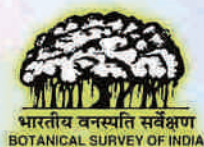


ENVIS CENTRE ON FLORAL DIVERSITY




ENVIS  
NEWSLETTER



From Director's Desk

Biodiversity and the goods and services provided by ecosystems play a vital role in providing livelihood security of human beings. The extent and composition of all ecosystems are being modified at an unprecedented rate across the world due to various anthropogenic activities. The conservation of plant diversity is critical for sustainable development. Botanic garden is one of the most conventional methods of *ex situ* conservation of plant species. The ENVIS Centre has been publishing articles on floral diversity, medicinal plants, ethnobotany, conservation, and also interesting observations on plants, found especially at Acharya Jagadish Chandra Bose Indian Botanic Garden in its official Newsletter. The first article of this issue provides a note on the distribution of *Curcuma bhatii*, a narrow endemic species confined to Manipal in Udupi district of Karnataka. The article provides the morphological features, nomenclature, and introduction of this species in the botanic garden for *ex situ* conservation. One of the greatest attractions and landmark of AJC Bose Indian Botanic Garden – The Great Banyan Tree, narrates its biography, the history of AJC Bose Indian Botanic Garden and the founder and various in-charges of Garden in the past and also illustrates its significant features and hazards faced in different periods. The article on utilisation of plants in herbal drug industry, explains the properties of few common medicinal plants and quantity of consumption by herbal industry based on data compiled by the West Bengal State Medicinal Plants Board during 2009 – 2010. An article explains a lesser-known ethnic knowledge, the method of preparation of recipes using young culms of *Dendrocalamus strictus*, locally known as 'Salia Banse' by the tribals of Odisha. Indian Aconite, an article that gives a brief account on the *Aconitum* species in India, especially the chemical composition, medicinal properties and threat status of *A. ferox*. Observation of flowering in *Monodora myristica*, the 'African Nutmeg', at AJC Bose Indian Botanic Garden, characteristic features of seeds and their medicinal properties are discussed in an article. The efforts of entire team of ENVIS Centre to bring out this informative issue are appreciated. I wish the articles will also be appreciated by the readers.

  
(Paramjit Singh)  
Director & Scientist 'G'  
Botanical Survey of India

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A.B.D. Selvam

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## A note on the distribution of *Curcuma bhatii* (R.M. Sm.) Škorničk. & M. Sabu (Zingiberaceae) – A narrow endemic species confined to Manipal, Karnataka

*Curcuma bhatii* (R.M. Sm.) Škorničk. & M. Sabu is an acaulescent rhizomatous herb with terminal inflorescence arising from the middle of the tuft of radical leaves. It produces yellow-coloured flowers and subglobose capsules with seeds having entire aril.

*Curcuma bhatii* is known only from the type locality in Karnataka. It was first collected from Manipal by Dr. K. Gopalakrishna Bhat in 1976 near the Medical College at a distance of 3.2 km from Udupi, Karnataka. Smith (1977) described it as a new species and named after Bhat, as *Paracautleya bhatii*. However, the currently accepted name is *C. bhatii*. On 8th September, 2012, we along with Dr. H.S.P. Shenoy, Botanical Officer, Pilikula Nisarga Dhama, Mangalore were proceeding towards Agumbe area, a part of central Western Ghats about 120 km east of Mangalore. On the way Dr. Bhat accompanied us from his home and we proceeded towards the spot from where he collected this species way back in 1976. After reaching near the 'Aleyur temple' we trekked upwards towards the Medical College and near it the species was found growing in the rocky crevices amidst grasses. This endemic species probably occurs only in the aforementioned spot. It is suggested that the State Forest Department personnel should monitor the area to take necessary measures to conserve this species from extinction.



Habitat of *Curcuma bhatii*

As an immediate step, we have collected a few seedlings of the species and introduced them in AJC Bose Indian Botanic Garden, Howrah, for effective *ex situ* conservation. As the species is highly adapted to lateritic rocky crevices, it should be periodically monitored to find how it grows here in the clayey soil.

