



Editorial

In recent time Andaman and Nicobar Islands experienced tremendous natural disasters, first in the form of Earthquake followed by Tsunami on 26th December 2004 and subsequently volcanic eruption of Barren Island on 7th June 2005. The two incidents have caused extensive damage to the floral and faunal diversity of the area. Article on the flora of Barren Island in the present issue of ENVIS Newsletter, based on the survey conducted during the year 2003, thus provides the bench mark data on the floral diversity for any post volcanic botanical correlation and to estimate the loss and effect on biodiversity. Information on traditional use of leech repellent plant (*Xanthoxylum acanthopodium* DC.) and Bhote pan (*Piper* sp.) can be further explored for potential use. Article on the 'Apatanis' the sons of the soil of Arunachal Pradesh is informative. Other articles on parasitic mushroom, medicinal importance and present status of *Bergenia ciliata* (Haw.) Sternb., *Kaempferia galanga* L., etc., are very interesting and will help to evolve strategy for their long term conservation and sustainable utilization.

Hope this issue of ENVIS Newsletter will be informative and useful to the readers.

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A PARASITIC MUSHROOM

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The members of the order Agaricales are commonly called mushrooms or toadstools. They have large often brightly coloured fruitbodies which are more or less equivalent to the flower clusters of green plants, with the large and important part called mycelium remaining hidden in the substratum. The majority of them are saprophytic living on ground, decaying leaves, bark, wood, manure, etc. Only a few species like *Armellaria mellea* and *Pholiota aurivella* attack roots or trunks of flowering trees and cause damage to them.

Interestingly, some larger fungi like *Clitocybe nebularis* (Tricholomataceae) and *Scleroderma citrinum* (Sclerodermataceae) are attacked in old age by smaller parasitic *Volvariella surrecta* (Amanitaceae) and *Boletus parasiticus* (Boletaceae) respectively and hasten their decay. Similarly, the fruitbodies of *Russula* and *Lactarius* of the family Russulaceae are attacked by *Asterophora parasitica* (Tricholomataceae) and *A. lycoperdoides* and suffer in the same way. The family Russulaceae is one of the dominating and widely distributed



families of the agaricoid fleshy macrofungi having vividly coloured, stipitate fruitbodies growing ectomycorrhizally with roots of forest trees in vegetational zones at almost all altitudes. During our repeated surveys of Himalayan forests, we have found and collected *Asterophora parasitica* growing on aged fruitbodies of *Russula nigricans*, *R. adusta* and *R. albonigra*.

The parasitic *Asterophora parasitica* (Bull.: Fr.) Sing. usually grows in clusters sprouting just below or above the cap of an aged *Russula*; cap white, then grayish silky, campanulate, expanding up to 3 cm diam., gills white, then dingy, adnate, shallow very thick, soft, bearing white spores, somewhat forked, often wanting; stem 1-4 cm, slender, white to grayish, pruinose. Reproduction is also effected by large stellate shaped (15 x 10 µm) chlamydospores. Smell sickeningly unpleasant.

The species is considered poisonous in Kumaon Himalaya. Though it is widely distributed in temperate coniferous and mixed forests of Himalaya but is found in abundance in forests of districts Nainital and Champawat.



Barren Island, the only active volcanic Island in India is situated in the Andaman sea at about 135 km North of Port Blair, at 12° 17' N latitude and 93° 51' E longitude and is a part of Andaman and Nicobar chain of Islands in the Bay of Bengal. It lies on the Neogene inner volcanic arc also known as S.E. Asian volcanic rim of volcanic line of S.E. Asia extending between Sumatra and Myanmar (Evan & Crompton, 1946).

The Island is nearly circular in shape, about 3 km in diameter covering

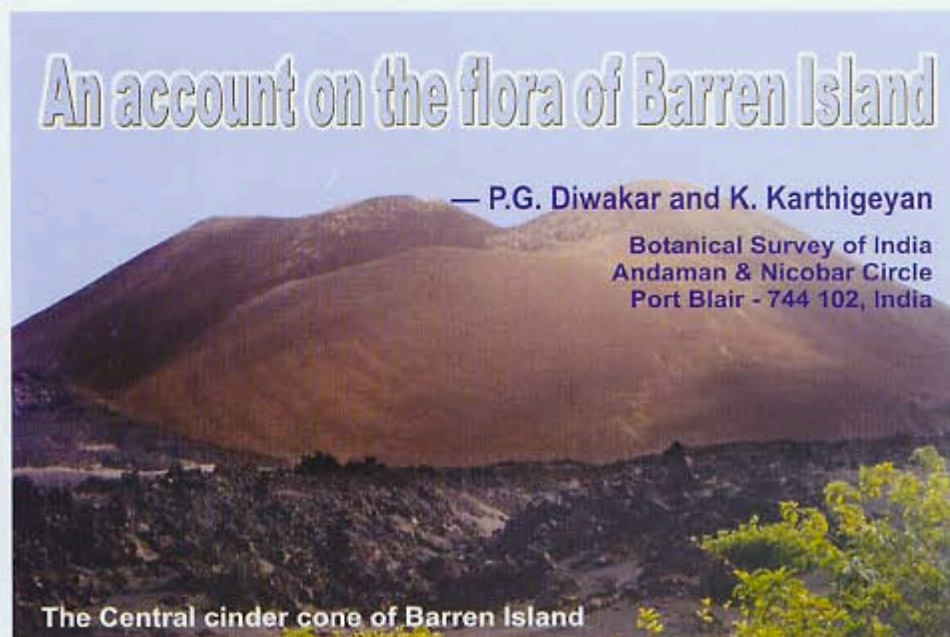
Due to severe hot and drought conditions the diversity of vegetation is also very poor when compared to that of the Andaman Islands. The sparse vegetation on Barren Island is mostly deciduous, except on the old volcano sides where it is mixed with giant evergreen and tropical evergreen forests (Balakrishnan & Rao, 1983).

