



भारतीय वनस्पति सर्वेक्षण  
BOTANICAL SURVEY OF INDIA

# ENVVIS

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NEWS LETTER

## EDITORIAL

Today we live amidst a revolution of biotechnology, information networking and environmental crisis. India by virtue of its varied topography, climate and habitats is very rich in biodiversity resources starting from cold desert to the tropical littoral forests. It is also rich in its folk and traditional knowledge of properties and uses of these resources. Biodiversity resources are valued directly such as food for human, fodder for animals, fibre, energy source as fuel, nutrients like leaf manure and structural materials like pharmaceuticals, fragrances, flavours, dyes and other genetic materials of special interest. These resources are viewed as a common heritage of mankind but in the recent Convention on Biological Diversity and General Agreement on Trade and Tariffs this has been focussed in some what conflicting system of rights. On one hand it is shown as sovereign property of Nation-State, while on



Sri Vinod Vaish Special Secretary, Govt. of India, Ministry of Environment & Forests is critically observing the establishment technique of the prop root system of the Great Banyan Tree at Indian Botanic Garden, Shibpur, Howrah.




Propagation of Rare and Endangered plants in IBG. under *ex-situ* conservation programme.

the other hand it is being accepted as intellectual property of enterprises, which has manipulated or even simply discovered them. In India, large number of plant diversity of species, within the species and habitats are very remarkable. A record of India's plant wealth indicates that there are 17,500 species of angiosperms, 48 species of gymnosperms, 1,200 species of ferns, 6,500 species of algae, 14,500 species of fungi, 2,500 species of lichens, 845 species of liverworts and 1,980 species of mosses. This great diversity of plant wealth is obviously maintaining the key role of the environment and the very existence of mankind. But a large number of plant diversity are becoming rare, endangered or even extinct without showing their scope of utility to mankind due to over-exploitation, environmental deterioration and habitat destruction. As India is a poor country in terms of well organised, well substantiated and well documented information system, it is imperative that to overcome this weakness a sound system of information on the biodiversity, knowledge regarding taxonomic identity, occurrence, practices of propagation, sustainable harvest, *ex-situ*, *in-situ* and

genome conservation as well as economic, commercial and medicinal uses of plant diversity resources that reside with India's local communities are the only way to meet the challenges of the millennium's biodiversity resources and environmental conservation.

The ENVIS Newsletter on plant diversity was started in the year 1994 and now it enters its fifth year of publication bringing out its sixth volume. In this issue of ENVIS Newsletter brief note on The Great Banyan Tree-*Ficus benghalensis* and Queen of the Seashore Trees-*Barringtonia asiatica* along with detailed information on Indian National Flower, Value of the Genus *Garcinia*, Vanishing 'Cobra Lily', Fern of Mangrove Swamp, Little Known Edible Herb-*Cardamine macrophylla* and the Pond Weeds-*Potamogeton* of Eastern India have been focussed.

  
(N.P. Singh)

Director

Botanical Survey of India

Place: Calcutta

Date: December 1999



The Great Banyan tree is enjoying the X-mass in the Indian Botanic Garden.

I am a living emblem of the Botanical Survey of India and growing still in the premier Indian Botanic Garden of South East Asia, located at Shibpur, Howrah of West Bengal, India. I took birth on the lap of a dead palm tree even before 20 years of establishment of the Indian Botanic Garden. I am proud that I am associated with this garden since its establishment in the year 1787 by Col. Robert Kyd, and witnessed several ups and downs of this garden for the last 213 years and became a legend of the millennium. Due to my magnificent growth spreaded over an area of 22,165 sq. m with more than 2,800 prop roots, I am looking like a mini forest.

## THE HISTORIC GREAT BANYAN TREE—STEPS INTO NEW MILLENNIUM

L.K. Banerjee and A.K. Banerjee

Indian Botanic Garden, Howrah - 3.

Due to my age and ill luck my main trunk of 17 m circumference was operated and amputated in the year 1925. In spite of these I feel honoured by the visits of distinguished guests like Lord Valentina, Pandit Jawaharlal Nehru, Niketa Kruschev, Nelaam Sanjeeva Reddy and others, and being a curio to the botanical world I have been placed in the Guinness Book of World Record in 1985.

Local people call me as a "Bishal Bot Briksha", and botanist named me in Latin as *Ficus benghalensis* L. belonging to the family Moraceae. I am providing shelter to various species of birds, squirrels and other organisms. Though it is painful that the birds pluck my fruits but still I feel happy when they eat them and assist in my regeneration.

I am ecofriendly with the living organisms by emitting large volume of Oxygen and absorbing other gaseous pollutants and filtering the ambient air by catching dust particles on my leaf surface. Milky juice and bark are being

used either as a health tonic or for the treatment of diabetic patients. Thousands of visitors during scorching summer sun take shelter under my cool shade and refresh. Some visitors used to damage my bark and I had to suffer from infections, but timely care taken by the scientists of the garden I have been treated with proper medicines and manures and for my protection they have erected a fence around me to prevent damage and injury.

You may award me as an unique natural conservationist, being a single tree I am able to sustain a broad spectrum of biological diversity and ecological security of the surrounding environment.

I invite you all to come and join me in the advancement of science and research to this millennium.

**Acknowledgement :** Authors are very much thankful to Dr. N. P. Singh, Director, BSI for his valuable help and guidance.

## INTRODUCTION OF *Barringtonia asiatica* (L.) Kurz.— A QUEEN OF THE SEASHORE, FROM ITS NATURAL HABITAT.

L.K. Banerjee & H. S. Panday

Indian Botanic Garden, Howrah - 3.

A beautiful coastal tree known as "Queen of the seashore"— *Barringtonia asiatica* (L.) Kurz., belonging to the family Barringtoniaceae has been introduced in the Indian Botanic Garden as well as other parts of District Howrah, West Bengal, India. The plant is well known for its attractive flowers, shiny broad leaves and showy stamens. During night when its large flowers open with numerous purple headed stamens, it looks like a large powder puff.

An evergreen tree attaining up to 20 m tall; leaves up to 30-40 cm long, broadly ovate, sessile, thick, coriaceous, narrowed at base and rounded at apex. Flowers 6-8 cm across, white; stamens



*Barringtonia asiatica* (L.) Kurz.  
9 year old tree planted in Howrah district.  
Inset flower (left) and fruits (right).



Pot with young seedling of *B. asiatica* (L.) Kurz

numerous with white filaments headed by purple coloured anthers; Fruit 10-12 cm long, quadrangular, fibrous, turbinate, pyramidal.

Generally it occurs in Malaya, Polynesia, Australia, Sri Lanka and India. In India, distribution of this tree has not been recorded from any mainland coastal regions, it is restricted only in Nicobar Group of Islands. Recently the tree has been reported from the sandy beaches of Madagascar by George Schatz (Personal Communication - 1999).

