CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES
OF WILD FAUNA AND FLORA

Sixteenth meeting of the Conference of the Parties
Bangkok (Thailand), 3-14 March 2013

CITES Asia Regional Workshop on Medicinal Plants
Ensuring Legal, Sustainable and Traceable Trade

PROCEEDINGS OF THE MEETING
HELD ON 24-26 MAY 2012, THIMPHU, BHUTAN

This document has been submitted by Bhutan, in relation to agenda item 10.3.1 on *Plants Committee – Report of the Chair*.*

---

* *The geographical designations employed in this document do not imply the expression of any opinion whatsoever on the part of the CITES Secretariat or the United Nations Environment Programme concerning the legal status of any country, territory, or area, or concerning the delimitation of its frontiers or boundaries. The responsibility for the contents of the document rests exclusively with its author.*

CITES Asia Regional Workshop on Medicinal Plants

"Ensuring Legal, Sustainable and Traceable Trade"

PROCEEDINGS

24-26 May 2012,
Thimphu Bhutan

Printed @ **KUENSEL** Corporation Ltd.

CITES Asia Regional Workshop on Medicinal Plants

"Ensuring Legal, Sustainable and Traceable Trade"

24-26 May 2012,

Thimphu Bhutan

PROCEEDINGS

Department of Forsest and Park Services,
Wildlife Conservation Division,
Royal Government of Bhutan,
Thimphu.
2012

1. Background:

Asia is known to be the home of Medicinal plants and also the consumer in practicing their traditional medicine system. The demand for the medicinal plants come from their systems such as traditional Chinese medicine, Ayurveda, Siddha, Unani and Tibetan medicines and more localized healthcare systems in the region. On the other hand medicinal plant collection is a source of livelihood to many of the communities in the Himalayan region as critical source of income.

The CITES listed medicinal plants are widely used in the region to keep their traditional medicine system alive. The demands for these medicinal plants are also high due to many consumer States in Europe and North America. With the increasing demand, issues of illegal trade and its sustainability are the challenges that requires intervention from the range states and regulatory bodies to ensure that its trade is legal, sustainable and traceable. So the need for the range states of CITES listed medicinal plants to come together was felt necessary during the 15th meeting of the Conference of the Parties to CITES (Doha, 2010) and was directed to the range states of *Cistanche deserticola, Dioscorea deltoidea, Nardostachys grandiflora, Picrorhiza kurrooa, Pterocarpus santalinus, Rauvolfia serpentina and Taxus wallichiana* to the regional representatives for Asia on the Plants Committee and to the Secretariat.

15.36 The bodies to which this Decision is directed should ensure the implementation of regionally coordinated actions to improve the management of the seven species and ensure that the trade therein is legal, sustainable and traceable. These measures could include, inter alia, the organization of regional capacity-building workshops, the improvement of methodologies to make non-detriment findings and to determine legal acquisition, the harmonization of management and compliance measures, and the development of incentives to prevent illegal trade.

Directed to the Secretariat

15.37 The Secretariat shall:

a) subject to the availability of external funding and in collaboration with the range States, the regional representatives for Asia on the Plants Committee, the World Health Organization, traditional medicine associations and TRAFFIC, organize one or several regional capacity-building workshops, on the basis, inter alia, of the recommendations in document PC17 Inf. 10; and
b) inform the Plants Committee on progress made at its 20th meeting.

2. Objective

The regional workshop was brought to Bhutan with the objective to examine means for ensuring that international trade in selected Asian medicinal plant species is legal, sustainable and traceable. The workshop also aimed to initiate cooperation among Range States, consumer States and relevant organizations and identify examples of good practice.

The delegates were also to delve on how to achieve legal, sustainable and traceable trade in medicinal plants and the actions required to deal with the illegality aspect of medicinal plants in sync with government policies, measures initiated, studies and researches conducted and the demand in the market .Capacity building workshop was also to discuss on the perspective of management of trade in medicinal plants by range states, consumer states, traditional medicine associations of the range and consumer states.

3. Expected outcome

The workshop will develop recommendations to ensure the implementation of regionally coordinated actions to improve the management of medicinal plant species in the region. It will include recommendations on trade controls, including methodologies to determine legal acquisition and to provide traceability. Workshop is also expected to recommend on sustainable resource management including methodologies and to make non detrimental findings.

The findings and recommendations of the workshop will be submitted at the CITES Conference of Parties 16 to be held in Bangkok sometime in March 2013.

4. Participants

The participants of the meeting included Management and Scientific Authorities from Bangladesh, Bhutan, China, India, Indonesia, Myanmar,

Nepal, and Sri Lanka. Representatives from NGOs viz. TRAFFIC International and TRAFFIC India and Indonesia Agar Wood Association also attended the meeting. Pakistan unfortunately couldn't attend the meeting due to some unforeseen logistical hitches in the last minute. All together there were 29 participants which included 2 observers from CITES Secretariat in Geneva and 8 observers from various offices that dealt with medicinal plants in Bhutan.

The list of the workshop participants is given in Annex 1.

5. Opening by Chief Guest, H.E. Dr. Pema Gyamtsho, Minister, Ministry of Agriculture and Forests, Royal Government of Bhutan.

His Excellency, Lyonpo (Dr.) Pema Gyamtsho, Minister for Agriculture and Forests, Royal Government of Bhutan welcomed all the delegates to Thimphu, the capital city of Bhutan. He also thanked the CITES management in choosing Bhutan as the venue for such an important workshop. He said that although Bhutan is a small country, Bhutan is rich in medicinal plant diversity. Bhutan is home to some 300 species of medicinal plants, and maintaining the momentum in medicinal plants is essential for Bhutan in particular. Therefore it is appropriate and timely for Bhutan to host this very important workshop in Bhutan.

In his keynote address, H.E said that when we do conservation, we need to do it for a purpose. He said that sustainable utilization is equally important along with the conservation. He also added that considering the socio economic importance of medicinal plants is highly important.

"This workshop will focus on three key elements of trade in medicinal plants," said His Excellency adding that the legality aspect will make the trade legal, transparent and beneficial to all, while sustainability will make the benefits long term. According to Hon'ble Minister, traceability of trade in medicinal plants is the most difficult element of all three. "but in Bhutan, we've difficulties with all three elements," His Excellency shared with the delegates. He concluded by saying that although nations are defined by boundaries, CITES norms should be adopted by all nations with dignity. If we think for future and work for the cause, failure in being able to implement legal aspects on the CITES species, is not an issue. Let's all work closely for the sustainability of these species and I am sure that this workshop in Bhutan will prove to be a successful one, Minister said. He wished all the participants a great success for the three days meeting workshop.

Picture: (Above): Participants stand for a photo opportunity with Chief Guest. (Below) Opening Ceremony at Convention Centre, Thimphu

6. Proceedings:

6.1 Day 1:

Chair: Dr.Sangay Wangchuk, SA, Bhutan.
Co-Chair: Ms. Marceil Yeater, Chief, Legal Affairs and Trade Policy Regulatory Services, CITES Secretariat, Geneva.

The meeting proceeded with presentations which were followed by discussions on the subject presented and also from their home country perspectives.

The presentation followed as per the agenda which has been summarized into the table below:

Presenter	Session Topic	Deliberations
Dr. Sangay Wangchuk (Scientific Authority, Bhutan)	Range state perspective of medicinal plants, Bhutan	Bhutan is one of the global hot spots for biodiversity conservation. About 79% of the people live in rural areas practicing and depending on subsistence farming. Bhutan has been able to achieve much in conservation because of the strong political support and religious sentiments. With a forest cover of 80.89%, country has about 5603 species of vascular plants and over 400 orchid species. He presented that out of over 300 medicinal plant species, 105 are endemic to Bhutan.

Presenter	Session Topic	Deliberations
Ms. Sonam Peldon, Sr. Forestry Officer, Social Forestry and Extension Division, Department of Forests and Park Services, Royal Govt of Bhutan	Management of Medicinal Plants in Bhutan	*Trade Scenerio:* Collection of high altitude medicinal plants is restricted to Menjong Sorig Pharmaceuticals (*A Govt owned Pharmaceutical Company*) It was also informed that Ministry of Agriculture and Forests decides the trade of any Medicinal plants. As of now, 60 species of NWFPS are listed in the framework for collection and marketing. Export permit is essential which is issued from the Department of Trade and phyto-sanitory certificate is issued by Bhutan Agriculture and Food Regulatory Authority. *Conclusion:* There is a scope for international market for medicinal plants from Bhutan and there is a need to strengthen the market chain. Cultivation of Medicinal plants have been a challenge in Bhutan and monitoring and evaluation of the sustainable management of the recourses is felt crucial

Presenter	Session Topic	Deliberations
Ugyen Dhendup Head, Menjong Sorig Pharmaceuticals, Ministry of Health, Royal Govt of Bhutan.	Trade and use of medicinal herbs and animal parts in the production of traditional medicines.	*Overview:* Traditional medicine was formalized in the national health system in 1961. It was mandated to promote traditional system of medicine in Bhutan. Menjong Sorig Pharmaceuticals produces: Traditional medicines; 94 medicines Commercial medicine: 20 products *Challenges and opportunities:* sustenance is the question Some of the species required for the production is in short of the ingredients of the species required as they are under the CITES list and are listed under the Schedule I of Forest and Nature Conservation Act, Bhutan 1995
Ugyen Dorji, Program coordinator, National Spices, Medicinal and Aromatic Plants Program, Department of Horticulture, Royal Govt of Bhutan	*Nardostachys grandiflora*-Status Report.	Ethono botanist and Production Managers of the Institute of Traditional Medicine Services and Renewable Natural Resources Research and Development Centre Yusipang prior to the initiation of the survey. Grows in dense clumps and the densities recorded ranges from 2.7 to 23.4 clumps/m^2 (average 8.9), with an average of 7 stems per clump.

Presenter	Session Topic	Deliberations
		At a density of 62 stems per square meter, 3,116 m^2 would be required to meet Menjong Sorig Pharmaceuticals' annual demand considering collection rate of 100%, while an area of 6,233 m^2 at 50 % collection rate. Therefore, long term sustainability and meeting the demand from the Menjong Sorig Pharmaceuticals is a concern.
Discussions: 1. TRAFFIC India 2. Indonesia:	Compared the clump size of *Nardostachys grandiflora* from Bhutan to that of Uttarakhand, TRAFFIC India informed that an average of 40 stems per clump is found in Uttarakhand. He informed that the deviation is huge. Raised the issue of Cordyceps utility and also questioned that the animal (caterpillar is being exported which is against the CITES norms).	

Presenter	Session Topic	Deliberations
Ms. Sonam Peldon, Sr. Forestry Officer, Social Forestry and Extension Division, Department of Forests and Park Services.	Management of Medicinal Plants in Bhutan	Trade on medicinal plants past: Majito, Chirata, Pipla, star anis, *Picrorhiza kurrooa,* were sold in India. Export on the MFPs which includes medicinal plants have been banned since 1980s. Collection and trade of cordyceps legalized in 2004 and even for pilpa, collection and trade is free of royalty. Trade present: collection of high altitude plants restricted to Menjong Sorig Pharmaceuticals It was also informed that MoAF decides the trade of any Medicinal plants. As of now, 60 species of NWFPS listed in the framework for collection and marketing. Export permit is essential and is essential and is issued from the Department of Trade and certificates issued by Bhutan Agriculture and Food Regulatory Authority, Bhutan

Presenter	Session Topic	Deliberations
Mr. KyawWin Deputy Director Nature and Wildlife Conservation Division Ministry of Environmental Conservation and Forestry The Republic of the Union of Myanmar	Myanmar country presentation: Implementation of CITES in Myanmar.	In Myanmar, medicinal plants are widely distributed. Regarding the CITES implementation, he informed that occasional checking are undertaken in the shops and other areas of hot spots. Latest and updated information of CITES necessary facts are regularly distributed to the Directorate of Trade, Myanmar. He also shared that the basic concepts of the CITES are being distributed to local communities through media. Cultivation of Plants are based on the traditional propagation methods for commercial purpose in adherence to the law and CITES resolution. He shared that on the National Wildlife Enforcement Task force, there are 7 relevant departments such as Forest Department, Border Affairs, Customs Department, Department of trade, General administration Department, Attoney-General office, Myanmar Police force.
Discussion:	**Nepal:** No. species listed under CITES list. As the country has about 19000 flowering species. Myanmar said 9 species under Appendix II. **Traffic international:** Asked if Myanmar has main destinations of trade and any changes on the trade status on the country to country level. Need to put the trade records for Myanmar for the species. **Myanmar:** Not sure of the status **Traffic India:** same question on the international trade of *Ravoulfia serpentina* as an example of species exported .	

Presenter	Session Topic	Deliberations
Dr. Zhang Yue (The CITES Management Authority of P. R. China) The Endangered Species Import and Export Management Office of P. R. China	Overview of Conservation and Trade Control of Cistanche deserticola in China	He presented on the Desert species Cistanche deserticola. He said that this species is most abundant in Xinjiang, followed by inner Mongolia. It is Listed in appendix II at CoP 11 and Chinese experts and government identified as least concern species. As a means to ensure international trade is legal and traceable, Building a complete chain of evidence for specimen source has been initiated and Invoice, sales, contract, certificate of origin, verification sheet etc are in place. Further, in order to ensure international trade sustainable he informed that following initiatives are taken: a. Restricting exports of wild-sourced specimens b. Promoting the use of alternative species c. Developing artificial propagation d. Artificially propagated plants have been able to supply market demand e. Establishing nature reserve
P. Lakshminarasimhan Central National Herbarium (Botanical Survey of India)	CITES and Plants	Presented the list of species in the CITES List. He mentioned that adulteration has become rampant in the vegetable crude drug industry which puts people's health at high stake. He also presented the status of the following species: *Cycas beddomei* *Nepenthes khasiana* *Saussurea costus* *Aquilaria malaccensis* *Dioscorea deltoidea* *Nardostachys grandiflora* *Picrorhiza kurroa* *Pterocarpus santalinus* *Rauvolfia serpentina*

Mr Tarun Kathula Project Officer, CITES Management Authority Ministry of Environment and Forests Government of India, New Delhi	Country status, INDIA: ensuring trade in medicinal plants is legal, sustainable and traceable	He mentioned that India one of the 17 mega diverse and contributes to 8% of the known global biodiversity. Explained the different categories of the CITES lists both on plants and animals. CITES listed species in India are: **Plants** Appendix 1=13 Appendix 2=469 Appendix 3=4 **Animals** Appendix 1=91 Appendix 2=469 Appendix 3=10
		Explained the trade routes for export from India. Mentioning about few ports. He also explained that CITES species are included in the Schedules of the Wildlife Protection Act , 1972 which ensures strict monitoring and high conservation status. Presented that the E- market supply is a trend now a days
Discussion	**Sonam Peldon, Bhutan:** Is unscientific harvesting not a threat to sustenance? **India:** Responded that it is not applicable on farmed or propagated ones. There is no harvest from wild and also mentioned that for domestic use from the wild, we can't stop it as it's a minor issue. Sonam responded that the tribal population is quite high and may be appropriate to take into consideration for the long term sustenance of the species. **Traffic International:** Asked how India cope up with supply to huge number of industries. **India:** Responded that industries are the main owners of the artificial propagations and artificial propagation/cultivations are the answer for the industrial supply. **Traffic India**: need to understand India as a consumer state and also need to know how much of what is being imported.	

Presenter	Session Topic	Deliberations
Dr. Nandang Prihadi Dr. Harry Wiriadinata Mr. Mashurbin Mohammad Alias	Indonesia: Achieving legal, sustainble and traceable trade in medicinal plantst (Agawood)	Explained about the traditional medicine in Indonesia and use of Agar wood as an ingredients Informed that Indonesia has produced and exported several type of Agarwood products: as wood/chips, powder, oil, aroma therapy, soap, and tea. They said that those products are somehow then utilized as material to produce medicine Regarding the permit system, it is managed by Scientific and Management Authority of Indonesia
		To ensure sustainability, according to study, there are 2,218,949 trees of Agar wood in areas of 2071.5 hectares (study carried out in 45 regencies (out of about 300 regencies and covering 25 provinces (out of 33). Plantation was also carried out since 1989 which their ages of trees are recorded varying from 2 to 20 years old.
Bryony Morgan TRAFFIC Global Medicinal Plants Program Rashid Raza TRAFFIC India	Medicinal Plants of Asia: Multi-stakeholder approaches to ensuring trade is legal, sustainable and traceable	Introduced TRAFFIC to the forum. It was informed that the TRAFFIC's goal is to ensure that trade in wild plants and animals is not a threat to its conservation in nature. She also explained about the CITES and Asian medicinal plants. On the resource security, TRAFFIC mainly works on how to help prevent illegal harvest and trade and improve sustainable management of legal harvest and trade. Status and threats to the CITES species also have been deliberated. She also briefed on the wild collection and trade on such species. Trading net works are typically long and complex. Based on their study findings of the regional analysis on the CITES species are also presented. TRAFFIC also introduced the new concept of FairWORLD to the participants.

Discussion	Indonesia pointed out that medicinal products should be certified by WHO standards.
	They also proposed that for a company, CITES certificate should be respected and should replace other Fair WILD , and WHO etc. Cost of certificate process should also be considered. The concern expressed was that If we need more certificates, does it mean CITES certificate is not efficient to ensure sustainability? TRAFFIC was of the view that the concern should not be only sustainability, but also to ensure health safety and other related issues as well.

6.2 Day 2

Chair: Dr. P. Lakshminarasimhan Scientific Authority of India

Presenter	**Session Topic**	**Deliberations**
Dr. Hemlal Aryal, Under Secretary, Dept. of Forests, Nepal	Achieving sustainable and traceable trade on *Taxus wallichiana* in Nepal	Introduced that this species Taxus wallichiana occurs from Afganistan through Himalayas till Phillipines. In Nepal it is found from east to west Nepal with more concentration on western side. Taxol extracted from the species is used for cancer treatment. Presented the list of plant species included in appendix I,II and III of CITES. He also presented the Legal framework for Forest Management and Protection for the different forest types like government managed forest, community forest, leasehold forest, religious forest, protection forest. He explained that the trend of collection of *T. wallichiana* has drastically reduced since 2007 and country to which it is exported is India.

		Still conservation status is little known due to over exploitation in 90s, however the trend has changed. Illegal harvesting of leaves not exceeding 10MT mainly from east and northern part of Nepal stil exists. One of the issues concerning the authority and the management is the poor harvesting technique.
Dr. H.D.Ratnayake Lakshman Peiris, Department of Wildlife Conservation, Sri lanka	Medicinal Plants of Sri Lanka	Sustainable use of plants is the sustenance of Sri Lankan people. Now a days the value of indigenous medicines are increasing and the trade is blowing up. In Sri Lanka, about 500 species of medicinal plants are indigenous and more than 900 medicinbal plants are non indigenous. Sri Lanka's import of medicinal plants is 1/3 of the total national demand. In-situ medicinal plants are found in Protected areas. On the enforcement front, Sri Lanka has more than one law to protect and conserve medicinal plants.
Dr. Tarun Kumar, Ministry of Environment and Forests, India	Status Report of Red Sanders (*Pterocarpus santilinus*) in India	This species has got high regeneration capacity like that of weeds and plantations have been successful on alluvial soil. It is mainly exported to Japan. The roots are used for dying and wood sometimes used as medicine. *Pterocarpus santalinus* was classified as endangered in the 1997 IUCN Red List of Threatened Plants.
Presenter	**Session Topic**	**Deliberations**
		The Government of India considers both legal and illegal trade as a threat to *P. santalinus* and proposed it for inclusion in CITES Appendix II. The restricted distribution in South India and the long rotation period also increases the level of threat. The species was included in CITES Appendix II in 1995. He also explained the legal provisions pertaining to the CITES species specifically Red sanders.

Mr. Sonam Wangchuk Chief Forestry Officer, Wildlife Conservation Division, Department of Forests and Park Services.	Over view of Agar wood (eagle wood) conservation in Bhutan	Two species of agar viz. *A. malaccensis* and *A. khasiana* have been recognized in Bhutan, however, detailed information on Agar wood in Bhutan is still limited. Host plants for future propagation has been identified. Because of the sustainability concern, Agarwood plantations have increased over the last few years. Royalty of Nu. 4000 (approx.US$100) per Kg of Agar wood both from wild and cultivated is imposed. Regarding the enforcement, Agar wood is included under the Schedule I of Forest and Nature Conservation Act of Bhutan, 1995 which prescribes a fine 1,00,000Nu/kg for any illegal activities concerning agar wood.
		Porous international border and improper management are some of the priority conservation issues in Bhutan. Everyone commended on information Bhutan has gathered on the particular species and suggested that all countries to strive to do in a similar way like Bhutan on respective species.
Mr. Lakey Tenzin Dy.Chief, Department of Agriculture Marketing Services.	Renewable Natural Resource marketing strategy for the 11th Five Year Plan of Bhutan *(2013-2018)*	Bhutan Government has set a mission to increase the income of farmers and allied entrepreneurs through the sale of such natural products. Bhutan currently faces technology constraints for production of such natural resources and also faces market constraints. The constraints for the export for Bhutan is mainly due to low volume and low product quality. Packaging and poor labeling are also factors which need to be improved for the success of exporting natural products.
Discussion	It was felt necessary to maintaining a proper database for the countries to know the base line information on the CITEs listed species in the nature. The concern was also raised on the challenges faced in identification of plant species for custom officials. House agreed to the proposal of CITES secretariat to make an arrangement of training enforcement officials on regional basis.	

Presenter	Session Topic	Deliberations
Dr. Tapan Kumar Dey, Wildlife and Nature Division, Bangladesh	Endangered Medicinal Plants of Bangladesh	A presentation was made on the Medicinal plants of Bangladesh particularly on the endangered medicinal plants and medicinal plants used commercially. Dr. Tapan said that trade monitoring (export and import) data is important for all countries and species identification capacity needs to be enhanced for the enforcement agencies in Bangladesh.
Discussion	TRAFFIC India informed the house to make use of IUCN criteria for listing CITES species and also while monitoring the trade	

6.3 DAY 3

Chair: Mr. Nandang Prihadi, Ministry of Forestry, Indonesia

General Discussion	Open discussion on the CITES implementation on medicinal plants.	1. Harvest permit and also the transport permit like Nepal does would be a good way. 2. E-permitting is next step for clearances. 3. India suggested the incorporation of the CITES list in the Biodiversity Act as it will ease law implementation 4. Harvest and supply should be done through forest department to keep the track of the quantity harvested to ensure sustainability 5. Information sharing should be standardized and shared through the CITES web site.

7.0 Group Work

The second half of the third day was used for group works where the participants in two groups worked on the following topics:

Group 1: Sustainable resource management, including methodologies to make non-detrimental findings

Proposed and agreed mandate:
1) Briefly review the work on NDF done at the workshop in Nepal and other countries: Chair briefed all.
2) Progress made on NDF related work by the Plants Committee: Chair brief all and all agreed that it is important to have a Resolution on NDF.
3) Towards the CoP16. Consider whether keep or update CoP15 Decs. and whether to propose draft decision. It was agreed to propose the following two draft decisions:

Cistanche deserticola, Dioscorea deltoidea, Nardostachys grandiflora, Picrorhiza kurrooa, Pterocarpus santalinus, Rauvolfia serpentina and Taxus wallichiana

Group 1: Discussing on Sustainable resource management, including methodologies to make non-detrimental findings

Directed to the range States
CoP16. XX
To organize national workshops in order to gather information on distribution, population status and trends, harvesting techniques, management areas, trade levels, and on all other information relevant to formulate and improve the methodologies to make non-detriment
findings for the species in this Decision. Range States will also agree on follow-up activities to share information at the regional workshop.

Directed to the Secretariat
CoP16.XX
subject to the availability of external funding and in collaboration with the range States, the regional representatives for Asia on the Plants Committee, traditional medicine associations and TRAFFIC, organize one capacity-building workshop, on the basis of the above mentioned decision. The bodies to which this Decision is directed should ensure the implementation of regionally coordinated actions to improve the management of the seven species and ensure that the trade therein is legal, sustainable and traceable.

4) Marking and tracking of medicinal plants and plants products: participants of the WG are not currently implementing tracking systems for neither medicinal plants nor plants products. It was recognized that the general marking system of finished products is the labeling system. It was proposed that containers of dry medicinal plants or parts are tagged (that is probably the current practice). Finally, it was recognized that if the costs in future go down, the DNA or isotopes marking systems could be used on the medicinal plants trade.

5) Consider the recommendations of the TRAFFIC report and from other workshops. The WG agreed on the following recommendations:

    a. Share and increase collective knowledge on these species.
    b. Share information on wild and cultivated share of trade in these species
    c. Share information on distribution and population status of CITES species
    d. Share information on harvest techniques with respect to impact on the regeneration status of the species.

A code of practice elaborating the above recommendations should be published by range states and shared with other range states. The documents should also be published in local languages.
Steps to be taken individually by each range state are:
    a. Undertake resource mapping of these species
    b. Develop training material for collectors/harvesters and conduct training programs to promote sustainable harvest methods.

c. Maintain a publicly accessible database on population status and trade of these species.

Group 2: Legal and traceability of CITES species.
Trade controls, including methodologies to determine legal aquisition and provide traceability

Group 2: Discussing on legal and traceability of CITES species

Relevant Decisions adopted at the 15th meeting of the Conference of the Parties to CITES (Doha, 2010):

Directed to the range States of *Cistanche deserticola, Dioscorea deltoidea, Nardostachys grandiflora, Picrorhiza kurrooa, Pterocarpus santalinus, Rauvolfia serpentine and Taxus wallichiana,* to the regional representatives for Asia on the Plants Committee and to the Secretariat

15.36 The bodies to which this Decision is directed should ensure the implementation of regionally coordinated actions to improve the management of te seven species and ensure that the trade therein is legal, sustainable and traceable. These measures could include, interalia, the organization of regional capacity-building workshops,

the improvement of methodologies to make non-detriment findings and to determine legal acquisition, the harmonization of management and compliance measures, and the development of incentives to prevent illegal trade

15.36: Decisions of the Management Working Group for ensuring legality and traceability:
Importing and exporting Regional Countries should develop a mechanism for sharing information, on a bilateral and multilateral basis, trade in seven medicinal plants.
Examples:

- China and Indonesian CITES Management Authorities had signed a Memorandum of Understanding (MoU) for the direct trade of Agar wood between the two countries. Such trade is initially limited to certain trading companies on each side.
- Nepal has integrated into department of forest website consisting detailed database eg. Copies of permits and certificate on the trade of CITES specie including medicinal plants
- China has established a pre- notification mechanism for export permits from Argentina for the trade in Bulnesia sarmientoi
- Under a free trade agreement between USA and Peru, there is a chapter on forestry which has led to the development of a web-based information system in Peru that allows the USA to check its imports of big leaf mahogany against Peru's export permit data
- India has already uploaded the Identification Manual and details of seizures for several medicinal plants on the web site: www.wccb.gov.in

15.36: Capacity Building for developing CITES implementation for CITES listed medicinal plants

Encourage and support investments for sustainably harvested/propagated and value added medicinal plants products and analyse the value chain for the seven medicinal plant species, for framing relevant policies to encourage value added medicinal plants products.
Looking for possible funding and investments from internal and external funding mechanisms such as GEF for capacity building of CITES implementation for strengthening the CITES Management in view of CITES listed Medicinal plants.
Develop ownership of local communities through expanding the existing programmes for strengthening benefit sharing and the management of CITES Medicinal Plants.
Examples:
India and Sri Lanka are already implementing GEF project on Community based Medicinal Plants cultivation through forest management policy and practice national, state and local levels, which may be replicated by other regional countries. Further, two community-based sustainable harvesting pilot projects (using Fair Wild

Standard) were implemented by TRAFFIC and partners, in collaboration with Government of India.
Nepal is implementing a programme on Medicinal and Aromatic Plants with internal funding. There is an example of a sustainable management project for Kutki implemented by TRAFFIC/ WWF Nepal with Kanchenjunga conservation area management committee, with external funding.
Indonesia has a partnership mechanism involving private sectors, government, and communities for cultivation, post harvest management and trade of medicinal plants. Also implementing medicinal plant project funded by ITTO and others.
Bhutan had a project funded by European Union for developing sustainable medicinal plants use.
China has implemented a medicinal plants programme for sustainable use of medicinal plants in the Upper Yangtze Eco-region, in collaboration with WWF, TRAFFIC and IUCN, with funding from the EU- China Biodiversity Programme.

- IUCN-Bangladesh is implementing a community based cultivation and conservation of medicinal plants in Bangladesh.

15.36: Integrating the medicinal plants conservation, sustainable harvesting models, artificial propagation and management programme with National Biodiversity Strategic Action Plan (NBSAP) for obtaining internal and external funding resources.

Example:
India is already implementing GEF funded medicinal plants project in different State Governments.
Nepal's National Biodiversity Strategy has separate chapter on medicinal and aromatic plants.

15.36: Development of Customs Codes

- All countries should develop detailed customs codes for medicinal plant species, especially those traded in large quantities.

Examples:

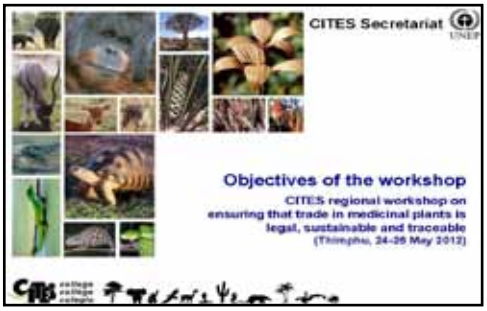
- India has adopted 8-digit codes for all medicinal plants and their products in trade under EXIM policy of India
- China has adopted 10-digit codes for all medicinal plants and their products in trade

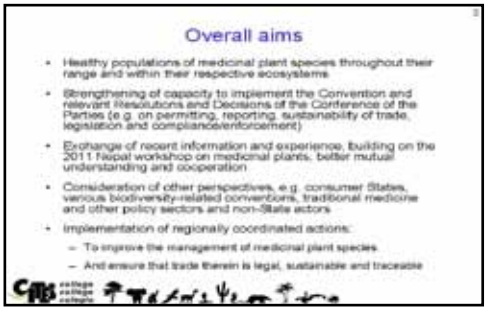
8.0: Recommendations from the Group Works:

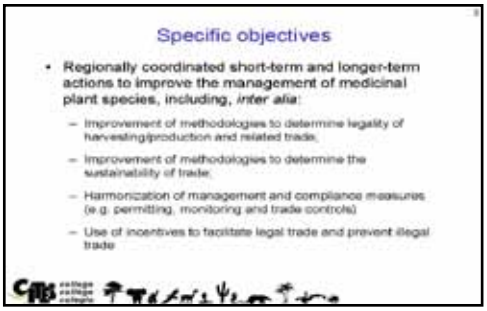
- Future work on medicinal plant trade should focus more on specific species and should be more precise about what has been accomplished to date and what remains to be done
- There is merit in using the aim of 'legal, sustainable and traceable trade' as an analytical structure but each element should be explained in more detail, so the structure serves as a better guidance tool for countries
- Medicinal plants and their trade should be reflected in countries' National Biodiversity Strategies and Action Plans as well as cooperative efforts by national focal points for biodiversity-related conventions and the GEF
- Regional bodies such as ASEAN, SAARC, SACEP, ASEAN-WEN and SA-WEN as well as bilateral agreements/mechanisms should be used to improve the management and control of medicinal plant trade
- A multi-agency approach should be developed and used in relation to medicinal plant trade
- The coverage of medicinal plants in current CITES capacity building materials (e.g. the Virtual College and library as well as the ID manual) and within InforMEA should be enhanced
- Work being done on innovative financing through technological products (e.g. species identification applications for smart phones) and private sector sponsorship should take medicinal plants into account
- The Green Customs initiative among CITES, other MEAs and UNEP should take account of medicinal plants
- Additional work is needed on determining whether the harvesting of medicinal plants is sustainable or not and in improving the traceability of medicinal plant trade through relevant supply or value chains
- There is a need to identify and make use of national expertise on medicinal plants
- Countries which use the ICCWC toolkit to assess their wildlife law enforcement efforts and which use new enforcement techniques (e.g. controlled deliveries or financial intelligence) should consider the medicinal plant trade as well
- Medicinal plant trade needs both political attention and technical work (both scientific and regulatory)
- There should be an emphasis on working together and in maintaining the momentum on medicinal plants
- More effort should be made to involve local people in the management and control efforts, e.g. by providing them with ownership rights over and benefits from medicinal plants
- If not already involved, FAO might be able to assist countries in ensuring the sustainable management and harvesting of medicinal plants, including for international trade

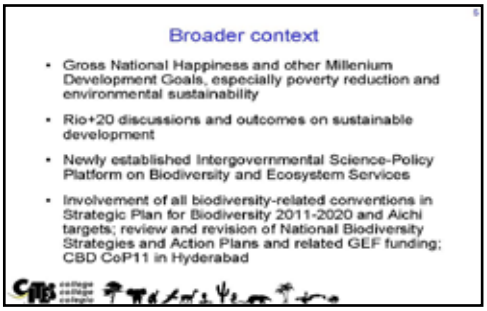
9.0 Presentation:

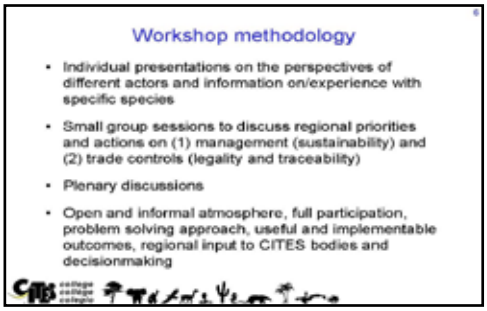
9.1 Workshop Objectives: Ms. Marciel Yeater, CITES Secretariat











10. Country Reports

10.1 Bangladesh

Contents of the Presentation

- Introduction
- Medicinal plants of Bangladesh
- Endangered Medicinal plants of Bangladesh
- Description of few medicinal plants
- Major Medicinal Plants used commercially in BGD

Eclipta prostata

Introduction

- Medicinal plants are special type of plants which have the preventive or curative power of different diseases in animal body.

IMPORTANCE

- Medicinal plants have significant use in Pharmaceuticals, Cosmetics, Agriculture and Industries.
- Usually medicine, extracted from medicinal plants does not have any side effect.
- Medicinal plants have been using since time immemorial because of its effectiveness.
- Treatment by medicinal plant is very much cost effective.

Medicinal plants of Bangladesh

- Bangladesh is rich in terms of medicinal plant diversity.
- In Bangladesh, so far 450- 500 medicinal plants have been recorded(Yusuf *et al., 1994* and Ghani, 1998)
- Medicinal plants are usually used in both Auyrvedic and allopathic pharmaceuticals in Bangladesh.
- Out of 450-500 species about 50 species of medicinal plants are widely used in Bangladesh.