The central cinder cone or Zone I is totally barren surrounded by volcanic ashes (Photo 1). Bordering the cone on the open sand, patches of *Fimbristylis cymosa* R. Br. and *Cyperus cuspidatus*

zone is open. The second zone encircling Zone I shows larger plants indicating its recent regeneration and its high level of adaptability in overcoming the worse edaphic conditions. Herbs like *Imperata cylindrica*, *Lindernia crustacea*, *Euphorbia hirta*, *Cyperus cuspidatus*, *Urena lobata*, *Desmodium heterocarpon* and arborescent elements such as *Ardisia solanacea*, *Trema orientalis*, *Leea indica*, *Dodonaea viscosa*, *Glochidion calocarpum*, *Vitex negundo*, *Macaranga peltata* are common.

The third zone (Zone III) shows very good vegetation especially along the Southern and the Northern region. Dense vegetation with fresh green foliage is encountered in these regions. Large tree species like *Ficus microcarpa*, *F. amottiana*, *Terminalia catappa*, *Canarium euphyllum*, *Syzygium samarangense* etc. are dominant in this Zone. A list of plant species commonly occurring in the island is enumerated in Table 1. The flora elements generally are composed of the same species occurring on the adjacent Andaman Islands, Myanmar and Thailand due to their geographical proximity (Balakrishnan, 1989).

The rocky shores around the Barren Island supports profuse growth of many marine algae. The common species are *Turbinaria ornata*, *Sargassum* sp. *Padina* sp. etc.



an area of 8 sq km. The maximum elevation of the Island is about 350 m above sea level. The central volcanic cone is surrounded by steep inner slopes. The crater wall is continuous except towards the North - Western side forming a lava path about 200 m wide and opening into the sea, the crater is devoid of vegetation.

David Prain in 1893 gave the first account on the flora of Barren Island. Boden Kloss in 1902 studied the topography, fauna as well as flora of the Island. Recent surveys include the explorations by Rao *et al.* 1990, Sinha *et al.* 1994, V. Maina and K. Sampath Kumar (pers. comm.) etc. resulting in series of scientific publications. In continuation, a recent expedition was carried out on 28.11.2003 where many interesting plants were collected. A brief sketch of the overall vegetation of this still active volcanic Island is presented here.

Kunth are seen. Vegetation at this level is very sparse and major part of this



List of plants recorded from Barren Island

Table 1

Botanical Name	Family	Distribution
<i>Ardisia solanacea</i> Roxb.	Myrsinaceae	Scarce
<i>Canarium euphyllum</i> Kurz	Burseraceae	Rare
<i>Cyperus cuspidatus</i> Kunth	Cyperaceae	Common
<i>Cyperus iria</i> L.	Cyperaceae	Common
<i>Desmodium heterocarpon</i> (L.) DC.	Fabaceae	Common
<i>Digitaria sanguinalis</i> Scop.	Poaceae	Scarce
<i>Dioscorea bulbifera</i> L.	Dioscoreaceae	Scarce
<i>Dodonaea viscosa</i> L.	Sapindaceae	Scarce
<i>Eragrostis tenella</i> Beauv. ex Roem. & Schult.	Poaceae	Common
<i>Euphorbia hirta</i> L.	Euphorbiaceae	Scarce
<i>Ficus arnottiana</i> (Miq.) Miq.	Moraceae	Scarce
<i>Ficus hispida</i> L.f.	Moraceae	Common
<i>Ficus microcarpa</i> L.f.	Moraceae	Common
<i>Ficus retusa</i> L.	Moraceae	Scarce
<i>Fimbristylis cymosa</i> R.Br.	Cyperaceae	Common
<i>Glochidion calocarpum</i> Kurz	Euphorbiaceae	Rare
<i>Heteropogon contortus</i> (L.) Beauv.	Poaceae	Scarce
<i>Imperata cylindrica</i> (L.) Beauv.	Poaceae	Common
<i>Leea indica</i> (Burm.f.) Merr.	Leeaceae	Common
<i>Lindernia crustacea</i> (L.) F. Von Muell.	Scrophulariaceae	Scarce
<i>Macaranga peltata</i> Muell. - Arg.	Euphorbiaceae	Scarce
<i>Mallotus resinosa</i> (Blanco) Merr.	Euphorbiaceae	Scarce
<i>Onychium siliculosum</i> (Desv.) Chr.	Pteridaceae	Common
<i>Pityrogramma calomelanous</i> (L.) Link	Hemionitidaceae	Common
<i>Pogonatherum crenatum</i> (Thunb.) Kunth	Poaceae	Scarce
<i>Pteris</i> sp.	Pteridaceae	Common
<i>Selaginella delicatula</i> (Desv.) Alston	Selaginellaceae	Scarce
<i>Syzygium samarangense</i> (Bl.) Merr. & Perry	Myrtaceae	Common
<i>Terminalia catappa</i> Steud.	Combretaceae	Common
<i>Tetracera sarmentosa</i> (L.) Vahl	Dilleniaceae	Common
<i>Trema orientalis</i> Bl.	Ulmaceae	Common
<i>Urena lobata</i> L.	Malvaceae	Scarce
<i>Vitex negundo</i> L.	Verbenaceae	Common

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A traditional use of the leaves of *Bauhinia vahlii* Wight & Arn.

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One of the main attractions in the holy city of Hardwar in Uttaranchal is the grand 'arti' performed at the Har-ki-Pauri area. The 'arti' is a daily evening ritual when the Mother Goddess Ganga or in other words, the sacred river Ganga is worshipped by the priests by lighting clusters of lamps and reciting hymns and verses.

