

# ENVIS NEWSLETTER

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## From Director's Desk



The United Nations Conference on Climate Change or the 21st yearly session of the Conference of the Parties (COP21) to the United Nations Framework Convention on Climate Change (UNFCCC) was held at Le Bourget in Paris, France, from 30th November to 12th December 2015. Nearly 50,000 participants including 25,000 official delegates representing nearly 200 countries attended the conference. On the concluding day of the conference, 12th December 2015, the envoys from 195 countries agreed to and approved the final draft of the Paris Agreement, to reduce emissions as part of the method for reducing greenhouse gas to slow down or hold global warming to well below 2°C, and strive for 1.5°C, if possible.

The Government of India has been taking range of necessary initiatives to combat and strengthen India's response to climate change. Initiatives like Green India Mission outlined under the National Action Plan on Climate Change aim to further increase and improve the quality of the forest/tree cover in the country. Furthermore, it is expected to enhance carbon sequestration by about 100 million tonnes CO<sub>2</sub> equivalent annually.

Article 51A(g) of the Constitution of India states that it is one of the fundamental duties of every citizen "to protect and improve the natural environment including forests, lakes, rivers and wildlife and to have compassion for living creatures". Therefore, it is the duty of every citizen of India to be an integral part of country's strategies to combat climate change, and thereby to protect and conserve the existing natural resources of the country for posterity.

The ENVIS Centre on Floral Diversity, Botanical Survey of India through its publications and website, aims to disseminate the general information and various critical issues on biodiversity (especially plants), environment and conservation, to create awareness among the general public. Newsletter is one of its publications, which publishes articles on biodiversity, endemic and threatened, medicinal and interesting plants of India, and their conservation and issues related to traditional knowledge.

I appreciate the efforts of entire team of ENVIS Centre in bringing out this informative issue.



(Paramjit Singh)  
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Botanical Survey of India, Kolkata

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# The Pitcher Plant

**Botanical Name:** *Nepenthes khasiana* Hook.f.

**Family:** Nepenthaceae

**Common/Vernacular Names:** Monkey Cups, Tropical Pitcher Plant; Garo: *Memang-koksi*; Jaintia: *Ksete-phare*; Khasi: *Tiewra-kot*.

**General Morphology:** A dioecious, more or less woody, sprawling or vining plant with passive traps into which insects tumble and drown in the pool of digestive liquid. Stems are 0.8–2.5 cm in diameter. Leaves are sessile or petioled, alternate, oblanceolate in outline with a tendril terminated by a pendant, cylindrical, coloured pitcher with recurved fluted rim and an operculum. Inflorescence is a raceme or panicle. Flowers are actinomorphic, with 3 or 4 nectariferous tepals in 2 whorls; male flowers with 2–24 stamens having connate filaments and bilocular anthers; female flowers with 3 or 4 carpels and each carpel has a superior ovary with many ovules; style is simple with a terminal discoid stigma. Capsules are elongated, leathery and with numerous filiform seeds.

**Pitcher and its Trapping Mechanism:** Pitcher varies greatly in shape and size and often brightly coloured. A pitcher consists of a lid, the waxy zone (slippery zone) and the digestive zone (glandular zone). The margin of each pitcher is widened or thickened into a collar-like shining rim or peristome. The upper 1/3–1/2 of the inner surface of the pitcher is extremely smooth with waxy coating that forms a sliding surface, where insects tumble into glandular digestive zone with pool of digestive fluid. Pitchers generally contain two types of glands, viz., nectar glands and digestive glands. The inner surface of lid and inner edge of peristome bears sunken discoid nectar glands, which secrete nectar to attract insects. In attempting to reach the droplets of nectar, the insects often slide down into the pitcher. The lower most part inside the pitcher possesses the digestive glands, which secrete proteolytic enzymes to digest the trapped insects, and the plant ultimately absorbs the released nutrients.

