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ENVIS Newsletter on Medicinal Plants



जहाँ है हरियाली
वहाँ है खुशहाली



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Editorial

Dear Friends, Greetings to you!

Perhaps it is time to share some experiences related to Medicinal Plants Conservation efforts across the county.

This time Volume 7 is indeed special! It comes to you with an exclusive experience from an Indian Herbal Industry which reciprocated successfully to the needs of sustainability concern through an integrated effort. Rightly said, "necessity is the mother of invention". Here too, this industry through a process of trial and error have attempted to raise their own medicinal plants resources to meet market demands, thus reducing the pressure on wild collections of a conservation concern species. Does this sound interesting to you?

Just read the cover story: "*Prishniparni*- A Journey from Forest to Farm" from Bio Resources Development Programme at Dabur Group, Dehradun. ENVIS team acknowledges their far-sightedness, sensitivity and measures taken. Moreover, as a responsible leader, they have shared their experiences in a magnanimous way with all the details. Do you think it's encouraging? Follow the leader, to become self-sufficient by your actions!

This volume also brings to you diverse articles/ news clippings related to medicinal plants trade, equivalents, identification, conservation concerns species, distribution studies, outreach activities etc, all related to medicinal plants.

If you find the write-ups valuable to you, then you can also share your precious experiences in a simple manner. Just write to us at email id: envis@frlht.org

With Season's Greetings

Suma TS

Editor-Medplant

ENVIS Centre on Medicinal Plants

Foundation for Revitalisation of Local Health Traditions(FRLHT), is a registered public trust, since 1991. Our vision is to "revitalise Indian Medical Heritage". Our Mission is to design and implement strategic programs in the three key thrust areas that will have high social impact:

- A. High priority research and education on Indian systems of medicine
- B. Conservation of threatened natural resources used by Indian systems of medicine
- C. Strategic outreach initiatives for widespread application and dissemination of knowledge of Traditional Health Sciences

ENVIS Centre on Medicinal Plants is an integral and inseparable part of Foundation for Revitalisation of Local Health Traditions (FRLHT), Bangalore. It started in 2002, as node and now a Centre! Today, we see ourselves as a unique podium to Collect, Curate and Disseminate authentic Multi-Dimensional Information on Indian Medicinal Plants via communication media. This year web statistics shows 8331670 lakhs hits & 699404 visitors' for envis.frlht.org and 7045 visitors for the new website: frlhtenvis.nic.in

Vision of the Centre: To Create an Enabling Platform to Disseminate Reliable Multi-dimensional Information on Indian Medicinal Plants

Mission of the Centre :

1. To Identify, Collect, Curate & Disseminate Multi-dimensional Information on Indian Medicinal Plants using suitable Communication Media
2. To Share Experiences of varied stake holders on Indian Medicinal Plants
3. To Empower People with Information to take up suitable Research, Conservation Action & Resource Augmentation measures
4. To Create a Network of Ambassadors (Individuals & institutions), who will broadcast Conservation Messages
5. To Publish, Well Researched, Popular Science Series Publications Medplant Newsletter, Field guides, manuals, trade booklet.

Centre is financially supported by Ministry of Environment and Forest, Government of India.

To know more about us email to: envis@frlht.org, frlhtenvis@nic.in

Next issue: Medicinal Plants Conservation Efforts across the country ...continued.

Production and Supply of Botanical Rawdrugs from Cultivated Sources

D.K.Ved & G.S. Goraya

(Excerpts from "Demand and Supply of Medicinal Plants in India**")

As per the assessment of Demand and Supply of Medicinal Plants in India published by FRLHT and NMPB in 2008, out of 960 traded medicinal plant species, 178 species are consumed in volumes exceeding 100 MT per year, with their consolidated consumption accounting for about 80% of the total industrial demand of all medicinal botanicals in the country. Analysis of these 178 species by their major sources of supply reveals that 21 species (12%) are obtained from temperate forests, 70 species (40%) are obtained from tropical forests, 36 species (20%) are obtained largely or wholly from cultivations/plantations, 46 species (25%) are obtained largely from road sides and other degraded land use elements and the remaining 5 species (3%) are imported from other countries.

There is no national level statistics available for the species-wise cultivation of medicinal plants and production of botanical raw materials. On the basis of field visits to the areas reported to be under sizeable medicinal plant cultivation, data in respect of six species (*Isabgol*, *Senna*, *Jojoba*, *Henna*, *Aswagandha* & Milk thistle), being almost exclusively obtained from cultivation, was compiled. These species, cultivated over an area of nearly 1,18,000 hectares, had an estimated annual production of 1,21,400 MT. Consumption estimates in respect of another set of 30 species consumed/ traded in high volumes, and obtained largely from cultivations, have been compiled from literature which add up to 24,000 MT, broadly correlating to a cultivation area of 24,000 hectares.

As regards, the following 36 species sourced wholly or largely from cultivation, it needs to be appreciated that cultivation of these species has already stabilised and got incorporated into the local agricultural systems and thus

does not need any promotional incentives. Instead, the focus in relation to these species would need to be on developing better cultivars/ varieties and making their germ plasm available to the growers in adequate quantities for enhancing their income.

In the trade study the demand for the roots of each of the ten botanicals constituting "Dashamoola" group, was estimated at >1000 MT/yr. *Prishniparni* is one of these ten botanicals and the acceptable plant resource for this plant drug as per the Ayurvedic Pharmacopoeia, is *Urarua picta*. The study, however, revealed that in practice most of the industries were using substitutes due to the non-availability of the genuine material from authentic plant sources. This species was not recorded under any sizable cultivation to meet the demand.

In this context the initiatives taken by NMPB to support cultivation programs for the "Dashamoola" species, including *Urarua picta*, need to be appreciated. With NMPB financial support, the State Forest Department of Gujarat did a commendable job in raising cultivation /plantation of many species of this *Dashamoola* group including *Urarua picta*. Subsequently, the Bio-resources Development Group of M/S Dabur took up a unique initiative to bring *Urarua picta* under cultivation in Eastern U.P. and their efforts being reported under, "*Prishniparni*- A Journey from Forest to Farm", in the current volume .7 need to be applauded.

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For more information:

1. <http://envis.frlht.org/traded-medicinal-plants-database.php>
2. <http://envis.frlht.org/medicinal-plants-conservation-Concern-species.php>

*Ved D.K & G. S Goraya (2008), Demand and Supply of Medicinal Plants in India, Bishen Singh, Mahendra Pal Singh, Dehra Dun & FRLHT, Bangalore, India (copy right 2008, National Medicinal Plants Board, New Delhi) ISBN: 9788121106283

36 species sourced under cultivation:

Abelmoschus moschatus (Muskdana), *Acorus calamus* (Bach), *Adhatoda zeylanica* (Adusa), *Aloe barbadensis* (Kumari), *Alpinia calcarata* (Chittartha), *Azadirachta indica* (Neem), *Caesalpinia sappan* (Pathimugam), *Cassia angustifolia* (Sonamukhi), *Catharanthus roseus* (Sadabahar), *Cichorium intybus* (Kasani), *Croton tiglium* (Jamalghota), *Curcuma angustifolia* (Tikhur), *Curcuma zerumbet* (Kachur), *Ficus benghalensis* (Vada Chhal), *Ficus religiosa* (Arali chakki), *Gloriosa superba* (Kalihari), *Indigofera tinctoria* (Nili), *Inula racemosa* (Pushkarmool), *Jatropha curcas* (Nepalam seed), *Kaempferia galanga* (Kacholum), *Lawsonia inermis* (Henna), *Lepidium sativum* (Halim), *Ocimum basilicum* (Sweet basil), *Ocimum tenuiflorum* (Tulasi), *Piper longum* (Pippali), *Plantago ovata* (Isabgol), *Plectranthus barbatus* (Gandhira), *Pongamia pinnata* (Karanj), *Prunus armeniaca* (Chuli), *Saussurea costus* (Kuth), *Silybum marianum* (Milk thistle), *Simmondsia chinensis* (Jojoba), *Trachyspermum ammi* (Ajwain), *Vitex negundo* (Neergundi), *Withania somnifera* (Ashvagandha) and *Ziziphus jujuba* (Ber).

PRISHNIPARNI- A Journey from Forest to Farm

BIO RESOURCES DEVELOPMENT GROUP, Dabur

Addressing concerns of sustainability for medicinal plants or for any other biological resources for that matter, often seeks inter-disciplinary approach. During such process, many complexities are naturally expected and also few inherent opportunities and solutions. The Bio Resources Development programme at Dabur is a unique attempt by private sector to address the sustainability concerns through inter-disciplinary approaches. We present an outline of our work on *Prishniparni* (*Uraria picta* Jacq.Desv.ex DC. Family Fabaceae) as case study.

Prishniparni in Ayurveda

Dashamoola is a fixed dose combination of ten root drugs described in Ayurvedic lexicon and *Prishniparni* is one of these 10 root drugs. Interestingly, the species is sparingly mentioned for its use as “stand alone” ingredient/ plant in Ayurvedic literature- thereby restricting its scope to the fixed dose combination. The market trends show that, two botanical entities viz. *Uraria picta* (Jacq). Desv.ex DC and *Psuedarthria viscida* (L.) Wight & Arn. are traded under the name of *Prishniparni*. The former is often reported to found in gangetic plains and in western India. However, the species is classified being Vulnerable from the perspective of its conservation. The species is reportedly vanished from the lower gangetic plains (See Box Text-1).

On the contrary, *Prishniparni* is a low-value medicinal species from a trading perspective and continues to be available at low price. This phenomenon leads to suspicion that; the species might largely consist of adulterants/ related species is given the sparse distribution of the species.

