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## ENVIS Newsletter on Medicinal Plants



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## Editorial

### Dear Friends,

### *Season's Greetings to you all !*

We strongly believe conservation of medicinal plants and promotion of traditional knowledge can happen through joint efforts across the country. This effort will be amplified if each one of us feel responsible and share our experience to wider audience.

This issue brings to you the highlights of the latest study on trade of botanical drugs in India, seed biology and germinations studies of selected medicinal plants of Western Ghats, conservation concern species of Sikkim and Nagaland, microbiome studies in saffron flowering and more. Hope these will enrich your understanding and guide you through to develop suitable conservation action research programs.

In the move to conserve our rich medicinal plants diversity, we invite each one of you to share your experience by writing to us.

### *With Best Season's Greeting*

**Suma T. S.**  
Editor, MEDPLANT

## ENVIS Centre on Medicinal Plants

Foundation for Revitalisation of Local Health Traditions (FRLHT), Bangalore 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. During 2016-2017 web statistics shows 12451972 hits & 483538 visitors for [envis.frlht.org](http://envis.frlht.org) and 69887 visitors for the new website: [frlhtenvis.nic.in](http://frlhtenvis.nic.in)

Centre is financially supported by Ministry of Environment Forests and Climate Change Government of India. To know more about us, just email us: [envis@frlht.org](mailto:envis@frlht.org), [frlhtenvis@nic.in](mailto:frlhtenvis@nic.in)

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

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

## Discussion

### Highlights of the latest study on trade of botanical drugs in India

D. K. Ved

This study was undertaken by Indian Council of Forestry Research and Education, Dehradun (ICFRE) and Foundation for Revitalisation of Local Health Traditions, Bengaluru (FRLHT) with financial support of National Medicinal Plants Board, Ministry of AYUSH, Government of India, New Delhi (NMPB) and has since been published as "Goraya G. S. and Ved D. K. (2017). Medicinal Plants in India: An Assessment of their Demand and Supply". It surveyed the national scenario extensively and analyzed the data pertaining to 2014-15. Following are some of the highlights of the study:

- About 9000 manufacturing units have been licensed in India to prepare herbal formulations under different streams of Indian Systems of Medicine (ISM) involving thousands of traders and millions of primary producers (wild collection and cultivation).
- More than a million folk healers are dispensing self prepared herbal medicines and about 138 million rural households are using herbs for healthcare.
- New consolidated inventory of traded botanicals consists of 1178 species (1622 botanicals) [Addition of 218 species over the earlier study undertaken during 2005-06 (Ved and Goraya, 2008), on account of more detailed literature study and better coverage of Unani and Homeo units].
- Total trade (demand) for 2014-15 has been estimated at 5,12,000 MT (1,95,000 for domestic herbal units, 1,34,500 MT for exports, 1,67,500 MT for rural households and 15000 MT as wastage). 692 domestic herbal units were sampled along with 2450 rural households (across 13 states). Average wastage was estimated to be 3% (2% to 8% for different herbal raw drug entities). Average annual usage by folk healers has been estimated at 109 kg per healer (of sampled folk healers).
- Exports have more than doubled in quantity over the last decade. Species in top domestic consumption are *Aloe vera* (L.) Brum.f.- 15,700 MT, *Phyllanthus emblica* L.- 14,200 MT, *Plantago ovata* Forssk.- 13,700 MT and *Terminalia chebula* Retz.- 6,000 MT.
- 242 species were found to be in high demand ( $\geq 100$  MT/yr), which included 15 (6%) imported, 54 (22%) from cultivated sources, 59 (25%) from wild non forested areas and 114 (47%) from the forests.
- In addition to these 242 species, 7 species like *Cymbopogon* [*Cymbopogon citratus* (DC.) Stapf], *Mentha* [*Mentha spicata* L.] and *Rosa* [*Rosa indica* L.], are cultivated mainly for use in aromatics and another 57 are mainly used as spices, cereals, pulses, fruits, vegetables and vegetable oils etc.
- Domestic trade of herbal raw drugs occurs through conventional Jari Buti mandis, specialized herbal mandis, co-operatives/ federations/ corporations and direct trade under buy-back policy. Across 40 such trade centers were visited during the survey and > 700 wild collected species were recorded in trade through these mandis (>3 lakh MT/yr). Another 1.5 lakh MT/yr of mostly cultivated botanicals has been recorded in trade through Krishi Upaj Mandis.
- More than 85% of medicinal plants species being used in Ayurveda, Siddha and Unani formulations continue to be sourced from the wild.
- Cultivation of 12 species namely Isabgol [*Plantago ovata* Forssk.], Henna [*Lawsonia inermis* L.], Senna [*Senna alexandrina* Mill.], *Mentha* [*Mentha spicata* L.], *Tulasi* [*Ocimum tenuiflorum* L.], *Ashwagandha* [*Withania somnifera* (L.) Dunal], *Aloe* [*Aloe vera* (L.) Brum.f.], *Pippali* and *Pippali mool* [*Piper longum* L.], *Bach* [*Acorus calamus* L.], *Artemisia* [*Artemisia annua* L.], *Vetiver* [*Chrysopogon zizanioides* (L.) Roberty.] and *Kuth* [*Saussurea costus* (Falc.) Lipsch.] cover approximately 1,80,000 ha and another 30 species are estimated to be cultivated over 5000 ha. These exclude spices and other crops having major utilization elsewhere.
- This increase in number of medicinal species and total area under cultivation has been mainly on account of preparation of extracts, proprietary formulations (limited species) and for exports. Almost all the recent successful initiatives towards cultivation have involved local community based organizations or progressive farmers as coordinators for providing logistics and technical support to act as a link between the producers and buyers.
- Demand for herbal raw drugs is projected to reach 6,50,000 MT/yr by 2020. In view of the increasing global demand for wellness products, the export value of herbal drugs is likely to continue to grow @ 20% per annum.

**Way forward-** As wild collection continues to be the major source for classical ISM preparations, there is a need for conservation, development and sustainable utilization of medicinal trees and Himalayan herbs of high conservation concern. Good post harvest practices for handling and infrastructure for testing is needed. Fair trade practices are needed for "effective trade record management system". Research and development coordination is required across different organizations, along with the need for referral repositories and quinquennial report generation on supply and demand of the botanical drugs.

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1. Goraya G. S. and Ved D. K. (2017). Medicinal Plants in India: An Assessment of their Demand and Supply. National Medicinal Plants Board, Ministry of AYUSH, Government of India, New Delhi and Indian Council of Forestry Research and Education, Dehradun.
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## Seed biology and germination studies of selected medicinal plant species from Western Ghats of India

Ankur Patwardhan, Amruta Joglekar, Monali Mhaskar, Pooja Ghate and R. Vasudeva

Western Ghats, one of the 34 global biodiversity hotspots is known for its floral and faunal diversity and is home to around 4000 plants of medicinal value. In a country like India, nearly 80 % of the population depends on medicinal plants for its primary health care. Several plant species are gaining international importance due to their newly identified pharmacological and curative properties. More than 60% of the total botanicals that are traded in excess of 100 tons per year are harvested from the wild (Ved and Goraya, 2008). Overexploitation of such resources is leading to over harvests, threatening global health care and local livelihoods. Reducing harvest pressure on wild population and promoting viable commercial cultivation with the community and government participation is a huge challenge. As a result, there are conscious efforts to induct species like *Nothapodytes nimmoniana* (J.Graham) Mabb., *Salacia chinensis* L., *Saraca asoca* (Roxb.) De Wilde, into the agro-forestry systems.

However, though lot of literature about nursery development, planting techniques is available for species that are used commercially such as timber, spices, condiments, beverages etc., hardly any attempts have been made to study medicinal plants for development of germination protocols and mass multiplication techniques. Therefore, studying seed biology, germination potential and standardizing nursery techniques becomes pre requisite for the conservation and promotion of threatened medicinal plant species.