**Distribution:** *Nepenthes khasiana* is an endemic species of India, confined to Meghalaya. In Meghalaya, it is distributed almost



a. An entire pitcher; b. A split-open pitcher showing trapped insects inside

throughout the state, from West Khasi Hills to East Khasi Hills, Jaintia Hills and South Garo Hills, at elevations from 1000 to 1500 m, except Ribhoi district, where it is not reported from wild. Very high population of this species can be seen in places such as Jarin and Baghmara in South Garo Hills district, Lawbah in East Khasi Hills district and Sonapahar in West Khasi Hills district.

**Medicinal Uses:** The fluid of the unopened pitchers is used by local Khasis and Garos as eye drops to cure cataract and night blindness; the fluid mixed with rice beer is taken to ease urinary troubles and also used in the treatment of stomach troubles, diabetes and for female diseases; the entire unopened pitcher is made into a paste and used in the treatment of leprotic ulcer of skin and various skin diseases.

**Threats and Conservation Strategies:** *Nepenthes khasiana* has been classified as an endangered species and is included in the Appendix I of CITES and Negative List of Exports of the Government of India. The population of this species is rapidly depleting in its natural habitats due to various anthropogenic activities such as road construction, agriculture, forest fire due to shifting cultivation, deforestation, mining of coal and lime stone, overexploitation for ethnomedicinal and horticultural purposes. The species has been conserved at an *ex situ* Germplasm Conservation Centre of Meghalaya State Forest Department (Silviculture) at Umiam (Barapani). It is also cultivated and conserved in some botanical gardens in India, that include BSI experimental gardens in Shillong, Meghalaya and Yercaud, Tamil Nadu, where it is well established and producing large number of pitchers.

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a. Habit; b. Female Inflorescence; c. Male Inflorescence

# Plea for conservation of *Neohymenopogon assamicus* (Rubiaceae) – An endemic and threatened species from Northeast India



*Neohymenopogon assamicus* in flowering

*Neohymenopogon* Bennet is a Southeast Asian genus represented only by three species, viz., *N. assamicus* (Hook.f.) Bennet, *N. oligocarpus* (H.L. Li) Bennet and *N. parasiticus* (Wall.) Bennet (Chen & Taylor, 2011). Among these, *N. parasiticus* is distributed widely in Bhutan, China, India, Myanmar, Nepal, Thailand and Vietnam, whereas, *N. oligocarpus* is endemic to western Yunnan province of China, and *N. assamicus* is endemic to Northeast India, and strictly confined to Lakhimpur district of Assam and foothills of Siang districts of Arunachal Pradesh.

The genus is epiphytic, epilithic or very rarely terrestrial shrubs with slightly succulent stems. Inflorescences are terminal, corymb-like, consisting of a few to several-flowered cymes, each subtended by a solitary enlarged creamy-white to white bract (semaphyll), persisting and becoming thin and papery during fruiting stage. Flowers are 5-merous and bisexual, stamens with subsessile anthers and inserted in upper part of corolla tube, and ovary with 2 cells. Fruits are 2-valved, elongated, septicidal capsules crowned by persistent calyx lobes and with numerous winged seeds.

During the plant exploration tours between 2010 and 2015 to East and West Siang districts of Arunachal Pradesh, this beautiful shrub was found in four different localities with a very small population of 10–20 mature individuals in each location. It is usually found epiphytic on species of *Quercus* L. or *Castanopsis* (D. Don) Spach. Due to its epiphytic nature and host specificity, the plants are not well-populated and are very rare. This tropical species prefers moderate shade and enough moisture and usually occurs in dense riverbank forest at elevations from 130 to 560 m.

The presence of white persistent semaphylls makes this species elegant and hence the plant can be introduced into gardens as an ornamental. As it is a species with high ornamental potential it can be subjected to multiple propagations through modern horticultural techniques.

Habitat modification, jhoom cultivation practice and landslides pose a serious threat to the survival of this species in its natural habitats. The indiscriminate cutting of trees of *Quercus* and *Castanopsis* from tropical forest for timber also pose a major threat to the species, as it is being an epiphytic on these trees.

