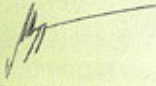


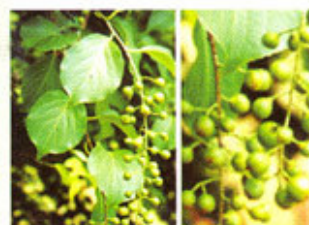
जहाँ है हरियाली।
वहाँ है खुशहाली।

From Director's Desk

This issue of the ENVIS Newsletter gives an elaborate account of the plants consumed by various wild animals in the Rajiv Gandhi National Park, Karnataka. *Dendrocnide sinuata* (Blume) Chew [Urticaceae] seems to be promising as an elephant repellent. Flowering in *Bambusa burmanica* Gamble (Poaceae) has been recorded for the first time from the Acharya Jagadish Chandra Bose Indian Botanic Garden after more than a century since its introduction. Articles on the use of the seeds of *Celastrus paniculatus* Willd. (Celastraceae) for the treatment of diabetes by the tribals of Sambalpur district, Orissa; the indigenous uses of *Arenga westerhoutii* Griff. (Arecaceae) by the Mishmee tribe of Arunachal Pradesh and the use of noxious weed viz., *Parthenium hysterophorus* L. (Asteraceae) as a broom which has been known while documenting the indigenous knowledge of the Nilgiri Biosphere Reserve are quite interesting. Information on *Capsicum baccatum* L. (Solanaceae) known as 'Aji pepper or Peruvian hot pepper' and the smell of 'Curry patta' in the leaves of *Bauhinia tomentosa* L. (Leguminosae : Caesalpinioideae) will surely attract the attention of the readers.


M. Sanjappa
Director

Botanical Survey of India



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Plants sustaining animals in Rajiv Gandhi (Nagarahole) National Park, Karnataka R. Manikandan & P. Lakshminarasimhan*

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The Rajiv Gandhi (Nagarahole) National Park is located at the foothills of the Brahmagiri hills in the Western Ghats and is a part of the Nilgiri Biosphere Reserve. It is situated in the Karnataka state between 11°50' and 12°15' N latitude and 76° and 76°15' E longitude. The total area of the park is 643.39 sq. km of which 354.95 sq. km falls in the Mysore district and 288.44 sq. km in the Kodagu district. The landscape of the park is gently undulating and it is drained by the rivers Kabini, Lakshmana theertha and Taraka, numerous small perennials and annual streams (Fig.-1a). There are ponds as well. The highest peak in the park is Masalbetta (959 m above sea level) and the lowest being the river bed of Kabini (701 m above sea level). Few tribes namely *Jenu Kurubas*, *Betta Kurubas* and *Yeravas* inhabit this National Park. As per the recent digital classified satellite data, out of the total area of 643.39 sq. km, the park covers 1.35% of semi-evergreen forests (Fig.-1b), 45% of moist deciduous forests (Fig.-1c), 22.39% of dry deciduous forests, 5.91% grasslands with scattered trees, 11.78% of bamboo mixed forests (Fig.-1d), 7.8% of forest plantations, 3.3% of scrub and 2.16% of other cultivated fields as well as water bodies (Appayya, 2000). At present the Rajiv Gandhi National Park comprises 152 families, 754 genera, 1338 species, 16 subspecies and 34 varieties of Angiosperms including some cultivated species. Besides the Angiosperms, 30 Pteridophytes and 3 Gymnosperms have also been recorded from the National Park. About 32 species of larger mammals have been reported from the Park (Appayya, l.c.).

