pradesh state where wheat yield potential is already low as a result of relatively higher temperature than northern India. The temperature rise was found to have negative impacts on Kharif rice crop. Temperatures are projected to increase in an entire year but changes in 'rabi' season are expected to be prominent as compared to 'kharif' season. Likewise in eastern Madhya Pradesh with about 90% of the region being rain-fed, erratic rainfalls in the last fifteen years have caused up to a 60% decrease in crop yields, directly impacting the food security of the region. Meanwhile, increased pressure on common lands has caused fuelwood scarcity for households and decreased livestock fodder.

Also, the total area in 2009-2011 under forests has declined due to encroachment on forest lands, mining activities and increase in submergence areas as per State of Forest Report (SFR) - 2103. The forest area change matrix presented by the Forest Survey of India for the period 2011 to 2013 in the State of Forest Report (2013) indicates an insignificant decrease in area under dense forests while in the moderately dense and open forest categories declined by 65 and 105 sq. km, respectively. Moreover, the output of most non-timber forest products (NTFPs) has reduced drastically due to unsustainable extraction.

The effect is tremendous and unmanageable but may be and can be reduced more future adversities by taking strong policies in consideration at the local level with a careful analysis of the natural resources and impacts of various abiotic and biotic factors on various sectors.

The development of new infrastructure, policies and institutions to support the land use arrangements identified by science and technology, enhancing and promoting the investment in water harvesting and conservation options and use of modern tools of information technology are few technically and economically measures which require implementation in Madhya Pradesh. The crop insurance policies, better forecasting of weather conditions and weather based Agro-Advisories Services are necessary to be provided by agro-advisories to farmers for real-time decision making in order to protect any lethal adversities on crops. Also, resource conservation technologies development by cultivating high yielding and alternate plant species or cultivars more adapted to changed environment, intensifying search for genes for stress tolerance across plant

and animal kingdom and research efforts on marker-aided selection and transgenic development for biotic and abiotic stress management can provide multiple benefits to overcome the future climatic stress conditions.

There is need to explore the international partnerships for collaborative research regarding abiotic and biotic stresses literacy among all stakeholders of agriculture, including students, researchers, policy planners, science administrators, the industry as well as farmers. The combined efforts of each and every person with the intentions to save environment can only save life on earth from uncontrollable destructive effects of climate.

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Bremia lactucae causing leaf spot in *Euphorbia heterophylla*: a new host record

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Abstract

Bremia lactucae causing leaf spot disease in a common tropical weed plant, *Euphorbia heterophylla* in central India (Jabalpur, Madhya Pradesh) is reported. It constitutes a new host record.

Introduction

Euphorbia heterophylla Linn., is commonly known as wild poinsettia or milkweed. This weed is widespread in the tropical countries. It occurs as a major weed in several tropical countries. It causes serious loss of yield and quality in a wide range of crops especially of summer crops. It competes successfully by growing rapidly and forming a dense canopy over the crop. Dormancy is an important factor in the persistence of seed reservoirs in the soil (Wilson, 1981). It is a short-lived, annual plant with an upright and branched main stem usually growing 20-80cm tall, but occasionally reaching up to 2m in height.

Bremia lactucae Regel is a member of Peronosporaceae, Peronosporales and earlier this fungus was reported on terrestrial weeds of Haryana (Aneja and Kaur, 1995). The present article reports *Euphorbia heterophylla*: a new host for *Bremia lactucae*.

Materials and methods

Specimens were collected from campus of TFRI, Jabalpur, Madhya Pradesh. Identification of the fungus was done with the help of literature (Aneja and Kaur, 1995; Choi and Shin, 2008; Ciferri, 1956; Li and Yuan, 1998) and information available on net. The slides were prepared in lactophenol and cotton blue and observed under advance Research Microscope, make Leica, Germany and photomicrographs were taken with a digital camera attached to the microscope. The specimen was deposited in the Mycology Herbarium, Tropical Forest Research Institute, Jabalpur and got accession numbers.

Results

Taxonomic description:

***Bremia lactucae* Regel (Figures 1-9)**

Leaf spots yellowish, first appeared on upper surface of leaves later on turning reddish-brown, hologenous, on lower surface grayish necrotic spots appeared with fungal fructification, spots measuring 5-9 x 4-7mm. Sporangiophores simple-branched, straight, flexuous or bent, smooth, pale-brown, lighter in colour towards apex, bearing round to oval sporangia at the tips, varying in diameter, 300-500 x 10-20µm. Sporangia round to oval developed at the tips of sporangiophores, varying in diameter, congaing spore bearing dichotomously branched structures, measuring 60-94µm in diam. Sporangiospores hyaline, smooth,

oval-oblong, pointed at one end, measuring 6-10 x 5-8µm.

Collection examined

On living leaves of *Euphorbia heterophylla*, TFRI campus, Jabalpur, Madhya Pradesh, 21.08.2017, R.K. Verma, Mycology Herbarium, Tropical Forest Research Institute, TF-3958.

Figure 1: Symptoms on leaves of *Euphorbia heterophylla* caused by *Bremia lactucae*

Figure 2: An enlarge view of symptoms

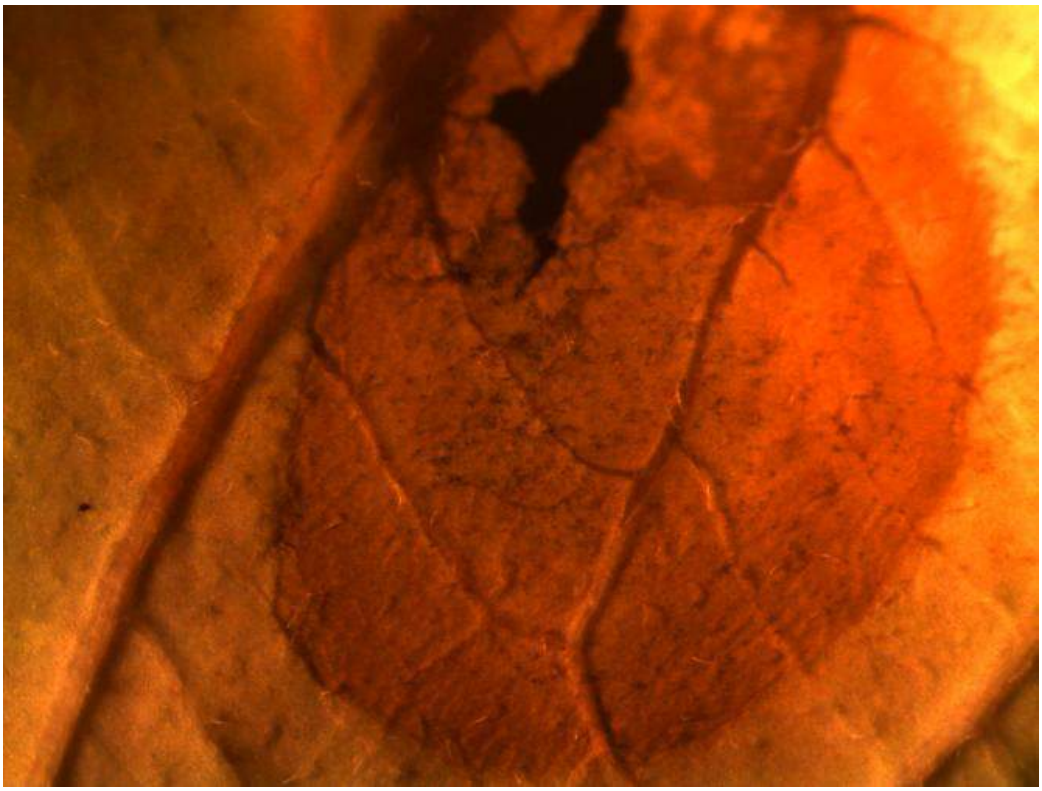
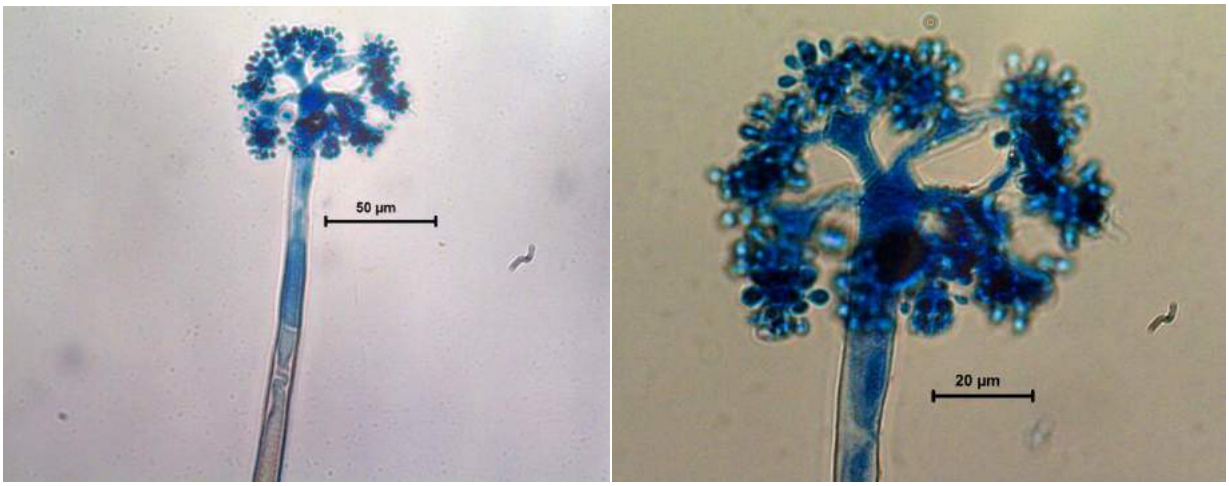
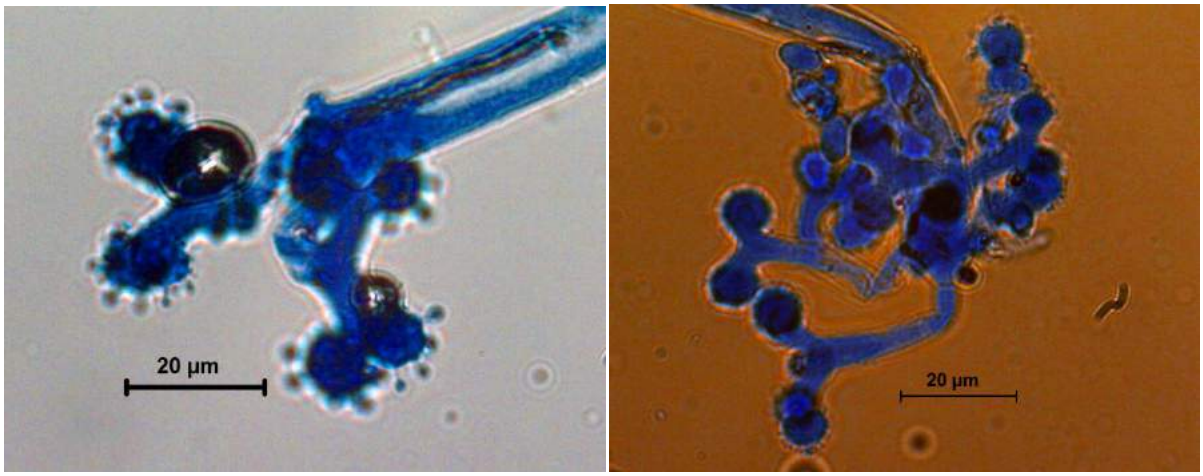