This species is found growing in four different localities in two districts of Arunachal Pradesh. The Extent of Occurrence (EOO) and Area of Occupancy (AOO) of this species have been measured using the GeoCat software. The EOO of this species is 5838 km<sup>2</sup>, and AOO is 16 km<sup>2</sup>, and the species is represented only by 64 mature individuals, thus the species has been assessed here as Vulnerable [VU B1b(i, ii, iii, iv), c(ii); D2], following IUCN Red List Categories and Criteria Version 3.1 (IUCN, 2012).

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# A report on the flowering of two reed bamboos

The genus *Ochlandra* Thwaites is represented by 11 species, and confined to southern India and Sri Lanka. Of the 11 species, 10 are endemic to Western Ghats of southern India and 1 to Sri Lanka (Kumar, 2011). Species of *Ochlandra* are commonly known as reeds. They are shrubby, thickly clumped, thin-walled with long internodes and usually large-leaved and the spikelets are characterised by having one floret with numerous stamens, 4–6 stigmas, and baccate fleshy fruits (Seethalakshmi & Kumar, 1998). In India, the reeds usually grow gregariously and form impenetrable thickets in valleys, on wet hillslopes and banks of rivers and streams, generally under the shades of lofty trees or in open patches in the Western Ghats, at elevations ranging from 700 to 1500 m.

During an exploratory tour to collect species of bamboos from Kerala in January 2015, two species, viz., *O. travancorica* (Bedd.) Gamble and *O. wightii* (Munro) C.E.C. Fisch. were found in flowering and fruiting stage. While *O. travancorica* was seen growing commonly by the sides of rivers and streams and in open patches from Palode to Rose mala, *O. wightii* was found growing under the shade of lofty trees on the hillslopes near Rose mala. The flowerings of *O. travancorica* from different localities of Kerala and Tamil Nadu were reported in 1868, 1875, 1882, 1905, 1976, 1982, 1988, 1992–93, 1997–98, 2004–06 and 2008–09 (Blatter, 1929; Venkatesh, 1984; Seethalakshmi, 1993; Seethalakshmi & al., 2009; Gopakumar & Motwani, 2013a). These records show a coincidence of the predicted cycle of seven years with possibilities of unreported flowering events.

The earlier reports of flowering in *O. wightii* were during 1835 and 1882 from Tinnevely (Tirunelveli) Ghats (Kumar, 1995). Thereafter, flowering in this species was reported only after a gap of 110 years in 1992 by Kumar (1995) and recently during 2006–13 (Gopakumar & Motwani, 2013a). The flowering cycle of this species is presumed to be 15–17 years (Jijeesh & Seethalakshmi, 2011).

However, the cycle is also stated to be about 30 years for both these large-leaved, co-existing species (Gopakumar & Motwani, 2013b). Good seed setting and vivipary is common in both species.

The fallen fruits of these reed species are eaten by rats, squirrels, porcupines and even by wild boars. The culms of both species are widely used in pulp, paper, plyboard and cottage industries



*Ochlandra travancorica* (Inset: Flower)



*Ochlandra wightii*: a. Habit; b. Flowers; c. Fruits

for making flute and umbrella handles. The leaves are used as fodder and thatching substitutes. The gregarious nature combined with the large-sized leaves help them to withstand extensive elephant browsing and felling by human beings. The extensive fibrous root system and clasping rhizomes of the reed bamboos act as an excellent soil binder in hilly riparian zones of southern Western Ghats.

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Investigation on the natural and traditional relationship between plants and human societies has brought to light several little or unknown uses of plants developed through trial and error methods as well as by the creative thinking of the indigenous people all over the world. The usage of palm leaves for writing and etching by some specific people in ancient Odisha is one such typical use of plants, unique to this region. As there was no other suitable medium available, it helped in preserving the history and culture of the people of this state and also influenced the script, language, the then people's mode of thinking and creativity. In Odisha, the history of writing is very old and leaves of palm or bamboo were used mainly for writing epics and other religious texts during medieval period. Some of them are preserved and available for ready reference at Srikhetra, Puri and Goddess Viraja Khetra, Jajpur. The manuscripts of Odisha are unique because rich colourful illustrations are seen with inscriptions.