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*Curcuma bhatii*

## “I am the Identity and I am the Emblem” (The Great Banyan Tree speaks)

My being was brought to light perhaps when I was about 25 years old and growing on a date palm almost in near wilderness. I remember a ‘sanyasi’/‘fakir’ used to sit in my shade and I do not remember how long he lived there! My surroundings got merged with the establishment of the big experimental Garden under the East India Company’s patronage in the year 1787. Col. Robert Kyd, Secretary to the Military Board of Fort William, Calcutta was instrumental in its establishment and he functioned as Honorary Superintendent for almost seven years (1787 – 1793). The Garden used to be known by “The Hon’ble Company’s Botanic Garden” or “Company Bagan” then. He prepared an inventory of over 4000 plants growing in the Garden and introduced many economically important plants. He had a garden of his own and spent much of his time there at Shalimar. His attachment to the Garden was so apparent as he made a dying request that he be buried without any religious ceremony near his favourite Avocado tree that he planted in the Garden. His last wish was not fulfilled. He was buried in Calcutta’s South Park Street Cemetery.

William Roxburgh took charge of the Garden after the death of Col. Kyd in 1793. He was the first salaried

Superintendent and continued till 1814. He established a famous herbarium in the Garden and prepared a catalogue – ‘*Hortus Bengalensis*’ (1814) and also wrote ‘*Flora Indica*’. With the help of local artists by using vegetable dyes he got coloured drawings made for many garden plants. During his tenure Mahogany – the high quality timber-yielding tree from West Indies was first introduced in this Garden in 1795. He introduced many more species such as Tea, Coffee, Rubber, Indigo, Sago, Tobacco, Cinchona, Cinnamon, Cardamom, Pepper, Nutmeg, Cotton and Teak in the Garden.

For a brief period Buchanan-Hamilton took charge of the Garden in 1815, and then followed Nathaniel Wallich (1815 – 1846), a Danish surgeon, to take charge of officiating Superintendent of the Garden. Wallich made numerous explorations and collected plants. Further, he received collections of other botanists throughout the country. He too used Indian artists for drawing botanical paintings.

His successor Hugh Falconer arrived in 1848 with a gap of almost two years after retirement of Wallich. Falconer was not only the Superintendent of the Garden but also served as a Professor of Botany at Calcutta Medical College. He retired from the Garden in 1855.

Thomas Thomson took charge of the Garden in 1855. Collections made by Sir J.D. Hooker and Thomson greatly enriched Garden’s Herbarium. He was succeeded by Thomas Anderson (1864 – 1870). Storms in 1864 and in 1867 destroyed many trees of the Garden.

George King was appointed as the Superintendent in 1871. During his tenure (1871 – 1898), the Royal Botanic Garden, Calcutta, expanded to just over 270 acres with the restoration of the land formerly occupied by the Agri-Horticultural Society of India in 1872. Its unique landscape what you see today was designed by Sir George King in 1872 with undulated land surfaces, artificial lakes and moats interconnected with underground pipes receiving water from the river Hooghly. It was King’s initiatives which led to the establishment of the Botanical Survey of India as an Imperial Department in 1890. King was also the founder Ex-officio Director of Botanical Survey of India with the Headquarters at Royal Botanic Garden, Calcutta. He worked as a Superintendent of the Garden for 26 years. He made a new double storey herbarium building in 1882 adjacent to Roxburgh’s house. Nursery buildings were put up and houses were made for the Garden staff.



A portion of me since no camera captures me in full!

David Prain succeeded King in 1897 and held the position till 1903. Andrew Thomas Gage who succeeded him in 1905 held the post till 1923. His successor, Charles Cumming Calder was the last European Director of the Survey prior to the British leaving the country. He was succeeded in 1937 by the well-known Bengali Botanist, Kalipada Biswas, who was the first Indian Director of the Garden as well as the Botanical Survey of India. Thus the Survey and the Garden flourished for about half a century.



