

# ENVIS

NEWSLETTER  
ENVIRONMENTAL INFORMATION SYSTEM



## From Director's Desk

The North-western Ghats, popularly known as *Sahyadris*, being part of one of the world hotspots, abound in rich floral wealth. Dr. S.R. Yadav who is a distinguished explorer and also a photographer contributed to this issue [(14(1))] an interesting article on the **Plateaus in Northern Western Ghats – Paradise of flowers**. I am sure people at large appreciate the richness and elegance of the plant wealth in this part of the country. The Double Coconut, *Lodoicea maldivica*, a native to the Seychelles, an island nation off the east coast of Africa, is disadvantaged for continued survival for being highly restricted in distribution and slowness in germination/growth as it takes quite some time for germination, for leaves to appear and plants to mature (30-40 years). Both male and female trees are required to set fruit. An attempt on artificial pollination on **Double Coconut** is also reported. People from different corners of the country, college and university teachers and researchers are visiting the Garden (recently renamed as **AJC Bose Indian Botanic Garden**) and Central National Herbarium of the Survey regularly for they being the large repositories of live/dry plant collections. An article on this **Garden and Herbarium** is given. Like earlier ones, I am certain this issue of ENVIS Newsletter will be appreciated by the regular readership for its contents specially on floral diversity/conservation.

**M. Sanjappa**  
Director

Botanical Survey of India



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## Plateaus in Northern Western Ghats – Paradise of flowers

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**N**orthern Western Ghats in Maharashtra region are gifted with plateaus, grasslands and characteristic herbaceous vegetation. Amongst these, the plateaus which are also known as tablelands, are a unique feature of Sahyadri ranges. Some well known plateaus are Panchgani and Kas (Satara), Gothane (Ratnagiri), Radhanagari and Borbett (Kolhapur). These plateaus generally lie between 900 – 1400 m altitude on mountain tops of main Sahyadri ranges forming a bridge between Konkan and Desh regions of Maharashtra. The plateaus are lateritic in composition. They are 5 – 10 m thick flat-topped slabs of laterite rocks on tops of Sahyadri Mountains. The plateaus possess little accumulated soil in low-lying areas on the rock tops and characteristic herbaceous vegetation during monsoon season intermixed with few shrubs. The vegetation of plateaus is unique in its composition possessing many species solely adapted to these climatic and edaphic conditions and hence, these rock-outcrops bear high endemism.

The plateaus enjoy cloudy and misty climate with high wind velocity blowing throughout rainy season. During summer, the plateaus are apparently barren except for sparsely distributed shrubs and sometimes small trees. Some plants such as *Euphorbia panchganiensis* Blatt. & McCann, *E. fusiformis* D. Don, *Drimys polyantha* (Blatt. & McCann) Stearn and *Blumea* species flower during April – May.

By mid May, with the onset of pre-monsoon cloud and misty atmosphere, the plants such as *Arisaema caudatum* Engl., *A. murrayi* (J. Graham) Hook., *A. sahyadricum* S.R. Yadav *et al.*, *A. sahyadricum* S.R. Yadav *et al.* var. *ghatica* Sardesai *et al.*, *Crinum brachynema* Herb., *C. woodrowii* Baker, *Iphigenia stellata* Blatt., *I. pallida* Baker, *Pancreatium triflorum* Roxb., *Scilla hyacinthina* (Roth) McBride and some such other monsoon perennials raise their heads above ground and produce first flush of brown, white and pink inflorescences.

With first spell of monsoon showers, the plateaus gradually turn from black to green as number of grasses start growing on barren rocks. Seeds of *Eriocaulon*, *Glyphochloa*, *Commelina*, *Murdannia*, *Rotala*, *Utricularia*, *Eulalia*, *Impatiens* and number of other such species become active, germinate and clothe the barren rocks green. Triploid form of *S. hyacinthina* spreads its leaves on ground and the moment the leaf tip touches the ground, it produces roots and bulbils.

The arrival of monsoon breaks the dormancy of tubers of *Aponogeton satarensis* Sundararagh. *et al.* in Kas and Gothane. It grows in ponds, puddles and marshy grounds and adds pink colour to plateaus during June. The plateaus keep on changing their colour every week with white, red, yellow, pink, blue and combinations of these colours. *Habenaria grandifloriformis* Blatt. & McCann with single heart shaped leaf lying flat on ground produces white spurred flowers on erect scapes and the ground is mainly occupied by this species during June. *H. panchganiensis* Santapau & Kapadia, *H. rariflora* A. Rich. and other orchids add to the beauty and diversity of flowers.