On this background, the present study was conducted involving students of Masters of Biodiversity ([www.mesbiodiversity.in](http://www.mesbiodiversity.in)) and farmers from Maval and Velhe region of Maharashtra. It focused on seed biology, pre-sowing treatments and germination studies of eight medicinal plant species namely *Canarium strictum*, *Dysoxylum binectariferum*, *Symplocos racemosa*, *Mammea suriga*, *Nothapodytes nimmoniana*, *Garcinia indica*, *Beilschmiedia dalzellii* and *Mesua ferrea* from the Western Ghats and the details are given in Table 1.

### Photo plate 1: Seeds and germination of selected plant species

*Canarium strictum* Roxb.



*Mammea suriga* Kosterm.



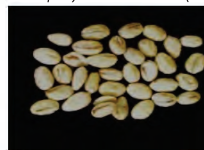
*Symplocos racemosa* L.



*Dysoxylum binectariferum* (Roxb.) Hook.f.ex.Bedd.



*Nothapodytes nimmoniana* (J.Graham) Mabb



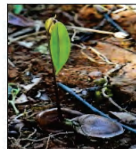
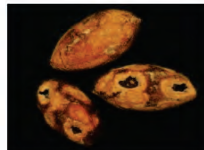
*Garcinia indica* (Thouars) Choisy



*Mesua ferrea* L.



*Beilschmiedia dalzellii* (Meisn.) Kosterm.



Minimum 100 seeds were handpicked from different individuals of each species to encompass variation in seed mass and seed measurements. Pre sowing treatments were designed as per the species requirement. Soil, sand, farm yard manure and coir pith were used as sowing material. Germination trials were carried out on minimum 100 seeds per species and percentage germination was recorded for each. Further studies on designing mass multiplication protocols and cultivation studies are necessary to develop package of practices so that viable commercial plantations can be raised.

**Table 1: Species information and various steps involved in development of nursery protocol of selected medicinal plant species**

Species	<i>Canarium strictum</i> Roxb.	<i>Dysoxylum binectariferum</i> (Roxb.) Hook.f.ex.Bedd.	<i>Mammea suriga</i> Kosterm.	<i>Symplocos racemosa</i> L.	<i>Nothapodytes nimmoniana</i> (J.Graham) Mabb.	<i>Garcinia indica</i> (Thouars) Choisy.	<i>Beilschmiedia dalzellii</i> (Meissn) Kosterm.	<i>Mesua ferrea</i> (L. emend.) Kosterm
Local Name	Raldhup	-	Surangi	Lodhra, Dhama	Narkya, Amruta	Kokam	-	Nagkesar
Family	Burseraceae	Meliaceae	Clusiaceae	Symplocaceae	Icacinaceae	Clusiaceae	Lauraceae	Clusiaceae
Flowering period	Feb to March	Oct to Jan	Feb to Apr	Feb to Apr	Aug to Oct	Nov to Feb	Nov to Mar	Mar to Apr
Fruiting Period	Mar to May	Jan to Apr	May to Aug	Mar to Jun	Nov to Feb	Feb to May	Apr to Jun	Apr to Jun
Number of seeds per fruit / diaspore	1 to 3	1 to 4	1	1	1	Variable	1	1 to 4
Seed mass range (g)	-	2 - 8	-	0.10 - 0.19	0.2 - 0.4	0.1-0.6	2 - 4	1 - 5
Seed grading and seed storage	Seeds are dried and stored	Seed grading is done on the basis of sturdiness	-	Seeds are stored under ordinary room conditions	Shade dried seeds are stored in air tight containers under ordinary room conditions	-	-	-
Pre sowing treatment	Complete or partial removal of seed coat followed by alternate wetting and drying for 5 - 6 times	Dark purple seed coat removed for enhancing germination	Alternate wetting and drying of seeds in cow dung slurry for three days	Seeds are treated with cow dung slurry followed by shade drying	1.Depulped seeds mixed with cow dung slurry for 24 hrs 2.Seeds are treated with 50 ppm GA <sub>3</sub> for 12 hours	No specific pre sowing treatment was given	No specific pre sowing treatment was given	Cold water treatment for 24 hrs was given to seeds followed by seed coat removal
Seed bed preparation	Soil, Sand and FYM (1:1:0.5) of 6"height	Soil, Sand, FYM (1:1:0.5) of 6" height	Sand bed of 6" height	Soil, Sand and FYM (1:1:0.5)	Soil / sand bed of 6" height treated with 0.1% Bavistin	Coir pith used as sowing material	Coir pith used as sowing material	Coir pith used as sowing material
Sowing	Seeds are gently placed on seed bed with little exposure of seed	Seeds are gently placed on seed bed with little exposure of seed	Seeds are gently placed on seed bed with little exposure of seed	Seeds are gently placed on seed bed with little exposure of seed	Sowing at the depth of 2 cms	Sowing at the depth of maximum 1 cm	Seeds are gently placed on seed bed with little exposure of seed	Seeds are gently placed on seed bed with little exposure of seed

**Table 1: Species information and various steps involved in development of nursery protocol of selected medicinal plant species**

Species	<i>Canarium strictum</i> Roxb.	<i>Dysoxylum binectariferum</i> (Roxb.) Hook.f.ex.B edd.	<i>Mammea suriga</i> Kosterm.	<i>Symplocos racemosa</i> L.	<i>Nothapodytes nimmonian</i> (J.Graham) Mabb.	<i>Garcinia indica</i> (Thouars) Choisy.	<i>Beilschmiedia dalzellii</i> (Meissn) Kosterm.	<i>Mesua ferrea</i> (L. emend.) Kosterm
<b>Germination</b>	Starts after 20 days of sowing with 60% epigeal germination	Starts after 30 days of sowing with 77 % germination	60% germination within 45 days of sowing	Poor germination up to 5%	Germination up to 70% and 90% respectively as per the pre sowing treatment	Up to 80% germination	Up to 72% germination	Up to 50% germination
<b>Pre sowing treatment</b>	Complete or partial removal of seed coat followed by alternate wetting and drying for 5 - 6 times	Dark purple seed coat removed for enhancing germination	Alternate wetting and drying of seeds in cow dung slurry for three days	Seeds are treated with cow dung slurry followed by shade drying	1.Depulped seeds mixed with cow dung slurry for 24 hrs 2.Seeds are treated with 50 ppm GA <sub>3</sub> for 12 hours	No specific pre sowing treatment was given	No specific pre sowing treatment was given	Cold water treatment for 24 hrs was given to seeds followed by seed coat removal
<b>Seed bed preparation</b>	Soil, Sand and FYM (1:1:0.5) of 6"height	Soil, Sand, FYM (1:1:0.5) of 6" height	Sand bed of 6" height	Soil, Sand and FYM (1:1:0.5)	Soil / sand bed of 6" height treated with 0.1% Bavistin	Coir pith used as sowing material	Coir pith used as sowing material	Coir pith used as sowing material
<b>Sowing</b>	Seeds are gently placed on seed bed with little exposure of seed	Seeds are gently placed on seed bed with little exposure of seed	Seeds are gently placed on seed bed with little exposure of seed	Seeds are gently placed on seed bed with little exposure of seed	Sowing at the depth of 2 cms	Sowing at the depth of maximum 1 cm	Seeds are gently placed on seed bed with little exposure of seed	Seeds are gently placed on seed bed with little exposure of seed
<b>Germination</b>	Starts after 20 days of sowing with 60% epigeal germination	Starts after 30 days of sowing with 77 % germination	60% germination within 45 days of sowing	Poor germination up to 5%	Germination up to 70% and 90% respectively as per the pre	Up to 80% germination	Up to 72% germination	Up to 50% germination
<b>Vegetative Propagation</b>	No successful propagation	No successful propagation	No successful propagation	Successful sprouting of stem cuttings treated with 500 ppm IBA initiated in 2 to 3 weeks(80-90% humidity and 30°-35°C temp)	Successful sprouting of stem cuttings treated with 2000 ppm IBA in dust form	Not tried	Not tried	Not tried

**Table 1: Species information and various steps involved in development of nursery protocol of selected medicinal plant species**

Species	<i>Canarium strictum</i> Roxb.	<i>Dysoxylum binectariferum</i> (Roxb.) Hook.f.ex.B edd.	<i>Mammea suriga</i> Kosterm.	<i>Symplocos racemosa</i> L.	<i>Nothapodytes nimmoniana</i> (J.Graham) Mabb.	<i>Garcinia indica</i> (Thouars) Choisy.	<i>Beilschmiedia dalzellii</i> (Meissn) Kosterm.	<i>Mesua ferrea</i> (L. emend.) Kosterm
Uses	Against fever, cough etc.	Anti-inflammatory activity	Against skin diseases	In treatment of hemorrhage, acne	Against treating tumours	Anti-acidity, against dysentery, diarrhoea	-	Against fever, vomiting
Status	***	-	***	Vulnerable*	Endangered*	Vulnerable**	***	***

\* CAMP (2001) Conservation Assessment and Management Plan for Medicinal Plants of Maharashtra State, Foundation for Revitalisation of Local Health Traditions, Bengaluru.