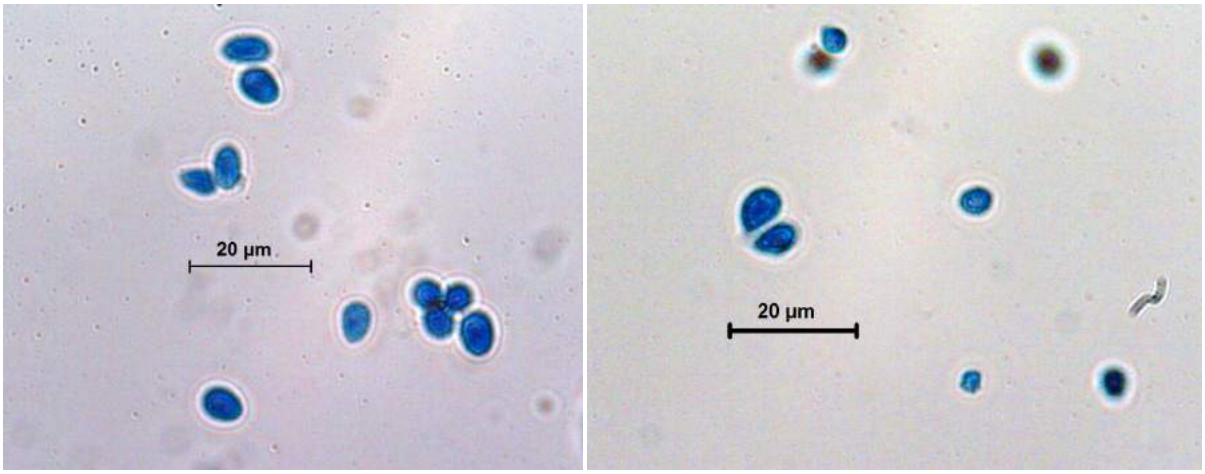
Figure 3: Close view of leaf lesion on *Euphorbia heterophylla*



Figures 4-5: *Bremia lactucae*, sporangiophore



Figures 6-7: *Bremia lactucae*, sporangia with developing sporangiospores



Figures 8-9: *Bremia lactucae* sporangiospores

Discussion

Bremia lactucae caused leaf spotting in milkweed plant *Euphorbia heterophylla* during rainy season. Earlier this fungus was reported from, Kurukshetra, Haryana (Aneja and Kaur, 1995). It also causes leaf spot in *Sanchus oleoraceous* (Asteraceae). Another fungus of this group, *Bremia betae* H.C. Bai & X.Y. Cheng is a common leaf spot pathogen of *Beta vulgaris* in China (Bai et al., 1985). A new species of *Bremia* (*B. cicerbitae*) was reported on leaves of *Cicerbita azurea* (Li and Yuan, 1998). *Bremia graminicola* var. *indica* Patel was reported on *Arthraxon lancifolius* (Patel 1948). Some *Bremia* species, for example *Bremia domingensis* was transferred to the genus *Plasmopara* (Choi and Shin, 2008).

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देश में घटते वन क्षेत्र तथा संरक्षण में हमारी सहभागिता

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[1]वन कीटविज्ञान प्रभाग
[2,3] अकाष्ठ वन उत्पाद प्रभाग
[4]आनुवांशिकी एवं पादप प्रजनन प्रभाग
उष्णकटिबंधीय वन अनुसंधान संस्थान
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मानव प्राचीन काल से अपने जीवन यापन की समस्त आवश्यकताओं की पूर्ति हेतु वनों पर निर्भर रहा है। वनों से विभिन्न उपयोगी पदार्थों के साथ औषधियां भी प्राप्त होती हैं । परोपकारी स्वभाव के कारण मानव का वृक्षों के प्रति हमेशा से प्रेम व आदर का भाव रहा है। वनों के सौन्दर्य से प्रभावित हो कर कवियों ने अपनी रचनाओं में समय-समय पर इसका बखान भी किया है। विश्व के कुल भूमि क्षेत्रफल का 30% हिस्सा वनों से आच्छादित है। 10 मिलियन से अधिक प्रजातियाँ पूरे विश्व में पेड़ पौधों, जंतुओं तथा सूक्ष्म जीवियों की पायी जाती हैं जिसमें लगभग 40 हज़ार प्रजातियों का उपयोग प्रतिदिन दैनिक जीवन में मानव द्वारा किया जाता है। भारत विश्व में जैव विविधता से सर्वाधिक सम्पन्न 12 देशों में से एक है जिसमें 12% वनस्पति प्रजातियाँ, 59000 कीट प्रजातियाँ, 2500 मत्सय प्रजातियों के साथ साथ विश्व की 7% लगभग 90000 जन्तु प्रजातियाँ जिनमें 4000 स्तनी पाये जाते हैं। हमारा देश पक्षियों की विविधता के लिए भी विख्यात है यहाँ विश्व की 12.5% पक्षी प्रजातियाँ पायी जाती हैं। बहुत सी वनस्पति तथा जीव प्रजातियाँ भारत की स्थानीय प्रजातियाँ हैं।