During June – July the white colour that dominates the plateaus is soon replaced by upcoming flush of blue *Utricularias*, pink and yellow *Impatiens*, golden-yellow *Senecios*, *Smithias* and innumerable white heads of *Eriocaulons*. *Strobilanthes sessilis* Nees var. *ritchiei* C.B. Clarke with beautiful foliage usually flowers after 3 – 4 years and when it flowers, it produces flowers in great profusion. The purplish flowers catch everybody's attention. The plants form dense mats which are distributed randomly throughout the plateau. Many other tiny plants with varied

flower colour add to the colour diversity of the plateaus. The grass-green plateaus act as carpets to the flowers of plateaus making them more attractive. Swarms of honeybees arrive in the entire plateau.

The monsoon starts receding in the later part of September and quite a large number of monsoon species start flowering by the last week of September which presents the loveliest scene of the year. During October and November the plants disperse their seeds enriching soil-seed bank for next season. With the start of winter, most of the herbaceous species including grasses dry and complete their life.

These unique ecosystems are presently under tremendous anthropogenic pressure. The major threats are tourist spots, bungalows/farm houses, mining activities, windmills, encroachment and grazing.

These plateaus are heavenly gifts of nature where man gets eternal happiness. We should judiciously use these natural resources for the bright future of this earth.



1. *Euphorbia fusiformis* D. Don; 2. *Aponogeton satarensis* Sundararagh. et al.; 3. *Habenaria grandifloriformis* Blatt. & McCann; 4. Utricularias; 5. Mat of *Impatiens lawii* Hook.f. & Thomson; 6. Grass – *Smithia* association; 7. Infinite heads of *Eriocaulons*; 8. *Ceropegia jainii* Ansari & B.G. Kulk.; 9. *Flemingia nilgheriensis* (Baker) T. Cooke; 10. *Pogostemon deccanensis* (Panigrahi) Press.

## Attempts of artificial pollination and fruit setting in *Lodoicea maldivica* (J.F. Gmel.) Pers. in AJC Bose Indian Botanic Garden, Howrah

S.S. Hameed & Sheo Kumar

AJC Bose Indian Botanic Garden, Botanical Survey of India, Howrah – 711 103

**L***odoicea maldivica* (J.F. Gmel.) Pers. belongs to the family *Arecaceae* and is endemic only to two small islands, namely, Praslin and Curieuse among the chain of 115 islands in Seychelles. It is commonly known as 'Double Coconut' tree because its seeds i.e. the coconuts have two lobes, each resembling a coconut. Interestingly, these seeds are the largest (the one that is shown to the students in the AJC Bose Indian Botanic Garden is 35 × 35 × 20 cm) and heaviest (up to 30 kg) in the plant kingdom.

*L. maldivica* was introduced in the AJC Bose Indian Botanic Garden,

Howrah in 1894. It was planted at the centre of a specially designed enclosure widely known as *Large Palm House*. The enclosure has a framework which is octagonal in shape. There are four ornamental metallic gates for entering inside. The top of the roof is covered with wire net to provide a safe and secure area for protection of the plant. To create a natural condition of a tropical rain forest, diverse species of palms, ferns and shade loving plants from different geographical areas have been brought and planted from time to time. The shade is provided by the climbers like *Antigonon leptopus* Hook.

& Arn. and *Porana paniculata* Roxb. Presently the 'Double Coconut' tree has touched the roof top of the enclosure



Double Coconut

and, therefore, action has been initiated to raise the height of the roof so that its normal growth is not hampered.

It flowered for the first time at the end of October, 1988 after a period of over 94 years of its planting and was then found to be a female plant. After 114 years it has attained a height of nearly 12 m. The girth of the trunk is 1 m in diameter at breast height and there is a crown of evergreen foliage at the top. In total 12½ fronds have developed spirally, 5 each in the 1st and the 2nd whorls and 2½ in the third whorl. Leaves are fan-shaped on maturity, up to 7 m long including petiole and 3.5 m wide, fringed at the edges; segments 4 – 10 cm broad, with drooping bifid frond tips; petioles up to 4 m long. During the years 2006-07, four inflorescences developed, measuring 78.34 cm in length with 5 flowers, 86.36 cm in length with 6 flowers, 101.60 cm and 104.14 cm in length with 9 flowers each. The flowers were 20–30 cm across.