Project Initiation

Way back in 2006, few populations of *Uraria picta* (UP) were seen in the experimental farms at National Botanical Research Institute, Lucknow, wherein; the soil pH was more than 8.5. The Scientist concerned Dr. S.K. Tiwari informed during the discussion that it shows fairly good tolerance to sodium though not reproducible precisely. He also cited the constraints about seed germination. During 2008, National Medicinal Plant Board responded positively to our project proposal to identify sodium tolerant populations of the species and through selection. Around the same time, The Department of Forests, Government of Gujarat launched a major initiative for resource augmentation of *Dashamoola* species funded by NMPB. The project too captured good number of populations and started working on their multiplication.

Developmental work on *Prishniparni*

Our approach was conceptually based on theory of

selectivity- to identify potential germplasm having requisite attributes- viz. Sodium tolerance, phytochemical profile and genetic stability. The elite germplasm was planned to be selected through graded dosing of sodium in the nutrient medium- using the following steps:

- Collection of germplasm of the subject medicinal plant species from different sources
- Exposure of these selections to different levels of sodic stress under both *in-vitro* and *in-situ* experimental conditions. For conducting *in-vitro* studies, firstly, Micropropagation protocol is to be standardized.
- Validation of methods for Genetic and Phytochemical analysis.
- Analysis of exposed selections for Phyto-physical, Phyto-chemical & Phyto-genetic parameters so as to assess the effect of induced sodic stress.
- Multiplication of elite germplasm (with reference to sodium tolerance, optimal phytochemical profile and genetic stability) for subsequent stages of assessment/ utilization.

Collection of Germplasm

Germplasm of *Prishniparni* required for the study was collected from four different sources. The details of these sources are enumerated in the table below:

Code Assigned	Date of Collection	Source Details
UP-2	7 th March-2008	Dr. Sushila Devi Herbal Nursery (Hrishikesh- Uttarakhnad)
UP-3	31 st Aug-2009	Govt. Ayurvedic Pharmacy (Rajpipla-Gujrat)
UP-4	30 th Aug-2009	Gowat Forest Nursery (Umarpura, Dist.-Sarat, Gujrat)
UP-5	30 th Aug-2009	Gowat Forest Nursery (Umbargaon, Dist. Vapi, Gujrat)

Micropropagation: In-vitro multiplication of plants

Tissue culture techniques are applied to generate large number of clonal propagules and biodiversity conservation especially for species like *Prishniparni* with poor natural regeneration and where the roots or the whole plant is used in drug preparation. The experiments conducted provided a simple & reproducible micro-propagation protocol. The method resulted in healthy



In-vitro raised plants of *Prishniparni*

plants with a multiplication ratio of 1:5 and a survivability of above 80% during acclimatization.

Vegetative propagation

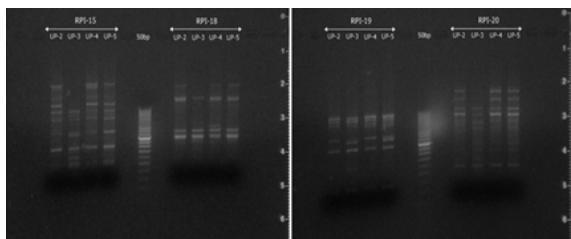
Natural regeneration of *Prishniparni* is hampered due to poor seed viability and low percentage of germination. Studies were conducted to enhance the percentage of germination of the viable seeds. Although plants can be raised by sowing seeds directly in the field, it results in very poor crop stand and yield. To obtain optimum germination in nursery, the seeds were treated with different concentration of Gibberlic Acid (GA3) and sowed on substrate containing Neopeat, FYM (Farm yard manure), soil and sand at different ratio. Above 85% germination was attained using the optimized method (See Box Text-2). The saplings resulted in better yield and stand when transplanted.



Germination of *Prishniparni* seeds

Phytochemical profiling: Method developed for quality evaluation by High Performance Liquid Chromatography

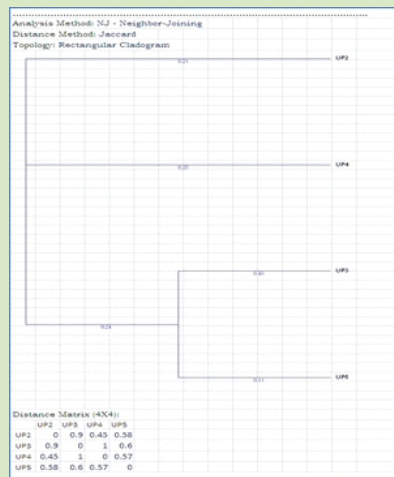
A flavonoid, Rhoifolin (Apigenin-7-o-neo-hesperidoside) has been isolated and is being considered as a marker compound for qualitative and quantitative standardization of *Uraria picta* (See Box Text-3). The isolated flavonoid, Rhoifolin exhibits a partial vasorelaxing effect. It is also effective against hypodynamic and pulmonary hypertensive cases. Estimation of Rhoifolin in different accessions of *Prishniparni* indicated its higher percentage in one accession (UP-3).



Study of Genetical diversity: An insight into the molecular ancestry

Genetical diversity in *Uraria picta* was studied using the fingerprints developed by RAPD (Random Amplified Polymorphic DNA) technique. Analysis of different accession classified them into smaller groups and indicated presence of high genetical diversity among them. Dendrogram constructed for cluster analysis using the distance matrix differentiated one accession (UP-3) from others. This attribute may be linked to the higher Rhoifolin

content of the particular accession. The dendrogram also identifies other accessions which are closely related to this accession.



Dendrogram showing Genetical relationship among different accession of *Prishniparni*

Exposure to Sodic stress

Plants of *Prishniparni* were exposed to sodic stress under *in-vitro* and *in-situ* conditions. The pH of the optimized substrate was altered using 1N NaOH (Sodium hydroxide). Plants were screened for their phenotypic character and samples were collected for genetical and phytochemical profiling from each level of stress. In terms of survival rate and phenological characters, it was observed that, the selected accessions could withstand T-2 (pH 8.5) level of sodium dosing. At higher level of stress, survivability was observed in two accessions (UP-3 and UP-5). However, on account of phenological parameters, UP-3 found to be better.

While genetical fingerprints showed no difference across the treatments in all accessions, estimation of Rhoifolin by HPLC showed its subsequent increase with the increase in the pH in all accessions.

Cultivation profile: Agronomic package developed for qualitative scale-up of quality yield



Prishniparni Crop: Pre-harvesting phase

The accession selected on basis of phytochemical and genetical profile was multiplied by vegetative and Micropropagation techniques to produce sufficient stock for pilot scale cultivation trial. Trials conducted optimized the agronomic package (See Box Text-4) which resulted in successful commercial cultivation yielding elite quality raw material. The cultivation experiments also recorded substantially high yield using one accession (UP-3) when compared to other accessions.

Current status of commercial cultivation:

The accession UP-3 was selected for commercial cultivation on basis of bio-metric parameters and Rhoifolin content and is being cultivated presently in 13 acres land at District- Kushinagar, Uttar Pradesh.

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BOX TEXT-1:

Conservation Biology is a complex subject. As of now, its application in the context of Indian Medicinal Plants is rare. As such it would be Herculean task to trace the reasons for resource depletion in wild. However, the following factors may be assumed to deplete the natural populations of *Prishniparni*

- Being a member of Fabaceae, the UP is prone to high degree biotic stress. We observed that, the species is prone to the following infestations: 1. Root Knot nematode (Development of galls on roots) 2. Gundhi bug (*Leptocoris oratorious*): *Prishniparni* serves as an alternate host for the insect.
- Herbivorous wild animals tend to graze its tender leaves and apical buds- making it difficult for the plant to grow to the reproductive phase/ seeding stage.
- The seed germination rate is low (less than 20%).
- In addition to these factors, extraction for medicinal purposes- depletes further, the limited quantum of regenerating populations.

BOX TEXT-2:

Procedure for Seed Treatment

- Soak the seeds in 1000 ppm GA3 and incubate at 40°C for 48 hours.
- Substrate for sowing: Neopeat: Soil: FYM: Sand (2:1:1:1).
- Sowing of Seeds: Place the seeds in the cups (trays, etc.) and cover it to a depth of 0.5-0.7cm using the substrate. Supply with adequate water and cover the trays using black polythene. Remove the polythene 10 DAS.
- Transplantation: 30-35 DAS

BOX TEXT-3:

Agronomic Package

- **Land Preparation:** Prepare land to fine tilth followed by manuring.
- **Plantation:** Onset of monsoon.
- **Fertilizers:** N:P2O5:K2O (80:60:40).
- **Irrigation:** 5-6/annum, fortnightly during summers and one in October.
- **Inter-Culture:** Three weeding.
- **Harvesting and Yield:** November yield- 1st year-5q/acre; Ratoon crop- 25q/acre.
- **Post harvest handling:** Sun Drying followed by packaging and storage.

BOX TEXT-4:

In Ayurveda, the *Dashamoola* species are expected to be used as roots. When Rhoifolin is used as marker for the purpose of standardization- the roots of *Prishniparni* is not a valid choice for use in anti-inflammatory compositions. The distribution of the marker is restricted only to the aerial parts. The marker was not detectable in roots at any stage of the plant growth.

As of now, suggested harvesting practice seeks the use of aerial parts only. This method allows improved economic returns to the farmers. The ratoons left behind after the first harvest-lead to the production of second crop cycle during the monsoons. The yield from ratoons production is significantly higher to the first crop cycle from seedlings.

A HERBAL GARDEN OF ARYA VAIDYA SALA, KERALA

Udayan P.S. and T. K. Sabu

The Arya Vaidya Sala Herb Garden has been in existence for about 3 decades and situated on the Kottakkal-Malappuram road, Kerala, a few hundred meters from the AVS Charitable Hospital, and spread over some nine acres. This garden is one of the Ethno-Medicinal Plant Gardens in the country, which serves as valuable *ex-situ* conservation sites for educative purposes and as reference points related to medicinal plants. This was established by Late Dr. V. V. Sivarajan Professor, Calicut University and Late Mr. Vargheese, Herb Garden. This was thoroughly documented by Shri N. K. Janardhanan, Herbal Garden staff.