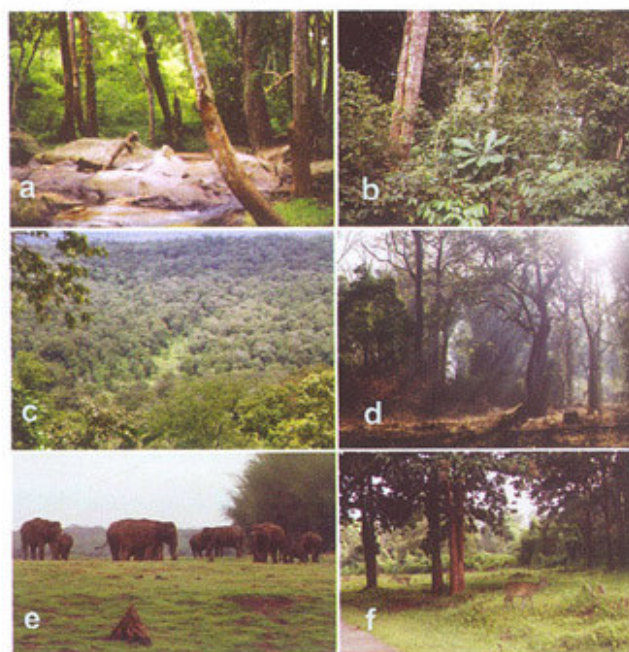


Fig.-1: a. Streams in moist deciduous forests; b. General view of semi-evergreen forests; c. General view of moist deciduous forests; d. General view of bamboo mixed forests; e. Elephant herd at Kabini backwaters; f. Spotted deer at Nagarahole range

While working on the flora of the Rajiv Gandhi National Park from 1999 to 2004, information on the plants eaten by various wild animals was collected and is given as follows:

(I) **Herbivores:** Elephants (Fig.-1e) feed on trees, shrubs and herbs such as *Acacia* spp., *Albizia* spp., *Anogeissus latifolia*, *Antidesma menasu*, *Bambusa bambos*, *Bauhinia racemosa*, *Dalbergia* spp., *Dendrocalamus strictus*, *Ensete superbum*, *Ficus benghalensis*, *F. drupacea* var. *pubescens*, *F. tsjakela* and *F. virens*. They also feed on grasses such as *Alloteropsis cimicina*, *Apluda mutica*, *Cymbopogon* spp., *Digitaria* spp., *Eleusine indica*, *Eragrostis* spp., *Imperata cylindrica*, *Oryza meyeriana* var. *granulata*, *Panicum*, *Setaria* and *Themeda* spp. During hot season, they feed on bark of some trees and shrubs such as *Bauhinia malabarica*, *Eriolaena hookeriana*, *Ficus* spp., *Grewia tiliifolia*, *Helicteres isora*, *Kydia calycina*, *Tectona grandis* and *Ziziphus xylopyrus*. They also eat the fruits of *Aegle marmelos*,

Artocarpus heterophyllus, *A. hirsutus*, *Careya arborea*, *Cipadessa baccifera*, *Ficus* spp., *Gmelina arborea*, *Limonia acidissima*, *Mangifera indica*, *Phyllanthus emblica*, *Tamarindus indica*, *Ziziphus* spp., etc.

Chital [spotted deer (Fig.-1f)], Gaur [Indian bison], barking deer, Sambar and four horned antelope feed on almost all grasses, young leaves and shoots of plants like *Acacia* spp., *Bauhinia* spp., *Bambusa bambos*, *Cipadessa baccifera*, *Dendrocalamus strictus*, *Helicteres isora*, *Grewia*, *Lantana* and *Ziziphus* spp.

Sloth bear feeds on plants such as *Cordia* spp., *Ficus* spp., *Grewia* spp., *Syzygium* spp., *Ziziphus* spp., flowers of *Madhuca longifolia* var. *latifolia*, fruits of *Cassia fistula*, and sometimes tubers of *Dioscorea* spp., *Pueraria tuberosa*, etc.

Wild boar feeds mostly on tubers and rhizomes of *Curculigo orchoides*, *Curcuma* spp., *Dioscorea* spp., *Pueraria tuberosa*, etc. and some sedges.

