



ENVIS

Newsletter

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वहाँ है खुशहाली।

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Editorial

ENVIS was conceived as a distributed information network with subject-specific centers to provide relevant information readily and appropriately to all concerned. The network with c. 80 subject/situation-specific centers, expanded steadily with the focal point in the Ministry for coordination. The ENVIS Center at BSI, Kolkata, being one among them, was recognized aptly for floral diversity and since its initiation the Center has been occupied in publicizing information on plant diversity. Further it has been bringing out Newsletters periodically to appraise the activities of the Survey in general and the Center in specific. It has been highlighting on various aspects of phyto-diversity with the objectives of bringing in awareness, sustainable utilization and conservation in public and academicians alike. The current issue, 12th in the series, presents certain interesting and diverse articles that include horticultural potential of two wild orchids, bamboos – their multiple uses in Garo tribal sustenance, less known wild edible plants from Orissa, ornamental bamboos, therapeutic potential of Himalayan *Litsea* and the realized threats to two mangrove species of Sunderbans. What adds appeal to this issue is an article on 'fairy ring' on the forest floor of Kumaon, Himachal Pradesh. This issue expectantly brings in the desired awareness about floral wealth of the country and thereby promoting its conservation as a people's movement.

M. Sanjappa
Director
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**A note on
Mastigophora woodsii
 – A disjunct from
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 Sanctuary,
 Arunachal Pradesh
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Mastigophora Nees belongs to Mastigophoraceae – a small monogeneric family (Schuster, 1987). The genus is represented in India by two species, viz., *Mastigophora woodsii* (Hook.) Nees and *M. diclados* (Brid.) Nees ex Schiffn. Whereas, *M. sikkimensis* Steph. (1922) described from Sikkim is considered to be synonymous with *M. woodsii* (Inoue, 1971).

M. woodsii, so far known in gametophytic state only, is reported to occur in India, Nepal, Bhutan, China, Taiwan, Faeroes Island, British Isles and the British Columbia (Inoue, 1978; Schuster, 1987; Long & Grolle, 1990; Paton, 1999). The species thus shows an interesting disjunct distribution. In Indian subcontinent the species has so far been known from eastern Nepal, West Sikkim and Western Bhutan. In Indian bryoflora it was first recorded by Mitten (1861) based on the collections made by Sir J. D. Hooker from Sikkim. Subsequently, it was collected from Jongri in West Sikkim by the members of the Botanical Expedition of the University of Tokyo, Japan in 1960 (Hattori, 1966).

In 2000, one of us (DKS) collected this species from Mayodia pass, at an altitude of c. 2650 m, in Mehao Wildlife Sanctuary in Lower Dibang Valley district of Arunachal Pradesh. The plants were growing on mossy forest floor. In *M. woodsii*, the sporophyte was not known all these years. Interestingly the species has been collected, with mature sporophyte bearing dehiscent capsules and is hence described as follows.

Large, robust, julaceous plants with distally flagelliform branches. Leaves rounded to subglobose, subcordate at base, spinose-dentate to ciliate along margin; collenchymatous leaf cells with angular thickenings. Underleaves similar to branch leaves, ovate,

obovate to oblong. Terminal gynoecia with 3-plicate perianth; capsules 4-5-valved; capsule wall 6-layered. Spores roundish-ovoid, densely papillose to baculate; elaters branched, uni and bispiral.

M. woodsii closely resembles *Ptilidium ciliare* (L.) Hampe of Ptilidiaceae but the latter has more ciliate leaf margins and the branches do not become attenuate or flagelliform.

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Mastigophora woodsii
 (Hook.) Nees
 showing mature sporophyte

Aromatherapeutic uses of *Litsea cubeba* (Lour.) Pers.

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L*itsea cubeba* (Lour.) Pers. (syn. *L. citrata* Blume), a common wild plant of the Himalayas, produces aromatic oil of great medicinal potentiality. It is an evergreen dioecious tree with small pepper-like fruits. It reaches a height of 8–10 m. It belongs to the laurel family (Lauraceae Juss.) and grows in south-east Asian countries, like Bhutan, China, India, Indonesia, Java, Korea, Myanmar, Nepal, Taiwan and Vietnam.

In ancient times the decoction of the plant parts was used to cure burns, sprains, indigestion, cough and bronchitis, paralysis and even mental disorders like hysteria and forgetfulness. The flowers are often used to flavour tea. The leaf extract is used to treat athlete's foot and other skin diseases. The fruit is edible, carminative, used to cure dizziness and to control excessive perspiration. In Indonesia the fruits are used as a substitute of cubeb piper (*Piper cubeba* L.). The fruits are sold in the markets of north-east India, especially in Arunachal Pradesh, and are eaten raw or as pickles.

Presently, the plant extract is used in aromatherapy as a stimulant. Aromatherapy is a form of alternative medicine that uses essential oils and



Fruits of *Litsea cubeba* (Lour.) Pers. being sold in a market at Itanagar

other scented compounds from plants for the purpose of having an effect on a person's well-being. The word "aromatherapy" was first used in the 1920s by the French chemist René-Maurice Gattefossé, who devoted his life studying the properties of essential oils. The Greeks, Romans and Egyptians, all used aromatherapy oils. These oils differ in chemical composition from other herbal products because the distillation process only recovers the lighter phytomolecules. For this reason essential oils are rich in monoterpenes and sesquiterpenes, esters, aromatic compounds, non-terpene hydrocarbons, some organic sulfides etc. The aroma of these compounds affects the brain, especially the limbic system through the olfactory system. They also exhibit antiseptic, antiviral, antifungal, and antibacterial properties in the control of infections. When applied to skin, they activate thermal receptors and kill microbes and fungi.