List of some medicinal plants of Bangladesh

SL. No	Local Name in English	Scientific Name	Using Parts
1.	Arjun	*Terminalia arjuna* W & A.	Bark
2.	Asok	*Saraca indica* Linn.	Bark & Fruit
3.	Anontomul	*Hemidesmus indicus* R. Br.	Root, Whole plant
4.	Arsogondha	*Withania somnifera* Dunal,	Root, Fruit & Seed
5.	Arhor	*Cajanus cajan* Huth.	Leaf & Seed
6.	Akondo	*Calotropis procera* Br.	Root, Bark & Leaf
7.	Atha	*Annona muricata* Linn.	Root
8.	Apank	*Achyranthes aspera* Linn.	Whole plant
9.	Amloki	*Phyllanthus embelica* Linn.	Fruit, Leaf & Flower
10.	Amor	*Amoora cucullata* Roxb.	Bark
11.	Asar	*Grewria pariculata* Roxb.	Bark
12.	Asamlota	*Eupatorium ordoratum* Linn.	Leaf & Stem
13.	Asfol	*Euphorbia longan* Steud.	Fruit
14.	Udal	*Sterculia villosa* Roxb.	Gum
15.	Ulotkombol	*Abroma augusta* Linn.	Root, Bark & Leaf
16.	Ulotchondal	*Gloriosa superba* Linn.	Leaf, Root
17.	Kodbal	*Feronia limonia* Linn.	Leaf & Flower
18.	Korobi	*Nerium indicum* Mill.	Leaf, Root & Oil
19.	Korpor	*Cinnamomum camphora* Nees.	Extract
20.	Kakdumur	*Ficus hispida* Linn.	Seed & Bark
21.	Katbadam	*Terminalia catappa* Linn.	Seed, Bark & Leaf
22.	Kababchini	*Pimenta diocia* Merr.	Bark
23.	Kalogam	*Syzygium cumini* Linn. SK.	Fruit, Seed & Bark
24.	Kalotulche	*Ocimum sanctum* Linn.	Leaf ,Flower & Whole plant
25.	Kalodhotra	*Datura metel* Linn.	Leaf, Root & Seed
26.	Kalomagh	*Andrographis paniculata* Nees.	Whole plant
27.	Kus	*Abrus precatorius* Linn.	Leaf, Root
28.	Kumarilota	*Smilax macrophylla* Roxb.	Root
29.	Kurche	*Holarrhena pabesens* Wall.	Seed & Leaf
30.	Kasraj	*Eclipta prostata* Hassk.	Whole plant
31.	Golmoris	*Piper nigrum* Linn.	Fruit
32.	Satim	*Alstonia scholaris* R.Br.	Leaf & Bark
33.	Nisinda	*Vitex trifolia* Gram.	Seed & Leaf
34.	Jointi	*Sesbania sesban* Merr.	Leaf, Root & Seed
35.	Tridhara	*Tridex procunbens* Linn.	Whole plant
36.	Datmajon	*Glycosmis pentaphylla* Corr.	Leaf
37.	Durbagass	*Cynodon dactylon* Pers.	Whole plant
38.	Nim	*Azadirachta indica* A.Tuss	Seed & Root
39.	Patorkuche	*Kalanchoe pinnata* Pers.	Leaf
40.	Pan	*Piper betal* Linn.	Leaf

Cont.

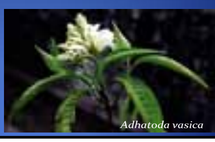
41	Pudina	*Mentha viridis* Linn.	Whole plant
42	Piag	*Allium cepa* Linn.	Bulb
43	Bohera	*Terminalia belerica* Roxb.	Fruit
44	Basok	*Adhatoda vasica* Nees.	Leaf, Root & Flower
45	Bel	*Aegle marmelos* Cor.	Fruit & Leaf
46	Varenda	*Ricinus communis*	Seed
47	Loggapoti	*Mimusa pudica* Linn.	Whole plant
48	Shorpogondha	*Rauwolfia serpentina* Benth.	Root & Leaf
49	Holud	*Curcuma longa* Linn.	Rizome
50	Horitoki	*Terminalia chebula* Retz.	Fruit

Some medicinal plants

Abroma augusta

Acalypha indica

Achyranthes aspera



Adhatoda vasica

Endangered Medicinal Plants of Bangladesh

Sl	Scientific name	Local name	Family
1	*Aloe barbadensis* Mill.	Ghretokumari	Liliaceae
2	*Achyranthes aspera* Linn.	Apang	Amaranthaceae
3	*Andrographis paniculata* Wall & Nees.	Kalomegh	Acanthaceae
4	*Asparagus racemosus* Willd.	Sotomuli	Asparagaceae
5	*Eclipta prostata* Hassk.	Kasoraj	Compositae
6	*Abroma augusta* Linn.	Ulatkombol	Steraculiaceae
7	*Gloriosa superba* Linn.	Ulatchondal	Liliaceae
8	*Gynocardia odorata* Br.	Anontomul	Asclepiadaceae
9	*Holarrhoena pubesens* Wall.	Kurche	Apocynaceae
10	*Adhatoda vasica* C.B. Clark.	Basok	Acanthaceae
11	*Rauwolfia serpentina* Benth.	Sorpogondha	Apocynaceae
12	*Saraca indica* Linn.	Asok	Caesalpinaceae
13	*Sesbania sesban* Merr.	Jointi	Liguminosae
14	*Temninalia belerica* Roxb.	Bohera	Combretaceae
15	*Calotropis procera* R.Br.	Akondo	Asclepiadaceae

Description of *Rauwolfia serpentina*

- It is one of the most important native medicinal plants of Bangladesh.
- It an evergreen, perennial, glabrous and erect under shrub of height up to 60 cm . Roots are tuberous with pale brown cork.
- The leaves of the plant are in whorls or three, lanceolate or obovate, bright green in color.
- Flowers are in irregular corymbose inflorescence with white or pink color.
- Root of this plant is used for the treatment of hypertension.
- It is endangered because it is being extracted from the nature extensively due to its widespread use.

Description of *Justicia adhatoda*

- It is well known plant drug in Ayurvedic and Unani medicine.
- A much branched, evergreen, shrub.
- Height is 2 meter. Stem terete, glabrous.
- Leaves are elliptic- lanceolate, flowers in short, dense, long, stout, bracts elliptic.
- It is bitter tasting, and used in asthma, brochitis, chronic caughs, breathless, peptic ulcer, piles, lower blood pressure and so on.

Major Medicinal Plants Used Commercially in BGD

Sl	Scientific name	Using parts	Yearly demand (ton)
1	*Terminalia arjuna*	Dried bark	3000
2.	*Aloe barbadensis*	Green bark	2400
3.	*Saraca indica*	Dried bark	1600
4.	*Terminalia belerica* *Terminalia chebula*	Dried fruit Dried fruit	1500 1500
5.	*Azadirachta indica*	Bark, seed and leaf	1050
6.	*Andrographis paniculata*	Dried plant	1000
7.	*Justicia adhatoda* *Ocimum sanctum*	Dried leaf Dried leaf	800 800

Source: Dey, 2009

Some commercially important medicinal plants in BGD

Some commercially important medicinal plants

10.2 Bhutan

The Management of Medicinal Plants in Bhutan

Sonam Peldon, Sr.Forestry Officer, SFED

Background

The Non-wood forest products (NWFPs) including the medicinal plants play an important role in the daily lives and overall well-being of the Bhutanese people especially among the rural farming community; for instance they are a major source of off-farm income, food, medicinal and aromatic products, fodder, fiber, and also used for local construction materials. The NWFPs often are a safety net for poor people in the off-farm season and/or whenever needed as a food security measure. NWFPs offer a lifeline for many rural Bhutanese households. Women have been doing this since time began, using a host of forest products for handicrafts, dyes, waxes, tools, clothing, medicines, food and fodder.

With the majority of the population living in rural areas, NWFPs have a great potential for income generation for the poor living in remote areas in Bhutan. At present several case studies have demonstrated that NWFPs can contribute to income generation while managing the resources in a sustainable manner. However, the potential needs further consolidation and realization to provide local people with a stepping stone out of poverty.

The NWFPs cover a wide range of products such as forest vegetables, fruits and nuts, forest food crops, fodder, bamboo and cane, medicinal plants, dyes, spices, ornamental plants, resins and oils, honey, etc. These NWFPs confirm the important components/ ingredients for paper, furniture, incense sticks, medicines, cosmetics etc.

Past collection trends of medicinal plants

For the production of traditional medicines, upon request from ITMS (Institute of Traditional Medicine Services), the Department of Forests use to award blanket approval for the collection of high altitude medicinal plants. Lingzhi was the main site for the collection of high altitude medicinal plants for ITMS. In the last few years ITMS tripled its production of medicinal plant medicines as the aim is to establish access to traditional medicines in every Geog in Bhutan. The increase in demand for the medicinal plants has led to increased pressure on the resources, especially on a few species.

The Royal Government of Bhutan realized that in the long run such unscientific harvesting of plant species would bring more harm than the revenue generated. Hence there was a ban on exporting MFP - which included medicinal plants - imposed in the early 1980s.

Present collection trends of medicinal plants

The Department of Forests & Park Services (DoFPS) policy is to allow for NWFP resource collection on community basis rather than issuing permits to individual collector, trader and exporter. For the long-term sustainable management of NWFP resources in the country, a National NWFP Development Strategy has been prepared to guide the future NWFP management in the country.

Considering the tremendous potentials of enhancing rural livelihoods through income generation, business and employment opportunities through collection, trade, and export of NWFP resources, it is best that the DoFPS takes a major step towards making sustainable use of NWFP resources in the country.

While resource assessments and inventories, and understanding the ecology, abundance, habitats and threats of several important NWFP species through surveys, studies and in-depth research must be taken up, community-based collection and harvesting of NWFPs must be started immediately. As an initiative towards the livelihood development activities, the interim framework for the collection/harvesting of NWFPs to guide NWFP collection and trade. The interim framework has the clear roles and responsibilities of NWFP collectors or harvesters; traders and exporters; DoF Head Quarter, DoF field offices and agriculture marketing services.

This framework is developed for the collection/harvesting of NWFPs from Government Reserved Forests (GRF) and from Private Registered Land (PRL). The framework is developed to guide the NWFP collection using a system of permits.

Trade of medicinal plants in the past

In the past the medicinal plants, such as Majito (*Rubia cordifolia*), Chiraita (*Swertia chirayita*), Pipla (*Piper nigrum* and *Piper longum*), Staranis (*Illicium griffithii*) and Putishing/kutki (*Picorrhiza kurroa*), among others, were sold to India. The sales method used was the leasing of large tracts of land through tenders or auctions. The highest bidder was given full access to the jurisdiction over seasonal collection in the area allotted. Such produce was classified as minor forest produce (MFP) and could be exported to India upon issuance of a "Certificate of Origin" by the Divisional Forest Officers concerned.

Trade of medicinal plants at present

In the case of commercial purposes (imports and exports), permit approvals must be obtained from the DFO with final approval from the Department of Forest & Park Services or the Ministry of Agriculture & Forests. Such a requirement applies to non-Community Forests areas, while members belonging to a Community Forest, are guided by the management plan and its bylaws.

The import of NWFPs is also guided by these rules whereby an importer must obtain official approval in the form of a written import permit from the Department of Forest & Park Services through either the DFO or the PM. Similarly, in the case of exports, only the Ministry of Agriculture & Forests decides on the export of any items of medicinal plants from government reserved forests. No exports are permitted without the export certification issued by Bhutan Agriculture and Food Regulatory Authority (BAFRA) and an export license issued by the Department of Trade, Ministry of Economic Affairs.

The trade and transit of medicinal plants are allowed provided valid permits are secured from the Divisional Forest Officer (DFO) or the Park Manager (PM) if they are within protected areas. Royalty rates for NWFPs are waived for domestic purposes however, for commercial purposes a nominal royalty is levied. The collection of medicinal and aromatic plant species is limited to a requisition from the Menjong Sorig Pharmaceutical (MSP), only upon receipt of the formal application as per the MoU developed between DoFPS & MSP. The harvest of the medicinal plants has to be accompanied by written permits and approval from either the DFO or PM. The import and export of medicinal plants are regulated by centralized control requiring approval from the head of the Forest Department.

Status of *Dioscorea deltoidea* in Bhutan

There are about 13 species of *Dioscorea* found in Bhutan. The tubers of most *Dioscorea* spp are used as food supplement in Bhutan and are sold in the domestic market only. Though there is traditional knowledge on the use of other species of Dioscorea but there are hardly any literature/documents on the use of *D.deltoidea*. Locally the tuber of D. pentaphylla are used for making container to feed water to chickens as it is believed to have medicinal property and also used for flu, fever. The fruit and tuber of *D. alata* are used as medicine for diabetes. The tuber of *D.bulbifera*, locally called as ghitta in Lhotsamkha is used for preparation of local alcohol. The tubers are usually collected from matured plants usually in winter months.

Conclusion & Recommendation

There are a number of medicinal plants growing naturally in Bhutan which have scope for international market value. The major high value products are *Ophiocordyceps sinensis*, which was legalized for collection only from 2004 through the Royal Command giving an opportunity to generate additional income to the highlanders or the yak herders. The other major forest product are the lemon grass oil, Matsutake mushroom, *Pipla* spp, *Rubia cordifolia* and *Swertia chirayita*

With the increasing demand for medicinal plant and aromatic plants by MSP, lack of proper management practices and monitoring, some species of medicinal and aromatic plants in Lingzhi dungkhag will face depletion if not properly managed in the near future. Most of the medicinal plants could also get depleted if commercial harvesting is allowed and no proper management systems are put in place. For example *Podophyllum hexandrum* is still relatively abundant in Lingzhi area (main collection area for high altitude medicinal plants) while it is depleted in India.

The MSP is very much aware of the situation and has explored other collection sites from other districts i.e Bumthang and Dagala. However, the collectors are more concerned with meeting demands for medicinal and aromatic plants of MSP and less concerned with sustainability issues.

The development of a management plan, first for the most priority high altitude medicinal plant are deemed necessary to ensure that collection is based on supply and not solely based on demand. Collectors also need to be trained in proper collection techniques. Finally, monitoring and evaluation of medicinal plant collection is crucial to ensure that collection methods are properly implemented and to make timely interventions to ensure sustainable management of the resources (use of adaptive management approaches). The Cultivation of medicinal plants can help to strengthen the production of a certain commodity and ensure its sustainable supply while reducing the pressure on the wild resources.

MAPs- Past collection trends

- Upon request by MSP to collect medicinal plants, the DoFPS issues permits where the location for collection and quantity to be collected are specified in the permits
- Payment is generally made for each kilogramme collected. For quality control, "dungtshoes," or indigenous technicians, supervise the collection whenever possible
- No royalty was levied
- In most cases, meeting the collection target is more important to collectors than the scientific harvesting on a sustainable basis

Present collection trends

- MSP apply to DoFPS for collection permit which is based on the MoU
- Conducts collaborative training on identification and sustainable collection of MAPs (DoFPS & MSP)
- Community based management of NWFPs including Medicinal plants was started from 2009 as per the framework

PRESENT SYSTEM OF PERMITS

Legal system of harvesting

- Approved CF management plan
- Approved NWFP management & marketing plan

Collection permits issued by DFO/PM

Minimal Royalty Levied except for Cordyceps (Nu.7000 per kg)

Trade of Medicinal Plants in the past

- In the past, medicinal plants, such as majito (*Rubia cordifolia*), charaita (*Swertia chirayita*), Pipla (*P. pedicellatum* and *P. longum*), Staranis (Illicium griffithii) and putishing/kutki (*Picorrhiza kurroa*), among others, were sold to India
- leasing of large tracts of land through tenders or auctions and the highest bidder was given full access to and jurisdiction over seasonal collection in the area allotted
- MAPs was classified as minor forest produce (MFP) and exported to India upon issuance of a "Certificate of Origin" by the concerned Divisional Forest Officers

- Ban on export of MFP - which included medicinal plants - imposed in the early 1980s as unscientific harvesting of plant species would bring more harm than the revenue generated
- Collection & trade of Cordyceps legalized in 2004 though Royal Command giving an opportunity to generate additional income to the highlanders or the yak herders
- Collection & trade of Pipla through Royal command to only the four eastern Dzongkhags, free of royalty

Trade of Medicinal Plants at present

- Collection of the high altitude medicinal plants had been limited to Menjong Sorig Pharmaceutical
- trade and transit of medicinal plants are allowed provided valid permits are secured from the Divisional Forest Officer (DFO) or the Park Manager (PM)
- For commercial purposes exports, permit approvals must be obtained from the DFO/PM with final approval from the DoFPS/the MoAF. Such a requirement applies to non-Community Forests areas, while members belonging to a Community Forest, are guided by the management plan and its bylaws
- MoAF decides on the export of any items of medicinal plants from the GRF land
- Collection/harvesting though community based, no individual requests is entertained
- Management and marketing guided by the interim framework

- Trade of Cordyceps exclusively through auction
- As of now, 60 spp. of NWFPs are listed in the framework which can be collected, marketed and traded provided harvesting guidelines are strictly followed
- Royalty collected by office of DFO/PM as per the Departments schedule of rates
- DFO/PM issues the transit permit and movement order for exports
- No exports are permitted without the export certification issued by Bhutan Agriculture and Food Regulatory Authority (BAFRA) and an export license issued by the Department of Trade, Ministry of Economic Affairs

General Information

Family – Dioscoreaceae

Species found in Bhutan

- *Dioscorea prazeri*
- *D. alata* (Bantarul)
- *D. hamiltonii*
- *D. bulbifera* (gittha)
- *D.pentaphylla*
- *D. esculenta*

D. deltoidea

- *D.pubera*
- *D.glabra*
- *D.belophylla*
- *D.kamoonensis*
- *D. melanophyma*
- *D.hispida*

D.deltoidea

- Found in Mongar district (as per flora of Bhutan)
- Available in Zhemgang, Pemagatsel, Tsirang, Samtse
- A species of drier area and commoner in the Western Himalayas and is used as a soap(as per flora of Bhutan)
- Most *Dioscorea* spp. are used as food supplement in Bhutan
- Sold in domestic market seasonally – Damphu market, Punakha market
- Now people have started collecting for commercial purposes. its available in vegetable markets of Tsirang and Thimphu

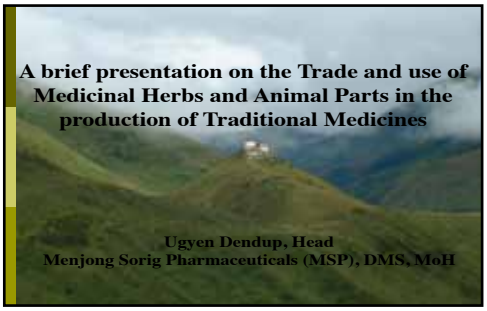
Traditional Knowledge

- *D.pentaphylla* – locally called Bhaigur/tamarkey (Lho) – tuber is used for making container to feed water to chickens as it is believed to have medicinal property
- Consumed in remote villages as a staple food
- *D. alata* - in Lhotsamkha Bantarul (both fruit & tuber)– medicine for diabetes
- *D.bulbifera* – in Lho ghitta, for preparation of local alcohol
- *D.pentaphylla* – for flu, fever
- The tubers are collected from matured plants usually in winter months
- A small portion of tuber is left for regeneration

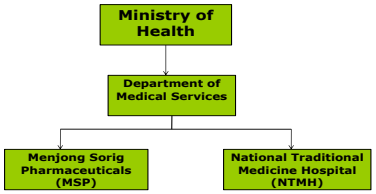
- People collect tubers for their own consumption (as food supplements) earlier
- Since people collect tubers for their own consumption, sustainability of plants was never a issue earlier
- Lack of proper scientific documentation on its distribution pattern, regeneration and methods of collection for most medicinal plants
- Lacks knowledge on its medicinal properties and its other uses.

Conclusions

- Scope for International market
- Further strengthen the market chain for some of the important medicinal plants like *Pipla* spp, *Rubia cordifolia* and *Swertia chirayita*
- Cultivation of medicinal plants can help to strengthen the production and ensure sustainable supply while reducing the pressure on the wild resources
- monitoring and evaluation of medicinal plant collection is crucial to ensure that collection methods are properly implemented and to make timely interventions to ensure sustainable management of the resources (use of adaptive management approaches)



Organizational structure of MSP



Historical Background

- Bhutan was historically described as the Southern Land of Medicinal Plants.
- gSo-ba Rig-pa is the system of traditional medicine practiced in Bhutan.
- From Tibet in the 1st half of the 7th century.
- Formalized in the National Health system in 1961.
- Assimilated elements from
  - ✓ Ancient Greek medical system (via Persia)
  - ✓ Ayurvedic medical tradition (from India)
  - ✓ Some forms of Chinese medicine
  - ✓ Pre-Buddhist shamanistic traditions

Mandates of Traditional Medicine Services

- Promote traditional system of medicine in the country
- Preserve the unique culture and tradition related to medical practice
- Achieve excellence in traditional medical services in Bhutan
- Provide traditional medicine as an alternative to allopathic medical system
- Develop human resources required for the traditional medical system.
- Produce medicines required by the traditional medical system
- Conduct research and quality control of TM

Major MSP Activities

- **Production**
  - traditional medicines (94 medicines)
  - commercial products (20 products)
- **Research & Development**
  - Standardization
  - Quality Control
  - Scientific validation
  - New product development
- **Commercialization & Marketing**
  - Spa and Health promoting products
  - Toiletries
  - Essence & Fragrance
  - Herbal teas
  - Cosmetics

Medicinal Plants in the Production of Traditional Medicines

- There are more than 2990 different types of raw materials for preparation of traditional medicines.
- Currently 300 different types of raw materials are used.
- 70% of these are sourced within the country.
- Such raw materials can be classified into:

1. sNgo-sMen -high altitude medicinal plants
2. Throg-sMen -low altitude medicinal plants
3. Sa-sMen -Mineral origin.
4. Sog-cha-sMen -Animal origin.

Raw materials Procurement…

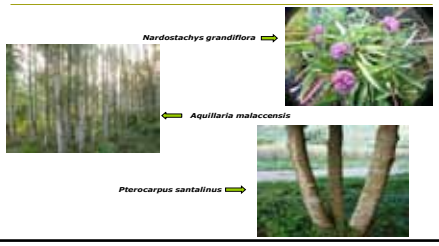
Year	2011		2010		2009	
Source	Import	Local	Import	Local	Import	Local
No. of Species	57	188	64	177		
Qty (Kg)	3052.8	3385.4	5438	11032		
Value (US $)	56024.03	11387.37	156887.0	59185.4	43891.9	37895.1

- Annual Demand for TM growing rapidly.
- Demand for 2012-2013 is 20 tons for just TM alone.
- Demand for Health promoting and other herbal products is immense.
- Raw materials for 2012-2013 projected at 35-40 tons.

Species on the CITES list (2011)

Species	Local name	Source	Qty (kg)	Value (US $)
Pterocarpus santalinus	Tsanmar	India	380	3054.6
Nardostachys grandiflora	Pangpoe	Bhutan	220	410.4
Aquillaria malaccensis	Archa	Bhutan	357	528.6

CITES List…



Research and Quality Control

- Assuring quality, efficacy and safety of TMs
- Authentication of species and monograph building
- Building quality parameters
- Monitor stability of traditional medicine
- Extraction and identification of chemical constituents
- Validation of pre-processing and detoxification methods
- Management of adverse drug reactions – Pharmacovigilance
- Survey on alternate sources for medicinal plants

Commercialization and Marketing

- Initiated in 1998 to generate fund for sustainability.
- Introduced 8 products for sale in the local market (30).
- Most popular products are Tsheringma herbal tea, Cordyplus/Cordyactive and Tsheringma incense powder.
- More products are in the process of development.
- Marketing strategy is being developed to export TM products.
- Gross amount of Nu. 15.47 million was generated from the sale of medicines & commercial products.

Challenges & Opportunities

- Ensuring sustainability – natural resources
- Protection of rights – how can we protect the indigenous knowledge on Traditional Medicine
- Community based resources – collaboration with the farmers
- Legal issues – endangered and protected species, wild life regulations
- Product Development and Scientific research opportunities
- Complexity of research on TM.
- Green economy

Future Priorities

- Ensuring sustainability of resources
- Development of core technical competency
- Strengthening of Research & Development
- Protection of Intellectual Property Rights
- Patenting of the medicinal products
- Keeping up with technology
- Climate change impact mitigation efforts

Nardostachys grandiflora DC. -status report

Ugyen Dorji
Program Coordinator
National Spices, Medicinal and Aromatic Plants Program
Horticulture Division, Department of Agriculture
Ministry of Agriculture and Forests
ugdorji@moaf.gov.bt; ugdorji@googlemail.com

Outline

- Methodology: Survey and Mapping
- Result: Uses, Harvest, Distribution and Ecology, Density

Methodology: Survey and Mapping

- 16 'priority species' were identified by *Drungtshos* (traditional doctors), Ethonobotanist and Production Managers of the ITMS and RNR-Research and Development Centre Yusipang prior to the initiation of the survey.
- These were chosen primarily using Ranking technique, on the basis of concerns over the sustainability of harvesting, and of the long-term capacity of the resources in Lingshi to meet the demands of ITMS.
- Surveys conducted from 2004-2008
- Permanent plots (5X5 m for this species) with geo reference, were established
- Local collectors of Lingzhi were used to identify collecting areas
- Data on soil and vegetation
- Herbarium specimens collected, and compared with collections at National Biodiversity Centre and RBG Kew

ITMS's collecting area/Study area

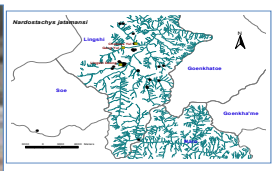
- Collection since 1961
- Over 70 Species collected
- Over 20 tonnes (dried) collected

Survey and Mapping: Methodology

Team members:
- TA Ethonobotanist from RBG Kew,
- a Drungtsho and an Ethonobotanist from ITMS
- Field Ranger from JDNP(National Park)
- RNR RDC Yusipang
- local collectors: and
- field enumerators

Survey for *Nardostachys grandiflora* below Lingzhi Dzong

Result



Collecting areas of *Nardostachys grandiflora*

Guidelines for Identification and Collection of Medicinal Plants in Bhutan

Nardostachys grandiflora DC.

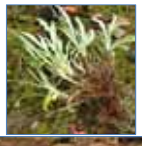
- Synonyms: *N. jatamansi* DC.
- Local Name: *pang poe*
- Flowering in July

Uses

- Dried rhizomes used in Traditional Medicine and in making incense
- Local people as incense

Harvest

- The whole (mature) plant is dug up in August and September.
- In Lingzhi, collection restricted in the vicinity of habitation, as it leaves unsightly holes in the ground.



Distribution and Ecology

- ***Distribution:*** Mainly found in areas of open grassland but also among sparse *Rhododendron* scrub,
- ***Soil type:*** on loam and sandy clay with low to medium pH, high to very high levels of organic matter, medium to high calcium and potassium, and variable levels of nitrogen.
- ***Altitude:*** Relatively widespread species with a wide altitude range, between 3824 and 4664m.
- ***Slope:*** Recorded on slopes of variable aspect, but with a strong tendency towards NE-facing (and to a lesser degree E- and SE-facing).
- ***Species association:*** Commonly found in association with *Bistorta macrophylla*, *Dactylorhiza hatagirea*, *Morina nepalensis*, *Onosma hookeri*, *Pedicularis flagellaris*, *Pterocephalus hookeri* and *Rhododendron anthopogon*.

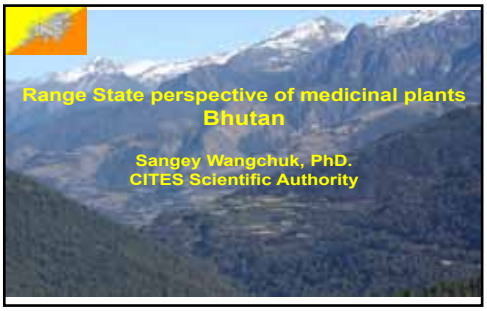
Population Density

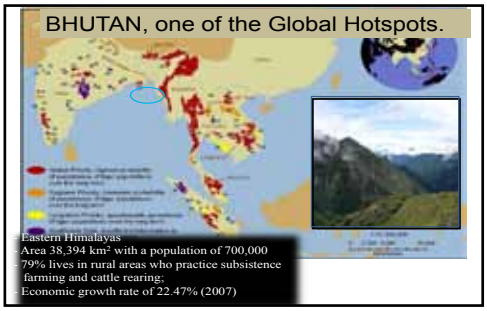
- Grows in dense clumps.
- Densities recorded ranging from 2.7 to 23.4 clumps/m^2 (average 8.9), with an average of 7 stems per clump.
- The average dry weight per rhizome was found to be 1.4 g per stem

- Average MSP requirement is 268 kgs of dried plant (2008-2011)
- At a density of 62 stems per square meter, 3,116 m^2 would be required to meet MSP's annual demand considering collection rate of 100%, while an area of 6,233 m^2 at 50 % collection rate.

Jatamansi being dried at Lingzhi

Thank you





Conservation Hub

- 51.44% of total land under Protected Areas system
- Relatively safe haven for a wide array of wildlife...
- Threat to wildlife survival is not so pronounced

Strong political support & religious sentiments

Bhutan's conservation policy strongly favors conservation and sustainable management of natural resources;

Bhutan's guiding development philosophy of maximising "Gross National Happiness (GNH) bears "Environmental conservation" as one of the four pillars. This unique approach sacrifices short term gain over long term sustainability

Explicit provisions to maintain 60% forest cover at all times (*NFP 1974 & Article 5 of Bhutan's Constitution 2007*)

The Constitution of the Kingdom of Bhutan

Article 5(1):
Every Bhutanese is a trustee of the Kingdom's natural resources And environment for the benefit of the present and future generations and it is the fundamental duty of every citizen to contribute to the protection of the natural environment, conservation of the rich biodiversity of Bhutan and prevention of all forms of ecological degradation including noise, visual and physical pollution through the adoption & support of the environment and friendly practices and policies.

Article 5(3):
.... a minimum of sixty percent of Bhutan's total land shall be maintained under
Forest cover for all time.

{Press release: Bhutan's Forest Policy received an hon'ble mention during the Future Policy Award (Bhutan, The Gambia, Nepal, Rwangda, Switzerland and the USA}
http://www.worldfuturecouncil.org/4322.html

Policy to Action

- 80.89% forest cover, 70.46% excluding scrub & Shrub (MoAF, 2011)
- 5,603 species of vascular plants
- 369 species orchids & 46 Rhododendrons
- Over 90 species of mushrooms including Matsutake (BAP 2009)

Over 300 species of medicinal and aromatic plants including 105 endemic species (BAP 2009)

RNR Marketing Strategy for the 11th FYP

RNR Marketing Mission for 11 FYP

To increase the income of farmers and allied entrepreneurs

To increase RNR sector's contribution to the GDP through enhanced returns from the RNR sector

To increase RNR sector's contribution to the GNH

RNR sector contribution to GDP declined from 18% in 2009 to 14% in 2010.

Technological Constraints

- Poor quality *(appearance, uniformity , colour)*
- Poor post harvest practices,
- Limited market information
- Inadequate market research

Domestic Market Constraints

High prices (not competitive with cheap import
Poor infrastructure
Limited and dis-organised market outlets(Sunday Market, auction yards)
Scattered and uneconomic scale of production
lack of consistency in supply and quality,

Constraints for Exports

- Low volume
- Inconsistent supply
- Limited alternative market
- Low product quality
- Poor packaging and Labeling
- No proper branding
- High cost of logistics

Constraints related to market support services

- Weak entrepreneurship spirit/attitude of farmers
- RNR staff still dominated with PAM
- Policy support (minimum price support/ subsidy)
- Poor private investment in RNR sector

Guiding principles

- Sustainable utilization of natural resources for enterprise development
- Promote organic and natural agriculture
- Promote domestic markets to substitute imports of major RNR and allied products
- Promote niche products export markets

- Vibrant institutional linkages (BAIL, FCB, BEA, MoEA)
- Attract investment (FDI) in RNR and allied sector
- Brand Bhutan
- Fiscal Incentives and facilities

Strategies

- Infrastructure Development (cold storage, market outlet, transportation facilities)
- Farmer groups and cooperatives
- Market Information, research and intelligence
- Access to capital (Investment & CDF)
- Capacity Building
- One stop farmer shops

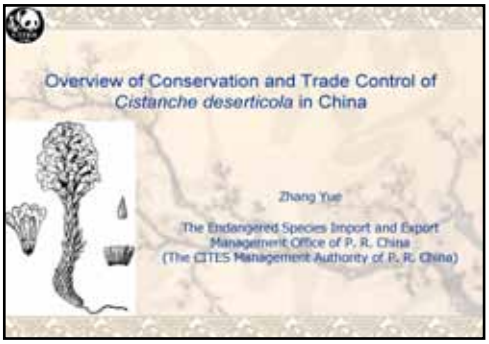
Strategies

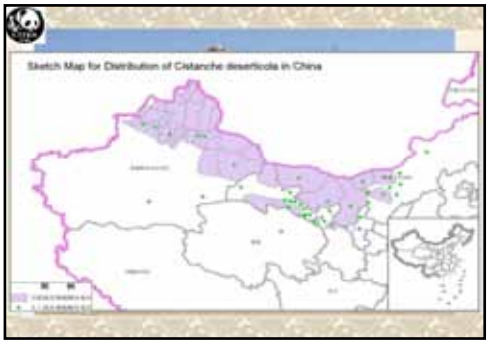
Brand Bhutan - Natural/organic
PPP (Contact Farming, FDI)
Agribusiness industry promotion

Strategies

Strategies

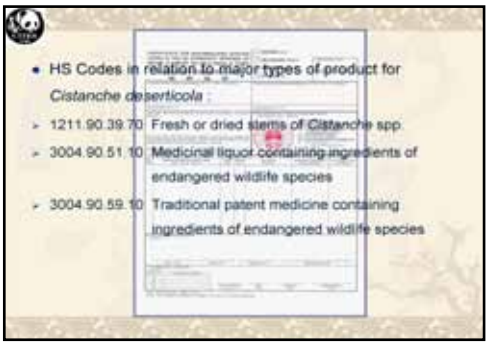
10.3 China


Overview of Conservation and Trade Control of
Cistanche deserticola in China
Zhang Yue
The Endangered Species Import and Export Management Office of P. R. China
(The CITES Management Authority of P. R. China)


Sketch Map for Distribution of Cistanche deserticola in China


Means to ensure international trade is legal and traceable
Strict review process
Applicant
Forestry Department at the Provincial Level
State Forestry Administration
Branches of CITES MA
Headquarters of CITES MA
NDF
CITES SA


Means to ensure international trade is legal and traceable
Building a complete chain of evidence for specimens source
Invoice, sales contract, certificate of origin, verification sheet etc.
Adoption of wildlife-specific HS Codes
To implement HS Commodity Catalogue of Import and Export on Wild Fauna and Flora as of 1998
To apply Certificate for Non-regulated Species as a supplement for permit system


HS Codes in relation to major types of product for Cistanche deserticola :
1211.90.39.70 Fresh or dried stems of Cistanche spp.
3004.90.51.10 Medicinal liquor containing ingredients of endangered wildlife species
3004.90.59.10 Traditional patent medicine containing ingredients of endangered wildlife species


Means to ensure international trade is sustainable
Restricting exports of wild-sourced specimens
The Expert Panel review by SFA and NDF by SA would not support exports of raw materials of Cistanche derticola.
The level of exports of wild-sourced Cistanche derticola is representing less than 5% of the total export volume and 1% of the available wild stocks.


Means to ensure international trade is sustainable
Developing artificial propagation
Yields from cultivation of Cistanche deserticola reach about 5,700 tons per year with a area of 9,810 ha.
Artificially propagated plants have been able to supply market demand.
Promoting the use of alternative species
C. tubulasa has been officially recognized as the source of Herba Cistanches.
Annual output of C. tubulasa stem from artificial propagation has reached nearly 1,000 tons with a cultivation area of 12,845 ha.


Actions being taken
• Cistanche deserticola has been included in the draft revision of the List of National Key Protected Wild Plants, which will be getting into the legislative procedure of the State Council soon.
• The Programme on the Second Resources Survey of National Key Protected Wild Plants has been launched and implemented since late April this year, in which Cistanche deserticola was also identified as objective species.


