MEDICINAL PLANT CULTIVATION AND CONSERVATION IN THE HIMALAYA : AN AGENDA FOR ACTION

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Introduction

The diverse natural habitats all over the Himalayan region are rich repositories of plant species that are used for a variety of purposes, i.e. food, fibre, fodder, medicine, spices, dyes, beverages etc. A large number of plants are collected from wild habitats for their use in traditional medicinal system, and a few of them are sold in the market as well. In India nearly 5,000-8,000 plant species are known for their medicinal value and large number of them are used in Ayurveda, Homeopathy and Unani systems of medicine (Kirtikar and Basu, 2001). The Indian drug industry is estimated to have an annual turn-over of Rs. 4,000 crores. Nearly 80% of world population still relies on plant drugs for their health care, and as per a report of World Health Organization (WHO), there is about US$ 62 billion market turnover of medicinal/herbal plant products and it is estimated to increase to US$ 5 trillion by 2050 (Rawat and Uniyal, 2003). This provides due incentive to select and grow a few potential medicinal plants for increasing the economy of the rural people on one hand and to save these species in the nature on the other.

Despite a large number of trials on cultivation of Medicinal and Aromatic Plants (MAPs), and also development of suitable technology packages for many species, replication and adoption of such schemes/programmes at farmers level have been a major constraint. This is due to the fact that the medicinal plant sector is not well organized and 90% plants are used as raw-drugs and harvested from natural habitats. There are a large number of stakeholders in this sector, however they work independently. In recent times there has been a common consciousness that all stakeholders have to be involved if a sound and sustainable programme on medicinal and aromatic plants cultivation is to be succeeded. This paper highlights certain issues that are of major concerns for all stakeholders, and suggests a strategy to adopt cultivation of medicinal and aromatic plants as a successful venture. The material presented in this paper has been generated through discussions held in different stakeholders meetings, from marginal farmers to State level policy meetings, literature surveys and by formal/informal discussions with the persons involved in cultivation and protection of medicinal plants (Sundriyal and Sharma, 1995; Samant *et al.*, 2001). It is expected that the paper will provide certain guidelines for large scale cultivation and multiplication of medicinal plants in the Himalayan region.

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Important Medical Plants

High diversity of MAPs have been reported from different parts of the Himalayan region (Kaul and Handa, 2001; Badola, 2001; Joshi *et al.,* 2001; Sundriyal and Sharma, 1995; Samant *et al.,* 2001). A few reports are also available from the eastern Himalaya (Rai and Sharma, 1994; Haridasan *et al.,* 1996, 2001). Information is also available on the approaches for cultivation of MAPs (Ahuja, 1995, 2001; Nautiyal, 1995). The survey reveals that there are over 20 most prominently used medicinal plants from the Eastern Himalaya (Table 1). These species are already having well established markets and being collected in large quantities mainly from natural habitats. Nearly 9 species are collected from Arunachal Pradesh by paying royalty to state government (Table 2). Similarly at least 5 species are being collected from natural habitats in Sikkim as per government records (Table 3). Since these species are market-demanded, they could be promoted for large scale cultivation in the area as it will help to increase farmers' income on one hand and also conserve these species in natural stands. Fortunately, the basic information and technology for cultivation of some of these species is already available with Central Drug Research Institute (CDRI), Institute of Himalayan Bioresource Technology, G.B. Pant Institute of Himalayan Environment and Development (GBPIHED), High Altitude Plant Physiology Research Centre (HAPPRC), State Forest Research Institute, Regional Research Laboratory (RRL), Indian Institute of Ayurved for Drug Research, National Bureau of Plant Genetic Resources (NBPGR), Defence Research Laboratory (DRL), Central Institute of Medicinal & Aromatic Plants (CIMAP) and various other departments. Besides, large number of universities, private agencies/firms, NGOs are also working on cultivation of selected medicinal & aromatic plants. There is a need to share experiences from all these agencies for preparing a comprehensive plan for developing suitable cultivation packages for large scale cultivation of medicinal plants.