A fruiting twig of *Litsea cubeba* (Lour.) Pers., inset: Male flowers

A host of useful chemical compounds have been isolated from different parts of *L. cubeba* (*May Chang* in Chinese). The oil from the fruit resembles citronella oil and is used widely in perfumery, soap industry, sanitary products and as deodorizer. In aromatherapy it is used for refreshing and rejuvenating as well as stimulating and balancing oneself. Its aroma inspires, brings fresh energy and clears the mind. It blends well with other essential oils of lavender, neroli, ylang ylang, rose, sandalwood, frankincense, geranium, vetiver, fennel, tea etc. It diffuses to give a pleasant, fresh, lemony top note to any blend. It can "anchor" the essential oils of citrus which tend to be rather fleeting. People often call it 'tropical verbena' due to the resemblance of its oil with the popular

smell of 'verbena oil', extracted from *Aloysia triphylla* (L'Her.) Britt. (Verbenaceae). The oil is also a popular skin care ingredient for oily and inflamed skin and in acne treatment.

Unfortunately, in India the plant has hardly been exploited for any of these purposes even though the species grows abundantly in the Himalayas and have been reported from Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Uttaranchal, Uttar Pradesh and West Bengal. A 10 ml bottle of 'May Chang' oil costs from \$ 4.5 to \$ 9.25. The plant is also cultivated in China as a timber-producing cash crop inter-cropped with Chinese fir, *Cunninghamia lanceolata* (Lamb.) Hook., endemic to China. This controls weeds. It can also be sold for cash at an early stage of afforestation as a part of agro-eco farming. The plant can also be cultivated to produce fruits in a large scale that can be sold in the market to improve the economy of the rural folks of north-east India.

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Bamboos in the lives of Garos of Nokrek

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Nokrek is one of the fourteen biosphere reserves in India and only one in Meghalaya. It is located in the north-western part of the state between 25° 20' to 25° 29' N latitude and 90° 13' to 90° 35' E longitude. The total vegetation of this biosphere reserve is represented by the tropical moist evergreen, tropical semi-evergreen, tropical moist deciduous and sub-tropical broadleaved hill forests along with grass lands and bamboo forests.

The bamboo forests are scattered in small patches mixed with the other types of forests. The degraded forest lands are getting replaced by the bamboo plants. Therefore the bamboo forests are secondary or tertiary in origin. These are found in the areas with moderate slope along the streams. The bamboos have a high regeneration capacity. It gives them a good scope to grow in fringe areas of forests. According to our study about eight species of bamboo viz. *Bambusa tulda* Roxb., *B. balcooa* Roxb., *B. nutan* Wall. ex Munro, *B. bambos* (L.) Voss, *Dendrocalamus hamiltonii* Nees & Arn. ex Munro, *D. asper* (Schult.) Backer ex K. Heyne, *D. strictus* (Roxb.) Nees, *Melocanna baccifera* (Roxb.) Kurz grow in the forests of Nokrek. Due to their abundance and sustainability these are very much used by the local Garo people in different ways.

As food: The young shoots of *B. balcooa* (GORUA), *B. nutan* (WASIM),

D. hamiltonii (KAKU/ WANOK), *M. baccifera* (WATRE) are cooked as vegetable with spices and oil and provide excellent addition to the diet. *B. balcooa* is rich in starch. *B. tulda* (WAGE) is used to make pickles. The mature stem and leaves of bamboo are burnt to get the ash. They call the ash KHARCHI or SODA and use it as baking soda to cook food. It makes food more delicious and easily digestible.

For cooking: They use the internodes of mature bamboo (BRENGA) to cook food. Generally *D. hamiltonii* (KAKU/ WANOK) is used for this purpose. They make a longitudinal incision in the internode and put fish along with spices, salt and little bit of oil. Then they tie it with the help of some thread and put it directly into the fire. It gets ready in 15-20 minutes. The bamboo provides a gentle heating and a very special taste to the roasted fish. The same procedure of cooking is also applied in case of some other vegetables.

As construction materials: Bamboo is extremely tough when whole, and can be used as framework for all sorts of construction. Basically all houses (KACHA NOK) of Garo people living in villages or forests are made up of bamboo. Garos make the framework, wall, door, beam, roof and floor of a house with the help of bamboo. As a raw material, bamboo is exceedingly versatile, and many of its varied physical properties are put to use. They use the different species of bamboo for constructing the various parts. For instance *D. hamiltonii* (KAKU/ WANOK) is used to make the strong beam and pillars and *B. tulda* (WAGE) is used for making the moderately flexible walls. It splits easily in a lengthwise direction, and can be



A bamboo hut (KACHHA NOK)

shaved down to extremely thin, flexible strips. These are used to join larger pieces. A house is literally tied together with them, and stands without a single piece of metal or even a wood peg. The clumped bamboo *B. balcooa* (GORUA) has a thick wall and is very strong. They are perfect for short term constructions. The giant thorny bamboo *B. bambos* (WAKANTHA) is also used for constructing the watch houses (BORANG / JAMATAL) on the tree tops.