Thanks for your attention
Website: www.cites.gov.cn
Email: zhang-yue@vip.sina.com

10.4 India MA

CITES regional workshop on ensuring that trade in medicinal plants is legal, sustainable and traceable, Thimphu, Bhutan - 24-26 May 2012

Mr Tarun Kathula
Project Officer, CITES Management Authority
Ministry of Environment and Forests
Government of India, New Delhi

BIODIVERSITY IN INDIA

- India is one of the 17 mega diverse with only 2.4% of world's land area
- Contributes about 8% of the known global biodiversity.
- 10 Biogeographic Zone and areas of ecological significance in each zone have been declared as Protected Areas (PAs) under the Act of Parliament.
- Today there are 668 PAs covering 1,61,221.57 sq. kms (4.90% of total geographic area).
- Five of these Protected Areas are also designated as World Heritage Sites by UNESCO

PA Network of India

Sl. No.	Category	Nos.	Area (in sq. kms)	% of Geographical Area
1	National Parks	102	39,888.11	1.21
2	Sanctuaries	515	119,930.50	3.65
3	Conservation Reserves	47	1,382.27	0.04
4	Community Reserves	4	20.69	-
	Total	**668**	**161,221.57**	**4.90**

India and CITES

- India signed the Convention in July 1976 which was ratified in October 1976.
- India had also hosted the CITES CoP-3 in January-February 1981

CITES Scientific Authorities

- The Director
  Zoological Survey of India
  'M' Block, New Alipore
  KOLKATA – 700 053
- The Director
  Botanical Survey of India
  CGO Complex, 3rd M.S.O. Building
  Block F, 5th Floor, Salt Lake City
  KOLKATA – 700 064
- The Director
  Central Marine Fisheries Research Institute
  Post Box No. 1603, Ernakulam North PO
  COCHIN – 682 018
- The Director
  Wildlife Institute of India
  P.O. Box 18 Chandrabani
  DEHRADUN – 248 001
- The Director
  Institute of Forest Genetics and Tree Breeding
  P.B. N°. 1061 ,R.S. Puram
  P.O.COIMBATORE 641 002

CITES listed species in India

	Appendix I	Appendix II	Appendix III
Animals	91	469	10
Plants	13	469	4

Examples

Appendix I: ***Saussurea costus, Cycas beddomei*** **etc.**

Appendix II: ***Rauwolfia serpentina, Dioscorea deltoidea, Nardostachys grandiflora, Picrorhiza kurrooa, Pterocarpus santalinus, Rauvolfia serpentina and Taxus wallichiana*** **etc.**

Appendix III: ***Gnetum montanum, Magnolia liliifera*** **etc.**

The main objectives of the workshop are:

- **Examine means for ensuring that international trade in selected Asian medicinal plant species is legal, sustainable and traceable;**
- **Initiate cooperation among range States, consumer Parties and relevant organizations, and**
- **Identify examples of good practice and any other relevant topics.**

7

Species	Distribution	Parts used	Medicinal Value
Dioscorea deltoidea	Himalayas.	Rhizomes	Rheumatic, Ophthalmic disorders, Vermifuge and anthelmintic, Fish poisoning
Nardostachys grandiflora	Himalayas	Rhizomes	Antiseptic, Appetizer, aromatic, carminative, diuretic, expectorant, nervine tonic, sedative, stimulant, tonic, tranquilizer and vermifuge – Eff. Dish, Dig, Resp disorders, dysmenorrhea, Epilepsy, leprosy, palpitation of heart and Hair growth

8

Species	Distribution	Parts used	Medicinal Value
Rauvolfia serpentina	Himalayan range Deccan and Peninsula	Roots	Antidote to snake venom, depressant, expectorant, insomnia, High B.P, dysentery, insanity
Aloe vallichiana	Himalayan Range	Leaves	Dysentery, bilious affections, blood cure, skin inflammation, headache, fever, scorpion sting, strengthening eye site

9

Species	Distribution	Parts used	Medicinal Value
Picrorhiza kurroa	Himalayan range states	Rhizomes and roots	Stomachic, anti-inflammatory, antipyretic, cathartic, cold, cough, bronchitis, asthma, gastric trouble, heart problems, anaemia, skin diseases, liver and spleen diseases
Pterocarpus santalinus	A.P and T.N	Heart wood	Dysentery, bilious affections, blood cure, skin inflammation, headache, fever, scorpion sting, strengthening eye site

10

CITES vs Wild Life (Protection) Act, 1972

- **In CITES, wild animal and plant species are listed in three categories namely Appendix – I, II & III**
- **In Wild Life (Protection) Act, 1972 Wild Plants are included in Schedule VI**
- **Trade of all species listed in Wild Life (Protection) Act, 1972 are prohibited except registered cultivation nursery**
- **Export/Import are allowed by Scientific Management under CITES and WLPA. Further, trade of Appendix-I species requires advance import permit.**

CITES vs EXIM POLICY

- **As per EXIM Policy (Foreign Trade Policy) of India, the import and export of wild plants are governed through International Trade Classification (Harmonizing system) (ITC (HS)) codes, an eight digit code which are subject to Wild Life (Protection) Act, 1972, FTA, CA and CITES**
- **Articles XIV of the CITES states that it shall in no way affect the provisions of any domestic measures or the obligations of Parties**
- **Under EXIM policy: An application for grant of a licence for export and import of wild plants are to be made in the form given in ANF 2B of the Handbook of Procedures Vol. 1, to the Director General of Foreign Trade along with the recommendation of the Chief Wild Life Warden of the State concerned**
- **The EXIM policy of India is standardized and Harmonized with CITES and Wildlife (Protection) Act, 1972.**

The export of under mentioned 29 (groups/species) plants, Plant portions and their derivatives and extracts as such obtained from the wild is prohibited However, the formulations* made therefrom are allowed:-

Beddomes cycad (Cycas beddomei), Blue vanda (Vanda Coerulea), Saussurea costus.,Ladies slipper orchid (Paphiopedilium Species), Pitcher Plant (Nepenthes Khasiana), Red Vanda (Renanthera imschootiana) – Appendix – I and also listed in Schedule – I of WLPA.

Rauvolofia serpentina (Sarpagandha), Ceropegia Species, Frerea indica (Shindal Mankundi), Podophyllum hexandurm (emodi) (Indian Podophyllum), Cyatheaceae species (Tree Ferns), Cycadacea Species Cycads), Dioscorea deltoidea (Elephant's foot), Euphorbia Species (Euphorbias), Orchidaceae Species (Orchids), Pterocarpus santalinus Redsanders), Taxus wallichiana (Common yew or Birmi Leaves), Aquilaria malaccensis (Agarwood) – Appendix - II

Aconitum Species, Coptis Teeta, Coscinium fenestrum (Calumba wood), Dactylorhiza hatagirea. Gentiana Kurroo (Kuru, Kutki), Gnetum Species, Kampheria Galenga Nardostachys grandiflora, Panax pseudoginseng, Picrorhiza kurrooa Swertia Chirata (Charayatah)

The term " formulation " used here shall include products which may contain portions / extracts of plants on the prohibited list but only in unrecognizable and physically inseparable form.

Plants and plant portions, derivatives and extracts of the cultivated varieties of the above plant species (excluding Sl. No.16) will be allowed for export subject to production of a Certificate of Cultivation from the Regional Deputy Director (WCCB), or Chief Conservator of Forests or Divisional Forest Officers of the state concerned from where these plants and plant portions have been procured.

However, in respect of the cultivated varieties of the species as covered by Appendix 1 and Appendix 2 of CITES, a CITES permit for export will also be required.

The value added formulations, made out of imported species of plants and plant portions as specified the list will be allowed to be exported freely without any restriction subject to furnishing of an affidavit to the Customs authorities at the time of export that only the imported plant species as above have been used for the manufacture of value added formulations being exported.

In the event of affidavit proving to be false, on the basis of random sample tests, action would be initiated against the firm under the Foreign Trade (Development & Regulation) Act, 1992.

All formulations, herbal / Ayurvedic medicines, where the label does not mention any ingredients extracted from these prohibited plants shall be freely exportable without the requirement of any certification from any authorities what so ever.

Export allowed only through the ports of Mumbai, Calcutta, Cochin, Delhi, Chennai, Tuticorin and Amritsar."

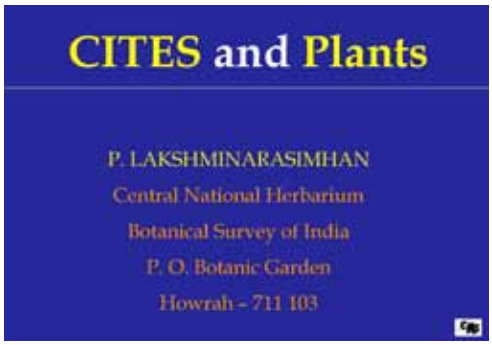
- All the trade of CITES species listed in Appendix – I, Appendix – II and Appendix III are subject to the 'no objection certificate' issued by CITES Management Authority or Assistant Management Authorities of CITES. Further for trade of species listed in Appendix – II, a positive NDF from Scientific Management Authority of CITES is essential.
- The Regional Deputy Director of Wildlife Crime Control Bureau (also called CITES Enforcement Agency) located at Northern, Eastern, Western, Southern and Central Regions are also called Assistant Management Authorities of CITES working closely with air ports and sea port cargos.
- The Ministry of Environment and Forests in consultation with Ministry of Commerce and Industries regularly updates the EXIM policy through 'Notifications and Circulars'
- All the relevant resolutions and decisions taken in Plant Committee and COPs of CITES are also incorporated in the EXIM Policy.

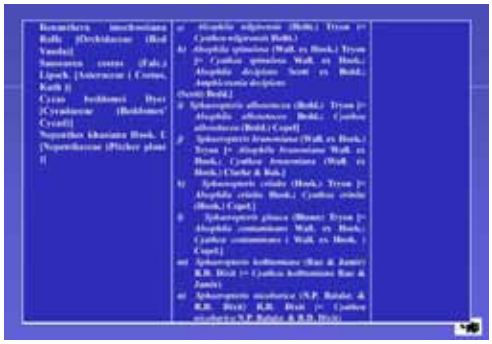
NDF studies/RST

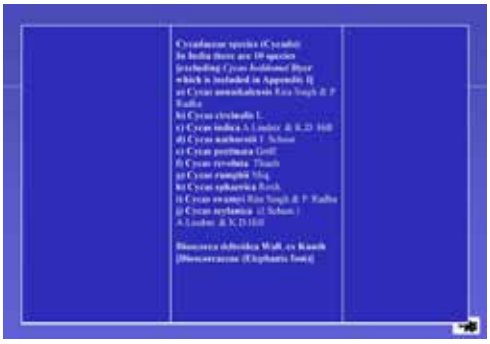
- **Red Sanders (*Pterocarpus santalinus*):** The species is found in Andhra Pradesh and is threatened due to demand of its heartwood in international markets. Institute of Forest Genetics and Tree Breeding (IFGTB) was given the task of doing NDF study for Red Sanders. The study was started in November 2010 was submitted to MoEF
- **Agarwood (*Aquilaria malaccensis*):** This species is found in north-eastern states of India and is threatened due to over-exploitation of oil from the wood of this species. Rain Forest Research Institute, Jorhat is proposed to do NDF study.
- *Dioscorea deltoidea and Rauvolfia serpentina: ToR for RST has been prepared and very soon the study will be initiated.*

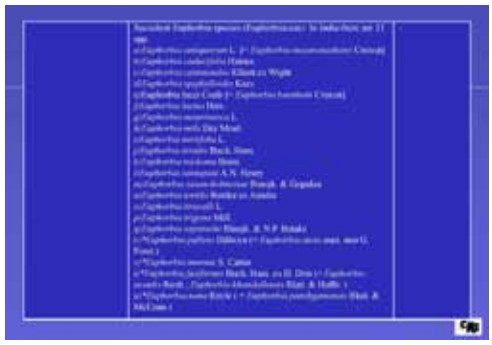
Thank You

India SA









Work done on Indian Plants listed in CITES

Identification of drug plants can be done taxonomically provided the samples bear floral and foliar characters. If the plant specimens are fragmentary such as root, rhizome, wood, stem, bark, leaf etc., it can be identified and authenticated only through pharmacognostic studies, especially through microscopic observations. Lack of protocol standards for the botanical identity of crude drugs gives room for raw-drug dealers to market morphologically similar or allied drugs in place of genuine drugs.

Adulteration has become rampant in the vegetable crude drug industry, which puts people's health at high stake. The genuine samples are generally adulterated with allied species or with substandard or inferior quality crude drugs. To get the desired therapeutic effect only authentic drugs should be used.

- Complete and comprehensive botanical pharmacognostic data on CITES / Negative listed plants is a prerequisite to identify and authenticate the genuine samples and to check illegal trade. BSI is bringing out a manual with consolidated pharmacognostic data on some of the CITES / Negative listed plants and their plant parts that are in trade. It is believed that this manual would facilitate easy and quick identification of some of the CITES / Negative listed plants and effective banning of illegal trade, by which these plants could be conserved in the wild.

Methodology

- In BSI, the following pharmacognostic parameters were carried out on 21 plant species that are included in the CITES and/or Negative list of exports.
- Exomorphic features and Organoleptic characters
- Endomorphic features
- Powder Microscopic studies
- Maceration
- Scanning Electron Microscopic (SEM) studies
- Fluorescence studies

***Cycas beddomei* Dyer**

DISTRIBUTION

It is endemic to Cuddapah-Tirupati range in the Southern part of Eastern Ghats in Andhra Pradesh, India. This species is associated with other drought resistant species like *Phoenix pusilla* Gart., *Pterocarpus santalinus* L. and so on. Now, this species is probably confined to the Tirupati hills and other hills at altitudinal ranges of 300 – 900 m.

Cycas beddomei Dyer

Plant parts used: Male cones (pollen) and Seeds, used in Folk, Tribal and Siddha medicine.

Medicinal properties and uses: Seeds edible. The seeds are processed and eaten in mixture with 'Ragi' cereal. Crude flour made out of the endosperm of the seeds of this plant is used as one of the ingredients in the preparation of Sweet and Dhosa. The male cones are pruned away by local tribals for its professed medicinal properties and are used as a major ingredient in rejuvenating tonics. The male cones of this plant are also considered to possess the narcotic properties like that of *C. circinalis*. Further, this plant is horticulturally valued due to the palm-like appearance.

The male cones of this plant are used by local herbalists as a cure for rheumatoid and muscle pains. The seeds are ground to a paste with coconut oil and are used as a poultice to treat skin complaints such as wounds, sores and boils.

Trade details: It is traded mostly in local and regional markets. It is learned from the local people that male cones of *C. beddomei* are collected and sold in Chennai market for a maximum of Rs. 1,000/- per cone.

***Nepenthes khasiana* Hook.f.**

DISTRIBUTION

Nepenthes khasiana is the only carnivorous plant species occurring as endemic in Meghalaya State in India at an altitudinal range of 1000 to 1500 m. This species is widely distributed almost throughout the state of Meghalaya in 19 different localities.

Nepenthes khasiana Hook. *f.*

Plant part used: Pitcher, used in tribal medicine.

Medicinal properties and uses: Khasi and Garo tribes use the fluid of the unopened pitcher of *N. khasiana* as eye drops to cure cataract and night blindness and to treat stomach troubles, urinary troubles, diabetes and gynaecological problems. The pitcher with its contents is made into a paste and is applied on affected parts of leprosy patients.

- Trade details: It is traded mostly in local and regional markets. The pitcher plants are collected from the wild and are sold at the rate of Rs. 40 – 50 per plant in the markets of Shillong and other towns in Meghalaya. Local plant collectors are collecting the pitcher plants and are exported to other states of India. Further, the pitchers of this plant species are being sold locally at the rate of Rs. 1 per pitcher to Colleges and Universities for classroom studies.

Saussurea costus (Falc.) Lipsch.

DISTRIBUTION

India and Pakistan. Within India, it is found in Western Himalayas in subalpine regions of Jammu & Kashmir, Himachal Pradesh and Uttarakhand between altitudinal ranges of 3200 – 3800 m.

Saussurea costus (Falc.) Lipsch.

Plant part used: Root, used in Folk, Ayurveda, Siddha, Unani and Modern medicine.

Medicinal properties and uses: The root of this plant is credited with anodyne, anti-arthritis, antiseptic, aphrodisiac, astringent, carminative, digestive, diaphoretic, deodorant, disinfectant, diuretic, emmenagogue, expectorant, febrifuge, spasmodic, stimulant, stomachic, vermifuge and tonic properties. It is used in perfume industry and as medicine.

It is used singly or as an ingredient in the drug formulations prescribed for the treatment of cough, bronchitis, asthma, colic, dental trouble, diarrhoea and dysentery, fever, flatulence, hair wash, headache, hysteria, chest complaints, nervous disorders, irregular menstrual problems, promoting urination, rheumatism and chronic skin diseases. The raw drug has a remarkable effect in controlling bronchial asthma.

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

The raw drug (roots) collected from wild plants comes mainly from Jammu & Kashmir while the cultivated sources come from Lahul Valley of Himachal Pradesh. Jammu & Kashmir State's Forest Development Corporation located at Baramulla handles the commercial supply of the raw drug collected from Jammu & Kashmir. Small quantities of the raw drug are also produced from Uttarakhand.

Lahul Kuth Growers Co-operative Marketing Society based at Manali markets this raw drug produced by cultivation in Himachal Pradesh. This raw drug is also available with the drug dealers located at Chamba, Kullu and Manali in Himachal Pradesh; Rishikesh and Ramnagar in Uttarakhand. Crude drug markets located at Amritsar, Delhi and Mumbai undertake commercial supplies on specific demand.

Presently, roots of this plant are mostly exported to Hong Kong, France and Singapore. It is also exported to Thailand, Vietnam, Siberia and Netherlands.

DISTRIBUTION

This plant occurs sporadically in wet sub-tropical forests in North-eastern Hill States of India, Myanmar, Bangladesh (Sylhet) and Bhutan, it extends through South East Asia to Philippines. In India, it is primarily distributed in Assam (districts of Nowgong, Sibsagar, Sadiya, Nowgong, Darrang, Goalpara and Cachar), Arunachal Pradesh (Lohit, Changlang and Tirap), Manipur, Meghalaya (Khasi and Garo hills), Mizoram, Nagaland, Sikkim, Tripura and also in West Bengal (Darjeeling), at an altitude of 800 – 1200 m. It is localised mainly in the foothills and undulating slopes of evergreen and semi-evergreen forests.

Aquilaria malaccensis Lam.

Plant part(s) used: Chips of fungal infected heartwood of *Aquilaria malaccensis* (Agar) and Agar oil. It is used in Ayurveda, Siddha, Unani, Tibetian and folk medicines.

Medicinal properties and uses: Agar and Agar oil are considered anodyne, antidiarrhoeal, antiasthmatic, aphrodisiac, astringent, carminative, cholagogue, cardiac deobstruent, deodorant, diuretic, laxative, stomachic, stimulant and tonic. It is used to treat diarrhoea and vomiting, diseases of the ear, nose and eyes, obstinate skin diseases including leprosy and preserves clothes from lice.

It is used in the treatment of cough, hiccough, bronchitis, asthma, rheumatoid arthritis, oedema, diabetics, skin diseases and as rejuvenator. Agar on burning emits a sweet fragrance for which it is used as incense. Much used for sacramental purposes, prized mainly for burning as incense by Parsees and Arabs. It is used in cosmetics and for making of fumigators.

Trade details: Agar and agar oil are traded in regional, national and global markets. Assam is the trade route for South-east Asia. Agar oil is one of the highly priced essential oils in Asian and African countries. If the trade of agar and agar oil is organised and regulated properly, it could earn handsome foreign exchange for our country. Agar and Agar oil are commercially available at Kolkata, Delhi and Mumbai.

The agar oil is known as Agar-attar in the East, which is one of the oldest and costliest perfumery raw materials used in high-class perfumery and as a fixative, imparting a long-lasting balsamic odour to the product. Hence, it is also known as 'The Liquid Gold'. The price of agar depends upon it severity of the fungal infection and the essential oil content. The price of agar (fungal infected heartwood) ranges from Rs. 250 – 10,000/- per kg. The price of genuine agar oil ranges from Rs. 10 – 12 lakhs per kg. However, the agar oil is also available at cheaper rates, that is, Rs. 1 – 5 lakhs per kg., which is not true agar oil, but adulterated one.

DISTRIBUTION

This species occurs mainly in Himalayan region across Afghanistan, Pakistan, India, Nepal, Bhutan and China. Within India, it is reported from the Himalayan region across Jammu & Kashmir, Punjab, Himachal Pradesh, Uttarakhand, Sikkim and Arunachal Pradesh at an altitudinal range of 1,000 – 3500 m.

Dioscorea deltoidea Wall. ex Griseb.

Plant part used: Rhizomes, used in Folk, Ayurveda and Modern medicine.

Medicinal properties and uses: The rhizome of this plant is not edible. The rhizome has a rich Saponin content, thus, it is used for washing silk, wool and hairs and for dyeing. It has been found effective in rheumatic diseases, ophthalmic disorders etc. It is also used as a vermifuge and anthelmintic for purging out intestinal worms, a fish poison and to kill lice.

The rhizome of this plant is one of the richest sources of Diosgenin, a steroidal sapogenin, which is the major base chemical for preparation of several steroidal hormones including sex hormones, cortisones and an active ingredient in the oral contraceptive pill.

Trade details: It is traded in local, regional, national and global markets. The current market rate of rhizome of this plant is Rs. 10 to 15 per kg.

Nardostachys grandiflora DC.

DISTRIBUTION

Globally, this species is distributed in India, Afghanistan, Nepal, Bhutan, Myanmar and South West China, at an altitudinal range of 3600 – 5000 m. Within India, it has been recorded from Himachal Pradesh, Uttarakhand, Sikkim and Arunachal Pradesh.

Nardostachys grandiflora DC.

Plant parts used: Rhizome and *Jatamansi* oil (essential oil obtained from rhizome).

Medicinal properties and uses: In action, the rhizome of *N. grandiflora* is antiseptic, appetiser, aromatic, carminative, diuretic, emmenagogue, expectorant, nervine tonic, sedative, stimulant, tonic, tranquilizer and vermifuge. It is used to treat high blood pressure, cold and cough, colic, diabetes, diarrhoea, digestive and respiratory disorders, dysmenorrhoea, epilepsy, erysipelas, flatulence, headache, hysteria, convulsions, leprosy and palpitation of heart.

The *Jatamansi* oil has the property of promoting hair growth and turning the hair black. Hence, it is much used locally as a hair tonic. Essential oil is also used in aromatherapy. The rhizome has remarkable property to tone up the brain. It is a very good intellect-promoting and nervine tonic. It is a very good medicine for mental disorders.

Trade details: It is traded in local, regional, national and global markets. The current market price of the rhizome of this plant is Rs. 90 to 160 per kg. Bulk crude drugs (rhizomes) of this plant are available in Indian markets, which are mostly imported from Nepal. Some quantities are also procured from Kumaon region of Uttarakhand and Sikkim. The crude drug markets located in Gangtok, Siliguri, Kolkata, Mumbai and Delhi handle bulk supplies. This crude drug is otherwise available in most of the drug markets

Picrorhiza kurroa Royle ex Benth.

DISTRIBUTION

This plant species is distributed in the Himalayas across Pakistan, India and Nepal. In India, it is found in the alpine Himalayas of Jammu & Kashmir, Himachal Pradesh, Uttarakhand, Sikkim and Arunachal Pradesh between the altitudinal ranges of 3000 – 4000 m.

Picrorhiza kurrooa Royle *ex* Benth.

Plant parts used: Rhizome and root, used in Ayurveda, Siddha, Tibetian, Unani, Modern and Folk medicine.

Medicinal properties and uses: The rhizome and root of this plant are credited with bitter, tonic, acrid, cooling, carminative, stomachic, anthelmintic, anti-inflammatory, antipyretic, antiperiodic, hepato-protective, cholagogue, cardiotonic, hypertensive, immune-modulating, expectorant and cathartic properties. It is used to treat cold, cough, bronchitis, asthma, gastric trouble, constipation, fever, intermittent fever, burning sensation, heart trouble, anaemia, skin diseases including leprosy and diseases of spleen and lever including jaundice. It is a very good liver tonic.

Trade details: It is traded in local, regional, national and global markets. Bulk raw drugs of this plant come from Jammu & Kashmir, Himachal Pradesh, Uttarakhand and Sikkim. It is cultivated on a small scale, but its production is too small to permit commercialization. The collection of the drug is regulated under 'Kuth Act' in Jammu & Kashmir. The State Forest Corporation located at Jammu and Baramulla sells this raw drug.

In Uttarakhand, Kumaon Mandal Vikas Nigam, Sahakan Bheshaj Vikrai Sangha and Forest Corporation located at Rishikesh and Haldwani market this raw drug. In Himachal Pradesh, this raw is available at crude drug markets located in Chamba, Jogender Nagar, Manali and Kullu. Some quantities of the raw drugs come from Sikkim.

Raw drugs of this plant are also sold in the drug markets of Calcutta, Saharanpur, Ranikhet, Lucknow, Varanasi, Amritsar, Delhi and Mumbai. Current market rate of the dried rhizomes and roots of this plant is Rs. 150 to 165 per kg.

Trade details: It is traded illegally in local, regional, national and global markets. The collection of the heartwood of this plant from forests is restricted and is regulated by the forest department. The bulk raw material (heartwood) available in the market is supplied by Andhra Pradesh Forest Department. Supply of smaller amount of this raw material is now obtained from cultivated sources.

DISTRIBUTION

This plant occurs as an endemic species in the hills of Cuddapah, Kurnool, Chittoor, Nellore and Prakasam districts of Andhra Pradesh and sporadically occurring in some pockets of adjoining states of Tamil Nadu and Karnataka at an altitude range of 200 – 900 m.

Pterocarpus santalinus L. *f.*

Plant part used: Heartwood, used in Siddha, Ayurveda, Unani, Tibetian and folk medicines.

Medicinal properties and uses: The heartwood of *P. santalinus* is considered as cooling, astringent, antipyretic, diaphoretic, febrifuge and tonic in action. It is employed in drug formulations used in the treatment of dysentery, bilious affections and diseases of blood. The wood paste is externally applied to cure skin inflammation, headache, fever, scorpion sting, skin diseases and to strengthen eyesight.

It has remarkable property of healing pimples, scars, boils, wounds, burnt marks, black spots, eczema and other blemishes of skin. It can make the skin smooth and attractive. A red chemical substance, *Santalin* present in the heartwood of this plant is used as a dyeing/staining agent. In European medicine, it is used as a colouring agent. It is well known ingredient of French polish.

Trade details: It is traded illegally in local, regional, national and global markets. The collection of the heartwood of this plant from forests is restricted and is regulated by the forest department. The bulk raw material (heartwood) available in the market is supplied by Andhra Pradesh Forest Department. Supply of smaller amount of this raw material is now obtained from cultivated sources.

Rauvolfia serpentina Benth. ex Kurz

DISTRIBUTION

The distribution range of *Rauvolfia serpentina* is very wide; however, its occurrence is sporadic. Beyond India, this plant is distributed in Bangladesh, Myanmar, Malaya, Sri Lanka, Thailand, Java and Vietnam.

In India, the plant occurs in the wild in almost all parts of India up to an altitude of about 1000 m especially in the sub-Himalayan tract situated between Dehra Dun and Darjeeling hills, Meghalaya foot hills, coastal regions of West Bengal and Orissa, Eastern Ghats in Andhra Pradesh and Tamil Nadu and in Western Ghats between Southern Maharashtra and Kerala.

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

Plant part used: Root, used in Tribal, Folk, Siddha, Ayurveda, Tibetian, Unani, Homoeopathy and Modern medicine.

Medicinal properties and uses: In action, the root is bitter, acrid, laxative, anthelmintic, diuretic, antidote to snake venom, depressant, expectorant, febrifuge, insanity, insomnia, hypnotic and hypotensive properties.

In folk and tribal medicine, the root of this plant is used during delivery to stimulate uterine contractions and promote the expulsion of the foetus. Crying babies are put to sleep by working mothers by making them to suck the breasts, which are smeared with the root-paste.

- This herb is a best remedy for high blood pressure. It is also used to reduce fever. It is popularly known as *pagal-ka-dawa*, an effective medicine in treating insanity. The herb is effective in treating insomnia because of its sedative properties. It is also very effective in treating hysteria. It is a valuable remedy in dysentery and painful affections of the bowels. The root of this plant contains several alkaloids; the major and most potent alkaloid is '*reserpine*', which is very much useful in insomnia and reducing blood pressure.

- Trade details: This plant is traded in various levels viz. local, regional, national and global markets. The crude drug sold in the local markets comes largely from wild sources. The forest departments of various States regulate the collection of this plant from the wild. The crude drug commercially supplied by forest Corporations, Co-operative marketing societies and certain selected drug dealers located in Dehra Dun, Rishikesh, Hazaribagh, Shillong, Cuttack, Raipur and Vishakhapatnam. Drug dealers placed in Thrissur, Mumbai, Delhi and Kolkata arrange bulk supplies of this raw drug.
- Quantity traded is 200 – 500 MT of roots annually. During 2004-2005, India exported 1.3 MT of Serpentina roots, valued at Rs 99, 361 and 28 MT were imported for a value of Rs. 8.7 Lakhs. The current market rate of the roots of this plant is Rs. 140 per kg.

TRAFFIC

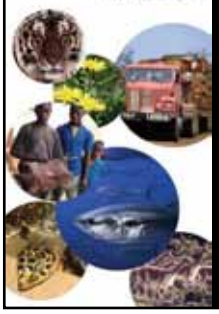
Medicinal Plants of Asia:
Multi-stakeholder approaches to ensuring trade is legal, sustainable and traceable

Bryony Morgan
TRAFFIC Global Medicinal Plants Program

Rashid Raza
TRAFFIC India

Part I - Introduction

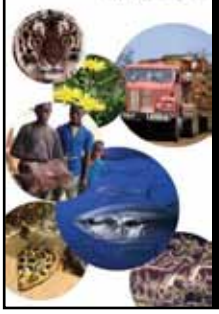
TRAFFIC



TRAFFIC's **goal** is to ensure that trade in wild plants and animals is not a threat to the conservation of nature.

TRAFFIC's **vision** is of a world in which trade in wild animals and plants is managed at sustainable levels without damaging the integrity of ecological systems and in such a manner that it makes a significant contribution to human needs, supports local and national economies and helps to motivate commitments to the conservation of wild species and their habitats.

TRAFFIC



Threatened species

Critical resources

Areas of high biodiversity

Livelihoods and incentives

TRAFFIC
- ONE GLOBAL PROGRAMME -

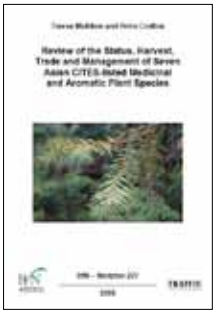
TRAFFIC: work on resource security

→Help prevent illegal harvest and trade

→Improve sustainable management of legal harvest and trade

Providing guidance to government agencies, private sector, international agreements, donors

Part II – Regional Analysis:
Seven Asian CITES-listed Medicinal and Aromatic Plants



CITES and Asian Medicinal Plants Three Decades of History

1975 Elephant's Foot *Dioscorea deltoidea* among the first species included in CITES Appendix II

1989 Snakewood *Rauvolfia serpentina* listed in CITES Appendix II; Jatamansi *Nardostachys grandiflora* proposed then withdrawn

1995 Red Sanders *Pterocarpus santalinus* and Himalayan Yew *Taxus wallichiana* included in CITES Appendix II

2000 CITES "significant trade reviews" of Jatamansi *Nardostachys grandiflora* and Kutki *Picrorhiza kurrooa* published

2008 Further CITES "significant trade reviews" considered by the CITES Plants Committee

TRAFFIC

CITES-listed medicinal plant species included in the review

TRAFFIC

Research Methodology and Focus

Combination of:

- Literature Reviews
- Review of information on the World Wide Web
- Analysis of available trade data (Customs, CITES)
- Consultation with local experts in the target countries

Looking at:

- Taxonomy, trade names, medicinal and other uses
- Distribution, status and threats
- Harvest and trade characteristics
- National and international trade controls

TRAFFIC

Main Findings: USES

- All seven species are used in traditional medicine, some appearing in several different systems of medicine
- Three are also used in western pharmaceutical products
- Six of the seven also have non-medicinal uses

TRAFFIC

STATUS AND THREATS

- Information on the status of the species in the wild is limited
- Population surveys typically limited to a relatively small number of sites, more widespread or global studies lacking
- Based on the information available, all species are declining in at least parts of their range, some to the point of being threatened with local extinction
- One species (Red Sanders) categorised as globally threatened (Endangered) in the IUCN Red List.
- Harvest for medicinal use appears to be the primary threat in all but two cases (Cistanche and Red Sanders)

TRAFFIC

WILD COLLECTION AND TRADE

- Information on the harvest and trade of the species is limited and "patchy", most well-documented for Nepal
- Many thousands of families involved in harvest for trade
- Wild collection typically involves the rural poor, and is mainly for income generation
- Little processing or value addition by harvesters
- Trading networks are typically long and highly complex

TRAFFIC

INDIA AT THE CENTRE…

- Major processing and trade of medicinal plant materials sourced from within India and from neighbouring countries
- Production of a wide range of traditional medicines and herbal products and compounds for pharmaceutical use
- Largescale imports and exports recorded in India's Customs data

TRAFFIC

…BUT CHINA INCREASING IN MARKET SHARE

- Huge producer and consumer of plant-based traditional medicines
- Processing capacity growing for pharmaceutical products such as taxanes
- Indications of growing production within China of products also produced within India, e.g. *Dioscorea* spp.

TRAFFIC

WILD COLLECTION VS. CULTIVATION

- Cultivation routinely promoted as the preferred (and sometimes the only) solution to the twinned problems of dwindling supplies and species conservation
- Much less emphasis being placed on sustainable wild-sourcing
- Like information on wild-harvest, scale of cultivation not well-documented
- Economic consequences of a shift to cultivation also poorly understood
- Cultivation contributing an increasing share of pharmaceutical compounds from some species, including through cultivation of non-native species
- Some species difficult and/or un-economical to cultivate, including owing to preferential demand for wild specimens by practitioners and consumers

TRAFFIC

HARVEST AND TRADE CONTROLS

- Harvest is highly regulated in India and other range States
- It appears that implementation of these regulations is often low
- International trade is also regulated via CITES, Customs and phytosanitary controls
- It appears that implementation of CITES trade controls is often low, and in some cases apparently non-existent.

TRAFFIC

Recommendations I

Address issues of conservation and trade at the REGIONAL level.

Build on the efforts of the many institutions and organisations actively working to understand and manage harvest and trade of medicinal plants.

- Involve the full range of stakeholders concerned with medicinal plant harvests and trade in these efforts.

TRAFFIC

Recommendations II

- Working together:
  - Increase the collective knowledge of harvest and trade;
  - Focus greater attention on and investment in conservation and sustainable sourcing of wild plant populations;
  - Support implementation of harvest and trade controls in a manner meeting conservation and development needs
- Improve CITES implementation, including with reference to other trade agreements
- Develop more detailed Customs codes for species traded in large quantities

TRAFFIC

Part III – Moving knowledge to action

TRAFFIC

Commitment of governments

Involvement of industry

Communities engagement

FAIRWILD

Guidance on sustainability approaches to use of wild plants

TRAFFIC

FairWild development process

Development 2004-2006 | Implementation 2007-2009 | 2010-...