\*\* The IUCN Red List of Threatened Species. Version 2016-3. <[www.iucnredlist.org](http://www.iucnredlist.org)>. Downloaded on 06 March 2017

\*\*\* Endemic in distribution

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1. Ved, D. K. and Goraya, G. S. (2008) Demand and Supply of Medicinal Plants in India, Foundation for Revitalization of Local Health Traditions, Bangalore.
2. CAMP (2001) Conservation Assessment and Management Plan for Medicinal Plants of Maharashtra State, Foundation for Revitalization of Local Health Traditions, Bangalore.
3. The IUCN Red List of Threatened Species. Version 2016-3. <[www.iucnredlist.org](http://www.iucnredlist.org)>. Downloaded on 06 March 2017

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#### Application of Bhuvan portal for ENVIS Centre's activities:

Team members in the FRLHT-ENVIS centre underwent training program related to application of Bhuvan portal, GoI. Subsequently, they have facilitated in uploading state level distribution information on medicinal plants species (generated through MoEF & CC's CoE project at FRLHT). More information: <http://bhuvan-staging.nrsc.gov.in/events2/forest/frlht> /<http://frlhtenvis.nic.in/> Database/Digital Atlas\_2272.aspx108 Medicinal Plants Conservation Areas (MPCAs) location details is now available on Bhuvan portal, GoI. Information related to location name, latitude, longitude and state name is uploaded on the website. These are in-situ conservation sites established for conservation of wild, threatened medicinal plants species across the country through various projects supported since 1993 till date. For more information: <http://bhuvan-staging.nrsc.gov.in/events2/forest/frlht>,[http://frlhtenvis.nic.in/Database/MPCAs\\_2273.aspx](http://frlhtenvis.nic.in/Database/MPCAs_2273.aspx)



## Microbiome Regulate Saffron Flowering

Sheetal Ambardar

Saffron (*Crocus sativus* L.) is one of the world's highly priced medicinal and aromatic plants. It has been used in cuisines of many European and Asian countries. Saffron is world's most expensive spice and is popularly referred as "Golden Condiment" and is selling for over \$2000/Kg (Sharaf-Eldin et al., 2008). The major saffron cultivating countries for trade are Iran, Spain, India, Greece, China and Morocco. Iran is the largest producer of saffron while India (Kashmir) ranks second in the production. It is reported that, approximately 75,000 *Crocus* flowers or 225,000 stigmas are required to make one pound of the spice (Ferna'ndez et al., 2011) which makes it world's expensive spice.

Saffron is a sterile plant ( $2n=24$ ) and does not bear viable seeds, thus propagates by underground vegetative organs called corms (Yasmin and Nehvi, 2013). Saffron has an interesting life cycle of two years which is characterized by three distinct stages, dormant (July-Aug), flowering (Oct- Nov) and vegetative (Jan-May). Corms are sown during dormant stage that flowers during mid Oct-Nov which is further followed by vegetative stage, that is characterized by initiation of grass like leaves and production of daughter corms from mother corm; thereby leading to next year dormancy (Yasmin and Nehvi 2013).

*Crocus sativus* is an autumn blooming plant which bears 2-4 lilac colored flowers each with three crimson stigma. The stigma of *Crocus sativus* flowers are dried, processed and commercialized as saffron spice. *C. sativus* possesses a number of medicinally important activities such as antihypertensive, anticonvulsant, antitussive, antigenotoxic and cytotoxic effects, anxiolytic aphrodisiac, antioxidant, antidepressant, antinociceptive, anti-inflammatory, and relaxant activity. It also improves memory



and learning skills, and increases blood flow in retina and choroid. Crocin, picrocrocin, crocetin and safranal are the four component of saffron that have cytotoxic, anticarcinogenic and antitumour properties (Khorasany and Hosseinzadeh 2016).

Plant associated microbial community are reported to influence plants by promoting their growth, increasing stress tolerance and mediating local patterns of nutrient cycling (Berendsen et al., 2012). Plant- microbe interactions are reported to occur in various plants rhizosphere, which is biologically active zone of the soil close to the root and contains soil-borne microbes including bacteria and fungi. Microorganisms present in soil are one of the major factors influencing saffron production, but there were no reports on the microbes associated with Saffron plant, despite being world's costlier spice.

Microbes associated with rhizosphere and cormosphere of Saffron were studied using cultivation dependent (wherein bacteria were cultivated on synthetic media) and cultivation independent approach [wherein nucleic acid (DNA) are directly extracted from soil and analyzed for microbial community] Ambardar (2015).

Using cultivation dependent approach, six bacteria namely *Acinetobacteria calcoaceticus* WRF1, *Pseudomonas tremae* WRF2, *Pseudomonas kilonensis* WRF3, *Chryseobacterium elymi* WRF4, *Bacillus aryabhattai* WRF5 and *Pseudomonas koreensis* WRF6 were isolated from rhizosphere and was exhibiting the plant growth promotion (PGP) properties like production of indole acetic acid, siderophore and solubilization of phosphates *in-vitro*. Effect of these microbes on the saffron plant was analysed *in-vivo* wherein these microbes were inoculating with the corms in pot assay. It was observed that these microbes influences the growth of saffron by increasing root/ shoot number/length, production of

daughter cormlets along with reduction in disease incidence *in-vivo* also (Ambardar and Vakhlu 2013).

Microbes associated with rhizosphere and cormosphere were also studied during the life cycle of saffron using cultivation independent approach. As *C. sativus* is sterile plant and propagates vegetatively by corms, the microbes associated with corms (Cormosphere) were also studied. The microbes associated with rhizosphere (*Pseudomonas* species (bacteria), *Rhizopus* species (fungus) were found to be different from cormosphere [*Pantoea* species (bacteria), *uncultured basidiomycota* (fungus)] despite the fact that the roots emerges from the corm (Ambardar et al., 2014; 2016).

Although there are many plants like Banana, Colchicum, Gladiolus that reproduce vegetatively by underground corms; Saffron is the first plant where, the microbes associated with cormosphere has been explored (Ambardar et al., 2014). Microbes associated with underground parts of *C. sativus* during different growth cycle studied and found specific to developmental stages (Ambardar 2015; Ambardar et al., 2016).

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## Training Program in Herbarium Technique and Identification of Plants

Centre for Repository of Medicinal Resources announces two day training program on herbarium technique and identification of plants. So far, we have conducted more than 100 training program for the Ayurveda, Unani Pharmacy, Researchers, Foresters and Botany students. More than 3000 students have been trained under the aegis of subject experts. The students will visit National Herbarium and Raw Drug repository on Natural Resources, Ethno-medicinal Garden and other facilities of Foundation for Revitalisation of Local Health Traditions-Trans-Disciplinary University (TDU).

The training session will concentrate on providing and improving the concept of plant identification along with field exposure to varied life forms of plants. The students will undergo hands on experience on herbarium techniques for preparation of specimen.