हमारे देश में वन लगाने की सीमा 3 लाख 26 हजार हेक्टेयर प्रतिवर्ष है, जबकि 15 लाख हेक्टेयर वन नष्ट हो रहे हैं यही स्थिति बनी रही तो कुछ दशकों में ही वन समाप्त हो जाएंगे। यह जानते हुए भी कि वन बहुत मूल्यवान हैं मानव ने अपना स्वार्थ साधने के प्रयास में वनों का लगातार दोहन किया है जिसके विनाशकारी परिणाम प्रत्यक्ष रूप में हमारे सामने हैं । सैलाब और भूकम्प का आना, पर्यावरण में विषैली गैसें घुलना, मनुष्य की अल्प-आयु, धरती पर पानी की विकट समस्या इसी के ही दुष्परिणाम हैं । तापमान में निरंतर वृद्धि के कारण ग्लेशियर पिघल रहे हैं तथा समुद्र का जल स्तर तेजी से बढ़ रहा है जिससे उसके समीपवर्ती क्षेत्रों में भयावह स्थिति उत्पन्न हो सकती है। औद्योगीकरण की क्रान्ति तथा शहरीकरण हेतु मानव द्वारा किए जा रहे अनावश्यक निर्वनीकरण से भारत में पर्यावरण पर गहरा संकट मंडराने लगा है ।

विकासशील देशों में वनों की कटाई मुख्य रूप से एक प्रतिस्पर्धी वैश्विक अर्थव्यवस्था के कारण है। वर्ल्ड वाइल्ड लाइफ फंड (WWF) द्वारा किए गए सर्वे के अनुसार, पृथ्वी हर साल 18.7 मिलियन एकड़ वनों को खो देती है। वैज्ञानिकों का अनुमान है कि सन 1960 से निर्वनीकरण होते रहने से विश्व का एक तिहाई वनक्षेत्र कम हुआ है। निर्वनीकरण (Deforestation) से वन्यजीवों का भोजन, आश्रय और प्रजनन आवास विखंडित हो जाता है । वृक्ष, वनस्पति एवं वनों द्वारा वाष्पीकरण प्रक्रियाओं के माध्यम से वायुमंडलीय नमी बनी रहती हैं। जल चक्र में परिवर्तन बहुत शुष्क और गर्म परिस्थितियों का कारण बनते हैं, जिससे वन्यजीव निवासों पर

ऋणात्मक प्रभाव पड़ता है। ऐसा होता रहा तो अगले 50 सालों में आधे से अधिक प्रजातियां लुप्तप्राय हो सकती हैं । एकत्रित आंकड़ों के अनुसार सर्वाधिक प्रजातियां उष्णकटिबंधीय वर्षावन में रहती हैं। नेशनल ज्योग्राफिक के अनुसार यदि इसी प्रकार वनो का दोहन होता रहा तो विश्व के वर्षावन आने वाले 100 वर्षों में समाप्त हो सकते हैं। जैव विविधता से सम्पन्न भारत के वनों को चैंपियन एवं सेठ (1968) ने 16 प्रकार से विभाजित किया है । पहाड़ी क्षेत्रों में वनों का होना पारिस्थितिकी सन्तुलन और पर्यावरणीय स्थिरता की दृष्टि से महत्वपूर्ण है। 1988 में बनाई गयी राष्ट्रीय वन नीति में इस बात पर बल दिया गया है कि देश के पहाड़ी क्षेत्रों में दो-तिहाई भौगोलिक क्षेत्र वनाच्छादित हो। पर्यावरण, वन और जलवायु परिवर्तन मंत्रालय (एम.ओ.ई.एफ.सी.सी.) द्वारा जारी की गयी भारतीय वन सर्वेक्षण (Forest Survey of India, FSI) की 'वन स्थिति रिपोर्ट (Indian State of Forest Report, ISFR) 2017 के अनुसार भारत में कुल वन आवरण 7,08,273 वर्ग किमी. है । देश में कुल 8021 वर्ग किमी. (80.20 मि. हेक्टेयर) वन क्षेत्र बढ़ा है जो 2015 की तुलना में 1% अधिक है। देश में वन एवं वृक्ष आच्छादन क्षेत्र 24.39 प्र.श. है जिसमें वन आच्छादित क्षेत्र 6778 वर्ग किमी. तथा वृक्ष आवरण 1243 वर्ग किमी. है। अति सघन वन क्षेत्रों में वृद्धि हुई है। वन स्थिति रिपोर्ट (2017) के अनुसार विश्व में विशालतम वन क्षेत्र वाले देशों (रूस, कनाडा, ब्राजील, अमेरिका, चीन, ऑस्ट्रेलिया, कोंगों, अर्जेन्टीना, इन्डोनेशिया, भारत) में भारत देश का दसवाँ स्थान है जबकि क्षेत्रफल विश्व के कुल भौगोलिक क्षेत्र का केवल 2.4 प्र.श. है।

भारत में वन क्षेत्र

वे (7) राज्य जिनमें 75% से अधिक वन क्षेत्र हैं मिजोरम, लक्षद्वीप, अण्डमान एवं निकोबार द्वीप समूह, अरुणाचल प्रदेश, नागालैण्ड, मेघालय, मणिपुर वे (8) राज्य जिनमें 33%-75% तक वन क्षेत्र हैं त्रिपुरा, गोआ, सिक्किम, केरल, उत्तराखण्ड, दादरा एवं नागर हवेली, छत्तीस गढ़, असम वे (5) राज्य जिनमें वन क्षेत्र में सर्वाधिक वृद्धि हुई है आन्ध्र प्रदेश (2141 वर्ग किमी.), कर्नाटक (1101 वर्ग किमी.), केरल (1043 वर्ग किमी.), ओडिसा (885 वर्ग किमी.), तेलंगाना (565 वर्ग किमी.) वे (3) राज्य जिनमें सर्वाधिक वन क्षेत्र हैं मध्य प्रदेश (77414 वर्ग किमी.), अरुणाचल प्रदेश (66964 वर्ग किमी.), छत्तीस गढ़ (55547 वर्ग किमी.), वे (3) राज्य जिनमें भौगोलिक (%) वन क्षेत्र सर्वाधिक है लक्षद्वीप (90.33%), मिज़ोरम (86.27%), अण्डमान एवं निकोबार द्वीप समूह (81.73%) वे (5) राज्य (उत्तर पूर्वी) जिनमें सर्वाधिक वन क्षेत्र घटा है मिजोरम (531 वर्ग किमी.), नागालैण्ड (450 वर्ग किमी.), अरुणाचल प्रदेश (190 वर्ग किमी.), त्रिपुरा (164 वर्ग किमी.), मेघालय (116 वर्ग किमी.) भारत का सर्वाधिक वन क्षेत्र उत्तरी पूर्वी क्षेत्रों के अंतर्गत (प्रत्येक 70% से अधिक) आता है। इन वनों में कमी का प्रमुख कारण कृषि क्षेत्र का बढ़ना, प्राकृतिक आपदा, शिफ्टिंग कल्टीवेशन तथा विकास क्रियाएँ हैं।

मेंग्रोव वनस्पति क्षेत्र

पारिस्थिकीय एवं जैव विविधता से परिपूर्ण मेंग्रोव समुद्र तटीय क्षेत्रों को सुनामी तथा भूमि के कटाव से सुरक्षा प्रदान करता है। ISFR-2017 के अनुसार देश में कुल मेंग्रोव विस्तार क्षेत्र 4921 वर्ग किमी. है। 2015 की तुलना में यह 181 वर्ग किमी. अधिक है। भारत के 12 राज्यों/केन्द्रशासित प्रदेशों (आन्ध्र प्रदेश, गोवा, गुजरात, कर्नाटक, महाराष्ट्र, ओडिशा, तमिलनाडु, पश्चिम बंगाल, अण्डमान एवं निकोबार, पुड्डुचेरी, केरल और दमन एवं दीव) में से 7 में मेंग्रोव क्षेत्र वृद्धि में सकारात्मक संकेत मिले हैं जिसमें महाराष्ट्र (82 वर्ग किमी.), आन्ध्र प्रदेश(37

वर्ग किमी.), गुजरात (33 वर्ग किमी.) में सर्वाधिक है।

वन स्थिति रिपोर्ट-2017 के अनुसार वन क्षेत्रों में जल निकायों (Water bodies) का क्षेत्रफल पिछले दशक की तुलना में 2647 वर्ग किमी. बढ़ा है जिसमें महाराष्ट्र (432 वर्ग किमी.), गुजरात (428 वर्ग किमी.) तथा मध्य प्रदेश (389 वर्ग किमी.) में सर्वाधिक वृद्धि हुई है। बांस के क्षेत्र में 2011 में किए अवलोकन की तुलना में 1.73 मि. हेक्टेयर की वृद्धि हुई है। कुल बांसयुक्त क्षेत्र लगभग 15.69 मि. हेक्टेयर है।

कितना हो वन आच्छादित क्षेत्र

देश के लगभग 24.39 प्र.श. (वन तथा वृक्ष आच्छादित) हिस्से पर ही वन हैं जबकि भारत की राष्ट्रीय वन नीति के अनुसार भू-भाग का 33 प्र.श. हिस्सा वनों से आच्छादित होना चाहिए। जो निर्धारित सीमा से कम है। देश के 15 राज्यों तथा केंद्र शासित प्रदेशों में 33 प्र.श. से अधिक क्षेत्र वन से सम्पन्न हैं। परंतु विकास परियोजनाओं के कारण यहाँ भी संकट मंडराने लगा है ।