Testing

Drafting

Consultation

Conferences

Legal Adoption & Policy

Development Cooperation

People & Politics

Certification

Voluntary Codes of Practice

Plant

Product

Resource Management

Information & Training

CITES

FairWild Foundation

FAIRWILD

TRAFFIC

FairWild Standard principles

1. Maintaining wild plant resources
2. Preventing negative environmental impacts
3. Complying with laws, regulations, and agreements
4. Respecting customary rights and benefit sharing
5. Promoting fair contractual relationships between operators and collectors
6. Limiting participation of children in wild collection activities
7. Ensuring benefits for collectors and their communities
8. Ensuring fair working conditions for all workers of FairWild collection operations
9. Applying responsible management practices
10. Applying responsible business practices
11. Promoting FairWild buyer commitment

TRAFFIC

Sections of FairWild Standard

- SECTION I: WILD COLLECTION AND CONSERVATION REQUIREMENTS
- SECTION II: LEGAL AND ETHICAL REQUIREMENTS
- SECTION III: MANAGEMENT AND BUSINESS REQUIREMENTS
- SECTION IV: FIRST BUYERS OF FAIRWILD PRODUCTS

TRAFFIC

FairWild and relevant frameworks

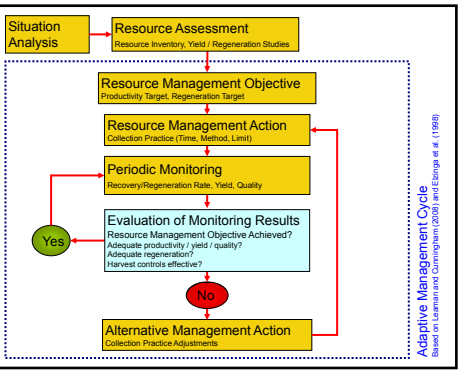
TRAFFIC

FairWild Standard use

Includes:

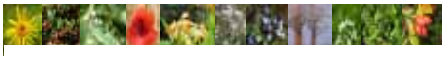
- resource assessment
- management plan
- sustainable collection practices
- cost calculation along the supply chain
- traceability of goods and finances
- documented fair trading practices

TRAFFIC



FW Standard use pathways

1. Voluntary codes of practice, internal standards (companies, associations, donors)
2. Local, regional and national resource management schemes (Government institutions)



3. Legal frameworks and policies (conservation, trade policy, international agreements - CBD, CITES)
4. Certification (for businesses at all stages of the wild plants trade chain - FairWild Label)

TRAFFIC

FairWild Certification

- Based on compliance with FairWild Standard
- Assessment uses FairWild Standard performance indicators
- Annual audit by FairWild certification body
- Implementation over five year period – continuous improvement
- Distinction made between high and low risk species

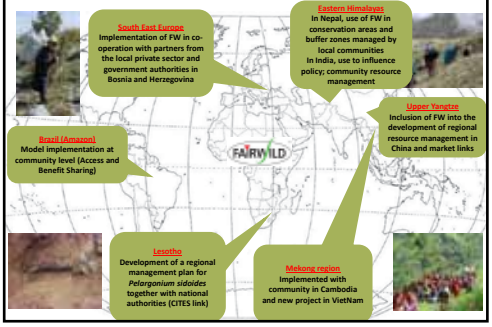
TRAFFIC

Producers from 7 countries (29 species in total) certified in 2011

First FAIRWILD® certified products are on market since 2009

TRAFFIC

FairWild Projects



Strengthening resource management

TRAFFIC

Strengthening capacity

TRAFFIC

Engaging private sector

TRAFFIC

Supporting governments and IGOs

- CITES NDF
- CBD's Global Strategy on Plant Conservation
- WHO Guidelines

- National governments, e.g. Guidelines for India's National Working Plan Code

TRAFFIC

FairWild for NDFs in South Africa and Lesotho

- Growing international market for root tubers of *Pelargonium sidoides*; income for rural collectors
- Unclear impact of wild-harvesting on species, potential long-term threat
- Support to building the capacities of authorities, training through practical fieldwork focusing on making a non-detriment findings (NDF) for *P. Sidoides*

TRAFFIC

Pelargonium s. NDF

- Cooperation between government in ZA and LA, universities, NGOs, communities: making non-detriment findings (NDF)→ resource assessment, recovery studies, integrated management plan
- SANBI, DEA, TRAFFIC - development of Biodiversity Management Plans (BMPs) for *P. sidoides* based on the FairWild principles

TRAFFIC

Further NDFs work

- Development of guidelines for making NDFs for perennial plants
- Development of training modules for SAs for NDF workshops focusing on key perennial plant taxa and carry out workshop
- Building capacity of CITES Scientific Authorities in carrying out NDFs – ensuring trade in plant is legal and sustainable

TRAFFIC

WHO Guidelines

WHO/IUCN/WWF International Consultation on the Conservation of Medicinal Plants Chiang Mai, Thailand, 1988

Main results:

- Chiang Mai Declaration "Saving Lives by Saving Plants"
- *Guidelines on the Conservation of Medicinal Plants*, 1993 (WHO, IUCN, WWF)

Finalisation workshop recently held for revised WHO/IUCN/WWF/TRAFFIC Guidelines

TRAFFIC

Agents for Change

✓Companies	through Certification; Corporate Social Responsibility (CSR); Voluntary Codes of Practice, projects, Financial support
✓Organizations (IGOs, NGOs, MEAs)	through strategic Partnership (internal policies/Codes of Ethics, on project base)
✓Governmental institutions	through Cooperation (e.g. on CITES NDF; integration into legal frameworks, national biodiversity, resource management strategies)
✓Research institutes	through collaborative research projects

TRAFFIC

TRAFFIC

Thank you!

For more information, please contact:
Bryony Morgan
bryony.morgan@traffic.org
Rashid Raza
rraza@wwfindia.net

www.traffic.org
www.fairwild.org

Red Sanders (*Pterocarpus santalinus*)

Trade issues in India

Tarun Kathula, Project Officer, CITES MA, India
Ministry of Environment and Forests
Government of India

Introduction

Pterocarpus Santalinus Lin.f., known as 'Red Sanders' is a member of Fabaceae.

It is a **tropical dry deciduous forest** species confined to the only 4 Districts of A.P, and small pop in T.N.

Facts - Red Sanders

- **Specific Density of Pterocarpus santalinus (Red Sanders):0.97**
- **Raktachandan (Hind, Bengali and Telugu) – Blood wood**
- **Found at altitudes of 1500 - 900 m.**
- **Grows on dry, hilly, often rocky ground, occasionally found on precipitous hill sides.**
- **Prefers lateritic soil and gravelly soil – Highly Regenerative - breeds profusely – as weed.**
- **Natural habitat the tree experiences hot, dry climate with normal rainfall of 88-105 cm received from north-east and south-west monsoon.**
- **It has been planted successfully on rich alluvial ground.**

FACTS – Red Sanders

- **The wood is heavily impregnated with reddish brown gum and contains a red dye santalin.**
- **The timber is immune to white ants and other insects and does not require antiseptic treatment**
- **The timber is used for house posts, agricultural implements, poles, shafts and bent rims of carts, boxes and picture frames**
- **Exported to Japan where it is used in the manufacture of a musical instrument called Shamisou**
- **The wood and roots are used for dyeing wool, cotton and leather. It is also used for staining other woods and for colouring pharmaceutical preparations and food stuffs.**

USES

- The heartwood of *P. santalinus* is used in the treatment of diabetes. Water held in barrels made from the wood is used in the treatment of this disease.
- Preparations made from the wood are used to reduce swelling, alleviate pain, stop bleeding and treat infections.
- It is also considered to be astringent, tonic disphoretic, antibilious anti-inflammatory, emetic, febrifuge and is used in treating boils, scorpion-stings and in skin diseases.
- It is also known to be used as coolant in some nuclear reactors and rumors – Viagra.

Population status and threats

- *Pterocarpus santalinus* was classified as *endangered* in the 1997 *IUCN Red List of Threatened* Plants.
- The Government of India considered both legal and illegal trade to threaten *P. santalinus* and proposed it for inclusion in CITES Appendix II, with its restricted distribution and slow rotational rate - increasing the level of threat. The species was included in CITES Appendix II in 1995.

Legal provisions

- **India ratified the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) in 1976.**
- **As per the DGFT notification No. 2(Re-98)/1997-2002 the export of plant derivatives of Red Sanders cannot be allowed in any form except finished products.**
- **According to the Article IV of CITES on Regulation of Trade in Specimens of Species Included in Appendix II.**
- **The export of any specimen of a species included in Appendix II shall require the prior grant and presentation of an export permit.**
- **An export permit shall only be granted by CITES Management Authority, when a Scientific Authority of the State of export has advised that such export will not be detrimental to the survival of that species (known as Non-Detriment Findings).**
- **An export permit shall only be granted when a Scientific Authority of the State of export has advised that such export will not be detrimental to the survival of that species.**

•In 2008, the Plants Committee of CITES in its 17th meeting had made some short term and long term recommendations. However, as we had inadvertently not responded on these issues to the CITES

• The 59th Standing Committee (SC59) of Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) has recommended to the parties not to accept permits issued under Article IV of the Convention for specimens of *Pterocarpus santalinus* from India.

•This recommendation is still in force. Therefore the export of red sanders from India cannot be allowed until the suspension on trade is lifted by the CITES Standing Committee or Conference of Parties.

•The Ministry of Environment and Forests has sanctioned a study on Non-Detriment Findings (NDF) as per the requirements for export of this Appendix II species, to the Institute of Forest Genetics and Tree Breeding (IFGTB), Coimbatore. The same has been submitted to the CITES Secretariat.

10.5 Indonesia

ACHIEVING LEGAL, SUSTAINABLE AND TRACEABLE TRADE IN MEDICINAL PLANTS (esp. AGARWOOD PRODUCING TAXA) IN INDONESIA

Dr. Nandang Prihadi
Dr. Harry Wiriadinata
Mr. Mashur bin Mohammad Alias

Scientific and Management Authority of Indonesia

Medicinal Plants in Indonesia

- Rumphius in Mollucas (15th Century)
  - Spices (nutmeg, cloves, others medicinal plants)
- Kalimantan and Sumatera
  - Trade barter with China (Rattan, resin, orchards, agarwoods and medicinal plants for malaria disease)
- Java
  - Traditional medicines (jamu) made from herbal and plants

Scientific and Management Authority of Indonesia

Medicinal Plants in Indonesia

- Traditional medicine :
  - today has been industrialized (modern)
  - Controlled by Badan POM (Agency for Medicinal and Foods)
- R & D has run by Researchers, Universities, LIPI, Ministry of Health
- Agarwood is plant utilized for medicinal in Indonesia which is listed on Appendix-II CITES

Scientific and Management Authority of Indonesia

Agarwood Producing Species in Indonesia

- The Agarwood producing species consisting of **10 species** belong to 2 genera ***Aquilaria*** *and* ***Gyrinops*** *that distributed throughout Indonesia.*
- *Four species of* ***genus Aquilaria****, namely* ***Aquilaria malaccensis, A.hirta, A.beccariana*** *and* ***A.microcarpa*** *are known grow in western part of* Indonesia only, including Sumatra and Kalimantan
- The six species of 2 genera namely ***Aquilaria cumingiana, A. filaria, Gyrinops decipiens, G. ladermanii, G. moluccana, and G. versteegii*** *are distributed in eastern part of Indonesia, including*

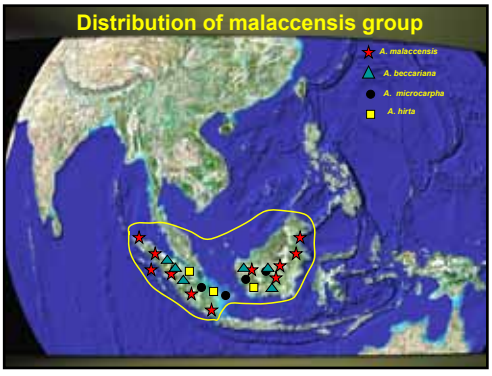
Scientific and Management Authority of Indonesia

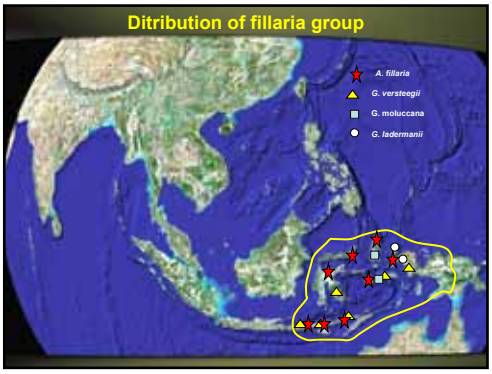
Agarwood Producing Species in Indonesia

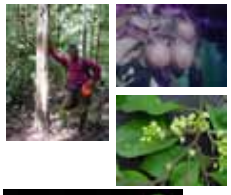
For further management and harvesting control they have been grouped into two geographical distributions :

1. ***Malaccensis*** **group** for species that grow in **western part** of Indonesia
2. ***Filaria*** **group** for species from **eastern part** of Indonesia.

Scientific and Management Authority of Indonesia







Aquilaria malaccensis

- Gaharu, karas, kekaras, mengkaras, galoop, halim
- India, Malaysia, Sumatra, Kalimantan, Philippines
- Primary & secondary forest, low-medium alt.
- Tree >40 m, > 60 cm diam
- Leaf elliptic oblong-lanceolate
- 7,5-12 x 2-5 cm
- Inflorescence umbel
- Flower cup-shaped 5-6 mm
- Stamen 10 (twice of petals)
- Fruit 3-4 cm, mesocarp thick

Agarwood for Medicine

- Indonesia has produced and exported several type of Agarwood products: as wood/chips, powder, oil, hio, aroma therapy, soap, and tea
- Those products are somehow then utilized as material to produce medicine
- Tea of agarwood is important for antioxidan
- Agarwood is also utilized for producing aromatherapy (spa)

Products of Agarwood

Permit System

Collectors and exporters must be licensed and registered at the Directorate General of Forest Protection and Nature Conservation (PHKA), MoF in order to apply CITES export permits. Currently, … companies are registered as *Agarwood exporters which are directly under the control of the CITES Management Authority.*

Setting National Quota Scheme

- According to Government Regulation No. 8 of 1999 Article 66 paragraph 2, SA carry out the population survey of *Agarwood* in collaboration with the Universities, NGOs and Forest Research Development Agency, and another related stakeholders.
- Based upon the result of the survey SA then drafted harvest quotas of *Agarwood*
- SA discusses the harvest quota' draft on focus discussion group, which consists of academics/experts, researchers, NGO's and others to obtain input or data verification.

Setting National Quota Scheme

- Followed by submission and recommendation of the harvest quota to MA.
- Based on the SA recommendation, CITES MA invite the stakeholders who consists of relevant government agencies i.e. custom, quarantine, provincial BKSDA, law enforcement office to decide the harvest quota and to make sure that export quota is non detrimental effect, and doesn't caused illegal unreported trading/smuggling.
- CITES MA determines harvest and export quota. The export quota is always smaller than harvest quota.

Setting National Quota Scheme

- CITES MA socialize the quota to the Provincial BKSDA and Association
- The Provincial BKSDA Manager will report actual harvest to CITES MA
- The Association contributes on monitoring their member' export realization and evaluate the company's performance and report it to CITES MA.

Sustainability

- Godoy and Lubowski (1992) in Suhartono (2002) stated that the sustainable economic value of a non timber forest product is difficult to estimate, especially in the case of Agarwood, there is no direct relationship between the growth rate of the plant and the resin content
- So that the sustainability of agarwood trade, should be supported by plantation

Sustainability

- According to Siran (2011), there are 2,218,949 trees of Agarwood in areas of 2071.5 hectares (study carried out in 45 regencies (out of about 300 regencies and covering 25 provinces (out of 33)
- Variously planted since 1989 which their ages of trees are recorded varying from 2 to 20 years old.

No	Provinces	Ages/Years	No of Trees/ stems	Areas (ha)
1.	West Java	3-15 years	3,830	2.5
2.	Banten	2 years	43,000	43.0
3.	Central Java	2-7 years	22,163	22.0
4.	Yogyakarta	7 years	4,000	4.0
5.	East Java	4 years	37,000	35.5
6.	Aceh	10 years	17,000	17.0
7.	North Sumatera	Various age	125,000	125.0
8.	West Sumatera	2001–2004	4,500	4.0
9.	Riau	10 years	5,000	5.0
10.	Riau Islands	2001–2004	11,000	10.0
11.	Jambi	1–5 years	150,000	150.0
12.	Bengkulu	---	20,000	19.0
13.	Bangka Belitung	2008–2009	602,854	600.0
14.	Lampung	2004–2009	175,000	175.0
15.	South Sumatera	---	20,000	10.0
16.	East Kalimantan	2006–2007	750,000	750.0
17.	West Kalimantan	2005–2006	172,800	15.0
18.	Central Kalimantan	---	12,600	10.0
19.	South Kalimantan	2005–2009	40,000	40.0
20.	North Sulawesi	2005	2,000	2.0
21.	Gorontalo	2006	5,000	5.0
22.	Bali	---	4,000	3.0
23.	West Nusa Tenggara	---	25,000	20.0
24.	East Nusa Tenggara	---	3,000	3.0
25.	Maluku	---	1,500	1.5
	Total		2,218,949	2071.5

Agarwood Plantations

There are two types of plantation in Indonesia: Monoculture and mixed plantation

Plantation of Agarwood producing taxa in Indonesia are:

- Gardens (home and community)
- Production plantation forests (State, private and community) established on previously cleared land.
- All plantings originating from seed.

Monitoring

- In the case of community/local scale plantation : the local government is going to monitor and register the plants from the registered community group cultivator.
- In the case of company scale : the provincial offices (i.e. the BKSDA) monitors the plantation and register the plants from the registered companies.
- Local government or BKSDA will monitor harvesting activities through regular inspection of the registered collector companies (middlemen traders). This inspection undertakes to ensure that harvested materials would not exceed the plants registered.
- Then, every transport permit issued must being enclosed with inspection documents which verify the specimen being exported is in accordance with the permit.

TERIMA KASIH
THANK YOU

10.6 Myanmar

Republic of the Union of Myanmar

Ministry of Environmental Conservation and Forestry

Forest Department

Report on the Implementation of CITES in Myanmar

May, 2012

Table of contents

Report on the Implementation of CITES in Myanmar

1 Legal bases

Forest Law (1992), The Protection of Wildlife and Protected Areas Law (1994), their Rules and the list of protected wildlife has already been proclaimed for proper control and management of wildlife trade. Other legislations such as Export-import Law, Fishery Law and Criminal Law are being applied whenever necessities occur in wildlife trade, locally and internationally. The Protection of Wildlife and Protected Areas Law is being amended to be compatible with current situation.

Management Authority

Director General
Forest Department
Ministry of Environmental Conservation and Forestry
Bldg.39. Nay Pyi Taw
The Republic of the Union of Myanmar
Tel: 95+67 405400
Fax: 95+67 405017
Email: dg.fd@mptmail.net.mm

Scientific Authority

Director
Nature and Wildlife Conservation Division
Forest Department
Ministry of Environmental Conservation and Forestry
Bldg.39. Nay Pyi Taw
The Republic of the Union of Myanmar
Tel: (95+67) 405002
Fax: (95+67) 405397
E-mail: nwcdfdmof@gmail.com

2 Training and Workshop

Staff from the Forest Department are joining international training and workshop at abroad to implement the CITES resolutions and advance to illegal wildlife crime suppression. Table (1)

Table (1) List of Forest Department 's staff attended the International Workshop and Training during year 2011.

No	Name	Occupation	Title	Country	Date	
					From	To
1	Mr. Mg Mg Than	Director	Non-detriment Finding and Review Significant Trade for Plant Species	Nepal	9-1-2011	11-1-2011
2	Mr. Thein Aung	Assistant Director				
3	Mr. Kyi Win	Deputy Director	The Six meeting of the ASEAN Wildlife Enforcement Network (ASEAN-WEN)	Philippines	24-5-2011	28-5-2011
4	Mr.Shein Gay Ngai	Assistant Director	Workshop on Implementation CITES for Agarwood Producing	Kuwait	3-10-2011	6-10-2011
5	Mr. Phyo Zin Mon Naing	Staff Officer				
6	Mr.Shein Gay Ngai	Assistant Director	Workshop on Agarwood "Management of Wild and Plantation Source Agarwood"	Indonesia	22-11-2011	24-11-2011
7	Mr. Phyo Zin Mon Naing	Staff Officer				

3 Activities Related to the Implementing of CITES in Myanmar

- The information on most aspects of the CITES is being distributed at the intradepartmental and interdepartmental trainings and workshops.

- ❖ The basic concepts of the CITES are being distributed to local communities through media.
- ❖ Trade in wildlife and its derivatives are occasionally investigated at pet markets and souvenir shops.
- ❖ To regulate the illegal wildlife trades and poaching especially in National Parks and Sanctuaries departmental forces have been formed to carry out special duties.
- ❖ For biodiversity conservation, ex-situ and in-situ conservation are carried out to raise public awareness in Parks, Zoos and Protected Areas.
- ❖ Protected Areas are being extended for in-situ conservation in high potential areas. Total 43 protected areas which cover 6.67% of the country area have been notified and proposed at the moment in Myanmar.
- ❖ Flora propagation and fauna breeding for commercial purpose are also carried out in Myanmar according to Protection of Wildlife and Protected Areas Law and CITES's resolutions.
- ❖ Latest and updated information of CITES and necessary facts are regularly distributed to the Directorate of Trade and Myanmar Floriculturist Association and tour guide training courses of Ministry of Hotel and Tourism.
- ❖ Public awareness of environment and wildlife conservation activities are also being conducted at traditional and regional festivals and at some public ceremonies.
- ❖ For more public awareness and people participation in preventing illegal wildlife trade seized offences are printed in private journals and forestry newsletters.
- ❖ With the collaboration of local authorities and some local NGOs, nature and wildlife conservation talks are occasionally done in schools and in village.

4 The National Wildlife Law Enforcement Task Force

The Republic of the Union of Myanmar reformed the National Wildlife Law Enforcement Task Force composing of 7 relevant departments such as Forest Department, Border Affairs, Customs Department, Department of Trade, General Administration Department, The Union Attorney - General Office and Myanmar Police Force on 27 th May 2011.The main objective of the task force is to develop a plan for wildlife crime control, educate to public by mass media and networking. Director General of the Forest Department plays a leading role as a chairman and Director of the Nature and Wildlife Conservation Division as a secretary in the National Task Force.

5 Imports, Exports and Other

5.1 Imports

Table (2) List of CITES import permits issued by CITES Management Authority of Myanmar during year 2011.

No	App:	Species	Description	Quantity	Country of export or re-export	Number of export permit or re-export certificate	purpose	Source	Remark
1	I	*Panthera tigris*	Animal exchange program for zoo	Alive (1:1)	South Africa	11MM 000003/FD	Z	C	Cancelled
2	I	*Panthera tigris* *Panther tigris* (white tiger)	Animal exchange program for zoo	Alive (2:2) (1:1)	South Africa	11MM 000005/FD	Z	C	

5.2 Exports

Table (3) List of CITES export permits issued by CITES Management Authority of Myanmar during year 2011.

No	App:	Species	Description	Quantity	Country of destination	Number of export permit or re-export certificate	purpose	Source	Remark
3	II	Orchid Spp:	Issued for the exhibition of the Okinawa International Orchid Show, 2011held on 4 th – 14 th February, 2011	160 Plants 130 Flower Spike	Japan	11MM 000001/FD	Q	A	
4	II	*Grus grus* and *Grus antigone*	Issued to Ms. Tin New Latt, candidate from Heidelberg University for her thesis research	15 blood samples and 3 pieces of wings	Germany	11MM 000002/FD	S	W	CACELLED due to expired date
5	II	*Taxus wallichiana*	Issued to Kochi Prefectural Makino	3 Dried Specimens	Japan	11MM 000004/FD	S	W	

No	App:	Species	Description	Quantity	Country of destination	Number of export permit or re-export certificate	purpose	Source	Remark
	II	*Dendrobium Spp:*	Botanical Garden for joint research	30 Alcohol Spirit Bottle				W	
6	I	*Elephas maximus*	Animal exchange program	2 live (1:1)	China	11MM000006/ FD	Z	C	Expired and renew the permit
7	II	*Grus grus* and *Grus antigone*	Issued to Ms. Tin New Latt, candidate from Heidelberg University for her thesis research	15 blood samples and 3 pieces of wings	Germany	11MM 000007/FD	S	W	Renew permit for 11MM000002/ FD
8	II	Orchid Spp:	Issued for World Orchid Conference 2011	70 Plants 300 Flower Spikes	Singapore	11MM 000008/FD	Q	A	2 costume set decorated with orchid

No	App:	Species	Description	Quantity	Country of destination	Number of export permit or re-export certificate	purpose	Source	Remark
9	I	Ivory (*Elephas maximus)*	Government donated to Lingguang Temple, Beijing	One pair L- 4 feet 1in R 4 feet 1 in	China	11MM 000009/FD	P	C	Weight 11.3 kg each
10	II	Orchid Spp:	Issued for the 6th China (Sanya) International Orchid Show	215 Plants 200 Flower Spikes	China	11MM 000010/FD	Q	A	

5.3 Other

Table (4) List of CITES permits (other) issued by CITES Management Authority of Myanmar for year 2011.

No	App:	Species	Description	Quantity	Country of destination	Number of export permit or re-export certificate	purpose	Source	Remark
-	-	-	-	-	-	-	-	-	-

6 Seizures

Table (5) List of wildlife trafficking offences for year 2011.

No.	Date	Seized Items	Place	Seized Organization	Action Taken	Remark
1	14.1.2011	Rat snake (3688) head Viper (649) head Cobra (230) head	16 Mile check point (*Pathein Kyi* township, Mandalay Region)	FD		Alive snakes hand over to Myanmar Pharmacy Industry

No.	Date	Seized Items	Place	Seized Organization	Action Taken	Remark
2	21.1.2011	Pangolin (7 head alive) Myanmar flat shell turtle (3 head alive) Myanmar eyed turtle (13 head alive) ? turtles (6 head alive)	*Pegu* (*Phaung Taw Oo* quarter) Pegu Region	FD/PF/GAD	37 (A)	Seized from house
3	25.1.2011	Snakes (30 boxes)	*Kawkarate* town, Kayin state	OSS	35 (A)	
4	9.2.2011	Soft Shelled Turtles (15 alive)	*Myauk Oo* town, Rakhine state	FD/ PF	36 (A)	
5	14.2.2011	Clouded Leopard Skin (2 sheet) Wild Cat bone (1 piece) Sambar antlered (3 pairs) Barking Deer Skin (98 sheet) Tortoise carapaces (97 pieces)	*Pauk* town Magwe Region	FD	37 (A) 36 (A)	

No.	Date	Seized Items	Place	Seized Organization	Action Taken	Remark
6	14.2.2011	Soft Shelled Turtles (30 alive)	105 mile check point , *Muse*, Shan state	FD		Waif
7	27.3.2011	Pangolin (4 head) Bear paw (8 pieces)	*Tar Kow* check point , *Kun Hein* township, Lowlin, Shan State	FD		Waif
8	30.3.2011	Pangolin 4 alive Big-headed turtle30 alive Key chain make of barking deer horn 800 pieces	*Kyine Ton* , Shan State	FD	37 (A) 35 (A)	
9	1.4.2011	Wild Elephants (2 alive)	*Homalin*, Sagaing Region	FD	37(A) 36 (C) 35 (A)	
10	4.5.2011	3 months old wild elephant cub (1) head	*Kankawmying* village, *Buthe Taung* township, Rakhine State	FD	37 (A)	
11	12.5.2011	Tortoise (43) heads	105 mile checkpoint , *Muse*, Shan State	FD/OSS		waif

No.	Date	Seized Items	Place	Seized Organization	Action Taken	Remark
12	2.6.2011	Pangolin scale 150 kg	105 mile checkpoint , *Muse*, Shan State	FD/OSS	37 (A)	
13	6 .6. 2011	Pangolins (4) heads	*Ye* , Mon state	FD/PF	37 (A)	Carry by woody box at Highway bus stop
14	7.7.2011	Soft shell Turtles (72) heads, tortoise (50) heads	*Theindi* checkpoint, Shan State	FD/OSS		waif
15	13.7. 2011	Red whiskered Bulbul (50) heads	*Kyaing Tong* , Eastern Shan state	FD/ PF	31 35(A)	Carry by motor bike
16	17.7. 2011	Elephant skin 571 Kg, 2 ivory with 18 inches and base circumstance 6 inches	Check point , *Gwa* township, Rakhine State	FD/PF/IMG	37 (A)	
17	4.8. 2011	Yellow tortoise (154)head, Myanmar Flat shell turtle (31)head	16 miles check point, *Patheingyi* township, Mandalay Region	FD/OSS	36 (A)	seized from bus no 1A/ 3220
18	6.8. 2011	Turtles and tortoises (101) head	At main road between *Myit Nge* and *Mandalay*, Mandalay Region	FD	36 (A)	Enclose with bag and carry by motor cycle
19	3.9.2011	Ivory (3) pieces	*Maleikha* boat, *Bu The Taung* township, Rakhine	PF/IMD		

No.	Date	Seized Items	Place	Seized Organization	Action Taken	Remark
20	12.9.2011	Goral horn (580)pieces, domestic goat horn (145)pieces, Bear claws (20) pieces, goral teeth (30)pieces, barking deer teeth (45) pieces, bear canine (30) pieces, sambar deer antler (1) pair,	Mandalay International Airport, Mandalay Region	FD/PF	31 36 (A) 37 (A)	
21	24.9.2011	Soft shell turtle (3) head Big headed turtle (13) head	105 mile checkpoint , *Muse*, Shan State	FD/OSS	-	Waif
22	30.9.2011	Female elephant death	*Oaktwin* township, Pegu Division	FD/PF/ GAD	37 (A)	
23	21.10.2011	Sambar antler (346) kg	*Tarchilake* , Shan State	FD/PF	36 (A)	
24	19.11.2011	2 inches ivory (2), Hand made gun (1) , hand made bullet gun (1), arrow (2), mettle stick (3), poison (24) bottles	Near *Chaungtha* village, *Pathein* township,	FD/PF/ GAD	37 (A)	
25	26.12.2011	Pangolin 75 kg (20 head) , pangolin scale 8 kg (1) box	Border checkpoint *(Chin Shwe Haw)*, *Lashio*, Shan State	FD	37 (A)	

No.	Date	Seized Items	Place	Seized Organization	Action Taken	Remark
26	26.12.2011	Bear paw and bones	(16) miles checkpoints	OSS	37 (A)	

Notes; All actions taken by Protection of Wildlife and Protected Areas Law (1994). Alive animals are released in suitable natural habitats. All above mentioned cases are only from outside of Protected Areas mainly near the international border.

Seized organization abbreviation: **FD**; Forest Department, **PF**; Police Force, **IMG**; Immigration Department, **OSS**; One Stop Service, **GAD**; General Administration Department, **IMD**: Immigration Department

7 Current Status and Situations

- In Myanmar, people living in remote and mountainous areas traditionally hunt wildlife for their daily livelihood. Indeed, the commercial wildlife hunting is very few. However, high demand of wildlife and its parts by traders of neighboring countries make local people involved in illegal wildlife trade.
- This illegal commercial trade has highly mounted since the Year 2000 due to gradually increasing market demand and is also of very lucrative business.
- The educational program "Why the illegal wildlife trade is needed to ban" is being broadly propagated through the nation- wide media.
- An amendment to the list of protected animals in Myanmar is being considered.
- To be in line with the Convention, Protection of Wildlife and Protected Areas Law and Rules are being reviewed by the Attorney General office for more effective implementation of the Convention.

8 Other Comments

- Wildlife is one of the very precious natural resources of every nation and should be valued for the present and posterity.
- Effective wildlife conservation, especially in the border areas, needs bilateral cooperation.
- With the view to conducting effective Law enforcement, bilateral and transboundry conservation among the neighbouring countries are required.
- Myanmar, like other countries, highly emphasizes on wildlife management. Cooperation of International and local non-government Organizations is important.
- Although the availability of fund, expertise, research and trained staff are inadequate, wildlife conservation efforts are being carried out not only by " Protection of Wildlife and Protected Areas Law" but also by the CITES regulations.
- Wide collaboration in the tasks of public awareness and people participation in nature and wildlife conservation by various groups is welcome.

IMPLEMENTATION OF CITES IN MYANMAR

Mr. Kyaw Win
Deputy Director
Nature and Wildlife Conservation Division
Ministry of Environmental Conservation and Forestry
The Republic of the Union of Myanmar

Country Profile : Myanmar

- Myanmar is the largest country in South-East Asia with a total land area of 677,000 sq.km
- Boundaries share with China in north, Laos and Thailand in east, Bangladesh and India in west
- Andaman sea and Bay of Bangal edge Myanmar coast in the south and west
- Medicinal plants are widely distributed

Biodiversity richness in Myanmar

Taxonomic group	Species	Number
Species of vascular plants of Gymnosperms and angiosperms		11,800
Mammals		258
Bird species		1,056
Reptiles		272
Marine water fish		465
Bamboo		96
Rattan		37

Legal Basis

Prohibit the exploitation of medicinal plants from wild by law

- ❖ Forest Law(1992)
- ❖ Foerst rules (1995)
- ❖ The Protection of Wildlife and Protected Areas Law(1994)
- ❖ Rule related to the protection of wildlife and protected law (2002)
- ❖ Other legislations such as Export-Import Law, fishery law and criminal law

Activities related to the implementing CITES in Myanmar

- ➢ The information on most aspects on the CITES is being distributed at the intradepartmental and interdepartmental training and workshop.
- ➢ Trade in wild founa and flora and their derivatives are occassionally investigated at pet markets and souvenir shop.
- ➢ To regulate illegal wildlifes trades and poaching especially in National parks and sanctuaries departmental forces have been formed to carry out special duties.

Activities related to the implementing CITES in Myanmar

- ➢ Latest and updated information of CITES necessary facts are regularly distributed to the Directorate of trade, Myanmar Floriculturist Association and tour guide training course of Ministry of Hotel and Tourism.
- ➢ The basic concepts of the CITES are being distributed to local communities through media.
- ➢ Plants are cultivated by traditional propagation methods for commercial purpose according to imposed law and CITES resolution

National wildlife enforcement task force

- ❑ There are 7 relevant departments such as Forest Department, Border Affairs, Customs Department, Department of trade, General administration Department, Attoney-General office, Myanmar Police force.
- ❑ Moreover, we used website wildlife seizure news sharing to ASEAN countries.

Current status and situation

- ▪ Illegal wildlife trade has highly mounted since 2000 due to gradually increasing market demand and great deal of profit.
- ▪ Local people involve in illegal collection
- ▪ An amendment to the list of protected wildlife is being considered.
- ▪ To be inline with the Convention ,Protection of Wildlife law and Rules are being reviewed by the Attorney General office for more effective implementation of the convention.