While observing the 'arti' sitting beside the 'Clock Tower', opposite to the temples of Ganga, many small leaf-boats floating on the Ganga canal water containing flowers and a lighted candle in each of them also drew my attention. Enquiring the local people I came to know that they are known as 'dawns' and are floated by the devotees on the Ganga water in the evening from the banks of the canal wishing to Mother Goddess Ganga to fulfill their desires.



The leaf-boats, according to tradition, are usually made from fresh green leaves of 'Maljan' i.e. *Bauhinia vahlii* Wight & Arn. and during the time of my visit in the month of April the floral offerings were mainly roses and marigolds.

The 'dawns' were circular like a bowl, navicular or star-shaped and were sold at prices in between Rs. 2 to Rs. 100 per piece at the banks of the canal or at local market places. The bigger ones in addition to flowers and candle also contained some small pieces of dried leaves said to be of 'Panchpati'.

The devotees believe that greater the distance the boats float safely on the swiftly flowing Ganga water with the candles burning in it, the greater the chances of the fulfillment of their much cherished desires.

The two photographs given here show 'dawns' being sold at a local market place and a devotee floating such a 'dawn'.

An Indigenous Leech Repellant Plant in Sikkim

Leech bite is a common phenomenon for a plant collector and botanical worker in the Sikkim Himalayas. This happens at the altitudinal ranges of 2000 - 3500 m, particularly in rainy season (May-October). The rural folk of Sikkim, too, face the leech bite, while collecting the food materials, fodder, fuel woods in the forest or while collecting tea leaves in the Tea gardens. The common salt or tobacco leaf dusts are applied to ward off the leeches. Sometimes these materials are either not available or procurable. However, an indigenous method is practiced by

the villagers to repel leeches in the rural and remote pockets of Sikkim. The green fruits of *Zanthoxylum acanthopodium* DC. locally known as "Timbur" or "Boke Timbur" are effectively used to ward off leeches. The green fruits along with a few leaves are crushed to paste in water and a solution thus obtained is directly applied as a lotion on the body parts to keep away from leech bite. The paste is massaged on the skins for healing of leech bites. This solution is carried with them in a container for instant use while moving inside the forest. The author during his plant collection field tours

in the Tendong Reserve forest, South Sikkim could spot this rare plant at the altitude of 2600 m and experienced, too, about the efficacy of this plant as a popular leech - repellant one.

Botanical Notes: The "Timbur" or "Boke timbur" (*Zanthoxylum acanthopodium* DC., family Rutaceae) is a rare thorny small tree up to 5 m high, growing at the range of 2000 - 3000 m altitude in Sikkim. Leaves are compound, glandular, aromatic, trifoliate, with 4 - 5 pairs of leaflets, abaxial surface glabrous, adaxial surface pubescent, base

rounded, margins serrated. Flowers green in axils. Fruits in follicles, subglobose, ca 3 - 4 mm in diameter and one seeded.

Conservation strategies: The few number of plants growing in the natural habitat are required to be protected from further depletion. "Timbur" plant seedling could be developed in the nurseries for future plantation and mass propagation. A herbal product of insecticides and leech repellant solution could be launched in the market to improve the economy of the rural folk of Sikkim.

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Flowers of *Bauhinia acuminata* L.
and *B. tomentosa* L. visited by the
insects of the order Hymenoptera.



Photo
S. Bandyopadhyay
and
M. S. Mondal

PUERARIA TUBEROSA (Roxb. ex Willd.) DC.

A UNIQUE SOIL BINDER

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Pueraria tuberosa (Roxb. ex Willd.) DC. (Syn. *Hedysarum tuberosum* Roxb. ex Willd.), the Indian Kudzu, belongs to the family Leguminosae, subfamily Papilionoideae and its popular hindi name is Bankumra or Patakumra. This woody climber is quite satisfactory from the point of soil binders, soil cover and restoration of soil fertility for its large underground tuber which is 30-60 cm long and 25-30 cm broad. The generic name *Pueraria* is derived after the name of Swiss botanist Marc Nicolas Puerari and specific epithet *tuberosa* is given for its tuberous underground part.

Vernacular names : Hindi—Bankumra, Patakumra, Sural, Bilaikand, Bharda, Tirra; Bengali—Shimaia batraji; Marathi—Ghorbel; Oriya—Patal kumra.

Distribution : This species is distributed in Southern, Northern and Eastern parts of India except in very humid and arid regions and extending up to 1200 m in North-Western Himalayas.

Description : Perennial twinners, woody climber with tuberous roots. The tubers large, 30-60 cm long and 25-30 cm broad, weighing up to 35 kg. Often found in strings connected with the main roots, young branches pubescent, stem woody, up to 12 cm in diam,. Stipules minute deciduous, cordate, ovate. Leaves pinnately trifoliate, leaf rachis 12-15 cm long; terminal leaflet broadly ovate, equal

sided, up to 18 cm long and 16 cm broad, acuminate, lateral leaflets ovate-oblong, unequal sided acuminate, silky pubescent beneath, stipellate, lanceolate, subulate. Flowers in axillary or terminal racemes 15-30 cm long, flowering when leafless; calyx densely silky, 5-lobed, up to 8 mm long; teeth shorter than the tube, 2-upper teeth slightly connate; corolla bluish white or purplish blue, exerted up to 1.5 cm long, standard orbicular, clawed, wings obliquely oblong, keels obtuse; stamens usually diadelphous. Pods linear, 5-8 cm long, densely clothed with long, silky, bristly brown hairs, 3-6 seeded, constricted between the seeds; seeds reddish brown, ellipsoid-oblong.

Flowering and Fruiting time :

Fl.: February - April ; Fr.: May - June.

Propagation : The plant can be easily propagated from seeds and crowns, the production of seeds being prolific.