In 1989 two mature seeds were collected from Nicobar Islands and germinated in two pots at Bally, District Howrah, West Bengal, India. After two years those young plants attaining the height of one meter were planted along the road side of Bally. After 6 years these trees started producing beautiful flowers and fruits. It has been reported that January - March, is the only flowering time of this species but it is observed

that these planted trees produce flowers from March - November. Some of the fruits from the planted trees were again germinated in the Indian Botanic Garden and they are thriving well.

In Australia the plant is known as "Sea island fish poison tree" and in Nicobar it is seen that fishermen use the fruit to catch fish and is popular to them as a fish poison tree.



Local people is drying the fruits of *B. asiatica* (L.) Kurz in the sun for fish poisoning purpose

## THE SACRED LOTUS - INDIAN NATIONAL FLOWER

**Anirban Roy**

Ecology Unit, Botanical Survey of India, Howrah - 3.

Among the sustainable aquatic plant resources, lotus, (*Nelumbo nucifera* Gaertn.) - the National Flower of India demands a unique position mainly for its immense socio-economic and medicinal potentialities, mythological fables, entry into the Indian art and religion of all ages and an auspicious symbol of the Indian culture from the time immemorial. It has been mentioned in the Rigveda under the name of 'Pundarika' and also in the Yajurveda and Atharvaveda. Fossil records of lotus occur right from cretaceous upto Pleistocene (Mitra & Kapoor, 1976). Puri (1950) firstly reported lotus of Pleistocene from Kashmir and then Lakhanpal (1955) reported tertiary fossil of Indian lotus.

The nativity of lotus is too much disputed. Starbo and Theophrastus recorded the plant, a native of Egypt as the sculptured representations of it abound among the ruins of Egyptian temples, and as many other circumstances proved the veneration

paid to this plant by the votaries of Iris (Dymock, Warden & Hooper, 1981). Baily (1950) had the opinion that China and Japan are recognized homes of the lotus. The fossil remains are suggesting that India also the native place of the lotus.

*Nelumbo nucifera* Gaertn. belongs to the family Nelumbonaceae and the order Nymphaeales, Mitra (1993) and Wood (1959) considered it under the sub family Nelumbonoidae of the family Nymphaeaceae. It is first described by Gaertner, Joseph in Fruct. 1: 73, t. 19., f. 2. 1788. The genus *Nelumbo* comprises two species all over the world viz. *N. lutea* (Willd.) Pers. and *N. nucifera* Gaertn. (Wood, 1959) but only *Nelumbo nucifera* Gaertn., is found to occur in India.

*Nelumbo nucifera* Gaertn. is a large, perennial, rhizomatous, rooted floating aquatic herb; rhizome stoloniferous, branched, creeping with adventitious roots from the nodes; leaves flat when floating, cup shaped when emerged,

suborbicular, 20-80 cm across, glabrous, dark green above, paler beneath, coriaceous, entire, petiolate; petiole up to 2 m long with hard minute papillae; flowers 7-25 cm across, rose pink or white, fragrant, peduncle up to 2 m long with minute papillae; sepals 1.4-5 x 0.7-3.8 cm, ovate or elliptic, green or rose pink; petals 3.6-14.5 x 1.8-7.8 cm, obovate to spatulate; stamens 2-4 cm across, spongy, yellow during anthesis turning green and finally dark brown in fruit; carpels 7.5-10.2 x 1.8-8.1 mm with oblong-cylindric ovary, short, exerted stylopodium and peltate, papillose stigma.

This plant is distributed south and east Asia to far eastern Russia and to Northern Australia (Mitra, 1993). In India, it is found in the fresh water wetlands of all the states. It is also cultivated in the fresh water tanks and ponds for its economic and ornamental value.

The main ecological condition for the occurrence of lotus is the fresh water



*Nelumbo nucifera* on full bloom in Indian Botanic Garden

inundation with loose mud containing high organic matter. This plant in wild condition grows initially in association with *Nymphaea*, *Nymphoides*, *Typha*, *Salvinia* and other aquatic plants but later on it forms pure community. It shows a special adaptive features for surviving in aquatic habitat both morphologically and anatomically with significantly long pedicel, petiole and lamina, showy and fragrant flowers and numerous aerenchymatous cells for greater buoyancy. The seeds possess long viability. The seeds buried deep in the soil of South Manchuria for 120 years retained their viability (Ohga, 1923).

Multiplication of lotus is carried out by two ways: (1) by means of rhizomes (2) by means of seeds. The cultivation may be performed in tubs or in the ponds. For the beautification of garden, pot culture is preferred but for the rapid commercial utilization, pond culture is practised as it permits the radial spread of rhizome up to 15 m in a year.

In March-April mature rhizomes are cut into small pieces and planted with 'eyes' above the soil surface submerged with fresh water. The enough waterlogged condition is to be kept till October. For seed multiplication 10-12 kg seeds are required for one hectare. The mature seeds are sown in the mud inundated with sufficient water. During summer and rainy season the plants flower. Seeds ripen during September-October. During October the rhizomes are harvested, flowers and leaves are collected when the plants are fully mature. Before opening, the flower buds are plucked and supplied in bunch to the market. It has been reported that the crop yields 3600 - 4600 kg rhizomes per ha. (*The Wealth of India* 7: 8, 1966)

Lotus possesses high nutritive value. Analysis of fresh rhizome and dried carpel show the following chemical constituents (Table-1).

Different parts of the lotus like rhizomes, flowers, leaves, fruiting torus and seeds are economically very important. Apart from the medicinal value of lotus, there are several uses of it in the society from long historical period. The socio-economic values of its different parts are as follows:

**Rhizome :** It is reported that rhizomes were used as a main food during Deccan famine (Watt, 1972; Conard, 1905). Chung (1929) reported that large quantities of lotus rhizomes were shifted to the United States to feed the Oriental population. In China rhizomes are boiled

and sold in the form of slice or in dried for the future uses. In India there are two types of rhizomes are available in the market i.e. white and reddish brown coloured and sold commonly in the name of 'Kamal Kakari'. The rhizomes are farinaceous and sold as vegetable in the market. Generally it is 60-120 cm in length and 6-9 cm in diam. Fresh rhizomes are eaten after roasting and their dried slices are used in curry or fried as chips. They are also used in pickles and may be preserved in frozen condition for precooked food. A kind of arrowroot is also prepared from rhizome (Porterfield, 1941).

**Fruiting torus :** The fruiting torus is also available in the market due to highly nutritive value of edible carpels embedded on it. The dark brown carpels are eaten after removing the outer covering and embryo to avoid the bitterness. These are sweet, tasty and consumed as raw or after roasting or boiling or sometimes grinding with flour.

