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:
by e-mail to vansangyan_tfri@icfre.org
or, through post to The Editor, Van Sangyan,
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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 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 waterlogged 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 root 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 bamboo 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. केरवा चावल बन्द के क्षेत्र में हुआरी नहारारिता. 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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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

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 et al., 2016). The specimens were deposed 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)

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

Fruitbody, 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](image_url)
Discussion

Amylosporus campbellii 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 et 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 2-3 Amylosporus campbellii: mature fruit-bodies in habit

Figure 4 Amylosporus campbellii: hyphae and basidia attached with developing basidiospores
Figure 5 *Amylosporus campbellii*: hyphae and basidia with sterigmata

Figure 6 *Amylosporus campbellii*: basidiospores

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

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References


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, 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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Forest Survey of India (FSI) 2015. India State of Forest Report, Ministry of Environment, Forest and Climate change.


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. Sporangiohores 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,

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

Collection examined


**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
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. *indicata* 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

मंसूर अहमद1, रविशंकर मठाने2, संदीप कुमार3 एवं जयप्रकाश मिश्र4

1वन की उद्योजन प्रभाग
23अकांड वन उद्योजन प्रभाग
4आनुवांशिक एवं मान्य प्रजनन प्रभाग
उपायकेंद्रीय वन अनुसंधान संस्थान
(भारतीय वाणिज्यिक अनुसंधान एवं शिक्षा परिषद, पर्यावरण, वन और जलवायु परिवर्तन मंत्रालय, भारत सरकार)
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मानव प्राचीन काल से अपने जीवन यापन की समस्त आवश्यकताओं की पूर्ति हेतु बनों पर निर्भर रहा है। बनों से विभिन्न उपयोगी पदार्थों के साथ औषधियां भी प्राप्त होती हैं। परिपक्वता स्वाभाविक का कारण मानव का वृद्धि के प्रति हमेशा से प्रेरणा आदर का भाव रहा है। वनों के सींडर्स से प्रभावित होने के कारण प्रजातियों ने अंततः रचनाओं में समय-समय पर इसका विविध भी माना है। विश्व के कुल भूमि क्षेत्रफल का 30% हिस्सा वनों से आक्षेपित है। 10 मिलियन से अधिक प्रजातियों पूरे विश्व में पेड़ पौधों, जंतुओं तथा मूषम जीवितों की खाद्य जाती हैं। इसमें लगभग 40 हज़ार प्रजातियों का उपयोग प्रतिदिन दैनिक जीवन में मानव द्वारा किया जाता है।

भारत विश्व में जैव विविधता से सर्वाधिक समझदारी 12 देशों में से एक है। जिसमें 12% बनसपूत प्रजातियों, 59000 कीट प्रजातियों, 2500 मस्से प्रजातियों के साथ साथ विश्व की 7% लगभग 90000 जंतु प्रजातियों जिनमें 4000 स्तरी पाये जाते हैं। हमारा देश पक्षियों की विविधता के लिए भी विश्व प्रतिभा है। विश्व की 12.5% पक्षि प्रजातियों पायी जाती है। बहुत सी बनसपूत तथा जीव प्रजातियों भारत की स्थानीय प्रजातियों हैं।

हमारे देश में वन लगाने की सीमा 3 लाख 26 हज़ार हेक्टेयर प्रतिवर्ष है, जबकि 15 लाख हेक्टेयर वन नष्ट हो रहे हैं। यही स्थिति बनी रही तो कुछ दशकों में ही वन समाप्त हो जाएगी। इसे जानते हुए भी कि वन बहुत मूल्यवान हैं। मानव ने अपना स्वार्थ साधने के प्रयास में वनों का नष्ट होना दोहन किया है। जिसके विनाशकारी प्रतिकृति प्रयास के रूप में हमारे सामने हैं।

1960 के अनुसार भारतीय वनों का आकार, पर्यावरण में विशेष वृद्धि है। 1987 में वन तथा जीव प्रजनन प्रभाग ने वनों की विविधता के लिए जाते हुए वनों को प्रतिष्ठित किया।