The survey reveals that large number of species have been recommended for different elevation zones in the Himalaya. There is a need to carry researches on the adaptational trials for these perspective medicinal plants for different zones :

Alpine region : *Aconitum ferox* Wall., *Podophyllum hexandrum* Royle, *Picrorhiza kurroa* Benth. Scroph, *Nardostachys jatamansi* DC., *Bergenia purpurascens.*

For temperate region : *Swertia chirata* Ham., *Taxus baccata,* Linn., *Valeriana wallichii,* DC., *Angelica glauca* Edgew, *Glycyrriza glabra* Linn., *Tagetus minuta* Linn., *Viola odorata* Linn., *Sapindus pinnatus,* Mill., *Rubia cordifolia,* Linn., *Cinnamomum zeylanicum* Breye., *Zanthoxylum armatum* DC., *Valeriana jatamansi* Jones., *Hippophae rhamnoides* Linn., *Artemesia vulgaris* Linn.

Subtropical region : *Terminalia chebula* Retz., *Emblica officinalis* Gaertn., *Sapindus pinnatus* Mill., *Melia azedarach* Linn., *Solanum khasianum* Clarke, *Asparagus racemosus,* Willd., *Rauvolfia serpentina,* Benth, *Dioscorea bulbifera* Linn., *Aristolochia indica* Linn.

Besides, a few funding agencies have also identified some selected medicinal plants ensuring buy-back guarantee.

Table 1

Important medicinal plants in the Eastern Himalaya that could be exploited for large-scale cultivation

Species	Local name	Family	Habit	Perennating organ and uses
1	2	3	4	5
Aconitum ferox Wall., *Aconitum heterophyllum* Wall. ex Royle	Atish, Aconite	Ranunculaceae	Perennial herb	Multiplication through seeds and tubers. Roots used for medicine.
Acorus calamus L.	Boch, Vacha, Vayambu	Araceae	Perennial herb	Cultivated through rhizome cuttings. Used as brain tonic, coolant and drug for colic. It has high demand in the market.
Amomum subulatum Roxb.	Borong elichi	Zingiberaceae	Perennial herb	Vegetative propagation through rhizome, also from seeds. Used as spices.
Andrographis paniculata (Burm. F.) Nees.	Kalmegh, Chiraita teeta	Acanthaceae	Herb	Propagated through seeds. Used as anthelmentic, liver tonic, blood purifier. The whole plant is used.
Aquilaria agallocha Roxb.	Agar, Sasi, Indian eagle wood	Thymelacaceae	Tree	Cultivation is through seed raised seedlings. Agar oil is used in perfume and cosmetic industries.
Cinnamomum zeylanicum Breye.	Dalchini	Lauraceae	Tree	Perenated through seeds. Leaves used as spices
Coptis teeta Wallich.	Mishmi teeta	Ranunculaceae	Herb	Endemic to Arunachal Pradesh and propagated through seeds. The roots are sold for treatment of variety of diseases.
Dioscorea floribunda Yam.	Kham alu	Dioscoreaceae	Climber	Propagation through tubers and bulbils. Tubers yield alkaloid & used in pharmaceuticals.
Gymnadenia orchidis Lindl.	Panch hath, Salam pancha	Orchideae	Herb	An orchid with high medicinal value and propagation through tubers. The tubers are used in tonic.
Illicium griffithii Hook f. & Thoms.	Lissi	Magnoliaceae	Tree	Propagated through seeds. The fruits are used as spice and medicine.

Contd...