Indian giant squirrel feeds on fruits of *Bombax ceiba*, *Ficus* spp., *Mangifera indica*, *Tamarindus indica*, *Tectona grandis*, *Terminalia* spp., etc.

Indian porcupine usually feeds on roots of *Cassia fistula* and the damaged root portion can often be seen in the fields and also on dry bony fruits of *Ziziphus* spp.

Langur feeds on young leaves of *Bischofia javanica*, *Schleichera oleosa*, *Terminalia* spp., *Tamarindus indica*, etc. and flowers and fruits of *Artocarpus* spp., *Bombax ceiba*, *Dillenia pentagyna*, *Erythrina* spp., *Ficus* spp., *Grewia tiliifolia*, *Madhuca longifolia* var. *latifolia*, *Mangifera indica*, *Syzygium* spp., *Ziziphus* spp., etc.

Bats, rats, black naped hare and Indian palm civets feed on fruits of *Artocarpus* spp., *Cordia* spp., *Ensete superbum*, *Ficus* spp., *Limonia acidissima*, *Syzygium* spp., *Ziziphus* spp., etc. Rats feed mostly on tubers, seeds or grains of some herbaceous members and also fruits; hare feeds on almost all species of grasses. Indian palm civets also feed on ripe *Coffea arabica* fruits.

(II) **Carnivores**: Most of the carnivores feed on few species of grasses and sedges such as *Cyperus* spp., *Digitaria* spp., *Imperata cylindrica*, *Pennisetum hohenackeri* and *Setaria* spp. when they face the problem of indigestion because these act as emetic agents.

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An indigenous broom made from *Parthenium hysterophorus* L. (Asteraceae)

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Rao (1956) reported *Parthenium hysterophorus* L. (Asteraceae) as a new record to India from Poona. It is an annual herbaceous seed-propagated weed commonly known as *Carrot grass*, *Congress grass* or *Wild carrot weed*. In Hindi it is known as *Chatak chandani* (*Chatak* means bright; *chandani* means moonlight because of its numerous white flowers) or *Gajar ghas* (*Gajar* means carrot; *ghas* means grass). *P. hysterophorus* came to India along with PL 480 wheat seeds in the 1950's by accident. In over five decades the species has spread throughout the country, even in the remote Andaman & Nicobar Islands (Mohanraj *et al.*, 1994), and invading almost all terrestrial ecosystems and growing almost as a monoculture in most situations (Pandey, 2004). It is one of the ten worst weeds in the world and dangerous to crops, animals and human beings and responsible for afflictions ranging from asthma, bronchitis and hay fever to dermatitis in both human and livestock. However, while documenting the indigenous knowledge of the Nilgiri Biosphere Reserve [10°45'-12°5' N lat. and 76°10'-77°10' E long.], it was interestingly found that in spite of the noxious nature of this tropical American weed, it has become a part and parcel of the day to day life of the Irulas, who depend primarily on agriculture (Daniels, 1993). In Neeradi village of Pillur area the fully grown plants were observed to be harvested by the Irulas, tied into bundles, sun dried till the leaves fall off and then used as broom (Fig.-2) to clean their homes and surroundings. The same kind of broom was also observed in the Bangalabadigai and Chokkanalli areas.



Fig.-2: An indigenous broom made from the plants of *Parthenium hysterophorus* L.; Inset: *P. hysterophorus* growing in the agricultural field of Neeradi village, Pillur

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Uses of *Arenga westerhoutii* Griff. (Arecaceae) by the Mishmee tribe of Arunachal Pradesh

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In India, *Arenga westerhoutii* Griff. (Arecaceae) is found in Arunachal Pradesh, Manipur and North Andaman (Basu & Chakraverty, 1994: 101).

In Arunachal Pradesh it occurs abundantly in Italin, Angolin, Hunli and Malinye areas of the Dibang Valley district, mainly on the steep slopes well exposed to sunlight, at elevations ranging from 650 – 1750 m. The species is also known to occur in Singa area of Upper Siang district.