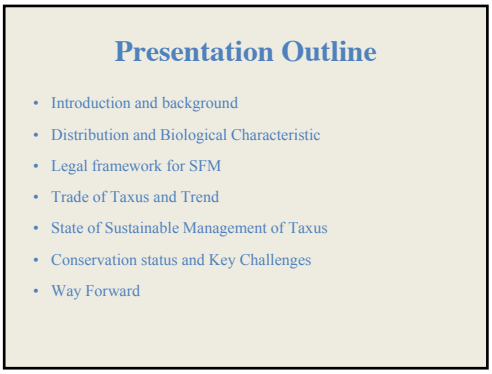
Other Comments

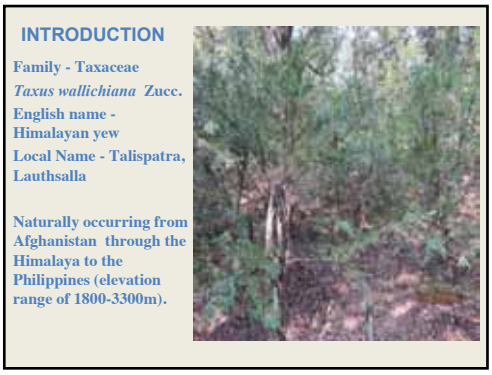
- **The effective Law enforcement bilateral and transboundary conservation among the neighboring countries are required.**
- **Wildlife should be valued for the present and posterity since it is one of the very precious natural resources of every nation.**

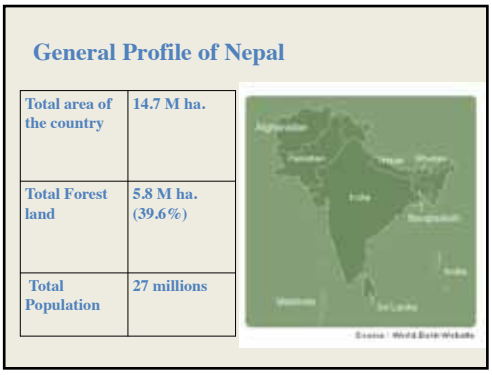
Thank you for your kind attention

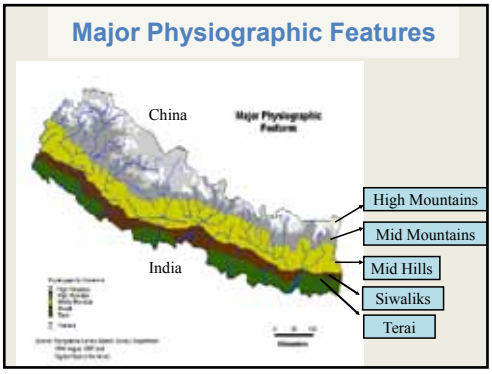
10.7 Nepal

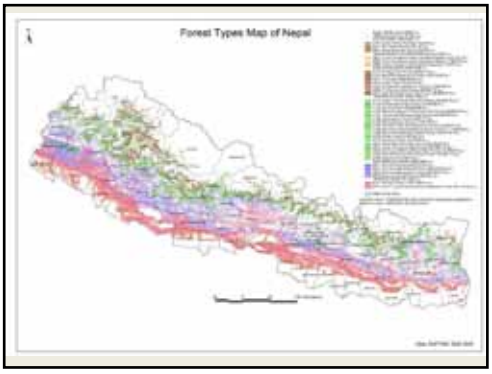

Achieving Sustainable, Traceable and Legal Trade of *Taxus wallichiana in Nepal*
National Authorities for Plant Species
Nepal


Presentation Outline
• Introduction and background
• Distribution and Biological Characteristic
• Legal framework for SFM
• Trade of Taxus and Trend
• State of Sustainable Management of Taxus
• Conservation status and Key Challenges
• Way Forward

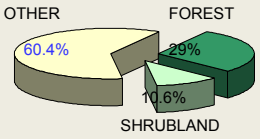

INTRODUCTION
Family - Taxaceae
Taxus wallichiana Zucc.
English name - Himalayan yew
Local Name - Talispatra, Lauthsalla
Naturally occurring from Afghanistan through the Himalaya to the Philippines (elevation range of 1800-3300m).


General Profile of Nepal
Total area of the country
14.7 M ha.
Total Forest land
5.8 M ha. (39.6%)
Total Population
27 millions


Major Physiographic Features
China
India
High Mountains
Mid Mountains
Mid Hills
Siwaliks
Terai

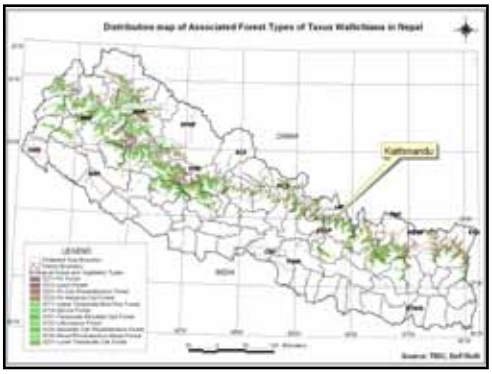

Forest Types Map of Nepal

Land Use Pattern of Nepal



Distribution and Biological Characters

- *T. wallichiana* has been reported to be distributed in 39 out of 75 districts of Nepal.
- Naturally occurs under-storey of Blue pine, Hemlock, Fir, Oak, Spruce forests of moist temperate zone.
- It is a strongly shade-tolerant, evergreen tree usually 6 to 20m in height with a trunk up 2m.
- Bark reddish brown, thin scaly, leaves distichious, linear with recurved margin, shining above, pale yellowish brown below.
- Diocious, male strobili stalked, globose arising from the axils of the leaves on the under side of the branch-lets and female strobili solitary, axillary.
- Growth rate slow, woody is hard and durable.



Ethnobotanical Uses

It is a multipurpose spp. Various parts of this species are used for food, medicine, fuel and other domestic purposes:
·***Food***: The red and fleshy cup-shaped aril that surrounds the seed is eaten by villagers. The foliage is used as litter and fed to cattle.
·***Wood***: The wood is hard, fine and even-grained and heavy widely used as round timber
· ***Medicine***: Leaf and bark are the source of taxol, which is said to be used as anti-cancer medication. In village, decoction of leaves is given for cough, bronchitis, and asthma. young shoots used for treatment of headache, giddiness and diarrhoea.
·***Others:*** Agricultural tools, incense, green twigs are used to decorate houses festivals, dye and staining the forehead.

Nepal in CITES

- Nepal is a party of CITES since I8 June 1975.
- Department of Forest is the Management Authority and Department of Plant Resources (DPR) is the Scientific Authority for plant species of Nepal.
- *T. wallichiana* has been exported in accordance with provision of the convention.
- CITES implementation Act is under consideration in the Parliament

Plant species included in CITES Appendices

Appendix I (Orchidaceae)

Paphiopedilum insigne
Paphiopedilum venustum

Appendix II

- *Rauvolfia serpentina* ~;k{uGwf_
- *Podophyllum hexandrum* ~n3'kq_
- *Cyathea* spp. ~?v pGo'_
- *Dioscorea deltoidea* ~Eofe'/_
- ORCHIDACEAE .;'gfv/L kl/]f/_ **(402 spp.)**
- *Taxus wallichiana* ~nf}7;Nnf_
- *Nardostachys grandiflora* ~h6fdjL_
- CYCADACEAE

Appendix III

- *Talauma hodgsonii* ~ef]6]rfk_
- *Meconopsis regia* ~Sof:/_
- *Podocarpus neriifolius* ~u'G;L_
- *Tetracentron sinensis* ~em/Lsf]6]_
- *Gnetum montanum* ~ef]6]nx/f_

Legal Framework for Forest Management & Protection

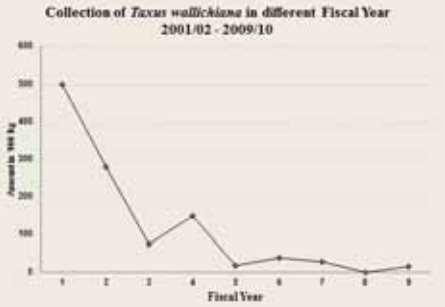
Forest Act, 1993 categorizes National Forests into five categories:

- Government managed forest- DFO responsible for management on the basis of approved plan)
- Community forest- CFUG responsible for management with approved CF Operation plan
- Leasehold forest- Leasehold Group or Leaseholder responsible for management with approved plan
- Religious forest- Religious Group responsible for the management
- Protection forest - DFO responsible for management

Beside Protected Areas (National Parks and Reserves) managed under NPWC Act 1973

Condt...

- Forest management, harvesting and sale of forest products are governed by the forest Act.
- unlawful harvesting is a forest crime and punishable by the Act.
- DFO issues license or permit for harvest of unrestricted species in Govt managed forest within the limit of approved plan.
- CFUGs, LH, RF - respective owner issue permit within the approved plan and DFO's consent
- Unprocessed or raw collection from Taxus is banned by the law and is punishable including seizure of amount of ill collection with fine and imprisonment or both.
- Virtually no sale after 2007.



Annual Trade volume of Annex II Species on basis of recorded transaction under CITES in 2010 /11

Species and products	Quantity (Kg)	Country
T. Wallichiana (DAB)	1205	India
Neopicrorhiza scrophulariifolia (Rh)	72480	India
Pterocarpus santalinus	35000	Return to origin

Source: Dept of Forests, Mgt authority

Annual Trade volume ....

Species and products	Quantity (Kg)	Country
Nardostachys jatamansi (Oil and Mark)	1614 & 117779	Belgium, India and France, UK, Pakistan
Orchids (*Dendrobium sp.*)	1585	China , Thailand

Source: Dept of Forests, Mgt authority

State-of-art of Sustainable MANAGEMENT

- Importance of mgt recognized only after 1995 when Dabur Nepal was allowed to harvesting of 800 MT of leaves from 9 districts.
- Management prescription is being included in the working schemes after 2000.
- Instead a five -year District Forests working schemes and CF Operation plan no specific detailed management plan prepared.
- Management objectives include meeting the forest product needs of people and of industry on sustained basis, generating local employment and promoting natural and artificial regeneration.

Cont...

Main elements of scheme and CF-OP include:

- Yield estimation of biomass, fixation of lopping cycle and method of harvest, monitoring, & biodiversity conservation.
- Restoration measures - protection of natural regeneration and promotion of artificial plantation.
  - Dabur Nepal has been producing seedlings and distributing farmers for cultivation in private lands since 1995.
- At field, Rangers and forest guards responsible for monitoring, however, due to difficult terrain and paucity of staff it is very weak as a result, irregularities reported.

Contd...

Harveting Regime:

- Trees above 20cm diameter are allowed to harvested during October to December and March - June .
- Leaves and twigs are collected leaving 1/3 of its crown .
- The yield of leaf clippings varies from 15-25 kg per tree (green weight).
- Three-year rotation has been fixed for harvesting.
- Clippings are gathered, bundled and taken to depots.
- Dried in shade for 4-5 days ensuring moisture level at 10%. Dried leaves are packed in jute sacks and sent to the factory.

Contd..

Regulation and Control

- There was a Quota system to control on harvest however at present non of the company has got quota due to change in policy.
- Dabur Nepal is the first company established in 1995 and received a quota of 800 MT/yr for 5 yrs with 5 yrs extension but abandon in 2003 due to failure in abiding harvest.regime and closed its factory
- Second, Machhapuchre Herbal and Natural Flower and Herbal Pvt. Ltd. established in 2001 still hopeful to get quota.
- Third, Natural Flower and herbal company established in 2002 got a quota of 800MT and 400 MT respectively for 5 yrs.
- Their quota not extended failing to compliance of EIA reports preparation.

Contd..

Regulation and Control

- New Regulations stipulates that instead of quota system DFO will auction the prescribed amount of allowable harvest in District working scheme and similarly CFUGs can also auction if their CF-OP permits.
- Company has to follow the rules of harvesting.
- District Forest Officers verify the quantity collected, collect associated fees, and issue a "release order", which is required to transport harvested products out of the district of origin.
- The release order should state: the species and quantity transported, the destination and the period in which transportation must take place.
- Department of forests provide export permit of semi-processed products following the provision of the CITES convention.

Conservation Status and Key Challenges

- Conservation status is little known and vulnerable due to over exploitation in the 90's, however, the trend has been changed from 2007
- Illegal harvesting of leaves is believed to exist in small quantities probably not exceeding 10 MT/yr especially from the eastern part of the country and most of these cross the boarder though different names
- Coordination with mgt and scientific authority due to absence of : MIS, Training and enabling environment (resource, motivation, carrier opportunity, equipment ..)

Key Challenges

- Indiscriminate harvesting
- Inadequate knowledge on the size of the present population
- Insufficient knowledge and Technique
- Absence of regular monitoring and periodic survey
- Unaware of resource depletion
- Poverty

Way Forward

- Periodic survey and research
- Strengthen Scientific authority to develop NDF
- National policy and guidelines for sustainable and predictable resource management developed.
- Regular monitoring of effect and impact on resource carried-out.
- Establish equitable benefit sharing among resource dependent community
- Create awareness among resource owners and beneficiary
- Establish MIS
- Coordination and cooperation at national, regional and international stakeholders

1.8 Sri Lanka

Conservation on International trade in Endangered Species of Wild Flora and Fauna

Subject: Country report on medicinal plants of Sri Lanka

Name and title of designated Focal Point	Mr H.D.Rathnayaka, Director (Operation), Department of Wildlife Conservation
Mailing address	No 811, Jayanthipura Road, Jayanthipura, Battaramulla Sri Lanka
Telephone	+94112888585
Fax	+94112883355
E-mail	**director@dwc.gov.lk** dayawanratnayake@yahoo.com
APPOINTMENT TO THE SCIENTIFIC COUNCIL	
Full name of the institution	Department of Wildlife Conservation
Name and title of contact officer	Dr U.K.Lakshman Peiris
Mailing address	No 811, Jayanthipura Road, Jayanthipura, Battaramulla SriLanka
Telephone	+9411888585
Fax	+9411883355
E-mail	Lakshmanp5@yahoo.com
SUBMISSION	
Name and Signature of officer responsible for submitting national report	Name: Dr U.K.Lakshman Peiris Address: DWC Jayanthipura Road Jayanthipura Battaramulla Sri Lanka Tel.: +9411888585 Fax: +94 112883355 E-mail: lakshmanp5@yahoo.com
Date of submission	12.05.2012
Competent Authority:	Department of Wildlife Conservation
Relevant implemented legislation:	Fauna and Flora Protected Ordinance,

Geology and geo morphology of the country

Sri Lanka, consisting of a main island with several small offshore lands, is situated close to the south eastern corner of the Indian subcontinent. The country lies in the Indian ocean between longitudes 79° 39'and 81° 53' East and latitudes 5° 54' and 9° 52' North. It covers a total extent of 65,609.8 Km2, consisting of 64,453.6 Km^2 of land area and 1,156.2 Km^2 of inland waters. Geologically, Sri Lanka shares with India, the South-Asian Tectonic plate, since the time of the breakup of the Gondwanaland.

Three distinct peneplains are discernible in the land form of the country. The lowland peneplain covers about 75 percent of the land with the altitude rising from sea level to 300 m above mean sea level. The second peneplain of `Mid country' is identifiable from 300m to 1,000 m. Further inland the land rises very steeply to form the south central mountain massif with plateau like areas constituting the third peneplain or `Up country' about1, 000 m - 2,500 m.

The chief determinants of the climate in Sri Lanka are rainfall and temperature. The mean temperature is 27.5°C over low lands. The montane region the mean monthly temperature varies from 13°C to 16°C with the night temperature occasionally dropping to around zero. The rainfall is of three types - monsoonal, convectional and depressional. The two monsoonal periods, the South west (May - September) and the North east (December - February) is responsible for major part of the annual precipitation. Local topography plays a major role in determining the rainfall distribution over the island. Based on the mean annual rain fall and its distribution, the country is classified into to three major climatic zones: Dry zone (1,250 mm - 1,525 mm), Intermediate zone (1,525 mm - 2,280 mm) and wet zone (2,280 mm - 5,100 mm). The centrally placed mountain mass encircled by coastal plains provides for radial pattern of surface drainage to all rivers except the river Mahaweli. The 1700 km of coastline is laced with 103 river basins, which end as sand bars, deltas, lagoons, marshes and mangrove swamps.

Taking the topography and the climate into consideration recognised six bioclimatic zones to describe the distribution of natural vegetation in the country (Wijesinghe, 1984). Subsequently through vegetational analysis identified 15 floristic regions in the country (Ashton and Gunatilleke 1987). Superimposing the ecological parameters such as the climatic, topographic, edaphic, vegetational, cultural, land use, drainage and micro-climatic factors the major climatic zones have been subdivided into 24 agro ecological regions. (Panabokke et al, 1975)

Ecological diversity

The major ecosystem diversities present in the country can be characterized under the forests, grasslands, coastal and marine, inland wetlands and the agricultural systems. The high level of ecosystem diversities exhibited in the country can be gauged from the identification of 15 floristic regions which describe the distributional patterns of natural vegetation and the demarcation of 24 agro ecological zones which

characterizes agro ecosystem diversity. The natural forest vegetation includes both closed canopy and open canopy forests. Nine major plant communities in relation to forests and four types for grasslands and one community type for mangroves have been identified. The main forest types are : 1) Tropical Thorn Forest (Arid zone), 2) Dry Evergreen Forest (Dry zone), 3) Moist Deciduous Forest (Dry zone), 4) Moist Semi Evergreen Forest (Intermediate zone), 5) Wet Semi Evergreen Forest (Intermediate zone), 6) Tropical Savannah Forest (Dry/Intermediate zone), 7) Tropical Wet Evergreen Forest (Wet zone), 8) Sub Montane Evergreen Forest (Wet zone), 9) Montane Temperate Forest.he grasslands are classified as : (1) wet montane grasslands (wet patanas), (2) Dry montane grasslands (dry patanas), (3) Damana and Talawa grass lands and the (4) wet villu grasslands. The coastal and the marine systems consists of mangroves, salt marshes, sand dunes, mudflats, seagrass beds, lagoons and estuaries, coral reefs and the coastal seas. The inland wetlands are distinguished into flood plains, swamp forests, streams, rivers and ponds.

Floral diversity

Within a small island matrix, Sri Lanka has a rich floristic wealth. Over 4000 species of angiosperms have been described with about 28 percent of its flowering plants being endemic.

Number of Described Flora of Sri Lanka

Group	No. of described species	Endemism (%)
Algae	896	NA*
Fungi	1920	NA
Lichens	About 1000	35
Mosses	562	NA
Liverworks	303	NA
Ferns & fern allies	345	18
Gymnosperms	02	00
Angiosperms	About 4000	28

*** NA = Estimates Not Available**

Sri Lankan flora exhibits a high degree of endemism across the different taxonomic groups. A large proportion (94 percent) of the endemics is distributed in the wet zone of South western and south central regions of the country.

Medicinal plants of Sri Lanka

Introduction

Among the native flora of Sri Lanka, there are well over 500 species being used in traditional medicine. Apart from that there are over 900 non-indigenous medicinal plants used in native medicine. Over 10% of all the medicinal plants used in Sri Lanka are endemic to the island and of these, 79 species are threatened. Conservation of these plants will secure the continued existence of these rare and endemic species of plants. Over harvesting of plants is mainly due to the high demand for Ayurvedic medicines. In addition, increased demand for agricultural land and unsustainable cultivation practices such as shifting cultivation and 'Chena" or slash and burn cultivation affects habitats of medicinal plants.

Sri Lanka is fortunate to have a rich reserve of indigenous knowledge on medicinal plants due to a large number of practitioners of traditional medicine. However, this important source of knowledge is currently under threat as little effort has been made to understand and document their knowledge.

Usage of medicinal Plants in Sri Lanka

Demand for medicinal plants is in the increase and there is a thriving ayurvedic drug production business. A survey carried out in 2000 showed that there were 104 Ayurvedic Drug Production Units in the country, using herbal materials valued at SL Rs 176 million. According to Abeywardena & Hettiaratchi (2001), 68% of the national demand for medicinal plants is currently met by local supply.

The national demand for herbal material (in 2000)

Source	Quantity (kg)	Value (SLRs)	%
Imports	1,509,201	125,091,177.96	32
Local supply	2,355,559	261,634,461.65	68
National Demand	**3,864,760**	**386,725,639.61**	**100**

Source: Abeywardena & Hettiaratchi (2001)

However, about 80% of locally supplied medicinal plants are collected from the wild. According to an IUCN survey (IUCN, 1996) 30 out of 50 most heavily used species are collected primarily from forest habitats.

The 10 largest imported herbal materials (in 2000)

Species	Source	Quantity (Kg)	Value (SL Rs)

Solanum virginianum	India	253,416	10247506.40
Mollugo cerviana	India	151,539	10909611.00
Zingiber officinale	Dubai/China	126,500	8321600.00
Anethem graveolens	Pakistan	83,341.6	2518364.00
Cedrus deodara	India	74,737.5	2452939.20
Glycyrrhiza glabra	Pakistan	55,609	1878654.40
Phyllanthus emblica	India	55,100	4772611.20
Trachyspermum roxburghianum	Pakistan/Dubai	53,222.2	3202500.00
Withania somnifera	India	42,347.1	2840449.60
Piper longum	India	42,163	20084158.80

Source: Abeywardena & Hettiaratchi (2001)

Conservation

The sustainable use of plants has been central to the sustenance of the people of Sri Lanka since historical times. The multiple values of these resources were used in different ways according to needs. Since the 1950's and with increase in population pressures, there has been a progressive erosion of the biodiversity in Sri Lanka. The economic development activities such as irrigation schemes, agricultural expansion, urban development etc. made heavy demands on biodiversity and directly and indirectly aggravated the depletion of the genetic resources. Until the advent of the green revolution crop genetic diversity was an inherent feature of the traditional crops.

Quarantine laws allow the international transfer of seeds and *in vitro* materials, and no loss of materials through quarantine are experienced. National laws restrict unregulated collection and export of flora, as well as planting out of certain imported genetic resources to comply to quarantine regulations. Sri Lanka's protected area network is considered to be large and lies in the dry and arid areas where both biodiversity and endemism are low. Many of the ecosystems in the wet areas, where most of the country's biodiversity and endemism occur, are less included in the protected area network. To ensure the protection of the country's indigenous fauna and flora outside the protected area network, the protection of flora outside National Reserves and Sanctuaries is covered by Section 42 of the Fauna and Flora Protection Ordinance. The number of protected species of plants has been increased from nine to over 679 and all species of family Orchidaceae through the Fauna and Flora protection (Amendment Act of 2009).

The programmes in *in situ* conservation are carried out through the legally established protected area networks which are scientifically managed for the conservation of particular eco-systems and the genetic diversity contained within the systems. Sri Lanka has one of the oldest and extensive networks of protected areas, extending to over 14 percent of the land area. Most of the protected area network (9053 km2) comprises of 3 Strict Nature Reserves, 5 Nature Reserves, 22 National Parks and 65 Sanctuaries established under the Fauna and Flora Protection Ordinance and managed by the Department of Wildlife Conservation. The remainder (1,178 km^2) consists of Sinharaja National Heritage Wilderness Area, 40 National Man and Biosphere reserves, and 14 Conservation forests which are managed by the Forest Department. A comprehensive, scientific and systematic survey has been done in almost all the natural and near natural forests including grasslands and mangroves.

The indigenous gene pool of medicinal plants, wild types and wild relatives of crops are found mainly in the wild. These are:

1. Fruit crop
2. Species with recalcitrant seeds;
3. Wild relatives of rice, legumes and spices;
4. Medicinal plants.

Home gardens are commonly found in many rural areas of Sri Lanka. The sizes of the gardens vary from 100 m2 to about 1000 m2. As altitude increases the home gardens become smaller with greater density of plants and plant species and lower diversity. A well defined plant association and canopy structure that reflect a variety of complementary functions are displayed in the system.

Sri Lanka implements a strong national programme on *ex situ* conservation of genetic resources especially with regards to plants of agri-horticultural importance. This programme has been establised during the past decade. Most common methods used at present for *ex situ* conservation and the corresponding plant genetic resources categories.

Conservation of medicinal plant resources have been established and the researches on indigenous medical systems are been carried out by universities and other higher education institutes of the country. Field gene banks are being established to suit the specific ecologic requirements of the target plant species.

Field Genebanks for medicinal plants

Location	Ecological zone	Extent (ha)
Haldumulla	Up country wet zone	7

Pattipola	Up country wet zone	7
Nawinna	Low country wet zone	20
Girandurukotte	Low country dry zone	45

Additionally, medicinal plants are also maintained by the Botanical Gardens in 4 locations of the country.

1. Royal Botanic Gardens, Peradeniya,
2. Botanic Gardens Hakgala,
3. Botanic Gardens, Gampaha and
4. Medicinal Plant Garden, Ganewatte

Among the CITES listed plant species of Sri Lanka, *Cyathea walkerae, dendrobium macarthiae, Gyrinops walla and Nepenthes distillatoria* are recognized as medicinal plants.

Medicinal plants commonly used in Sri Lanka

The list of medicinal plants commonly used in Sri Lanka (Jayaweera 1981-1982) with their uses is given in Appendix. The list was prepared by using the published literature. Of the 649 plants in the list only about 30 species are endemic to Sri Lanka. However, there are many other native plants that are used as substitutes of non indigenous medicinal plants.

Appendix. List of medicinal plants commonly used in Sri Lanka

Family	*Species*	*Uses*
ACANTHACEAE	*Acanthus ilicifolius Linn.*	*Expe* *ctorant, stimulant, cough, asthma, snake-bite, rheumatism*
	Adhatoda vasica Nees	*Diarrhoea, dysentery, phthisis, cough, asthma, pneumonia, typhoid, heart diseases, catarrh, eye diseases, opthamia, snake-bite,wounds, jaundice, biliousness, malaria, bleeding from nose, headache, fever, colic*
	Andrographis paniculata (Burm.f.) Nees	*General debility, dysentery, dyspepsia, febrifuge, stomachic, tonic, alterative, anthelmintic, snake bite*
	Asteracantha longifolia (Linn.) Nees	*Oedemia, dropsy, diuretic, kidney stones, antidysenteric, gonorrhoea, jaundice, aphrodisiac, rheumatism*
	Barleria prionitis Linn.	*Cholagogue, diuretic, jaundice, dropsy, rheumatism, rat-bite, cough, catarrh, bleeding gums, otitis, mouthwash, snake-bite*
	Blepharis repens (Vahl) Roth.	*Astringent, aphrodisiac, leucoderma, mental derangements, wounds, ulcers, diuretic, expectorant, deobstruent*
	Justicia betonica Linn.	*Poultice for boils*
	Justicia gendarussa Burm.f.	*Rheumatism, fever, jaundice, diarrhea, diuretic, diaphoretic, emetic, facial paralysis, cough, colic, ear-ache, glandular swellings, eczema, beriberi*
	Justicia procumbens Linn.	*Asthma, cough, rheumatism, opthalmia, laxative, diuretic, astringent for skin eruptions*

	Rhinacanthus nasuta (Linn.) Kurz.	*Scabies, ring worm, skin diseases, aphrodisiac, dermatitis, dhobis' itch*
	Rungia repens (Linn.) Nees	*Vermifuge, fever, cough, snake-bite*
AIZOACEAE	*Gisekia pharnacioides Linn.*	*Anthelmintic, taeniasis, diarrhoea*
	Glimus oppositifolius (Linn.) A.DC.	*Stomachic, aperient, antiseptic, dyspepsia, itch, skin diseases*
	Mollugo cerviana Seringe	*Antiseptic, itch, skin diseases, fever, gonorroea, promotion of flow of lochial discharge*
	Mollugo pentaphylla Linn.	*Stomachic, aperient, antiseptic, promotion of menstrual discharge, poultice for sore legs*
	Trianthema decandra Linn.	*Aperient, hepatitis, asthma, orchitis, migraine*
	Trianthema portulacastrum Linn.	*Cathartic, abortifacient, emmenagogue, constipation, jaundice, dropsy, asthma, poultice*
ALANGIACEAE.	*Alangium salviifolium (Linn.f.) Wangerin*	*Poultice for rheumatic pains, piles, anthelmintic, purgative, skin diseases, pyrexia, snake-bite*
AMARANTHACEAE.	*Achyranthes aspera Linn .*	*Diuretic, laxative, toothache, dysentery, bleeding piles, retention of memory, removing opacities in the cornea, scorpion stings, cough, hydrophorbia*
	Aerva lanata (Linn.) Juss.	*Diuretic, lithiasis, cough, vermifuge, headaches*
	Alternanthera sessilis (Linn.)	*Cholagogue, laxative, liver congestion, pyelitis, cystitis, gonorrhoea, strangury, increase flow of milk in nursing mothers, snake-bite, poultice, abortifacient, indigestion*
	Amaranthus paniculatus Linn.	*Diuretic, scrofulous scores, piles, blood purifier, chest congestion*
	Amaranthus polygonoides Linn.	*Menorrhagia, gonorrhoea*

	Amaranthus spinosus Linn.	*Febrifuge, sudorific, fevers, emollient, lactagogue, colic, exzema, gonorrhoea, diuretic, piles*
	Amaranthus tricolor Linn.	*Astringent, menorrhagia, diarrhea, dysentery, haemorrages from the bowels, mouth and throat ulcers, poultice*
	Amaranthus viridis Linn.	*Cholagogue, diuretic, demulcent to the urinary tract, cronic congestion of liver, bladder irritation, menorrhagia, bleeding from haemorrhoids, snake-bite, stings of wasps and centipedes, poultice, galactagogue*
AMARYLLIDACEAE	*Allium ascalonicum Linn.*	*Anthelmintic, stomachic, asthma, diuretic, carminative, aphrodisiac, diarrhea, choleric attacks, headaches, amenorrhoea, inflammation, body pains, ear-ache, fever*
	Allium sativum Linn.	*Stimulant, carminative, anthelmintic, diaphoretic, diuretic, expectorant, controlling bronchial and pulmonary secretions, dropsy, infantile convulsions, asthma, facial paralysis, gout, sciatica, rheumatism, leprosy, high blood pressure*
	Crinum asiaticum Linn.	*Emetic, toe and finger inflammations, ear-acheexpectorant, pneumonia, malaria, lumbago, headaches*
	Crinum bulbispermum (Burm.) Milne-Redhead and Schweicherdt.	*Rheumatism, piles, ear-ache*
	Pancratium zeylanicum Linn .	*Boils*
ANACARDIACEAE	*Anacardium occidentale Linn .*	*Darrhoea, diabetes, dropsy, leprosy, psoriasis, vermicide, insecticide, purgative, cough*
	Buchanania lanzan Spreng.	*Diarrhoea, glandular swellings of the neck, skin diseases, pimples, itching*

	Lannea coromandelica (Houtt.) Merril	*Ulcers and eruptions, sprains and bruises, toothache, poultice on wounds,swellings, body pains, elephantiasis*
	Mangifera indica Linn .	*Bleeding dysentery, lung diseases, cough, asthma, menorrhagia, bleeding piles, bleeding from internal organs,*
	Pistacia integerrima Stew. ex Brandis	*Expectorant, asthma, phthisisdysentery, snake-bite and scorpion stings*
	Rhus succadanea Linn.	*Phthisis, diarrhoea, dysentery*
	Semecarpus anacardium Linn. f.	*Leprous and venereal affections, rheumatism, piles, boils in the rectum, urinary diseases, nervous debility, skin diseases, sexual debility, liver and spleen diseases, vermifuge, asthma, cancer*
	Semecarpus coriacea Thwaites	*Leprous and venereal affections, rheumatism, piles, boils in the rectum, urinary diseases, nervous debility, skin diseases, sexual debility, liver and spleen diseases, vermifuge, asthma, cancer*
	Semecarpus gardneri Thwaites	*Leprous and venereal affections, rheumatism, piles, boils in the rectum, urinary diseases, nervous debility, skin diseases, sexual debility, liver and spleen diseases, vermifuge, asthma, cancer*
	Semecarpus obovata Moon	*Leprous and venereal affections, rheumatism, piles, boils in the rectum, urinary diseases, nervous debility, skin diseases, sexual debility, liver and spleen diseases, vermifuge, asthma, cancer*

	Semecarpus obscura Thwaites	*Leprous and venereal affections, rheumatism, piles, boils in the rectum, urinary diseases, nervous debility, skin diseases, sexual debility, liver and spleen diseases, vermifuge, asthma, cancer*
	Semecarpus subpeltata Thwaites	*Leprous and venereal affections, rheumatism, piles, boils in the rectum, urinary diseases, nervous debility, skin diseases, sexual debility, liver and spleen diseases, vermifuge, asthma, cancer*
	Spondias pinnata Kurz	*Dysentery, rheumatism, ear-ache, antiscorbutic, bilious dyspepsia*
ANNONACEAE	*Annona squamosa Linn.*	*Vermicide, insecticide, destroy lice, abortifacient, suppuration of malignant tumors, diarrhea, dysentery, dyspepsia, purgative*
APIACEAE	*Apium graveolens Linn.*	*Alterative, diuretic, colic, asthma, chest diseases, indigestion, rheumatism, liver and spleen diseases, itch, aphrodisiac, gout, carminative, lumbago, abortifacient, emmenagogue*
	Carum carvi Linn.	*Carminative, stimulant, flatulence, stomach ailments, eyewash, diuretic, anthelmintic, swellings of thw womb, piles*
	Carum copticum Berth & Hook.f	*Diuretic, carminative, stomachic, flatulence, dyspepsia, diarrhoea, cough, hookworm infections*
	Centella asiatica Urb.	*Lowering blood pressure, blood purifier, indigestion, nervousness, dysentery, improving memory, skin diseases, eczema, syphilis, enlargement of glands, leprosy, rheumatism, urinary problems, ovarian irritations, diuretic, elephantosis, enlarged scrotum, alterative tonic*

	Coriandrum sativum Linn.	*Colds, influenza, fever, refrigerant, diuretic, aphrodisiac, dyspepsia, sore throat, catarrh, bilious complaints, flatulence, rheumatism, neuralgia, ptomaine poisoning*
	Cuminum cyminum Linn.	*Stomachic, carminative, astringent, dyspepsia, choric diarrhea, bilious nausea in pregnant women, increasing breast milk*
	Ferula asafoetida Karst	*Flatulence, ringworms, antispasmodic, expectorant, anthelmintic, nervine stimulant, asthma, dysentery, catarrh, hernia, whooping cough, angina pectoris, pneumonia, bronchitis, snake-bite, rheumatism, carminative*
	Foeniculum vulgare Gaertn.	*Stimulant, carminative, stomachic, flatulence, griping, diuretic, purgative, vermicide, poultice for mammary inflammations, jaundice, menstrual troubles, emmenagogue, galactagogue, diarrhea, cramp*
	Hydrocolyle javanica Thunb	*Alterative, tonic, diuretic, stimulant, indigestion, nervousness, dysentery*
	Peucedanum graveolens Hiern	*Carminative, stomachic, easing pains after child birth, flatulence, indigestion, griping, promote secretion of breast milk*
	Pimpinella anisum Linn.	*Carminative*
	Trachysperinum roxburghianum (DC) Craib	*Flatulence, hiccough colic, atonic dyspepsia, spasmodic ailments of bowels, bladder pains, vomiting, diarrhea, diuretic*