1	2	3	4	5
Oroxylum indicum Vent.	Bhatghilla, Jigat	Bignoniaceae	Tree	Regeneration through seeds. Bark is used in fevers as a tonic.
Panax pseudo-ginseng Wall.	Ginseng	Araliaceae	Perennial herb	Propagation through seeds and tubers. The tubers are used to produce rejuvenating general tonic, high in demand.
Picrorrhiza kurroa Royle ex Benth	Kutki	Scrophu-lariaceae	Perennial herb	Propagation is through seeds and suckers. Royle Rhizome used for medicine.
Piper longum Linn.	Round Pipli	Piperaceae	Climber	Fruits are traded in large quantities. Could be easily multiplied by seeds and stem cuttings.
Rauvolfia serpentina L. Benth. ex Kurz	Sarpagandha	Apocynaceae	Shrub	Propagation through seeds and stem cuttings. Roots are well-known source to treat blood pressure.
Rubia cordifolia L.	Manjista	Rubiaceae	Perennial climber	Propagated through seeds. Plant is a source of dye and medicine.
Swertia chirata Buch. Ham	Chirayata	Gentianaceae	Herb	Propagated through seeds. Drug obtained from dried plant is used as tonic, stomachic, in chronic fevers, anaemia, bronchial asthma, liver disorders and as laxative.
Taxus baccata L.	Yew	Taxaceae	Conifer tree	Could be propagated through seeds and stem cuttings. Leaves are source of taxol with high market demand.
Tinospora cordifolia (Wild.) Miers.	Amrit lata, Guduchi	Menispermaceae	Climber	Vegetative propagation by stem cuttings. Used as a tonic and vitaliser. The stem is used for drug manufacture and traded.
Whithania somnifera (Linn.) Dunal	Aswagandha	Solanaceae	Perennial herb	Propagation through seeds. The roots are reputed as Indian Ginseng and used for vitality and vigour.

Table 2

Total Production of important medicinal plants in Arunachal Pradesh
(quantity in tonnes except for pine blaze, Value in Rs. x 10^3)

English name/ Vernacular name	Botanical name	Year											
		1990-91		1992-93		1993-94		1996-97		1997-98		1998-99	
		Qty.	Val.	Qty.	Val.	Qty.	Val.	Qty.	Val.	Qty.	Val.	Qty.	Val.
Yew	*Taxus baccata*	-	-	851.00	338.32	663.25	1322.10	166.30	844.80	81.50	783.04	81.50	773.04
Lissi	*Illicium griffithii*	-	-	308.63	415.42	6.00	36.10	6.70	73.70	4.75	82.23	38.00	159.67
Chirayata	*Swertia chirata*	-	-	-	-	-	-	-	-	4.50	28.63	4.00	22.45
Boch	*Acorus calamus*	-	-	-	-	-	-	-	-	4.50	16.71	3.00	11.14
Pine	*Pinus* spp.	-	-	30865 Blaze	1990.57	-	-	232664 Blaze	2715.23	27188 Blaze	4078.18	433376 Blaze	3931870 Blaze
Lalrashi	*Rubia cordifolia*	-	-	-	-	-	-	-	-	1.50	2.59	1.00	1.72
Dalchini	*Cinnamomum zeylanicum*	-	-	-	-	-	-	-	-	1.50	1.215	-	-
Pipli	*Piper* sp.	2.15	16.45	1.525	14.09	0.50	13.75	-	-	0.03	-	-	-
Borong Elichi	*Amomum subulatum*	0.10	1.00	-	-	-	-	-	-	-	-	-	-

Qty. : Quantity
Val. : Value

Table 3

Medicinal plant collection in Sikkim State (data for the year 1990-1991)

Local name	Species	Qty. (tonnes)
Chirowto	*Swertia chirata* Ham.	3.44
Pipla	*Piper longum* L.	0.53
Jatamashi	*Nardostachys jatamansi* DC.	31.00
Kutki	*Picrorhiza kurroa* Benth.	6.20
Bikh	*Aconitum* sp.	10.72

Strategy for cultivation of MAPs

The cultivation of MAPs could be done for single species or many species together. The major challenge is to extend knowledge of local healthcare as well as making people aware of market demands. Initial cultivation of selected species could be for house consumption as well as commercial purpose. For selecting species, two possible approaches for cultivation could be adopted; one, either conserve overexploited, threatened and endangered plants; or, two, promote cultivation of economically important medicinal plants for which technology packages are well established. To start for the cultivation of MAPs, some background information is needed about the area and people where we propose to start cultivation (Box I).