वनों का महत्व तथा वन क्षेत्र घटने के दुष्परिणाम

वन देश का सौंदर्य तथा आय के प्रमुख स्रोतों में से एक हैं। वन वाटर शेड के रूप में जल संचित करते हैं, जिस कारण जैव विविधता समृद्ध होती है। वृक्षों की जड़ें गहराई में जाकर मिट्टी को बांधे रखती हैं, जिससे मृदा अपर्दन रुकता है और इस प्रकार मिट्टी की उर्वराशक्ति बनी रहती है। हम सभी जानते हैं कि स्वस्थ पारिस्थितिक तंत्र स्वस्थ पर्यावरण का सूचक है। वन कार्बन डाई आक्साइड सहित ग्रीन हाउस गैसों को अवशोषित करके पर्यावरण को शुद्ध करते हैं। पर्यावरण मंत्रालय द्वारा जारी की गयी रिपोर्ट के अनुसार देश में उत्सर्जित होने वाली 11.25 % ग्रीनहाउस गैसों (13.8 करोड़ टन कार्बनडाई आक्साइड) को जंगल अवशोषित करके भोजन (कार्बोहाइड्रेट, वसा, और प्रोटीन) का उत्पादन करते हैं, पर्यावरण को दूषित होने से बचाते हैं।

पशु, पक्षियों तथा पेड़ पौधों की लुप्तप्राय होती जा रही प्रजातियों से पारिस्थितिक तंत्र दृढ़ता खोता जा रहा है। जलवायु परिवर्तन (Climate change), सामूहिक कृषि, निर्वनीकरण , अधिक चराई (Over grazing), पेड़ काटना और जलाना, कृषि क्षेत्रों में विस्तार, शहरी विकास, वन्य-जीवन व्यापार, वायु एवं जल प्रदूषण, वनों में आग लग जाना (Forest fire) प्राकृतिक-वास विखंडन या छिन्न-भिन्न होना (Habitat loss & fragmentation) वन्यप्राणियों के साथ-साथ मानव जीवन के लिए भी बड़ा खतरा हैं। तेज़ी से बढ़ती जनसंख्या की आवश्यकताओं की पूर्ति (जैसे बांध, सड़क, उद्योग, ईंधन, मकान) के लिए मानव वन क्षेत्रों का चुनाव कर इन्हे अपने स्वार्थ के लिए निशाना बना रहा है जबकि इसके अस्तित्व को यही संकट में डाल रहा है, परिणामस्वरूप सूखे की स्थिति उत्पन्न हो रही है। घट रही वन वार्षिक दर देश की अर्थव्यवस्था के साथ साथ पर्यावरण के लिए एक बड़ी चुनौती बन कर सामने आ रही है।

संरक्षण हेतु वन नीतियां

वन न केवल किसी देश का एक महत्वपूर्ण भाग हैं बल्कि देश के वाणिज्यिक, आर्थिक तथा सामाजिक मूल्य इन पर आधारित होते हैं। वन नीतियां सरकार और लोगों के लिए दिशानिर्देश हैं इस बात का कि जैव विविविधता की लोगों को समझ हो, चिंता हो ताकि देश स्वच्छ, स्वस्थ और समृद्ध बना रहे।

आधिकारिक तौर पर भारत की प्राकृतिक संपत्ति को सर्वप्रथम पहचानने वाले अंग्रेज ही थे जिन्होंने 19वीं शताब्दी के उत्तरार्ध वन सुरक्षा हेतु नीति बनाने की प्रक्रिया शुरू की थी। उनकी योजना स्वार्थ आधारित थी क्योंकि उस समय लकड़ी का व्यापार प्रधान व आकर्षक था। उनकी नीतियों का उद्देश्य देश के संसाधनों का अधिकाधिक उपयोग करके खुद को लाभ में रखना था। देश में वन सुरक्षा हेतु वर्ष 1952

में राष्ट्रीय वन नीति बनाई गयी परंतु उद्देशों को पूर्ण नहीं कर पाने के कारण इसमें राष्ट्रीय वन नीति-1988 के रूप में संशोधन किया गया । वनों की सुरक्षा, संरक्षण, विस्तार तथा प्रबंधन से संबंधित बातों को ध्यान में रखते हुए यह नीति बनाई गयी है। वर्ष 1980 में निर्माण कार्य हेतु की जा रही वनों की अंधाधुंध कटाई रोकने और वन के अंतर्गत भूमिक्षेत्र के विचलन की जांच के लिए वन संरक्षण अधिनियम लागू किया गया। भारत सरकार ने अनुसूचित जनजातियों और अन्य पारंपरिक वनवासियों के लिए कानून (अधिकार अधिनियम, 2006) के माध्यम से वन-निर्भर लोगों को उनकी अर्थव्यवस्था में सुधार हेतु छोटे वन उपज का स्वामित्व सौंपा। राष्ट्रीय जैव विविधता अधिनियम (2002) के अंतर्गत जीवों की सुरक्षा हेतु बहुत से प्रोग्राम चलाये जा रहे हैं। वन तथा जैव विविधता संरक्षण हेतु भारत सरकार व्यापक स्तर पर कार्य नीति के तहत विभिन्न परियोजनाओं को संचालित कर रही है।

वन तथा जैवविविधता संरक्षण व शोध हेतु कुछ प्रमुख संस्थाएं/ संस्थान/ केंद्र

-इन्दिरा गांधी नेशनल फॉरेस्ट एकेडमी, देहारादून (Indira Gandhi National Forest Academy, Dehradun)

-नेशनल ज़ूलोजिकल पार्क, नयी दिल्ली (National Zoological Park, New Delhi)

-डायरेक्ट्रेट ऑफ फॉरेस्ट एजुकेशन (Directorate of Forest Education)

-वाइल्ड लाइफ क्राइम कंट्रोल ब्यूरो (Wildlife Crime Control Bureau)

-फॉरेस्ट सर्वे ऑफ इंडिया, देहारादून (Forest survey of India, Dehradun)

-द इंडियन काउंसिल ऑफ फोरेस्ट्री रिसर्च एंड एजुकेशन (The Indian Council of Forestry Research and Education)

प्राकृतिक संरक्षण के अंतर्राष्ट्रीय प्रयास

IUCN-WWF, IBP, UNEP- MAB, क्योटो (Green house gases के उत्सर्जन पर नियंत्रण हेतु) तथा मोण्ट्रेयल (CFCs के लिए) प्रोटोकॉल

संकट ग्रस्त पौधों के संरक्षण हेतु विधियां

जीन बैंक, क्रायोप्रिज़र्वेशन, इन सीटू तथा एक्स सीटू संरक्षण, ऊतक संवर्धन

जन साधारण द्वारा किए जाने वाले प्रयास

मानव वनों पर निर्भर हैं। वन ईधन, वायु, जल तथा पर्यटन आय के साथ साथ औषधि के भी अच्छे स्रोत हैं। वनों के बचाव, वन्य जीवों के रख-रखाव के लिए नीतियों और कानूनों का पालन करते हुए सभी लोगों को आपसी सामंजस्य के साथ मिलकर काम करना होगा। इस समस्या से निपटने के लिए आज आवश्यकता है एक ऐसे अभियान की जिसमें हम सब सक्रिय भागीदारी निभाएँ। वन संरक्षण एवं सतत विकास हेतु आदिवासियों का परंपरागत ज्ञान तथा उनकी कार्यशैली को ध्यान में रख कर ही वन्यप्राणी तथा जैव विविधता का संरक्षण हो सकेगा। स्वार्थ छोडकर वनों का सम्मान करना सीखना होगा तथा अपनी प्रकृति एवं व्यवहार में परिवर्तन लाना होगा।

वन तथा वन्य जीवों के अस्तित्व को बचाये रखने हेतु की जाने वाली क्रियाएँ

प्रत्येक व्यक्ति अधिक से अधिक तथा विभिन्न प्रजातियों का पौधारोपण करे। फलदार तथा औषधीय पौधों को बढ़ावा दे। वर्षा जल संग्रहण करे। जल का आवश्यकतानुसार उपयोग करे। जल स्त्रोतों को प्रदूषित होने से रोके। उद्योगों की स्थापना रिहायशी जगहों से दूर की जाए। रासायनिक कीटनाशकों के स्थान पर जैव कीटनाशकों का उपयोग किया जाए। निजी वाहनों के प्रयोग से बचा जाए। एसी. तथा बिजली उपकरणों का आवश्यकता से अधिक उपयोग नहीं किया जाए। प्रदूषण कम हो इस हेतु पवन ऊर्जा, सौर ऊर्जा और जल ऊर्जा उपकरणों तथा सीएनजी वाहनों का उपयोग हो,