APOCYNACEAE	*Alstonia scholaris (Linn.) R. Br.*	*Fevers, diarrhea, dysentery, febrifuge, emmenagogue, anticholetic, vulnerary, astringent, anthlmintic, alterative, antiperiodic, poultice, beriberi, liver congestion, ulcers, rheumatism, toothache, ear-ache, stomachic, fevers, diabetes, hemorrhoids, snake-bite*
	Carissa carandas Linn.	*Diarrhoea, ear-ache, mouth and throat soreness, syphilis, fevers, stomachic, itch, antiscorbutic*
	Catharanthus roseus (Linn.) G. Don.	*Diabetes, emmenagogue, antidysenteric, purgative, vermifuge, depurative, toothache, rheumatism, constipation*
	Ervatamia divaricata (Linn.) Burkill	*Anodyne, anthelmintic, toothache, opacities of the cornea , eye diseases, opthalmia, skin diseases*
	Holarrhena antidysenterica (Roxb.) Wall.	*Fever, diarrhea, dysentery, dropsy, amoebiasis*
	Holarrhena mitis (Vahl) R. Br.	*Antiperiodic, fever, diarrhea, dysentery, dropsy, amoebiasis,*
	Ichnocarpus frutescens (Linn.) Ait. f.	*Fevers*
	Nerium oleander Linn.	*Ringworm, leprosy, skin eruptions, boils, haemorrhoids, asthma, eczema, epilepsy, diuretic, heart-tonic*
	Plumeria acuminata Ait. f.	*Purgative, emmenagogue, febrifuge, purgative, diuretic, antiherpetic, gonorrhoea, venereal sores, abortion, dropsy, dysuria, toothache, itch, boils, bronchial diseases, vermifuge, vaginal inflammations, poultice, asthma*
	Rauvolfia serpentina (Linn.) Benth. ex Kurz	*Increase uterine contraction, anthelmintic, opacities in the cornea, snake-bite, fever, cholera, blood pressure*

	Rejoua dichotoma (Roxb.) Gamble ...	*Snake-bite and centipede bites, antiseptic, ulcers, fistulae, purgative, eye infections, toothache*
	Wrightia antidysenterica (Linn.) R. Br.	*Tonsilitis, bronchial diseases, snake-bite*
	Wrightia tomentosa Roem. and Schultes	*Snake-bite, scorpion stings, menstrual and renal complaints*
APONOGETONACEAE	*Aponogeton crispus Thunb.*	*Cholagogue, diuretic, diluent, pyelitis, cystitis, gonorrhoea, strangury, rheumatism*
ARACEAE	*Acorus calamus Linn .*	*Stomachic, carminative, emetic, flatulence, colic, dyspepsia, fevers, bowel complaints, dysentery, bronchial affections, asthma, internal heamorrhages, intestinal ulcerations, theumatism, nerve diseases, coughdropsy, piles, anaemia, indigestion, anthelmintic, stimulant, insecticide*
	Alocasia indica (Roxb.) Schott	*Anasarca, laxative, diuretic, constipation, aphthae*
	Alocasia macrorrhiza (Linn.) Schott.	*Stings of nettle, joint pains, dog bites, piles, fevers*
	Amorphophallus campanulatus (Roxb.) Bl. Ex Decne.	*Rheumatism, piles, dyspepsia, abdominal colic, elephantiasis, skin and blood diseases, fistula, glandular swellings in the neck, urinary diseases, dropsy, opthalmia, haemorrhoids, toothache*
	Arisaema leschenaultii Bl.	*Rheumatism, piles, dyspepsia, abdominal colic, elephantiasis, skin and blood diseases, fistula, glandular swellings in the neck, urinary diseases, dropsy, opthalmia, haemorrhoids, toothache*

	Colocasia esculenta (Linn.) Schott.	*Laxative, diuretic, lactagogue, styptic, haemorrhage, ear-ache, otorrhoea, rubefacient, piles, wasp and insect stings, aphthae in the mouth*
	Cryptocoryne spiralis (Retz.) Fischere x Wydler.	*Infantile vomiting, cough, abdominal pains, fever*
	Lasia spinosa (Linn.)Thw.	*Piles*
	Pistia stratiotes Linn.	*Diuretic, gonorrhoea, demulcent, dysuria, laxative. Emollient, poultice applied on haemorrhoids, dysentery, cough, asthma, ringworm, boils, skin diseases*
	Pothos scandens Linn.	*Snake-bite, wounds, ulcers, cholagogue, diaphoretic, diuretic, liver congestion, rheumatism, malaria, small-pox, asthma*
	Rhaphidophora lacinata (Burm.f.) Merr.	*Snake-bite*
	Scindapsus officinalis Schott	*Stimulant, diaphoretic, anthelmintic, diarrhea, asthma, bronchial diseases, rheumatism*
	Typhonium trilobatum (Linn.) Schott	*Poultice for snake-bite, bowel haemorrhoids, stomach complaints*
ARECACEAE	*Areca catechu Linn.*	*Stimulant, astringent, taenifuge, sialogogue, stimulate sweat secretion, masticatory, dentifrice, vermifuge, abortifacient, lumbago, round worms, choleric ailments, flatulence, dropsy, ulcers, abdominal worms, bronchitis, diarrhea, liver diseases*
	Borassus flabellifer Linn.	*Inflammatory ailments, dropsy, diuretic, gonorrhoea, amoebiasis, syphilis, spleen diseases, cough, food poisoning, arrest bleeding from wounds, cholera, child birth, anthelmintic, antibilious, antidysenteric*

	Calamus rotang Linn.	*Diabetes, ulcers, boils*
	Caryota urens Linn.	*Rheumatism, snake-bite, gastric ulcers, tooth ailments, boils, promoting hair growth*
	Cocos nucifera Linn.	*Diuretic, anthelmintic, sun-stroke, aperient, diarrhea, anaemia, urinary irritations, dysentery, promoting hair growth, vermifuge, astringent, strengthening gums*
	Corypha umbraculifera Linn.	*Stomach disorders, purgative*
	Nypa fruticans Wurmb.	*Herpes, toothache, ulcers, centipede bites*
	Phoenix zeylanica Trim.	*Gonorrhoea, gleet, fractures, antidote for poisons, vermifuge, toothache*
ARISTOLOCHIACEAE	*Aristolochia bracteolata Lam.*	*Purgative, colic, syphilis, gonorrhoea, eczema, roundworms*
	Aristolochia indica Linn.	*Stimulant, tonic, emmenagogue, fevers, diarrhea, dropsy, leucoderma, tonsillitis, dyspepsia, rheumatism, centipede and scorpion bites, snake-bite, bowel complaints*
ASCLEPIADACEAE	*Asclepias curassavica Linn.*	*Emetic, depurative, haemostatic, piles, gonorrhoea, intestinal worms, sores and wounds, pulmonary tuberculosis*
	Calotropis gigantea (Linn.) Ait. f.	*Skin diseases, leprosy, syphilis, dysentery, enlargement of abdominal vicera, worms, ascites, anasarca, ulcers, sinus troubles, anal fistula, piles, toothache, apthae in the mouth, jaundice, elephantiasis, eczema, skin diseases, snake-bites*
	Caralluma umbellata Haw.	*Drawing thorns or spikes from the body, dislocation of bones*
	Cryptolepis buchananii Roem.and Schult.	*Rickets, promotion of breast milk secretion*

	Dregia volubilis (Linn.f.) Hook.f.	*Emetic, expectorant, boils and abscesses*
	Gymnema sylvestre (Retz.) R.Br. ex Schult.	*Reducing blood sugar, increasing urine secretion, snake-bite, emetic, expectorant, eye diseases*
	Hemidesmus indicus (L.) R.Br.	*Demulcent, alterative, diaphoretic, diuretic, tonic, loss of appetite, fever, skin diseases, syphilis, leucorrhoea, inflammaton of urinary poassages, rheumatism, fever, carbuncles, fistula, urinary diseases, blood tumours, cough, strangury, snake-bite*
	Hoya ovalifolia Wight & Arn.	*Fractures*
	Marsdenia tenacissima (Roxb.) Moon	*Flatulence, gonorrhoea*
	Pergularia daemia (Forsk.) Chiov.	*Emetic, diarrhea, catarrh, asthma, rheumatism, anthelmintic, purgative, snke-bite, eye diseases*
	Sarcostemma brumonianum W.& A.	*Fractures, stomachic, cholagogue, laxative, diuretic, stimulate appetite, aneroxia, atonic dyspepsia, neurasthenia, debility, galactagogue, hepatic dropsy, haemorrhoids*
	Tylophora flava Trimen	*Asthma, expectorant, dysentery, cough, tuberculosis, emetic, neuralgia, headache, diuretic*
	Tylophora indica (Burm.f.) Merr.	*Dysentery, asthma, cough, tuberculosis, emetic, neuralgia, headache*
ASTERACEAE	*Ageratum conyzoides Linn.*	*Wounds, sores, diarrhea, dysentery, prevention of tetanus, colic, flatulence, rheumatism, catarrh, burns, purgative, skin diseases, leprosy, boils, opthalmia*

	Anacyclus pyrethrum DC.	*Boils, sores, framboesia, sialagogue, rheumatism, masticatory, toothache, aphonia, paralysis of the tongue and muscles of the throat, tonsils, typhoid fever, convulsions in children, skin eruptions, bronchial diseases, sexual debility*
	Anaphalis subdecurrens (DC.) Gamble	*Removal of poisonous effects from the body*
	Artemisia vulgaris Linn.	*Stomachic, deobstruent, antispasmodic, anthelmintic, ulcers, skin diseases, convulsions, haemoptysis, dysentery, menorrhagia, post partum haemorrhage, wound wash, indigestion, diarrhea, haemostatic, tape worm, carminative, vermifuge, urinary troubles*
	Blumea mollis (D.Don) Merr.	*Anthelmintic, thread-worm, dysentery, chronic discharges from uterus, bleeding piles, renal dropsy, diuretic, catarrh, bronchitis, antiscorbutic*
	Centipeda minima (Linn.) A.Br.& Aschers	*Sternutatory, ozaena, headaches, colds, paralysis and pains in the joints, toothache*
	Eclipta prostrata (L.)Linn.	*Chronic skin diseases, ulcers, elephantiasis, conjunctivitis, stimulation of hair growth, arthritis, dropsy, deobstruent for hepatic and splenic enlargements, emetic, purgative, haemorrhage after childbirth, asthma, bronchitis, toothache, strengthening gums, jaundice, fevers, hepatitis*

	Elephantopus scaber Linn.	*Urethral discharges, diarrhea, dysentery, dysuria, cardiac-tonic, anthelmintic, roundworm, cough, bites of wild animals, increasing urine discharge, diuretic, febrifuge, diaphoretic, emmenagogue, dyspepsia, fevers, menstrual derangements, emollient*
	Emilia sonchifolia (Linn.)DC.	*Bowel complaints, night blindness, eye inflammation, antipyretic, cuts and wounds, ulcers, expectorant, anti-haemostatic, fever, cough, phthisis, diarrhea, astringent, anti-asthmatic, vulnerary, sore throat*
	Eupatorium triplinerve Vahl	*Dyspepsia, lung diseases, fevers, colds, diarrhea, sudorific, stimulant, laxative, emetic, diaphoretic, indigestion, skin affections*
	Gymura pseudo-china DC.	*Cooling medicine, leprosy*
	Saussurea lappa Clarke	*Leucoderma, abdominal colic, dropsy, piles, asthma, coughs, anaemia, enlarged liver, diarrhea, urticaria, insanity, epilepsy, impotence, carbuncles, fistula, syphilis, nervous urinary and blood diseases, typhoid fever, cardiac stimulant, expectorant, diuretic, persistent hiccough*
	Sphaeranthus indicus Linn.	*Stomachic, stimulant, glandular swellings in the neck, uretharl discharges, jaundice, dyspepsia, flatulence, colic, diaphoretic, laryngitis, bronchitis, coughs, anthelmintic, piles, diuretic*
	Spilanthes paniculata Wall.	*Toothache, sore-mouth in children, insecticide, burns and scalds, stomachic, expectorant, dyspepsia, bronchitis, dysentery, purgative, dissolving vesical calculi, itch, psoriasis*

	Vernonia anthelmintica (L.) Willd.	*Fever, convulsions, improvement of appetite and digestion, aneroxia, atonic dyspepsia, flatulence, anthelmintic, diuretic, staomachic, colic, dysuria, paralysis, coughs*
	Vernonia cinerea (L.) Less.	*Stomachic, carminative, dyspepsia, flatulence, colic, diaphoretic, dysentery, piles, vermifuge, dropsy, conjunctivitis, anthelmintic, asthma, coughs, bronchitis, wounds and sores*
	Vernonia zeylanica Less.	*Fractures, suppuration, eczema, asthma, emetic, food poisoning*
	Wedelia chinensis (Osbeck.) Merrill.	*Uterine haemorrhage, menorrhagia, deobstruent, coughs, cephalalgia, skin diseases, alopecia, promoting hair growth*
	Xanthium strumarium Linn.	*Cancer, strumous diseases, diaphoretic, sedative, malaria, ulcers, boils, abscesses, catarrh, scrofula, leprosy, tubercular and other skin diseases, dysentery, bladder ailments*
BALSAMINACEAE	*Impatiens repens Moon*	*Epilepsy, piles, haemorrhoids, insanity*
BAMBUSACEAE	*Bambusa arundinacea (Retz.) Willd.*	*Emmenagogue, diarrhea (in cattle), leprosy, fever, haemoptysis, threadworms, cough, asthma, lung diseases*
BASELLACEAE	*Basella alba Linn.*	*Poultice for swellings, demulcent, diuretic, emollient, boils, ulcers, abscesses, suppuration, burns and scalds, laxative*
BERBERIDEAE	*Berberis aristata DC*	*Jaundice, diarrhea, malaria, urinary problems, eye and skin diseases, ulcers, dysentery, abdominal colic, nervous diseases, menorrhagia*
BETULACEAE	*Betula utilis D.Don*	*Washing wounds, carminative for hysteria, jaundice, bilious fevers, catarrhal fevers*

BIGNONIACEAE	*Oroxylum indicum (Linn.) Vent.*	*Astringent, diarrhea, dysentery, diaphoretic, rheumatism, otorrhoea, piles, purgative*
	Stereospermum suaveolens (Roxb.) DC.	*Cooling medicine, diuretic, hiccough, aphrodisiac*
BOMBACACEAE	*Adansonia digitata Linn .*	*Emollient, diuretic, febrifuge, malarial fever, astringent, dysentery, diarrhea, diaphoretic, hiccough*
	Ceiba pentandra (Linn.) Gaertner.	*Dysentery, diarrhea, ascites, anasarca, aphrodisiac, gonorrhoea, menorrhagia, urinary problems, asthma, colds, diuretic, bladder stones, coughs, intestinal catarrh, urethritis, astringent, constipation*
	Salmalia malabarica (DC.) Schott & End.	*Astringent, restorative, alterative, aprodisiac, demulcent, diuretic, gonorrhoea, dysentery, impotency, threumatism, inflammations and eruptions, diarrhoea, laxative, bladder and kidney problems, weaknesses of genital organs, custitis, catarrh*
BORAGINACEAE	*Carmona microphylla (Lamk)G.Don*	*Cachexia, syphilis, vegetable poisoning, diarrhoea, cough*
	Cordia dichotoma Forst.f.	*Colic, dysentery, cough, chest diseases, problems in uterus and urethra, laxative, gonorrhoea, boils, tumors, headache, stomach ache, ulcers in mouth, ringworm*
	Heliotropium indicum Linn.	*Boils and ulcers, sores, gum-boils and pimples, sore-throat, emmenagogue, abortifacient, ringworm, rheumatism, bronchial diseases, asthma, gonorrhoea, erysipelas, stings of insects, preventing abortion*
BRASSICACEAE	*Brassica alba Hook.f.*	*Stimulant, rubefacient, emetic, diuretic, poultice for bronchitis, pleurisy, neuralgia, fever, promoting appetite and digestion*

	Brassica integrifolia (West) O.E.Schult.	*Pleurodynia, pleuritis, hepatitis, gastralgia, colic, neuralgia, lumbago, counter irritant, viscera, cerebral congestion, convulsions, rheumatism, stiff neck, secretion of gastric juices, galactagogue*
	Brassica nigra (Linn.)Koch.	*Febrile and inflammatory diseases, internal congestions, spasmodic, neuralgia, rheumatism, pimples, urticaria, stimulant, sore-throat, promoting digestion*
BROMELIACEAE	*Ananas comosus Merrill.*	*Anthelmintic, vermicide, vermifuge, abortifacient, purgative, hiccough, flatulence, distension of abdomen, uterine contractions, jaundice, diarrhoea, antiscobutic, diuretic, aperient, refrigerant, digestive*
BURSERACEAE	*Boswellia serrata Roxb.ex Colebr.*	*Stimulant, expectorant, diuretic, stomachic, hepatic stimulant, diarrhoea, dysentery, haemorrhoids, hair growth*
BURSERACEAE	*Canarium zeylanicum Blume*	*Astringent, antiseptic, bleeding and spongy gums, chronic ulcers and fistulae, stomachic, diabetes, febrifuge, antiperiodic, malaria, pyorrhea, halitosis*
	Commiphora mukul Engl.	*Caries of teeth, weak and spongy gums, pyorrhea, tonsillitis, pharyngitis, ulcerated throat, catarrh of bowels, typhoid fever, senile debility, neurasthenia, neuritis and paralysis, rheumatism, aphrodisiac, sexual debility and impotence, antisuppuative, boils, ulcers and haemorrhoids*
CACTACEAE	*Opuntia dillenii (Ker-Gawl.)Haw.*	*Poultice for inflammations, suppurations, ear-ache, gonorrhoea, whooping cough, expectorant, heart ailments*

CAMPANULACEAE	*Lobelia nicotianifolia Heyne*	*Antispasmodic, asthma*
CANNABINACEAE	*Cannabis sativa Linn.*	*Coughs, asthma, dropsy, diarrhea, dysentery, piles, neuralgia, migraine, malaria, fever, blood poisoning, anthrax, snake-bites*
CAPPARIDACEAE	*Capparis horrida Linn.*	*Counter irritant, boils, swellings, piles, syphilis, sedative, stomachic, anti-hidriotic, gastric irritations, vomiting, improving appetite, cholera*
	Capparis moonii Wight	*Glandular swellings of the throat, bronchitis, tonsillitis, removing growths in the throat*
	Capparis zeylanica Linn.	*Counter irritant, boils, swellings, piles, syphilis, sedative, stomachic, anti-hidriotic, gastric irritations, vomiting, improving appetite, cholera*
	Crataeva religiosa Forst.f.	*Urinary complaints, fever, skin diseases, gastric irritations, poultice, gouty swellings, swellings and burning sensation in the soles of feet, stomachic, purgative, diuretic, snake-bite, kidney and bladder stones, dropsy, enlargement of abdominal viscera, scrofula, painful micturition, febrifuge, colic, indigestion, rheumatism*
	Gynandropsis gynandra (Linn.) Merrill.	*Pustular eruptions, cutaneous diseases, leprosy, rubefacient, vesicant, rheumatism, neuralgia, headache, stiff neck, febrifuge, antispasmodic, sudorific, anthelmintic, carminative, snake-bite, dyspepsia, flatulence, colic, aphrodisiac*
	Polanisia icosandra (Linn.) Wight & Arn.	*Anthelmintic, carminative, rubefacient, vesicant, fevers, diarrhea, infantile convulsions, blisters, vermifuge, ear-ache, deafness, boils, prevention of pus, cardiac stimulant, worms*
CARICACEAE	*Carica papaya Linn.*	*Dyspepsia, intestinal irritation,*

		diphtheria, ulcers, fissures of tongue, removing warts and corns, styptic, vermifuge, anthelmintic, abortion
CELASTRACEAE	*Celastrus paniculatus Willd.*	*Antidote for opium poisoning, rheumatism, gout, paralysis, leprosy, beriberi, nerve stimulant, brain tonic, rheumatiusm, dysentery, scabies, ringworm, skin diseases, improve appetite, aneroxia, dyspepsia, nerve tonic, diaphoretic, diuretic, anasarca, ascites*
	Elaeodendron glaucum (Rottb.) Pers.	*Headaches, swellings, snake-bite, emetic, pneumonia*
	Kokoona zeylanica Thw.	*Diabetes, snake-bite, swollen joints, eye diseases, headaches, framboesia, pimples, skin diseases, lighten skin colour, removing marks from the face*
CLUSIACEAE	*Calophyllum inophyllum Linn.*	*Antiseptic, disinfectant, bromidrosis, expectorant, bronchitis, phthisis, rheumatism, inflammations of bones and joints, ankylosis, lung ailments, ulcers and wounds, sore eyes, astringent, purgative, internal haemorrhages, gout, scabies, migraine, verigo, orchitis, anodyne, anti-psoric, diuretic*
	Calophyllum tomertosum Wight	*Fractures and contusions*
	Calophyllum walkeri Wight	*Fractures and contusions*
	Garcinia cambogia Desrouss.	*Astringent, antiseptic, ulcers, weak and spongy gums, stomachic, anorexia, dyspepsia*
	Garcinia mangostana Linn.	*Diarrhoea, dysentery, genito-urinary diseases, aptthae in the mouth, dysmenorrhoea, astringent*

	Garcinia morella Desrouss.	*Anthelmintic, dropsy, amenorrhoea, constipation, vermifuge, cathartic, anasarca, ascites, pimples, boils, antilithic, urinary gravel and calculi*
	Mesua ferrea Linn.	*Astringent, sudorific, cough, expectorant, bleeding piles, uterine haemorrhages, rheumatism, itch, dysentery, bronchitis, pneumonia*
COMBRETACEAE	*Anogeissus latifolia Wall.*	*Snake-bite, expectorant, phlegm obstructions*
	Terminalia arjuna Wight & Arn.	*Bilious affections, antidote for poisons, ear-ache, fractures, contusions, ecchymosis, heart and lung diseases*
	Terminalia bellirica (Gaerm.)Roxb.	*Dropsy, piles, diarrhea, leprosy, fever, sore eyes, diuretic, demulcent, purgative, hair application, rheumatism*
	Terminalia catappa Linn.	*Astringent, bilious diarrhea, gastric fevers, dysentery, gonorrhoea, leucorrhoea, scabies, leprosy and other cutaneous diseases, diuretic, cardio tonic, catarrh, sudorific, rheumatism*
	Terminalia chebula Retz.	*Diuretic, cardio tonic, purgative, carious teeth, bleeding and ulceration of gums, fever, eye diseases, piles, dropsy, sores, dysentery, improving complexion*
	Terminalia tomentosa Wight & Arn.	*Diuretic, cardio tonic, diarrhea, removing apthae, ulcers, fractures*
COMMELINACEAE	*Commelina diffusa Burm.f.*	*Burns, itches, boils, poultice for groin pains, eye lotion*
	Cyanotis axillaris (Linn.) J. A.& J. H.Schult.	*Tympanitis, ascites*
CONVOLVULACEAE	*Argyreia nervosa (Burm.f.)Boj.*	*Rheumatism, nervous diseases, abscesses of the stomach, antiphlogistic, rubefacient, maturative, poultice for wounds and skin diseases*

	Argyreia populifolia Choisy.	*Astringent, antiseptic, spongy gums, dog bite, rabies*
	Cuscuta chinensis Lam.	*Inflamed eyes, tonic, diaphoretic, demulcent, purgative, fevers, retention of wind, liver induration, bilious disorders, carminative, anodyne*
	Cuscutar eflexa Roxb.	*Purgative, fevers, retention of wind, liver induration, bilious disorders, carminative, anodyne*
	Evolvulus alsinoides Linn.	*Bowel complaints, desentery, febrifuge, alterative, vermifuge, nervous debility, loss of memory, syphilis, scrofula, growth of hair, fevers, bronchitis, asthma*
	Ipomoea angustifolia Jacq.	*Head ailments due to snake-bite, increase breast milk*
	Ipomoea aquatica Forsk.	*Laxative, diabetes, emetic, poultice for fever, ringworm*
	Ipomoea asarifolia (Desr.) Roem. & Schult	*Anaemia, neurasthenia, general debility, rheumatism, syphilis, poulticing sores, boils, skin eruptions, leprosy, elephantiasis, fractures, poultice for eye injuries, removing poisons from the body*
	Ipomoea mauritiana (Jaeq.) Abeywick.	*Restorative, alterative, aphrodisiac, demulcent, galactagogue, stomachic, cholagogue, dyspepsia, congestion of liver, jaundice, diuretic, Bright's disease, pyelitis, cystitis, gonorrhoea, strangury, cerebral and spinal paralysis, uterine tonic, regulating of menstrual functions, sterility, rheumatism*
	Ipomoea maxima (Linn.f.) G.Don.	*Aesenic poisoning*
	Ipomoea nil (Linn.) Roth.	*Purgative, diuretic, anthelmintic, deobtruent, dropsy, abortion, constipation*

	Ipomoea obscura (Linn.) Ker Gawl.	*Aphthous affections, gangrenous sores, removing foreign bodies from the body, cardiac, stomachic, expectorant, diuretic, dyspepsia, bronchitis, renal and hepatic dropsy*
	Ipomoea pes-caprae (Linn.) Roth.	*Rheumatism, colic, boils, carbuncles, dropsy, diuretic, inflammations of legs, prolapsus ani, whitlow, escharotic, ulcers, purgative, anodyne, bladder diseases, stomach ache, cramps*
	Ipomoea pes-tigridis Linn.	*Purgative, poulticing sores, boils and carbuncles, dog bites, nervine and muscular tonic, neurasthenia, debility of old age, paralysis, aphrodisiac*
	Operculina turpethum (Linn) S.Manso	*Fever, cough, asthma, skin diseases, sores, boils, itches, anaemia, diarrhoea, piles, dyspepsia, rheumatism, gout, vomiting, biliousness, urinary diseases, strangury, dysuria, bladder stones, spleen diseases, excessive indulgence of alcohol, purgative, paralysis, antibiotic*
CRASSULACEAE	*Kalanchoe laciniata DC.*	*Urinary diseases, diarrhea, dysentery, lithiasis, cholera, phthisis, chronic sores and ulcers, poultice on chest for cough and colds, bruises and contusions, itch, bladder stones*
CUCURBITACEAE	*Benincasa hispida (Thumb.) Cogn.*	*Antidote for mercuric, alcoholic and snake-bite poisoning, insanity, epilepsy, nervous diseases, diabetes, cholera, purgative, anthelmintic, diuretic*
	Bryonopsis laciniosa (Linn.) Naud.	*Aperient, cathartic, inflammations*
	Coccinea grandis Kurz	*Skin eruptions, ringworm, itch, psoriasis, gonorrhoea, diabetes, dropsy, pyelitis, cystitis, strangury, urinary gravel and calculi, cathartic, snake-bite*
	Colocynthis citrullus (Linn.) Kuntze.	*Haemorrhage after abortion, diuretic, masticatory*

	Colocynthis vulgaris Schrad.	*Boils, pimples, abdominal swellings, cough, asthma, poultice for breast inflammation, cronic skin diseases, syphilis, elephantiasis, leprosy, hemiphlegia, piles, anaemia, colic, ascites, jaundice, rheumatism, urinary diseases, dropsy, snake-bite, scorpion sting, epilepsy, growth and darkening of hair, purgative*
	Corallocarpus epigaeus C.B.Clarke	*Dysentery, venereal complaints, anthelmintic, rheumatism, laxative, snake-bite*
	Cucumis callosus (Rottb.) Cogn.	*Purgative, insanity, strengthening memory, bilious disorders, diabetes, snake-bites, diuretic, cardiac, renal and hepatic dropsy, nephritis, pyelitis, cystitis, gonorrhoea, urinary gravel and calculi*
	Cucumis melo var.egrestis Naud.	*Diuretic, urinary complaints*
	Cucumis sativus Linn.	*Dysentery, diuretic, taenicide, anthelmintic,*
	Cucurbita maxima Duchesne	*Poultice for boils, carbuncles and ulcers, haemoptysis, haemorrhages from pulmonary organs, insect and centipede bites, vermifuge, diuretic, urinary diseases, nervine tonic, roundworm, burns, scalds, inflammations, abscesses*
	Lagenaria siceraria (Mol.) Standley.	*Cough, antidote for poisons, antibilious, diuretic, regrigerant, cathartic, drpsy, taenicide, emollient, headache*
	Luffa acutangula Roxb.	*Splenitis, haemorrhoids, leprosy, granular conjunctivitis, snake-bites, jaundice, purgative, skin diseases, dropsy*
	Luffa cylindrica (Linn.) M.Roem.	*Hydragogue cathartic, skin diseases, orchitis, amenorrhoea, tonic, emetic, purgative, anthelmintic, diuretic*

	Melothria heterophylla Cogn.	*Spermatorrhoea, purgative*
	Melothria maderaspatana (Linn.) Cogn.	*Expectorant, toothache, flatulence, sudorific, strained backs*
	Momordica charantia Linn.	*Anthelmintic, vermifuge, piles, leprosy, jaundice, colic, aphrodisiac, haemorrhoids, tonic, stomachic, rheumatism, gout, spleen and liver diseases, purgative, abortifacient, dysentery, diabetes, stomach ulcers, skin diseases, headaches, constipation, colitis, coughs*
	Momordica dioica Roxb.	*Aphrodisiac, anthelmintic, asthma, bronchitis, hiccough, piles, expectorant, urinary complaints, staomachic, laxative, asthma, leprosy, bronchitis, excessive salivation, heart ailments, poisoning, snake-bite, elephantiasis, ulcers caused by snake-bite*
	Trichosanthes anguina Linn.	*Purgative, vermifuge, emetic, anthelmintic*
	Trichosanthes bracteata (Lam.) Voight.	*Hydragogue cathartic, boils, ulcers, hemicrania, ozaena, otorrhoea, asthma*
	Trichosanthes cucumerina Linn.	*Indigestion, dyspepsia, jaundice, fever, dropsy, acute bronchitis, pneumonia, anaemia, catarrh, bilious fevers, bolis, sires, skin eruptions such as urticaria, exzema, dermatitis, psoriasis, diabetes, emetic, purgative, anthelmintic, liver congestion, stomach disorders,*
	Zanonia indica Linn.	*Febrifuge, asthma, cough, cathartic, nervous irritation caused by boils*
CYCADACEAE	*Cycas circinalis Linn.*	*Piles, haemorrhoids, chronic constipation*
CYPERACEAE	*Cyperus rotundus Linn*	*Astringent, antiseptic, acne, scorpion stings, ulcers, stomachic, carminative, cholagogue, anorexia, dyspepsia, diarrhoea, dysentery, liver congestion,*

		laryngitis, bronchitis, pneumonia, diaphoretic, astringent, stimulant, tonic, demulcent, diuretic, galactagogue, indigestion, liver complaints, jaundice, malaria, urinary disorders, emmenagogue
DILLENIACEAE	*Dillenia indica Linn.*	*Astringent, laxative, fevers, cough, bone dislocations, hair wash*
	Dillenia retusa Thunb.	*Poultice in fractures and dislocations*
DIPTEROCARPEAE	*Dipterocarpus glandulosusThw.*	*Rheumatism, leprosy*
	Dipterocarpus zeylanicus Thw.	*Fever, chronic ulcers, sinuses, fistulae, diaphoretic, expectorant in pharyngitis, tonsillitis, bronchitis and pneumonia*
	Shorea robusta Gaertn.f.	*Dysentery, digestion, gonorrhoea, aphrodisiac*
EBENACEAE	*Diospyros malabarica (Lam.) Kostel*	*Wounds, aphthae and sore throat, diarrhea, dysentery*
ERICACEAE	*Gaultheria rudis Stapt.*	*Astringent, muscular pains, rheumatism, stimulant, carminative, antiseptic, sciatica, neuralgia, vermicide against hookworm, insecticide, hair tonic*
	Rhododendron zeylanicum Booth.	*Headaches*
ERYTHROXYLACEAE	*Erythroxylum monogynum Roxb.*	*Stomachic, diaphoretic, stimulant diuretic, dyspepsia, fever, dropsy, anthelmintic*
	Erythroxylum moonii Hochr.	*Anthelmintic for roundworms, poultice for boils and abscesses*
EUPHORBIACEAE	*Acalypha indica Linn.*	*Laxative, expectorant, emetic for bronchitis, asthma, cathartic, spasmodic retention of urine, anti-parasiticide, bed sores, ringworm, chronic constipation, problems in the rectum, rheumatism*
	Bridelia retusa (Linn.)Spreng.	*Astringent, rheumatism*

	Cleistanthus collinus (Roxb.) Benth.	*Cutaneous diseases*
	Croton lacciferus Linn.	*Fever, colds, dysentery, lung diseases including tuberculosis, skin diseases*
	Croton tiglium Linn.	*Purgative, carbuncles, cutaneous diseases, rheumatism, glandular swellings, bronchitis and other pulmonary affections, dropsy, lead poisoning, intestinal obstructions, cathartic, fever, constipation, colic, ascites*
	Dimorphocalyx glabellus Thw.	*Diuretic, purgative*
	Euphorbia antiquorum Linn.	*Purgative, gout, pain in the loins, rheumatism, toothache, nervine diseases, dropsy, palsy, deafness, amaurosis, warts, cutaneous affections, kill maggots in wounds, ear-ache, cough, dysentery*
	Euphorbia hirta Linn.	*Asthma, bronchitis, angina pectoris, dysentery, ringworm, bowel complaints, chest affections, constipation, gonorrhoea, fever, conjunctivitis, ulcerated cornea, opthalmia*
	Euphorbia indica Lamk.	*Diarrhoea, dysentery, menorrhagia, leucorrhoea, colic, purgative, skin diseases*
	Euphorbia neriifolia Linn.	*Ear-ache, purgative, asthma, diuretic, rheumatism, warts*
	Euphorbia thymifolia Linn.	*Poultice for snake-bites, astringent, diarrhea, dysentery, amenorrhoea, bowel complaints, ringworm, skin diseases, stimulant and laxative*
	Euphorbia tirucalli Linn.	*Poultice for fractures, rubefacient, rheumatism, toothache, itch, scorpion stings, colic, gastralgia, warts, impotence, emetic, snake-bite, antisyphilitic*

	Excoecaria agallocha Linn.	*Leprosy, swellings, epilepsy, ulcers*
	Jatropha curcas Linn.	*Purgative, cutaneous diseases, rheumatism, dropsy, sciatica, paralysis, worms, diarrhea, poultice for sprains abd dislocations, toothache, wounds, ulcers, scabies, arresting bleeding, scabies, eczema, ringworm, gum diseases, lactagogue*
	Jatropha glandulifera Roxb.	*Piles, abdominal enlargements, glandular swellings, purgative, eye problems, sinuses, ulcers, wounds, ringworm, rheumatism, paralysis, cough, asthma, anaemia, typhoid fever, bronchitis, indigestion, piles*
	Jatropha podagrica Hook.	*Snake-bite*
	Macaranga peltata Muell. Arg.	*Venereal sores*
	Mallotus philippensis (Lom.) Muell. Arg.	*Anthelmintic, removing leprous eruptions, poultice for cutaneous diseases, itch, rheumatism*
	Phyllanthus debilis Klein.	*Dropsy, gonorrhoea, dysentery, fever, jaundice, sores, tubercular ulcers, wounds, sores, bruises, scabies, ringworm, diuretic, diarrhea*
	Phyllanthus emblica Linn.	*Promoting suppuration, astringent, cooling laxative, diuretic, inflammation of eyes, gonorrhoea, diarrhea, urinary diseases, haemorrhage, anaemia, colic, leprosy, fits, insanity, jaundice, hiccough, indigestion, dyspepsia, asthma*
	Phyllanthus reticulatus Poir.	*Astringent, diuretic, asthma, sore eyes, sores, burns, suppurations, diarrhea, inflammation of bowels diseases of the blood*
	Phyllanthus urinaria Linn.	*Diuretic, dropsy, gonorrhoea, urino-genital troubles, dysentery, cystitis, insomnia*