**Flower :** The lotus flower is our inherited demand and in some communities it is customary to use the flower for paying regards. They are also supplied to perfume industry for the extraction of highly priced lotus perfume.

**Leaf :** The laminas are used in different religious functions. The petioles are eaten as vegetables.

Most of the parts of lotus have various medicinal uses. The medicinal uses of its different parts are shown in table: 2

TABLE : 1

Chemical Constituents	Material (%)	
	Rhizome	Carpel
Water	83.80	10.00
Protein	2.70	17.20
Fat	0.11	2.40
Starch	9.25	66.60
Fibre	0.80	2.60
Ash	1.10	3.80
Ca	0.06	0.14
P	*	0.29
Riboflobin	0.06	*
Niacin	2.10	*
Thiamine	0.22	*

(\* data not available)

[Source : *The Wealth of India* 7 : 7-9, 1996]

TABLE : 2

Parts of the lotus	Used as/used in
Rhizome	Diarrhoea, dysentery, cutaneous infections, ringworms, antidote to snake bite.
Leaf	Cooling agent, cephalagia, diarrhoea, antihaemorage.
Flower	Cooling agent, astringent, diuretic, diarrhoea, cholera, liver diseases, cough, menorrhagia, haemorage, diuretic
Petals	Piles and menorrhagia.
Stamens	Cooling, burns, piles, menorrhagia, diuretic, haemoptysis, spermatorrhoea.
Pistil	Antidote to snake bite.
Honey	Ophthalmic diseases.
Fruit	Astringent, cooling agent, aphrodisiac, sedative to pregnant uterus, tonic, anti-vomiting.
Seeds	Skin diseases and leprosy, antivomiting, diarrhoea, leucorrhoea, enteritis etc.



Leaves of Lotus are taken for vegetable

**Conservation :** Due to rapid urbanisation, industrialization, rehabilitation, pollution and several other anthropogenic activities wetlands are under constant pressure and gradually loose its ecological security which causes the depletion of several aquatic biodiversity including the lotus, one of the most significant components in the fresh water ecosystem. Therefore, proper conservation and management of wetlands can only protect and conserve this precious taxon.

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## Garcinia L. — A VALUABLE SOURCE OF HYDROXY CITRIC ACID FOR HUMAN WEIGHT-CONTROL.

L.K. Banerjee & Partha Sarthi Kumar

Botanical Survey of India, Howrah - 3.

The genus *Garcinia L.* belonging to the family Clusiaceae was established by Linnaeus in honour of a french botanist and traveller Laurant Garcin (1635-1752), who lived in India and collected plants in the eighteenth century. Sometimes due to heterogenous characters of its male flower, specially in shape, numbers of anther-thecae and nature of the stamens etc. led earlier authors to split the Linnaean genus *Garcinia* into number of generic taxa like *Mangostana* Gaertn., *Cambogia L.*, *Hebradendron* R. Ghar., *Oxycarpus* Lour., etc. Even after considering some general arrangement of floral parts, Roxburgh (Pl. Corom. Vol. 2: 51. t. 196, 1805) established a new genus



Garcinia L. in Indian Botanic Garden.

it has been established that *Garcinia L.* shows wide range of distribution with high amount of intermediate characters and as such delimitation of different generic status is not appropriate.

These trees or shrubs with yellow juice and coriaceous leaves are well known for beautiful polygamous flowers. It can be distinguished in the field by a very short style with a sessile, peltate or lobed stigma; fruit an indehiscent berry with pulpy-aril, embryo symmetrical.

The genus *Garcinia* with more or less 200 species throughout the world distributed mainly in the tropics of Asia, Africa and some part of Australia. In India it is represented by 35 species of which 31 species are wild and the rest are cultivated in different gardens. About 17 species of *Garcinia* are endemic in India of which 7 species are restricted to Western Ghats, 6 are in Andaman & Nicobar Islands, 4 species are restricted along North East India and 3-4 species are cultivated.

The species of *Garcinia* prefers



Fruits of *Garcinia gummi-gutta*, *G. indica*, *G. sopsopia* are being processed for extraction of gamboge.



Male Flowers of *G. dulcis*

*Xanthochymus*. However, due to revisionary works of this genus by various authors such as Choisy (1824, 1851), Roxburgh (1832), Wight (1839, 1840), Planchon & Triana (1860, 1861), Engler (1888, 1908, 1925), Maheswari, J.K. (1964) and Sing, N.P. (1993),

moist, evergreen or semi evergreen tropical forest regions with relatively medium monsoon climate. They usually appear below 1000 m altitude. It is known as one of the slowest growing tree species in the tropics. The remarkable fruit "Mangosteen" from the species *G. mangostana* L. is reported for fruiting even 10 to 20 years after plantation. Some species are reported as Parthenocarp, some are with medicinal properties and produce "Gamboge resin".

The fruits of several species are edible and some species produce beautiful flowers and foliage. Besides all the above mentioned properties, some species of *Garcinia* used as a source of Hydroxy Citric Acid (HCA) for human weight control product, which inhibit the transfer of carbohydrate into fat. Recently Dabar Research Foundation is marketing a herbal capsule named as "SUNOVA BIOSLIM" capsule from the fruit rind of *Garcinia* species. Due

to the presence of this therapeutic goods, the species of *Garcinia* have become more informative in the global market. Therefore, brief information regarding the supply of therapeutic products containing HCA may be useful for conservation and management of this species.

The brief informations regarding the distribution of species in India and their uses are shown in the Table.