बॉयो डीजल तथा जैविक खाद के लाभ बताकर इसके उपयोग के लिए लोगों को जागरूक किया जाए।

विश्व पर्यावरण दिवस

ममता पुरोहित, पूर्णिमा श्रीवास्तव एवं राजेश कुमार मिश्रा

उष्णकटिबंधीय वन अनुसंधान संस्थान
(भारतीय वानिकी अनुसंधान एवं शिक्षा परिषद, पर्यावरण, वन और जलवायु परिवर्तन मंत्रालय, भारत सरकार)
पो. ऑ. आर.एफ.आर.सी., मंडला रोड, जबलपुर (म. प्र.) – 482 021

दिन-प्रति-दिन बढ़ रहे पर्यावरण प्रदूषण और जनसंख्या के बोझ के कारण पर्यावरण संरक्षण विश्व में सभी के लिए चिंता और चुनौती का विषय बन गया है, चाहे वह आम आदमी हो, उद्योगपति हो, गैर सरकारी संगठन हो, पर्यावरणविद् हो या सरकार हो। पृथ्वी पर मानव जीवन और जैवविविधता को बचाने और सुरक्षित काने हेतु पर्यावरण को सुधारने एवं उसका संरक्षण करने के लिए पूरे जोर-शोर से विश्व स्तर पर प्रयास किये जा रहे हैं परन्तु अभी तक कोई ठोस परिणाम नहीं मिल पायें हैं। वायु प्रदूषण, जल प्रदूषण, मृदा प्रदूषण के साथ-साथ पिछले 50-60 वर्षों में पृथ्वी का तापमान भी 0.8 से 1.0 डिग्री सेल्सियस तक बढ़ा है। वैज्ञानिकों का मानना है कि यदि बढ़ती हुई ग्लोबलवार्मिंग को रोकने के लिए कारगर कदम नहीं उठाया गया तो प्रति दशक 2.0 डिग्री सेल्सियस तक तापमान बढ़ेगा। बढ़ते तापमान को रोकने के लिए विश्व के सभी देशों को ग्रीन हाउस गैसों के उत्सर्जन को कम करने के लिए दृढ़ संकल्पित होना पड़ेगा तभी पृथ्वी के बढ़ते तापमान के खतरे को 50 से 85 प्रतिशत तक कम करना संभव हो पायेगा। विश्व स्तर पर बढ़ती ग्लोबल वार्मिंग को रोकने के लिए संयुक्त राष्टऋ पर्यावरण कार्यक्रम के अन्तर्गत वर्ष 1972 में 5 जून का विश्व पर्यावरण दिवस के रूप में गठन सबसे सकारात्मक प्रयास है जो विश्व स्तर पर पर्यावरण के प्रति जागरूकता बढ़ाने तथा ध्यानाकर्षण के लिए किया गया तथा वर्ष 1973 से प्रतिवर्ष 5 जून को पूरे विश्व में मनाया जाता है। विश्व पर्यावरण दिवस के माध्यम से संयुक्त राष्टऋ पर्यावरण कार्यक्रम, पर्यावरण संबंधी मुद्दों को चिन्हित करने तथा सतत् एवं एक समान विकास के लिए प्रत्येक व्यक्ति को न केवल उसकी जिम्मेदारी से अवगत कराता है बल्कि उसकी सामर्थ्य को भी अनुभव कराने में सक्षम है।

विश्व पर्यावरण दिवस को पूरे विश्व के आम नागरिकों, गैर सरकारी संगठनों व सरकारों द्वारा विशाल समर्थन मिला । जैवविविधता के संरक्षण के महत्व के प्रति जागरूकता बढ़ाने के लिए एवं हरियाली को संरक्षित करने के लिए यह दिवस प्रत्येक वर्ष एक वार्षिक कार्यक्रम के रूप में मनाया जाता है जो पर्यावरण सुधार एवं संरक्षण के लिए सबसे बड़े व सार्वधिक विस्तृत रूप में विश्व स्तर पर मनाया जाता है। पूरी दुनिया में आम नागीरक

से लेकर सरकार तक पूरे वर्ष पर्यावरण से संबंधित गतिविधियों का कार्यान्वयन किया जाता है और 05 जून को पुनः हर्षोल्लास के साथ पर्यावरण दिवस मनाया जाता है। यह विश्व दिवस प्रत्येक नागीरक के लिए विशेष है उनको एक साथ आगे आने और स्वयं के तथा आने वाली पीढ़ियों के लिए एक साफ-स्वच्छ, हरे-भरे तथा प्रदूषण रहित पर्यावरणीय आवरण को सुनिश्चित करने के लिए। इसके लिए आवश्यकता है समस्याओं को पहचानने की और उनके निदान का उचित मार्ग निकालने की। विश्व पर्यावरण दिवस का मतलब पर्यावरणीय चुनौतियों जैसे जलवायु परिवर्तन, ग्लोबलवार्मिंग, प्राकृतिक आपदाऐं एवं संधर्ष, हानिकारक पदार्थ, पर्यावरणीय नियंत्रण, पारिस्थितकीय तंत्र का प्रबंधन एवं संसाधन /स्त्रोत सामर्थ्य आदि।

पर्यावरण के संरक्षण के लिए वर्ष भर संगठित कार्यक्रमों के आयोजन हेतु यह आवश्यक है कि सरकार लोगों को जागरूक करने के लिए गैर सरकारी संगठनों को साथ लेकर कारगर नीतियां बनाकर उनका कार्यान्वयन करें। नीतियों के कार्यान्वयन में आमजन की सहभागिता सुनिश्चित होना चाहिए। लक्ष्य प्राप्ति के लिए विश्व पर्यावरण दिवस पर पर्यावरण प्रदूषण रोकने के लिए प्रत्येक नागरिक ये संकल्प ले कि नीतियों के कार्यान्वयन में मैं पूरी निष्ठा के साथ अपनी जिम्मेदारी निभाऊँगा। हम सभी को चाहिए कि हम व्यक्तिगत स्तर पर, सामूहिक स्तर पर तथा सरकारी नीतियों के साथ अपने आस-पास के क्षेत्र और पर्यावरण को साफ एवं स्वच्छ रखने के लिए मिलजुल कर कार्य करें।

व्यक्तिगत प्रयासः-

1- नदी, तालाब, कुओं, बावडी आदि में पालीथीन, पूजा-पाठ की सामग्री, फूल-फल आदि न डालें।
2- जरूरत से ज्यादा पानी बर्बाद न करें।
3- पानी को व्यर्थ न बहने दें।
4- वारिश के पानी को भंडारित करने के लिए घरों आदि में वाटर हारवेस्टिंग सिस्टम की व्यवस्था करें।
5- पालीथीन एवं प्लास्टिक का उपयोग बंद करें और दूसरों को भी इसके दुश्परिणामों से अवगत करायें।
6- पब्लिक टऋांसपोर्ट का ज्यादा से ज्यादा उपयोग करें।
7- तेज आवाज में संगीत न बजायें।
8- जरूरत पड़नें पर ही हार्न का उपयोग करें।
9- सिगनल पर रेड लाइट होने पर अपने पेटऋाऽल/डीजल वाहन को बंद कर दें।
10-घर के गीले और सूखे कचरे को अलग-अलग कूड़ेदान में डालें।

11-सार्वजनिक स्थानों जैसे बस स्टेन्ड, रेल्वे स्टेशन, बाजार, बाग-बगीचों आदि में गंदगी न फैलायें और लोगों को गंदगी करने से रोकें।

12-घर व घर के आस-पास ज्यादा से ज्यादा पेड़-पौधें लगायें जायें।

संगठित प्रयासः- मिलकर कार्य करने के लिए आगे आयें संभावनायें अनंत हैं-

1- नदी और समुद्र तटों को साफ - स्वच्छ रखें।

2- भोजन को व्यर्थ न होने दें। यूनाइटेड नेशन्स के अनुसार फूड एन्ड एग्रीकल्चर आर्गेनाइजेशन (F.A.O.) की रिर्पोट है कि प्रत्येक वर्ष 1.3 बिलियन टन भोजन व्यर्थ हो जाता है साथ ही प्रत्येक 07 व्यक्तियों में से 01 व्यक्ति रात को भूखा सोता है। प्रतिदिन 05 वर्ष से कम उम्र के 20000 बच्चे कुपोषण से दम तोड़तें हैं।