**Assessment:** Pre and post training evaluation processes and peer discussion are part of the program. For outstation students TDU has residence facility.

Interested individuals/institutions, can write to:

[k.ravikumar@tdu.edu.in](mailto:k.ravikumar@tdu.edu.in); [noorunnisa.bequm@tdu.edu.in](mailto:noorunnisa.bequm@tdu.edu.in) /[info@frlht.org](mailto:info@frlht.org)

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## 'Herb Collectors' are 'Herb Mappers'

Suma Tagadur Sureshchandra and Kalaimoorthy Ravikumar

One of the biggest challenges in the medicinal plants' sector is tracing the sources of and establishing the identity of the botanicals in trade. In the PhD study on the raw drug markets of southern India, interactions with traders, collectors belonging to different ethnic communities at grass root level showed immense Traditional Ecological Knowledge (TEK) with regard to origin of drugs/ sources, identification, seasonal patterns and availability, alternatives, replacements, organoleptic characterization, diversity of names in trade etc.

Many of these local communities directly involved in the trade are an efficient 'Bare Foot Taxonomist', who is also a good 'Herb Mappers'. They bear a natural compass in their mind and move around for collections. They have acquired these skills over generations to track the availability and accessibility of the resources, which form part of their livelihood security program.

Learnings drawn from these members, will help in judicious resource planning and management of medicinal plant resources for a region on a long and short-term basis. Additionally, help in Quality Assurance (QA) and support in the documentation of Traditional Quality Standard (TQS), resources identification in a simplified manner and understand ecosystem services and dynamics. This extraordinary skills and knowledge honed in their traditional practices have to be valued and promoted widely. This particular article throws light on the diversity of TEK, these communities treasure with regard to the tracking of plant resources.

### Qualities to become a collector-cum-mappers:

Collectors have natural sense of direction, ecological and geographical knowledge. They have acquired this knowledge through their hands-on-experiences and constant travelling in wild and surroundings. They are observant like a field botanist/ taxonomist, register the growth pattern, climatic changes and predict the harvest pattern for next season, abundance, accessibility, extent of occurrences, area of spread of a particular plant entity etc. Here are few examples:

### A. Following the climatic and seasonal patterns:

#### 1. Post-harvest guided by Post rainy/ Pre-rains:

*Avarampoo* [*Senna auriculata* (L.) Roxb.] flowers are harvested observing rain patterns. Generally, plants growing in red soil are preferred. The wild collection is done in 2 seasons: South West Monsoon conclusion (January to February) or when North East Monsoon begins (June to August). Materials collected from Virudhunagar, Madurai, Pudukotai are considered to be good quality. It fetches Rs.20/kg. This is sold in Madurai, Virudhunagar, Dindigal and Palani (2012) markets by the agents. This pattern of collection helps them dry the flowers and package it before rains, thus avoiding losses that would occur due to moisture gain and fungal attacks.

#### 2. Extending storage warranty and a better price:

Post rains/ winter season: *Kezhanelli* (*Phyllanthus amarus* Schum. & Thenn): This is the original *Kezhanelli*. A delicate herb is harvested as a whole plant in all season (except post rains/ winter season). This measure is taken to avoid bad quality material. During the moist season, the plant is prone to infections, especially powdery mildew. It appears like white dust during the attack. This shortens the shelf life and becomes a sub-standard material for medicine preparation. The good quality material grows in fallow lands of drier regions. This species is now replaced by hardy variety which is called *Kuchikolai/Mevanelli* (*Phyllanthus maderaspatensis* Forssk.) possessing slightly woody stem and longer shelf life. This is seen growing widely in all the regions.

#### 3. Phenology and staggered harvest:

*Kandangatari* [*Solanum virginianum* (L.)] is a spiny plant. It is harvested in two seasons: The whole plant with few fruits is collected during March to April. This fetches about Rs.20/kg; only ripened fruits are collected in April, dried and sold. It fetches about Rs.30/kg (2011). Tutukodi, Perumbalur, Vilathikulam block area known for premium quality materials.

*Continued in page 12....*

## Medicinal Plants of Conservation Concern identified in Sikkim

Conservation Assessment and Management Prioritization (CAMP) workshop for the Medicinal Plants of Sikkim was held during 17th to 19th November 2014, at Gangtok, Sikkim. During this process, 48 taxa were assessed and IUCN Red List (RL) status were assigned. Out of 46 species assigned Red List (RL) status, 26 were assigned "Vulnerable", 5 as "Endangered", 6 were assigned "Least Concern", 7 were assigned "Near Threatened" and 2 were assigned "Data Deficient" status. *Panax sokpaiyensis* Shiva K. Sharma & Pandit has been assessed as Endangered (Globally), on account of narrow distribution (Authors of this species have recorded its wild presence only at 2 locations of West Sikkim, i.e. Utteray and Yuksom) and endemism to Sikkim Himalaya.

### Endangered (EN): 5

1. *Panax sokpaiyensis* Shiva K. Sharma & Pandit (Endangered Globally)
2. *Allium wallichii* Kunth
3. *Fraxinus floribunda* Wall.
4. *Saussurea obvallata* (DC.) Edgew.
5. *Swertia chirayita* (Roxb. ex Flem.) Kars.

### Vulnerable (VU): 26

1. *Aconitum ferox* Wall. ex Ser.
2. *Bergenia purpurascens* (Hook. f. & Thoms.) Engl.
3. *Dioscorea deltoidea* Wall. ex Griseb.
4. *Ephedra gerardiana* Wall. ex Stapf
5. *Flickingeria fugax* (Rchb. f.) Seidenf.
6. *Fritillaria cirrhosa* D. Don
7. *Gymnadenia orchidis* Lindl.
8. *Hippophae salicifolia* D. Don
9. *Hodgsonia heteroclita* (Roxb.) Hook. f. & Thoms.
10. *Jurinea macrocephala* (Royle) C. B. Clarke
11. *Litsea citrata* Blume
12. *Malaxis acuminata* D. Don
13. *Malaxis muscifera* (Lindl.) Kuntze
14. *Nardostachys jatamansi* (D. Don) DC.

15. *Neopicrorhiza scrophulariiflora* (Pennell) D. Y. Hong
16. *Ophiocordyceps sinensis* (Berk.) G. H. Sung, J. M. Sung, Hywel-Jones and Spatafora
17. *Panax bipinnatifidus* Seem.
18. *Paris polyphylla* Sm.
19. *Platanthera edgeworthii* (Hook. f. ex Collett) R. K. Gupta
20. *Podophyllum hexandrum* Royle
21. *Polygonatum cirrhifolium* (Wall.) Royle
22. *Polygonatum verticillatum* (L.) All.
23. *Rhododendron anthopogon* D. Don
24. *Saussurea gossypiphora* D. Don
25. *Valeriana jatamansi* Jones
26. *Zanthoxylum acanthopodium* DC.

### Near Threatened (NT): 7

1. *Juniperus recurva* Buch.-Ham. ex D. Don
2. *Mahonia napaulensis* DC.
3. *Meconopsis horridula* Hook. f. & Thoms.
4. *Betula utilis* D. Don
5. *Oroxylum indicum* (L.) Kurz
6. *Rheum nobile* Hook. f. & Thoms.
7. *Roscoea purpurea* Sm.

### Least Concern (LC): 6

1. *Campylandra aurantiaca* Baker
2. *Docynia indica* (Wall.) Decne.
3. *Hedychium spicatum* Sm.
4. *Heracleum wallichii* DC.
5. *Meconopsis paniculata* (D. Don) Prain
6. *Thalictrum foliolosum* DC.

### Data Deficient (DD): 2

1. *Berberis aristata* DC.
2. *Trillium govianianum* Wall. ex D. Don

**Source:** Ved D. K., Suma Tagadur Sureshchandra, Thinley Gyatso Bhumia, Kaliamoorthy Ravikummar, Vijay Barve, B. S. Somashekar, Vinay Tandon, G. S. Goraya, M. V. Sumanth and Soumyashree N. (Editors). 2017. Conservation Assessment and Management Prioritisation (CAMP) for the Wild Medicinal Plants of Sikkim. FRLHT-TDU, Bengaluru and SMPB-FEWM, Gangtok.