As house hold goods: Many articles of domestic use are made up of bamboo. Finer and more carefully smoothed strips of bamboo are the basic elements in most of the kinds of Garo basketry. These include delicate baskets (KOKCHHEU) for carrying rice,



Bamboo basket (KOKCHHEU) for carrying rice, sand and vegetables

sand and vegetables on their back, one of which may take an entire day to weave. Rougher baskets may be made more rapidly, and openwork baskets used for carrying cotton are produced



Woman carrying firewood in bamboo basket

so quickly that Garos can afford to make and give them away with the cotton in it when the latter is sold. Other baskets are designed for a multitude of special purposes: small round openwork baskets for carrying chickens; small, closely woven ones (NACHEK) for carrying seeds while planting, somewhat closely woven rougher ones (KOKSI) for keeping fish; larger ones for chill peppers, and still larger and coarser ones for firewood. All except the smallest of these are designed to be carried from a tumpline, and the basic material is always bamboo, though small quantities of cane are used in the finest of them. Wincwing baskets (ROAN) are also made from bamboo. KHERA is used to store rice and other things. A useful



Bamboo basket (KHERA) used to store rice and other things

container is made by cutting a section of bamboo with one node left in the bottom. Garos store many things in such containers. The handle of many tools are also made up of bamboo. They use the diagonally cut internode along with the intact lower node as the cup for drinks like wine, tea, etc. Narrow sticks cut out from internodes along with cows' leather are used for making of small seats.

As the alternative of polythene carry bags: In the market Garo people also use small portable bags KOKSI to carry the fish and other vegetables. These bags are made by careful meshing of narrow bamboo strips. According to them, these are quite cost effective.

In handicraft: Many important craft items and toys are also made by



A small portable bag (KOKSI)

bamboo. For this purpose people use *B. balcooa* (GORUA) and *B. nutan* (WASIM). These things are the basis of income of many families in Nokrek biosphere reserve.

Others: *B. tulda* (WAGE), *M. baccifera* (WATRE), etc. are variously used by the Garo people. The tender bamboo tips are used as fishing rods (CHEKKI). The mature internode of bamboo is cut in the middle to make an instrument which is used to create sound of high pitch to avoid the attack of wild animals inside the forest while going for fishing or collecting honey or fuel woods. Its hollowness makes it suitable for various types of pipes. By knocking out the nodes of a long piece and fixing one end in a tumbling stream, Garos produce an available supply of running water. Each village in Nokrek has few such spots where people bathe, wash their cooking pots, and fill their gourds. Scoops, mats, and children's toys are all made from bamboo. Great skill is required to make these objects, and only the Garos have this skill. All men learn to make baskets, but it is recognized that some maintain a greater degree of proficiency than others. For all the skill required, however, little imagination is shown, for Garos invariably follow a fixed and well-known pattern in their bamboo weaving. Dried bamboo makes excellent kindling, and a bunch of bamboo can be used as a first-class torch. The bundle of 20-25 bamboo along with an air filled sac is used as boat while fishing in the calm and shallow streams.

The dependency of Garo people on bamboo is also reflected in their rituals and culture.

Due to the special importance of bamboo in the life of people living inside Nokrek biosphere reserve, forest department is also trying to cultivate some important species viz. *B. tulda*, *D. strictus*, etc. in the old *Jhum* lands under the social forestry and afforestation programme. It may be an important raw material for paper industry. The

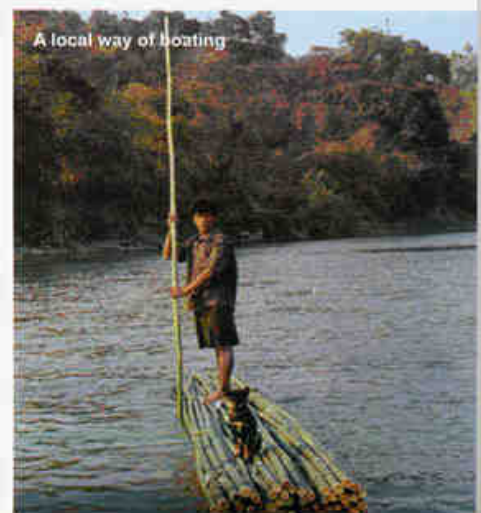


Instrument used for making noise while going inside the forest

government of Meghalaya is also trying to expose this rich natural resource for commercial exploitation. This will enhance the socio-economic condition of the local people.

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A local way of boating

'Kasru-konda' and 'Mal-velua' - Two less known edible plant parts from Kalahandi district, Orissa

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In the course of an ethnobotanical survey in Orissa it was observed that the tubers of *Schoenoplectus grossus* (L.f.) Palla (Cyperaceae) and hypocarps of *Anacardium occidentale* L. (Anacardiaceae) were being sold in a market at Bhawanipatna in Kalahandi district, Orissa.

On query it was learnt that the tribal people after removing the fibres and dark cuticle of the hard and globose starchy tubers of *S. grossus*, dry and ground them into flour to make bread and sometimes eat the sweet tasting tubers raw.

S. grossus is the currently accepted name of the species and in the earlier literature it was also known by the names *Scirpus grossus* L.f. and *Scirpus keysoor* Roxb. which are now considered as its synonyms.

The tubers are known as 'Kasru-konda' at Bhawanipatna.

The species is found throughout India up to an elevation of 700 m, especially in the swamps.

The tubers are considered to be highly nutritious. They contain c. 62-79 % of digestible carbohydrates and 7.5-11.8 % of proteins. The tubers are also said to possess astringent, laxative, tonic, cooling and diuretic properties and are used for stopping vomiting and diarrhoea.

Coming to *A. occidentale*, it was learnt that the fully ripe hypocarps are eaten raw.

The hypocarps are known as 'Mal-velua' at Bhawanipatna.

In India the species is cultivated in coastal areas especially for its tasty cashew nuts. It has also become naturalized at places on sandy coast and hills near the sea.

The ripe hypocarp look like an overripe apple and is known as 'Cashew apple'. It is nutritious and juicy possessing a characteristic exotic flavour and a pleasant aroma. When tender, it is acidic and highly astringent but when fully ripe, it is sweet and slightly astringent. It is edible and yields a delicious beverage. Cashew apple is rich in ascorbic acid (150-350 mg %) and sugars (10-12 %) mostly dextrose. Its juice is fermented and made into wine which contains 8.3 % alcohol. The wine can be distilled to produce a brandy. It can also be used in pharmaceutical industry. The cashew apple is utilized for making juice, syrup, candy, and pickle after removing the astringent principle. Candy prepared



Schoenoplectus grossus (L.f.) Palla

from the cashew apple is as attractive as fig candy. The fresh cashew apple is also used in the vinegar industry. The cashew apple, as well as the juice, possess antiscorbutic properties. The juice is used as a diuretic and is useful for kidney troubles and in advanced cases of cholera.