विविधता देश में बनों की कटाई मूल्य रूप से एक विस्तार-धर्मी वैश्विक अर्थव्यवस्था के कारण है। झील बाल्टिक लाइव फंड (WWF) द्वारा किए गए सर्वे के अनुसार, पृथ्वी हर साल 18.7 मिलियन एकड़ बनों को खो देती है। हमारी जीवनीकरण की प्राप्ति का शहर अनुसार निविदनकरण से भारत में पर्यावरण पर गहरा संकेत मंडराने लगा है।

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The forest survey of India (FSI) or Indian state forest report (ISFR) 2017, is the third national forest resource assessment of India, conducted between 2015 and 2016. The survey covers all types of forests and forested land, including plantations, scrub, and degraded land. The survey was conducted in all 29 states and seven union territories of India.

The survey estimated the forest area to be 750.81 million hectares, which is an increase of 9.84 million hectares from the previous national forest survey in 2007. The forest cover was estimated to be 20.2% of the country's land area, an increase of 1.43 percentage points from the previous survey.

The survey also estimated the biomass of standing forest biomass to be 14.4 gigatons of carbon (GtC), which is an increase of 1.6 GtC from the previous survey. The survey also estimated the forest carbon stock to be 7.8 gigatons of carbon (GtC), which is an increase of 0.4 GtC from the previous survey.

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The survey was conducted by the Ministry of Forests, Government of India, in collaboration with the Ministry of Environment and Forests, and the Ministry of Science and Technology.

The survey is a key component of India's efforts to mitigate climate change and achieve the goals of the Paris Agreement. The survey provides a basis for the implementation of the country's Nationally Determined Contributions (NDCs) and the achievement of the United Nations Sustainable Development Goals (SDGs).

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Water bodies, 24.39–33

Climate change), Overgrazing), Forest fire) Habitat loss & fragmentation) बांध, जिल्ला (Forest fire) प्राकृतिक-वास विविधता या छिल्ला-भिंत्री होना (Habitat loss & fragmentation) वन्यप्राणियों के साथ-साथ मानव जीवन के लिए भी बड़ा बदल रहा है। तेज़ी से बढ़ती जनसंख्या की आवश्यकताओं की पूर्ति (जैसे बांध, जिल्ला, इलाक़े, ऐंडर, मकान) के लिए मानव वन क्षेत्रों का चुनाव कर इसके अन्य स्थान के लिए निशाना बना रहा है जबकि इसके अस्तित्व को यही संकट में डाल रहा है: परिवर्तन स्वीकार नहीं की स्थिति उत्पन्न हो रही है। बांध रहे वन बांधिक दर देश की अर्थव्यवस्था के साथ साथ पर्यावरण के लिए, एक बड़ी जीवन बन कर सामने आ रही है।

संरक्षण हेतु वन नीतियाँ वन न केवल किसी देश का एक महत्वपूर्ण भाग हैं बल्कि देश के वाणिज्यिक, आर्थिक तथा सामाजिक मूल्य इन पर आधारित होती हैं। वन नीतियाँ सरकार और लोगों के लिए विशालनिदेश हैं इस बात की कि जैव विविधता की लोगों के सामने भिंत्री हो ताकि देश स्वच्छ, स्वस्थ और समृद्ध बना रहे।