Garden is a valuable repository of 1,025 species of medicinal plants belonging to 120 families collected from different vegetation types across the country over the years. This also has 40 species, which are so far not reported from any of the published floras of Kerala state (See box 1). The herbarium voucher specimens are deposited in the herbarium of Herbal Garden and CMPR, Kottakkal, Malappuram district. These plants are displayed with their botanical, Sanskrit and vernacular names, serve as a centre of education on their identification, medicinal importance, mode of cultivation etc.

Such gardens will develop awareness among the people about the importance of plants in healthcare systems as well as the need for conserving from extinction. This is also a research point where various aspects of cultivation, propagation trials, clinical, phytochemical and pharmacognostic actions of the plants are studied. Make a visit to this garden and experience the richness of our Indian Medicinal Heritage!

Box1: Species recorded new to Kerala

Acacia farnesiana (L.) Willd.; *Alstonia macrophylla* (Willd.) Baillon; *Amomum subulatum* Roxb.; *Andrographis stenophylla* Clarke; *Apium graveolens* L.; *Aquilaria malaccensis* Lam.; *Aristolochia bracteolata* Lam.; *Artocarpus chaplasha* Roxb.; *Baccaurea ramiflora* Lour.; *Bauhinia vahlii* Wight & Arn.; *Boswellia ovalifoliolata* Balakr. et Henry; *Capparis rotundifolia* Rottler; *Carissa paucinervia* A. DC; *Cassia senna* L.; *Chlorophytum borivillianum* Santapau & Fernades; *Cinnamomum cassia* Blume; *Cinnamomum tamala* Nees & Eberm.; *Commiphora wightii* (Arn.) Bhandari [= *Commiphora mukul* (Hook. ex Stocks) Engl.]; *Cycas beddomei* Dyer; *Dioscorea deltaidea* Wall ex Kunth; *Elaeocarpus sphaericus* (Gaertn.) K. Schum.; *Eupatorium triplinerve* Vahl.; *Fagopyrum esculentum* Moench.; *Gymnema cuspidata* (Thunb.) Huber; *Mentha piperita* L.; *Mentha spicata* L.; *Mentha viridis* L.; *Moringa concanensis* Nimmo ex Dalz. & Gibson; *Ocimum kilimandscharicum* Guerke; *Paederia foetida* L. *Phoenix dactylifera* L. *Phyllanthus missioinis* Hook.f.; *Pluchea lanceolata* Oliver & Hiern; *Polianthes tuberosa* L.; *Prosopis cineraria* (L.) Druce; *Roupelia grata* Wall.; *Seshagiria sahyadrica* Ansari et Hemadri; *Stevia rebaudiana* Bert.; *Tinospora crispa* (L.) Hook.f. & Thoms.; *Uraria picta* (Jacq.) Desv. ex DC.

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Distribution and Conservation status of *Croton scabiosus* Bedd. (Euphorbiaceae),

an endemic species of southern Eastern Ghats of Andhra Pradesh.

Salamma S. and B. Ravi Prasad Rao

Croton scabiosus Bedd. belongs to family Euphorbiaceae and subfamily Crotonoideae. This is a small deciduous tree growing up to 7 m and can be recognized by its silvery foliage. This species is commonly called as *Yerrichilla*, *Verri chilla* in various localities of its presence in Southern part of Andhra Pradesh. Beddome (1872) discovered the species in Nulley Mullay Hills, Kurnool district (now, called as Nallamalais). Gamble (1921) reported the species occurrence in Sanipaya in Kadapa district. Surya Prakash Babu (1997), Pullaiah and Sandhya Rani (1999) and many others recorded the species occurrence from Guvvalacheruvu, Kadapa district. Suryanarayana Rao and Sreenivasa Rao (2002) recorded the species from Penchalakona and Rapur of Nellore district. Regarding its conservation status, the species is categorized rare or threatened by Ahmedullah and Nayar (1986) and 'indeterminate' by Rao et al. (2003) based on secondary data.

All subsequent floristic studies took up in Nallamalais after Beddome's report in 1872 including that of Gamble, Fischer, and Ellis are in vain in locating the species in the area. Raju and Pullaiah (1995), who worked on the Kurnool, reported its doubtful occurrence in the district. All our team studies for the past 20 years could not locate the species in Nallamalais. Hence, we presumed that the actuality locality of collection of the species might be Nallamalais covering parts of Kadapa district. It may be probably representing a broad range of Nallamalais covering Lankamalleswaram forests, presently in Kadapa district, where the species is located in our study. This view can be supported, since, there is contiguous forest patch traversing North Kadapa and Southern part of Kurnool districts. Further the species distribution has become enigmatic as its occurrence was reported from 'Travancore' along with Nallamalais by Hooker in 1890; he cited Beddome (1872) for species distribution, although Beddome has not referred the distribution of the species in Travancore in his original work. Personal communication with experts in Kerala have confirmed 'wrong citing' of the species distribution from Travancore area. Further, this deciduous tree is found only in drier localities and its occurrence in evergreen forests is 'uncertain'. It is interesting, to note that our intensive literature survey and consultation of national and regional herbaria has ended up without a single specimen record either from Western Ghats or even Kurnool district!

The present studies, confirms endemism to open dry deciduous forests of Southern Eastern Ghats of Andhra Pradesh in Kadapa district; Nellore and Anantapur districts bordering Kadapa district. Different vegetative parts of the Species have a diversity of secondary metabolites-alkaloids, coumarins, glycosides, flavonoids, steroids, and gallic tannins; seeds and stem bark paste for snake/ scorpion bite

and also for other insect bites (pers. comm. with forest dwellers during our field work). There is no commercial value for the species recorded.

With an objective to determine its population size and conservation status, an intensive explorations in the forests of Southern Andhra Pradesh during 2010 to till date. We found the species population in few dry deciduous forest patches distributed in Anantapur, Kadapa and Nellore districts at the altitudes of 300 -700 m above the mean sea level. For the purpose of the study, the Southern Andhra Pradesh region was stratified into 40 km² (6.25x6.25 km) grids for sampling and found the presence of the species in 16 grids. In each grid, 1 km x 5 m transects were laid down for enumerating all the mature individuals. Additionally, sapling and the seedling data all over the sampling sites were recorded.



Population of *Croton scabiosus*

The present studies clearly established the species endemism with three districts in Southern Andhra Pradesh region, viz., Anantapur, Kadapa and Nellore. They are found growing in open dry deciduous forests with patchy distribution. 9000 mature individuals were enumerated from the study. It is to be highlighted that in the sampled area, about 500 seedlings/saplings and 340 coppiced individuals were seen growing. The Extent of Occurrence

(EOO) as about 9000 Km² and Area of Occupancy (AOO) as 7 Km² were observed. Based on IUCN Red list Criteria Version 2013.2, Criterion 'B', this species is evaluated as 'Vulnerable'. Populations are facing major threat due to forest fires and pathogens infecting the seeds. Only 2-5% seed germination observed prompted us to initiate in-vitro propagation studies. An *in-vitro* propagation trails to produce multiple plantlets for resource augmentation in natural habitat was also tried. Fresh plant material from three representative localities of the species distribution range was subjected to *in-vitro* trails. Different concentrations of plant growth regulators to various kinds of explants on MS/B5/WPM media were used generating plantlets with stem cuttings. After transferring to pots, only 3 out of the 40 plantlets survived, but these showed tendency for fungal attack after 15 days.

Apart from advocating 'sophisticated propagation techniques', for obtaining a better survival rate of the plantlets, inclusion of this species in IUCN Red List and take up immediate measures for '*in-situ* conservation' of this endemic species is most important.

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For more information on Indian Medicinal Plants, its botanical names, vernacular names, Digital Atlas, digital Herbarium, Plant images and more....click envis.frlht.org/frlhtenvis.nic.in

Chai or Tea Substitutes of Wild Plants in Jammu Woodlands

O.P Sharma Vidyarthi

Wilderness is a treasure trove of many edible plants, lesser known to general masses but intimately associated with traditional Dogra cuisines and beverages. Dogra communities since ages, have put to test different plants and by hit and trial usage evolved traditions to use different edible plants in varied forms such as, Holi colours (*Tesu, Burans*), refreshing drinks (*Nazposh, Burans, Banafsha*), tree vegetables (*Sohanjana, Kachnar, Semal, Pauna, Phagwada*), root vegetables (*Vidarikand, Tarad, Seyaadu, Shingoley*), flower vegetables (*Guaalmanda, Kachnar, Kaththi*), wild fruits (*Karoundha, Ber, Kakoha, Kanaihnua, Naabhrey, Hinsalu, Teldu, Kaimblu, Kaffal, Panjakha*), leafy vegetables (*Shura, Indu, Loldu-phofdu, Kunaahn, Fafru, Sridi, Koku*) spices and condiments (*Choru, Kiyar, Farnu, Tejpat, Kala zeera*) and in addition to lesser known tea beverages (*Chai in Dogra*) from several wild plants in Jammu region.

Most familiar tea of hill people is *Malchhain cha* (*Machran chai in Kashmiri, Bistort Tea*) obtained from underground rhizomes of a perennial plant with white or red blooms called Adder's tongue (*Bistorta amplexicaulis* (D.Don) Greene). This is seen growing in places like Kalounta, Trikuta Bani, Bhaderwah, Sannasar. Rhizomes are collected fresh in July- August, washed and boiled in water to get pink coloured tea with added sugar and milk.