Prior to writing and etching on palm leaves, various steps are involved in processing the leaves. As a first step, young, not fully spread leaves of Toddy Palm or Palmyra Palm (*Borassus flabellifer* L.) are selected. These are processed by drying and seasoning in muddy water pond for 6–7 days. Then they are removed, cleaned, dried alternately under sunlight and shade till they get completely dried. In the final process, they are polished and cleaned with a piece of soft cloth and cut into required size.

*Lekhani*, an iron stylus is used for inscribing letters on palm leaves. It has a needle-like point at one end while the other end is flat with sharp edge for cutting and resizing the leaf to desired size.

Normally the writer in sitting position hold the leaf in left hand and placing it on the left thigh and write with the stylus holding firmly with the thumb and forefinger of right hand in a 'V'-shaped angle. Besides, inscribing letters in lines, different geometrical figures are drawn in manuscripts like *jataka* or horoscope. Moreover, the characters of different religious texts and Hindu mythologies, plants, animals, birds, different floral motifs and other elements of nature are incised on palm leaves. Finally, either turmeric powder or *hingula* (iron oxide) is rubbed over it to make it prominent and readable. Natural colours such as black [burned char of oil lamp wick mixed with gum of wood apple (*Limonia acidissima* L.) or charcoal made from burned coconut shells], green [a paste made from leaves of bean (*Phaseolus vulgaris* L.)], yellow [rhizome paste of turmeric (*Curcuma longa* L.) mixed with wood apple gum], blue [leaf paste of indigo (*Indigofera tinctoria* L.) mixed with wood apple] and red (iron oxide) are applied on some illustrated manuscripts as per requirement. A hole is made finally at the centre of each finished leaf through which a string is inserted and all the leaves are bundled and threaded together placing two wooden planks at two sides of the bundle. The planks are of same size as leaves and sometime their outer sides are carved with different floral motifs. Finally, it is bounded circularly with the string for safekeeping of the manuscripts containing a definite theme. As most of such creations are religious scriptures relating to divine characters and associated matters, they are considered sacred, and for which they are preserved in a separate place on a flat wooden stand called *Khatuli* in the sanctum sanctorum of temples or other religious institutions or in the place



**Fig. 1.** a. Palm tree with fruits; b. Young palm leaf used for manuscript writing and etching; c. Stylus used for etching; d. Preparation of palm leaf for writing; e. Writing on palm leaf with stylus; f. Horoscope or *Jataka*; g. Palm leaf manuscript with central hole and thread; h. Palm leaf manuscript with wooden planks; i. Manuscript bundles; j. Storage of manuscripts on *Khatuli* in the temple; k & l. Inscription on palm leaf



Fig. 2. a-k. Illustrated palm leaf manuscripts; l. Modern use of palm leaf as an invitation card

Courtesy: Fig. 2a-k. Odisha State Museum, Bhubaneswar

of worship of certain households called *Bhagabata gadi*. To avoid moisture and microbial attack the bundles of such palm leaf manuscripts are normally wrapped with a piece of red-coloured dry cotton cloth along with fruit powder of Indian gooseberry (*Phyllanthus emblica* L.), beleric myrobalan [*Terminalia bellirica* (Gaertn.) Roxb.], black pepper (*Piper nigrum* L.), long pepper (*Piper longum* L.), leaf powder of neem (*Azadirachta indica* A. Juss.) and Indian privet (*Volkameria inermis* L.). Apart, the manuscripts are annually sun dried in the month of *Bhadra* (August–September).

The Odisha State Museum at Bhubaneswar has the largest collection of 37,273 numbers of ancient palm leaf manuscripts, covering 27 different subjects such as *Veda*, *Tantra*, *Darsana*, *Silpa sastra*, *Abhidhana*, *Ayurveda* and other historical records written in Bengali, Devanagari as well as in Odiya. But some unique among them are the illustrated ones, which are broadly of two types, viz. simple engravings and illustrations in pure lines on palm leaves, and engravings with colour fillings. Other than line drawings, some innovative showpieces made by the artisans on particular subject or an entire story such as *Gita Govinda*, *Usha Harana*, *Rasika Harabali*, *Jagannath Janana* or *Chausathi Ratibanadha* (64 copulation poses) is depicted within the limit of five to seven folia, these are joined lengthwise and stitched together to form a rectangular or square format. This could be folded and opened

hang on the wall. There are also palm leaf manuscripts in the shape of daggers, fans and garlands.