आधिकारिक तौर पर भारत की प्राकृतिक संपत्ति को सर्वप्रथम पहचानने बाले 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 प्रख्यात व आकार क्षैति था। उनकी नीतियों का उद्देश्य देश के संसाधनों का अधिकाधिक उपयोग करके बुद्ध की लाभ में रखना था। देश में वन सुरक्षा हेतु वर्ष 1952
IUCN- WWF, IBP, UNEP- MAB, क्लिमेट (Green house gases के उत्सर्जन पर नियंत्रण हेतु) तथा मोण्डल (CFCs के लिए) प्रोटोकॉल संकट प्रस्त पैमाने के संरक्षण हेतु विभिन्न जीव बैंक, क्राउप्रिजेव, इन सी मू तथा एक्स मी रंग संरक्षण, उठत संवर्धन जन साधारण द्वारा किए जाने वाले प्रयास मानव बनों पर निर्भर है। वन ईंधन, बायो, जन तथा पर्यटन आय के साथ साथ औपचारिक के भी अच्छे सितों हैं। बनों के बचाव, वन्य जीवों के रख-रखाव के लिए नीतियों और कानूनों का पालन करते हुए सभी लोगों को आपसी सामयिक के साथ मिलकर काम करना होगा। इस समस्या के निपटने के लिए आज आवश्यकता है एक ऐसे अभियान की जिसमें हम सब सहकर भागीदारी करेंगे। बन संरक्षण एवं संरक्षण हेतु आविष्कारों का परंपरागत ज्ञान व उनकी कार्यवाही को ध्यान में रख कर ही व्यन्याणात्मा अथवा जैव विभिन्नता का संरक्षण ही रहेगा। स्वयं छोड़कर बनों को सम्मान करता सीखना होगा तथा अपनी प्रकृति एवं व्यवहार में परिवर्तन लाना होगा।

बन तथा वन्य जीवों के अस्तित्व को बचाये रखने हेतु की जाने वाली क्रियाएं प्रत्येक व्यक्ति अथवा अतिरिक्त तथा विभिन्न प्रजातियों का पौधारोपण करें। फलदार, तथा औषधीय पौधों को बढ़ावा दें। वर्षा जल संपादन करें। जल का आवश्यकतात्मक उपयोग करें। जल खोजों को प्रौद्योगिक क्रियाओं से रोके। उद्योगों की स्वापनात्मक रिश्तेश्वरी जगहों से दूर की जाए। राजस्वाधिकारी केन्द्रों के रूप में रीतितवादों का उपयोग किया जाए। निजी बांटनों के प्रचार से बना जाए। दूसरी तथा बिजली उत्पादन का आवश्यकता से अधिक उपयोग नहीं किया जाए। प्रौद्योगिक क्रम ही इस हेतु पतन ऊर्जा, सौर ऊर्जा और जल ऊर्जा उपकरणों तथा सीएनजी बांटनों का उपयोग हो।
वायु डीजल तथा जैविक खाद के लाभ बताकर जाए।
इसके उपयोग के लिए लोगों को जागरूक किया
विश्व पर्यावरण दिवस

ममता पुरोहित, पूर्णिमा श्रीवास्तव एवं राजेश कुमार मिश्रा

उपन्यासिक वन अनुसंधान संस्थान
(भारतीय वनाञ्जी अनुसंधान एवं शिक्षा परिषद, पर्यावरण, वन और जलवायु परिवर्तन मंत्रालय, भारत सरकार)

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विश्व-प्रति-दिन बढ़ रहे पर्यावरण प्रदूषण और जनसंख्या के बढ़ने के कारण पर्यावरण संरक्षण विधि में सभी के लिए चिंता और चुनौती का विषय बन गया है, जहाँ वह आम आदमी हो, उच्च-माध्यमिक हो, गैर सरकारी संगठन हो, पर्यावरणविद् हो या सरकार हो। पृथ्वी पर मानव जीवन और जैविक विभिन्नता को बचाने और सुरक्षित करने हेतु पर्यावरण को सुधारने एवं उसका संरक्षण करने के लिए पूरे जीर्ण-शोर से विश्व स्तर पर प्रयास किये जा रहे हैं। परन्तु अभी तक कोई दोस्त परिणाम नहीं मिल पायें हैं। वायु प्रदूषण, जल प्रदूषण, मूद्रा 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 दूर 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 राष्ट्र वर्तनी कार्यक्रम के अंतर्गत वर्ष 1972 में 5 जून का विश्व पर्यावरण दिवस के रूप में गठन सबसे सकारात्मक प्रयास है जो विश्व स्तर पर पर्यावरण के प्रति जागृति 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 राष्ट्र वर्तनी कार्यक्रम, पर्यावरण संबंधी मुद्दों को विनिमय करने तथा सतर्क एवं संदेश विकास के लिए प्रतिष्ठित व्यक्ति को न केवल अपनी जिम्मेदारी से अवरुद्ध करता है बल्कि उसकी सामर्थ्य को भी अनुभव कराने में सहम है।