Himalayan Yew (*Taxus wallichiana* Zucc.) locally called *Brammi rukh, Thnuer* in Hindi and *Postul* in Kashmiri is a unique anti-cancerous naked seeded tree, grows in temperate places like Sudhmahandev, Patnitop, Sannasar, Sarthal, Dudu Basantgarh. It bears scarlet fleshy seeds with arils, relished by birds and animals, including humans. Bark is a source of traditional tea taken by nomadic and resident hill communities. Pink coloured decoction is recommended to cure cough and cold. Yew bark has been found to have anti-cancerous compounds called *Taxol*, which is useful in ovarian and breast cancer treatments. It is also useful in the induction of menstruation, treatment of arthritis, kidney disease, tuberculosis and scurvy.

Nepal Cinquefoil (*Potentilla nepalensis* Hook.) locally called *Trohad cha* in Dogri, *Bajrdanti* in Hindi, *Gul-e-lala* in *Gojri* is another plant of Jammu region, which bears elegant blooms during monsoon season at hill destinations like Sannasar, Samna banj, Ramrachna, Jodeyiaa mata, Seoj dhar, Bhairoghati, Pancheri. Underground parts are used as tea substitute by locals.

Real *Marua* (*Origanum vulgare* L.) is seen frequently in Machail Padder belt is used as condiments but leaves can be used to flavor tea as well. Leaves of Sacred basil (*Ocimum tenuiflorum* L.) *Tulsi* in Hindi which is seen planted in temples and leaves of wild sage (*Ocimum americanum* L.), locally called *Greehda* are useful as tea substitutes. Seeds of *Greehda* are also employed to prepare refreshing sherbet as with *Nazposh* or *Babbri beol* seeds.

Sunderbani communities use another herb called *Chidu Marua* in Dogri, *Sehsrpatti* in Sanskrit, *Hazarpatti* in Hindi

(*Micromeria biflora* (Buch.-Ham.ex D.Don) Benth.) as a tea substitute which is useful in respiratory ailments.

Kishtwar region has a tradition of using bark of *Oriental Plane/ Chinar* (*Platanus orientalis* L.) as tea. Sometimes, leaves of wild olive (*Olea ferruginea* Wall.ex Aitch.) locally called *Kahu/Kahuaa* are brewed as tea. Bark of Madagascar plum (*Flacourtia indica* (Burm.F.) Merr.), locally called *Kakohaa*, is also a source of popular herbal tea for Dogra communities, residing in places like Ramnagar, Udhampur and Reasi region.

Roots of wild strawberry (*Fragaria nubicola* (Lindl.ex Hook.F.) Lacaita), locally called *Panjakha* is also a source of wild tea. *Lal jadi* or *Ringresh* (*Geranium wallichianum* D.Don ex Sweet) is employed as tea substitute in Chenab valley as well as Kashmir. Leaves of *Tejpat* (*Cinnamomum tamala* (Buch.-Ham.) T.Nees & Eberm), flowers of *Banafsha/ Violets* (*Viola canescens* Wall.), are also added to common Desi chai for flavor and health benefits.

Sea buckthorn popularly called *Lehberrry* (*Hippophae rhamnoides* L.) is seen growing not only in cold desert of Ladakh but also along hill streams of Marusudar River in Inshan Aftee area of Marwah in Kishtwar region and are used as tea substitutes.

Last, but not the least, *Hyssops* (*Hyssopus officinalis* L.) tea is useful in blood sugar control, due to presence of anti-oxidants in the aromatic leaves that inhibits activities of the enzyme alpha glucosidase, which breaks starch into sugar. This plant grows wild in virgin verdant mountains of Machail Sumchaam adjoining to Zanskar in Padder region of Jammu and is popularly known by the native name as *Tengu* or *Zufi*.

There are innumerable equivalents for tea, which may have better and multitude effects than *Camelia sinensis* L. Kuntze (Popular Tea). Documentation of botanical folklore regionally will help conserve traditional knowledge, plant resources and guide future research and development work based on clues obtained that can help in life saving drug development.

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Herbarium Technique Training Programme

The goal of FRLH is to make significant contribution towards creating awareness about the diversity of medicinal plants and their conservation status. Thus act as a vehicle to promote medicinal plant conservation and go a long way to help revive our health care traditions. Several training programs and workshop have been conducted for high school students, teachers, lecturers, students of pre-university, graduation and post graduation, ISM practitioners on need basis. Usually a 15 member team is given training and interested institutions or groups may write to:

Assistant Director

FRLH (Bio-Cultural Herbarium & Repository of Raw Drugs)

Foundation for Revitalisation of Local Health Traditions

No. 74/2, Jarakbande Kaval, Post Attur, Via Yelahanka Bangalore. 560 106, Karnataka, INDIA.

Phone: + 91 80 2856 8005/8000/8001 Fax: + 91 802856 5873

Email: herbarium@frlh.org, k.ravikumar@frlh.org <http://envis@frlh.org>

Medicinal Plants of Conservation Concern identified for Chhattisgarh

Conservation Assessment Management Prioritisation (CAMP) workshop was held during July 2003 at Bhopal to assess the threat status of prioritized Medicinal plants of Chhattisgarh. During this process 47 medicinal plant species were assigned the RL status of Near Threatened (NT) and above.

Of these 47 species, only 1 species has been assigned Critically Endangered (CR) status, 5 species are Endangered (EN), 11 species are Vulnerable (VU) and 30 species are Near Threatened (NT). 30 of these Red Listed medicinal plant species have been recorded in high volume trade, as per the national level trade study.

Critically Endangered:

1. *Rauvolfia serpentina* (L.) Benth. ex Kurz

Endangered

1. *Acorus calamus* L.
2. *Angiopteris evecta* (G. Forst.) Hoffm.
3. *Clerodendrum serratum* (L.) Moon
4. *Eulophia herbacea* Lindl.
5. *Luffa echinata* Roxb.

Vulnerable:

1. *Andrographis paniculata* (Burm.f.) Nees
2. *Boswellia serrata* Roxb. ex Colebr.
3. *Caesalpinia digyna* Rottler
4. *Celastrus paniculatus* Willd.
5. *Chlorophytum tuberosum* (Roxb.) Baker
6. *Citrullus colocynthis* (L.) Schrad.
7. *Cochlospermum religiosum* (L.) Alston
8. *Costus speciosus* (J. Koenig) Sm.
9. *Crateva magna* (Lour.) DC.
10. *Curcuma angustifolia* Roxb.
11. *Curcuma zedoaria* (Christm.) Roscoe
12. *Dioscorea bulbifera* L.
13. *Dioscorea hispida* Dennst.
14. *Gloriosa superba* L.
15. *Gymnema sylvestre* (Retz.) R.Br. ex Sm.
16. *Litsea glutinosa* (Lour.) C.B.Rob.
17. *Oroxylum indicum* (L.) Kurz
18. *Peucedanum nagpurens* Prain
19. *Phyllanthus emblica* L.



Gloriosa superba L.



Operculina turpethum (L.)
Silva Manso



Sterculia urens Roxb.



Strychnos nux-vomica L.

20. *Piper longum* L.
21. *Plumbago zeylanica* L.
22. *Pterocarpus marsupium* Roxb.
23. *Rubia cordifolia* L.
24. *Sterculia urens* Roxb.
25. *Strychnos nux-vomica* L.
26. *Terminalia chebula* Retz.
27. *Thalictrum foliolosum* DC.
28. *Tylophora indica* (Burm. f.) Merr.
29. *Uraria picta* (Jacq.) DC.
30. *Urginea indica* (Roxb.) Kunth

Near Threatened:

1. *Abrus precatorius* L.
2. *Asparagus racemosus* Willd.
3. *Baliospermum montanum* (Willd.) Müll.Arg.
4. *Buchanania lanzan* Spreng.
5. *Ceropegia bulbosa* Roxb.
6. *Embelia tsjeriam-cottam* (Roem. & Schult.) A.DC.
7. *Mucuna pruriens* (L.) DC.
8. *Operculina turpethum* (L.) Silva Manso
9. *Merremia turpethum* (L.) Rendle
10. *Stereospermum chelonoides* (L.f.) DC.
11. *Terminalia arjuna* (Roxb. ex DC.) Wight & Arn.concern-species-india.php



Buchanania lanzan Spreng.



Celastrus paniculatus Willd.



Citrullus colocynthis (L.)
Schrad.



Dioscorea hispida Dennst.

Medicinal Plants of Conservation Concern identified for Orissa

CAMP workshop was held during October 2007 at Bhubaneswar to assess the threat status of prioritised Medicinal plants of Orissa. During this process 40 species were assigned the RL status of Near Threatened (NT) and above. Of these 40 species, only 1 species has a global RL status as this species is endemic to peninsular India. 2 species have been assigned Critically Endangered (CR) status, 12 species are Endangered (EN), 25 species are Vulnerable (VU) and 1 species is Near Threatened (NT).

Saraca asoca (Roxb.) Willd. and *Symplocos racemosa* Roxb. are of highest priority in Orissa, as both of these have been assessed as Critically Endangered while their basket is recorded in high volume trade in the national level study. 16 of these Red Listed medicinal plant species have been recorded in high volume trade, as per the national level trade study.

Critically Endangered:

1. *Saraca asoca* (Roxb.) Willd.
2. *Symplocos racemosa* Roxb.

Endangered:

1. *Blepharispermum subsessile* DC.
2. *Cordia macleodii* Hook.f. & Thomson
3. *Gloriosa superba* L.
4. *Mesua ferrea* L.
5. *Mucuna gigantea* (Willd.) DC.
6. *Oroxylum indicum* (L.) Kurz
7. *Piper longum* L.
8. *Pterocarpus marsupium* Roxb.
9. *Rauvolfia serpentina* (L.) Benth. ex Kurz
10. *Stereospermum colais* (Buch.-Ham. ex Dillwyn) Mabb.
11. *Uraria picta* (Jacq.) DC.
12. *Xylocarpus granatum* J. Koenig



Cycas circinalis L.



Pterocarpus marsupium Roxb.