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Tubers of *Schoenoplectus grossus* (L.f.) Palla being sold in a market at Bhawanipatna



Hypocarps of *Anacardium occidentale* L. being sold in a market at Bhawanipatna

Worth seeing 'fairy ring' in the forest bed of Kumaon Himalaya

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A rare fairy ring by *Gomphus floccosus* (Schw.) Singer

Have you ever seen rings of dark green grass separated by a narrow brown strip of grass or concentric ring of fruit bodies of mushrooms or toadstools? They are nothing but the fairy rings. For centuries people believed that the fairy rings are the paths of dancing fairies or elves. Thunder, lightning, whirlwinds, ants, moles, haystacks, animal urine, etc were considered to be the causal agents. Only in 1796, English Botanist, William Withering reported that these rings are caused not by fairies but, due to the growth of fungi.

Fairy rings usually occur in soils which are rather low in organic content and are known to be produced by over hundred species of Agarics. Best known species are *Marasmius oreades*, *Agaricus campestris*, *Chlorophyllum molybdites*, *Lepiota procera*, etc. They belong to Basidiomycota, a group of higher fungi. They reproduce sexually by producing basidiospores. Each basidiospore germinates to produce hypha which on growing and branching forms a complex network called mycelium. The growth pattern is more or less circular and during sexual reproduction, fruitbodies (basidiomata) are produced at the periphery of the actively growing hyphae in a circular fashion year after year. Some species are found to be as old as 400 years.

There are three zones which are clearly recognized in the field. In the

outer zone, hyphal tips grow outwards utilizing the humus of soil making nitrogen and phosphorus available to the grass growing ahead of them. It causes the luxuriant growth of grass in a concentric zone. In the middle zone, the grass immediately above the mycelial mat eventually dies from either lack of moisture or nutrients. It causes the brownish concentric ring of dead grass. In the inner zone, the older mycelium gradually dies and disintegrates causing nitrogenous substances available to the grass. It causes the re-growth of grass in this area.

During our survey of Kumaon Himalaya, we observed a rare fairy ring composed of *Gomphus floccosus* (Schw.) Singer. Fruitbodies grow solitary or in clusters and rarely produce fairy rings. Fruitbodies can

grow up to 160 mm high. Cap 40-100 mm in diameter, truncate when young, vase to funnel shaped at maturity, scaly, reddish orange to orange yellow. Ventral surface of cap bears decurrent low blunt ridges or folds that are forked whitish to yellowish white in colour. Stipe short. Spore print ochraceous; spores ellipsoidal, 12-16.5 x 6-7 µm; surface roughened to wrinkled. Clamp connections absent.

G. floccosus is distributed in temperate regions of Himalaya. It is also found in North America and other Asian countries like Korea, China, Nepal and Pakistan. Though the fungus has been reported to cause gastrointestinal irritation and diarrhoea after consumption, at certain places, we have found people eating it in the Himalayan region without any after-effect.



Fruitbodies of *Gomphus floccosus* (Schw.) Singer

Two mangrove species on the verge of extinction from the Sunderbans in West Bengal

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The world's largest continuous marine mangrove forest is in Sunderbans, the active deltaic plain of the rivers Ganga-Brahmaputra. The forest stretches from the southern most part of West Bengal in India to our neighbouring country Bangladesh. Out of the 50 true mangrove species of the world, the Sunderbans in West Bengal have approximately 41 true mangroves under 26 genera and 16 families and about 19 species are identified as mangrove associate (Naskar, 2004).

Amongst the littoral mangrove species, *Heritiera fomes* Buch.-Ham. and *Nypa fruticans* Wurmb are now on the verge of extinction from the Sunderbans in West Bengal.

The name 'Sunderbans' is supposed to have derived from the vernacular name 'sundri' or 'sundari' of *H. fomes*, a plant belonging to the family Sterculiaceae. *H. fomes* was reported as a common dweller of the Sunderbans since the time of formation of the delta. This can be evidenced by the fact that the peat soils and some underground plant debris from the present day's Canning Town revealed the presence of wood of *H. fomes*, *in situ* (Ghosh, 1941; Chanda & Mukherjee, 1969) but this plant has now become very rare in the Sunderbans.

During the recent field study *H. fomes* has been occasionally seen in the tidal swamps of the western Sunderbans. It is mainly restricted in some blocks of south-eastern part of Sunderbans. This species showed a relatively high abundance only in the Chamta and Arbesi blocks. It was found to grow in association with *Ceriops decandra* (Griff.) Ding Hou, *Excoecaria agallocha* L., *Xylocarpus granatum* Koenig, *Rhizophora apiculata* Blume and *R. mucronata* Lam. But most of the plants were found to have stunted growth. Therefore, the original 'Tall and Dense Mangroves comprising *Heritiera* sp.' as defined by Blasco (1975) has now become almost extinct from the Sunderbans. A noteworthy observation regarding the decline of *H. fomes* is that the pure *Heritiera* community is gradually getting replaced by the *Ceriops* dominated mixed plant community, as seen in the Arbesi block. The gradual rise of salinity level due to the abatement of freshwater flow from the up streams of the river Ganga, affects the natural regeneration of *H. fomes* and this may be one of the main causes for their decline from many areas inside the forest. Moreover, the trees of *H. fomes* are being exploited indiscriminately for its timber value, since a very long time.