A portion of my pillar-like prop roots

The Survey turned quiescent till 1953. After the country gaining independence, the Survey was reborn in 1954. In 1963, this Garden was taken over by the Union Government of India from the State Government and became part of the Botanical Survey of India. In 1938, 150th anniversary of the Garden was celebrated.

With passing time, my expansiveness grew, some people calling me walking tree, and I was known to possess 89 prop roots and a canopy perimeter of about 240 m in the year 1850. Today my prop roots are numbered at 3562. Unfortunately, sometime during 1825, I had been infected with a fungus for which I had to pay heavily losing my main trunk. A plaque with inscription was erected exactly on this location. Apart from the storms blown in the years

1864 and 1867, I remember some severe storms in 1901, 1904, 1916 and a super cyclone named *Aila* in 2009. All these years I never moved, but people from all corners of the world visit me, greet me and look at me in enigma and admiration. My mere size facilitates as a comforting site for many birds offering figs. I have become a landmark and identity and honoured as the emblem of the organization. I have entered in the Guinness Book of World Records and also gained a heritage tree status by UNESCO. The worthiness I achieved over the years is by God's grace and I continue to live in humility serving His reasons.

#### Goutam Sarkar

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## Utilisation of Plants in Herbal Medicine Industry

The natural wealth of our country comprises an enormous resource of plants that are used as raw materials for many drugs developed by the industry. Herbal drug market is expected to grow up to US \$ 5 trillion by 2050 according to WHO estimates. India, with its herbal medicines, has the potential to govern the global market. West Bengal alone has more than 300 manufacturers of Ayurvedic and Unani medicines. Besides herbal medicines, crude drugs have huge demand in the global market. The properties of a few common

medicinal plants and quantity of consumption [data compiled by the West Bengal State Medicinal Plants Board (WBSMPB) from the values provided by the individual manufacturing units in West Bengal during the year 2009 – 2010 (Graph 1)] in the ever expanding herbal industry of the state are discussed here. Among the herbaceous plants, *Bacopa monnieri* (L.) Pennell (Scrophulariaceae) or 'Brahmi' is widely used. The whole plant extract acts as hypotensive, neuropathic agent and used as brain tonic in loss of memory, and also used for treating

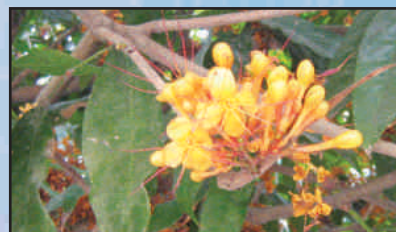
asthma and epilepsy. Nearly 16,299.435 kg is used annually in the industry to prepare herbal formulations. *Andrographis paniculata* (Burm.f.) Wall. ex Nees (Acanthaceae), locally known as 'Kalmegh', is a common ingredient in syrups as an appetizer, possesses properties like febrifuge, anthelmintic and also used for curing diarrhoea, dysentery and dyspepsia. On an average, about 11,537.320 kg of dried whole plant may be utilized in a year for preparing these medicines. *Aloe vera* (L.) Burm.f. (Xanthorrhoeaceae) or 'Ghritakumari'



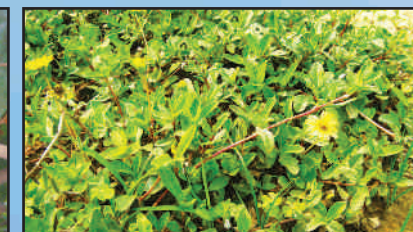
*Aloe vera*



*Saraca asoca*



*Wedelia chinensis*



is also a common cultivated medicinal plant. Presently about 9,261.795 kg leaf gel is required by the industry to produce a host of medicines which are employed as anthelmintic, purgative and in colic problems, skin diseases, eye diseases, to treat burnt areas and also as cosmetic base. The extract of the whole plant of *Wedelia chinensis* (Osbeck) Merr. (Asteraceae), commonly known as ‘Bhringaraj’ is used in treating skin diseases, cough, anaemia and also used as a hair tonic and in cosmetics. As much as 4,543.810 kg is required industrially in a year. *Asparagus racemosus* Willd. (Asparagaceae), popularly called ‘Satavari’, produces roots which are used as an aphrodisiac, diuretic and appetizer and are effective as veterinary medicine. The yearly requirement is nearly 3,746.750 kg of dry root.