It is a medium size tree, 3 – 10 m tall. Stem solitary, covered with brownish leaf-sheath fibres in upper half. Leaves pinnate, 3 – 5 m long; leaflets linear-lanceolate with unequal auricles at base. Inflorescence axillary, drooping. Inflorescence rachilla of female flowers simple, glabrous. Female flowers 3-seriate; sepals and petals persistent. Fruits globose, apiculate. Seeds 3, convex, brownish-black, endospermous.

This tree is known to the Mishmee tribe of Arunachal Pradesh by the name 'Aoumbo' and they use it in a number of ways (Fig.-3a-d) which are reported here for the first time.

The leaves are used for thatching huts. The midribs are separated from the lamina to make brooms which are used for sweeping bamboo floors. The reticulate leaf-sheath fibres are used for making ropes and also used as brooms.

At the time of scarcity of food the soft part of the pith, collected from the apical part of the stem, is eaten raw or the pith is at first crushed in water by hand. The starchy water, so produced, is then strained through a piece of clean cloth to eliminate the fibrous impurities. The clear starchy water is either taken as a health drink or is boiled in a vessel by burning firewood till a solid mass is produced. The solid mass is eaten right after preparing it or stored after drying under the sun for future use.

The pith is sometimes chopped into pieces and fed to the pigs after boiling them.

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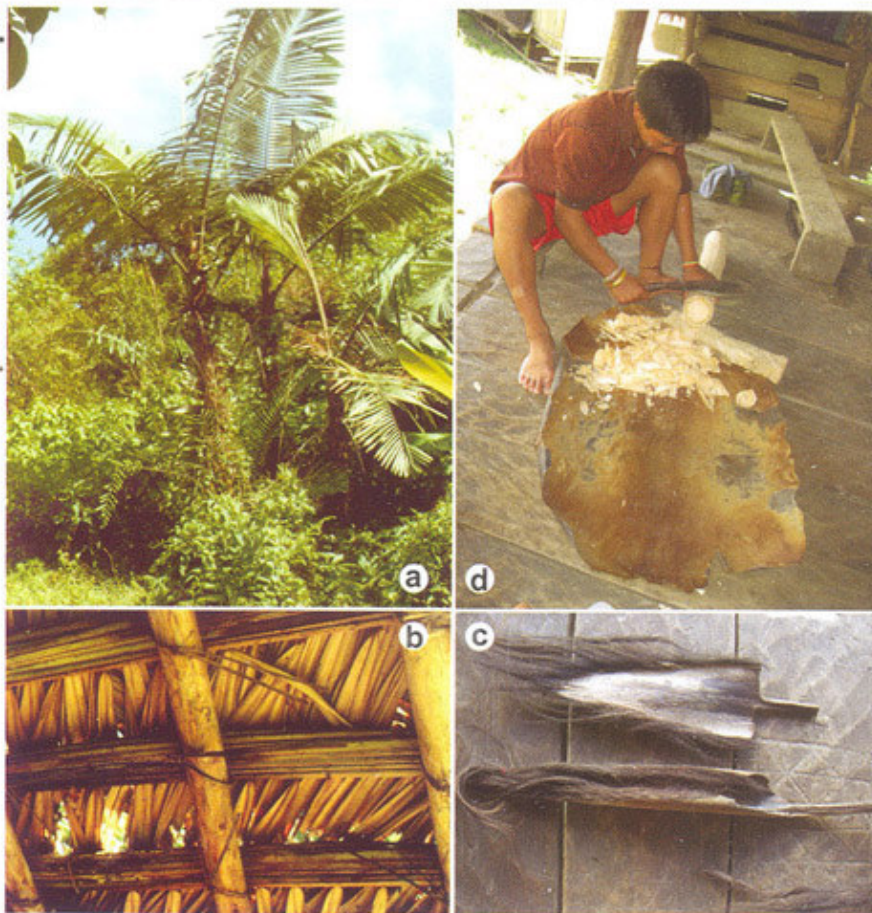