USES : Medicine

The paste of tubers is applied on abdomen to cure abdominal pain. It is also applied on chest pain. The juice of tubers is given once in morning in diarrhoea and fever. The paste is also applied as poultice to cure rheumatic pain and swellings. It also given to increase lactation. 250 gm of tuber is made into paste with the seeds of *Papavar somniferum* Linn. and given to women who have underdeveloped breast or little secretion of milk. The tuber is also given to cows to promote secretion. Tuber extract mixed with a little sugar (*Saccharum officinarum* Linn.) is administered for peptic ulcers.

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The root is said to be used in medicine as a demulcent and refrigerant in fevers, as cataplasm for swellings of joints and as lactagogue. The dried roots are sold as drug in the form of longitudinally cut, decorticated flat thin slices of a white to dirty white colour with a slight characteristic odour and peculiar sweet taste. The juice of root is given twice daily in asthma and also in bodyache.

The powdered dust of seeds mixed with sesame oil is applied to cure skin diseases. The paste of leaves and young stem is applied on ulcerous wounds to cure it.

Food : The tubers taste like liquorices and are said to be eaten raw or boiled. The yield of tubers is reported to be about 5-7.5 tones per hectore. Tubers eaten by the tribals and their children specially. The tubers can be used for extraction of starch.

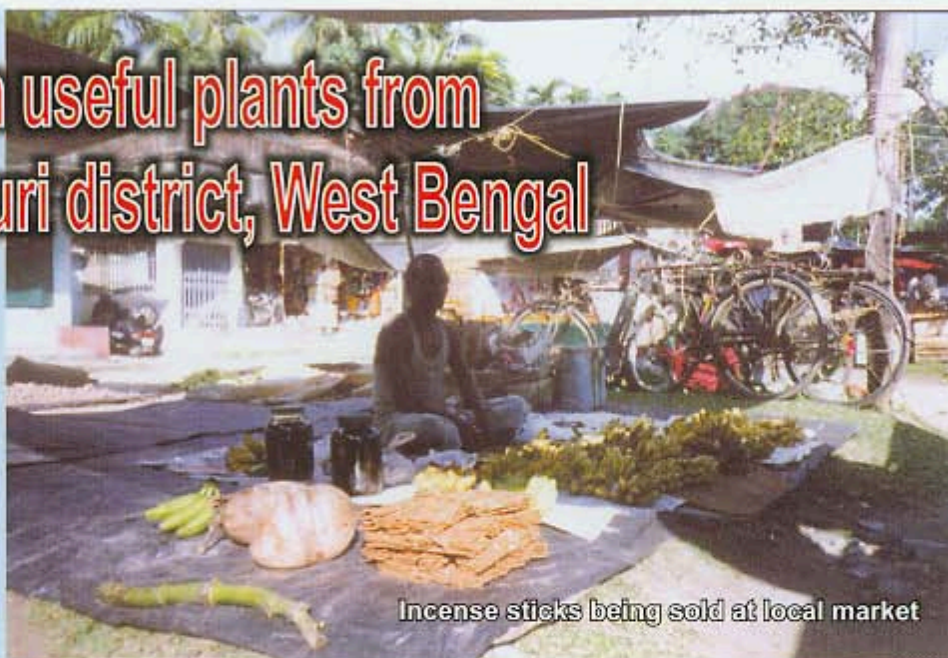
Fodder : The tubers are often fed to horses and cattle. The leaves afford good fodder for cattle. The green leaves and tender twigs are nutritious and palatable. Analysis of the dry leaves gave crude protein, fat, crude fibre, other carbohydrate, ash, calcium and phosphorus.



Some less known useful plants from Lataguri, Jalpaiguri district, West Bengal

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Incense sticks being sold at local market

Recently ENVIS team visited some places in and around Gorumara National Park at Lataguri in Jalpaiguri district, West Bengal to collect local uses of plants in connection with a project work of ENVIS Centre, Botanical Survey of India, Howrah.

Four less known useful plants were recorded from the area.

A species of *Piper* (Piperaceae), climbing on the trunk of the trees is noteworthy. Its leaves are narrowly ovate, 8-17.5 x 4.5-8 cm, acute at apex, asymmetrically cordate at base and locally known as 'Bhote Pan'. They are sold there in the local markets, as well as in the betel shops. Like the leaves of *P. betle* L., 'Bhote Pan' is chewed by the local people with a half or a quarter of ripe, undried areca nut. However, unlike those of *P. betle*, hydrated lime, catechu or any other flavouring agent are not used with it. Team members chewed the leaves and found it to be very pungent. Small branches of the plant in bundles, each containing approximately 50-60 leaves,



Bhote Pan



Golden Scene

are sold in the market @ Rs.2 / bundle and the leaves with areca nuts are sold in the betel shops @ Re. 0.50 / piece. Field guide Sri Ram Bahadur Subba informed that in 1970's 'Bhote Pan' was purchased by some traders from the local people of Lataguri and then taken in fully loaded small trucks to Thimphu in Bhutan fortnightly for selling there.

Inside the Gorumara National Park, some spiny fruits and beautiful basidiocarps drew attention.

They are known there as 'Kadam Katus' and 'Golden Scene' respectively. It is informed that 'Kadam Katus' i.e. fruits of *Sloanea sterculiacea* (Benth.) Rehder & Wilson var. *assamica* (Benth.) Coode (Elaeocarpaceae) and the basidiocarps are purchased from the local people by some traders @ Rs. 50-100 / thousand, depending on their sizes for ornamental purposes.

In the local market place of Lataguri, some indigenously prepared incense sticks also drew attention. They are said to be prepared from the saw dust of 'Sal' tree i.e. *Shorea robusta* Gaertn. f. (Dipterocarpaceae), the resin of the same tree called 'Dhuno' and a gum obtained from a plant locally called 'Khagar'. The said ingredients are mixed and put around small sticks of bamboos to make the incense sticks and are sold @ Rs. 2 / bundle consisting of about 48 sticks.