	Putranjiva roxburghii Wall.	*Colds, fevers*
	Ricinus communis Linn.	*Headaches, poultice for rheumatism and boils, toothache, purgative, skin diseases, burns, sores, increasing the breast milk, lactagogue, emmenagogue, scrofulous sores, diarrhea, dysentery, constipation, abdominal pains, lumbago, sciatica, pleurodyna, jaundice, nervous disorders*
	Sapium indicum Willd.	*Fever, gonorrhoea*
	Securinega leucopyrus Muell.Arg.	*Destroying maggots in sores*
	Tragia involucrata Linn.	*Cholagogue, diaphoretic, alterative, liver congestion, laryngitis, bronchitis, pneumonia, typhoid and other fevers, itch, leprosy, cough*
FABACEAE	*Abrus precatorius Linn*	*Emetic, alexiteric, cough, sore throat, conjunctivitis, painful swellings, nervous affections, aphrodisiac, preventing conception, skin diseases, ulcers, chest pains, eye infections, venereal diseases, snake-bite, opthalmia, worms, oral contraceptive, itch, dog bites, cat bites and rat bite, leucoderma, anti-suppurative, acne, boils, abscesses, tetanus, rprevention of hydrophorbia after rabid dog bites, diabetes, Bright's disease*
	Acacia catechu Willd	*Astringent, diarrhea, dysentery, uterine haemorrhages, throat, chest ailments, promotion of breast milk secretion, masticatory, strengthening gums, cancer*

	Acacia chundra Willd	*Fever accompanied with diarrhea and worms, biliousness, eczema, psoriasis, acne, dermatitis, insanity, poisoning, astringent, antiseptic, ulcers, spongy gums, stomatitis, pharyngitis, local inflammations of skin, boils, abscesses, anti-suppurative*
	Acacia nilotica var, indica (Benth) A. F. Hill	*Astringent, demulcent, prolapsus ani, ulcers, diarrhea, diabetes, throat and chest troubles, dysentery, opthalmia*
	Albizzia odoratissima Benth	*Leprosy, ulcers, coughs*
	Alhagi camelorum Fisch	*Asthma, diaphoretic, swellings, abscesses*
	Alysicarpus vaginalis DC.	*Fevers,dysentery, diarrhea, bladder stones, anti periodic, malaria, diuretic, diluent, demulcent, cardiac, renal and hepatic dropsy, pyelitis, cystitis, gonorrhoea, strangury*
	Arachis hypogaea Linn	*Aperient, emollient, lactagogue, abdominal pains, dislocations*
	Bauhinia acuminata Linn	*Enlargement of the glands of the neck, tumors, ulcerations, skin diseases, fistulae, dyspepsia, flatulence, vermifuge, leprosy, slimming, dysentery, piles*
	Bauhinia racemosa Lam	*Headaches, malaria, dysentery, diarrhea, internal haemorrhages, bleeding and threatened abortion*
	Bauhinia tomentosa Linn	*Chronic diarrhea, dysentery, internal haemorrhages, inflammation of liver, vermifuge, tumors, wounds, aphrodisiac, wounds inflicted by poisonous animals*

	Bauhinia variegata Linn	*Enlargement of the glands of the neck, tumors, ulcerations, skin diseases, fistulae, dyspepsia, flatulence, vermifuge, leprosy, slimming, dysentery, piles*
	Butea monosperma O.Kuntze	*Diarrhoea, dysentery, polypus in the nose, snake-bite, diuretic, aphrodisiac, astringent, ulcers, sore throat, elephantiasis, dhoby's itch, ringworm*
	Caesalpinia bonduc (Lion)Roxb	*Anti-suppurative, local inflammations, acne, stomachic, carminative, anti-spasmodic, dyspepsia, flatulence, colic, anthelmintic, headaches, fever, stomach and bowel upsets, rubefacient, emetic, dropsy, rheumatism*
	Caesalpinia digyna Rottl	*Astringent, pthisis, scrofulous affections, diabetes*
	Caesalpinia major (Medic) Dandy & Excell	*Liver disorders, fevers, intestinal worms, hydrocele, orchitis, glandular swellings, leprosy, asthma, leucorrhoea, blennorrhagia, tonic, febrifuge, anthelmintic, convulsions, paralysis*
	Caesalpinia sappan Linn	*Dysmennorrhoea, leucorrhoea, emmenagogue, astringent, diarrhea, dysentery, skin diseases, haemorrhage from lungs, sapraemia, wounds, menstrual disturbances*
	Cassia absus Linn	*Ringworm, opthalmia, purgative, eye diseases, constipation*
	Cassia alata Linn	*Ringworm, skin diseases, purgative, bronchitis, asthma, eczema, vermifuge, leprosy, dhoby's itch, hastening child birth, snake-bite*
	Cassia angustifolia Vahl	*Purgative for children and undernourished females*

	Cassia auriculata Linn	*Fevers, diabetes, urinary diseases, constipation, laxative, improving complexion, conjunctivitis, rheumatism, gout, gonorrhoea*
	Cassia fistula Linn	*Fever, heart diseases, bronchitis, pneumonia, malaria, rheumatism, purgative, ringworm, insect bites, facial paralysis, leprosy, eczema, psoriasis, rat bite, laxative, blood poisoning, anthrax, dysentery*
	Cassia obovata Collad	*Purgative, influenza*
	Cassia occidentalis Linn	*Purgative, tonic, febrifuge, dropsy, rheumatism, fevers, venereal diseases, ringworm, eczema, skin diseases, diuretic, liver complaints, diabetes, cathartic, heart disease, oedema, snake-bite*
	Cassia sophera Linn	*Ringworm, dhoby's itch, skin diseases, asthma, bronchitis, gonorrhoea, rheumatism, jaundice, expectorant, diminishing quantity of urine*
	Cassia tora Linn	*Laxative, constipation, haemorrhoids, anti-parasitic, ringworms, scabies, vermifuge, purgative, dysentery, opthalmia, eye diseases, liver complaints, boils, stomachic, anti periodic, anthelmintic*
	Cicer arietinum Linn	*Dysmenorrhoea, astringent, diuretic, anthelmintic, urinary calculi*
	Clitoria ternatea Linn	*Hydragogue cathartic, anasarca, ascites, cholagogue purgative, liver congestion, biliousness, hemicrania, bladder and urethra irritations, diuretic, swollen joints, anthelmintic, laxative, aperient*

	Crotalaria juncea Linn	*Gastric and bilious fevers, skin diseases, impetigo and psoriasis, astringent, colic, epistaxis, blood purifier, promoting hair growth, haemoptysis*
	Crotalaria verrucosa Linn	*Scabies, impetigo*
	Desmodium gangeticum DC	*Anti-pyretic, anti-catarrhal, cholagogue, expectorant, diuretic, liver congestion, diarrhea, jaundice, stones in kidney gall bladder and bladder, laryngitis, bronchitis, pneumonia, typhoid and other fevers, toothache*
	Desmodium heterophyllum DC	*Dysentery, increasing the flow of milk after child birth, stomach ache, abdominal complaints, sores*
	Desmodium trifiorum (Linn) DC	*Stomachic, cholagogue, laxative, anorexia, chronic dyspepsia, liver congestion, aphrodisiac, carminative, diuretic, ulcers, dysentery, diarrhea, snake-bite*
	Dichrostachys cinerea Wight & Arn	*Washing itches, sores, boils, opthalmia, indigestion, diarrhea, chest complaints, gonorrhoea, syphilis, elephantiasis, skin diseases, aphrodisiac, leprosy, catarrh, sore throat, colic, urethral complaints, anthelmintic, bronchitis, pneumonia, epilepsy, internal abscesses, diuretic, snake-bite*
	Dolichos biflorus Linn	*Rheumatism, enlargement of spleen, liver pains, menstrual derangements, discharge of lochia, relieving profuse sweating, stomachic, carminative*
	Entada phaseoloides (Linn) Merr	*Glandular swellings, general debility, relieving pains after child birth, body pains, colds, cerebral haemorrhages, emetic, skin ailments*

	Erythrina variegata Linn	*Glandular swellings, local inflammations of the skin, expectorant, bronchitis, bronchial asthma, ear-ache, anodyne in toothache, dysentery, worms, coughs, poulticing sores, cancer*
	Glycyrrhiza glabra Linn. Var. glandulifera Regel & Herder	*Pectoral, demulcent, emollient, stomatitis, pharyngitis, conjunctivitis, laxative, liver congestion, dysentery, laryngitis, bronchites, uterine tonic, menstrual derangements, sterility, aphrodisiac, appendicitis, pulmonary tuberculosis, eye diseases, sudorific, diuretic*
	Indigofera aspathaloides Vahl ex DC	*Leprosy, cancer, toothache, alterative, syphilis, psoriasis, abscesses, skin diseases, erysipelas*
	Indigofera enneaphylla Linn	*Alterative, venereal affections, anti-scorbutic, diuretic*
	Indigofera tinctoria Linn	*Hydrophorbia, wounds, asthma, whooping cough, palpitation of the heart, lung diseases, kidney complaints, hepatitis, epilepsy, nervous affections, antidote for arsenic poisoning, prevent falling hair, rheumatism, bronchial and eye diseases, cardia, renal and hepatic dropsy, sores, chronic ulcers, haemorrhoids, syphilis, lithiasis, gonorrhoea, anthelmintic, anti-tubercular, snake-bite, scorpion stings*
	Lens culinaris Medikus	*Constipation and intestinal affections, ulcers*
	Mimosa pudica Linn	*Bronchites, convulsions, arrest bleeding from wounds and ulcers, bladder stones, urinary complaints, diarrhea, dysentery, hydrocele, glandular swellings, piles, pistula, diuretic, astringent, anti-spasmodic, sudorific, emetic*

	Mucuna prurita Hook	*Diuretic, paralysis, nervous ailments, dropsy, aphrodisiac, anthelmintic, scorpion stings, elephantiasis*
	Phaseolus mungo Linn	*Paralysis, rheumatism, nervous affections, piles, liver complaints, diuretic, anti-scorbutic, tumors, abscesses, suppuration, scorpion stings*
	Phaseolus radiatus Linn	*Paralysis, rheumatism, ailments of the nervous system, fever, piles, cough, liver diseases, diuretic, dropsy, cephalalgia, promoting bowel movement*
	Pongamia pinnata Merr	*Rheumatism, arthritis, lymphangitis, phlebitis, elephantiasis, boils, abscesses, antiseptic, parasiticide, chronic eczema, psoriasis, scabies, ringworm, pityriasis, diarrhea, dyspepsia, flatulence, diuretic, bronchitis, pneumonia, strangury, urinary gravel and calculi, anti-periodic, malaria, bleeding piles, diabetes*
	Psoralea corylifolia Linn	*Leucoderma, snake-bite, leprosy, chronic eczema, psoriasis, sycosis, dermatitis, constipation, haemorrhoids, promoting hair growth, cheking premature grayness, aphrodisiac, stomachic, spermatorrhoea*
	Pterocarpus marsupium Roxb	*Diarrhoea, pyrosis, leucorrhoea, chronic and flabby ulcers, diabetes, toothache, astringent*
	Pterocarpus santalinus Linnf	*Boils, inflammations, skin diseases, headaches, astringent tonic, chronic dysentery*
	Saraca asoca Linn.	*Uterine affections, menorrhagia, bleeding piles, dropsical swellings, haemorrhagic dysentery, fractures*

	Sesbania grandiflora Pers	*Rheumatic swellings, eye problems, nasal catarrh, headache, sinuses, haemoptysis, diarrhea, dysentery*
	Sesbania sesban (Linn.) Merr	*Suppuration of boils and abscesses, hydrocele, rheumatism, anthelmintic, astringent, diarrhea, checking excessive menstrual flow, enlarged spleen, itch, skin eruptions, scorpion stings, sore throat, gonorrhoea, syphilis, yaws, galactagogue, bronchial catarrh*
	Smithia conferta Sm	*Laxative, biliousness, rheumatism, sterility in women, ulcers*
	Tammrindus indica Linn.	*Boils, inflammations, abscesses, pimples, cholagogue, laxative, congestion of liver, constipation, haemorrhoids, digestive, carminative, jaundice, eye diseases, ulcers, astringent for diarrhea, dysentery, hair oil, rheumatism, diaphoretic, emollient, anthelmintic, stomach disorders, wounds, leprosy*
	Tephrosia purpurea Pers	*Deobtruent, diuretic, coughs, biliousness, liver, spleen and kidney obstructions, stomachic, carminative, anorexia, atonic dyspepsia, flatulence, colic, blood purifier, anthelmintic, purgative*
	Tephrosia villosa Pets	*Dropsy, preparation of toothpaste*
	Trigonella corniculata Linn.	*Astringent, styptic, bruises, swellings*
	Trigonella foemumgraecum Linn.	*Carminative, aphrodisiac, dyspepsia, diarrhea, dysentery, rheumatism, gonorrhoea*
	Uraria picta Desv	*Sore mouth in children*
	Vigna marina Merr	*Diuretic, antibilious, jaundice, liver complaints*
FAGACEAE	*Quercus lusitanica Lam.*	*Eczema and other skin diseases, astringent, diarrhea, dysentery,*

		vegetable poisoning, stomatitis, anal fissures, haemorrhoids
FLACOURTIACEAE	*Casearia zeylanica (Gaertn.)Thw.*	*Purgative, diabetes*
	Flacourtia cataphracta Roxb.	*Stomachic, diarrhea, biliousness, sore throat, nausea, purgative*
	Flacourtia ramontchi L'Herit.	*Cholagogue, astringent, internal haemorrhages and bleeding, expectorant, diuretic, fevers, liver congestions, laryngitis, bronchitis, pyelitis, cystitis, gonorrhoea, urinary gravel and calculi, jaundice, enlarged spleen, relieve pains after child birth, cholera, nephritic colic*
	Gynocardia odorata R.Br.	*Leprosy, skin diseases, scrofula, rheumatism*
	Hydnocarpus venenata Gaertn.	*Cutaneous diseases, leprosy*
	Hydnocarpus wightiana Blume	*Skin diseases, opthalmia, wounds, ulcers, scalds, scabby eruptions*
GENTIANACEAE	*Canscora decussata (Roxb.) J.A.&J.H.Schult.*	*Laxative, alterative, nerve tonic, insanity, epilepsy, enlargement of scrotum*
	Exacum trinerve (Linn.) Druce	*Mild fevers*
	Swertia chirata Buch-Ham.	*Tonic, stomachic, febrifuge, laxative, anthelmintic, skin diseases, liver disorders, cholera*
HIPPOCRATEACEAE	*Salacia prinoides DC .*	*Amenorrhoea, dysmenorrhoea, abortive*
	Salacia reticulata Wight	*Rheumatism, gonorrhoea, skin diseases, diabetes*
IRIDACEAE	*Crocus sativus Linn.*	*Stimulant, anti-spasmodic, emmenagogue, catarrh, fever, liver enlargement*
LAMIACEAE	*Anisochilus carnosus (Linn) Wall ex Berth*	*Coughs, stimulant, expecorant*

	Anisomeles indica O Ktze	*Stomach and bowel complaints, catarrh, fever, colic dyspepsia, fever in children due to teething, rheumatism, gravel in kidneys, uterine affections*
	Coleus amboinicus Lour	*Whooping cough, laryngitis, bronchitis, pneumonia, asthma, epilepsy, convulsions, dyspepsia, diarrhea, dysentery, flatulence, colic, urinary diseases, vaginal discharges, relieving pain after child birth, heart and stomach pains*
	Dysophylla auricularia (Lion) Blume	*Stomach trouble in children, worms, kidney ailments, diarrhea*
	Leonotis nepetaefolia (Linn) R.Br.	*Burns, scalds, ringworm, skin diseases, allowing flow of breast milk, emmenagogue, laxative, amenorrhoea, fever, tape worms, ulcers, abdominal troubles, elephantiasis, asthma, haemostatic, rheumatism*
	Leucas marrubioides Desf	*Diuretic, expel phlegm and worms, coughs, catarrh*
	Leucas zeylanica (Linn) R.Br.	*Stomachic, carminative, dyspepsia, anorexia, flatulence, ant periodic, malaria, wounds, sores itches, headaches, vertigo, fever due to ingestion, intestinal worms, skin diseasesinsecticide*
	Mentha arvensis Linn	*Stomachic, diuretic, stimulant, jaundice, vomiting, carminative, sudorific, anti-spasmodic, insect stings*
	Mentha sylvestris Linn	*Carminative, stimulant*
	Ocimum americanum Linn	*Skin diseases, tonic, febrifuge, expectorant, malaria, fever, dysentery*

	Ocimum basilicum Linn	*Carminative, stimulant, diaphoretic, expectorant, bowel complaints, ringworm, diuretic, coughs, gonorrhoea, diarrhea, chronic dysentery, constipation,internal piles, eye diseases, hair application, ear-ache, cephalalgia, gargle for foul breath*
	Ocimum gratissimum Linn	*Gonorrhoea, seminal weakness. Aphthae, rheumatism, paralysis, digestive, anti-spasmodic, antineuralgic, toothache*
	Ocimum sanctum Linn	*Gonorrhoea, diaphoretic for malaria, croup, catarrh, bronchitis, diarrhea, gastric disorders, hepatic affections, ear-ache, vomiting, intestinal worms, rheumatism, yrino-genital problems, stings of bees, wasps, mosquitoes, and leeches, stomachic, carminative, improving appetite and digestion, anorexia, chronic dyspepsia, flatulence, colic, lung problems, phthisis, cardiac stimulant, snake-bite*
	Plectranthus zeylanicus Berth	*Astringent, stomachic, fevers, dysentery, diarrhea, vomiting, thirst, cholagogue, liver congestion, diuretic, diaphoretic, tarantula bites*
	Pogostemon heyneanus Berth	*Spongy gums, pyrrhoea, halitosis, stomachic, carminative, anorexia, dyspepsia, flatulence, expectorant, diuretic, disinfectant for genitor-urinary mucous membrane, bronchitis, lung diseases, cardiac dropsy, gonorrhoea, asthma, boils, headaches, jaundice, bilious fevers, rheumatism*
	Pogostemon parviflorus Berth	*Wounds, colic, fever, haemorrhage, snake-bite*

LAURACEAE	*Cinnamomum camphora F. Nees & Eberm.*	*Inflammations, bruises, sprains, bed sores, carminative, antiseptic, stimulant, anti-spasmodic, fevers, cholera, whooping cough, epilepsy, asthma, angina pectoris, convulsions, hysteria, palpitation and ailments of the genito-urinary system, abortifacient*
	Cinnamomum zeylanicum Blume	*Dyspepsia, flatulence, diarrhea, dysentery, vomiting, bronchitis, lung diseases, boils, abscesses, rubefacient, rheumatism, anti tubercular, phthisis, cramps of the stomach, toothache, paralysis of the tongue, cancer, carminative, stimulant, expectorant*
	Litsea glutinosa (Lour.) C.B.Rob	*Demulcent, diarrhea, dysentery, sprains, bruises, boils, rheumatism, aphrodisiac*
	Litsea longifolia Benth.& Hook.f.	*Nervous diseases, boils*
	Neolitsea involucrata Alston	*Fractures*
LECYTHIDACEAE	*Barringlonia acutangula (Linn.) Gaertn.*	*Diarrhea, febrifuge, coughs, colds, asthma, reduction of enlarged abdomen in children, catarrh, respiratory ailments, colic, headache, insect stings, wounds*
	Barringlonia ceylanica (Miers) Gard.exC.B.Clarke	*Dysentery, arrest bleeding from cuts, rat poisoning, snake-bites, boils, itch, piles, tonsillitis, typhoid fever, gastric ulcers,*
	Barringtonia racemosa (Linn.) Blume	*Deobstruent, coughs, asthma, diarrhea, eczema and other skin diseases, colic, vermifuge, febrifuge, stomach ache*
	Careya coccinea A Chev	*Astringent, demulcent in coughs and colds, tonic after child birth, anti-pyretic, fevers*
LEEACEAE	*Leea indica (Harm f) Merr*	*Astringent, antiseptic, ringworm, wounds, ulcers, colic, thirst, warts, diuretic, cystitis, strangury, diarrhea,*

		dysentery, burns
LILIACEAE	*Aloe vera Linn. var. littoralis Koen*	*Constipation, dyspepsia, coughs, asthma, nervous diseases, glandular enlargements of the spleen, dropsy, piles, colic, cathartic and cooling, eye diseases, reducing swellings, ulcers, preventing hair falling, curing baldness, dysentery, kidney pains, burns, scalds*
	Asparagus falcatus Linn.	*Cholagogue, liver congestion, jaundice, gall stones, diuretic, nephritis, pyelitis, cystitis, gonorrhoea, strangury, urinary gravel and calculi, rheumatism, wasting diseases, nervine tonic, aphrodisiac, sexual debility, sterility*
	Asparagus racemosus Willd	*Refrigerant, demulcent, diuretic, aphrodisiac, alterative, diarrhea, dysentery, rheumatism, dyspepsia, barrenness of women, increasing sexual vigor, urinary and kidney diseases, stangury, retention of urine, boils, swellings*
	Gloriosa superba Linn.	*Bruises and sprains, blood diseases, swellings, wounds, abscesses, leprosy, piles, gonorrhoea, promote easy labor, impotence, ascites*
	Sansevieria zeylanica (Linn.) Willd	*Bile treatment, gonorrhoea*
	Smilax zeylanica Linn.	*Venereal diseases, dysentery, rheumatism, pains in the lower parts of the body*
LINACEAE	*Hugonia mystax Linn.*	*Inflammatory swellings, snake-bites, anthelmintic, febrifuge*
LOGANIACEAE	*Strychnos nux vomica Linn.*	
	Strychnos potatorum Linn. f.	*Ulcers, tonic for dyspepsia, diarrhea, cholera, leprosy, syphilis, fevers, rat bites, epilepsy, paralysis, spinal debility*

LYCOPODIACEAE	*Lycopodium cermum Linn.*	*Eye diseases, diarrhea, diuretic, demulcent, urinary problems, pyelitis, cystitis, gonorrhoea, strangury, Bright's disease, snake-bite*
	Lycopodium phlegmaria Linn.	*Coughs, diuretic, dysentery, gout, rheumatism, skin eruptions and irritations*
	Lycopodium pulcherrimum Wall.ex Hook.et Grev.	*Snake-bite*
LYTHRACEAE	*Lagerstroemia speciosa Pers.*	*Snake-bite*
	Lawsonia inermts Linn.	*Diabetes, purgative, aphthae*
	Woodfordia fruticosa (Linn.) Kurz	*Haemorrhoids, liver diseases, dysentery, snake-bites, colic, dropsy, liver and spleen diseases, fever, asthma, fistula, syphilis, piles, lung and heart diseases, insanity, apoplexy, nervous diseases*
MAGNOLIACEAE	*Magnolia fuscata Andr .*	*Strengthening sexual virility, stimulant, expectorant, astringent, purgative*
	Michelia champaca Linn.	*Swellings, colic, fevers, emmenagogue, purgative, stimulant, carminative, demulcent, diuretic, dyspepsia, ephalalgia, opthalmia, rheumatism, vertigo, gout, flatulence*
MALVACEAE	*Abutilon asiaticum G. Don.*	*Rheumatism, vomiting, boils, sores, ulcers, drawing out pus, piles, gonorrhoea*
	Abutilon indicum Sweet	*Ulcers, diuretic, strangury, haematuria, leprosy, bleeding piles, bronchitis, bilious diarrhea, gonorrhoea, bladder inflammation, fevers, mothwash, toothache, gum disease, aphrodisiac, laxative, cough, puerperal diseases, urinary disorders, dysentery, wounds, enemas*

	Gossypium herbaceum Linn.	*Irregular and painful menstruation, rheumatism, convulsions, micturition, eye diseases, swellings, ulcerations of female organs, urinary diseases, orchitis, emmenagogue, dysmenorrhoea, abortifacient, hypochondria, burns, scalds*
	Hibiscus abelmoschus Linn.	*Headaches, rheumatism, varicose veins, fever, gonorrhoea, demulcent, stomachic, antispasmodic, nervous debility, hysteria, dryness of throat, itch, heart tonic, snake-bite*
	Hibiscus esculentus Linn.	*Emollient, demulcent, coughs, catarrh, gonorrhoea, micturition, dysuria*
	Hibiscus furcatus Willd.	*Cooling drink, suppuration of boils*
	Hibiscus rosa-sinensis Linn.	*Boils and swellings, fevers, coughs, venereal diseases, expectorant, bronchitis, paralysis, dysmenorrhoea, , abortion, blackening eye-brows*
	Hibiscus tiliaceus Linn.	*Dysentery, emetic, ear-ache, fevers, diuretic, febrifuge, bronchitis, laxative, sore throat, pulmonary diseases*
	Pavonia odorata Willd.	*Typhoid fever, dysentery, inflammation, internal haemorrhage , rheumatism*
	Sida acuta Burm.f.	*Haemorrhoids, fevers, impotency, gonorrhoea, rheumatism, boils, intestinal worms, enlarged glands, inflammatory swellings*
	Sida alba Linn.	*Gonorrhoea, gleet, scalding urine, demulcent, bladder irritations, diaphoretic, fever*
	Sida cordifolia Linn.	*Boils, bleeding piles, rheumatism, spermatorrhoea, gonorrhoea, diuretic, nervous diseases, urinary diseases, blood disorders, bile disorders, cardiac tonic, aphrodisiac, asthma, colic, tenesmus, cystitis, children's' diseases*

	Sida racemosa Burm.f.	*Cooling tonic, astringent, fevers, urinary disorders, preventing miscarriages*
	Sida rhombifolia Linn.	*Ulcers, boils, fractures, chickenpox, itches, pulmonary tuberculosis, rheumatism, mouthwash, toothache, fever, abdominal ailaments, irregular menstruation, abortifacient, inflammations, purgative*
	Sida veronicaefolia Lamk.	*Micturition, cuts and bruises, fevers, urinary complaints, diarrhea in pregnant women, miscarriages*
	Thespesia populnea Soland	*Blood purifier, piles, fractures, ulcers, boils, flatulence, wounds, purgative, astringent, tonic, alterative*
	Wissadula periplocifolia (Linn.) Presl. ex Taw.	*Snake-bite*
MARANTACEAE	*Maranta arundinacea Linn .*	*Convalescence, wounds, demulcent, emollient, bowel complaints, urinary diseases, food poisoning, snake-bite*
MELASTOMATACEAE	*Memecylon capitellatum Linn .*	*Swellings, ulcers*
	Memecylon umbellatum Burm.f.	*Irregular menstruation, opthalmia*
	Osbeckia octandra D.C.	*Diabetes, haemorrhoids, hepatitis*
MELIACEAE	*Aglaia roxburghiana (Wight & Arn.) Miq.*	*Dysentery, fever, emetic, abdominal pains, haemoptysis, diarrhea, vomiting, ulcers*
	Amoora rohituka (Roxb.) Wight & Am.	*Astringent, liver and spleen enlargement, rheumatism*
	Azadirachta indica A.Juss.	*Antiseptic, washing wounds, ulcers, chicken pox, and women after child birth, insecticide, catarrh, leprosy, skin diseases, ulcers, preventing maggots, rheumatism, syphilis, malaria, typhoid, intestinal worms, jaundice*

	Melia azedarach Linn.	*Anthelmintic, vermifuge, cathartic, emetic, fevers, dysentery, leprosy, scrofulous ulcers, anthelmintic, astringent, hernia, destroying lice, cutaneous diseases, rheumatism, syphilis, malaria, leprosy, eczema, asthma*
	Melia dubia Cav.	*Colic*
	Munronia pumila Wight	*Bitter tonic, fever, blood purifier*
	Soymida febrifuga A. Joss.	*Astringent, fevers, dysentery, diarrhea, malaria*
	Walsura piscidia Rosb.	*Emmenagogue, emetic, itch, stimulant, expectorant*
MENISPERMACEAE	*Anamirta cocculus (Linn.) Wight & Ara.*	*Drug poisoning, destroying lice, ringworm, snake-bite*
	Cissampelos pareira Linn.	*Antiscabious, abscesses, ulcers, wounds, febrifuge, diuretic, lithotriptic, pectoral remedy, emetic, purgative, cystitis, nephritic colic, nephritis, vesicular calculus, fever, diarrhea, urinary and venereal diseases, bladder stones, antiseptic*
	Cocculus hirsutus (Linn.) Diels.	*Alterative, rheumatism, venereal diseases, laxative, sudorific, gonorrhoea*
	Coscinium fenestratum Colebr	*Tonic, tetanus, antiseptic, wounds, ulcers*
	Cyclea burmanni Miers	*Stop bleeding from wounds, stimulant, expectorant, diuretic*
	Hyserpa nitida Miers	*Fever, boils*
	Stephania japonica (Thumb.) Miers	*Fevers, bowel complaints, itch, fractures*
	Tiliacora acuminata (Lam.) Miers	*Snake-bite*

	Tinospora cordifolia Miers	*Fever, skin diseases, jaundice, syphilis, diarrhea, dysentery, rheumatism, alterative, blood purifier, aphrodisiac, diabetes, syphilis, insect stings, snake-bite*
	Tinospora glabra (Burm.f.) Me".	*Stomach trouble, indigestion, diarrhea, fever, rheumatism, flatulence, ulcer, wounds*
	Tinospora malabarica Miers	*Tonic, rheumatism, piles, ulcerated wounds, liver complaints*
MORACEAE	*Antiaris toxicaria (Pets.) Leschen*	*Cardiac and circulatory stimulant, stimulant for intestinal and uterine contractions, febrifuge, dysentery*
	Artocarpus heterophyllus Lam.	*Insomnia, antidote for narcotic poisoning, skin diseases, diarrhea, fever, asthma, swellings, abscesses, bilious colic, aphrodisiac, bladder stones, diabetes*
	Ficus benghalensis Linn.	*Diabetes, pains, bruises, rheumatism, lumbago, feet problems, gonorrhoea, haemoptysis, dysentery*
	Ficus hispida Linn.	*Astringent, bowel complaints, dysentery, ulcers, biliousness, psoriasis, anaemia, piles, jaundice, haemorrhage of nose and mouth, blood diseases, aphrodisiac, lactagogue, emetic*
	Ficus racemosa Linn.	*Menorrhagia, haemoptysis, urinary diseases, piles, diarrhea, bilous ailments, dysentery, diabetes, haemorrhoids, intestinal damages, gonorrhoea, cat bites*
	Ficus religiosa Linn.	*Purgative, scabies, inflammations, mouthwash, toothache, strengthening gums, gramulation in apthae and ulcers, fever with diarrhea and dysentery, hiccough, fistula, laxative, asthma, promoting fertility in women*

	Streblus asper (Retz.) Lour.	*Fever, dysentery, diarrhea, wounds, ulcers, glandular swellings, piles, leucoderma*
MORINGACEAE	*Moringa oleifera Lamk.*	*Snake-bite, glandular swellings, purgative, stimulant, diuretic, anti-scorbutic, rubefacient, counter irritant, asthma, gout, rheumatism, enlarged spleen and liver, inflammations, calculus ailments, dropsy, diuretic, antifebrile, diarrhea, hysteria, scurvy, fever, epilepsy, sore in the mouth, leprosy, goiter, purgative, anthelmintic, diseases of pancreas, stomachic, abortifacient*
MYRISTICACEAE	*Horsfieldia irya (Gaertn.) Warb.*	*Ulcers, snake-bite, boils and sores*
	Horsfieldia iryaghedhi (Gaertn.) Warb.	*Dysentery, hiccough, wasting diseases*
	Myristica dactyloides Gaertn.	*Throat ailments*
	Myristica fragrans Houttuyn	*Carminative, stomachic, flatulence. Nausea, vomiting, loose bowels*
MYRSINACEAE	*Embelia ribes Burm.f.*	*Carminative, stomachic, anthelmintic, intestinal worms, dyspepsia, skin diseases, tape worms, tumors, calculi, fistula, piles, cough, enlarged spleen, abdominal dropsy, old age problems, gripe*
MYRTACEAE	*Eugenia bracteata (Willd.) Roxb.*	*Various medicinal uses*
	Eugenia caryophyllata Thumb.	*Carminative, stomachic, stimulant, nausea, worms, indigestion, colic, cheast and throat problems, cough, hiccough, asthma, diarrhea, urinary diseases, toothache*
	Melaleuca leucadendra Linn.	*Rheumatism, hysteria, flatulence, colic, fevers*

	Psidium guajava Linn.	*Diarrhoea, dysentery, mouthwash, swollen gums, toothache, cerebral ailments, nephritis, cachexia, rheumatism, epilepsy, cholera, anthelmintic, throat tonic, constipation, diabetes, antidote for manioc and cannabis and alcohol poisoning, leucoderma, deep cuts, sprains, diarrhea, intestinal haemorrhages, cough, pulmonary disorders, wounds*
	Syzygium caryophyllatum (Limn.)Als.	*Burns, boils, ulcers, diabetes, purgative*
	Syzygium cumini Skeels.	*Diarrhoea, dysentery, ulcers, mouthwash for spongy gums, enlarged spleen, diabetes*
	Syzygium zeylanicum DC.	*Stimulant, rheumatism, vermifuge, syphilis*
NYCTAGINACEAE	*Boerhavia diffusa Linn.*	*Oedema, ascites, liver, kidney ailments, dropsy, anaemia, jaundice, asthma, cough, colic, enlargement of liver, piles, worms, leprosy, heart diseases, fistula, blood and skin diseases, anasarca, liver and spleen diseses, strangury, retention of urine, yaws, dysentery, emetic, gonorrhoea*
	Mirabilis jalapa Linn.	*Purgative, itching, dyspepsia, diuretic, dropsy, boils, abscesses, gonorrhoea, purgative*
	Pisonia grandis R.Br.	*Contusions, inflammations, fractures, rheumatism, dyspepsia*
NYMPHAEACEAE	*Nelumbo nucifera Gaerm .*	*Bleeding piles, debility in children, snake-bite, diarrhea, cholera, fevers, liver complaints, cardiac tonic, cough, dysentery, syphilis, leprosy, skin diseases, improving complexion*

	Nymphaea lotus Linn.	*Dyspepsia, diarrhea, piles, urinary ailments, palpitation of heart, blood purifier, aphrodisiac, diabetic, snake-bite, cystitis, nephritis, enteritis, fevers, insomnia, jaundice, urinary troubles, haemorrhoids*
	Nymphaea stellata Willd.	*Emollient, diuretic, urinary diseases*
OCHNACEAE	*Ochna jabotapita Linn.*	*Various medicinal uses*
	Ochna squarrosa Linn.	*Digestive tonic, fractures*
OLACACEAE	*Olax ceylanica Linn.*	*Micturition*
OLEACEAE	*Jasminum angustifolium (Linn.) Willd.*	*Ringworm*
	Jasminum grandiflorum Linn.	*Skin diseases, ulcers in the mouth, toothaches, corns, eye wash*
	Jasminum sambac (Linn.) Ait.	*Lactifuge, eye complaints, insanity, emmenagogue, bronchitis, pulmonary catarrh, asthma*
	Nyctanthes arbor-tristis Linn.	*Rheumatism, sciatica, malaria, intestinal worms*
ONAGRACEAE	*Jussiaea suffruticosa Linn.*	*Vermifuge, purgative, dysentery*
OPHIOGLOSSACEAE	*Helminthostachys zeylanica (Linn.) Hook. & Bauer*	*Syphilis, dysentery, catarrh, whooping cough, phthisis, aperient*
	Ophioglossum pedunculosum Desv.	*Wasting diseases, impotence, micturition, insanity*
ORCHIDACEAE	*Anoectochilus setaceus Blume*	*Snake-bite*
	Ephemerantha macraei (Lindl.)Hunt & Summerhayes	*Stimulant, tonic*
	Vanda tessellata (Roxb.) Lodd. ex G.Don	*Rheumatism, nervous diseases*
	Zeuxine regia (Lindl.) Trimen	*Snake-bite*
OXALIDACEAE	*Averrhoa bilimbi Linn.*	*Inflammation of the rectum, mumps, rheumatism, pimples, piles, fevers, haemorrhage from bowels and stomach*