Fig.-3: *Arenga westerhoutii* Griff.: a. The tree; b. Leaves used as a thatch; c. Leaf-sheath with reticulate fibres used as broom; d. Pith being chopped into pieces to feed the pigs

Dendrocnide sinuata (Blume) Chew [Urticaceae] – A plant that can be grown to repulse the wild elephants

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While exploring the Mahananda Wildlife Sanctuary, Darjeeling district, West Bengal, a treasure house of biodiversity, an interesting poisonous plant viz. *Dendrocnide sinuata* (Blume) Chew (= *Laportea crenulata* Gaudich.), belonging to the family Urticaceae, was collected. The plant has highly irritant small stinging hairs on its surface that cause acute burning pain when coming in contact with the skin. The effect lasts for several days and is further aggravated when water is applied to the affected area. The irritation caused by the stinging hairs of the inflorescence is more severe and causes violent sneezing, sleeplessness and fever.

After interacting with the local inhabitants, authors came to know that the wild elephants of the area are well aware of the highly irritating nature of this plant and carefully avoid the area where it grows.

The Mahananda Wildlife Sanctuary is famous for the wild elephants. During scarcity of food in the forest, they enter into the nearby villages in search of food causing loss of lives of the villagers, their crops and properties every year. This is a severe problem to the villagers and the forest managers.

As a possible way to repulse the elephants, *D. sinuata* (Fig.- 4) can be planted on experimental basis as hedge around the crop fields and also in the elephants' corridors. In this way the lives of the villagers, their crops and properties can be saved. For this purpose the local NGOs and the forest managers may come forward for

plantation programs on experimental basis.

The morphological description, flowering and fruiting time, distribution, local names and uses of the species are given below:

Evergreen large shrubs to small trees, 3 – 7 m tall; young stems and branchlets densely covered with stinging hairs. Leaves elliptic, oblong or obovate-lanceolate, 10 – 45 × 5 – 20 cm, acute or acuminate at apex, rounded, cordate or cuneate at base, entire, sinuate to irregularly denticulate at margins, subglabrous or sparsely covered with stinging hairs on veins; petioles 2 – 10 cm long, sparsely pubescent and armed with stinging hairs.

Stipules ovate-lanceolate, 1.5 – 2.5 cm long, caducous. Male and female inflorescences in distal axils of branchlets, paniculate, 5 – 20 cm long, densely covered with stinging hairs. Male flowers subsessile; perianth lobes 4, ovate; stamens 4. Female flowers with fleshy pedicels; perianth lobes 4, unequal; ovary c. 1.5 mm long; stigma ligulate. Achenes ovoid, 3 – 5 × 2.5 – 4.5 mm, conspicuously verrucose.

Fl. & Fr.: Sept. - June.

Distribution: India: In mixed forests between 300 – 850 m. Bihar, West Bengal, Sikkim, N.E. India and Peninsular India.

China, Bhutan, Sri Lanka, Myanmar, Malaysia and Thailand.

Local names: Assamese: *Sirnat*; Bengali: *Chorpata*; Lepcha: *Mealumma*, *Ongyalop*, *Sunkroug*; Malayalam: *Anachoriyanam*; Nepali: *Moringe*; Tamil: *Anachoriya*, *Ottapilavu*, *Ottarbala*.

Other uses: The juice of the root is reported to be used in chronic fevers. The roots are also boiled in water and the decoction is given to cure jaundice. The roots and leaves are used to prepare poultice and applied on boils, carbuncles, wounds, burns and rashes for curing. The root extract has remarkable antibacterial activities against both Gram (+) and Gram (-) bacteria due to presence of 2 α , 3 β , 21 β , 24 β , 28-pentahydroxy-olean-12-ene. The stem-bark yields a strong cordage fibre. The fibre is also used to make coarse cloth. The flowers are reported to be used in curries in N. Lakhimpur, Assam. The seeds are chewed to freshen breath.