There is a need to assess market

Box I

Background information needed about the area where trials on selected plants species are to be conducted

Parameters	Definitions
Select size of the plot	Small size will be worthwhile to start with (<10 ha)
Climatic conditions	Demarcate climatic conditions of the target area, Mapping of micro-climate-rainfall, temperature, humidity, wind velocity
Soils	Define soil types, nutrient status and water availability
Natural vegetation	Define the area and its vegetation
Land use	Define prevalent landuses in practice and people dependence on them
Socio-cultural aspect	Identify the existing cultural, agrotechnological base in the area. Also the existing organization structure relevant to the project
Stakeholders	Identify farmers, NGOs, traders and other persons involved interested in cultivation business
Infrastructure	Identify infrastructure base that may be required for the project

linkages and identify species being marketed, thereafter a list of raw as well as semi-raw products is to be prepared. For this purpose help of local government, NGOs, Institutions, farmers and banking institutes could be sought. The main purpose of cultivation of MAPs is to supplement the cash earnings of the farmers. This is essential since MAPs may have a gestation period of 3-4 years (or more) and at initial years farmers cannot totally rely on these plants for their livelihood. A detailed action plan is to be developed for cultivation of MAPs. After selection of the species, necessary planting materials and package of practices have to be provided to the targeted farmers. At the same time farmers capacity is to be built through training to take up such cultivation. Considering that the technology for these plants is available with the CIMAP, RRL, HAPPRC, CDRI, GBPIHED and other organizations, these agencies may assist in the implementation of the programme. Necessary monitoring of the progress of the programme has to be in-built.

To start initial trials on cultivation, there will be a need of large quantities of the seeds. The local governments in each State could arrange the same from the present collectors within the State from whom a royalty is being charged because these are the people who are directly linked with the collection of medicinal plants. The plant collectors can pay the royalty in the form of providing planting material (seeds/rhizomes/roots) and other propagules to the government. Such materials can serve as the initial planting stock with which the programme could be commenced.

Demonstration plot has to be in the farmers fields and all necessary inputs are needed to be given to them. These inputs include planting materials, technology packages, polyhouses, misting and irrigation facilities. In identifying the farming groups, local people who are already associated with harvesting and collection of such plants (particularly women), need to be targeted. Besides, all stakeholders, comprising farmers, NGO's/ Panchyats, community leaders, traders need to involved in organising/motivating and implementing these programmes in the farmers field. This is essential as all stakeholders have different concerns in this sector (Table 4). Proper nursery, production of planting material, identifying sites and field plantations, need to be carried out. While evolving and extending the package of practices, only organic farming should be encouraged without any use of pesticides and herbicides. Assurance of marketing of produce need to be provided to the farmers. It will be worthwhile to promote competitiveness among farmers as it will enhance quality of product. To promote this, suitable provisions for awards/prizes need to be made in the project and necessary guidelines for such competition should be framed and circulated amongst the growers well in advance by local governments in respective states. Certain most commonly known tree/ shrub species of medicinal importance namely *Taxus baccata, Hippophae, Asparagus, Berberis* species could be directly planted by the Forest Department as much information about these plants is already available.

After careful selection of the species, farmers should be educated for post harvest management and due facilities be provided to them for post harvest management of produce so as to supply

Table 4

Major concerns for selected people stakeholders involved with medicinal plant cultivation

Stakeholders	Concerns
Traditional Healers	Due recognition of traditional healing system, conservation of traditional knowledge, least interest by young generation, support for livelihood as most patients are poor and not able to pay fee, willing to be part of production trials.
Farmers	Alternate for incomes, willing to cultivate medicinal plants. Need infrastructure, planting material, package of practice and capacity building needed. Financial security for produces selling is also warranted
Plant collectors, Traders	High royalty on certain plants, quality of raw material along with regular supply
Govt. Officials	Need of projects, provision of fencing, appointing nodal officer in all districts
NGOs	Package of practices of suitable spp., funding support, Awareness and capacity of local people, marketing of products
Community leaders	Lack of awareness among farmers about growing medicinal plants, package of practices on spp., suitable policies for cultivation, large community participation, funding.
Local Governments	Habitat protection, large scale replication of technology packages, policy formulation and strategies, germplasm conservation, central support, employment generation

the quality material. For the purpose, inputs in the form of solar driers and dehumidifier would be necessary.