Bhote Pan being sold in a betel shop

KAEMPFERIA GALANGA L. – A NEGATIVE LISTED PLANT WITH PROMISING AROMATIC AND MEDICINAL VALUES

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after a German Physician Engelbert Kaempfer, who was associated with the Dutch East Indian Company (Quattrocchi, 2000). The specific epithet '*galanga*' is derived from an English word 'galingale' which means aromatic nature of the rhizome (Geddie, 1955).

Vernacular names

Chandumula (Bengali); *Chandramula* (Hindi); *Kachchoora*, *Chand-moola* (Kannada); *Kachri*, *Kapur-kachri* (Marathi); *Katjulam*, *Kacholam* (Malayalam); *Chandramulika* (Sanskrit); *Kacholam*, *Kacholakilangu* (Tamil); *Kachoram* (Telugu).

Introduction

The genus *Kaempferia* L. belongs to the family *Zingiberaceae*. It is represented by ca. 50 species (Wielgorskaya, 1995), of which ca. 8 species occur in India (Karthikeyan *et al.*, 1989).

One of the Indian species of *Kaempferia* is *K. galanga* L. It is a small rhizomatous herb with beautiful flowers and foliage. Further, the rhizome has promising aromatic and medicinal values.

In India, the plant species is overexploited from the wild for its aforesaid values. So as to save the species in the wild for posterity, Government of India has included it in the Negative list of Export and as a result of which a ban has been implemented on the trade and export of collections from the wild.

Etymology

The genus '*Kaempferia*' was named



Brief description

Aromatic herbs with tuberous rhizomes, without any aerial stem. Leaves usually 2, rarely 3, flat, expanded, spreading horizontally on the surface of the ground, 3.5-13 x 2-9 cm, orbicular to ovate-orbicular, green; petioles short. Flowers 6-12, collected in small fascicles, fugacious, opening successively, fragrant, white with a purple or lilac spot on each side of the lip.

Flowering: June - July

Distribution

It is found throughout the plains of India and cultivated for its ornamental qualities and aromatic rhizome (Anonymous, 1959; Karthikeyan *et al.*, 1989).

Aromatic and medicinal values

The herb is used for flavouring rice. Rhizomes and leaves are employed as a perfume in hair washes and in other cosmetics. They are used as deodorant, worn by women for fragrance and also used for protecting clothes against insects. Leaves are used in lotions and poultices for sore eyes, sore throat, swellings, rheumatism and fevers. The rhizomes are diuretic, carminative, stimulant and expectorant and they are also used as a masticatory with betel leaves and areca nut. The rhizomes, crushed to powder and mixed with honey, are given in coughs and pectoral affections. The rhizomes, boiled in oil, are

externally applied to remove nasal obstructions. The rhizome is stomachic and anti-inflammatory. In the form of powder or ointment, it is applied on the wounds and bruises to reduce swellings. Roasted rhizomes are applied hot in rheumatism and for hastening the ripening of inflammatory tumours. They are used as a wash for dandruff and for relieving irritation produced by stinging caterpillars. The rhizomes are also employed in some medicines. They have disinfectant properties too (Kirtikar *et al.*, 1935; Nadkarni, 1954; Anonymous, 1959;

Joshi, 2000; Bhat, 2003).

Conservation

It is suggested that the people concerned should acquire the plant/plant parts from cultivated sources to meet their needs without disturbing the wild populations. The plant can easily be cultivated in gardens. It is generally propagated by potting the rhizome, after cutting it into pieces, in light soil. It thrives well under shaded conditions (S. Tetali, *pers. comm.*).



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KNOW OUR CITES PLANTS - II

Nepenthes khasiana
Hook.f. and
Saussurea costus
(Falc.) Lipschitz.
- Treasures worth
saving (CITES
Appendix - I)



Nepenthes khasiana Hook.f.

This curious critically endangered and rare pitcher plant belonging to the family Nepenthaceae is endemic to Meghalaya in India. The plant is a dioecious shrub, climbing by tendrillar leaf-petiole. Leaves alternate with an expanded lamina and a prolonged apex forming a tendril terminating in a coloured cylindrical pitcher with a recurved fluted rim and operculum. Inflorescence is a raceme or panicle. Tepals in 2 whorls, free. Stamens 2-24, monadelphous, in a column. Carpels 3-4, ovary superior, ovules many, stigma discoid. Fruit is an elongated loculicidal capsule. Seeds numerous, filiform.

Nectar is secreted on the rim of the pitcher, at the mouth of the pitcher and often at base of the operculum. The insects fall into the pitcher, which

contains a fluid with proteolytic enzyme secreted by glands lining the lower portion of the wall and get digested. The soluble protein is ultimately absorbed by the pitcher.

Habitat: The plant prefers acidic and nitrogen deficient soil, high rainfall and a warm climate. The pitcher traps insects to compensate for nitrogen deficiency in the soil.

Status: This endemic plant is critically endangered in its natural habitat. The major threats to its population are due to human activities like deforestation, coal mining, construction, agriculture, etc. in addition to animal grazing. Natural calamities like land slides and forest fire have also destroyed their natural habitats.

The plant also finds ethno-medicinal

uses for which they are collected by the tribals. Khasi and Garo tribals use the fluid of unopened pitcher of the plant as eye drops to cure cataract and night blindness. It is also used for treating stomach troubles, diabetes and gynaecological problems.

Conservation: Botanical Survey of India, Eastern Circle, Shillong maintains the plant for *ex-situ* conservation and has also started tissue culture. The Meghalaya State Forest Department (Silviculture division) has set up *ex-situ* germplasm of the plant for conservation at Umian (Barapani) Forest Research Station (Mao & Kharbuli, 2002).