Out of the commonly used shrubby plants, *Withania somnifera* (L.) Dunal (Solanaceae) or ‘Ashwagandha’, is widely known in Ayurveda. About 30,513.580 kg of dried roots are used on an average by the herbal industry to prepare medicines for nervous weakness, rheumatism, ulcer, fever and gynaecological problems. *Tinospora cordifolia* (Willd.) Miers (Menispermaceae) or ‘Giloe’ is a climbing shrub of medicinal use. About 13,560.375 kg dried bark is used per year to prepare medicines for fever, vomiting, diarrhoea and dysentery. *Ocimum tenuiflorum* L. (Lamiaceae), commonly called ‘Tulsi’ is equally important medicinally. Leaf extract is used as an expectorant, in treatment of bronchitis, gastric and hepatic disorders and also applied in ear ache; root extract is used in malarial fever. On an average, about 6,814.858 kg of dry leaves is utilized in a year. Another important plant is *Solanum*

*nigrum* L. (Solanaceae) or ‘Kakamachi’. Fruits are effective against dysentery, liver enlargement, fever, cough, cold, skin diseases and piles. About 1,238.950 kg is used yearly in manufacturing drugs.

A host of perennial trees also act as sources of useful medicines. *Phyllanthus emblica* L. (Phyllanthaceae) or ‘Amla’ is well known in herbal formulations. Fruits are sources of vitamin C and antioxidant. Nearly 1,43,918.349 kg of fruits are used per year by the Ayurvedic industry for making hair tonic, medicines for asthma, jaundice, dysentery and diarrhoea. Bark decoction of *Saraca asoca* (Roxb.) W.J. deWilde (Leguminosae – Caesalpinioideae) or ‘Ashoka’ is used to prepare medicines to cure uterine ailments, menorrhagia and scorpion stinging. The yearly consumption of its dry bark is about 83,572.090 kg. Fruits of *Terminalia chebula* Retz. (Combretaceae) or ‘Haritaki’ are antiseptic and laxative. They heal ulcers, act as heart tonic and expectorant. They are required on an average of 31,522.473 kg in a year. *Azadirachta indica* A. Juss. (Meliaceae) or ‘Neem’, with a yearly consumption of about 20,860.666 kg comes next to ‘Amla’. Leaves and bark are useful in skin diseases, ulcers, jaundice, rheumatism, diabetes; it also exhibits carminative as well as anthelmintic properties.

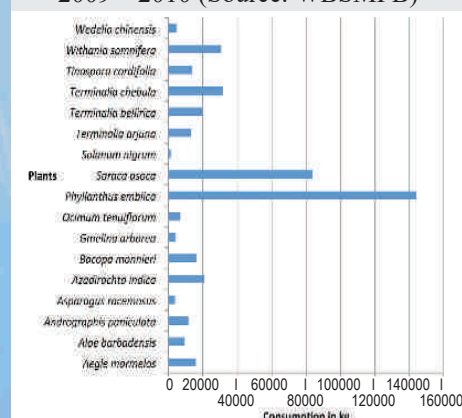
Dry fruits of *Terminalia bellirica* (Gaertn.) Roxb. (Combretaceae) or ‘Bahera’ with a requirement of about 19,592.346 kg per year are effectively used to prepare medicines for diarrhoea, fever, headache, leprosy and piles. Dry fruit extract of *Aegle marmelos* (L.) Corrêa (Rutaceae) or ‘Bel’ of the quantity of 15,844.609 kg per year is consumed by the industry to treat diarrhoea, stomach problems and in intermittent fever; it also acts as a laxative. Bark of *Terminalia arjuna* (Roxb. ex DC.) Wight & Arn. (Combretaceae) which cures heart diseases, hypertension, earache and scorpion sting, exhibits a demand of nearly 13,014.030 kg per year by the industry. *Gmelina arborea* Roxb. (Lamiaceae) or ‘Gumbhari’/‘Gamar’, provides bark for use in ulcer, stomachic ailments, snake bite and scorpion sting with an approximate annual requirement of 3,825.655 kg.