3- पुनर्चक्रण की शुरूवात करें।

4- ई-कचरें के अवैध पुनर्चक्रण पर पूरी तरह रोक लगे क्योंकि इसे जलाने, गड़ाने व इकट्ठा करने में प्रकृति के साथ-साथ जीव मात्र को भी खतरा है। ई-कचरे से निपटने का सबसे अच्छा तरीका है। रिड्यूज, रियूज व रीसायक्ंिलग अर्थात् इलेक्टऋाWनिक्स को सावधानी और किफायत से इस्तेमाल करें। पुराने आइटम को बेच दें और जिन चीजों को ठीक न कराया जा सके उन्हें सही ढंग से रीसायक्ंिलग करायें।

5- ग्रीन इकोनॉमी के अर्न्तगत उन्नत व प्रदूषण न फैलाने वाले संसाधन लगाये जाऐं जिससे कार्बन का उत्सर्जन कम हो।

6- प्रतिवर्ष उपलब्ध भूमि में पौधा रोपण करें एवं उसकी सुरक्षा व वृद्धि के लिए बारी-बारी से संगठन के 4-5 व्यक्तियों का समूह बनाकर जिम्मेदारी सौंपी जाए।

7- जीवन दायिनी नदियों को प्रदूषित करने वाले नालों को रोका जाए। सीवेज वाटर टऋाटमेन्ट प्लान्ट लगाने स्थानीय सरकार को बताया जाए।

8- पर्यावरण संगोष्ठियों के माध्यम से स्थानीय दशाओं को ध्यान में रखते हुए वरिष्ठ पर्यावरणविदों के मार्गदर्शन में पर्यावरण सुधार एवं संरक्षण संबंधी गतिविधियों की रूप रेखा तैयार की जाए।

प्रोत्साहन हेतु-

1- जिन व्यक्ति, संस्थाओं आदि के द्वारा स्थानीय; जिला; संभाग; राज्य एवं राष्टऋ स्तर पर वर्ष भर पर्यावरण सुधार एवं संरक्षण की दिशा में उत्कृष्ट कार्य किया है उन्हें पुरूस्कृत किया जाये जिससे अन्य लोगों को प्रोत्साहन मिले।

2- समाचार पत्रों, पम्पलेट्स व सिटी केबिल (दूरदर्शन) के माध्यम से ग्राम; शहर; तहसील; जिला; राज्य एवं राष्टऋ स्तर आदि पर हो रही पर्यावरण सुधार एवं संरक्षण संबंधी गतिविधियों एवं व्यक्तियों तथा संगठनों की जानकारी देकर लोगों को जागरूक किया जाए एवं कार्ययोजनाओं में शामिल किया जाए। भारत वर्ष 2018 के विश्व पर्यावरण दिवस का मेजबान देश है । इस वर्ष का विषय है "Beat Plastic pollution" जिससे निपटने के लिए पूरा विश्व एक साथ मिलकर विरोध/युद्ध करेगा। यह संकल्प विश्व सरकारों, उद्योंगों, समुदायों और आम नागरिक को एक साथ मिलकर प्लास्टिक का सतत् एवं एकान्तर विकल्प खोजने के लिए प्रवृत करेगा तथा शीघ्रातिशीघ्र प्लास्टिक के उत्पादन को कम करने तथा नदियों एवं समुद्रों में प्रदूषण फैलाने वाले, जलीय जीवन को नुकसान पहुँचाने वाले तथा मानव जीवन को हानि पहुँचाने वाले तथा केवल एक बार उपयोग होने वाले पॉलीथीन के अत्यधिक उपयोग को कम करना होगा। प्लास्टिक हमारे जल और भोजन को प्रदूषित कर स्वास्थ्य संबंधी गंभीर समस्याऐं पैदा कर रहा है।

प्लास्टिक प्रदूषण के तथ्य-

1- प्रत्येक वर्ष पूरे विश्व में 05 ट्रिलीयन पॉलीथीन/प्लास्टिक बैग उपयोग किया जाता है।

2- प्रत्येक वर्ष कम से कम 13 मिलीयन टन पॉलीथीन/प्लास्टिक समुद्रों में पहुँचकर प्रदूषण फैलाता है।

3- विश्व में 50 प्रतिशत पॉलीथीन/प्लास्टिक केवल एक बार उपयोग कर फेंक दिया जाता है।

4- प्रत्येक मिनिट में 01 मिलीयन प्लास्टिक बोतल खरीदी जाती है।

5- कुल कचरे कर 10 प्रतिशत कचरा पॉलीथीन/प्लास्टिक से बना होता है।

Curry leaves (*Murraya koenigii* Spreng.)

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The name curry plant is often used for Heli-chrysum italicum (Aster-aceae), a relative of im-mortelle; several sub-species grow in the Euro-pean Medi-terranean countries. The essential oil shows considerable infraspecific variation; its main components are mono-terpene hydro-carbons (pinene, cam-phene, myrcene, limonene) and mono-terpene-derived alcohols (linalool, ter-pinene-4-ol, nerol, geraniol, also their ac-etates); further important aroma com-ponents are non-terpenoid acyclic β-ketones, which give rise to a somewhat dis-agreeable flavor.

Names in different languages

Botanical *Chalcas koenigii*

English Curry leaves

French Feuilles de Cari, Feuilles de Curry, Caloupilé (Réunion), Carripoulé (Ile Maurice)

German Curryblätter

Gujarati મીઠો લીમડો, Mitho limado

Hindi करीपत्ता, मीथ णीम, मीथ नीम पत्ता, Karipatta, Mitha nim, Mitha neem patta

Kannada ಕರಿ ಬೇವು, ಕರಿಬೇವು ಸೊಪ್ಪು, Karibevu, Karibevu soppu, Sinhal, Karapincha

Tamil கறூவேப்பிலை, கறிவேப்பிலை, Kariveppilai, Karuveppilai

Urdu کری پتہ, کریاپات, Kari patah, Kariapat

Murraya koenigii (L.) Spreng., is commonly found in the outer Himalayas, from the Ravi eastwards, ascending to 5,000 feet, in Assam, Chittagong, Upper and Lower Burma. It is also found in evergreen and deciduous forests of peninsular India, often as underwood (Brandis, 1906).

A small spreading shrub, about 2.5 metres high; the main stem, dark green to brownish, with numerous dots on it; its bark can be peeled off longitudinally, exposing the white wood underneath; the girth of the main stem is 16 cm.

Leaves, exstipulate, bipinnately compound, 30 cm long, each bearing 24 leaflets, having reticulate venation; leaflets, lanceolate, 4.9 cm long, 1.8 cm broad, having 0.5-cm-long petiole.

Flowers, bisexual, white, funnel-shaped, sweetly scented, stalked, complete, ebracteate, regular, actinomorphic, pentamerous, hypogynous, the average diameter of a fully opened flower being 1.12 cm; inflorescence, a terminal cyme, each bearing 60 to 90 flowers; calyx, 5-lobed, persistent, inferior, green; corolla, white, polypetalous, inferior, with 5 petals, lanceolate; length, 5 mm; androecium, polyandrous, inferior, with 10 stamens,

dorsifixed, arranged into circles of five each; smaller stamens, 4 mm. long whereas the longer ones, 5 to 6 mm; gynoecium, 5 to 6 mm long; stigma, bright, sticky; style, short; ovary, superior.

Fruits, round to oblong, 1.4 to 1.6 cm long, 1 to 1.2 cm in diameter; weight, 880 mg; volume, 895 microlitres; fully ripe fruits, black with a very shining surface; pulp, Wistaria blue 640/2; the number of fruits per cluster varying from 32 to 80. Seed, one in each fruit, 11 mm long, 8 mm in diameter, colour spinach green 0960/3; weight, 445 mg; volume, 460 microlitres.

The shrub is of common occurrence in Himachal Pradesh in areas lying between 800 and 1,450 metres above the sea level. Almost every part of this plant has a strong characteristic odour. The people of the plains, particularly of southern India, use the leaves of this plant as a spice in different curry preparations.

Flowering starts from the middle of April and ends in the middle of May. The peak flowering season under the Sanwara (H.P.) conditions was observed to be the last week of April. The fruiting season was observed to continue from the middle of July to the end of August. The peak fruiting season, however, was found to continue from the last week of July to the 1st week of August.

The average yield of a medium-sized bush was found to be 480 g in three to four pickings.