Legal Status: The plant is included in the Appendix I of CITES. It is also enlisted in the Rare and threatened taxa of India (Jain & Rao, 1983).

***Saussurea costus* (Falc.) Lipschitz.**

The herb commonly known as 'Costus' or 'Kuth' belongs to the family Asteraceae. It is found growing wild in Kishanganj valley and higher elevation of Chenab valley in Jammu & Kashmir, sporadically in Pangi of the Chamba in Himachal Pradesh and Uttaranchal.

This critically endangered plant is a perennial, pubescent herb, 1-2.5 m high. Roots stout, carrot like, up to 60 cm long, grayish to dull brownish and possess characteristic odour. Basal leaves are scabrous above and glabrous beneath, margin irregularly toothed; petiole 60-90 cm, lobately winged. Stem leaves semi-amplexicaule. Involucral bracts ovato-lanceolate, glabrous, purple. Flowers in axillary or terminal clusters of 2-5 on subglobose heads, sessile; petals dark purple. Achene 8 mm, compressed, curved. Pappus hairs brown, feathery.

Habitat: Found in sub-alpine Himalayas, on open hill slopes, at elevations ranging from 2,400-3,900 m.

Status: Costus has become critically endangered due to indiscriminate collection of its roots, which finds various uses, and also destruction of its natural habitat.

The roots contain an alkaloid 'Saussurine' which is medicinally important. It is an antiseptic, used in chronic skin diseases, asthma and high blood pressure, and good for stomach

ailments. It is also carminative, stimulant, prophylactic and sedative. It inhibits peristaltic movement of the gut and produces relaxation. Essential oil of kuth roots is used extensively in high grade perfumes and cosmetics.

Dry roots constitute the drug "Saussurea". They are scented and yield an aromatic oil, which is also used in making insecticides. In Kashmir the roots are used to protect woolen fabrics and are also smoked as a substitute for opium.

Kulu is the biggest centre of trade for 'Kuth'. Export of plants cultivated in Himachal Pradesh is allowed if the plants are accompanied by a cultivation certificate issued by the State's Chief Wildlife Warden. The 'Kuth' or 'Costus' roots are collected and supplied to State Trading Corporation by the State Forest Department and the same from Lahul is collected Lahul Kuth Growers' Society, Manali and supplied to State Trading Corporation (Gulati, 1982). The roots of wild plants are believed to be collected in Jammu and Kashmir for illegal export.



Conservation

Commercial cultivation of 'Costus' or 'Kuth' as it is known in trade was taken up during second and third decades of twentieth century in Kashmir, Lahul-Spiti in Himachal Pradesh and Garhwal in Uttar Pradesh in its natural habitat. It has also been successfully cultivated in semi-natural condition in Jammu & Kashmir and Garhwal, and as a regular crop in Lahul.

The plant prefers a deep porous soil for development of long and thick roots. A canopy of either *Betula utilis* D. Don, *Quercus semicarpifolia* Sm. or *Abies webbiana* Lindl. is quite favourable for costus plantations in forest areas of Kashmir and Garhwal.

Legal Status

The plant included in the Appendix – I of CITES and enlisted in the Red Data Book of Indian Plants by Nayar & Sastry (Eds.), Vol. 2, 2000 (repr. ed.), Botanical Survey of India. It is also included in the negative list of export of the Ministry of Commerce, Government of India, and 'Schedule VI' of the Wildlife Protection Act of India (Anon, 1995) which makes its unauthorized collection from wild a cognizable offence.

References:

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B *ergenia ciliata* (Haw.) Sternb. belongs to the family Saxifragaceae and is found throughout the temperate Himalayas between elevations of 800-3000 m. The plant mostly grows on moist crevices of rocks and boulders. The plant is known as Pashanbheda (Pashan = rock stone, bheda = piercing) in Sanskrit; Silphora (Sil = a rock, phora = breaking) in Hindi; and Rock-foil in English which itself indicates that the plant grows between rocks and appear to break them or that it possesses lithotriptic property. Due to over-exploitation it has been placed in

Fls. & Frs.: Feb.-May.

Chemical constituents:

The rhizome contains bergenin (0.6%), gallic acid, glucose (5.6%), mucilage and wax. The presence of sitosterol and four flavonoids are also reported. It is also a source of tannin (14.2-16.3 %) and of a dye.

Medicinal uses:

The rhizomes and roots are cooling, bitter, acrid, laxative, astringent, abortifacient, tonic, analgesic, aphrodisiac and are useful in tumors, heart diseases, urinary discharge,

Folk uses:

It is said to be very effective in dissolving kidney and urinary bladder stones. The rhizomes are pulverized and made into a paste which is applied for 3 - 4 days on burnt part of body for soothing relief. The burn heals without leaving any scar. The bruised rhizomes are applied in boils, cuts and eye diseases. The paste of rhizome is applied on dislocated bones after setting in proper place. The rhizome are chewed in diarrhoea and given with honey in fever. The leaves are also chewed in constipation and juice of the

Bergenia ciliata (Haw.) Sternb.

A rare promising medicinal plant needing conservation and cultivation

Harish Singh

Central Botanical Laboratory, Howrah 711 103

the vulnerable category in the Himalayan region, especially in hilly areas of Uttaranchal.

Botanical description:

Bergenia ciliata (Haw.) Sternb. is a perennial stunted creeping herb with a stout and cylindrical rootstock. The stalked leaves are nearly circular, obovate or elliptic, 5-35 cm long, finely denticulate and densely ciliate at margins, sparsely hairy to glabrous on both surfaces. The plant bears pinkish white flowers in spreading panicles and capsules are round.

piles, spleen enlargement, ulcers, pulmonary affection, dysuria, diseases of bladder, dysentery, menorrhagia, hydrophobia, biliousness, eye sores, diseases of lungs and liver and cough and fever in Ayurveda and Unani systems of medicine.