Heritiera fomes Buch.-Ham. Inset: Flowers

N. fruticans, commonly known as 'Golpata' belonging to the family Arecaceae, is now confined only to the south-east corner of the Bidya-Matta river system. This palm showed a high abundance in the Chamta, Arbesi and Khatuajhuri in comparison to other blocks. They were found to grow in discrete patches on the sides of narrow canals or the creeks. *N. fruticans* is observed in the field to grow in association with *Phoenix paludosa* Roxb., *E. agallocha* and *Aegialitis rotundifolia* Roxb.

The illegal cutting of its hard, durable, isothermic leaves for thatching huts has been showed as a major cause for the rapid declination of *N. fruticans* from the Sunderbans (Naskar & Guha Bakshi, 1987). But during the study no such activities as well as 'Golpata' thatched huts have been noted. *N. fruticans* is a less competitive species and needs a permanent humid soil and washing of the surface soil particles with the flow of fresh water for its better growth and regeneration. Probably due to the neotectonic movement of the river Ganga and the tilting effect of fresh water flow towards east, *N. fruticans* is gradually shifting its habitat from the west to the eastern side of this forest.

Therefore, it is being felt that conservation priorities should be focused on these two unique mangrove species to protect their extinction from the forest of Sunderbans lying in the Indian region.

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Nypa fruticans Wurmbr. Inset: Fruit

Some recently collected rare and endemic liverworts from Sikkim Himalaya, India

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The favourable phytogeographic location and climatic conditions of Sikkim with altitudes ranging between 250 and 8598 m and rainfall ranging from 200-500 cm provide excellent conditions for rich and diverse growth of liverworts. In the present state of our knowledge, approximately 330 species of liverworts and hornworts are known to occur in Sikkim of which about 11 per cent are endemic to the area. The following are three rare and endemic liverworts from Sikkim recently collected by the authors after their type collection.

Metzgeria crispula Herzog (Metzgeriaceae): This endemic taxon was described by Herzog (1939) based on the collections made by Troll in 1937 from Tsomgo lake between Nathu La and Gangtok in East Sikkim. After that this species could never be collected from anywhere. Srivastava & Udar (1975) recorded this species on the basis of type specimens only. Recently, one of us (DS) collected this species in the months of January, March and October, 2005 from Rate Chhu (c. 1750 m), Pangthang (c. 2250 m) and Bitu (c. 1850 m) respectively in East Sikkim, growing epiphyllously in moist and



Metzgeria crispula Herzog

shady places in association with *Metzgeria furcata* (L.) Dumort. var. *ulvula* Nees, *Lejeunea tuberculosa* Steph. and mosses.

Metzgeria macrospora Kuwah. (Metzgeriaceae): This species was described by Kuwahara (1969) based on the collections made by M. Togashi from Migothang-Nayathang, (3300 m) in West district of Sikkim in 1960. In the same year the species was also collected by Hara from Jongri (4000 m) and Nayathang-Phalut (3300 – 3500 m), again from West Sikkim. Authors collected this species in the month of June, 2006 from Lungthung (c. 3772 m) in East Sikkim, growing on *Rhododendron* bushes in association with *Lejeunea indica* Udar & U.S. Awasthi under very moist and cool



Metzgeria macrospora Kuwah.

conditions. Recently, So (2003) treated it as a synonym of *Metzgeria consanguinea* Schiffn. without giving any valid explanation. A critical study of the specimens together with the paratype of *M. macrospora* Kuwah. shows that it is characterized by antheridial branches 210 – 300 µm in diameter, club shaped calyptra, cylindrical capsule, '*M. furcata*-type' of capsule wall and large spores (35 – 47.5 µm in diameter) with spinose surface, as compared to *M. consanguinea* Schiffn. having antheridial branches 120 – 200 µm in diameter, pyriform calyptra, globose capsule, '*M. consanguinea*-type' capsule wall and much smaller spores (18 – 21 µm in diameter) with granulose surface. Thus, the taxonomic individuality of the species is confirmed.

Cyathodium acrotrichum Schiffn. (Cyathodiaceae): This species was described by Schiffner (1939) based on the collections made by Reverend Decoly and Schaul from Kurseong in Darjeeling district of West Bengal in



Cyathodium acrotrichum Schiffn.

October, 1899. After this it could not be collected again either from its type locality or elsewhere. Recently, one of us (DS) collected the species from Nimachen (c. 1900 m) and Boudha (c. 1800 m) in East Sikkim during October–November, 2005, and again from Busuk (c. 1340 m) in East Sikkim in the month of February, 2006. The species grows in extremely shaded condition on scanty soil over rocks soaked by dripping water in association with *Dumortiera hirsuta* (Sw.) Nees and *Heteroscyphus hyalinus* (Steph.) A. Srivast. & S.C. Srivast.

It is rather interesting that none of the above species could be collected again from their type locality. This underlines the need for intensive bryological explorations for a more pragmatic assessment of status of some of our rare hepatics. Nonetheless, the fact that the type localities of all the three species are amongst the few most frequented areas in Indian hepaticology suggests their annihilation from the original places of occurrence due to various anthropogenic pressures.

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**New record of
Psilotum nudum
(L.) P. Beauv.
(Psilotaceae) from
Paschim Medinipur
district, West Bengal**

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Two rows of trees of *Polyalthia longifolia* (Sonn.) Thwaites in the college campus

Inset: *Psilotum nudum* (L.) P. Beauv. growing at the base of one of the trees in the right hand side row, as seen in the photograph

P*silotum nudum* (L.) P. Beauv. (syn. *P. triquetrum* Sw.) is reported here from Paschim Medinipur district, West Bengal, hitherto unreported from this region. It was found to be growing in erect position at the base of old tree trunks of *Polyalthia longifolia* (Sonn.) Thwaites (Annonaceae) very close to the soil surface, in association with *Vernonia cinerea* (L.) Less., *Blumea lacera* (Burm.f.) DC. and *Hedyotis racemosa* Lam. at Raja N.L. Khan Women's College in the said district.