The pulp of the fruit contains 64.9 per cent moisture. The content of total soluble solids of the fruit juice is 16.8 per cent. The pulp contains 9.76 per cent total sugars, 9.58 per cent reducing sugars, 0.17 percent non-reducing sugars and almost a negligible amount of tannins and acidity. The vitamin C content of the fruit, which is 13.35 mg per 100 g of the pulp, is better than that of many fruits studied during the course of the present investigation.

The mineral content of the edible portion of the fruit, as represented by its ash, is 2.162 per cent. Similarly, 100 g of the edible portion of the fruit contains, protein, 1.97 g; phosphorus, 0.082 g, potassium, 0.811 g, calcium, 0.166 g; magnesium, 0.216 g; and iron, 0.007 g.

The leaves, the bark and the roots of *Murraya koenigii* (L.) Spreng. can be used as a tonic and a stomachic. The bark and the roots are used as a stimulant by the physicians. They are also used externally to cure eruptions and the bites of poisonous animals. The green leaves are stated to be eaten raw for curing dysentery, and the infusion of the washed leaves stops vomiting (Watt, 1891; Kirtikar and Basu, 1935; Dastur, 1962).

Strong odiferous oil occurs in the leaves and the seeds of Murraya koenigii (L.) Spreng. The chemical examination of this oil has been made by Nigam and Purobit (1961). Gautam and Purobit (1974) reported that this essential oil exhibited a strong antibacterial and antifungal activity. An alkaloid, murrayacinine, is also found in this plant (Chakrabarty et al., 1974).

The major part of the fruit is occupied by the seed and the edible portion is only 49.4 per cent of the whole fruit. The fruits are very sweet and are eaten fresh. They have a characteristic odour which makes them slightly unpleasant. The overall fruit quality is fair.

This curry herb is occasionally used for culinary purposes, but its fragrance is not alike to curry leaves at all. A curry leaf is compound and consists of up to 20 leaflets arranged in pairs along the middle rib. For cooking purposes, the leaflets are usually torn from the rib to facilitate eating; in recipes, ten curry leaves more often than

not refers to ten leaflets, or about one half to one full leaf. Since curry leaves lose their delicate fragrance soon after drying, you should try to obtain them fresh; don't waste your time with the dried stuff!

Fresh leaves are rich in an es-sen-tial oil, but the exact amount depends besides fresh-ness and genetic strain also on the ex-traction technique. Typical figures run from 0.5 to 2.7%.

The following aroma com-ponents, mostly sesqui-terpene hydro-carbons, have been identi-fied in curry leaves of Sri Lanka (in paren-theses, the content in mg/kg fresh leaves): β-caryo-phyllene (2.6 ppm), β-gurjun-ene (1.9 ppm), β-elemene (0.6 ppm), β-phel-landrene (0.5 ppm), β-thujene (0.4 ppm), α-selinene (0.3 ppm), β-bisa-bolene (0.3 ppm), further-more limonene, β-trans-ocimene and β-cadinene (0.2 ppm). (Phytochemistry, 21, 1653, 1982)

Recent work has shown a large variability of the composition of the essential oil of curry leaves. In North Indian plants, mono-terpenes prevail (β-phel-landrene, α-pinene, β-pinene), whereas South Indian samples yielded sesquiterpenes: β-caryo-phyllene, aroma-dendrene, α-selinene. (Flavour and Fragrance Journal, 17, 144, 2002)

The curry tree is native to India; today, it is found wild or culti-vated almost every-where in the Indian sub-continent excluding the higher levels of the Hima-layas, though it reaches the Inner Terai valleys in Nepal. In the East, its range extends into Burma.

The botanical name, *Murraya koenigii* refers to two 18th century botanists: the Swede Jo-hann Andreas Murray (1740–1791) and the German Jo-hann Ger-hard König (1728–1785).

The English term curry is of Indian origin: In Tamil, the most im-por-tant South Indian lan-guage, the word kari means soup or sauce; this is also the basis of the Tamil name for curry-leaves, kari-veppilai which contains ilai leaf. In English usage, curry has a wider meaning encom-passing not only spicy foods of various kinds, but also Indian-style spice mixtures (curry powder).

In North In-dian (Ar-yan) lan-guages, curry leaves are usu-ally de-noted by their Tamil name, or an adap-tation there-of, for example Hindi kari-patta [करीपत्ता] and or Bengali karhi-pat [কাঢ়িপাত] Curry-leaf, or Sinhala karapincha. The same first element is also found in Marathi kadhi-limb [कढीलिंब] (from limbu [लिंबू] lemon) and Kannada kari-bevu [ಕರಿಬೇವು], where second ele-ment bevu [ಬೇವು] desig-nates the nim tree (often spelled neem, Azadirachta indica), which has similar foliage. Cf. also the Sanskrit name girinimba [गिरिनिंब] mountain-neem. There is also the Hindi name mitha nim [मीथ णीम] sweet nim, where the adjective sweet refers to edibility in general.

The famous term curry was basically invented by the British as an um-brella term for all kinds of spicy main courses, and is based on a local South Indian name; never-the-less, it is now in use all over the Indian sub-continent. I guess that its wide accep-tance among Indians of very dif-ferent languages is due to a lucky co-inci-dence: Some Northern Indian lan-guages have culinary terms that sound similar, easing the adoption of the new word. In Nepali, veget-ables are called tarkari (e. g., in the name of the common food dal bhat tarkari lentils, rice and

vegetables), and in the North West, a flat heavy pan similar to a Chinese Wok is known as karhai.

Curry leaves are extensively used in Southern India and Sri Lanka (and are absolutely necessary for the authentic flavour), but are also of some impor-tance in Northern India. Together with South Indian immigrants, curry leaves reached Malaysia, South Africa and Réunion island. Outside the Indian sphere of influence, they are rarely found.

Curry pow-der is a British in-ven-tion to im-itate the flavour of Indian cooking with minimal effort. Some curry pow-ders, or so the books tell, in-deed con-tain curry leaves, but pro-bably only for histo-ric or lin-guistic reasons, since dried curry leaves lose their fragrance within days. A typical curry powder should derive its taste mainly from toasted cumin, toasted coriander, black pepper, chiles and toasted fenu-greek. Other typical Indian spices often contained in curry powders are dried ginger, ajwain and celery (as a sub-stitute for Indian radhuni), further-more salt, flour from lightly toasted lentils and aromatic Moghul spices in variable amounts (cinnamon, cloves, green cardamom, Indian bay-leaves). The yellow colour stems from turmeric. I think it's pretty unreasonable to put spices with absolutely no tradition in India into a spice blend that claims to have an Indian flavour, but nevertheless galangale, caraway, allspice, and zedoary are occasionally listed as ingredients in curry powders. Remember that since curry powder is not a traditional recipe, there is little consensus about what should go into it, and anyone is free to sell his own creation.

In Indian cuisines, curry leaves are used fresh. They develop their flavour best after a short heating; thus, they are often fried in butter or oil as a part of the spice mix that marks the beginning of a preparation and gives a unique flavour to the food (baghar, see onion); in South India, they are often employed in tarka-like preparation that flavour foods after cooking and just before serving (see ajwain). Since South Indian cuisine is dominantly vegetarian, curry leaves seldom appear in non-vegetarian food; the main applications are thin lentil or vegetable curries (sambaar), the typically South Indian dry curries, which consist just of vegetable pieces sautéed with spices, and also in some rice dishes like bisi bele (see coconut). In the North, they are mostly found in the stuffings for the crispy samosa. Because of their soft texture, they are never removed before serving, but can be eaten without any hazard.

Although cur-ry leaves real-ly must be fresh, they can be dried in a hot pan or deep-fried in fat im-media-tely be-fore usage; then, they will not only retain their fra-grance and dark green colour, but also ac-quire a very pleasant, crispy tex-ture. I'll never forget a South Indian beef fry which was pre-pared by Muslim cooks in Kar-nataka: Lean beef cubes were mari-nated with joghurt and a spice mix quite similar to the blends used for North Indian tandoori foods; then, they were deep-fried and mixed with crispy curry leaves. This type of usage is, however, mostly found in Sri Lanka, for example in the national rice dish buriyani, a mild rice flavoured with turmeric and other spices and usually served with chicken pieces. Hot-dried or deep-fried curry leavs can also be ground to a fragrant powder and may appear in spice blends, but their fragrance will not last very long.

In Sri Lanka, the delicious chicken and beef curries are flavoured with curry

leaves; the leaves are further-more used for kottu roti, vegetables and sliced bread which are quickly fried together. Sri Lankan cooking is very hot and pungent due to almost excessive use of chiles, but also very aromatic. Compared to Indians, Sri Lankans eat more meats and less dairy products; meats and vegetables are often cooked in gravies based on water or thin coconut milk instead of yoghurt.