The acetone-extract is cardiotoxic in higher doses and possesses significant anti-inflammatory activity but the activity decreases with increasing dosage. In lower dosage, the extract is mildly diuretic but in higher doses it exhibits anti-diuretic action in experimental animals.

leaves is used in earache. The inflorescences are mixed with barley flour and given to bullocks and cow to check bleeding in urine.

Miscellaneous uses:

The juvenile leaves are fried with gram flour and served as 'Pakora'. The broad leaves are used as plates in picnic, parties and agricultural fields. The children offer the flowers on the doors of their neighbours as a good wish in a local festival called 'Phool sangran' in Uttaranchal. The people also grow this plant for its beautiful pinkish flowers.

Status:

This species has been included in the vulnerable category by a Conservation Assessment and Management Plan Workshop Process, WWF, India, ZOO/CBSG, India and Uttar Pradesh Forest Department in 1997 (Samant *et al.*, 1998). There is a good demand of rhizomes of this plant species in various pharmaceutical companies. The villagers who are poor and do not care about degradation of plant resources, collect this plant for earning their livelihood. As a result the whole plant is dug out with very little chances of regeneration.

Conservation and cultivation:

Possible reasons for rarity might be over-exploitation for medicinal value, beautiful flowers and its occurrence in selected habitats. Keeping in view these reasons, its *in-situ* as well as *ex-situ* conservation is highly recommended.

It has great potentiality for the large-scale cultivation. This plant can be grown in rocky-gravelly and sandy soil at elevations of 800–3000 m. An experiment was conducted by the author at Govt. Garden, Chaubattia, Uttaranchal and it was recommended

that the seeds should be sown from April–May and pieces of rhizome should be planted from January–February for getting maximum germination (92%) and maximum sprouting (96%), respectively.

Due to its great potentiality for large-scale cultivation, the various State agencies and NGO's may initiate its cultivation in the Himalayan region. Farmers may grow the plant in their agricultural land for their economic upliftment as it has a good market value in Ayurvedic and Unani systems of medicine.

References:

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Cultivation of *Bergenia ciliata* (Haw.) Sternb. in Govt. Garden, Chaubattia (Uttaranchal)

Apatanis are one of the distinguished tribal groups among the 27, inhabiting the state Arunachal Pradesh. Ziro, a beautiful valley in the Lower Subansiri district is the home to the Apatani tribe. The valley has an area of more than 1058 km², of which 43 km² of land is under cultivation (Sundriyal & Dollo, 2004). It lies between Panior and Kamla rivers at altitudes ranging between 1524 m – 2738 m and is bounded by the areas traditionally belonging to the neighbouring Nyishi and Hill-Miri tribes and in the south east by Assam.

The Apatanis are considered to be the descendants of Abotani (Abo = father). Haimendorf (1962) etymologically described them as 'Apa' = a world for regard, and 'Tani' = human race. They are one of the most efficient and well settled communities of Arunachal Pradesh and is divided into a number of clans and subclasses. Despite being surrounded by a number of different tribes, they have their own style of living and cultural values. They have been secluded from the outside world by both natural barriers and warrior neighbours. Unlike the neighbouring tribes, they love to live in nuclear families and prefer settled agriculture. Apatanis have more than ten villages, with a population of 24,650 and a density of 23 persons/km². The growth rate at 8.62% is much lower as compared to the state which is 26.21%.

Agricultural and the unique irrigation system of Apatani

Apatanis are more particularly known for their excellent irrigation system. Almost all Apatanis except few have their own land. Their primary crops are rice, millet and maize. They follow a unique system to irrigate their rice fields, making channels from the streams towards the fields which are regulated by wooden flood gates. Terraced rice fields are also located around the sides of the valleys, which are done by hand without the aid of animals or ploughs. After harvesting crops they plant bamboo and pine for the future generations.

Apatani and plants : Interrelationships

Apatanis depend on the forests for their social, cultural and economical needs. Some of the important plants used by them with their uses are enlisted below :

Phyllostachys assamica Gamble ex Brandis

This unisexual (male) bamboo known as 'Apatani bamboo', is an integral part of their economy and is widely cultivated to meet the housing and fencing needs and to get the edible bamboo shoots, locally called 'bamboo tenga'. It is used as ritual altar in 'Myokoh' festival.

Pinus wallichiana A.B. Jackson

This valuable tree is believed by the Apatanis to be introduced by their ancestors in the country. Its wood is used widely for building purposes, whereas the resin of the plant is used as a medicine to cure inflammations, swellings, aches, etc. The wood

is also useful in making fire torches owing to its resinous contents. This plant is extensively planted and conserved in clan, subclan and individual forest.

Berberis wallichiana DC.

Tattooing on the face and body is a traditional custom of Apatani tribes. Spines of this plant is used for tattooing the face. The skin is pricked with spine and a mixture of rice starch and soot is applied on the wound. The soot gives the colour. The tattoo is locally called 'te'.

Bambusa tulda Roxb.

The plant is called 'Bije' in their local



language. The stem is used for making flutes. It is also used by the priests during 'Dree' festival of ritualistic purpose. The sound produced by the bamboo is believed to keep the evil spirits away.

Calamus floribunda Griff.

It is called as 'Easoo' in their local language. Parts of the stem is used for making baskets and hats. Leaves are used for thatching roofs.

Callicarpa vestita Roxb.

The plant known as 'Lamii' in their local language is used widely in preparing local liquor 'Apong'. The leaves are used for fermentation.

Castanopsis indica A. DC.

Locally known as 'Raohu'. Wood is used as timber and the fruits are consumed. Also used for ritualistic purposes during Myokoh festival.

Castanopsis tribuloides A. DC.

Most preferred species for 'Myokoh' festival and other ceremonies.