Although writing and etching in palm leaf became obsolete and outdated due to use of paper, developed mechanism in printing and ultimately by electronic devices, it is occasionally used in rural milieu for making wedding invitation and in some other socio-cultural activities. This ancient method of writing and making art forms can be revived for some such uses, which can be instrumental in protecting the art as well as providing income to the palm leaf artisans those who still produce inscribed letters and arts of various designs, befitting item for preservation as memento or souvenirs. Otherwise, it is difficult to save this gradually dying invaluable art of this region.

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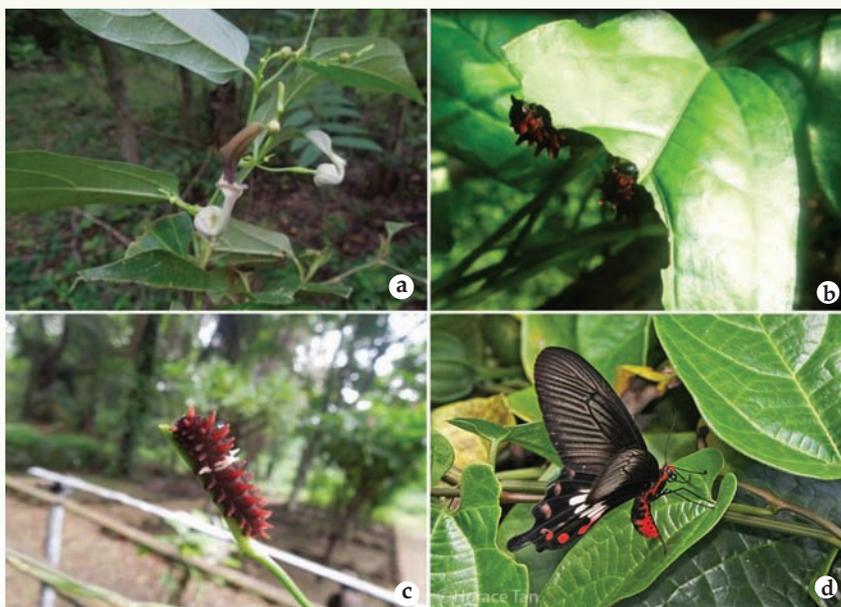
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## *Aristolochia indica* (Aristolochiaceae) – A host plant for caterpillars of *Pachliopta aristolochiae*

Attractive caterpillars were seen on the plant of *Aristolochia indica* L. (Aristolochiaceae) in Charak Udhyan, AJC Bose Indian Botanic Garden, Howrah. Later, they were identified to be of the common rose butterfly, *Pachliopta aristolochiae* Fabricius. It is a host specific butterfly species and that might be the reason its specific epithet is named after its host plant, *Aristolochia*.

*Aristolochia indica* is a climber with beautiful pitcher-like flowers and known as *Ishwar mul* in Hindi. The highly nephrotoxic aristolochic acid, an herbal remedy for weight reduction, is reported from this plant. The female butterfly of *P. aristolochiae* lays its eggs on the lower surface of leaves or even on young shoots of healthy plants to ensure adequacy of food for its caterpillars during their development. The caterpillar is velvety maroon in colour and has many fleshy red-tipped white protuberances and a white band on its middle of the body. It is bulky and slow in its movement and completes its life cycle on its host plant. The caterpillar feeds on leaves and young stems and sequesters the toxin, aristolochic acid in its body thus making it unpalatable to the predators such as birds and reptiles.



a. *Aristolochia indica*; b. Caterpillars feed on leaves; c. Close-up of a caterpillar; d. An adult common rose butterfly

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# Seedling morphology of the branched palm, *Hyphaene thebaica* (Arecaceae)



*Hyphaene thebaica* at AJCBIBG

*Hyphaene thebaica* (L.) Mart., the dichotomously branched palm is native to the Nile Valley of Northeast Africa and commonly known as 'Doum' Palm of Egypt with distribution from western tropical Africa to Egypt and Arabian Peninsula (Govaerts & al., 2011). In India, this palm is grown as an ornamental plant.