Value Additions/Product Formulation/ Processing Units

At present the major trade on MAPs is based on supply of raw materials directly collected from natural habitats. Simply increasing the quality of raw-material; by collecting it in proper time, and providing proper care to the collected material, could increase the return to farmers. Using technological inputs of CDRI, CIMAP, Tibetan pharmacy, Ayurvedic Council, Pharmacy, Medicinal Plant Board in association with NGOs/ Panchayats, a cottage industry can be evolved based on the produce from the domesticated medicinal plants. Proper drying, sorting, semi-processing and packaging can enhance quality of the product. Suitable networking of cultivators/ collection points/processing points depending upon location/areas/quantum of produce can be established.

Marketing

For the development and commercial exploitation of medicinal plants in the Himalayan States, marketing is most crucial aspect in this sector. Though, as suggested earlier, cultivation of market demanding species should be promoted,

however large scale cultivation and bulk production of raw-material need proper fore-thought for a comprehensive marketing strategy. It is very difficult to establish the marketing linkages of the plants being collected at present. Medicinal plants collected from Arunachal Pradesh find markets in Tezpur, Banderdewa, and Likabali, whereas from Sikkim initial market is Siliguri. Thereafter these plants are dispatched to Delhi, Kolkata, Chennai, Rajasthan, Patna, Banglore etc. Subsequently the plants are either used in our country by various pharmaceutical firms or exported to other countries. There are no proper prices in place and it largely depends on the middlemen and collectors, therefore vary from area to area. In year 2000-01 'Lissi' seeds were sold at a price Rs. 45-60/kg, though in 1999-2000 it was Rs. 100-200 per kg. Similarly 'Pipli' is sold at Rs. 80-90 per kg at place of production, and 'Acorus' for Rs. 8-10 per kg, which goes up to Rs. 12 in Tezpur and may be as high as Rs 20 when it reaches the factory. At times there are buyers for selected medicinal plants only. 'Mishmi teeta' market is out of Kolkata. It is highly required to identify possible buyers in the trade, and the raw material could be sold directly to them fetching better prices to local people. For marketing purpose, services of Forest Development Corporation (FDC) in each State or any other autonomous organization could be used. Forest Department has to be actively involved in it as most of these species are collected from forest areas. The FDC or other such organizations could take up work on research and development (R&D), plantation and harvesting, and product quality control. The activities of Forest Corporation would be governed by a Board of Directors nominated by the respective State Governments as per their norms. The FDC can also take or assign work on propagation of cultivating materials, and harvest of the products on the stipulated terms and conditions finalized by local Government. The quality product should finally be supplied to designated agencies for onward marketing.

A detailed marketing survey has to be conducted to explore the potential buyers. The local State govt. should advertise the medicinal products for ascertaining the prevalent selling rates. Based on this exercise the selling rates should be determined for various products as per quality gradation. Medicinal plants could prove as low volume and high value products and could be marketed either as: (a) Raw products, and (b) Semi-processed form. Carrying out some sort of semi-processing before marketing may increase return. Initially ginger, cardamom and juniper leaves could be processed to get their essential oils by using simple hydro-distillation process, as these species are already available in good quantity. Such processing units can be set up with the Forest Corporation or with the Department of Industry or in the private sector.

Financing

Financing the marketing intelligence services is essentially required for the sale of MAPs. Finance is required for marketing medicinal plants as the farmers can not afford to sell their products on credit, therefore Central and State Governments need to be fully involved. The State government could make arrangements to fund such schemes to potential growers within their states. At the same time the local govt. at its own should try to raise finances through sale of shares and floating of debentures. Necessary permission would

be obtained prior to floating of the project. There are also a large number of agencies that could be interested to fund such programmes. Some selected agencies are DOEn, DBT, DST, ICMR, ICAR, CSIR, Medicinal Plant Board and NEDFI, as all of them have schemes for selected medicinal plants.