Name of the species	Distribution	Uses
<i>Garcinia acuminata</i> Planch & Triana	West Bengal, Assam, Meghalaya, Arunachal Pradesh, Mizoram, Tripura	Gum used as dye and medicine, Seed oil for illumination and preparation of ghee.
<i>G. affinis</i> Wall. ex Pierre	Assam, Meghalaya, Kerala, cultivated in West Bengal	Yields inferior quality of gamboge, fruits edible.
<i>G. andamanica</i> King	Endemic to Andaman	Wood is used for packing boxes and fuel
<i>G. andamanica</i> King var. <i>pubescens</i>	Endemic to Myanmar	Wood is used for packing boxes and fuel
<i>G. anomala</i> Planch & Triana	Assam, Meghalaya, Mizoram, Nagaland	Yields inferior quality gamboge.
<i>G. atroviridis</i> Griff. ex T. Ander	Assam, Arunachal Pradesh	Decoction of leaves and root are medicinal; fruits edible, used in dyeing; it may contain HCA.
<i>G. brevirostris</i> Scheff.	Andaman & Nicobar island, rare in West Bengal.	Timber; produces inferior quality of gamboge.
<i>G. cadelliana</i> King	Endemic to Andaman & Nicobar	Fruits sour, acidic, it may contain HCA.
<i>G. calycina</i> Kurz.	Kamorta Island, endemic to Andaman & Nicobar	Uses not known.
<i>G. cowa</i> Roxb. ex DC.	Assam, Bihar, West Bengal, Sikkim, Nagaland, Tripura, Meghalaya, Orissa, Andaman & Nicobar Islands and introduced in Indian Botanic Garden.	Inferior gamboge used in yellow varnish; leaves used as vegetable; acidic fruit with pleasant flavour, medicinal. It may contain HCA.
<i>G. dulcis</i> (Roxb.) Kurz.	Andaman & Nicobar, introduced in Indian Botanic Garden.	Acidic fruits used as preservative, seeds for medicine, bark for dyeing material. It may contain HCA.
<i>G. gummi-gutta</i> (L.) N. Robson var. <i>conicarpa</i> (Wight) N.P. Singh var. <i>papila</i> (Wight) N.P. Singh	All of the species are endemic to Western Ghat, Maharashtra, Karnataka, Tamil Nadu, Kerala and introduced in Indian Botanic Garden.	Gamboge used for varnishes and water colour; Fruits edible used as substitute of lime and tamarind, rind used for coagulation of rubber latex, as a substitute for Acetic acid and Formic acid, used for polishing gold; Seed oil medicinal, it may contain HCA.

<i>G. hambroniana</i> Pierre	Andaman and Nicobar, and also occur throughout the coastal area.	Fruit sour, edible, it may contain HCA.
<i>G. imbertii</i> Bourd.	Endemic to Kerala (S. Travancore), Tamil Nadu (Tirunelveli)	Yield inferior quality of gamboge, sour fruit may contain HCA.
<i>G. indica</i> (Thouars.) Choisy	Endemic to Western Ghats, Maharashtra, Goa, Karnataka, Tamil Nadu, Kerala and introduced in Indian Botanic Garden.	Acidic fruits used for melting iron, outer fruit rind used as Kokam in Konkan and Maharashtra, used for preparing syrup, exported to Zanzibar, ripe fruits are used as anthelmintic and cardio tonic; Seed oil known as Kokum butter used as edible fat, adulterating ghee, making soap and candle and also in medicine. It may contain HCA.
<i>G. keenania</i> Pierre	Assam (Cachar), endemic, rare.	Uses not known.
<i>G. kingii</i> Pierre ex Vasque	Endemic to Andaman & Nicobar Islands.	Uses not known.
<i>G. kurzii</i> Pierre	Endemic to Andaman & Nicobar Islands.	Uses not known.
<i>G. kydia</i> Roxb.	Assam, Meghalaya, Andaman & Nicobar Islands	Yields inferior gamboge, fruits used in dysentery and headaches
<i>G. lanceaefolia</i> Roxb. var. <i>oxyphylla</i> (Planch. & Triana) Lanessan.	Assam, Meghalaya and Nagaland Endemic to Assam, Meghalaya Nagaland and cultivated in Tripura.	Leaves used as vegetable; fruit acidic, ripe fruits are eaten. It may contain HCA Fruits sour, edible; It may contain HCA
<i>G. loniceroides</i> T. Ander.	Only in Nagaland and Manipur.	Uses not Known
<i>G. merguensis</i> Wright.	Andaman & Nicobar Islands	Sour fruits are edible. It may contain HCA
<i>G. microstigma</i> Kurz.	Endemic to Andaman and Nicobar	Leaves used as vegetable, sour fruits edible. It may contain HCA
<i>G. morella</i> (Gaertn.) Desr.	Western Ghats, Karnataka, Tamil Nadu, Kerala, Assam and Meghalaya.	Yields superior gamboge with morellin, it has anti-bacterial properties used in vernishing metal and silk dyeing, also used for hydragogue, drastic, cathartic, anthelmintic, constipation, anarca and dropsical affection; the fruit rind is used in tanning, the seed oil edible, used for adulterating ghee, candle making and also in medicine. It may contain HCA.
<i>G. nervosa</i> Miq.	Andaman & Nicobar Islands.	Uses not known.
<i>G. pedunculata</i> Roxb. ex Buch.-Ham.	West Bengal, Assam, Nagaland Arunachal Pradesh, Mizoram.	Timber; fruit edible, used as fixative for saffron dye, dried slices of fruit used as substitute for lemon. It may contain HCA.
<i>G. pictoria</i> Roxb. ex Buch.-Ham.	Western Ghats, Karnataka, Tamil Nadu and Kerala	Yields excellent gamboge with yellow pigment, seed oil used for preparation of ghee and for burning lamp.

<i>G. rubro-echinata</i> Koest.	Endemic to Western Ghats, Karnataka, Tamil Nadu and Kerala.	Seed oil for adulterating ghee, preparation of soap and candle, also used for burning lamp. It may contain HCA.
<i>G. sopsopia</i> Maberly	Sikkim, Meghalaya, Assam, Tripura, cultivated in Indian Botanic Garden.	Fruits with good flavour, edible, young leaves used as vegetable; It may contain HCA
<i>G. speciosa</i> Wall.	Andaman and Nicobar	Timber.
<i>G. spicata</i> (Wt.& Arn.) Hook.f.	Assam, Meghalaya, Orissa, Andhra Pradesh, Maharashtra, Karnataka, Tamil Nadu & Kerala	Timber; fruits edible, give a chrome yellow pigment "Fukuji" a colouring matter in Japan. It may contain HCA
<i>G. stipulata</i> T. Ander.	West Bengal(Tista Valley), Sikkim, Arunachal Pradesh, Assam, Nagaland, Meghalaya.	Fruits are edible It may contain HCA
<i>G. talbotii</i> Raizada ex Santapau	Western Ghats, Karnataka, Goa, Meghalaya, Tripura, and Kerala.	Fruits are used for tanning
<i>G. travancorica</i> Bedd.	Kerala, Tamil Nadu, Lalbug Botanic Garden	It produces yellow gamboge.
<i>G. wightii</i> T. Ander.	Endangered in Tripura, Karnataka and Kerala.	Produces soluble gamboge and gives good pigment.
<i>G. xanthochymus</i> Hook. f.	Sikkim, Assam, Tripura, Meghalaya, Orissa, Maharashtra, Goa, Andhra Pradesh, Karnataka Tamil Nadu, Kerala, Andaman & Nicobar Islands	Gamboge used in water colour for dyeing; fruits edible, pulp is melt in mouth like a bit of icecream, used as medicine and preservative. It may contain HCA.