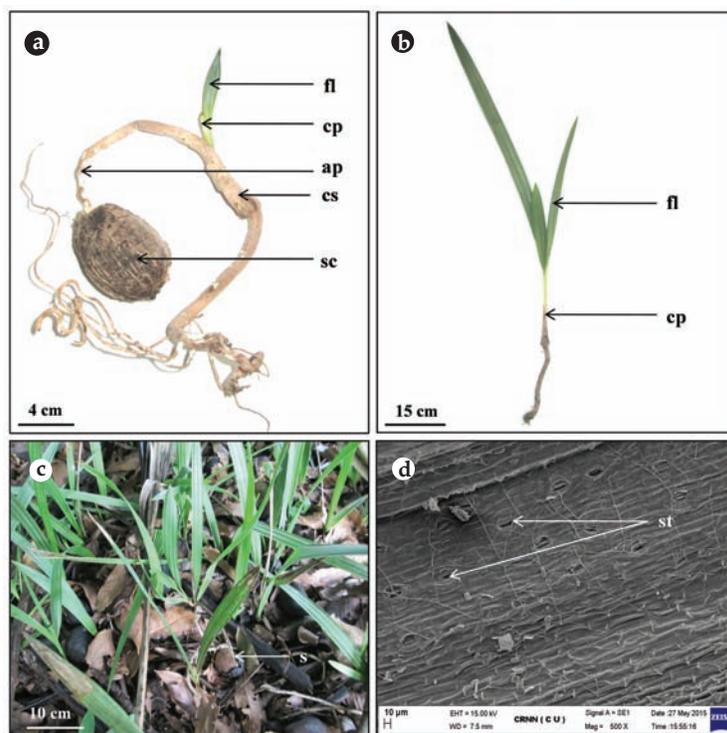
The seedlings are juvenile stage of a plant and the characters of seedlings are genetically stable and reliable and can be utilized for identification of a taxon much before the flowering stage (Paria, 2014). The morphology of *H. thebaica* seedlings collected from AJC Bose Indian Botanic Garden (AJCBIBG), Howrah has been studied using standard methodology and literature, and the Scanning Electron Microscopic study of the first leaf has been done using CARL ZEISS EVO 18 Special Edition Scanning Electron Microscope. The morphological features of the seed and seedling investigated up to its eighth leaf stage are provided here in detail.

Seeds are ovoid or oblongoid in shape, obtuse at ends, 7–8.5 × 4.5–5.5 cm in size, and are enclosed in a thick shell or woody endocarp covered by yellowish soft fibres. The circular hilum at apex is smaller in comparison to seed size, and poorly protected. Seedlings show semi-hypogeal, phanerocotylar and remote type of germination pattern. During germination half of the seed remains below the soil surface, the tubular cotyledon emerges as a wide thread-like organ, which keeps the seed away from the seedling axis. The wide thread-like organ known as apocole, is 10–12 cm long and 0.4–0.5 cm in wide, curved, glabrous and creamish white in colour. Proximal part of the apocole is swollen and attached to the haustorium (remaining inside the seed). Distal part is relatively thin and attached to the 3.5–5 cm long, glabrous cotyledonary sheath. The sheath extends up to the cotyledonary node. A cataphyll develops at the apical opening of the sheath. Cataphyll is tubular, 4–5 cm long and 0.4–0.5 cm in wide, obtuse at mouth, truncate at apex, glabrous.