विश्व पर्यावरण दिवस को पूरे विश्व के आम नागरिकों, गैर सरकारी संगठनों एवं सरकारों द्वारा विभिन्न समर्थन मिला। जैविक विभिन्नता के संरक्षण के महत्व के प्रति जागृति बढ़ाने के लिए एवं हरियाली को संरक्षित करने के लिए यह दिवस प्रत्येक वर्ष एक महत्वपूर्ण कार्यक्रम के रूप में मनाया जाता है। जो पर्यावरण सुधार एवं संरक्षण के लिए सबसे बड़े एवं सार्वजनिक वित्तीय रूप में विश्व स्तर पर मनाया जाता है। पूरी दुनिया में आम नागरिक
से लेकर सरकार तक पूरे वर्ष पर्यावरण से संबंधित गतिविधियों का कार्यान्वयन किया जाता है और 05 जून को पूनः हस्ताक्षर के साथ पर्यावरण दिवस मनाया जाता है। यह विषय दिवस प्रत्येक नागरिक के लिए विशेष है उनको एक साथ आगे आने और स्वयं के तथा आने वाली पीढ़ियों के लिए एक साफ-स्वच्छ, हुरे-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।

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 कार्य करनेवाली नीतियां बनाकर उनका कार्यान्वयन करें। नीतियों के कार्यान्वयन में आमजन की सहभागिता सुनिश्चित होना चाहिए। लक्ष्य प्राप्ति के लिए विषय दिवस पर पर्यावरण प्रदूषण रोकने के लिए प्रत्येक नागरिक ये संकल्प ले कि नीतियों के कार्यान्वयन में मैं पूरी निश्चित के साथ अपनी जिम्मेदारी निभाओगा।

हम सभी को चाहिए कि हम व्यक्तिगत स्तर पर, सामुदायिक स्तर पर तथा सरकारी नीतियों के साथ अपने दांत-पास के क्षेत्र और पर्यावरण को साफ एवं स्वच्छ रखने के लिए मिलजुल कर कार्य करें।

**व्यक्तिगत प्रयास:**

1. नदी, तालाब, कुओं, बाबड़ी आदि में पालीचीन, पूजा-पाठ की सामग्री, फूल-फल आदि न डालें।
2. जरूरत से ज्यादा पानी बर्बाद न करें।
3. पानी का व्यर्थ न बनाएं।
4. बारिश के पानी को बंदित करने के लिए घरें आदि में बाटर हार्वेस्टिंग सिस्टम की व्यवस्था करें।
5. पालीचीन एवं प्लास्टिक का उपयोग बंद करें और इससे बहुत अधिक सुविधाओं से अवगत करनें।
6. पद्धतिक तेक्सासपीर्ट का ज्यादा से ज्यादा उपयोग करें।
7. तेज आवाज में संगीत न बजायें।
8. जरूरत पड़ने पर ही हार्म न का उपयोग करें।
9. सिमलान पर रेड लाइट होने पर अपने पेट्रोल/डीजल वाहन को बंद करें।
10. घर के गीले और सूखे कचेरे को अलग-अलग कूदेदार में डालें।
11-सार्वजनिक स्थानों जैसे बस स्टेंड, रेलवे स्टेशन, बाजार, बाग-बगीचों आदि में गंदगी न फैलायें और लोगों को गंदगी करने से रोकें।
12-पर व पर के आस-पास ज्यादा से ज्यादा पेड़-पीपीं लगायें जायें।