Detailed chemical analysis for knowing the percentage of HCA from fruit rind of different species of *Garcinia* would be a valuable work for obtaining the useful therapeutic product as it has a high demand in the global market. A recent advertisement in the NewsPaper, "Ananda Bazar Patrika" by the Dabur Research Foundation with the BIOSLIM Capsule Photograph expressed the following:

"Sunova Bioslim is the only natural way for lowering the body weight without any side effect. It is internationally proved that this product containing the extract of *Garcinia* & *Areca catechu* inhibit the transformation of Carbohydrate into fat. Prescribes dose is to take two capsules twice a day before half an hour of the meal. Bioslim helps for lowering body weight upto 4-5 kg within two months in addition to adequate food and physical exercise."

#### Acknowledgement :

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The advertisement of Sunova Bioslim in Newspaper

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## *Arisaema griffithii* Schott; A vanishing Cobra-Lily from Sikkim

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Cobra-Lily is a member of the genus *Arisaema* under the family Araceae. The local name is because of the similarity of its spathe with the hood of Cobra snake. The generic name *Arisaema* is derived from the Greek Word *Aron*=Arum and *Aima*=Blood-red, referring to the red-blotched petioles and peduncle of many species. Sikkim is the treasure house for the genus *Arisaema*. Out of 38 species of *Arisaema* in India near about 14 species are found here.

*Arisaema griffithii* Schott, is a typical Cobra-Lily characterised by depressed globose tuber; single or two leaves with three leaflets, median being ovate-

rhomboid; spathe-blade laterally dilated and much broader than the length of spathe-tube, strongly incurved, spreading like ears on both sides, deep violet or purple with cream-white reticulation.

**Fl. & Fr.:** March - June.

It is distributed in India throughout the Sikkim, Nepal and Bhutan. Mostly distributed in moist shady places in temperate forests; 2400-3500 m.

### Uses :

1. Tubers of this species are eaten by local people as a source of food and called Ladua (Sherpas).

2. Tubers are also used to prepare local drinks.

3. Tubers are favourite food of Black bear.

4. It is of immense horticultural importance for its paradise beauty.

### Conservation :

Due to extensive extraction for its food value the population of this species is declining rapidly. Though a portion of its locality is under Kanchendzonga Biosphere Reserve, proper monitoring is essential to save it from further destruction. Collection of this species from the wild should also be banned. Cultivation by local people with the help of modern technology should be encouraged.

### Acknowledgement :

Authors are grateful to the Director, Botanical Survey of India, Dr. L.K. Banerjee, Dr. M.S. Mondal, Scientist 'SE', Botanical Survey of India Calcutta and Dr. G.G. Maiti, Reader, Kalyani University for constant encouragements.

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*Arisaema griffithii* Schott



## *Cardamine macrophylla* Willd. : A little known wild edible herb of the Eastern Himalaya

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and

Sujit Kumar Jana

Sikkim Himalayan Circle, Botanical Survey of India, Gangtok

The genus *Cardamine* L. (Brassicaceae), 'bittercress' is with 200 species (Al-Shehbaz 1988, Mabberley 1997) distributed in north and south temperate

mountains. Majority of the species grow in moist habitats, alpine lands and temperate forest floors but few are aquatic. The genus exhibits its wide range of variation in the far eastern Asia

and in the Himalayas. Al-Shehbaz (1988) reported about 70 species throughout the world. In India it is represented by 14 species (Henry and Janarthanam, 1993), distributed mainly



*Cardamine macrophylla* Willd.

in the Eastern Himalaya. *C. macrophylla* is popularly known as 'Bhoteshak' and 'Khendu' among Lepchas and Bhutias respectively who are the inhabitants in the interior sectors of Darjeeling and Sikkim of India, Nepal and Bhutan regions.

*C. macrophylla* Willd., Sp. Pl. 3 : 484, 1800. Henry & Janarthanum, Fl. India 2: 115. 1993.

Branched, hairy perennials with adventitious roots frequently arising from the nodes. Stem erect or procumbent, erect part may attain the height of 100 cm or so, hairy in young condition, seldom glabrous at maturity. Leaves alternate, pinnate, 5-many, 5-12 cm long and 3-16 cm broad; leaflets 2-7 pairs, alternate, very variable in shape and size, elliptic, obovate or lanceolate, 1.5-10 cm long and 0.7-2.5 cm broad, crenate or irregularly serrate, obtuse or acuminate at apex, cuneate at base, sessile. Petioles slender 4-18 cm long, hairy with ramment of laminar extension.

Flowers, 5-many, in erect raceme, occasionally condensed to form subcorymbose, pedicellate; pedicels slender, 1-2 cm long, hairy, variously coloured as rich-purple, rose pink rarely crimson or violet, or white, 0.8-1.5 cm across. Siliqua narrow, linear, 2.5-4.5 cm long and 0.2-0.4 cm broad, erect, glabrous, but with distinct midrib on the valves; seeds flattened.

**Fl. & Fr. :** May to July.

**Ecology :** This plant commonly grows in wet open slopes or near the stream or under *Rhododendron* shrubs. Local vendors collect the whole plant of *Cardamine macrophylla* along with *C. hirsuta* from this habitat.

**Socio-economic aspect :** Local people use to collect the plant and after washing make bundles for selling the same in the local market of Gangtok and Darjeeling @ Rs. 1-2 per bundle and they earn Rs. 100-200 per day.

**Voucher Specimen :** Sikkim: Yumthang, near hot spring, 3200m, 12.6.1998, Jana & Basak 18457 (BSHC)

**Economic Uses :** The whole plant after sundrying and frying in oil is taken as a vegetable or young shoots are also taken as salad by people of Lepcha and Bhutia community in the villages of Dzongu, Lachung and Yumthang of North Sikkim.

The fleshy underground parts of several species of *Cardamine* are eaten like radish or used as substitute for horseradish when grated and mixed with vinegar. The young green parts of many species are said to be an excellent substitute for watercress. Certain species are considered to have medicinal properties and are used in Asia as stimulants, diuretics, diaphoretics and antidiarrhetics.

**Chemical constituents** □: About ten south-eastern American species of *Cardamine* have been surveyed for glucosinolates, *C. cordifolia* contain as many as nine compounds of which 2-butyl glucosinolate is the major constituents. *C. diphylla*, *C. concatenata* and *C. x maxima* contained various amounts of isopropyl, 2-butyl and 2-methyl butyl glucosinolates (Al-Shehbaz 1988).

**Conservation strategies :** So far the existence of these plant is not threatened at their natural habitat but the population of this species may become rare due to regular consumption by tribals directly from nature without cultivation.

**Acknowledgement :** The authors are grateful to the Director, Botanical Survey of India and Dr. L. K. Banerjee, Deputy Director, India Botanic Garden for giving facilities and inspiration. The authors also express sincere gratitude to Dr. G. G. Maiti, Department of Botany, Kalyani University for critical evaluation of the manuscript.