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Fig.- 4: *Dendrocnide sinuata* (Blume) Chew; Inset: Inflorescence

In the garden of Teen Murti Bhawan, New Delhi, Dr. M. Sanjappa noticed some plants of *Bauhinia tomentosa* L. (Leguminosae: Caesalpinioideae) having yellow flowers with a dark purple blotch at the base of uppermost petal. He came to know from Ms. Jaya Iyer (*pers. comm.*, 2009) that its leaves smell like those of 'Curry patta' i.e. *Bergera koenigii* L. [= *Murraya koenigii* (L.) Spreng. (Rutaceae)] and are used for flavouring curries and chutneys in Tamil Nadu. Locally this plant is known by the names viz., *Kaanchini*, *Kaat-atti*, *Kaattumandaarai*, *Kokkumandaarai* and *Tiruvatti*.

Bauhinia tomentosa L. ▶



Flowering of *Bambusa burmanica* Gamble (Poaceae) in the Acharya Jagadish Chandra Bose Indian Botanic Garden, Howrah

Pushpa Kumari

Central National Herbarium, Botanical Survey of India, Howrah 711 103

B*ambusa burmanica* Gamble (Poaceae) is native to Burma. It was first grown in the Acharya Jagadish Chandra Bose Indian Botanic Garden, Howrah probably through seeds sent by Oliver, Conservator of Forests, Burma by the end of nineteenth century and later, two plants were brought by Pandey from Forest Research Institute, Dehra Dun in 1983 (Bose *et al.*, 1989). Presently this species is growing in Division nos. 3, 11 and 17 of the Acharya Jagadish Chandra Bose Indian Botanic Garden.

Two clumps growing outside the 'Large Palm House' in Division no. 17 were found to flower in February 2008 after shedding off their leaves. The morphological description based on the flowering collections (16.2.2008, P. Kumari 44003A-B - CAL) is given below:



Fig.-5: *Bambusa burmanica* Gamble;
Inset: Inflorescence

Inflorescence of branched panicles having clusters of pseudospikelets in the axils of c. 2.5 cm long, glabrous, smooth, truncate bracts; pseudospikelets 2 – 3 cm long with terminal immature floret; empty glumes 2 – 3, 5 – 7 mm long, glabrous, mucronate; lemma 8 – 10 mm long, mucronate, multinerved, glabrous, finely ciliate at upper margins; palea slightly shorter than lemma, 2-keeled, ciliate at keels, 5 – 6-nerved in between keels, 2 – 3-nerved on either side, glabrous on outer surface, minutely hairy on inner surface, smooth at margins; rachilla 1 – 2 mm long, densely hairy at top, sparsely below; stamens 6, exserted; anthers 5 – 6 mm long, acute or apiculate at tip; lodicules 2 – 3, hyaline, oblong-obovate, fimbriate at top; ovary c. 2 mm long, stalked, obovate-truncate, with white hairs at top, surmounted by a very short style which at once divides into three hairy stigmas (Fig.-5 & 6).

There was no seed formation and the clumps died after flowering.

Gamble (1896) in the protologue of *B. burmanica* gave the place of its occurrence as 'Upper Burma, in the Katha district, found on dry hill slopes' and stated 'This handsome species flowered in 1890'.

Barooah & Borthakur (2003) stated 'This species flowered in 1890 in Katha district of Upper Myanmar (Gamble 1896). There is no report of its flowering since then. In August, 1986, flowering of this handsome bamboo occurred in North Cachar Hills district of Assam (Biswas 1993)'.