Exbucklandia populnea (R. Br. ex Griff.) R. W. Brown

Used to construct platform during 'Myokoh' and 'Murung' festivals.

Animal husbandry

Apatanis domesticate mithun, fowls and pigs. These are used as source of meat and also sacrificed during various religious ceremonies.

Customs, culture & beliefs of Apatani

Apatani worship traditional ethnic religion. They have a culture that contains remnants of the archaic Tibetan culture. The important festivals celebrated by Apatanis are 'Myokoh', 'Murung', and 'Dree'. Myokoh is celebrated for well being and wealth of individual family member. It is celebrated by rotational manner to keep the social fabric intact. The preparation of festival stars after the completion of harvesting, by hunting and sacrificing monkeys during early November, known as 'Bidding Lanii' in local dialect. But the actual festival



starts during the month of March with the flowering of *Prunus persica* (L.) Batsch. The ceremony is concluded by 20th April which is known as 'Tagii Tache' locally. **Dree** is celebrated for well being of seasonal crops. Apatanis do not prefer idol workshop. They believe in Donyi (Sun) and Polo (Moon). Besides these they also worship the couple Kiro and Kilo during 'Myokoh' festival. Apatani believe they are surrounded by invisible beings which are capable of affecting their welfare. They also believe that after death all men will go to the 'underworld' and begin re-living their lives.

Their dresses are colourful. Tattooing and stuffing of large nose plugs are popular among women, although this practice is gradually falling into decline in the recent years.

The men folk tie their hair in a knot just above the forehead with a brass rod.

The sustainable approach of life

Even the modern lifestyle of Apatani follow a sustainable approach which can be seen in their agricultural system, utilization of forest resource, consumption patterns and festivals. Despite the above approaches the malpractice of hunting rituals and other practices of different categories, the biodiversity is threatened to some extent. The Government of Arunachal Pradesh is attempting to bring in a vast area under the unclassified state forests, under 'Anchal Forest Scheme', for better management. UNESCO is considering the Apatani valley to be declared a world heritage site for its extremely high productivity and unique way of preserving the ecology.

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A. K. Baishya,
Ritesh Kr. Chowdhery &
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Crotalaria assamica Benth. -A Wild Ornamental Plant of Restricted Distribution in India

A.A.Ansari & A.B.D.Selvam

Botanical Survey of India

Introduction

C*rotalaria* L. (Leguminosae), the largest legume genus in India has many interesting and ornamental species. *Crotalaria assamica* Benth. although has distribution in other Asian countries like Malaysia, Philippines, China and Taiwan, was originally described from India having restricted occurrence only in North-Eastern region (Assam, Meghalaya and Nagaland). Bentham in 1843 first described this species based on a collection from Meghalaya. This species is of great potential ornamental value. Based on survey, it has been found that so far it is only introduced and cultivated in the Experimental Garden, Botanical Survey of India, Barapani (Shillong).

opposed; peduncles 12-30 cm long. Flowers 15-30 in number, 1.6-2.2 x 1-1.4 cm; pedicels 0.5-1.5 cm long, pubescent; bracts linear or linear-lanceolate, 3-4 mm long, pubescent; bracteoles 2, at the middle of pedicels or slightly below, setaceous, 2-3 mm long, pubescent. Calyx-tube ca 5 mm long; lobes lanceolate, 1-1.5 cm long, acuminate, golden-pubescent. Corolla golden-yellow, much exerted; vexillum ca 2 cm long, glabrous. Pods oblong, distinctly stalked, 4-5 cm long, glabrate. Seeds numerous.

Ecology: Generally found on hills up to 1700 m in thickets.

Flowering & Fruiting: September to January. Pods may persist up to April.

Possible use: It can be used as an ornamental plant.

Possible threat: At present none but its occurrence is sporadic and the area of its distribution is restricted to smaller states of North-Eastern region including its type locality.

Conservation: Cultivated in Experimental Garden, Botanical Survey of India, Barapani (Shillong), Meghalaya (Khasia hills).

Propagation : Through seeds.

Reference

- Bentham, G. 1843. In Hook., *London J. Bot.* 2: 481.



Some information about ENVIS Centre



Director, BSI releasing the e-book
of ENVIS Newsletter Vol.10

Established
Subject Area
Contact person
Address

Telephone
Fax
E-mail
Website
Activities of the Centre

April, 1994.
Floral Diversity.
DR. M. S. MONDAL
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The centre has enormous data on many areas and wants to create database and publish the following information.

- i) Dry & wet coastal ecosystem in India : Vegetation pattern, floristic component, their values in Assessment of Floristic Diversity of Angiosperm in regard to different ecozones in India
- ii) Database on indigenous medicinal and aquatic plants of India.
- iii) 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. An identification manual of CITES plants will be prepared and published from the ENVIS centre.

*List of Publications
broughtout so far*

Books :

1. Mangroves, Associates and Salt Marshes of the Godavari and Krishna Delta, Andhra Pradesh, India.
2. Diversity of Coastal Plant Communities in India. (Priced publication) Rs.804.00 *
3. Red List of Threatened Vascular Plant Species in India.

Newsletters :

Up to Vol.10. Vol. 11 (in press).

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



Prof. H. Y. Mohan Ram, Chairman, Programme Advisory and Monitoring Committee of Botanical Survey of India and Zoological Survey of India starting the functioning of Deccan Circle, Botanical Survey of India, Hyderabad in presence of (left to right) Dr. M. Sanjappa, Director, Botanical Survey of India, Shri D.C.S. Raju, Ex-Joint Director, Botanical Survey of India, Prof. H. Y. Mohan Ram, Shri R. Rajamani, Ex-Secretary, Ministry of Environment & Forests, Government of India and Prof. R.S. Rao, Ex-Joint Director-in-charge, Botanical Survey of India.



Workshop on Awareness cum Herbarium
Technique and Methodology 2005