Vulnerable:

1. *Aphanamixis polystachya* (Wall.) R.Parker
2. *Caesalpinia digyna* Rottler
3. *Celastrus paniculatus* Willd.
4. *Cerbera odollam* Gaertn.
5. *Crateva magna* (Lour.) DC.
6. *Cycas circinalis* L.
7. *Embelia ribes* Burm.f.
8. *Embelia tsjeriam-cottam* (Roem. & Schult.) A.DC.
9. *Garcinia xanthochymus* Hook.f. ex T.Anderson
10. *Gardenia gummifera* L.f.
11. *Hedychium coronarium* J.Koenig
12. *Litsea glutinosa* (Lour.) C.B.Rob.
13. *Operculina turpethum* (L.) Silva Manso
14. *Merremia turpethum* (L.) Rendle
15. *Paederia foetida* L.
16. *Polyalthia simiarum* (Buch.-Ham.) Hook.f & Thoms.
17. *Pueraria tuberosa* (Willd.) DC.
18. *Salvadora persica* L.
19. *Schrebera swietenoides* Roxb.
20. *Scindapsus officinalis* (Roxb.) Schott
21. *Stemona tuberosa* Lour.
22. *Strychnos potatorum* L.f.
23. *Thalictrum foliolosum* DC.
24. *Zanthoxylum armatum* DC.
25. *Zanthoxylum rhetsa* DC.

Near threatened:

1. *Eulophia herbacea* Lindl.



Rauvolfia serpentina (L.)
Benth. ex Kurz



Saraca asoca (Roxb.) Willd.



Schrebera swietenoides
Roxb.



Symplocos racemosa Roxb.

High Altitude Medicinal Plants of Conservation Concern in Sikkim

Sabita Dahal & T.P.Sharma

Sikkim Himalayas has a unique eco-system with rich diversity of medicinal plants, local health culture. There are records of more than 490 species of plants in Sikkim Himalaya, which are of ethno-medicinal values (Sharma 2010), distributed across the different eco-region of the state viz. tropical, sub-tropical, temperate and alpine region. Alpine areas of Sikkim begins with an altitude from 3000 m, harbours high valued medicinal plants species such as *Aconitum heterophyllum*, *Aconitum ferox*, *Ephedra Gerardiana*, *Rheum nobile*, *Rheum acuminatum*, *Allium wallichii*, *Rhododendron arboreum*, *Rhododendron anthopogon*, *Dactylorhiza hatagirea*, *Picrorhiza kurrooa*, *Bergenia ciliata*, *Podophyllum hexandrum* etc.

Earlier, the medicinal plants growing in the mountainous region were used only by the local people like Lepcha, Bhutia and Nepali. But commercialization of some species has increased their demands and consequently resulting over-exploitation, lack of knowledge of traditional knowledge and traditional conservation practices, demand from outside the state, impact of western culture and allopathic system of medicines, human interference, developmental activities, low natural regeneration processes etc. Here are few examples of potential threats observed in **Table 1**: Medicinal plants and threats

1. **Thangu Herbal Nursery**, at an altitude of 4000 m in north Sikkim which have maintained the species viz *Aconitum ferox*, *Picrorhiza kurrooa*, *Podophyllum hexandrum*, *Dactylorhiza hatagirea*, *Bergenia ciliata*, *Nardostachys jatamansi*, etc. 2. **Tingda Nursery**, at an altitude of approximately 1600 m, North Sikkim, focuses on species of temperate region such as *Oroxylum indicum*, *Taxus wallichiana*, *Rhododendron anthopogon*, *Digitalis purpurea*, *Terminalia chebula*, *Terminalia bellirica*, *Phyllanthus emblica*, *Hippophae salicifolia*, etc. 3. Kyongnosla herbal nursery at an altitude of approx. 3000 m, harbours species such as *Aconitum ferox*, *Aconitum heterophyllum*, *Picrorhiza kurrooa*, *Podophyllum hexandrum*, *Dactylorhiza hatagirea*, *Bergenia ciliata*, *Panax pseudoginseng* var. *Bipinnatifidus*, *Nardostachys jatamansi*, etc. 4. **Ravongla Field Nursery**, South Sikkim has species like *Taxus wallichiana*, *Berberis aristata*, *Polygonatum sp*, etc.

5. **A Territorial Nursery at Ralang Reserve Forest**, South Sikkim, has like *Juglans regia*, *Tetradium fraxinifolium*, *Litsea citrata*, etc. has been conserved.

Further, the State Government agencies in Sikkim such as State Medicinal plants Board (SMPB) under Department of Forest, Environment and Wildlife Management (FEWMD) and Horticulture and Cash Crop Development Department has been providing financial assistance to the local farmers and Joint Forest Management Committee (JFMC) on subsidy basis for the commercial cultivation of medicinal plants. Research and Developmental activities on conservation of medicinal plants are being carrying out in

the state by both State like High Altitude Research Centre under FEWMD, as well as the Central Government agencies like GB Pant Institute of Himalayan Environment and Development, Ayurvedic Research Centre, ICAR, etc. Apart from these, the NGOs like The Mountain Institute (TMI) has been playing vital role in generating awareness amongst the people on the conservation as well as the cultivation aspects. The State Forest Department (FEWMD) is conducting survey for demarcation and designation of areas rich in medicinal plants as Medicinal Plants Conservation Area (MPCA). Rural Management and Development Department, Government of Sikkim has created herbal gardens at village level in every Gram Panchayat Unit, which are owned by the respective Panchayats.

In a step towards conserving the long existed traditional system of medicine, the Government of Sikkim has set up separate clinic, Amji Clinic in the Government hospital (STNM), where two trained Amjis are employed on regular basis. A charitable Amji clinic under his Highness, The Dalai Lama has also been established in Gangtok. A Traditional Healthcare Centre at Sawaney Busty, East Sikkim is famous for bones and muscle problems. The State Medicinal Plant Board (SMPB), Government of Sikkim has been providing financial assistance to the local herbal practitioners registered with SMPB for encouraging traditional healing as well as setting up herbal gardens, an effort towards *ex-situ*



Allium wallichii Kunth



Ophiocordyceps sinensis (Berk.) G.H.Sung



Paris polyphylla Sm.

Bergenia ciliata Sternb.

Conservation of medicinal plants. NMPB-SMPB has supported project to FRLHT, Bangalore for inventorisation of medicinal and aromatic plants of Sikkim. This project has listed 1681 medicinally important species of Sikkim. CDROM will soon be released.

Even though, the State Government has been trying to conserve the important medicinal plants as well as preserve the dying traditional knowledge on human healthcare, more efforts are needed. There is a need to build a guild of conservationist, who can facilitate the process of CAMP exercise and identify the conservation concern species, encourage local entrepreneurs for commercial cultivation of medicinal plants by providing additional financial assistance, plan resource augmentation with State Forest Departments, establish propagation protocols on trial and error basis and implement Medicinal Plant Conservation Areas(MPCAs) programs.

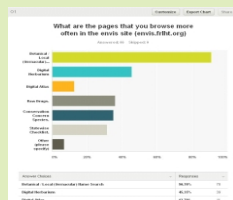
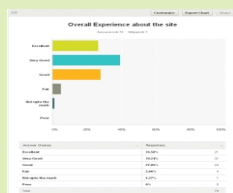
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Table 1: Medicinal plants and threats observed