For more information visit: <http://envis.frlht.org/mpcc-species>



*Allium wallichii* Kunth



*Neopicrorhiza scrophulariiflora* (Pennell) D. Y. Hong.



*Panax sokpaiyensis* Shiva K. Sharma and Pandit



*Platanthera edgeworthii* (Hook. f. ex Collett) R. K. Gupta

## Medicinal Plants of Conservation Concern identified in Nagaland

Conservation Assessment and Management Prioritization (CAMP) workshop for the Medicinal Plants of Nagaland was held during 22<sup>nd</sup> to 25<sup>th</sup> September 2015, at Dimapur, Nagaland. During this process, 48 taxa were assessed and IUCN Red List (RL) status were assigned. Of the 48 taxa assessed 8 were assigned RL status as Endangered (EN), 17 were assigned as Vulnerable (VU), 8 as Near Threatened (NT), 10 were Least Concern (LC) and 5 were Data Deficient (DD). *Swertia lacei* Craib was found to be the only species with restricted distribution (endemic to Nagaland and Manipur), assessed and was assigned Vulnerable globally on account of its endemism.

### Endangered

1. *Aconitum elwesii* Stapf
2. *Canarium bengalense* Roxb.
3. *Cyathea gigantea* (Wall. ex Hook.) Holtt.
4. *Dendrobium devonianum* Paxton
5. *Gynocardia odorata* R. Br.
6. *Hydnocarpus kurzii* (King) Warb.
7. *Panax bipinnatifidus* (Burkill) J. Wen
8. *Paris polyphylla* Sm.

### Vulnerable

1. *Angiopteris evecta* (Frost.) Hoff.
2. *Cinnamomum tamala* (Buch.-Ham.) T. Nees & Eberm.
3. *Dioscorea deltoidea* Wall. ex. Griseb.
4. *Embelia ribes* Burm.f.
5. *Garcinia xanthochymus* Hook. f. ex Anderson
6. *Hodgsonia macrocarpa* (Blume) Cogn.
7. *Homalomena aromatica* (Spreng.) Schott
8. *Kalanchoe laciniata* (L.) DC.
9. *Momordica cochinchinensis* (Lour.) Spreng.
10. *Oroxylum indicum* (L.) Kurz
11. *Piper peepuloides* Roxb.
12. *Sapindus mukorossi* Gaertn.

13. *Swertia lacei* Craib
14. *Valeriana hardwickii* Wall.
15. *Valeriana jatamansi* Jones.
16. *Zanthoxylum armatum* DC.
17. *Zanthoxylum rhetsa* DC.

### Near Threatened

1. *Bergenia ciliata* (Haw.) Sternb.
2. *Canarium strictum* Roxb.
3. *Dendrobium densiflorum* Lindl.
4. *Dendrobium nobile* Lindl.
5. *Diospyros lanceifolia* Roxb.
6. *Entada rheedii* Sprengel
7. *Stephania glandulifera* Miers
8. *Symplocos racemosa* Roxb.

### Least Concern

1. *Clerodendrum glandulosum* Lindl.
2. *Curcuma angustifolia* Roxb.
3. *Dichroa febrifuga* Lour.
4. *Hedychium spicatum* Ham. ex Sm.
5. *Mahonia nepaulensis* DC.
6. *Myrica esculenta* Buch.-Ham. ex D. Don
7. *Pericampylus glaucus* (Lam.) Merr.
8. *Piper betleoides* C. DC.
9. *Rhynchosstylis retusa* (L.) Blume
10. *Thalictrum foliolosum* DC.

### Data Deficient

1. *Aconitum nagarum* Stapf
2. *Curcuma caesia* Roxb.
3. *Piper griffithii* C. DC.
4. *Piper sui pigua* Buch.-Ham. ex D. Don
5. *Rauwolfia serpentina* (L.) Benth. ex Kurz

**Source:** Ved D. K., Anu V., Saha D., Kareem A. M. and Ravikumar K. 2016. Conservation Assessment and Management Prioritization for the Medicinal Plants of Nagaland. FRLHT, Bengaluru.

For more information visit: <http://envis.frlht.org/mpcc-species>



*Oroxylum indicum* (L.) Kurz



*Panax bipinnatifidus* Seem.



*Thalictrum foliolosum* DC.



*Valeriana jatamansi* Jones

#### 4. Getting an extra mile from geographical indicator species:

Traditionally, certain traders have made a difference in providing best quality materials. They make an effort to fetch materials from specific micro-climatic conditions/ regions for a better price. These materials can be "Potential Geographical Indicators (GI)". (Table 1)

In the study, it was noted that 85-95% collectors comprise of women, who are locally engaged in the collection of herbs and have tremendous knowledge about the identification and processing unlike men-folk, who are more involved in arduous jobs of tracing the material from far of places.

There is no question about the significant role of these collectors. Their TEK is unwritten and needs to

be documented for prudent resource management. Their involvement in conservation action programs being designed by State Forest Departments will help in tracking the species from specific localities and ensure long-term sustainability programs. No doubt modern tools including taxonomy, pharmacognosy, DNA barcoding helps in identification and authentication of botanicals scientifically but in ground realities, the barefoot taxonomist involved in herb collections are field botanists.

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2. Dr. Kalaimoorthy Ravikumar, Professor, FRLHT-TDU, Bengaluru

**Table 1: Soil types and choice of species collected for botanical trade**

Sl. No.	Scientific name (trade name)	Collections preferred from these locations based on soil types [All red and black soils (4species)]	Harvest time that fetches good price
1.	<i>Adhatoda vasica</i> Nees (Adhatodaiei)lai)	All over. Theni ( <i>Kambabumpala</i> ) region of TN	Collection is done in all seasons and sold to Madurai, Virudhunagar and Dindigal markets. It fetches about Rs.10/kg
2.	<i>Boerhavia diffusa</i> L. (Vattasaranai)	Dindigal, Madurai and Virudhunagar	Roots are harvested during July to September. As a recent innovation, consumption of whole plant is being done by most of the industries.



## Annotated Bibliography on Medicinal Plants

### Conservation of Medicinal Plants

#### Biodiversity Act to be implemented soon in entire Himachal Pradesh

Biodiversity Act of 2002 will be implemented in all 12 districts of Himachal Pradesh. The act mandates in sharing of monetary profits made by industries and companies using biological resources with the state gram panchayats. Now the state Chief Secretary Mr. Pharka V. C., has asked panchayats to constitute biodiversity management committees (BMCs) for implementation of the act.

Reference: Down to Earth; 1-15 march 2017; 14

#### 5.5 cr saplings planted under 'Smriti Van Yojana'

Himachal Pradesh State forest department has planted 5.5 cr saplings through "Smriti Van Yojana", with participation by local forest and village people, planting wide leaved and fruiting trees and medicinal plants on occasion of birthdays and anniversaries as remembrance. The programme has been able to cover 48,000 hectares and creating employment opportunities in forest by wild fruits and herbs collection for industries.

Reference: The Tribune: Feb 20, 2017, 12:26 AM

<http://www.tribuneindia.com/news/himachal-community/5-5-cr-saplings-planted-under-smriti-van-yojana/366540.html>

#### Dabur, DRDO unit tie up for high altitude medicinal plants

Dabur and Defense Research & Development Organisation have signed an agreement for cultivation of high altitude medicinal plants at Leh region. This would help in cultivation research of the high altitude medicinal plants in turn as step towards conservation, and a source of income generation to farmers.