There are two rows of the trees of *P. longifolia* starting from the college gate up to the administrative building. The soil of the college campus is lateritic type. Initially *P. nudum* was first observed to be growing surrounding the three tree trunks at base in September, 2004 and it grew abundantly and luxuriantly till 2006 but later on they gradually became rare and presently growing at the base of only a single tree trunk. Furthermore, the trees of *P. longifolia* are becoming infected by heart rot disease caused by fungus. It is felt that the College authority should take initiative to observe the biotic pressure on *P. nudum*, if any. They should also take measures to rescue the trees of *P. longifolia* from the fungal attack so that they can be conserved for the

sustenance of *P. nudum*. In this connection it should be mentioned here that despite a through search *P. nudum* could not be located in any other part of the district.

In the Narendra Narayan Park in Koch Behar, West Bengal, this species was also found to be growing on the tree trunks of *P. longifolia* (Biswas, 1956; Bandyopadhyay *et al.*, 2006) and, there too, the survival of the species is at stake because the very old trees of *P. longifolia* are gradually falling down due to their age (Bandyopadhyay *et al.*, 2006).

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Young boys of the Rabha tribe at South Khairbari of Jalpaiguri district, West Bengal enjoying their childhood by playing with air guns made of bamboo. Small compressed masses of wet papers are used as pellets so that they do not hurt others. The air guns, however, produce sound just like real ones.

Photo : T. Chakraborty

Indigofera cassioides Rottler ex DC. – An uncommon wild edible plant

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During the course of an ethnobotanical survey in Orissa, it is observed that the flowers of the legume plant *Indigofera cassioides* Rottler ex DC. (syn. *I. pulchella* Roxb.) are being used as a vegetable in different parts of Orissa.

This plant is locally known as Girili, Gibri, Ghirel, Giral phool in Oriya and Dare Huter, Lilibichi in Santali languages.

The pinkish-purple flowers are cooked and eaten as a vegetable by the tribal and poor people. Sometimes, this is also used along with other vegetables in a curry. The local people collect the flowers and sell them @ Rs. 20/Kg in the market.

The species is found throughout India in the slopes of the dry hills in deciduous forests, Savannahs and scrub forests at elevations ranging from 100 – 1200 m.

In the Chamoli district of Uttarakhand the flowers are collected and sucked by village children for their sweet nectar. In Orissa the 'Saoras' tribal community also takes it as 'Uihef' which is a mixture of the flowers and green pigeon pea seeds.

The mixture is eaten with boiled rice and chapattis made out of *Caryota urens* L. In Andhra Pradesh, Bihar, Haryana, Madhya Pradesh, Maharashtra, Orissa, Uttarakhand, Uttar Pradesh and West Bengal the inflorescences together with flower buds and flowers are eaten by the different communities. In Andhra Pradesh, Madhya Pradesh and Orissa the tender leaves and in Haryana the pods are also eaten.

In Nepal the flowers are consumed as pickle.

In spite of the aforementioned uses in the different parts of India and Nepal *I. cassioides* is still not well known as an edible plant. An attempt has been made here to draw the attention of the readers so that it can be tried by them too for its suitability as a subsidiary food. It can also be used as an emergency food in case of famine in the remote parts of our country. However, food value analysis of the edible parts of this wild plant is certainly necessary.

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The flowers of *Indigofera cassioides* Rottler ex DC. are being sold in a market at Panposh, Sundargarh district, Orissa



Horticultural potential of two wild orchids from Eastern Himalaya

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The stunningly beautiful flowers with gorgeous colours, unique shape, curious ornamentation and prolonged life have made orchids one of the most sought after flowering plants. These are grown as ornamentals throughout the world by the florists and the horticulturists, the amateurs and the professionals as they are very popular as indoor plants or as cut flowers. Today orchid cultivation is a multi-million dollar industry. In spite of having so much beauty and curious floral structure, a large number of orchids still remain to be exploited for horticultural purpose.

In connection with the All India Coordinated Project on Orchidaceae, the authors came across a large number of orchids in vegetative condition from the Eastern Himalaya. The plants were grown under the nursery care at the Orchid House of Botanical Survey of India, Dehradun. Out of these, two species when flowered were identified and found to have significant horticultural potentiality. These species are not known to be grown commercially by any orchid grower or horticulturist. Since these two species have wide range of distribution and found abundantly in many localities, they can be exploited commercially by cultivating and multiplying in hothouses.

The brief descriptions and photographs of the two species along

with other relevant data are provided as follows for their easy identification and cultivation.

1. *Gastrochilus calceolaris* (Buch.-Ham. ex Sm.) D. Don, Prodr. Fl. Nepal. 32. 1825.

Aerides calceolare Buch.-Ham. ex Sm. in Rees, Cycl. (Addenda): 39, *Aerides*, no. 11. 1819.