संगठित प्रयास:- 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। गृहगाढ़ी नेशनल के अनुसार पूंड इंडे एथलीट्स आर्गुनाइजेशन (F.A.O.) की रिपोर्ट 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। प्रतिवर्ष 05 वर्ष से कम उम्र के 20000 बच्चे कुपोषण से दम तोड़ते हैं।
3- पुनर्निर्माण की शुरुआत करें।
4- ई-कंपनी के अवैध पुनर्निर्माण पर फूटी तरह रोक लगें क्योंकि इसे जलाने, गड़ने व इकट्ठा करने में प्रकृति के साथ-साथ जीव मात्र को भी खतरा है। ई-कंपनी से निपटने का सबसे अच्छा तरीका है। रिक्यूज़, रियूज़ व रीसायकलिंग अर्थात् इलेक्ट्रिकल विक्स को सावधानी और किफायत से इस्तेमाल करें। पुराने आइटम को बच्चे दें और जिन चीजों को ठीक न कराया जा सके उन्हें सही ढंग से रीसायकलिंग करायें।
5- ग्रीन इकोनॉमी के अन्तर्गत उद्योग व प्रौद्योगिकी न फैलायें बाले संसाधन लगायें जाएं जिससे कार्बन का उत्सर्जन कम हो।
6- प्रतिवर्ष उपलब्ध भूमि में पौधा रोपण करें एवं उसकी सुरक्षा व बृद्धि के लिए बारी-बारी से निर्माण के 4-5 व्यक्तियों का समूह बनाकर जिम्मेदारी सीधी जाए।
7- जीवन धारित निदानों को प्रदूषित करने वाले नानाओं को रोका जाए। सीवेज बाटेर ट्यूबहेंटमेंट प्लांट लगाने स्थानीय सरकार को बताया जाए।
8- पर्यावरण संगठनों के माध्यम से स्थानीय दशाओं को ध्यान में रखते हुए विरोध पर्यावरणविदों के मार्गदर्शन में पर्यावरण सुधार एवं संरक्षण संबंधी गतिविधियों की रूप रेखा तैयार की जाए।

प्रोत्साहन हेतु:

1- जिन व्यक्ति, सर्वसाधारण आदि के द्वारा स्थानीय; जिला; संघ; राज्य एवं राष्ट्र में प्रयावरण सुधार एवं संरक्षण की दिशा में उत्कृष्ट कार्य किया है उन्हें पुरस्कृत किया जाये जिससे अन्य लोगों को प्रोत्साहन मिले।

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2- समाचार पत्रों, पम्पलेट्स व सिटी केबल (दृश्य) के माध्यम से ग्राम; शहर; तहसील; जिला; राज्य एवं राष्ट्रीय स्तर आदि पर हो रही प्लास्टिक प्रदूषण सूचार एवं संरक्षण संबंधी गतिविधियों एवं व्यक्तियों तथा संगठनों की जानकारी देकर लोगों को जागरूक किया जाए एवं कार्योत्तरों में शामिल किया जाए।

भारत वर्ष 2018 के बिंदु पर्यावरण दिवस का मेजबान देश है। इस वर्ष का शि योजना है "Beat Plastic pollution" जिससे निपटने के लिए पूरा विश्व एक साथ मिलकर जिराध/युद्ध करेगा। अब संरक्षण खोजने के लिए प्रवृत्त करेगा तथा शीमालीय प्लास्टिक के उपयोग को कम करने तथा नहीं एवं समुद्रों में प्रदूषण फैलाने वाले, जलीय जीवन को नुकसान पहुँचाने वाले तथा वातावरण की हानि पहुँचाने वाले तथा केबल एक बार मिलकर होने वाले पौधों के अत्यधिक उपयोग को कम करना होगा। प्लास्टिक हमारे जल और भोजन को प्रदूषित कर स्वास्थ्य संबंधी गंभीर समस्याएं उत्पन्न कर रहा है।