Reference: The Economic Times: Jul 17, 2016, 06.54 PM IST

<http://economictimes.indiatimes.com/news/economy/agriculture/dabur-drdo-unit-tie-up-for-high-altitude-medicinal-plants/articleshow/53252830.cms>

### Climate Change-Impact on Medicinal Plants

#### Uttarakhand state flower Burans blooms early, may not be juicy enough, fear experts

Burans (*Rhododendron arboretum*), the state flower of Uttarakhand have bloomed a month earlier, instead of March in the hills of Garhwal and Kumaon. The global warming has been the cause as said by Manisha Joshi, horticulture officer, Pithoragarh district and had a direct effect on the flowering which may miss out good rains, and where the flowers are plucked and processed for their medicinal properties. Also, reported with similar incidence in the previous year, had an effect on the squash and juices that were extracted.

Reference: The Times of India: Prachi Raturi Misra and Arpita Chakrabarty | TNN | Feb 23, 2017, 10.16 AM IST

<http://timesofindia.indiatimes.com/city/dehradun/ukhand-state-flower-burans-blooms-early-may-not-be-juicy-enough-fear-experts/articleshow/57298451.cms>

#### Conserve medicinal plants to mitigate climate change, says India at COP22

22nd Conference of the Parties to the UN Framework Convention on Climate Change (COP22) was held at Marrakech, Morocco from 7-18 November 2016. In Indian context around 6000 medicinal plants have been used in natural and herbal system of medicine; out of these 350 species have been assessed as threatened, from 18 states by application of IUCN red list categories were highlighted by G. S. Goraya, senior scientist from ICFRE. Emphasis on herbal industries using substitutes for some of these medicinal plants, which are facing destructive harvesting and biotic pressure in India was made. The rampant climate degradation has weakened resilience of rootstocks and early flowering in flora. As part of United Nation's Reducing Emissions from Deforestation and Forest Degradation or REDD+ agenda, Indian government have to work on conserving these medicinal plants was also discussed.

Reference: Business Standard; IANS | Marrakech  
November 9, 2016 Last Updated at 22:36 IST  
[http://www.business-standard.com/article/news-ians/conserve-medicinal-plants-to-mitigate-climate-change-says-india-at-cop22-116110901658\\_1.html](http://www.business-standard.com/article/news-ians/conserve-medicinal-plants-to-mitigate-climate-change-says-india-at-cop22-116110901658_1.html)  
For additional information on Marrakech Climate Change Conference - November 2016: [http://unfccc.int/meetings/marrakech\\_nov\\_2016/meeting/9567.php](http://unfccc.int/meetings/marrakech_nov_2016/meeting/9567.php)

## Medicinal Plants –Traditional Knowledge, Uses and Discoveries

### Tribe offers clues to hidden wonders of medicinal plant

'Pacha chedi' used by Cholanaikkan tribe from Kerala has proven to be a potential herbal drug possessing wound and burn healing, anti-cancer, analgesic, anti-inflammatory, immuno- enhancing, platelet-augmentation and anti-oxidant effects. The species have been identified by Jawaharlal Nehru Tropical Botanic Garden and Research Institute (JNTBGRI) team led by Mr. Rajasekharan S. as *Neurocalyx calycinus* during their Biological survey in Nilambur forests in the year 1988. They evidenced A tribal man by name Kuppamala Kaniyan had recovered from injuries by the use of the plant. Now, the scientists from JNTBGRI have proved its medicinal properties animal and pre-clinical trials.

Reference: The Hindu; Nandakumar T., February 05, 2017 00:48 IST

<http://www.thehindu.com/sci-tech/science/Tribe-offers-clues-to-hidden-wonders-of-medicinal-plant/article17195140.ece>

### New Ginger species with medicinal properties found in Andamans

A new species of ginger, endemic to Andaman and Nicobar have been found by scientists of Botanical Survey of India (BSI). The species is named as *Zingiber pseudosquarrosus*, which was traditionally used by local Particularly Vulnerable Tribal Groups (PVTGs) of Andamans, for its medicinal values. By systematic documentation of new species, with ethno-medicinal uses, which possess cure for abdominal pain and anti-helminthic troubles by use of its fresh extract as said by Lal Ji Singh, one of taxonomist behind the discovery. Mr. Singh added that, it has red coloured pseudo stem, flower with vermilion tinge, dehiscent fruits which have lotus appearance, urceolate inflorescence buds and so on, which makes the species distinct from other Zingibers.

Reference: The Hindu; Shiv Sahay Singh, Kolkata: January 08, 2017 22:27 IST

<http://www.thehindu.com/sci-tech/energy-and-environment/New-Ginger-species-with-medicinal-properties-found-in-Andamans/article17009348.ece>

### Compiled by:

Ms. Soumyashree N., Research Fellow, FRLHT-TDU, Bengaluru

### FRLHT visitors for the year 2016-2017 who were oriented towards ENVIS Centre activities

1. 2<sup>nd</sup> March 2017: Srimed Andavan Arts & Science College, Tiruchirappalli (39 students)
2. 6<sup>th</sup> March 2017: Government Arts College, Chennai (54 students)
3. 7<sup>th</sup> March 2017: Christ University, Bengaluru (13 students)
4. 14<sup>th</sup> February 2017: Indian Academy Degree College, Bengaluru (31 students)
5. 9<sup>th</sup> January 2017: The Amaatra Academy, Bengaluru (49 students)
6. 17<sup>th</sup> January 2017: NMKRV College for Women, Bengaluru (16 students)
7. 4<sup>th</sup> November 2016: Canadian International School, Bengaluru (45 students)
8. 9<sup>th</sup> November 2016: Auro Mirra International School, Bengaluru (59 students)
9. 27<sup>th</sup> September 2016: Indian Academy Degree College, Bengaluru (19 students)
10. 3<sup>rd</sup> August 2016: College of Forestry, Ponnampet (55 trainees)
11. 17<sup>th</sup> August 2016: Government Arts College, Dharmapuri (15 students)
12. 29<sup>th</sup> August 2016: Karnataka Forest Academy, Dharwad (47 trainees)
13. 14<sup>th</sup> July 2016: Nangelil Ayurveda Medical College, Kothamangalam (40 students)
14. 1<sup>st</sup> June 2016: APD Horticulture Training Centre, Dodda Gubbi road, Bengaluru (25 trainees)

**Reported by:** Ms. Revathi R., Office Assistant, FRLHT-TDU, Bengaluru and Mr. Sumukha K. V., Senior Administrative Assistant, FRLHT-TDU, Bengaluru

### Publications:

- 1) Ved D. K., Suma Tagadur Sureshchandra, Thinley Gyatso Bhutia, Kaliamoorthy Ravikumar, Vijay Barve, B. S. Somashekar, Vinay Tandon, G. S. Goraya, M. V. Sumanth, Soumyashree N. (Editors). 2017. Conservation Assessment and Management Prioritisation (CAMP) for the Wild Medicinal Plants of Sikkim. FRLHT-TDU, Bengaluru and SMPB-FEWM, Gangtok. **ISBN 978-93-84208-13-4**
- 2) M. V. Sumanth, K. Ravikumar, N. Dhatchanamorthy and Suma T. S. 2016. Rediscovery of an endemic species, *Impatiens trigonopteris* Hooker f. (Balsaminaceae) from Sikkim Himalaya. *Pleiome*; 10 (2): 388-391.