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*Cardamine macrophylla* Willd. plants are sun drying in North Sikkim

## *Acrostichum aureum* L. : a well known fern of mangrove swamps

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Central National Herbarium,  
Botanical Survey of India, Howrah-3.



*Acrostichum aureum* L.

The genus *Acrostichum* L. belonging to the family Pteridaceae is a well-known mangrove fern. The name *Acrostichum* as given by Carl Linnaeus is probably related to the nature of 'acrostichoid' sporangia. Throughout the world the genus represents only 3 species such as *A. aureum* L., *A. speciosum* Willd. and *A. danaiefolium* Langsd. & Fisch. Its population shows a beautiful indicator of degraded mangrove swamps. It can tolerate high salinity and regular tidal inundation. Its population can be identified from a distance with the help of the tall pinnate fronds with rusty fertile pinnae at the top. In Andaman Islands sometimes local people use the young pinnate fronds as vegetables.

The genus *Acrostichum* is distributed along the coast of tropics and subtropics in America, Africa, East and South-East Asia, Queensland, Australia, North of Ryukyu islands, Pacific to Tahiti and Austral Islands. In India *Acrostichum* represents only by 2 species, *A. aureum* throughout the Indian Coast and Andaman and Nicobar Islands and *A. speciosum* only restricted in great Nicobar Island (Dixit, 1984).

Key to the species

### ACROSTICHUM

1. Pinnae widely arranged on the frond;

fertile pinnae usually situated on the upper part of lamina; spine like abortive petiolules present on the petiole:

2. Apex of pinnae suddenly rounded or lobed, always with mucronate tip at apex..... *A. aureum*

2. Apex of pinnae not suddenly rounded or lobed or mucronate but acuminate at apex.....*A. speciosum*

1. Pinnae densely arranged on the frond; fertile pinnae extend upto the base of lamina; spine like abortive petiolules absent ..... *A. danaiefolium*

*Acrostichum aureum* L., Sp. Pl. 2 :1096.1753; Bedd., Handbook Ferns British India.440.t.268.1892.

Scales on rhizome and stipe to about 4.5 cm long and 2 cm wide; base dark-brown, thick; margin thin, broad, pale. Fronds up to 5m tall; pinnae simple, upper ones fertile; Sterile pinna oblong-elongate, base unequal, cuneate to rounded, entire, apex slightly narrowed, abruptly rounded, texture coriaceous, midrib grooved towards the apical half and raised towards the basal half; veins forming irregular elongated areoles. Fertile pinna smaller than sterile pinna. Sporangia with trichomes; paraphysis with numerous lobed apical cells.

**Vernacular name :** "Udoban" (Sundarban, West Bengal) and "Arwar" (Karnataka).

**Habitat :** This species is common along the Sundarbans in West Bengal, Mahanadi delta in Orissa, Godavari-Krishna delta in Andhra Pradesh, Pichavaram in Tamil Nadu, back waters of Karnataka, Cochin and Kerala states. It usually prefers the degraded elevated part of the mangrove swamps where the land receive the tidal flow only during very high tide.

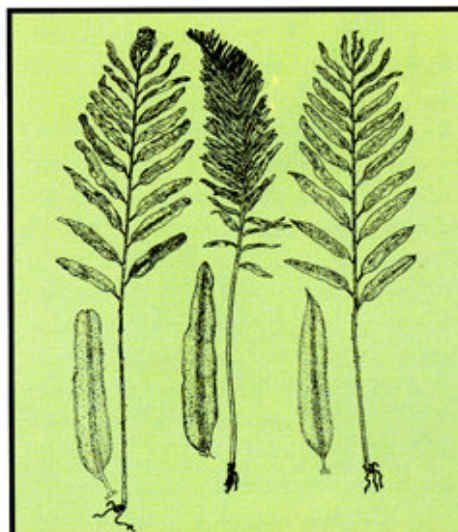
**Medicinal Importance :** The rhizome is pounded, grated and is applied as a paste to wounds and boils in Malaya and Borneo.

**Economic Uses :** Natives of Borneo, Celebes, Timor take very young leaves as vegetable. The finny parchment-like fronds are dried, strung upon rods and used instead of straw thatch. (Uphof, 1968). In the Gangetic Sundarbans, West Bengal and in Andamans the very young fronds are used as vegetable.

**Acknowledgement :** The author is grateful to Director, Botanical Survey India and Dr. L.K. Banerjee, Deputy Director, Indian Botanic Garden for their help and guidance.

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Leaf shapes of *A. aureum* L., *A. danaiefolium* Langsd. & Fisch., *A. speciosum* Willd.

## Potamogeton L. the common pond weed in Eastern India

Partha Sarthi Kumar & L. K. Banerjee

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from sugarcane product. Thus considering the above mentioned values a brief information regarding some species of *Potamogeton* occurring in Eastern India would be very much informative.

In eastern India this genus is represented by 6 species viz. *P. pectinatus* L., *P. crispus* L., *P. perfoliatus* L., *P. malaianus* Miquel, *P. nodosus* Poir. and *P. octandrus* Poir..

4. Floating leaves lacking, submerged leaves oblong, clearly veined and always pointed at apex ..... *P. malaianus*

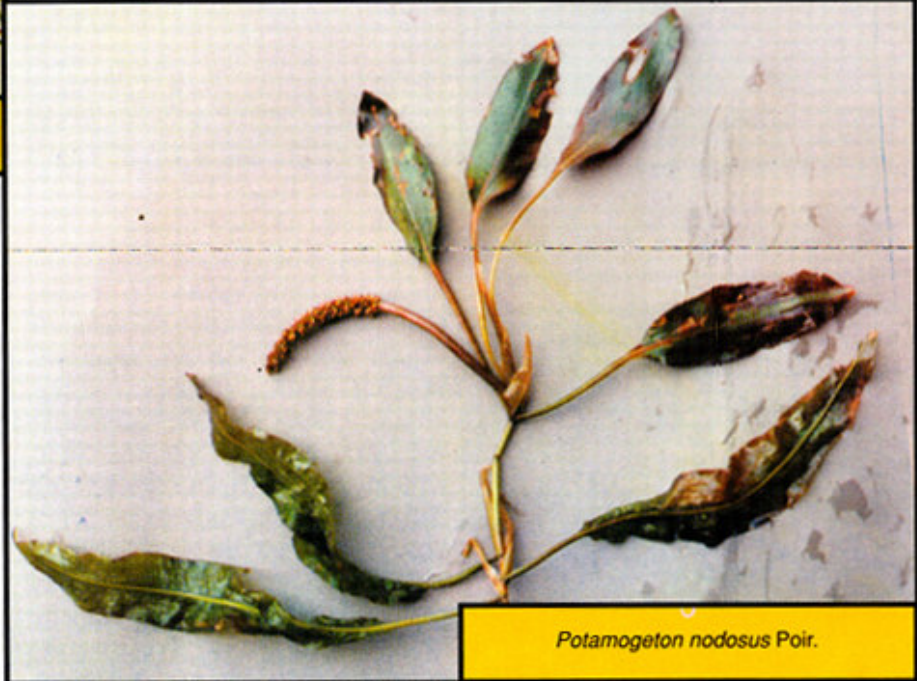
4. Floating leaves present, submerged leaves not oblong, not clearly veined and not pointed at apex:

5. Submerged leaves lanceolate, petioles of floating leaves longer than blades ..... *P. nodosus*



*Potamogeton pectinatus* L.