It can be summarized that fruits of *Phyllanthus emblica* are maximum utilized in the industry in herbal formulations, followed by bark of *Saraca asoca*, roots of *Withania somnifera* and fruits of *Terminalia chebula*. All such plants of medicinal importance should be conserved in nature. They can also be cultivated on a large scale by farmers. Supported with proper extension and marketing linkages they pose immense potential for income generation for rural folks. Such cultivation will help to produce quality raw herbs for supply to the industry.

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Graph 1. Consumption of plants in kg 2009 – 2010 (Source: WBSMPB)



## Less known Recipes of Bamboo shoots from Western Odisha

During a course of ethnobotanical survey in Angul and Balangir districts of Odisha, we have observed that a noodle-like white substance, known as ‘Kardi’, is being sold in some of the weekly markets at the rate of ₹ 20 – 40 per kg. On enquiry, we came to know that these are prepared from tender bamboo shoots. The local people also informed us that 5 – 7 days old and 1 – 3 feet long fresh shoots of *Dendrocalamus strictus* (Roxb.) Nees, locally known as ‘Salia Banse’ are at first collected from the wild, and the whitish brown, hairy culms and the hard green parts are removed with a knife. These are then grated into juliennes. It is said to be an

energetic and tasty vegetable consumed during the rainy season from July to September by the tribal as well as rural people of the area. Generally these juliennes are boiled in water for 5 – 7 minutes and the water is decanted. These are then fried in oil with spices and salt and consumed as a curry, which tastes like mutton. Sometimes it is mixed with tender leaves, flowers and ripe fruits of *Cucurbita maxima* Duchesne and wild mushrooms (‘Chhattu’) for a difference in taste and also to increase the quantity of the preparation. The unused juliennes become brownish within 2 – 3 days and then they are dried in sunlight and powdered which is known as

‘Handuwa’. This powder is preserved for use in winter. It is sold in the market at the rate of ₹ 60 – 80 per kg during November to December, for the preparation of chutney. For this, the powder is mixed with small pieces of tomatoes and onions and fried with oil, spices and salt and this sour chutney so prepared is eaten with rice and chapatti.

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A. *Dendrocalamus strictus* growing in the forest; B. Young shoots sprouting adjacent to old shoots; C. Single young shoot; D. A Kandha tribal man with young shoots; E. A Gond tribal man with young shoots; F. Discarded culm sheaths of young bamboo; G. Removed green hard parts of shoots; H. ‘Kardi’, being sold in market; I. Juliennes; J. Juliennes of 2 – 3-day old; K. ‘Handuwa’, being sold in market

## *Monodora myristica* (Annonaceae), the ‘African Orchid Nutmeg’ at AJC Bose Indian Botanic Garden, Howrah

*Monodora* Dunal is a tropical African genus, comprising c. 14 species (Mabberley, 2008). *Monodora myristica* (Gaertn.) Dunal is a tree species with eye-catching heart-shaped, colourful and fragrant flowers. The flowers look very similar to an orchid and the nearly spherical drupes resemble a nutmeg

and so it is commonly known as ‘African Orchid Nutmeg’. The scented, waxy flowers are suspended on long stalks. The large woody fruits are with numerous oblongoid, c. 1.5 cm long, pale brown seeds embedded in aromatic pulp.

Seeds are the most economically important part of this tree. They are

widely used in West Africa as a substitute for nutmeg in soups, stews and cakes. In traditional medicine, the seeds are used as a stimulant and stomachic. They are also used as rosary beads and are considered by some to have magical properties. Seed oil shows antimicrobial activity against *Bacillus subtilis*, *Candida*

*albicans* and *Staphylococcus aureus* and can be incorporated into cream as antimicrobial agent and as a perfume (Odoh *et al.*, 2004). The hard timber is easy to work and used for various carpentry works. The tree is also cultivated as an ornamental.