The Indian System of Medicine & Homoeopathy (ISM&H) that works in collaboration with Department of Health, also supports promotion of certain small scale industry production of cosmetics, and Ayurvedic & Homoeopathic medicine such as hair oil, herbal mosquito repellants, herbal lotions, herbal lipsticks, herbal agarbati, herbal mouth refreshners, spices, herbal soap etc. By that way the womenfolk can earn money through small scale medicinal industry. Herbal tea, Tulsi, cough-syrup, herbal hair oil can be produced locally and can be sent to market and in that way peoples involvement in promoting herbal medicine can be popularized by the the ISM&H. Capacity building courses leading to learning of preparation of herbal beer, herbal lipsticks, herbal tea, herbal mosquito repellants etc. may also be provided by ISM&H.

Medicinal Plants Board

The Medicinal Plants Board under the Ministry of Health and Family Welfare (Department of Indian Systems of Medicine & Homeopathy, Government of India) is a national level body constituted by the Government of India to ensure availability of medicinal plants and coordinate all matters relating to their development and sustainable use. In pursuance of this objective the Board plans to facilitate cultivation, buyback arrangement to ensure the off-take of the produce at reasonable prices (Rawat and Uniyal, 2003). Under the proposed scheme, cultivation of the selected herbs will be/is being encouraged under contract farming arrangements between the farmers and industrialists/traders (Table 5). The Medicinal Plants Board therefore, invites offers from cultivators and users for supply and/or purchase of the selected medicinal plants in the form of crude drugs on an annual basis. Interested cultivators and users may contact the Board for further details.

North-Eastern Development Finance Corporation Ltd. (NEDFi)

North Eastern Development Finance Institute supports farmers, NGOs, semi-government organizations, and self help groups. NEDFi provides loan system, and for small-holding farmers there are some micro-financial schemes. Realising the importance and potential of medicinal plants, NEDFi initiated a scheme of commericializing a few high value MAPs taking patchouli (*Pogostemon cablin)* and geranium (*Pelargonium graveolens*) as the starting crops as these plants are in demand at national/international markets (Table 6). Patchouli can be grown at low-hills and NEDFi provides all technical help along with buy-back guarantee. In temperate region, lissi + geranium can be grown together and may produce substantial results in 5 years. Geranium gives return after 6 months, lavender after 2 years and Bulgarian-rose after 3 years. One hectare land of rose will provide 1.2 kg of flower and rate of rose oil is 2.5 lakhs/litre. Lissi will give production after 6th year. After 5 years replace geranium with Chirauto and in between put Indian Velariana (*V. wallichii*)

Table 5

Priority Medicinal plants being promoted by National Medicinal Plant Board

Sl. No.	Local name	Botanical name	Family
1.	Amla	*Emblica officinalis* Gaertn.	*Euphorbiaceae*
2.	Ashok	*Saraca asoca* (Roxb) de Wilde.	Caesalpinaceae
3.	Ashwagandha	*Withania somnifera* (Linn.) Dunal	Solanaceae
4.	Atees	*Aconitum heterophyllum* Wall ex Royle	Ranunculaceae
5.	Bel	*Aegle marmelos* (Linn) corr.	Rutaceae
6.	Bhumi amlaki	*Phyllanthus amarus* Schum and Thonn.	Euphorbiaceae
7.	Brahmi	*Bacopa monnieri* (L) Pennel	Scrophulariaceae
8.	Chandan	*Santalum album* Linn	Santalaceae
9.	Chirata	*Swertia chirata* Buch. Ham	Gentianaceae
10.	Giloe	*Tinospora cordifolia* Miers	Menispermaceae
11.	Gudmar	*Gymnema sylvestre* Br.	Asclepiadaceae
12.	Guggal	*Commiphora wightii* (Arn) Bhandari	
13.	Isabgol	*Plantago ovata* Forsk	Plantaginaceae
14.	Jatamansi	*Nardostachys jatamansi* DC	Velerianaceae
15.	Kalihari	*Gloriosa superba* Linn.	Liliaceae
16.	Kalmegh	*Andrographis paniculata* Wall. Ex. Nees	Acanthaceae
17.	Kokum	*Garcinia indica* Chois.	Guttiferae
18.	Kuth	*Saussurea costus* C.B. Clarke (S. lappa)	Compositae
19.	Kutki	*Picrorhiza kurroa* Benth ex Royle	Scrophulariaceae
20.	Makoy	*Solanum nigrum* Linn.	Solanaceae
21.	Mulethi	*Glycyrrhiza glabra* Linn.	Fabaceae
22.	Musali Safaid	*Chlorophytum borivillianum* Sant	Liliaceae
23.	Patharchur (Rhiver)	*Coleus barbatus* Benth./C. vettiveroides	Labiatae
24.	Pipali	*Piper longum* Linn.	Piperaceae
25.	Rasaut (Daruhaldi)	*Berberis aristata* DC	Berberidaceae
26.	Saffron (Kesar)	*Crocus sativus* Linn.	Irideae
27.	Sarpandha	*Rauwolfia serpentina* Benth. Ex Kurz	Apocynaceae
28.	Senna	*Cassia angustifolia* Vahl.	Leguminosae
29.	Shatavari	*Asparagus racemosus* Wild	Asparagaceae
30.	Tulsi	*Ocimum sanctum* Linn.	*Lamiaceae*
31.	Vai Vidang	*Embelia ribes* Burn. F.	Myrsinaceae
32.	Vatsnabh	*Aconitum ferox* Wall.	Ranunculaceae