Monopodial, epiphytic herbs. Roots thick, velamenous, arise laterally from the basal portion of the stem. Stem reduced, cylindrical; internodes 0.5 – 1 cm long, covered by sheathing leaf-bases. Leaves alternate, distichous, oblong-lanceolate, flat, entire, apex unequally emarginate to retuse, base articulate. Inflorescence sub-corymbose, lateral, shorter than the leaves; peduncle cylindrical, green, with purple spots, at base with 1-3 short annular sheaths; rachis variously angled, sub-densely 4 – 10-flowered. Flowers up to 3 cm long, 2 – 2.5 cm across, yellowish-green with dark-purple blotches on sepals and petals, lip white with a dark-yellow blotch at the centre of epichile and several dark-purple spots at the spur. Floral bracts small, ovate-triangular. Sepals 8 – 9 × 4 – 4.5 mm, oblanceolate-spathulate, entire, obtuse; lateral sepals slightly falcate. Petals narrower than sepals, spatulate-falcate. Lip 1 cm long; hypochile saccate, forming a spur; spur

6 × 5 mm, broadly cylindrical, cup-shaped; epichile broadly ovate-triangular, margin finely fimbriate, surface densely long-papillate. Column 3 mm long, light-purple, clinandrium with 2-shallow grooves; rostellum bifid; stigmatic cavity broadly ovate-triangular. Anther 2 × 3 mm, beaked below, emarginate above, 2-lobed; pollinarium 3 mm long; pollinia 2, yellow, porate; stipe 2 mm long, hyaline; viscidium linear, bifid. Pedicel and ovary 1.6 – 1.9 cm long, purple-ridged.

Flowering: March – May. Flowers last for 1 month.

Fruiting: May – June.

Habitat: Epiphytic on moss covered tree trunks and branches in tropical and subtropical evergreen forests at altitudes ranging from 600 to 1800 m.

Distribution: India: Uttarakhand, Sikkim, West Bengal (Darjeeling district), Arunachal Pradesh, Nagaland, Meghalaya, Manipur and Mizoram. Nepal, Bhutan, Myanmar, China, Thailand, Indo-China and Malaysia.

Cultivation: This is a shade-loving species and during the period of vegetative growth it requires shorter day length and less exposure to light. However during flowering it needs longer day length and regular watering



Gastrochilus calceolaris (Buch.-Ham. ex Sm.) D. Don

and can be grown in pots filled with pieces of bricks and charcoal, mixed with some organic compost or on dry wooden blocks, wrapped with some moss.

2. *Gastrochilus obliquus* (Lindl.) Kuntze, Revis. Gen. Pl. 2:661. 1891.

Saccolabium obliquum Lindl., Gen. Sp. Orch. Pl. 223. 1833.

Monopodial, epiphytic herbs. Roots velamenous, in cluster from the basal portion of the stem. Stem pendent, much reduced; internodes very close together, up to 0.5 cm long, entirely covered by sheathing leaf-bases. Leaves alternate, distichous, weakly flabellate, oblong-linear, flat, entire, apex unequally bilobed to emarginate, sessile, base articulate, 5 – 20 × 1.8 – 3 cm. Inflorescence corymbose, much shorter than the leaves; peduncle 3 cm long, cylindrical, yellowish-green, suffused with dark-purple blotches, basally with 1-3 short, tubular sheaths; rachis densely 6 – 15-

flowered. Flowers 2.2 – 2.7 cm long, 2 – 2.5 cm across, sweetly scented, bright yellowish-green with very minute purple spots on sepals and petals, lip white with a large yellow blotch having dark-purple spots at the centre of epichile and with a large yellow area inside the cavity of the spur, a dark-purple line surrounds the opening of the spur. Floral bracts 4 mm long, ovate-lanceolate, obtuse; brown. Sepals subsimilar, 8–9 × 3–3.5 mm, oblanceolate-spathulate, entire; obtuse. Petals slightly narrower than sepals, spatulate-falcate. Lip 8 mm long; hypochile saccate, forming a spur; spur 6 × 5 mm, widely cup-shaped; with 2 obscurely developed side-lobes; epichile broadly semicircular to triangular, margin deeply laciniate, surface glabrous. Column 3.5 mm long, white, with dark-purple edges; clinandrium with 2 shallow grooves; rostellum bifid; stigmatic cavity broadly flask-shaped. Anther 2 × 3 mm, creamy-yellow, beaked below, entire

above, 2-lobed; pollinarium 3 mm long; pollinia 2, yellow, porate; stipe 2 mm long, hyaline; viscidium bifid. Pedicel and ovary 1.5 – 1.9 cm long, bright yellowish-green.

Flowering: October – December. Flowers last for 20 days.

Fruiting: December – February.

Habitat: Epiphytic on rough barked tree trunks and branches in tropical monsoon forests at altitudes ranging from 300 to 1300 m.

Distribution: India: Sikkim, West Bengal (Darjeeling district), Assam, Arunachal Pradesh, Meghalaya and Andaman & Nicobar Islands. Bhutan, Myanmar, Thailand and Indo-China.

Cultivation: During the period of vegetative growth it needs open sunlight, high humidity and moisture and regular watering. During the flowering season it needs shorter day length and intermittent water supply and can be grown in the same way as that of *G. calceolaris*.



Gastrochilus obliquus (Lindl.) Kuntz

Ornamental bamboos

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Bamboos are used in endless ways. Some of them are even used in landscape gardening and for beautification of interiors where they form one of the most picturesque features. Although bamboos have no particular beauty of showy flowers or fruits, they have a wonderful distinct appearance and in gardening make a unique contrast against dark green trees and bright colours. The beautiful species commonly used for landscaping in India are *Bambusa multiplex* (Lour.) Schult. & Schult.f., *B. vulgaris* Wendl. var. *striata* (Lindl.) Gamble, *B. wamin* Camus, *Phyllostachys nigra* (Lodd.) Munro, *Pleioblastus viride-striatus* (Regel.) Makino and *Pseudosasa japonica* (Steud.) Nakai. To acquaint the readers with these ornamental species their brief morphological descriptions and photographs are given as follows:

B. multiplex

Shrubby evergreen bamboo in tufted clumps. **Culms** 2-3 m high, 0.5-2.5 cm in diameter, light green, becoming yellowish with age; branches fasciated, 10-12 thin, subequal, with one somewhat longer. **Culm-sheaths** deciduous, shorter than internodes,



Bambusa multiplex (Lour.) Schult. & Schult.f.

yellowish, thin, crustaceous; imperfect blade persistent, as broad as the top of sheath; auricles unequal, very deciduous. **Leaves** 10-15 per twig, lanceolate; auricles rounded, fringed with long straight ciliate bristles.