A tree is grown at AJC Bose



*Monodora myristica*; inset: Flower

Indian Botanic Garden, Howrah in front of the Kiosk Building. It was brought from Agri Horticultural Society of India, Alipore and was planted by Dr. R.K.Chakraverty, Ex-Additional Director, Indian Botanic Garden, Howrah. Scanty flowering was observed in March 2011 but it flowered profusely in March 2012. However, fruit setting was not observed yet. Similarly, there is also no record of fruit setting in the trees growing in the garden of the Agri Horticultural Society of India. *Monodora myristica* flowers are pollinated in the wild by beetles and probably the absence of pollinators might be the cause for no fruit setting.

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## Indian Aconite

*Aconitum* L. belongs to the buttercup family, Ranunculaceae. The genus comprises c. 100 species, distributed mainly in North temperate regions of the world (Mabberley, 2008). It is also known as wolfsbane, leopard's bane, women's bane, devil's helmet or blue rocket. The Greeks named it as the 'Queen of Poisons'. It is also believed that aconite dripped from the jaws of Cerberus, the large three-headed mythical dog that guarded the entrance to the underworld.

The genus is represented by 27 species in India (Rau, 1993) and chiefly distributed in the alpine and subalpine regions of Himalayas. The tuberous roots of several species of *Aconitum* are commonly known as Aconites or monkshood and a number of them are known to contain highly poisonous alkaloids (Chadha, 1985). The roots of only nine Indian *Aconitum* species are commonly found in the trade. The crude drug of *Aconitum ferox*, commonly known as Indian Aconite that is being sold in the markets is actually a mixture

of three or four species. Though the Indian Aconite is used for homicidal purpose, it can be regarded more as a boon than a bane to the human society because of its various medicinal properties. It is used as a natural rodenticide and an effective pesticide. It is also useful in treating various human ailments, especially pain in nerves caused by a change in neurological structure or function, muscular rheumatism, inflammatory joint affections, nasal catarrh, tonsillitis, gastric disorders, debility and fevers of inflammatory origin. Besides, it is useful as a cardio-tonic, sedative and in excessive sweating commonly associated with shock. Six species of *Aconitum* have been used in Homoeopathic medicine.

All the Indian *Aconitum* species have been placed under Negative List of Exports by Government of India and the trade/export of these species collected from the wild sources has been banned.

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[http://www.h2g2.com/approved\\_entry/A4113983](http://www.h2g2.com/approved_entry/A4113983)

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*Aconitum ferox*; inset: Tuberous roots

Courtesy: M.K. Pathak



Dr. (Ms.) N. Chatterjee, IAS, Additional Secretary, Ministry of Environment & Forests, New Delhi addressing the ENVIS Coordinators and Evaluators in the National Evaluation Workshop for ENVIS Centres at Bhopal on 29th August, 2012

Professor Dr. Martin Krieger, Department of History, Chairperson, Northern European History, Germany viewing Wallichian Correspondences at Central National Herbarium, Botanical Survey of India, Howrah



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**Activities of the Centre:** The Botanical Survey of India having involved in exploration activity has been collecting diverse data pertaining to floral diversity and the ENVIS Centre of BSI proposes to disseminate this information by building databases on the distribution of endemic and threatened plants, documentation of traditional/ethnobotanical knowledge, carnivorous plants and mangroves of India. It is also engaged in publication of state-wise bibliography including abstracts of papers pertaining to plants of India and also selected publications that have relevance both in documentation and conservation.

### 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) ₹ 804.00\*
  3. Red List of Threatened Vascular Plant Species in India
  4. A Pictorial Guide of some of the Indian Plants included in CITES and Negative List of Exports
  5. Bibliography and abstract of papers on flora of West Bengal
  6. Bibliography and abstract of papers on flora of North East India – I
  7. Bibliography and abstracts of papers on flora of West Bengal – II
  8. Bibliography and abstracts of papers on flora of Andaman and Nicobar Islands
  9. Bibliography and abstracts of papers on flora of Maharashtra

**Newsletters:** Up to Vol. 17(2)

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