## Workshops organised by ENVIS Centre on Medicinal Plants

Date/ Place	Title of seminar/ workshop	Focal theme covered	Host Agency/ Institute
11 <sup>th</sup> January 2017 Bengaluru	Talk on India Bio-Diversity Portal: A way forward	Networking of ENVIS websites with India Biodiversity Portal	ENVIS Centre on Medicinal Plants, FRLHT-TDU
20 <sup>th</sup> May 2016 Bengaluru	Brainstorming session for Southern region ENVIS Centre	Activities on ENVIS Centre	ENVIS Centre on Medicinal Plants, FRLHT-TDU, Bengaluru along with WGBIs ENVIS Centre, CES, IISc, Bengaluru and Karnataka ENVIS Centre, EMPRI, Bengaluru

Participation in events/ workshops: Team members participated activities in various sharing platforms related to various aspects of medicinal plants diversity, identification, trade, traditional knowledge documentation and conservation concern

Date/Place	Title of seminar/ workshop	Focal theme covered	Host Agency/ Institute	Who were the participants
28 <sup>th</sup> -31 <sup>st</sup> December 2016 Moodabidri	Lake 2016: Conference on Conservation and Sustainable Management of Ecologically Sensitive Regions in Western Ghats	ENVIS Centre activities and FRLHT's contribution on conservation and dissemination of traditional knowledge	Centre for Ecological Sciences, IISc, Bengaluru and Alva's College and Alva's Institute of Engineering and Technology, Moodbidiri, Dakshina Kannada	School and college students
20 <sup>th</sup> - 23 <sup>rd</sup> December 2016 Bengaluru	Orientation programme on Plant morphology, Anatomy and Conservation for students	Plant morphology, Anatomy and Conservation of Medicinal Plants	FRLHT-TDU, Bengaluru	Students from Sri Vidya Mandir, Malleshwaram, Bengaluru
9 <sup>th</sup> -11 <sup>th</sup> November 2016 Imphal	Conservation Assessment and Management Prioritisation for the Medicinal Plants of Manipur	Conservation Assessment and Management Prioritisation for the Medicinal Plants	Manipur Biodiversity Board, Imphal and FRLHT-TDU, Bengaluru	65 experts and researchers
25 <sup>th</sup> October 2016 Bengaluru	Digitization of Medicinal Plants used in Indian Medical Heritage	Digitizing 600 medicinal plant herbarium specimens collected at FRLH herbaria	FRLHT-TDU, Bengaluru	25 students and researchers
3 <sup>rd</sup> - 5 <sup>th</sup> August 2016 Agartala	Conservation Assessment and Management Prioritisation for the Medicinal Plants of Tripura	Conservation Assessment and Management Prioritisation for the Medicinal Plants	Medicinal Plants Board of Tripura, and FRLHT-TDU, Bengaluru	75 experts and researchers

## Visit Undertaken by ENVIS team members

Date / Place	Visited place
16 <sup>th</sup> March 2016, Gandhinagar	Gujarat Medicinal Plant Board and Herbal Garden

## Activities conducted by ENVIS Centre on Medicinal Plants

Date / Place	Activities conducted	Who were the Participants
2 <sup>nd</sup> to 8 <sup>th</sup> April 2016 Mysore, Ballari, Wadi	Science Express Climate Action Special 2016	School, college students, public visitors
1 <sup>st</sup> to 15 <sup>th</sup> June, 1 <sup>st</sup> to 15 <sup>th</sup> November 2016 Bengaluru	Swachh Bharath Pakdwadas	FRLHT-TDU staffs

### Swachh Bharath Pakhwadas 2016-2017

### Science Express Climate Action Special



Awareness fortnight organised jointly with FRLHT-TDU



Staffs involved in collection of plastic waste



Students learning importance of medicinal plants in primary health care uses

### National Workshop of ENVIS Centres: Summary Evaluation and Roll out of the Revamped ENVIS Scheme” 17<sup>th</sup> to 18<sup>th</sup> March, 2017 Mahatma Mandir Convention and Exhibition Centre, Gandhinagar, Gujarat

- The workshop was inaugurated by Shri Ajay Narayan Jha, Secretary, Ministry of Environment, Forest and Climate Change (MoEF&CC), Shri Arvind Agrawal, ACS, Government of Gujarat, Dr. Anandi Subramaniam, Senior Economic Advisor, ENVIS, MoEF&CC, Shri Amit Vashishtha, Scientist C, MoEF&CC and Shri S. K. Chaturvedi, Add. PCCF, GEC.
- Roll out of the Revamped ENVIS scheme was presented by Shri Yashvir Singh, Economic Advisor, MoEF&CC; followed by discussion with Dr. Anandi Subramaniam, Senior Economic Advisor, ENVIS, MoEF&CC these schemes.

### Release of Mobile App

ENVIS Centre on Medicinal Plants' mobile app on “Indian Medicinal Plants of Conservation Concern – Redlisted Med Plants Version 1.0” was released by Shri Ajay Narayan Jha, Secretary, Ministry of Environment, Forest and Climate Change (MoEF&CC) on 17<sup>th</sup> March 2017 at National Workshop of ENVIS Centres.



<https://play.google.com/store/apps/details?id=friht.RedlistMedplants>



Release of Mobile app by Shri Ajay Narayan Jha, Secretary, Ministry of Environment, Forest and Climate Change (MoEF&CC)



## Simple Home Remedies for Childcare

Shilpa Naveen

The treatment for common childhood ailments consists mainly of allopathic drugs such as antibiotics. There may be times when these drugs are necessary, but often they could be substituted by a safer and more natural approach. Ayurveda has much to offer in a gentle way and effective towards health care. The herbs have been successfully used, over thousands of years for addressing a wide variety of childhood disorders. Some of the conditions are listed below.

### RINGWORM

Ringworm is a very contagious skin disease which is transmitted through fungi. The disease can affect the skin of the scalp, hands, feet, chest and nails. Ringworm has nothing to do with worms but it is an inflammation seen like a darkened ring on the skin.

#### Treatment:

- Juice of holy basil/Tulsi [*Ocimum sanctum* L.] leaves is applied locally on the affected regions.
- A solution of the turmeric [*Curcuma longa* L.] powder is made and applied directly on the skin.
- Neem [*Azadirachta indica* A. Juss.] leaves is made into a paste and applied on the affected parts.
- Prepare a paste of mustard [*Brassica juncea* (L.) Czerm.] seeds and apply it directly on the affected skin. You will get a slight tingling sensation but that indicates the healing process.

**Tip:** Ringworm can aggravate due to itching. If the skin is dry, then itching can cause eruptions and bleeding of the skin. This can be avoided by keeping the skin supple by the application of coconut [*Cocos nucifera* L.] oil.

### EARACHE

One should know about earache when the child touches ears with both the hands, rolls head too much, has dullness, anorexia and insomnia.

Earache is fairly common in children who are susceptible to cold or indulge in sweets. It is often caused either due to boils in the outer ear or due to inflammation of the middle or internal ear.

Middle ear infection generally follows the infection of upper respiratory tract.

#### Treatment:

- The most important is the use of garlic [*Allium sativum* L.]. A few cloves [*Syzygium aromaticum* (L.) Merril & Perry] should be warmed and mashed with salt. This mixture should be wrapped in a piece of woolen cloth and placed on the painful ear.
- Instill warm juice of ginger, 2-4 drops in the ear, twice a day.
- Instill 2-4 drops of warm juice of garlic in the ear, twice a day.
- Juice extracted from the leaves of tulsi should be used as ear drops (2 drops).

### CONJUNCTIVITIS

It means inflammation of the eyes is considered as one of the most common infection of the eyes which is very contagious, most often caused by a virus but also can be caused by bacterial infection, allergies (e.g. cosmetics, pollen) and chemical irritation.

#### Treatment:

- Take one teaspoon of dhania/ coriander [*Coriandrum sativum* L.] seeds in a small cloth and make a bundle of it and then keep it in water for an hour. Take this bundle and apply it on the affected eyes every now and then.
- Administration of fomentation therapy with the juice of the leaves of sigru [*Moringa oleifera* Lam.] cures all eye diseases.

#### Care:

This usually remains for a period of around 5-7 days or till the discharge continues to be produced.

Personal hygiene should be maintained and none of the personal things should be shared.

Hands should be washed thoroughly and eyes cleaned properly.

Disease prevention for children can be achieved through diet and lifestyle, as well as the use of medicinal herbs and spices. Many herbs can also strengthen their immune system and support the health of children of all ages in a safe and holistic manner.



*Ocimum sanctum* L.



*Zingiber officinale* Rose



*Moringa oleifera* Lam.



*Azadirachta indica* A. Juss.