Under natural conditions pollination in this species takes place by geckos, bees, slugs and different small flies as well as by wind and rain but in the AJC Bose Indian Botanic Garden the question of pollination does not arise because there is no male plant.

Rarity and uniqueness of this plant prompted the authorities of Botanical Survey of India to try for artificial pollination. On detailed inquiry and search it was learnt that a grove of this species is maintained in Peradeniya Botanic Garden, Sri Lanka. Thereafter, Director, Botanical Survey of India wrote to the Managing Director of Peradeniya Botanic Garden, Sri Lanka requesting him to send viable pollens of *L. maldivica*. In the meantime, the authorities of the AJC Bose Indian Botanic Garden made a MoU with M/s Sahayog Hortica Pvt. Ltd., 24 Parganas, West Bengal, for enriching the palm resources of the AJC Bose Indian Botanic Garden. M/s Sahayog Hortica Pvt. Ltd. has an associate office in Colombo. So they immediately contacted the authorities

of the Peradeniya Botanic Garden in the light of the letter from the Director, Botanical Survey of India for procuring pollen grains. A pouch of pollen grains from Sri Lanka arrived in the AJC Bose Indian Botanic Garden in the beginning of October, 2006. The pollens were preserved in deep freezers until the female flowers became receptive. Pollens were dusted on the stigmatic lobes on 30th November, 2006 for the first time after fulfilling all parameters for artificial pollination. The process was repeated in the subsequent weeks as and when the stigma indicated receptivity.

It took nearly six months' time to realize the fact that the fertilization was not effected through this pollination process. One more attempt was made in the month of July, 2007 with two new female inflorescences which was also not rewarding.

It seems that a lot of mystery prevails in the floral as well as pollination biology of this curious plant species. Learning from the previous falls and failures, scientists are eagerly waiting to see the blooming of new female flowers in the forthcoming season in order to fulfill a long cherished desire.



Artificial pollination being carried out in the AJC Bose Indian Botanic Garden, Howrah; Inset: A female flower

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# AJC Bose Indian Botanic Garden, Howrah – A guide to visit garden and herbarium

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The ENVIS Centre at Howrah, often receives queries from the teachers in connection with the visit of their students to the AJC Bose Indian Botanic Garden and Central National Herbarium (CNH), Howrah. This article has been written for providing them with relevant information.

The students can visit the AJC Bose Indian Botanic Garden at any time of the year but the best period will be from November to December when the climate is comfortable.

The AJC Bose Indian Botanic Garden remains open on all days throughout the year but it is advisable to the teachers not to bring the students on Saturdays, Sundays and national holidays because the CNH, Central Botanical Laboratory, etc. (working time 9.30 a.m. – 6 p.m.) remains closed on these days.

Map of the AJC Bose Indian Botanic Garden, Howrah. Courtesy: Dr. Sheo Kumar



There are two gates for entering the AJC Bose Indian Botanic Garden. The gates are Howrah gate/Main gate at the Bengal Engineering (B.E.) college [now Bengal Engineering and Science University (BESU)] end and the Bicentenary gate on the Andul road. However, it will be convenient to enter from the Bicentenary gate for visiting the AJC Bose Indian Botanic Garden.

The ticket counters remain open from 7.30 a.m. – 5.30 p.m. during March to September and 8 a.m. – 5 p.m. during

## Great Banyan Tree [*Ficus benghalensis* L.]

Courtesy : Dr. Sheo Kumar



October to February. The entry fee for each person is Rs. 5 and for the foreigners it is Rs. 50. There is no concession for the students. The car parking fee is Rs. 15 (including entry fee of the driver) at the Howrah gate and Rs. 10 at the Bicentenary gate (because no entry fee is required for the drivers as the cars are parked outside the gate where the entry tickets are checked) for the whole day. The bus parking fee is Rs. 60 (inclusive of the entry fee for the driver and one conductor) for the whole day. For cameras meant for still photography Rs. 10 will be charged per day and for video filming prior permission has to be taken from the Additional Director (AD), AJC Bose Indian Botanic Garden and Rs. 2400 is charged per day.

There is no space for parking buses near the Bicentenary gate. So the buses which will come to this gate will be sent to the Howrah gate for parking. At the time of returning, the students can board the buses at the Howrah gate but if they want to board the buses at the Bicentenary gate, their teachers have to request the ticket collectors for allowing the bus drivers to bring the buses at the Bicentenary gate.