The typical Sri Lankan flavour is due to heavy toasting some spices (cumin, coriander, black mustard, fenu-greek) until they reach a rather dark colour; it is often said that Sri Lankan curries have a darker or browner flavour than Indian curries. Sri Lankan cooks often use aromatic spices native to the island (cinnamon, cardamom) and fresh leaves (curry leaves, Pandanus leaves and lemon grass; the latter two are not in common use in India).

Curry leaves may be kept in the refrigerator for some time, but are better kept frozen; do not tear them from their stems before usage!

The term curry is applied inflationary to many dishes of Far Eastern ori-gin. As shown above, in its true home South India it means a thin, spicy veg-etable stew. In Thai-land, though, any food cooked in coco-nut milk is called a curry (gaeng [แกง]); the term is simi-larly used in Viet-nam, where cur-ries, see rice paddy herb) are in-deed often flavored with Anglo–Indian curry powder. Laksa, a soupy noodle dish from Malaysia and Singa-pore, is often referred to as curried noodles or the like, probably, because it contains coconut and derives the familiar yellow colour from turmeric (see Viet-namese coriander for details about laksa).

In Burma, how-ever, a com-plete-ly dif-ferent de-fini-tion of curry is in use: Bur-mese curries owe their flavor to a fried paste of ground onions and other spices (see onion for details). Lastly, in Indo-nesia, any spicy food may be termed a curry (Kari in Indo-nesian). Some-times, one even hears about Ethiopian (see long pepper) or Caribbean curries, whatever this may mean (except, perhaps, the least common denomi-nator of all those: Spiciness).

The shiny-black fruits are liked both by children and adults. As revealed by the chemical composition of the fruits, they are very nutritious. The leaves are used as a spice in different curries and impart a very good flavour to the preparations. These fruits have also many medicinal properties.

The branches of *Murraya koenigii* are very popular for cleaning the teeth as datun and are said to strengthen the gums and the teeth.

This plant is quite ornamental due to its compound leaves. It can, therefore, be used as a hedge and as an ornamental shrub.

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Carnivorous plants: Amazing to know

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Abstract

Plants are autotrophic in nature. But, are they always autotrophic? No, they are heterotrophic as well. The heterotrophic mode of nutrition is having full variety into it. There are plants as well as animals which follow the same. When we discuss heterotrophism in plants we speak about Symbiotic, partial parasitic, holoparasitic and insectivorous plants. Insectivorous plants are called Carnivorous plants also as they kill the prey and digest for the nutritional purposes. The current article throws light upon carnivorous type of plants.

Keywords: Carnivorous, heterotrophic, Heliamphora chimantensis, pitcher plant, Droseraceae, anti-fungal drugs.

Introduction

The nature is full of amazing facts and the world of plants is one step ahead in this context. Our eyes are blessed to see this beautiful and wonderful world. From the box of these amazing things we have the world of carnivorous plants. The word "Carnivorous Plants" really sounds like somewhat wondersome as the plants are basically autotrophic in nature which is considered to be very gentle in their behaviors. But, the fact is that there are some of the plants which have the aggressive nature.

Darlingtonia californica: The small entrance to the trap underneath the swollen "balloon" and the colorless patches that confuse prey trapped inside.

Carnivorous plants are plants that derive some or most of their nutrients (but not energy) from trapping and consuming animals or protozoans, typically insects and other arthropods. Carnivorous plants

have adapted to grow in places where the soil is thin or poor in nutrients, especially nitrogen, such as acidic bogs. Charles Darwin wrote Insectivorous Plants, the first well-known treatise on carnivorous plants, in 1875. True carnivore is thought to have evolved independently nine times in five different orders of flowering plants and is represented by more than a dozen

genera. This classification includes at least 583 species that attract, trap, and kill prey, absorbing the resulting available nutrients additionally, over 300 proto-carnivorous plant species in several genera show some but not all of these characteristics.

What the plants do for trappingor attracting other insects/prey?

The mechanism of trapping in carnivorous plants is wonderful. Different plants in this category use different ways of capturing the prey. This trapping/capturing is basically done for nutritional purpose. The pitchers ofHeliamphorachimantensis are the best examples of pitfall traps.Five basic trapping mechanisms are found in

An upper pitcher of Nepenthes lowii, a tropical pitcher plant that supplements its carnivorous diet with tree shrew droppings

carnivorous plants.

Pitfall traps (pitcher plants)

Trap prey in a rolled leaf that contains a pool of digestive enzymes or bacteria. Once the prey is captured the walls of pitcher body begin to release certain kind of enzymes which digest the organic matter of the prey body.Pitcher plants capture insects by luring them into a pitfall trap — a cupped leaf with a waxy, slippery interior that makes it difficult to climb out. A soup of digestive fluids sits at the bottom of this chamber and breaks down the flesh and exoskeletons of

The leaf of a Drosera capensis bending in response to the trapping of an insect

prey.Australian, Asian and American pitcher plants possess these features despite having evolved independently to become carnivores, as Albert and colleagues discovered in a 1992 study published in the journal “Science”.

Flypaper traps

Use sticky mucilage.

Snap traps

Utilize rapid leaf movements.

Bladder traps

Suck in prey with a bladder that generates an internal vacuum.

Lobster traps

Also known as eel traps, force prey to move towards a digestive organ with inward-pointing hairs.

These traps may be active or passive, depending on whether movement aids the capture of prey. For example, Triphyo-phyllum is passive flypaper that secretes mucilage, but whose leaves do not grow or move in response to prey capture. Meanwhile, sundews are active flypaper traps whose leaves undergo rapid acid growth, which is an expansion of individual cells as opposed to cell division. The rapid acid growth allows the sundew

tentacles to bend, aiding in the retention and digestion of prey.

Ecology and Evolution of carnivorous plants

Carnivorous plants also contribute to the world of Ecology and it is significant. They play an important role in building the balance in nature, they are widespread but rather rare. They are almost entirely restricted to habitats such as bogs, where soil nutrients are extremely limiting, but where sunlight and water are readily available. Only under such extreme conditions is carnivore favored to an extent that makes the adaptations advantageous.Almost all carnivorous plants have a basically similar ecology and several different species are often found growing almost side by side. They are most likely to be found in swamps, bogs, damp heaths and muddy or sandy shores. Drosophyllumlusitanicum from Portugal and Morocco is the one exception; it grows on dry gravelly hills. Like other green plants, carnivorous plants contain the organic pigment chlorophyll. This pigment helps to mediate a chemical process called photosynthesis. This converts light energy into the chemical bond energy of carbohydrate which is utilized as cellular energy, plant growth and development. Water, carbon dioxide, nutrients and minerals are also needed for survival. In wetlands, wherewater stagnates contains acidic compounds and chemicals from decaying organic matter many plants have a difficult time obtaining necessary nutrients. It is in these nutrient poor conditions that some plants evolved different ways of obtaining nutrients

The archetypal carnivore, the Venus flytrap, grows in soils with almost immeasurable nitrate and calcium levels. Plants need nitrogen for protein synthesis, calcium for cell wall stiffening, phosphate for nucleic acid synthesis, and iron for chlorophyll synthesis. The soil is often waterlogged, which favors the production of toxic ions such as ammonium, and its pH is an acidic (4 to 5). Ammonium can be used as a source of nitrogen by plants, but its high toxicity means that concentrations high enough to fertilize are also high enough to cause damage.

The above discussion takes us to a conclusion that carnivorous plants show a type of evolution. It's a way of adapting itself to the harsh of difficult life when the nutrients are not available in enough quantity by normal mode of nutrition. Living beings whether plants are animals they always tend to evolve and adapt themselves as per the changing conditions of environments.

Classification

The classification of all flowering plants is currently in a state of flux. In the Cronquist system, the Droseraceae and Nepenthaceae were placed in the order Nepenthales, based on the radial symmetry of their flowers and their possession of insect traps. The Sarraceniaceae was placed either in the Nepenthales, or in its own order, the Sarraceniales. The Byblidaceae, Cephalotaceae, and Roridulaceae were placed in the Saxifragales; and the Lentibulariaceae in the Scrophulariales (now subsumed into the Lamiales. In more modern classification, such as that of the Angiosperm Phylogeny Group, the families have been retained, but they have been redistributed amongst several disparate orders. It is also recommended that Drosophyllum be considered in a monotypic family outside the rest of the Droseraceae, probably more closely allied to the Dioncophyllaceae.

Medicinal uses

A study published in 2009 by researchers from Tel Aviv University indicates that secretions produced by carnivorous plants contain compounds that have anti-fungal properties and may lead to the development of a new class of anti-fungal drugs that will be effective against infections that are resistant to current anti-fungal drugs.

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