The genus *Potamogeton* L. belonging to the family Potamogetonaceae was first instituted by Tournefort in his "Institutionis rei Herbariae" in the year 1700; It was taken up by Linnaeus in the first edition of his Species Plantarum in 1753. It is distributed widely in aquatic habitats with 80-90 species and more or less 40 hybrids throughout the world. These perennials or rarely annual herbs are found submerged or sometimes floating in fresh, brackish and saline water conditions in the temperate, subtropical and tropical regions. Dense mat formation of some of the species along the littoral coastal lagoons and temperate lakes are sometimes reported to be a nuisance weed. They are wind pollinated and drupelets are dispersed by water current. Most of the species are very important for food and shelter of many fishes, crabs and many of them are decorative. Beside these, many species are used in softening the water by removing lime and Carbon-di-oxide. Some species in Kashmir and Ladakh region are used as a good fodder. Leaves of *P. malaianus* Miquel, and *P. crispus* L. are used for pigment "Rhodoxanthin" and are also used in Homoeopathic medicine. In Ladakh, Punjab and North west Himalayan region it is reported that some species of *Potamogeton* are also employed to refine and remove moisture



*Potamogeton nodosus* Poir.

### Key to species POTAMOGETON L.

1. Leaf filiform; peduncles flexible; flowers in whorls and in a discontinuous spike ..... *P. pectinatus*

1. Leaf flat; peduncles rigid; flowers not in whorls and in a continuous spike:

2. Submerged leaves sessile, always clasping the stem:

3. Leaves lanceolate, alternate, margin distinctly wavy ..... *P. crispus*

3. Leaves ovate, opposite, margin not wavy, entire ..... *P. perfoliatus*

2. Submerged leaves not sessile, not clasping the stem:

5. Submerged leaves linear, petioles of floating leaves shorter than blades ..... *P. octandrus*



*Potamogeton pectinatus* L. plants are used for providing shelter to the crabs in the Chilka market.

Table Shows No. of species, brief description, ecology, uses and distribution in Eastern India

Species	<i>P. crispus</i> L.	<i>P. malaianus</i> Miquel	<i>P. nodosus</i> Poir.	<i>P. octandrus</i> Poir.	<i>P. pectinatus</i> L.	<i>P. perfoliatus</i> L.
<b>Habit :</b>	Submerged	Floating herb	Floating herb	Floating herb	Submerged herb	Submerged herb
<b>Rhizome &amp; Stem :</b>	Stoloniferous; yellow-white, rarely branched	Stoloniferous; sparsely branched, terete	Stoloniferous; yellowish white, terete, branched	Stoloniferous; yellowish white, terete, simple or branched	Stoloniferous; whitish, terete, repeatedly branched	Stoloniferous; terete, sparsely branched
<b>Leaf :</b>	3 - 5 x 0.5 - 0.9 cm, linear-lanceolate, translucent, wavy, acute at apex rounded at base	Greenish-brown, 5 - 13 x 1.2 - 3 cm, oblong-elliptic minutely serrate, apex pointed, base cuneate	7-25 x 2.5 - 3 cm, lanceolate, translucent, entire, acute at apex, cuneate at base ; floating leaves 5 - 15 x 2 - 4 cm, ovate or lanceolate, entire, acute, base rounded	3 - 5 x 0.3 - 1 cm, linear, entire acute at apex cuneate at base; floating leaves 1.5 - 4 x 0.03 - 0.8 cm, lanceolate, entire, acute, base cuneate	4 - 20 x 0.2 - 3.5 cm, filiform, entire, apex pointed	5 - 12 x 3 - 6.5 cm, ovate lanceolate, minutely serrate, apex rounded or acute, base cordate or rounded
<b>Inflorescence :</b>	Terminal spike	Densely spike	Densely spike	Terminal spike	Interrupted spike	Terminal spike
<b>Fruit :</b>	Drupelet, 5 - 6 mm long, globose curved and beaked	Drupelet 2.4 - 4 mm long, globose keeled, beaked	Drupelets 2 - 4 mm long, keeled	Drupelet 2 - 3 mm long, keeled	Drupelets 2 - 3 mm long, ovoid, dentate, curved and beaked; seeds smooth, globose	Drupelets 2.5 - 3 mm long, obovoid, keeled, curved and beaked
<b>Ecology :</b>	Common in flowing water, sometimes in still eutrophicated water and produce gregarious growth	Common in lakes and ponds, specially in deep fresh water condition	Generally occur in flowing water particularly in eutrophic condition, also grows in lake and develops large population	Grows both on fresh and brackish water condition, sometimes in tidal swamps	It can grow from high altitudinal lakes to the coastal lagoons in fresh, brackish & salt water and tidal inundated regions, some times it grows so vigorously that creates actual problem for navigation	Commonly occurs in standing fresh water lakes and brackish tide water flow. In Chilka lake it is growing along the mouth, adjacent to the sea.
<b>Use :</b>	Good shelter of many fishes and crabs as well as fertilizer	Good shelter for aquatic fauna	Shelter and food for fishes and other aquatic animals	Young leaves and shoots serves as food for many fishes	Serves as food and shelter for many fishes, crabs and other aquatic animals and insects. In Chilka, local people use this as a source of fertilizer. In the market fishermen are keeping the crabs under the shade of this dried plant for selling	Serves as a shade and shelter of many fishes and often support growth of algae which indirectly provide food for fishes.
<b>Distribution :</b>	It is found in Mizoram, Bihar, Assam, Uttar Pradesh and West Bengal	Bhopal (Bhoj lake), Bihar (Kabar Lake)	Throughout Arunachal Pradesh, Bihar, Himachal Pradesh, Manipur, Orissa, Sikkim and West Bengal.	Himachal Pradesh, Meghalaya, Sikkim and West Bengal	Bihar, Himachal Pradesh, Orissa and West Bengal	Himachal Pradesh, Karnataka and Uttar Pradesh.