Primary roots are 17–20 cm long, hard, brownish; root hairs absent. Adventitious roots are initially short, also observed to

protrude through cotyledonary sheath. Hypocotyl as well as epicotyl is reduced. Eophyll simple, coriaceous, exstipulate, petiolate; petioles 4.5–6 cm long, glabrous; attachment simple; blades linear-lanceolate, 35–40 cm long and 1.8–2.5 cm in wide, cuneate at base, entire at margins, narrowly acute at apex, glabrous, deep green above, light green beneath; veins parallelodromous, convergent at apex. Subsequent leaves enlarge gradually and are eventually succeeded by palmate leaves with costapalmate venation through segmentation in the seventh to ninth leaf stages, spirally arranged; leaf sheath 4–5 cm long, glabrous; primary vein 1; secondary veins 6–8; other characters same as that of first two leaves. The upper surface of first leaf has thick cuticular deposition; transverse veins widely separated from each other, connecting some longitudinal veins and intercostal areas; epidermal cells in well-developed longitudinal files; stomata are paracytic, sunken, scattered at intercostal regions; marginal cells longitudinally extended.

The fruits of the doum palm are widely used as food and beverage in Egypt and possess antioxidant, antimicrobial, antidiabetic, and anticancer properties (Faten, 2009; Salib & al.,



a. Seedling of *Hyphaene thebaica* in first leaf stage; b. Seedling in third leaf stage; c. Seedlings growing naturally at the bottom of the tree; d. Upper surface of first leaf showing stomatal distribution (SEM). [ap – apocole; cp – cataphyll; cs – cotyledonary sheath; fl – first leaf; s – seed; sc – seed coat; st – stomata]

2013). With such important medicinal properties the doum palm should be grown in various natural sites as well as in different botanical gardens in India through introduction of seedlings.

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# Porcupine's Quill: An indigenous tool used for paddy threshing by Birhor tribe in Purulia district, West Bengal

Paddy is the principal crop of West Bengal and majority of people involve themselves in agricultural practices. In the early days, after harvesting the paddy, people were using various traditional methods for threshing, drying and storing the grains. The common paddy threshing method practiced by people in rural areas involve tying of harvested paddy crop with mature panicles into bundles with a wisp of straw and beating them by hand using a flail or on a threshing floor to remove rice grains. This method is time consuming and all grains are not easily detached from the panicles.

During the recent ethnobotanical survey in Purulia district, a 60-year old Birhor tribal man, Sri Chunu Sikari of Bhupatipolly village of Baghmundi block demonstrated a traditional paddy threshing method used by the tribal community. The method involves insertion of the quills of Indian Porcupine (*Hystrix*



Sri Chunu Sikari demonstrating the threshing method

*indica*), locally known as *Sojaru*, randomly in the paddy crop bundles, but closely adhering the panicles and then these paddy crop bundles will be flailed on a wooden threshing platform with a row of vertically inserted quills. The sharp-tipped quills while flailing the bundle help to separate relatively more grains in less time.

However, now-a-days Birhor tribal men could not hunt porcupines and collect quills, due to strict enforcement of Wildlife Act. Thus the old quills are handed over from generation to generation for threshing purpose.

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First author gathering information from Sri Chunu Sikari

# E.K. Janaki Ammal



Edavaleth Kakkat Janaki Ammal (1897–1984), a renowned Indian botanist, was born at Thalassery, Kannur district, Kerala. She obtained her B.Sc. degree from Queen Mary's College, Madras (Chennai) and an Honours degree in Botany from Presidency College in 1921. Janaki Ammal worked as a teaching faculty at Department of Botany, Women's Christian College, Madras, during 1921–1928, and meanwhile she had sojourned as a Barbour Scholar at the University of Michigan, USA, where she obtained her Master's degree in 1925. She went to Michigan again as the first Oriental Barbour Fellow and obtained her

D.Sc. in 1931. On her return, she worked as a Professor of Botany at Maharaja's College of Science, Trivandrum (1932–1934), and later as a geneticist at the Sugarcane Breeding Institute, Coimbatore (1934–1939). In 1940, Janaki Ammal left Coimbatore to join the John Innes Horticultural Institution, London, where she worked as an Assistant Cytologist during the years 1940–1945, and studied the origin and evolution of cultivated plants with C.D. Darlington, and co-authored with him the monumental work, "Chromosome Atlas of Cultivated Plants". She also worked as a Cytologist at the Royal Horticultural Society, Wisley from 1945 to 1951.