Table 6

*Selected Medicinal plants being promoted by NEDFi**

Sl. No.	Common name	Botanical name	Family	Medicinal uses
1.	Geranium	*Pelargonium graveolens* Herit	Geraniaceae	For geranium oil used in soap and cosmetics and for flavouring tobacco and pharmaceutical preparations. Also, the oil is an excellent base for artificial rose attar.
2.	Bulgarian rose	*Rosa damascena* Mill.	Rosaceae	Flowers used for rose water and attar of rose flower, buds tonic and aperients, used in cardiac troubles. Gulkand (preserve) made from petal is laxative, used in tonsils. Damask rose is a most important perfumery rose with high quantity of volatile oil.
3.	Patchouli	*Pogostemon cablin* Benth. var. *savris*, Hook.	Lamiaceae	Leaves used for production of 'patchouli-oil', used in perfumery, soaps and other cosmetics industry. It yields excellent attar on blending with sandal wood oil. Infusion of fresh leaves is used in menstrual troubles. Dried leaves used for sensing wardrobes.
4.	Lissi	*Illicium griffithii* Hook.f. & Thoms.	Magnoliaceae	Fruits stimulant & carminative. Yield an essential oil.
5.	Rosemary	*Rosmarinus officinalis* Linn.	Lamiaceae	Leaves & flowers yield an essential oil known as 'rosemary oil'. Used in cheap perfumery soaps, hair lotions, room sprays and inhalants. It is mildly irritant, used as carminative and cardiac stimulant.
6.	Peppermint	*Mentha piperita* Linn. Emend, Hooks.		Stimulant, stomachic, carminative, used for allaying nausea and flatulence. Source of peppermint oil, also applied in rheumatism neuralgia, congestive headache and toothache.

* These species are being promoted by NEDFi on buy-back guarantee

as it needs total shade. Seedlings technology of all these species is available with NEDFi.

R&D requirement

R&D back-up is essentially required

for successful implementation. It is further required to conserve certain species in their *natural habitats. Botanical Survey of India* (BSI) and many other national/local agencies have been conducting surveys. However, detailed information is available for a very few species only. The Forest Department in its capacity in each State independently conducts surveys on specific medicinal plants. The states could seek information from the agencies working in their respective areas. Maps with distribution frequency have to be finalized for plants of interest and commercial value with the help of the relevant agencies. The other important and priority R&D sectors that should receive due attention are evaluation of germplasm and developing of cultivars; nursery plant raising and supply of quality material; development of agro-technology and packages developed; continuous adaptation trials at different agro-climatic zones; post-harvest management; and value addition/ processing techniques should be *researched upon and for these purposes* relevant proposal should be sought from agencies like ICAR, CSIR, ICMR, and other agencies. It is also suggested to identify new prospective plants through ethnobotanical studies that could be of high potential in near future, which could also be exploited for better economic development of local people in a long run.