Species, habit	Local names	Distribution	Uses	Threats observed
<i>Aconitum heterophyllum</i> Wall.ex Royle Herb	Bikh (Nepali), Chendruk (Bhutia)	Himalayas of India and Bhutan between 3000-4800m. Humus rich soil of alpine region	Small piece of tuber is taken against appetite loss, stomach disorder, body ache, fever, throat infection, vomiting and also useful in diabetes	Uprooting of the plant for tuber
<i>Allium wallichii</i> Kunth. Herb	Banlasun (Nepali)	Rare in foothills of Himalayas, Nepal, China and Bhutan, between 2700-4000m. Seen in alpine region where herbs are grown	The root paste is used for headache and high altitude sickness. Leaf juice is used in vomiting and other stomach related problems.	Regeneration seems to be very low.
<i>Bergenia ciliata</i> Sternb. Herb	Pakhanbed (Nepali), Hong-Lem (Bhutia)	Himalayas of Eastern Asia, Afghanistan up to East Tibet. Common in temperate to alpine region, between 1800-3700. It grows moist rocks, ridges and cliffs	The roots are made into decoction and taken orally for fever, diarrhoea and vomiting etc. Leaf juice is used as drops for removal of ear wax.	Reduced population in the wild but no evident threat.
<i>Juniperus recurva</i> Buch-Ham.ex D. Don Tree	Dhupi (Nepali),	Himalayan region of Bhutan, China, India, Nepal, Pakistan. Common on rocky areas throughout subalpine or alpine coniferous forest up to alpine meadows in between 2700-4500m.	Leaves decoction is a cure for urinary bladder stones and frequent urination. Leaf paste is applied on burns and wounds. Stems and leaves are used as incense.	Loss of natural habitat, unscientific clipping of twigs for incense.
<i>Nardostachys jatamansi</i> (D.Don) DC. Herb	Jatamansi (Nepali), Pangtay (Bhutia), Spango (Lepcha)	Himalayas of Bhutan, China, India and Nepal, between 3000-5000m.	Spindle shaped root stock are used in preparing infusion for curing irregular menstruation, hysteria, epilepsy, low blood pressure, jaundice, piles, hair and brain tonic. The aerial parts are also used as incense.	Illegal collection and marketing, lack of natural regeneration, loss of natural habitat.
<i>Ophiocordyceps sinensis</i> (Berk.) G.H.Sung Fungus parasitized in the larvae of caterpillars	Jeevanbuti (Nepali), Yarasamtha (Bhutia).	Endemic to the alpine meadows of the Himalayas above 4200m, primarily seen in Tibetan plateau.	The larvae hibernates underground in winter and the spore of the fungus enters the body of the larvae and feed on it and causes its death. At the end of spring, the spore of the fungus will grow out of the ground like a little grass. It is used as tonic, aphrodisiac and used to treat impotency, body weakness, chronic cough and asthma, cardiac disorder and liver complaints.	Increasing demand in the market led to excessive harvest leading to decline of population in its natural habitat.
<i>Dactylorhiza hatagirea</i> (D.Don) So o Herb	Panchaula (Nepali)	Across the Himalayas of Bhutan, China, India and Nepal. Rare and seen in wet meadows of the alpine region in between 3000-4800m.	Nutritious tubers, decoction taken with milk and honey as tonic and aphrodisiac. It is useful in diarrhoea, dysentery, cuts and wounds.	Overexploitation due to the high market value, poor regeneration
<i>Panax pseudoginseng</i> var <i>bipinnatifidus</i> (Seem.) H.L.Li Herb	Ajambari (Nepali)	Himalayas of India, China, Nepal and Myanmar. Rarely seen in dense forest of the temperate region up to the sub-alpine region in between 2000-3500m.	Removes tiredness, anti-ageing, resisting oxygen deficiency, immunity booster	Reduced habitat, conversion of forest land to human settlements and agriculture fields, collection of timber and non-timber products, rate of regeneration low. Lack of data on wild harvest from Sikkim.
<i>Paris polyphylla</i> Sm. Herb	Satuwa (Nepali)	Across Nepal, Thailand, Myanmar, China and India. It thrives well with the moist and humus rich soil under the canopy of temperate forest in between 2000-2800m.	Rhizomes are useful in expelling intestinal worms, fever, diarrhoea, poisonous bites, cuts and wounds and food poisoning.	Unsustainable collection for local uses and low regeneration.
<i>Picrorhiza kurrooa</i> Royle Herb	Kutki (Nepali), Lie-sikta (Bhutia), La-sing (Lepcha)	Across India, China, Bhutan and Nepal. It grows naturally in the hilly slopes of the Himalayas in between 2700-4500m.	Woody rhizomes are useful in expelling intestinal worms, fever, high blood pressure, jaundice, anaemia, piles, asthma, cough and cold. The dried plant is also used as incense by monks. It has been domesticated since years back.	Natural habitat loss, rhizomes for the traditional uses
<i>Podophyllum hexandrum</i> Royle Herb	Laghupatra (Nepali), Yomhasii (Bhutia), Sungen Kyong (Lepcha)	Across Afghanistan, Bhutan, China, India and Nepal. It grows in subalpine forest up to the alpine meadows, between 2800-4300m usually in humus rich soil.	Rhizomes and roots are used as blood purifier, tonic and are also used in anticancer formulations in modern medicines (Chauhan, 1999). The roots and rhizomes are also used to cure vaginal infections, fever, cough, gas tritis and jaundice. Leaf juice is taken to expel intestinal worms. The ripe fruits are taken as a very good laxative.	Natural habitat, unsustainable harvest for local uses, and low regeneration.
<i>Rheum noble</i> Hook.f. & Thomson Herb	Kenzo (Lepcha)	Alpine region of Bhutan, India and Nepal. It appears in open, rocky slopes above 4000 m.	Rhizomes and leaves are used to cure food poisoning, cuts and wounds, piles, diarrhoea and dysentery. Leaves are also taken as curry by the local people.	Habitat destruction, human interference, unsustainable harvest
<i>Taxus baccata</i> Linn. Tree	Dhengre Salla (Nepali), Chongboo (Lepcha), Naga-Sing (Bhutia).	Across Bhutan, China, India, Afghanistan, Myanmar, and Nepal. Grows on steep slopes, under the canopy of broad leaved trees in the temperate and sub alpine region, between 2000-3000m.	The barks are used to cure night sweats, asthma, bronchitis, epilepsy and hysteria. In the modern medicine, the bark is used as an anti-tumour agent and to cure cancer particularly of breast and uterus.	Sexual dimorphism and female intolerance to draught condition influence the sex ratio and the extinction risk of the species.

Obtained feedback using survey monkey for envis.frlht.org and developed a Mobile App!



App was Released on 28th March 2014 by Shri A.K. Srivatsav, IAS, Chief Secretary and invited dignitaries during the ENVIS meeting at Sikkim https://play.google.com/store/apps/details?id=com.envis_frlht

Microscopic Identification of *Costus* Roots

A.B.D. Selvam

Saussurea DC. (Asteraceae) is a Eurasian genus consisting of ca. 400 species in the world, of which 61 species occur in India. *Saussurea costus* (Falc.) Lipsch. is native to North-western region of the Himalayas and its root has been highly esteemed in the indigenous systems of medicine in India since ancient days for its antiseptic, disinfectant, aphrodisiac and tonic properties. Its root is used in Folk, Ayurveda, Siddha, Unani and Modern medicine. In trade parlance, it is known as 'Costus root'.

An essential oil extracted from the roots of this plant has been much-priced for its aromatic odour. It is exported in very large quantities to China and Japan for use in Buddhist temples. Owing to a large demand of this root in the national and international markets and the high price that it fetches, this species is extensively cultivated in Lahul Valley of Himachal Pradesh and it is commonly referred to as 'The Green Gold of the Lahul Valley of Himachal Pradesh'.

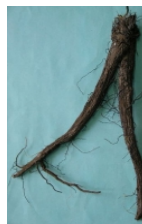
It has been categorised as a Critically Endangered species in the wild. This species is also included in the Appendix I of CITES. Endorsing the CITES decision, the Government of India has enlisted this plant in the Negative List of Exports (<http://envis.frlht.org>).

Substitutes and adulterants: The aromatic roots of *Inula racemosa* Hook.f. (Asteraceae) is used as an adulterant of *Kuth/Costus* root. Because of the high price, *Costus* root oil is often adulterated, particularly with oil of *Vetiver*.

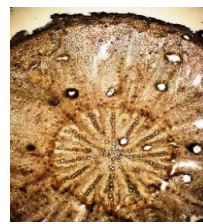
Trade details: It is traded in various levels, viz., local, regional, national and global markets. The current market price of *Costus* roots ranges from Rs. 80 to 100/- per kg. Essential oil extracted from its roots varies from Rs. 10,000 to 12,000/- per kg.

Identification characters: The roots of *Saussurea costus* possess a characteristic nose-penetrating aromatic odour, useful in identifying the species. The cross section of the root of *S. costus* exhibits the following structural features. Root shows a thick, irregularly fissured, superficial periderm, followed by a wide cortex with brick-shaped parenchyma cells in the peripheral region. The central region of the root is occupied by vascular tissues/cylinder.

The vascular cylinder shows several thin xylem segments; each xylem segment has 1 or 2 rows of radial multiples/chains of vessels radiating from the centre to the periphery and ends with a thick, gradually tapering, conical phloem segments. At the end of each xylem segment, there is a thin arc of lignified sclerenchyma cells, which separates the xylem and phloem segments. Wide parenchymatous xylem and phloem rays separate xylem and phloem segments laterally from each other. Large oil cavities of varying shapes and sizes are also seen in the root. This unique anatomical marker characters/structures may be used to identify/authenticate this species.



Costus root



Transverse section of the root

The vascular tissues (vessels) of the root of *S. Costus* look like the radiating spokes of a wheel and reminds of the Emperor *Ashoka's Dharma Chakra* (the Wheel of *Ashoka*) in overall appearance.

Further reading:

- Hajra, P.K., Rao, R.R., Singh, D.K. & Uniyal, B.P. 1995a & b. Flora of India. Vol. 12. And 13. Botanical Survey of India, Calcutta.
- Selvam, A.B.D. 2012. Pharmacognosy of Negative listed Plants. Botanical Survey of India, Kolkata, pp. 204-214.
- Shiva, M.P., Lehra, A. & Shiva, A. 2002. Aromatic and Medicinal Plants, yielding essential oil for pharmaceutical, perfumery, cosmetic industries and trade. International Book Distributors Book Sellers & Publishers, Dehra Dun, pp. 130-134.

About the Author: Dr. A.B.D. Selvam, Scientist, Pharmacognosy Section, Botanical Survey of India, P.O. Botanic Garden, Howrah - 711 103, India E-mail: abd_selvam@yahoo.co.in

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Contact : padma.venkat@frlht.org

Introducing *Kantakaaree*: a Popular Ayurvedic Drug

Shilpa Naveen

In Ayurveda, roots of *Kantakaaree* are extensively used in lumbago, pain, piles, thirst, urinary infections, bronchitis, asthma and fever. In popular Ayurvedic formulations like *Vyaghriharitaki*, *Vyaghrtaila*, *Kantakarighrta*, *Dashamula arista* and *Kantakaaree ghrta*, this drug is included.

Kantakaaree means the 'one having many thorns' in Sanskrit. There are 29 synonyms across 7 classical Ayurvedic texts for the same word. More than 150 citations are found as bibliography references for '*Kantakaaree*'. There are around 50 compound formulations in which *Kantakaaree* is used as an ingredient. Some of the important preparations are '*Kantakaaree ghrta*' and *Dashamula* preparations which are recommended for vatic and chest disorders.

Brhatee and *Kantakaaree* have been used as *Brhatee-dvaya* or '*Kantakaareedvaya*' due to similar activities shown. There are many species of *Solanum*, such as *Solanum virginianum* L., *Solanum anguivi* Lam., *Solanum aculeatissimum* Jacq., *Solanum torvum* Sw., *Solanum trilobatum* L., *Solanum hirsutum* Dunal, which are used as genuine or equivalents or regional variants. Even, *Bombax ceiba* L. and *Gymnospora spinosa* (Blanco) Merr. & Rolte are correlated to *Kantakaaree* for having spines. However, Ayurveda Scholars consider *Solanum virginianum* L. as genuine *Kantakaaree* and *Solanum indicum* L. as *Brhatee*.