On the invitation of the then Prime Minister of India, Jawaharlal Nehru, she returned to India in 1951, and was given subsequently the task of reorganising the Botanical Survey of India. Janaki Ammal was well-known for her cytological studies on Sugarcane, Bamboos, Cymbopogons, Solanums, Daturas, Menthas, Terminalias and Dioscoreas, besides a range of medicinal and economic plants. Though cytology was her forte, she also specialized in genetics, evolution, phytogeography and ethnobotany.

Janaki Ammal was elected Fellow of the Linnean Society of London, the Royal Geographical Society, London, Genetical Society of England, Royal Horticultural Society, London and Genetical Society of America. She was elected Fellow of the Indian Academy of Sciences in 1935 and of the Indian National Science Academy in 1957. The University of Michigan conferred an honorary Legum Doctor (LL.D.) on her in 1956. She was the recipient of Padmashri Award in 1957. The generic name, *Janakia* J. Joseph & V. Chandras. in the family Asclepiadaceae (now Apocynaceae) was named in honour of Janaki Ammal. She settled down in Madras in 1970 as an Emeritus Scientist at the Centre for Advanced Study in Botany, University of Madras. She lived and worked in the Centre's Field Laboratory at Maduravoyal, Madras until her demise in February 1984, at the age of 86.

In the year 1999, the Ministry of Environment and Forests, Government of India instituted the E.K. Janaki Ammal Award to promote excellent work in taxonomy of plants, animals and micro-organisms, and it was initially awarded to only one expert among the three fields. However, it has now been decided to enlarge the scope of the award and increased the number of awards to three, one each from plant, animal and microbial taxonomy. The three Awards are known as 'E.K. Janaki Ammal National Award on Plant Taxonomy', 'E.K. Janaki Ammal National Award on Animal Taxonomy' and 'E.K. Janaki Ammal National Award on Microbial Taxonomy'.

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a & b. Officials of Western Regional Centre, BSI with Sri Prakash Javadekar, Hon'ble Minister of State for Environment, Forest and Climate Change during a meeting at Van Bhavan, Pune; c. Smt. Ranee Prakash, Curator of Flowering Plants, Natural History Museum, London delivering a lecture on Fluid Preservation of Botanical Specimens at CNH, BSI, Howrah; d. A presentation on GIS by Dr. G. Mashewaran, Scientist, ZSI at CNH; e. Botanical exhibits displayed by BSI during the Platinum Jubilee Celebration of MMC College, Kolkata; f. School students and teachers with BSI officials during a bio-tour at AJCBIBG organised by the West Bengal Biodiversity Board, Kolkata; g. Visitors and students during *Van Mahotsav* Day celebration at AJCBIBG, BSI, Howrah; h. Retired Justice, Sri Bhagavati Prasad Banerjee, planting a sapling on *Van Mahotsav* Day at AJCBIBG, BSI, Howrah.

## ENVIS CENTRE

**Established** : April, 1994  
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**Activities of the Centre:** The Botanical Survey of India having involved in exploration activity has been collecting diverse data pertaining to floral diversity of the country and its ENVIS Centre proposes to disseminate this information by building databases on various scientific themes such as status of plant diversity in Indian States and Union Territories, Biodiversity Hotspots, distribution of endemic and threatened plants, CITES, interesting plants, carnivorous plants, invasive alien species, wetlands, mangroves, and traditional/ethnobotanical knowledge. It is also engaged in publication of state-wise bibliography including abstracts of papers pertaining to plants of India and also selected publications that have relevance both in documentation and conservation.

### LIST OF PUBLICATIONS BROUGHT OUT SO FAR

#### I. Books

1. Mangroves, Associates and Salt Marshes of the Godavari and Krishna Delta, Andhra Pradesh – India
2. Diversity of Coastal Plant Communities in India (Priced publication) ₹ 804.00\*
3. Red List of Threatened Vascular Plant Species in India
4. A Pictorial Guide to some of the Indian Plants included in CITES and Negative List of Exports
5. Bibliography and Abstracts of Papers on Flora of different States and Union Territories (West Bengal I & II, North East India – I, Andaman and Nicobar Islands, Maharashtra, Kerala, Tamil Nadu, Karnataka and Goa)

#### II. Newsletters: Up to Vol. 20(2), 2015