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## Botanic Gardens Conservation International - Global Seed Conservation Challenge Fieldwork fund

Botanic Gardens Conservation International (BGCI), London conducted workshop in Jawaharlal Nehru Tropical Botanic Garden and Research Institute (JNTBGR), Thiruvananthapuram, Kerala for providing an insight in to the seed collection program and apply for the funding during May 2016. Centre for Herbal Gardens, FRLHT received funding for the collection of Rare, Endangered and Threatened (RET) species at three different locations viz., Agumbe, Jogimatti and Gudaluru during the period 5-7-2016 to 31-12-2016. Centre for Herbal Gardens (CHG) field staff members were oriented on importance of collection, locations to visit, choice of species, collection procedure, filling of data sheets, precautionary measure to face adverse conditions, and time line for the collection. Target was to collect seeds of 20 different species, however seeds from other locations were also collected during the same period leading to collection from 36 different species. Information on availability of species, phenology, seasonal variation and soil conditions were recorded. Seed collection is displayed in the Centre for Herbal Gardens, FRLHT-TDU.



Seed collection near Jogimatti

### Women Technology Park

The Women Technology Park at the Institute of TransDisciplinary Health Sciences & Technology aims to enhance the livelihood opportunities for women. The objectives are to provide a learning platform in the use of green technologies and the Science and Technology (S&T) tools and to help them link up with supply of raw or semi-processed or value added materials.

Training will be in the following four S&T areas to enhance their livelihood.

- 1) Home herbal garden
- 2) Propagation and Nursery and Techniques
- 3) Vermi-composting techniques
- 4) Cultivation of selected medicinal and nutritional plants

During 2016-17 around 380 participates are trained and introduced to various financial and marketing schemes by the Government and non-Government agencies.

Some of them started their own production units, using it for self and marketing the products successfully.



Nursery training

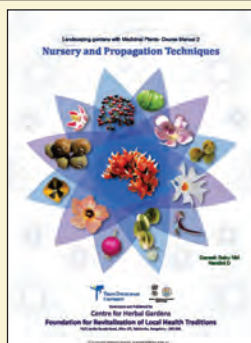
### Landscaping gardens with Medicinal Plants - Course Manual 2 Nursery and Propagation Techniques

Suggested citation: Ganesh Babu N. M. and Nandini D. 2017. Landscaping gardens with Medicinal Plants- Course Manual 2- Nursery and Propagation Techniques. FRLHT, Bengaluru.

#### Reported by:

Ms. Nandini D, Consultant, CHG, FRLHT-TDU, Bengaluru

For more details email: garden@tdu.edu.in



Just Double click: [frlhtenvs.nic.in/envis.frlht.org](http://frlhtenvs.nic.in/envis.frlht.org)

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!

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User engagement and interaction	
<a href="http://frlhtenvs.nic.in">frlhtenvs.nic.in</a>	FY 2016-17
Total number of visits (185442)	69887
Number of unique visits	5986
<a href="http://envis.frlht.org">envis.frlht.org</a>	FY 2016-17
Total number of visits <a href="http://envis.frlht.org">envis.frlht.org</a> Generated by <b>Webalizer Version 2.23</b>	<b>12451972</b>
Number of unique visits	<b>483538</b>
Total Number of Queries received <a href="mailto:envis.frlht.org/emails/">envis.frlht.org/emails/</a> <a href="tel:011-26116136">telephone/</a> <a href="mailto:envis.frlht.org">personal visits</a>	<b>600 + till date</b>

Usage statistics for [envis.frlht.org](http://envis.frlht.org)

Generated 15-Mar-2017 06:03 IST

Summary by Month										
Month	Daily Avg				Monthly Totals					
	Hits	Files	Pages	Visits	Sites	kBF	Visits	Pages	Files	Hits
Mar 2017	49673	46318	29236	4238	28421	25810118	63570	438541	694776	745105
Feb 2017	44472	40075	20560	4076	53127	33838340	114147	575681	1122116	1245230
Jan 2017	50611	46326	29552	2812	55292	34604722	87197	916115	1436119	1568961
Dec 2016	46963	43291	28551	2348	49242	31335501	72789	885098	1342052	1455865
Nov 2016	31710	27087	18824	2175	52304	24499008	65273	414723	812638	951317
Oct 2016	27900	22057	10966	2088	54920	24797823	64729	339962	683789	864918
Sep 2016	27726	22093	9819	1947	53701	26116136	58425	294592	662608	831800
Aug 2016	29058	23201	10837	1728	55161	32287981	53579	335063	719234	900824
Jul 2016	27729	22189	9875	1584	52868	25173375	49129	306155	686943	859609
Jun 2016	28883	23820	12350	1612	49027	26553297	48379	370518	714602	866516
May 2016	25352	20777	10091	1434	45536	24241399	44484	331430	644107	785942
Apr 2016	45863	40899	30017	1742	46007	44423381	52382	900537	1234298	1375895
<b>Totals</b>						<b>353681171</b>	<b>7739883</b>	<b>6109315</b>	<b>10743462</b>	<b>12451972</b>

Generated by [Webalizer Version 2.23](http://www.webalizer.com)

## Mobile Apps

ENVIS App on  
Indian Medicinal Plants  
Version 2.3



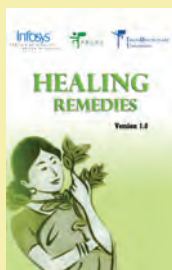
[https://play.google.com/store/apps/details?id=com.envis\\_frlht](https://play.google.com/store/apps/details?id=com.envis_frlht)

Neighbourhood Medicinal  
Plants Version 0.5.0



<https://play.google.com/store/apps/details?id=frlht.neighb.mpbricity&hl=en>

Healing Remedies  
App Version 0.1



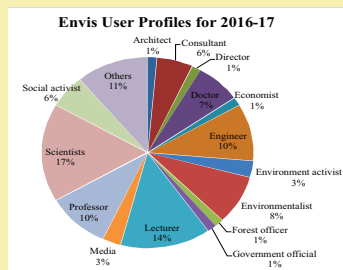
<https://play.google.com/store/apps/details?id=frlht.Healingremedies>

Indian Medicinal Plants of  
Conservation Concern  
Version 1.0



<https://play.google.com/store/apps/details?id=frlht.RedlistMedplants>

[envis.frlht.org](http://envis.frlht.org) users profile 2016-17





## Awards and Recognitions

- 2014: Life time's Service award for Conservation of Medicinal Plants was conferred to Mr. D. K. Ved, I.F.S. (Retd.) Former Director and Advisor, FRLHT by NMPB, GoI on 08/11/2014
- 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, FRLHT
- 2011: Padma Shri awarded to Shri. Darshan Shankar the Founder, FRLHT
- 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 Vaidyraj 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. & C.C., Go.I.
- 2002: Recognized as National Centre of Excellence, Ministry of Environment, Forests and Climate Change, 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



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## International Day for Biological Diversity 2017

Biodiversity and Sustainable Tourism



This theme has been chosen to coincide with the observance of 2017 as the [International Year of Sustainable Tourism for Development](#) as proclaimed by the United Nations General Assembly in its [Resolution 70/193](#) and for which the [United Nations World Tourism Organization](#) is providing leadership.

Biodiversity, at the level of species and ecosystems, provides an important foundation for many aspects of tourism. Recognition of the great importance to tourism economies of attractive landscapes and a rich biodiversity underpins the political and economic case for biodiversity conservation. Many issues addressed under the Convention on Biological Diversity directly affect the tourism sector. A well-managed tourist sector can contribute significantly to reducing threats to, and maintain or increase, key wildlife populations and biodiversity values through tourism revenue.

For more details: <https://www.cbd.int/idb/2017/>

### How to reach IAIM-Health Care Centre, Yelahanka, Bangalore

Contact us: Land line phone number:+91-80-28567000



We invite readers to send their responses/views/features of interest etc. through email. (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:

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ENVIS Centre on Medicinal Plants

Foundation for Revitalisation of Local Health Traditions

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