Kantakaaree has two morpho-variants viz *Nila pushpa* (blue flowered variety) and *Shveta pushpa* (white flowered variety). Blue variety is commonly available in natural state, while the white variety is rare.

Properties of *Kantakaaree* based on classical texts are:

कण्टकारी कटुस्तिक्ता तथोष्ण श्वासकासजित् ।
अरुचिज्वरवातामदोषहृद् गदनाशिनी ।

(*Dhanvantari nighantu*)

Kantakaaree is *katu* (pungent), *tikta* (pungent) in taste, *usna* (hot) in potency, alleviates *vata*, cures *svasa* (dyspnoea), *kasa* (cough), *aruci* (loss of taste), *jvara* (fever) and *ama dosha* (toxins). Hence used as *Mutrala* (diuretic), *Vajikarna* (aphrodisiac), *kanthya* (beneficial for the throat), *raktasodhaka* (blood purifier), *dipana* (appetizer), *pacana* (digestive).

Some simple home remedies:

Piles

Prepare a paste of *Kantakaaree* fruits. To this add a glass of butter milk. Keep it overnight. Consume it next morning in empty stomach. Dosage period: 5-6 days. It helps in alleviating piles (*Astanga Hrdaya*, *Cikitsa sthana*, 8/44)



Cough/Bronchial asthma

The whole plant is cooked in a steam container.

Crush it and extract juice. Add a pinch of Pippali (Piper longum L.) powder to the juice and consume 5-10 ml for 3 days. (*Dravyaguna vijnana*, Vol 2, Gyanendra Pandey)

About the author: Dr. Shilpa Naveen, Research Officer, FRLHT, Bangalore. Email: shilpa.naveen@frlht.org

Botanical Sources of *Murva*

Noorunissa Begum

Murva is considered a controversial drug in Ayurvedic medicine since more than one botanical source viz. *Argyrea nervosa* (Burm. f.) Bojer (Convolvulaceae), *Bauhinia vahlii* Wight & Arn, *Capparis oblongifolia* Forssk.; *Clematis heynei* M.A. Rau & al. (Ranunculaceae), *Dregea volubilis* (L.f.) Benth. ex Hook.f., *Helicteres isora* L., *Marsdenia tenacissima* (Roxb.) Moon (Asclepiadaceae), *Marsdenia roylei* Wight (Asclepiadaceae), *Chonemorpha fragrans* (Moon) Alston (Apocynaceae) and *Sansevieria roxburghiana* Schult. & Schult.f. (Agavaceae) are used in different regions of the country by physicians practicing ayurvedic medicine. The accepted botanical source of *Murva* is *Marsdenia tenacissima* (Roxb.) Moon (Asclepiadaceae).



'*Dhanurgunopayogya*' meaning 'the plant whose bark is being used for the bow - strings'. These synonyms have also contributed to the existing confusion of botanical entities.

The plant which has toughest fibers is the *Murva*. There are many such fiber yielding plants found in the plant kingdom and hence the confusion.

The other synonyms are *amaree* (perennial herb), *atirasa* (it transudes nectar), *dahane* (hot in potency), *gokarnee* (leaves resemble's cow's ears), *prthaktvachaa* (loose skin/bark), *rakthalaa* (reddish in color), *sravaa* (exudes juice) etc.

Its *rasa* is *madhura*, *tikta*; *guna* is *guru*, *sara*; *virya* is *usna*, *vipaka* is *madhura* and *karma* is *kaphahara*, *pittahara*, *Vatahara* and *visaghna*. *Murva* is used in diseases like anaemia (*pandu*); fever (*jwara*); diabetes (*prameha*); stomach disorders (*udara roga*); typhoid (*visama jwara*); urinary infection (*asmari*) and cough (*ksaya*).

Continued in page 14

It is also used as an ingredient in compound formulations in which it is included such as *Madhvasava*, *Mustadi coorna* (Kustha), *Kantaksiri taila*, *Tiktesvakadi taila*, *Mahapancagavya ghrta*, *Candanadya ghrta*, *Sarpiguda*, *Kiratadya choorna*, *Katukadya ghrta*, *Guducyadi ghrta*, *Amrta ghrta* etc.

Out of the above taxa, Bengali Kaviraja's accept *Sansevieria roxburghiana* Schult. & Schult.f. as the source of *murva*, which they locally call *sucimukhi murva*. In Kerala, however, accepted source of the drug is *Chonemorpha fragrans* (Moon) Alston. At times, *Argyreia nervosa* (Burm. f.) Bojer is also used as *Murva* in some parts of Kerala. The Ayurvedic formulary of India accepted *Marsdenia tenacissima* (Roxb.) Moon as the source of *Murva*.

Based on the characters described in the Ayurvedic literature, study of major raw drug markets along with the consultation with expert botanists and ayurvedic scholars, it is revealed that the major market samples of *Murva* comprised of stems of *Chonemorpha fragrans* (Moon) Alston and roots of *Marsdenia tenacissima* (Roxb.) Moon.

Special thanks: Dr. Shilpa for helping in deciphering the information from classical literature.

About the author:

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Building a cadre of Village Botanist / Para taxonomist

The Centre for Conservation of Natural Resources, FRLHT, Bangalore has been designing and conducting structured "Village Botanists Course" for village youths, to hone skills to identify and document information related to medicinal plants including its uses and thus helps in conservation activities. So far, a cadre of 220 'Para taxonomists' (Village Botanists) in 11 states across India has been created. In 2013-14, in collaboration with National Biodiversity Authority (NBA), Gol, Chennai, a series of "Skill Based training Programme for the Village Youth on Identification and Documentation of Biodiversity Components in Selected Five States" was held. The five states are Andhra Pradesh, Gujarat, Himachal Pradesh, Sikkim and West Bengal. 15 participants representing Biodiversity Management Committee (BMC) members from each state. This is a four months distant education course offered with syllabus. Each of the states had exclusive module. Prior to distant learning, 15 days training was organised at FRLHT, Bangalore. Subsequently, 45 days take home assignments and projects were given. Along with this a 5-day field visit with-in the respective states was conducted. Finally the knowledge and skill of the participants were evaluated through certain criteria, such as quality of the assignments/project work, initiative taken, written and practical examination, etc. The participants directly or indirectly support People's Biodiversity Registers (PBRs) programs as per Indian Biodiversity Act, 2002.

Email to: Ms. Deepa Srivatsav, Research Officer, FRLHT, Bangalore Email id: deepa.srivatsava@frlht.org

Neighbourhood Medicinal Plants of Bangalore CDROM for High School Students



Now, Bangalore city students can use the new CDROM, to explore your fascinating plant world. Experience the richness of plant diversity in your traditions, life style and environ. Share with us your interesting and enriching learnings in a creative way (such as poems, essays, paintings etc. Best expressions will be published in our website : www.envis.frlht.org. Email: envis@frlht.org or send your entries by post.

Whats in news?

FRLHT Visitors for the year 2013-14 who were oriented towards ENVIS Centre activities

- 20th June 2013, 1st year B. Sc (Botany) students from Maharani's Science College of Women, Bangalore.
 - 17th June 2013, 1st year B. Sc (Biotechnology) students from M S Ramaiah College of Arts, Science & Commerce, Bangalore.
 - 18th June 2013, 1st year B. Sc (Genetics) students from M S Ramaiah College of Arts, Science & Commerce, Bangalore.
 - 25th June 2013, Women's Voluntary organisation "Guild of Service" (15 members).
 - 02nd Aug 2013, Presidency School, pre nursery children, (100 children).
 - 07th Aug 2013, M. Sc life science students (15 members), from Mount Carmel college.
 - 22nd Aug 2013, Range forest officers (45 Members), from Madhya Pradesh.
 - 03rd Aug 2013, 50 students from Vogue institute of fashion technology, Bangalore.
 - 26th Sep 2013, 30 students from FRI University, Dehradun.
 - 01st Oct 2013, 38 students from Bharathiar University, Coimbatore.
 - 09th Oct 2013, MA students from Azeem Premji University.
 - 27th Nov 2013, B Sc Forestry from College of forestry, ponnampet.
 - 27th Nov 2013, Visitors from Denmark.
 - 12th Dec 2013, M Sc students from St Joseph College, B'lore.
 - 18th Dec 2013, Scientists from IWST, Bangalore
 - 23rd Dec 2013, 10th Standard School children from A V Education Society.
 - 02nd Jan 2014, 45 Trainee RFO's from Govt. of Andra Pradesh.
 - 07th Jan 2014, 45 BAMS 2nd year students from Sri Jayendra Saraswathi Ayurveda College, Tamil Nadu.
 - 17th Jan 2014, 50 Students from RGGPG Ayu. College Parola district Kangara (Himachal Pradesh).
 - 30th & 31st Jan 2014, school children from Mystique Montessori House of Children, Bangalore (60 children on each day).
 - 17th Feb 2014, 42 students from Sri Jayendra Saraswathi Ayurveda College, Chennai.
 - 04th March 2014, 41 2nd year BAMS students from Mahatma Gandhi Ayurved College, Hospital & Research Centre Wardha, Maharashtra.
- Reported by:** Chandini S.G., Front Office Executive, FRLHT Bangalore

Orientation Training on Medicinal Plants Conservation & Sustainable Use for IFS Probationers, 01-02 January 2014, FRLHT, Bangalore



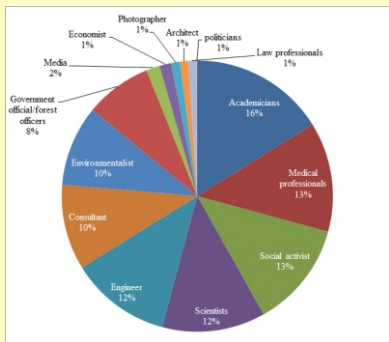
The 2-day course was designed as a capsule course keeping in view the broad learning needs of these audience, and covered the key focal subjects, such as: Medicinal plant diversity of India, Healthcare Significance & usage patterns of Medicinal plants, Collection & Trade, current status & threats to medicinal plants, Different conservation initiatives and strategies. Participatory sessions with Hands on activities, Discussion, Multimedia presentations, Experience sharing, Field visits and Assignment tasks were employed. An exclusive reading material compendium was prepared for the use of the participants.