Biswas (1993) stated 'There is no report of its flowering since 1890 when it occurred in Katha District of Myanmar (Burma)'. In his publication, besides the vegetative characters, he

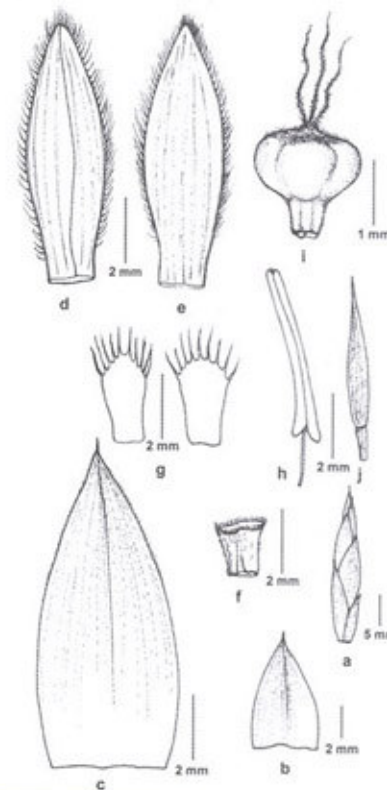


Fig.-6: *Bambusa burmanica* Gamble: a. spikelet; b. empty glume; c. lemma; d & e. palea; f. rachilla; g. lodicules; h. stamen; i. ovary; j. terminal immature floret

also provided the morphological description of the reproductive parts and their line drawings and cited his own collections (22.8.1986, Sas. Biswas 3489 - herbarium of SFS College-Cum-Research Centre, Burnihat, Assam; Nov. 1988, Sas. Biswas 809 - DD) from North Cachar Hills district, Assam. I could not understand how Barooah & Borthakur (2003) came to the conclusion that the species flowered in August, 1986 in North Cachar Hills district because they consulted both DD and the herbarium of S.F.S. College, Burnihat where the collections of Sas. Biswas have been stated to be deposited and if they had seen the specimen (22.8.1986, Sas. Biswas 3489) why did they state 'In the present investigation no flowering material has been found'. However, record of flowering in *B. burmanica* is very rare and scrutiny of literature shows that this is the first record of flowering from the Acharya Jagadish Chandra Bose Indian Botanic Garden, Howrah after more than a century since its introduction.

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***Celastrus paniculatus* Willd. (Celastraceae) – A source for the treatment of diabetes among the tribals of Sambalpur district, Orissa**

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C*elastrus paniculatus* Willd. (Celastraceae) is popularly known by its Sanskrit name 'Jyotishmati'. In Orissa it is known as *Korsana*, *Malkangni*, *Peng navbadhu* and *Ping*.

Sur & Halder (*J. Econ. Taxon. Bot.* 28: 573-584. 2004) first reported that at Pathoria, Badrama in the Sambalpur district, Orissa the oil from seeds is given orally in

diabetes. From Bamra, a small village in the aforesaid district, we have further come to know that the oil obtained by expressing the seeds in mills / 'ghanis' is sold in the market @ Rs 200/- per kg and is locally known as 'Ping' oil. It produces fall in high blood sugar if one teaspoonful is taken twice daily for 7 days. This use seems to be quite interesting in view of the high rise in the number of diabetic patients in India.

To facilitate identification of the species, other vernacular names, brief morphological description, phenological data and its distribution in India along with photograph (Fig.-7) are given here.

Bengali & Hindi - *Kondgaidh*, *Malkangni*, *Sankhu*; Gujarati - *Malkangana*; Marathi - *Dhimarbel*, *Kanguni*, *Pigavi*; Sanskrit - *Agnimasha*, *Amruta*, *Dipta*; Santali - *Kujari*; Tamil - *Adibaricham*, *Kaligam*; Telegu - *Bavangi*, *Gundumeda*.