प्लास्टिक प्रदूषण के तथ्य:

1- प्रत्येक वर्ष पूरे विश्व में 05 ट्रिलियन पौधों/प्लास्टिक बैग उपयोग किया जाता है।
2- प्रत्येक वर्ष कम से कम 13 मिलियन टन पौधों/प्लास्टिक समुद्रों में पहुँचकर प्रदूषण फैलाता है।
3- विश्व में 50 प्रतिशत पौधों/प्लास्टिक केबल एक बार उपयोग कर केबल दिया जाता है।
4- प्रत्येक मिनिट में 01 मिलियन प्लास्टिक बोतल खरीदी जाती है।
5- कुल करने कर 10 प्रतिशत कचरा पौधों/प्लास्टिक से बना होता है।

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Curry leaves (*Murraya koenigii* Spreng.)

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Kannada ಕೆರಿ ಪತ್ತೆ, ಸೋಪ್ಪು,ಏಲ್ಕೆಯೋಲೆ
Karibevu, Karibevu soppu, Sinhal, Karapincha

Tamil கரிபெப்பிலை, கரிபெப்பிலை
Kariveppilai, Karuveppilai

Urdu کری پتھ، کریپتی
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, pentamorous, 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 essential oil, but the exact amount depends besides freshness and genetic strain also on the extraction technique. Typical figures run from 0.5 to 2.7%.

The following aroma components, mostly sesquiterpene hydrocarbons, have been identified in curry leaves of Sri Lanka (in parentheses, the content in mg/kg fresh leaves): β-caryophyllene (2.6 ppm), β-gurjunene (1.9 ppm), β-elemene (0.6 ppm), β-phellandrene (0.5 ppm), β-thujene (0.4 ppm), α-selinene (0.3 ppm), β-bisabolene (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-phellandrene, α-pinene, β-pinene), whereas South Indian samples yielded sesquiterpenes: β-caryophyllene, aroma-dendrene, α-selinene. (Flavour and Fragrance Journal, 17, 144, 2002)

The curry tree is native to India; today, it is found wild or cultivated almost everywhere in the Indian sub-continent excluding the higher levels of the Himalayas, though it reaches the Inner Terai valleys in Nepal. In the East, its range extends to Burma.

The botanical name, Murraya koenigii refers to two 18th century botanists: the Swede Johann Andreas Murray (1740–1791) and the German Johann Gerhard König (1728–1785).

The English term curry is of Indian origin: In Tamil, the most important South Indian language, 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 encompassing not only spicy foods of various kinds, but also Indian-style spice mixtures (curry powder).

In North Indian (Aryan) languages, curry leaves are usually denoted by their Tamil name, or an adaptation thereof, for example Hindi kari-patta [करीपट्टा] and or Bengali karhi-pat [কারিপাট] Curry-leaf, or Sinhala karapincha. The same first element is also found in Marathi kadhi-limb [कडीलिंब] (from limbu [लिंबू] lemon) and Kannada kari-bevu [ಕರಿಬೆವು], where second element bevu [ಬೆವು] designates the nim tree (often spelled neem, Azadirachta indica), which has similar foliage. Cf. also the Sanskrit name girinimba [गीरिनिम्ब] mountain-neem. There is also the Hindi name mitha nim [मीठा नीम] sweet nim, where the adjective sweet refers to edibility in general.

The famous term curry was basically invented by the British as an umbrella term for all kinds of spicy main courses, and is based on a local South Indian name; nevertheless, it is now in use all over the Indian sub-continent. I guess that its wide acceptance among Indians of very different languages is due to a lucky co-in-cidence: Some Northern Indian languages 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 yoghurt 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 leaves 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-et-able 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-inese 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 Ethiop-ian (see long pepper) or Carib-bean 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.

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 trapping or 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 of Heliamphorachimantens is are the best examples of pitfall traps. Five basic trapping mechanisms are found in 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 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, Triphyophyllum 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. Drosophyllum lusitanicum 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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