The course was organized for 2 batches of IFS probationers (40 each) during 1-2nd January 2014 and 8-9th January 2014, at FRLHT-IAIM Campus, Bangalore. The Course was administered to the probationers who were on a field tour, during this period. The two courses offered a rare opportunity for the probationers to get an authentic exposure to different priority subjects related to medicinal plants conservation and offered many insights about the different conservation models available to them as the custodians of the natural resources.

For Conservation Education Training Programs
Contact: B.S. Somashekhar, Course Director, FRLHT, Bangalore
bs.somashekhar@frlht.org

Website Users Profile (2013-14)

<http://envis.frlht.org/amruthvana/index.php>



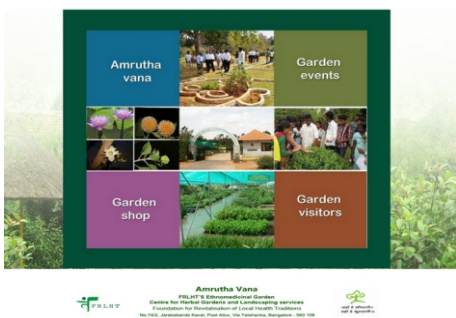
Just double click: envis.frlht.org/ / frlhtenvis.nic.in

Explore a well referenced, unique one-stop-information house on medicinal plants of India. This exclusively website gives information on conservation concern species, traded species, latest reports/publications/ directories. User friendly search, enables us to access range of information related to botanical and local names correlations, view digital atlas and digital herbarium! Down load free *Medplants* e-version newsletter. Browse for more.....



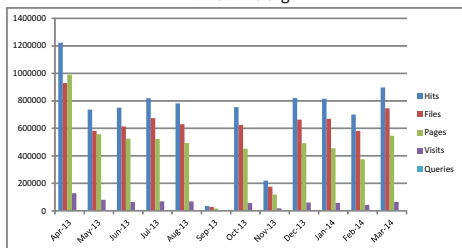
New web page:

<http://>



Usage Statistics for envis.frlht.org

8331670 lakhs hits & 699404 visitors annum
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 Envis.frlht.org



Website traffic: envis.frlht.org and queries address during 2013-14

Month	Hits	Files	Pages	Visits	Queries
Apr-13	1222308	928850	989926	128253	60
May-13	736090	581178	557653	80319	40
Jun-13	750638	613583	524831	64019	80
Jul-13	819376	674482	523305	69211	55
Aug-13	781847	629512	494016	68356	35
Sep-13	35982	28945	17065	3221	60
Oct-13	753538	625372	451933	56663	50
Nov-13	219934	175426	118202	18142	70
Dec-13	820958	663473	492406	59866	45
Jan-14	815226	669318	455296	58385	55
Feb-14	700212	581120	374683	43590	60
Mar-14	897423	745485	546065	64911	50

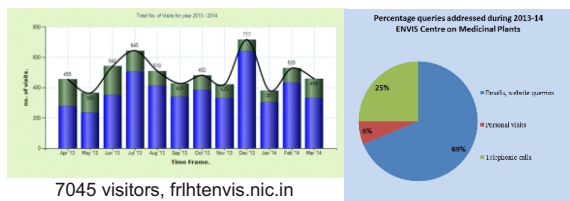
1. Only 3 days records and 2. Only 10 days records available due shift if server.
3. Queries: emails, online, personal visits, telephone calls

ENVIS Centre on Medicinal Plants: Since 2004

FRLHT, Bangalore. Financially supported by MoEF, Go.I. This centre aims to share information on Indian Medicinal Plants, Conservation Concern Species, trade related aspects to people in a popular, semi-technical fashion through websites and varied activities. The contents on the website is mainly derived from Centre of Excellence on Medicinal Plants program and other related projects across FRLHT and its partnering institutions. We invite academicians, policy makers, researchers, resource managers and people interested in medicinal plants conservation to contribute in development of this centre and propagate the message: Revitalising Indian Medical Heritage!

Status of envis.frlht.org or frlhtenvis.nic.in or https://play.google.com/store/apps/details?id=com.envis_frlht	
	Uploaded in 2013-14 after curation
Botanical names	7,637 <i>Maintained and uploaded with additional information</i>
Vernacular names in 12 languages	101745
Geographical distribution maps	1873 150
Herbarium specimen images	1257 150
Colorful plant images	1884 200
Raw drug images	250 50
Conservation concern medicinal plants profile	72 12
Registered users	1134
Querries	3886 660
State level checklist	8 1

Centre of Excellence on Medicinal Plants
 FRLHT-MoEF, GoI; Annual Report 2012-13
 Available as free download @ envis.frlht.org/coeannualreports/annual_report2012-13.pdf and frlhtenvis.nic.in/Publication.aspx?Lid=5808cat-Reports&Year=2012-2013



7045 visitors, frlhtenvis.nic.in

New website under testing:
<http://frlhtenvis.nic.in>



- 2013: FRLHT is also a Private University titled "Institute of Trans-Disciplinary Health Sciences and Technology", as per the special issue of Karnataka Gazettee notification number: HFW 90 PTD 2013, Government of Karnataka; dated 26/06/2013.
- 2012: The 7th Nutra India summit conferred its Nutra Excellence Award 2012 to the Founder Director of FRLHT.
- 2011: The Rajagopal Rama Varier Memorial AVP Excellence award to the Founder, Shri Darshan Shankar 2011: Padma Shri awarded to the Founder, Shri. Darshan Shankar
- 2011: Designated as Bio-Resource Information Centre on Indian Medicinal Plants Database, D.B.T., Go.I
- 2010: Recognized as National R&D facility (Rasayana) by : Department of Science and Technology, GOI
- 2010: Indian Innovation Award, Indian Express (EMPI Group of Institutions)
- 2009: Recognized as a Center of Excellence in Indian Systems of Medicine by Dept. of AYUSH, Ministry of Health and Family Welfare
- 2009: Award for Proficiency in Clinical Application of Ayurveda Shastra from Vaidyaraj Datar Panchaboutik Chikitsa and Samshodhan Kendra, Sangli, Maharashtra
- 2008: Global Propagation of Ayurveda Award from the AVR Foundation, Coimbatore
- 2007: "The Green Institution Award", Better Interiors, Mumbai
- 2007: "Citizen Extra Ordinaire", Rotary Club, Bangalore
- 2003: Recognized as an organization engaged in Scientific and Industrial Research by the Dept. of Scientific and Industrial Research
- 2003: International Award for Leadership in Complementary & Alternative Medicine, Columbia University, New York
- 2002: Designated as Environmental Systems Centre on Medicinal Plants, Mo.E.F., Go.I.
- 2002: Recognized as National Centre of Excellence, Ministry of Environment and Forests, GOI Ministry of Health and Family Welfare, GOI
- 2002: Equator Initiative Prize of United Nations for Linking Conservation to Livelihood Needs of Rural Communities
- 1998: Norman Borlaug Award

International Day for Biological Diversity 2014 Island Biodiversity

<https://www.cbd.int/idb/2014/>



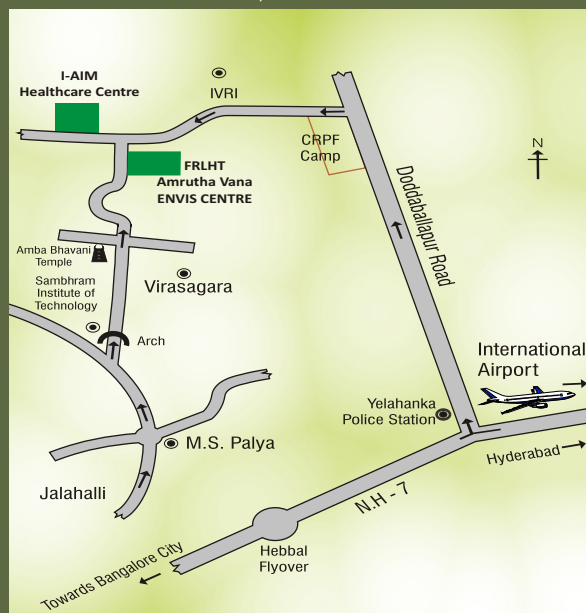
Islands and their surrounding near-shore marine areas constitute unique ecosystems often comprising many plant and animal species that are endemic—found nowhere else on Earth. The legacy of a unique evolutionary history these ecosystems are irreplaceable treasures. They are also key to the livelihood, economy, well-being and cultural identity of 600 million islanders—one-tenth of the world's population. Read more about the importance of islands.

The theme Island Biodiversity was chosen to coincide with the designation by the United Nations General Assembly of 2014 as the International Year of Small Island Developing States. In addition, the theme was chosen to correspond with the timing of COP decision XI/15 paragraph 1(a) "to strengthen the implementation of the Programme of Work on Island Biodiversity". Click to get more info: <https://www.cbd.int/doc/notifications/2013/nf-2013-094-idb-en.pdf>

For books and publications regarding medicinal plants and Indian Systems of Medicine, write to medplant@frlht.org
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We invite readers to send their responses/views/features of interest etc. through e-mail: envis@frlht.org (Please note: Articles for subsequent issues should not exceed more than 1500 words. It can be accompanied with images in .jpg format)

For more information contact:

The Co-ordinator,

ENVIS Centre on Medicinal Plants

Foundation for Revitalisation of Local Health Traditions

"Institute of Trans-Disciplinary Health Sciences and Technology",

74/2, Jarakabande Kaval Post Attur, Via Yelahanka, Bangalore-560 106, Karnataka, INDIA Ph: +91-80 - 28565 847, 28568000

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