Carrying plastic/polythene bags inside the AJC Bose Indian Botanic Garden is strictly forbidden. Plucking of flowers and other plant parts is strictly prohibited and punishable as per rule. The collection of weeds can be done only if permitted by AD, AJC Bose Indian Botanic Garden.

The teachers are requested to go through the relevant publications on the AJC Bose Indian Botanic Garden pertaining to its history, illustrated floristic accounts, plants that are likely to be found in each division, about the monuments, etc. before bringing their students for a visit. Their attention is being drawn to four such publications (Bose *et al.*, 1987; Desmond, 1992; Chowdhery & Pandey, 2007; Robinson, 2008) which would be helpful to them.



Children sitting on a leaf of Giant Water Lily [*Victoria* sp.]  
Courtesy: Dr. Sheo Kumar

The students can start visiting the AJC Bose Indian Botanic Garden from the Bicentenary gate at about 11.30 a.m. and within 4 – 5 minutes they will be able to walk down to the Great Banyan Tree [*Ficus benghalensis* L.]. The history of the tree is recorded there on display boards. The concrete structure, constructed inside the fencing, marks the position of the main trunk which once stood there. It was removed in 1925 due to fungal attack. The best view of the tree can be seen from the spot given in the map.

By the side of the Great Banyan Tree, the leaves of the Giant Water Lily viz., *Victoria* sp. floating on the King's lake with prominently upturned rims, will surely draw everyone's attention. A mature leaf is large enough to bear the weight of even 4 children sitting together on it.

Near the King's lake, across the road, there are some trees commonly known as 'Shivalinga' or 'Cannon Ball Tree'. Their scientific name is *Couroupita guianensis* Aubl. Inside the flowers the numerous stamens and the gynoecium form a structure that look like the expanded hood of a serpent over a 'Shivalinga' and the fruits look just like cannon balls.



Shivalinga or Cannon Ball Tree [*Couroupita guianensis* Aubl.]  
Inset : Fruit  
Courtesy: Dr. H.J. Chowdhery



Mad Tree [*Pterygota alata* (Roxb.) R. Br. var. *irregularis* (W.W. Sm.) Deb & S.K. Basu]

Now from this end of the AJC Bose Indian Botanic Garden all are to proceed towards the CNH building. After fulfilling the formalities at the reception counter the teachers have to meet AD, AJC Bose Indian Botanic Garden on the ground floor of the building with an application, written preferably on institutional letter head, to seek permission for entering the Medicinal Plant Garden (Charak Udyan) and Nursery number 1. Guides are provided on request, if they are available. A prior appointment with AD, AJC Bose Indian Botanic Garden can be made in his telephone no. (033) 2668-0554, fax no. (033) 2654-5096 or email ID [ibg@rediffmail.com](mailto:ibg@rediffmail.com).

The students should preferably wait in front of the building till their teachers return.

After getting the permission they can go inside the Medicinal Plant Garden (Charak Udyan) which is by the side of the CNH building. Inside this Medicinal Plant Garden everyone must also see the 'Mad Tree' [*Pterygota alata* (Roxb.) R. Br. var. *irregularis* (W.W. Sm.) Deb & S.K. Basu] in

which none of the leaves resemble one another.

After visiting the Medicinal Plant Garden, the nearby Cactus House can be visited to see the collections of cacti. In front of the Cactus House there are two clumps of an interesting bamboo species viz., *Bambusa vulgaris* Schrad. f. *waminii* T.H. Wen the internodes of which resemble pitchers. That is why it is locally known as 'Ghotibans'.



Ghotibans [*Bambusa vulgaris* Schrad. f. *waminii* T.H. Wen]

Next, the students have to go at the back of the CNH building to see the trees of *Ficus krishnae* C. DC., each growing on either side of the Roxburgh building. In this species, the leaves form a cup-like structure at base. This feature is very prominent in the tree growing near the old library building. It is commonly known as 'Krishna Bot'. There is a legend that god Krishna transformed the leaves into cups in order to use them for drinking (Benthall, Trees Calcutta 416.1946).

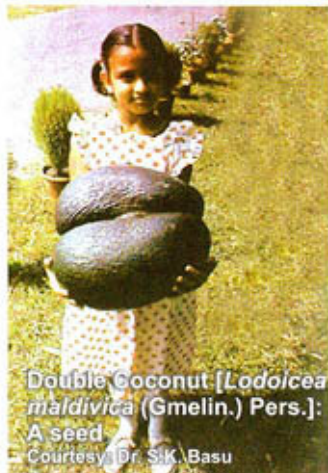
Now it is almost time for lunch. Students can bring their own food or have it in the nearby canteen. If the number of students is many, the staff-members of canteen have to be intimated at least two days before their visit and some money has to be paid in advance. There is also a cafeteria which is about 10 minutes walking distance from the CNH building towards the Howrah gate near the Gymnosperm garden along the side of the river Hoogly.