Conservation

There is a strong need to conserve over exploited species due to large scale collection from natural habitats. Two-three Herbal Gardens ranging at different elevations to conserve the germplasm of potential species are required in each state. These herbal gardens should serve as R&D field research stations. The required land could be procured from Forest Department. Work on evolving cultivation practices and conservation of germplasm should be a priority area for such gardens. The garden should be equipped with better infrastructure, i.e. polyhouses/glass-houses with misting /irrigation facilities for providing uniform planting materials. Grazers and Plant collectors need to be educated on the finer aspects of collection such that their activity is not destructive in eliminating the plants by hampering the reproductive cycle. Conservation strategy has to built on by involving local people and all stakeholders for achieving a long lasting solution.

Conclusion

The MAPs have a huge potential that could lead to generate enough employment and revenue. In hill areas, where the traditional agriculture could not match with the per unit area production with the plain areas, cultivation of medicinal plants could bring substantial benefit to local communities. In those areas where land-man ratio is good enough, these cultivation practices may change the life of the people. However it needs a strong will-power from politicians, administrators, scientists, NGOs and farmers together. Each State should plan for few selected species after careful screening, and trials should be conducted in different agro-climatic zones within the State. Germplasm base should be established in the herbal gardens. Young and unemployed rural youths and poor farmers could be motivated to raise selected species, and suitable support be made available to them in terms of planting material, technology practice, capacity building and infrastructure. The State should also prepare maps depicting distribution pattern of important MAPs.

The State departments should start funding to potential growers. If cultivation of medicinal plants is properly organized and thoroughly planned, it could easily take the shape of a cottage industry in each State, which sooner or later will lead to develop into an organized trade in the area of MAPs in the Himalayan region

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SUMMARY

This paper highlights strategy for large scale cultivation and long-term conservation of medicinal plants involving different stakeholders in the Himalaya. It is emphasized that the focus of the cultivation could be protection of endangered species and/or achieving the target of higher income by raising and cultivating market demanding species. The paper discusses selection of potential Medicinal and Aromatic Plants (MAPs) broadly recommended for the region and ways and means of domestication, value addition, product formulation, processing, conservation, infrastructure, and R&D support desired for cultivation of medicinal plants. Designs for marketing and possible funding sources are also given. It is highlighted that if cultivation of MAPs is planned properly, it could emerge as a potential sector to support large number of people with high revenue generation.

हिमालयी क्षेत्र में औषध पादपों की कृषि और संरक्षण : कार्य करने की एक कार्यसूची

आर०सी० सुन्दरियाल

सारांश

इस अभिपत्र में हिमालयी क्षेत्र में विभिन्न हितधारियों को सम्मिलित करते हुए, बृहत परिमाण पर औषध पादपों की खेती करने और दीर्घकाल तक उनका संरक्षण करते रहने की समरनीति पर प्रकाश डाला गया है । इस बात पर बल दिया गया है कि खेती कराने में ज्यादा ध्यान संकटापन्न पादप जातियों का रक्षण करने और अथवा बाजार में ज्यादा मांग रहने वाली जातियां उगाने और उनकी खेती करके अधिक आया बढ़ाने का लक्ष्य प्राप्त करने पर होना चाहिए । अभिपत्र में इस क्षेत्र के लिए मोटेतौर पर अभिस्तावित की गई संभावनापूर्ण औषध और सौरभिक जातियों का चयन करने तथा उन्हें घरेलूवत बनाने, मूल्य बढ़ाने, उत्पाद बनाने, विधायन करने, संरक्षण, अधोसंरचना तथा औषध पादपों की खेती करने के लिए वांछित अनुसन्धान व प्रदर्शन सहायता उपलब्ध कराने के उपायों की विवेचना भी की गई है । विपणन करने के आकल्प और धनराशि प्राप्त करने के संभावी स्रोत भी बताए गए है । विशेष प्रकाश इस बात पर डाला गया है कि यदि औषध और सौरभिक पादपों की कृषि को समुचित रूपेण आयोजित किया जाए तो यह क्षेत्र काफी अधिक संख्या में लोगों को सहायता पहुंचाने वाले और उन्हें अपेक्षतया अधिक आमदनी दिलाने वाले संभावनापूर्ण क्षेत्र के रूप में भी उभरकर आगे आ सकता है ।

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