**Chemical analysis of *P. pectinatus* L. and *P. perfoliatus* L., shows the following compositions:**

Components	<i>P. pectinatus</i>	<i>P. perfoliatus</i>
Crude protein	7.6-15.2%	6.6-13.5%
Fat	0.6-1.9%	0.6-1.3%
N-free extr.	45.5-52.0%	45.5-59.2%
Cellulose	19.1-23.7%	13.8-15.9%
Mineral matter	16.2-18.3%	12.3-31.5%
Carotene	10.5mg/100gm	11.3mg/100g

(Source: *The Wealth of India, Raw Materials*, VIII, 1969, CSIR, New Delhi.)

#### Germination :

According to Spencer, D.F. & G.G. Ksander (1992) tubers and buds of *Potamogeton* can be germinated in

between 10°-25°C but it has no dormancy. Germination is only controlled by environmental conditions.

#### Conservation :

Due to massive deterioration of wetland habitats like other aquatic species the genus *Potamogeton* is also facing a burning problem for its existence. Population of some of the species such as *P. malaianus*, *P. nodosus*, *P. perfoliatus* etc. have been found seriously reduced throughout the Eastern Indian regions. As it is the source of major food and shelter of many fishes, aquatic animals and crabs, proper protection and conservation of the surrounding wetlands will be the main objective for the conservation of this species.

#### Acknowledgement :

Authors are grateful to the Director, Botanical Survey of India for giving facilities and continuous encouragement.

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## TRAINING AND WORKSHOP

The Project co-ordinator, Dr. L. K. Banerjee attended 4 days National Convention on Information Networking (NACLIN99) organised by DELNET in New Delhi from 11-14 Oct. 1999.

Dr. L. K. Banerjee attended 2 days international meeting in Sukna, West Bengal from 15-17 Nov. 99 for information system on establishing a Biosphere Reserve in North Bengal

## SCIENTIFIC & TECHNICAL ACTIVITIES IN ENVIS CENTRE, BSI

The ENVIS Centre on Plant Diversity, of the Botanical Survey of India, Ministry of Environment & Forests, is situated at the Industrial Section, Indian Museum, 1 Sudder Street, Calcutta - 700 016. The main objectives of this Centre are to collect and store data on Plant Diversity from various sources and disseminate the same as much as possible through an appropriate database to a wide range of users nationally and internationally and to create an interlink by computer network.

Various queries on information have been received by the ENVIS Centre from different parts of India as well as from abroad. More than 150 National and International queries have been replied during the period under report in the field of terrestrial ecosystem, fresh water, oceans and coastal areas, environment and development, human settlements, agriculture, chemistry and biochemical processes, human health, Biostatistics and environmental awareness to different

universities, institutions and other departments.

#### International Queries received from different countries :

Bangladesh	:	2
Sri Lanka	:	2
Nepal	:	2
Bhutan	:	1
South Africa	:	2
USA	:	2
Australia	:	2
Costarica	:	1
Poland	:	2
Brazil	:	1

#### Statistics of Queries and replies during 1998-99 (in part):

Total no. of National Queries	134
Total no. of International Queries	17

L. K. Banerjee  
Project co-ordinator  
ENVIS, BSI

## BOOKS, NEW PUBLICATION FROM BSI : 1999-2000

**Flora of Bilaspur District, M. P.** Vol. 2 by S. K. Murty and G. Panigrahi Vol. 2 : (pp. 397-906 + 9 b/w photos) 1999 : Rs. 268.00 or \$ 56.00

**Flora of West Champaran District, Bihar State** by P. K. Bhattacharyya and Krishnendu Sarkar (pp. 1-534 + 33 photos) 1998 : Rs. 596.00 or \$ 200.00

**Plant Diversity in the Tiger Reserves of India** Edited by P. K. Hajra, M. Gangopadhyay and T. Chakraborty (pp.-100 + iv + 73 colour and 3 b/w photos) 1998 : Rs. 404.00 or \$ 80.00

**Plants for Human Consumption in India** by B. Roy, A. C. Halder and D. C. Pal (pp. 1-88 + 20 colour photos) 1998 : Rs.204.00 or \$ 40.00



Sri Vinod Vaish, Spl. Secretary MoEF is holding World's largest fruit of *Lodoicea maldivica* (Gmel.) Pers. in the Large Palm House at I.B.G.



Rare flowers of *Scindapsus aureus* Engler.



Worst disaster of Ekakula sea beach plantation, Orissa Coast due to 20th Century's Super Cyclone



Dr. P. S. N. Rao, Dy. Director, Andaman & Nicobar Circle, Port Blair is receiving Vishisht Vaigyanik Puraskar (1995-96) from Sri Vishwanath Anand., Secretary, MoEF, New Delhi on 8.12.1998.

Botanical Survey of India deeply condole the sad and sudden demise of Dr. V. Mudgal, Additional Director of this organisation, on 19th Nov. 1999.





Sri Monish Gupta, IAS, Chief Secretary, Govt. of W. Bengal is discussing various agenda items as a Chairman of the Joint Management Committee of Indian Botanic Garden with the Director, Botanical Survey of India, Dr. N. P. Singh.



Special Secretary, Joint Secretary, MoEF and Director, BSI along with other members of the National Mangrove and Coral Reef Committee are waiting at Goa, for field visit to observe Mangrove Plantation Scheme on Feb. 2000.



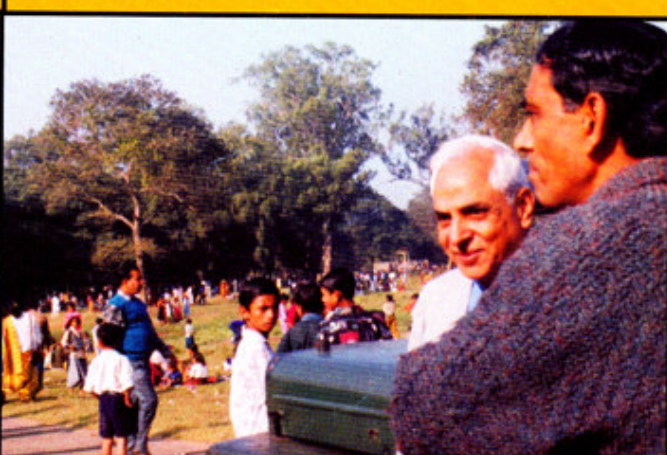
Medicinal Plant Exhibition at Central Circle, Allahabad, BSI.



Plantation ceremony at I.B.G. during The World Environment Day 1999.



A new panel on Endangered Plants of India inaugurated by Dr. N. P. Singh, Director, B.S.I. on 19th January, 2000 at the Botanical Gallery of the Industrial Section, Indian Museum, BSI, Calcutta.



The Director, Botanical Survey of India, Dr. N. P. Singh is observing the visitor's enjoyment on 25th December 1999 at Indian Botanic Garden, Shibpur, Howrah.



**Contact Address :**

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