	Averrhoa carambola Linn.	*Vomiting, internal bleeding piles, laxative, antiascorbutic, sialogogue, antiphlogistic, asthma, colic, jaundice, skin diseases*
	Biophytum reinwardtii Klotsch	*Expectorant, wounds, bruises, hypertension, asthma, phthisis, snake-bite, gonorrhoea, bladder stones, abscesses*
	Oxalis comiculata Linn.	*Scurvy, piles, strangury, prolapse, wounds, itch, antidote for mercuric, arsenic and datura poisoning, inflammations, fevers, dysentery*
PANDANACEAE	*Pandanus ceylanicus Solms .*	*Eyelid diseases*
	Pandanus tectorius Soland ex Parkinson.	*Boils, diuretic, depurative*
PAPAVERACEAE	*Argemone mexicana Linn.*	*Skin and blood diseases, scorpion stings, purgative, jaundice, diuretic, ulcers, gonorrhea, eye problems, asthma, diaphoretic, expectorant, ophthalmia, snake-bite, eczema, leprosy, laxative, emetic, nauseant, demulcent, catarrhal infections of throat, toothache*
	Papaver rhoeas Linn.	*Sedative, sudorific*
	Papaver somniferum Linn.	*Dysentery, urinary problems, stimulant, soporific, peritonitis, pleurisy, pneumonia, fever, genitor-urinary diseases, gallstones, rheumatism, neuralgia, hernia, eye diseases, diarrhea*
PEDALIACEAE	*Pedalium murex Linn.*	*Gonorrhoea, dysuria, demulcent, diuretic, antispasmodic, aphrodisiac, urinary irritations, spermtorrhoea, impotence, puerperal diseases, promoting lochial discharge, enlarged spleen*

	Sesamum indicum Linn.	*Vermifuge, stomach ailments, diarrhea, dysentery, catarrh, bladder troubles, cystitis, strangury, haemorrhoids, purulent otorrhoea, diuretic, lactagogue, burns, scaldings, piles, constipation, ulcers, wounds, gonorrhoea, coughs, aphrodisiac, destroying lice, promoting hair growth, malaria, purgative*
PINACEAE	*Abies spectabilis (D. Don) Spach.*	*Carminative, expectorant, stomachic, pthisis, asthma, bronchites, dyspepsia, flatulens, diaphoretic, diuretic, pneumonia, urinary problems, haemorrhoids*
	Cedrus deodara (Roxb.) Loudon	*Stomachic, carminative, improving appetite and digestion, aneroxia, dyspepsia, flatulence, diaphoretic, expectorant, diuretic, laryngitis, pneumonia, cardiac renal and hepatic dropsy, antilithic in urinary gravel and calculi, anti-periodic, malaria, astringent, diarrhea, dysentery, skin diseases, eczema, psoriasis, leprosy*
PIPERACEAE	*Piper betle Lim.*	*Masticatory, stimulant, antiseptic, sialogogue, carminative, astringent, aphrodisiac, antiseptic, cuts, wounds, boils, stomachic, febrifuge, cough, night blindness, checking milk secretion, bring about sterility in women, fever, enlarged glands, lymphangitis, gastric and lung disorders, catarrh, diphtheria, ulcers*
	Piper chavya Buch. Ham.	*Asthma, bronchitis, fever, piles, abdominal pains*
	Piper cubeba Linn.f.	*Stimulant, diuretic, gonorrhoea, gleet, bladder ailment, antiseptic, genitor-urinary problems, bronchitis*

	Piper longum Lion.	*Bronchitis, fever, cough, spleen enlargements, stimulant to urethra and rectum, increasing gastric secretions, improving appetite, haemorrhoids, piles, dropsy, rubefacient, carminative, laxative, expectorant*
	Piper nigrum Lim.	*Stomachic, carminative, inducing bile secreation, dyspepsia, flatulence, gonorrhoea, cough, haemorrhoids, fever, piles, elephantiasis, vomiting, cholera, paralysis, arthritis, antidote for shell-fish and mushroom poisoning, rubefacient, counter-irritant, dysentery, abortifacient*
PLANTAGINACEAE	*Plantago erosa Wall.*	*Diuretic, astringent, bladder stones, diabetes, worms, haemorrhoids, malaria, dysentery, coughs, diarrhea, whooping cough, wasting diseases, promoting fertility by increasing semen secretion in men*
	Plumbago indica Linn.	*Blisters in skin, abortion, rheumatism, paralysis, leprosy, syphilis, leucoderma, scabies*
	Plumbago zeylanica Linn.	*Increasing appetite, dyspepsia, flatulence, piles, anasarca, diarrhea, skin diseases, leprosy, germicide, abortifacient, influenza, black water fever*
POACEAE	*Brachiaria mutica (Forsk.) Stapf*	*Rheumatism*
	Cymbopogon citratus (DC) Stapf	*Flatulence, spasmodic ailments of the bowel, gastric irritability, cholera, vomiting, rheumatism, sprains, fever*
	Cymbopogon nardus (Linn.) Rendle	*Rubefacient, stimulant, carminative, antispasmodic, diaphoretic, diuretic, sudorific, antiperiodic, vermifuge, febrifuge, colds*
	Cymbopogon polyneuros (Steud.) Stapf	*Febrifuge, rheumatism, neuralgia*

	Cynodon dactylon (Linn.) Pers.	*Astringent, to stop bleeding in cuts and wounds, diuretic, dropsy, anasarca, diarrhea, dysentery, epilepsy, hysteria, insanity, gleet, syphilis, gout, rheumatism, indigestion, blood purifier, swellings, pectoral*
	Desmostachya bipinnata (Linn.) Stapf	*Stimulant, dysentery, menorrhagia, gonorrhoea, syphilis, snake-bite, dog bite, eczema, leucoderma, bleeding piles*
	Echinochloa crus-galli (Linn.) Beauv.	*Haemorrhages, spleen diseases*
	Eleusine coracana (Linn.) Gaertn.	*Astringent, leprosy, diaphoretic, liver diseases, vermifuge, diuretic, chest conditions*
	Eleusine indica (Linn.) Gaeritn.	*Sprains, dislocations, diaphoretic, antipyretic, liver complaints, convulsions, diuretic, dysentery, discharging placenta, anthelmintic, cough, haemoptysis, malaria*
	Heteropogon contortus (Linn.) Beauv. Ex R.&S.	*Asthma, bronchial diseases, cholagogue, diuretic, diluent, jaundice, pyelitis, cystitis, gonorrhoea, strangury, wounds, ulcers, swellings*
	Hordeum vulgare Linn.	*Demulcent, peptic, stomachic, demulcent, expectorant, indigestion*
	Imperata cylindrica L.) Beauv. var. major (Nees) C.E. Hubb.	*Diuretic, diluent, pyelitis, cystitis, gonorrhoea, strangury, retention of urine, passing blood with urine*
	Oryza sativa Linn.	*Absence of urinary secretion, demulcent, refrigerant, inflammations in intestine, bronchitis, coughs, hiccough, vomiting, diarrhea,*
	Panicum antidotale Retz.	*Wounds, throat affections, vermifuge, worms*
	Panicum miliare Lamk.	*Biliousness, snake-bite*

	Paspalum scrobiculatum Linn.	*Inflammations, liver diseases, eye diseases, alterative in child birth, snake-bite*
	Saccharum arundinaceum Retz.	*Demulcent, diuretic, pyelitis, cystitis, gonorrhoea, strangury, urinary gravel and calculi, emmenagogue, lochial discharge, protracted labor, puerperal fever, boil, abscesses*
	Saccharum offcinarum Linn.	*Demulcent, emollient, diuretic, stimulant, anti-periodic, malaria, cough, labor pains, ulcers, diarrhea, antidote for copper and arsenic poisoning, antiseptic, laxative*
	Setaria italica (Linn.) P.Beauv.	*Labor pains, diuretic, astringent, rheumatism, diarrhea, cholera*
	Vetiveria zizanioides (Linn.)Nash	*Stomachic, carminative, cholagogue, anorexia, dyspepsia, flatulence, liver congestion, jaundice, diaphoretic, diuretic, anti-periodic, malaria, typhoid, haemoptysis, phthisis, anaemia, skin and blood diseases, urinary disorders, piles, oedema, headaches, pneumonia, meningitis*
POLYGONACEAE	*Polygonum barbatum Linn .*	*Wounds, cicatrizant, ulcers, colic, astringent, strangury, gout, haemorrhoids, purgative, emetic, antiseptic*
	Polygonum chinense Lim.	*Antiscorbutic, boils, drawing foreign objects from the body*
	Polygonum pulchrum Blume	*Astringent, styptic, diarrhea, fever*
POLYPODIACEAE	*Drymoglossum heterophyllum (Linn.) Presl.*	*Styptic, eczema*

PORTULACACEAE	*Portulaca oleracea Linn.*	*Antiscorbutic, refrigerant, diuretic, catarrh, urino-genital ailments, scurvy, liver diseases, boils, ulcers, wounds, burns, skin diseases, gastric sedative, dysentery, stomachic, emollient, sudorific, haemoptysis, pulmonary diseases, snake-bite*
	Portulaca quadrifida Linn.	*Emetic, anthelmintic, stomach trouble, gonorrhoea, abortion, skin diseases, kidney, bladder and lung diseases, erysipelas, dysuria, toothache*
PTERIDACEAE	*Adiantum caudatum Linn.*	*Diabetes, coughs, fevers, skin diseases*
	Adiantum philippense Linn.	*Febrile ailments, inflammations, tumors, ringworm, promoting hair growth, menorrhagia, strangury, fever due to elephantiasis, dysentery, blood diseases, ulcers, epileptic fits*
PUNICACEAE	*Punica granatum Linn.*	*Tape worm, tuberculosis, eye diseases, micturition, catarrh, diarrhea, dysentery, anthelmintic, diuretic, abortifacient*
RANUNCULACEAE	*Aconitum ferox Wall*	*Inflammationa in throat, lungs, intestines, joints, Leprosy, fever, cholera, rheumatism, neuralgia, boils*
	Aconitum heterophyllum Wall	*Diarrhoea, dysentery, bilious complaints, vomiting, fevers, convalescence*
	Clematis gouriana Roxb	*Puerperal fever*
	Naravelia zeylanica (Linn.) Dc	*Itch, eczema, malaria, skin eruptions*
	Nigella sativa Linn.	*Stimulant, anthelmintic, carminative, lung complaints, coughs, jaundice, hydrophorbia, fever, paralysis, eye sores, skin eruptions*
RHAMNACEAE	*Colubrina asiatica Brongn*	*Rheumatism, inflammations*
	Rhamnus wightii Wight & Arn	*Tonic, astringent, deobtruent*

	Ventilago maderaspatana Gaertn	*Tonic, carminative, stomachic, stimulant, fever, dyspepsia, itch, skin diseases*
	Zizyphus jujuba Mill	*Bronchitis*
	Zizyphus mauritiana Lamk	*Dysentery, diarrhea, purgative, fevers, ulcers, wounds, cough, blood purifier*
	Zizyphus napeca Willd	*Fever, dysentery, loss of appetite*
	Zizyphus oenoplia Mill	*Wounds, wasp stings, stomach pains*
	Zizyphus rugosa Lamk	*Menorrhagia, antidote for mercury poisoning, fractures, sores, boils, drawing thorns from the eye*
ROSACEAE	*Prunus cerasoides D.Don*	*Bladder and kidney stones, snake-bite*
RUBIACEAE	*Adina cordifolia Benth&Hook.f*	*Worms in sores, astringent, dysentery*
	Anthocephalus cadamba (Roxb) Miq	*Tonic, febrifuge, coughs, fever, aphthae, stomatitis*
	Borreria hispida (Linn.) K Schum	*Haemorrhoids, diarrhoea, dysentery*
	Gardenia latifolia Ait	*Sores, fevers, pulmonary diseases*
	Geophila herbacea OKuntze	*Worms, rickets, anaemia, sores*
	Hedyotis auricularia Linn.	*Emollient, dysentery, cholera, reducing high blood pressure*
	Hedyotis fruticosa Linn.	*Bladder stones*
	Hedyotis nitida Wight & Arn	*Hepatitis, anaemia, insomnia, increasing digestion and quantity of urine, inflammation of urino- genital tract, ulcers, drawing out thorns or pieces of glass from the eye*
	Ixora coccinea Linn.	*Dysentery, sedative for hiccough, nausea, loss of appetite, fever gonorrhoea, skin eruptions, haemoptysis, catarrhal bronchitis, dysmenorrhoea*
	Mitragyna parvifolia Korth	*Fever, colitis*

	Mitragyna tubulosa Kuntze	*Fever, colitis*
	Morinda citrifolia Linn.	*Cathartic, gout, ulcers, snake-bite, spongy gums, tuberculosis, emmenagogue, dysentery, asthma, liver, kidney and spleen diseases, diabetes, beri beri, haemorrhages, coughs*
	Morinda tinctoria Roxb.	*Astringent, gout, rheumatism, diarrhea, woulds*
	Mussaenda frondosa Linn.	*Leprosy, jaundice, asthma, fever, dropsy, inflammations, ulcers, hepatitis*
	Nauclea orientalis Linn.	*Boils, tumors, anti-pyretic, diarrhea, toothache*
	Oldenlandia biflora Linn.	*Fever, gastric irritation, nervous depression*
	Oldenlandia corymbosa Linn.	*Fever, heat eruptions, anthelmintic, jaundice, liver diseases*
	Oldenlandia herbacea (Linn.) Roxb	*Malaria, abortifacient*
	Oldenlandia umbellata Linn.	*Expectorant, bronchial catarrh, bronchitis, asthma, snake-bite*
	Ophiorrhiza mungos Linn.	*Laxative, sedative, snake-bite, stomachic, ulcers*
	Paederia foetida Linn.	*Rheumatism, flatulence, diuretic, inflammation of urethra, dissolving vesical calculi, retention of urine*
	Pavetta indica Linn.	*Aperient, visceral obstructions, dropsy, haemorrhoids, rheumatism*
	Randia dumetorum Lamk	*Diarrhea, biliousness, fever, bruises, anthelmintic, emetic, snake-bite*
	Rubia cordifolia Linn.	*Urinary disorders, inflammatory conditions of chest, colic, fractures, removing freckles from the skin, pleurisy, lack of semen, overdue menses*
	Tarenna asiatica (Linn.) Alston	*Boils, promoting suppuration*

	Wendlandia bicuspidata Wight & Arn.	*Various medicinal uses*
RUTACEAE	*Acronychia pedunculata (Linn.) Miq.*	*Swellings, fractures, sores, ulcers, purgative, scabies*
	Aegle marmelos Correa	*Dysentery, piles, dyspepsia, jaundice, scrofula, indigestion, chronic fever, hypochondria, melancholia, palpitation of heart, diarrhea, gastric troubles, anasarca, laxative, piles, tuberculosis, hepatitis, asthma, eye lotion*
	Atalantia ceylanica (Arn.) Oliv.	*Catarrh, bronchitis, ague*
	Atalantia missionis Oliv.	*Swellings, fractures, piles, fistula, phlegm, puerperal diseases*
	Citrus aurantifolia Swingle	*Bilious vomiting, antiseptic, wounds, snake-bite, dysentery, dysentery, headache, coughs, stomach ache, vermifuge, sores, yaws*
	Citrus aurantium Linn.	*Inflammations in throat, drawing phlegm, cough, diaphoretic, purgative, febrile, scorbutic*
	Citrus medica Linn.	*Pleurodynia, sciatica, lumbago, pian in hip, joints, snake-bite, dysentery*
	Citrus sinensis Osbeck	*Coughs, bronchitis, diabetes, liver and heart ailments, blood purifier, antiscorbutic, stomachic, gout, rheumatism, diuretic, purgative, malaria, enlarge spleen, skin problems*
	Clausena indica Oliv.	*Colic, diarrhea, indigestion, diuretic*
	Euodia lunu-ankenda (Gacrtn) Merr	*Tonic, emmenagogue, fever, improving complexion, fever*
	Feronia limonia (Linn.) Swingle	*Stimulant, stomachic, diarrhea, dysentery, hiccough, gum ailment, insect stings, bowel complaints, biliousness, snake-bite*
	Glycosmis pentaphylla (Retz) Correa	*Fever, liver complaints, intestinal worms, eczema, skin diseases*

	Micromelum ceylanicum Swingle	*Phthisis, chest troubles, coughs, ague*
	Murraya koenigii Spreng	*Tonic, stomachic, constipation, colic, diarrhea, hiccough, dysentery, eruptions*
	Paramignya monophylla Wight	*Alterative, snake-bite, haematuria*
	Peganum harmala Linn.	*Anodyne, emetic, emmenagogue, stimulate sexuality, rheumatism, tape worm, malaria*
	Ruta graveolens Linn.	*Hysteria, amenorrhoea, epilepsy, flatulence, rubefacient, uterine and nervous problems, antispasmodic, convulsions, bronchitis, pneumonia, ascaricide*
	Toddalia asiatica Lamk	*Malaria, anti-pyretic, diarrhea, rheumatism, cough, indigestion, influenza, pneumonia, stomach ache, anthelmintic, toothache, fever, cholera, syphilis*
	Zanthoxylum tetraspermum W & A	*Stimulant, astringent, digestive, dyspepsia, diarrhea, rheumatism*
SALVADORACEAE	*Salvadora persica Linn.*	*Fever, stimulant, amenorrhoea, antidote for poisons, scurvy, deobstruent, carminative, diuretic, ankylostomiasis, gastritis, ascarifuge, gonorrhoea, catarrh*
SANTALACEAE	*Santalum album Linn.*	*Fever, diarrhea, dysentery, gastric irritation, spermatorrhoea, gonorrhea, inflammations, skin diseases, diaphoretic, haemoptysis, skin diseases, diuretic, antipyretic, wounds*
SAPINDACEAE	*Allophylus cobbe (Linn.) Blume*	*Emmenagogue, diarrhea, fractures*
	Allophylus zeylanicus Linn.	*Fractures, poultice*

	Cardiospermum microcarpum HBK	*Reheumatism, nervous diseases, dropsy, orchitis, ear-ache, dischatge from meatus, piles, bronchitis, phthisis, emetic, laxative, aperient, tuors, swellings, anthelmintic, anti-blenorrhagic, enema for dysenteries, sores, pulmonary disorders, digestive, demulcent, diuretic, diaphoretic, amenorrhoea, aphrodisiac*
	Euphoria longana Lamk	*Rheumatism, swellings, lung diseases, fractures, stomachic, anthelmintic, tonic, brain stimulant*
	Sapindus emarginatus Vahl	*Swollen glands, tonsils, fever*
	Sapindus trifoliatus Linn.	*Emetic, nausea, expectorant, asthma, colic, hemicrania, hysteria, epilepsy, expectorant*
	Schleichera oleosa Merr	*Astringent, back and loin pains, promoting hair growth, purgative, cholera, rheumatism, headache, skin diseases, malaria*
SAPOTACEAE	*Madhuca fulva [Thw) J F Macbr*	*Scalds, burns*
	Madhuca longifolia (Linn.) JF Macbr	*Swellings, fractures, snake-bite, rheumatism, skin diseases, glandular swellings,*
	Madhuca neriifolia (Thw) H J Lam	*Wounds, sores caused by bears, swellings, fractures, snake-bite, rheumatism, skin diseases, glandular swellings,*
	Manilkara hexandra (Roxb) Dubard	*Astringent*
	Mimusops elengi Linn.	*Gum and teeth diseases, bladder and urethra disorders, fever, increasing fertility in women, diarrhea, sprue, dysentery*
SCROPHULARIACEAE	*Adenosma capitatum Benth*	*Bowel complaints, rheumatism, pains in abdomen, washing sick children*

	Artanema longifolimn (Linn.) Vatke	*Rheumatism, stones in the bladder, ophthalmia, diarrhea, improving vitality, favoring conception, biliousness*
	Bacopa monniera (Linn.) Wettst	*Nervine tonic, insanity, epilepsy, loss of voice in phthisis, diuretic, aperient, purgative, snake-bite, increasing strength, memory, voice, brain and sexual power*
	Centranthera indica (Linn.) Gamble	*Diuretic, fever, sore eyes*
	Limnophila conferta Benth	*Sores on legs, fever, expectorant*
	Picrorrhiza kurrooa Benth	*Stomachic, dyspepsia, fever, purgative, vermifuge, dysentery, asthma, bilious dyspepsia*
	Torenia travancorica Ganble	*Gonorrhoea*
SELAGINELLACEAE	*Selaginella wightii Hieron*	*Paralysis, headaches, venereal sores*
SIMAROUBACEAE	*Ailanthus triphysa (Dennst) Als*	*Dyspepsia, diarrhea, dysentery, bronchitis, cephalalgia, gastralgia, snake-bite*
	Balanites aegyptiaca Del	*Purgative, anthelmintic, colic, coughs, ocline*
	Brucea javanica (Linn.) Merr	*Dysentery, anti-periodia, anti-dysenteric, anthelmintic, anti-pyretic*
	Samadera indica Gaertn	*Febrifuge, erysipelas, rheumatism, skin diseases*
SOLANACEAE	*Datura metel Linn.*	*Anodyne, antispasmodic, dilatation of the pupil of eyes, inflammation of breasts, check excessive flow of breast milk, rheumatism, lumbago, tumors, cataract, eye diseases, bronchial asthma, toothache, dog-bites, insanity, hydrophorbia, colds, cavities of teeth, intoxicant, tuberculosis,*
	Datura suaveolens Humb & Bonpl	*Narcotic, various medicinal purposes*

	Hyoscyamus niger Linn.	*Insomnia, cerebral and spinal sedative, griping caused by drastic purgatives, expectorant, toothache, gum bleeding, liver pains, gout, inflammation of breasts and testes, aphrodisiac, depilatory, astringent to bowels, nasal troubles, ophthalmia, ear-aches, fever, headache, pain in joints, asthma, cough*
	Solanum ferox Linn.	*Cutaneous diseases, toothache, swellings, syphilis, body pains and discomfort after heavy meals*
	Solanum indicum Linn.	*Astringent, resovent, aphrodisiac, dysuria, colic, cough, asthma, diuretic, dropsy, catarrh, toothache, itch, ringworm*
	Solanum nigrum Linn.	*Gout, rheumatism, piles, gonorrhoea, dropsy, liver and spleen enlargement, sore eyes, skin diseases, malaria, dysentery, black water fever, erysipelas, diabetes, fever, diarrhea, eye diseases, hydrophorbia, ringworm, abdominal pain, bladder inflammations, headaches, ulcers, wounds, diuretic, emetic, antispasmodic, diaphoretic, emollient, sedative*
	Solanum surattense Burm f.	*Lung ailments, diarrhea, cough, rheumatism, convalescence*
	Solanum trilobatum Linn.	*For consumptive patients, coughs*
	Solanum verbascifolium Linn.	*Abortifacient, expelling toxic substances from the body, dysentery, diarrhea, boils, ulcers, fever*
	Solanum xanthocarpumSchrad.	*Expectorant, coughs, asthma, colic fever, loss of appetite, chest pains, toothache, diuretic, drpsy, gonorrhea*

	Withania somnifera (Linn.) Dunal	*Tonic, alterative, aphrodiasiac, consumption, emaciation, debility due to old age, rheumatism, diuretic, deobstruent, cause abortion, ulcers, carbuncles, painful swellings, rectitis, syphilis, ringworm, haemorrhoids, sexual stimulant, abortifacient, diarrhea, proctitis, nausea, insanity, apoplexy, nervous diseases*
STERCULIACEAE	*Helecteres isora Linn.*	*Stomach ailments such as colic, gripe, flatulence, diarrhea, dysentery, clysters*
	Pentapetes phoenicea Linn.	*Emollient, astringent, anti-bilious, anti-phlegmonous*
	Pterospermum canescens Roxb	*Hemicrania, ulcers*
	Sterculia balanghas Linn.	*Laxative*
	Sterculia urens Roxb	*Throat ailments, wounds, fractures*
SYMPLOCACEAE	*Symplocos loha Buch-Ham*	*Phlegm, fractures, promoting the healing of bones*
	Symplocos racemosa Roxb	*Astringent, cooling, bowel complaints, eye diseases, ulcers, mouth wash, bleeding and spongy gums, snake-bite*
THYMELAEACEAE	*Aquilaria agailocha Roxb*	*Stimulant, gout, rheumatism, paralysis, astringent, diarrhea, vomiting, fever, bronchial diseases, aphrodisiac, malaria*
	Gnidia eriocephala Meissn.	*Contusions, swellings*
	Gyrinops walla Gaertn	*Vermifuge, boils, fistula, snake-bite, loosening teeth*
TILIACEAE	*Corchorus capsularis Linn.*	*Demulcent, stomachic, laxative, carminative, refrigerant, diuretic, fever, colic*
	Corchorus olitorius Linn.	*Fever, colic*
	Grewia polygama Roxb	*Diarrhoea, dysentery, wounds*

	Grewia tiliifolia Vahl	*Astringent, cooling, dysentery*
ULMACEAE	*Celtis cinnamomea Lindl*	*Blood purifier, itch, cutaneous eruptions, anointing the body*
	Gironniera cuspidata (Bl.) Kurz	*Cutaneous diseases, blood purifier*
	Holoptelea integrifolia (Roxb) Planch	*Rheumatism, poultice*
URTICACEAE	*Girardenia zeylnnica Decne*	*Headaches, swollen joints, fever*
VALERIANACEAE	*Nardostachys jatamansi DC*	*Stimulant, antispasmodic, epilepsy, hysteria, convulsions, palpitation of heart, consumption, eye diseases, itch, boils, swellings, head diseases, hiccough, improving complexion, increasing luster of the ye, promoting hair growth and blackening of hair*
	Valeriana wallichii DC	*Snake0bite, eye ideases, hair problems, liver, kidney and spleen diseases*
VERBENACEAE	*Callcarpa tomentosa (Linn.) Murr*	*Removing hepatic obstructions, cutaneous ailments, diuretic*
	Clerodendrum inerme (Linn.) Guerin	*Rheumatism, swellings, itch, fevers, venereal diseases, sea food poisoning*
	Clerodendrum infortunatum Linn.	*Tumors, skin diseases, vermifuge, malaria*
	Clerodendrum serratum (Linn.) Moon	*Catarrh, malaria, dropsy*
	Gmelina arborea Roxb	*Removing discharges and worms from worms, fever, thirst, increasing secretion of milk in women*
	Gmelina asiatica Linn.	*Washing sores and ulcers, bronchitis, pneumonia, asthma, gonorrhoea, rheumatism, syphilis*
	Phyla nodiflora (Linn.) Greene	*Indigestion in children and women after childbirth, boils, diuretic, carminative, demulcent, gonorrhoea, swollen cervical glands, erysipelas, ulcers*

	Premna herbacea Roxb	*Rheumatism, dropsy, asthma, fever, body pains in pregnant women*
	Premna latifolia Roxb	*Diuretic, dropsy, boils*
	Premna serratifolia Linn.	*Rheumatism, neuralgia, flatulence, fever*
	Premna tomentosa Willd	*Stomach disorders*
	Tectona grandis Linn.f	*Haemoptysis, sore throat, dyspepsia, dermatitis, vermifuge, astringent, diuretic, promoting hair growth, itch*
	Vitex leucoxylon Linn.f	*Catarrh, headache, fever, anthelmintic*
	Vitex negundo Linn.	*Vulnerary, sinuses, scrofulous sores, flatulence, inflammations, rheumatism, gonorrhoea, headache, catarrh, snake-bite, stupor, coma, tarantula-bites, cough, asthma, fever, ulcers, irritation of the bladder*
	Vitex peduncularis Wall	*Black water fever, chest pain*
	Vitex trifolia Linn.	*Sprains, contusions, rheumatism, fevers, spleen enlargements, brest cancer, nervive, cephalic, emmenagogue*
VITACEAE	*Ampelocissus indica Planch*	*Blood purifier, diuretic, pectoral, bronchitis, gonorrhoea*
	Cayratia pedata (Lam) Juss	*Astringent, checking uterine reflexes*
	Cissus quadrangularis Linn.	*Alterative, scurvy, irregular menstruation, ororrhoea, epistaxis, fractures, ulcers, wounds, myalgia, ear-ache, blenorrhagia, palpitation of heart, anthelmintic, muscular pains*
	Vitis vinifera Linn.	*Demulcent, pulmonary diseases, astringent, diarrhea, bowel complaints, diarrhea*
XYRIDACEAE	*Xyris indica Linn.*	*Ringworm, itch, leprosy*
ZINGIBERACEAE	*Amomum masticatorium Thw*	*Carminative*

	Costus speciosus (Koen) Smith	*Catarrhral fever, cough, dyspepsia, worms, skin diseases, depurative, aphrodisiac, purgative, dysentery, syphilis*
	Curcuma aromatica Salisb	*Carminative, bruises, sprains*
	Curcuma domestica Valet	*Bruises, sprains, wounds, leech-bite, anthelmintic, blood disorders, diarrhea, dysentery, flatulence, dyspepsia, colic, jaundice, amenorrhoea, colds in the head, catarrh, prurigo, urticaria, boils, rheumatism, bronchial ailments, snake-bite, eczema*
	Curcuma zedoaria (Berg) Roscoe	*Stimulnat, carinative, wounds, ulcers, sprains, dermatitis, decoction at childbirth, leucorrhoea, gonorrhoea, blood purifier, convulsions*
	Elettaria repens (Sonner) Baill.	*Carminative, stimulant, stomachic, emmenagogue, liver and uterus diseases, tumors in uterus, diuretic, relieving the retention of urine, vomiting, laxative*
	Globba bulbifera Roxb.	*Wounds, rheumatism, boils, dandruff, stimulant, carminative, diuretic, cough, pectoral ailments, dyspepsia, headaches, malaria*
	Kaempferia galanga Linn.	*Wounds, rheumatism, boils, dandruff, stimulant, carminative, diuretic, cough, pectoral ailments, dyspepsia, headaches, malaria*
	Kaempferia rotunda Linn.	*Wounds, swellings, removing blood clots, mumps*
	Languas calcarata Merr	*Rheumatism*
	Languas chinensis Koenig	*Fever, rheumatism, catarrh, bronchitis, dyspepsia, bronchial catarrh*

	Languas galanga (Linn.) Stuntz	*Rheumatism, fever, impotency, bronchitis, dyspepsia, diabetes, snake-bite, bronchial catarrh, colic, diarrhea, vomiting*
	Zingiber officinale Roscoe	*Stomachic, carminative, stimulant, diaphoretic, sialagogue, digestive, dyspepsia, flatulence, colic, vomiting, stomal and bowel pains, colds, coughs,, fevers, diarrhea, diuretic, asthma*
	Zingiber zerumbet (Linn.) Smith	*Diarrhea, coughs, asthma, worms, leprosy, skin diseases, rheumatism, pulmonary ailments*
ZYGOPHYLLACEAE	*Tribulus terrestris Linn.*	*Impotency, gonorrhoea, diuretic, aphrodisiac, bladder stones, coughs, spermatorrhoea, scabies, ophthalmia, ulcers and inflammation of mouth, disrrhoea, galactagogue, throat and eye diseases*

Medicinal Plants of Sri Lanka

H.D.RATNAYAKE
LAKSHMAN PEIRIS

DEPARTMENT OF WILDLIFE
CONSERVATION, SRI LANKA

Introduction

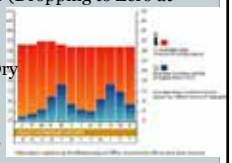
- Sustainable use of plants – Sustenance of the people of Sri Lanka
- Plant for
  - Medicine
  - Cosmetics
  - Crops and crop relatives
- The vale of Indigenous medicines are increasing
- Treads are blooming up
- Divers climatic conditions restore high floral diversity

Geology and geo morphology of the country

- Longitudes 79° 39'and 81° 53' East
- Latitudes 5° 54' and 9° 52' North.
- Total extent of 65,609.8 Km²
- Population – 20 million
- Three distinct peniplains
  - Low country – up to 300m
  - Mid Country – 300 – 1000m
  - Up Country – 1000 – 2500m

Climate

- Determine by Rainfall and temperature
- Mean Temperature - 27.5 C (Dropping to Zero at Montain region)
- Two Seasons - Rainy and Dry
- Two Monsoonal period –
  - North East – May to September
  - South West – December to February



Climatic Zones

- Wet Zone – Rainfall 2280 -5100mm
- Intermediate zone – 1250 – 1525mm
- Dry Zone – Rainfall – 1525 – 2280mm
- River basin – 103
- Bio climatic zone – 06
- Floristic Regions – 15
- Agro ecological regions – 24

Floral Diversity

Group	No of Described Species
Algae	896
Fungi	1920
Lichens	About 1000
Mosses	562
Liverworks	303
Ferns & fern allies	345
Gymnosperms	02
Angiosperms	About 4000

No of Medicinal Plants commonly used

- Among Indigenous – >500 sp are MP
- Among Non Indigenous - > 900 sp are MP
- 10% of MPs are Endemic
- 79 spp are threatened

Trade of Medicinal Plants -2010 (us$ 1= Rs 120)

Source	Quantity (kg)	Value (SLRs)	%
Imports	**1,509,201**	**125,091,177**	**32**
Local supply	**2,355,559**	**261,634,461**	**68**
National Demand	**3,864,760**	**386,725,639**	**100**

Highest Demand Herbal materials -2010 (us$ 1= Rs 120)

Species	Source	Quantity (Kg)	Value (SL Rs)
Solanum virginianum	India	253,416	10247506.40
Mollugo cerviana	India	151,539	10909611.00
Zingiber officinale	China	126,500	8321600.00
Anethem graveolens	Pakistan	83,341	2518364.00
Cedrus deodara	India	74,737	2452939.20
Glycyrrhiza glabra	Pakistan	55,609	1878654.40
Phyllanthus emblica	India	55,100	4772611.20
Trachyspermum roxburghianum	Pakistan	53,222	3202500.00
Withania somnifera	India	42,347	2840449.60
Piper longum	India	42,163	20084158.80

CITES Listed Species

Family	Species
Apocynaceae	***Rauvolfia serpentina***
Cyatheaceae	***Cyathea walkerae***
Nepenthaceae	***Nepenthus distillatoria***
Orchidaceae	***Vanda tessellata***
	Zeuxine regia
	Anoectochilus setaceus
	Dendrobium macarthiae
Thymelaeaceae	***Gyrinops walla***

Use of CITES Listed Species

Species	Medicinal value
Rauvolfia serpentina	*Increase uterine contraction, anthelmintic, opacities in the cornea, snake-bite, fever, cholera, blood pressure*
Cyathea walkerae	*Piles, haemorrhoids, chronic constipation*
Nepenthus distillatoria	*Various medicinal uses*
Vanda tessellata	*Rheumatism, nervous diseases*

Use of CITES Listed Species

Species	Medicinal values
Zeuxine regia	*Snake-bite*
Anoectochilus setaceus	*Snake-bite*
Dendrobium macarthiae	*Various medicinal uses*
Gyrinops walla	*Boils, fistula, snake-bite, loosening teeth*

Conservation

- ***Insitu*** – *Indigenous gene pool of MP, Wild types and Wild verities present in* Protected forest lands (>20% of the Land area)
- ***Exsitu*** –
- Plant and Genetic resource Center
- Field Gene banks
- Botanical garden
- Plantations and Home lands

Law related to the medicinal plant conservation

- Fauna and Flora Protection Ordinance
- Forest Ordinance
- Ayurvedic Act
- Custom Ordinance

Challengers

- Cater political and social requirements
- Increasing demands of indigenous medicine
- Managing natural habitats with increasing human population
- Destruction/fragmentation of habitats
- Regular monitoring of collection of medicinal plants
- Less tendency in Artificial propagation
- Sustenance of Indigenous Knowledge

Thank You