The pavilion (no. 6) for cooking is near the Cactus House. However, it has to be booked at least 2 – 3 months in advance from the office of the AJC Bose Indian Botanic Garden by paying Rs. 450 (including refundable caution money of Rs.100) for a day with the permission from AD, AJC Bose Indian Botanic Garden. There are two rooms (6A & 6B) in the pavilion and the aforementioned charge is only for one room.

After lunch the teachers have to meet AD, CNH on the 2<sup>nd</sup> floor of the CNH building for the permission of visiting CNH and the Economic Botany Section and also for taking photographs inside the building. One can have a prior appointment in his telephone no. (033) 2668-3235, fax no. (033) 2668-6226 or email ID calherb@yahoo.co.in and envis@cal2.vsnl.net.in.

Before entering inside the CNH, the students will have to deposit their bags at the reception. However, valuables like digital cameras, mobile phones, money bags, etc. must be kept with them.

The staff-members, nominated by AD, CNH, will tell the students about the history of the CNH and acquaint them with the methods of plant collection, herbarium techniques, etc. The B.Sc. (Hons.) and M.Sc. students of botany may be permitted to see the part of the herbarium where the type specimens and Wallichian collections are preserved (2<sup>nd</sup> and 3<sup>rd</sup> floors). On the 2<sup>nd</sup> and 3<sup>rd</sup> floors, the students can also see the Wallich's Catalogue and the Roxburgh's drawings, respectively.



Double Coconut [*Lodoicea maldivica* (Gmelin.) Pers.]:  
A seed  
Courtesy Dr. S.K. Basu

Now they can move to the 4<sup>th</sup> floor to see the ethnobotanical exhibits in the Economic Botany Section. Some one will explain to them all about the exhibits. While coming downstairs, they can see the Double Coconut [seed of *Lodoicea maldivica* (Gmelin.) Pers.] preserved in the room of the AD, AJC Bose Indian Botanic Garden. The Double Coconut is known to be the largest seed in the world. *L. maldivica* has been grown in the AJC Bose Indian Botanic Garden inside the Large Palm House. The teachers who will like to take the students inside the Large Palm House are suggested to contact AD, AJC Bose Indian Botanic Garden prior to their day of visit to get informed about the exact time when they can enter the Large Palm House because it does not remain open throughout the day.

By this time the students start feeling tired. Still, they should try and see the academically interesting *Psilotum nudum* (L.) P. Beauv. in the Nursery number 1, near the Kiosk building by the side of the river Hoogly and the palm with dichotomously branched trunk [*Hyphaene* spp.] near the Kyd's Monument, as well.

There are also many other interesting plants which will attract the attention of the enthusiastic students during their visit. The plants mentioned here are only a few of the botanical attractions that give immense pleasure to everyone. Further, the stated time of visit and the given route can also be changed according to one's convenience but it has to be kept in mind that during the summer season only the small-size leaves of the Giant Water Lilies [*Victoria* spp.], with slightly upturned rims, will be found in the lakes because the large ones start decaying slowly from the end of October and completely decay in 3 – 4 months.

The ENVIS Centre welcomes the teachers and the students to come, learn and enjoy in the AJC Bose Indian Botanic Garden and cherish the memories throughout their lives.

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Krishna Bot [*Ficus krishnae* C. DC.]: Leaves



*Hyphaene* sp.



Shri Jairam Ramesh, Hon'ble Minister of Environment & Forests releasing two volumes of "Agrobiodiversity Hotspots in India: Conservation and Benefit Sharing" written by Nayar *et al.*

From left: Dr. M.P. Nayar; Dr. S. Nagarajan, Chairman of PPV & FR Authority; Shri Jairam Ramesh, Hon'ble Minister of Environment & Forests; Dr. P.L. Gautam, Chairman of National Biodiversity Authority; Dr. M.S. Swaminathan, Chairman of MSSRF

Shri Jairam Ramesh, Hon'ble Minister of Environment & Forests viewing Wallichian catalogue in Type Section of Central National Herbarium, BSI, Howrah



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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

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(1). Vol. 14(2) (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