B. vulgaris var. *striata*

Arboreal, erect-arching bamboo in loose clumps. **Culms** 5-10 m high, 8-12 cm in diameter, yellow, beautifully striped with green; branching mainly above, in triplets with one dominating



Bambusa vulgaris Wendl. var. *striata* (Lindl.) Gamble

and subsequent thinner ones. **Culm-sheaths** deciduous, broadly triangular, densely appressed with blackish-brown hairs on outer surface; imperfect blade persistent; auricles fringed with golden wavy bristles.

B. wamin

Medium sized bamboo, with loosely tufted arching culms. **Culms** 3-5 m high, 8-10 cm in diameter, dark green; lower nodes bearing rootlets; internodes pitcher shaped; branches occurring almost at all nodes, in triplets. **Culm-sheaths** as in *B. vulgaris* var. *striata*.



Bambusa wamin Camus

P. nigra

Spreading, erect, shrubby bamboo. **Culms** 1.5-2.5 m high, 5-8 mm in diameter, blackish; nodes swollen, knotty; internodes flattened on branching side; branched on all nodes;



Phyllostachys nigra (Lodd.) Munro

branches paired with one dominating,

P. viride-striatus

Erect, shrubby, spreading bamboo, with interwoven running rhizome, rooting at each node. **Culms** spreading on ground or c. 1 m high, thin, hardly 2-4 mm in diameter; nodes swollen, dark ringed below nodal line; internodes 2-12 cm long, glabrous. **Leaves** 9-10 per twig, striated with



Pleioblastus viride-striatus (Regel.) Makino

green and yellow; auricles short, rounded, with 4-5, c. 4 mm long straight bristles.

P. japonica

Tufted, erect, shrubby bamboo. **Culms** 1.5-2(-5) m high, 2-5(-15) mm in diameter; branching from upper nodes, 3-6 subequal branches in axil of branch sheaths. **Culm-sheaths** thin, crustaceous; imperfect blade short, linear-lanceolate, deciduous; ligule 4-5 mm long; auricles absent. **Leaves** 4-12 per twig, linear-lanceolate; auricles not distinct, mouth end sometimes having 1 or 2, long bristle.



Pseudosasa japonica (Steud.) Nakai

Some information about ENVIS Centre

Established	April, 1994.
Subject Area	Floral Diversity.
Contact person	DR. M.S. MONDAL
Address	Additional Director & ENVIS Centre-in-Charge Central National Herbarium, 3rd Floor, Botanical Survey of India Indian Botanic Garden, Howrah – 711 103.
Telephone	(033) 2668 0667
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E-mail	envis@cal2.vsnl.net.in
Website	http://www.bsienvis.org • http://www.bsi.gov.in
Activities of the Centre	The centre has enormous data on many areas and wants to create database and publish the following information. i) Assessment of RET species of different phyto-geographical regions of India. ii) Dry & wet coastal ecosystem in India : Vegetation pattern, floristic component, their values in Assessment of Floristic Diversity of Angiosperms with regard to different ecozones in India. iii) Database on indigenous medicinal plants of India and common medicinal plants of West Bengal in regional language. iv) User service will continue.
Future plan	Thrust area of the ENVIS Centre, BSI, is the task of disseminating information on Floral Diversity from different eco-regions of India. Entry of data and scanning of photographs and illustrations of the plants included in the Red Data Book of Indian Plants will be continued. Economic and medicinal plants included in red list categories will be given special emphasis. Assessment of plants included in the CITES list will be continued. Preparation of Allergic Pollen Atlas of India with Scanning Electron photographs will also be continued. Incorporation of new data in Database of phyto-geographical distribution of Rare, Endangered, Threatened, Extinct species will also be continued. Initiative has been taken towards development of a database on plants of Ethnobotanical importance from West Bengal.

List of publications brought out so far

Books :

1. Mangroves, Associates and Salt Marshes of the Godavari and Krishna Delta, Andhra Pradesh, India.
 2. Diversity of Coastal Plant Communities in India. (Priced publication) Rs.804.00 *
 3. Red List of Threatened Vascular Plant Species in India.
- Newsletters : Up to Vol.12. Vol. 13 (in press).



Ma. Meena Gupta, IAS, Secretary, MoEF, Government of India, on a visit to the Economic Botany Gallery of Industrial Section, Indian Museum (ISIM), BSI, Kolkata.



Dr. S.P. Sharma, Statistical Advisor, Dr. S. Annadurai, NPC & Mr. D. Day, R.O. ENVIS (MoEF) Expert team, Government of India visiting the ENVIS Centre, BSI during Evaluation & Assessment Workshop, Kolkata, 2007.



Inaugural session of Training, Evaluation and Assessment Workshop, ENVIS, MoEF, Government of India, at Kolkata, November 5th-8th, 2007. Dr. M. Sanjappa, Director, BSI, delivering his lecture (on the dais from L to R: Dr. Ramakrishna, Director, ZSI, Dr. S.P. Sharma, Statistical Advisor, MoEF, Ms. Meena Gupta, IAS, Secretary, MoEF, Ms. Kalyani Chowdhury, IAS, Additional Chief Secretary, Government of West Bengal) and the august audience.



*DD is to be drawn in favour of ACCOUNTS OFFICER, P.A.O. (BSI/ZSI) and to be sent to the above address of ENVIS Centre