Scandent shrubs, up to 10 m in height; bark yellow, corky. Leaves 4.5 – 15 x 2.5 – 8 cm, ovate-elliptic or obovate, abruptly acute at apex, cuneate at base, serrate or crenate-serrate at margins. Flowers yellowish-green or greenish-white, in terminal 10 – 25 cm long, pyramidal panicles, unisexual, c. 4 mm across. Male flowers: Calyx lobes 5, suborbicular, ciliate; petals 5, oblong, rounded at apex; stamens 2 mm long, inserted on the margin of the disc; ovary 1– 1.5 mm long, rudimentary. Female flowers: Calyx and petals as in male flowers; stamens sterile; ovary subglobose; stigma 3-lobed. Capsules green, yellow when ripe, subglobose, 6 – 12 mm in diameter, transversely wrinkled, 3-valved, seeds 1– 6, ovoid or ellipsoid, 3 – 6 x 2.6 – 4 mm, yellowish or reddish-brown in colour, enclosed in scarlet aril.

Fl. & Fr.: April – December.

Distribution: The species occurs almost all over India including the Middle and South Andamans, up to the elevation of 1880 m.

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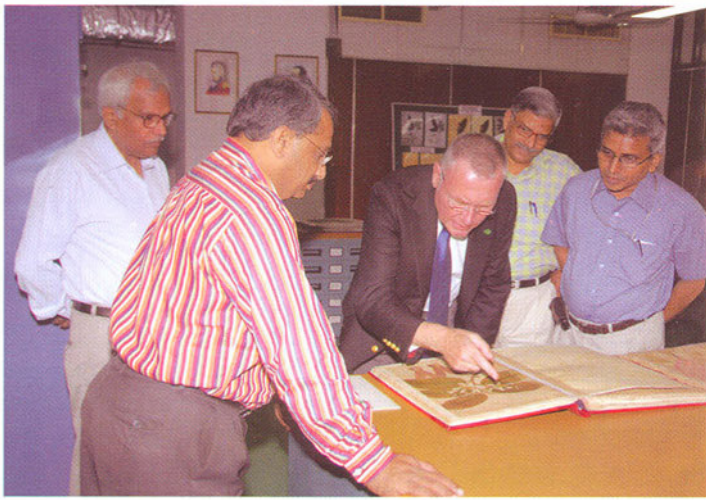
Fig.-7: *Celastrus paniculatus* Willd.- Fruiting twig. Photo courtesy : Sachin Anil Puneekar

Capsicum baccatum L. (Solanaceae), known as 'Aji pepper' or 'Peruvian hot pepper', is occasionally cultivated in some parts of Maharashtra and Sikkim for flavouring curries and used in salad due to its distinctive fruity flavour. It has been introduced in India from South America for breeding purpose.

Courtesy: T.K. Paul and Alope Mukherjee

Capsicum baccatum L.;
Inset: Ripe fruit





Shri Jairam Ramesh, Hon'ble Minister, Environment & Forests, Government of India releasing ENVIS Newsletter volume 14(1), 2009

Prof. D.J. Mabberley, Keeper, Herbarium and Archives, Royal Botanic Gardens, Kew viewing Roxburgh's Flora Indica drawings in Type Herbarium II of Central National Herbarium, BSI, Howrah



ENVIS Centre

Established	April, 1994
Subject Area	Floral Diversity
Contact person	DR. M.S. MONDAL
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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 Rare, Endangered and Threatened species of different phyto-geographical regions of India ii) Dry and 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 photomicrographs will also be continued. Incorporation of new data in Database of Phyto-geographical distribution of Rare, Endangered and Threatened species will also be continued. An offline database on plants of Ethnobotanical importance from West Bengal has been developed and data incorporation is continued. An initiative has been taken to make the ethnobotanical database online.
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 4. Bibliography and abstract of papers on Flora of West Bengal 5. Bibliography and abstract of papers on Flora of North East India – 1 Newsletters : Up to Vol.14(2). Vol. 15(1) (in press).

*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