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Medicinal Plant Sector in India: Status and Sustainability

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Abstract

Medicinal systems in India emerged during Indus Valley civilization. In Indian herbal texts use of herbal medicines has been mentioned. Total global market of herbal products is estimated at \$ 85 billion. Asian continent occupies about 30% of the market share in the global herbal market. European countries act as biggest importers of herbal health products. In India, there are 6 major, 21 medium and 37 minor herbal markets. Due to this increasing demand for medicinal plants, some of the medicinal plants have become extinct. To have the sustainability of medicinal plants, both *in-situ* and *ex-situ* conservation methodology along with some policy measures like certification of medicinal plant produce, contract farming of medicinal plants etc. is needed to promote farming of medicinal plants.

Keywords: Global scenario, herbal products, M&AP, market, policy, trade

1. Introduction

Indian ayurvedic health treatment is most likely the oldest medical care system in the world. The history of using herbs for a health purpose is very old and has been mentioned in an ancient religious work known as 'Vedas'. Practice of herbal healing is believed to be mentioned during 3000 BCE in *Rig Veda*, whereas division of *Ayurveda* into eight divisions on the basis of different parts and functions of the human body and its organs has been elaborated in *Atharva Veda*. In spite of systematic therapies, there are some specific herbal therapies developed by individuals which are also used for treating different diseases. However, the formulations developed by such individuals were kept secret and were passed on only in the family system from the older to the new generation.

Specific part(s) of a plant e.g. leaves, flowers, seeds, roots, barks, stems, etc. are used for preparing specific herbal medicines (Koyuncu, 2007).

For primary health care need, about 80% world population depends on traditional medicines (Owolabi et al., 2007). With the advancement of R&D in pharmaceuticals, allopathic medicine gained importance over ayurvedic medicines, regardless of its high cost and side effects. Due to increasing recognition that the natural products are non-hazardous, have less side effects and are easily available at reasonable prices, the demand for plant origin medicines, health products, pharmaceuticals, food supplement, nutraceuticals, beauty products etc. are rising in both developing and developed countries (Kalia, 2005).

On the whole, around 20% of the global species (45000 plant species) are found in the Indian sub-continent, whereas about 70% of Indian medicinal plants are in tropical region mostly in the various forests spread across the Western and Eastern Ghats, the Vindhyas, Chotta Nagpur Plateau, Aravalis and Himalayas (Singh et al., 2010). In the temperate and alpine regions or higher altitudes less than 30% of the medicinal plants are found which are of high medicinal value (Rathore and Singh, 2013).

In the whole world, plants varying between 50000 to 80000 numbers are utilized for medicinal purposes (Kumar and Bhagat, 2012). Due to mounting demand for herbal products, herbal trade in the world market is expected to increase from US \$ 120 billion to US \$ 7 trillion by 2015. At present, share of India in herbal world trade is quite low. The domestic trade of the natural medicine based industry is about Rs. 80 to 90 billion. India's medicinal plants and their herbal products exported from India have a value of about Rs. 10 billion. There are about 17500 species of flowering plants in India out of these plant species; 6000- 7000 plant species have medicinal use in traditional and documented medicine systems like Ayurveda, Siddha, Unani and Homeopathy. It is estimated that about 960 species of medicinal plants are in trade, out of which 178 species have more than 100 metric tonnes annual consumption (National Medicinal Plant Board, 2014). Different categories of products like new drugs, phyto-pharmaceuticals, nutraceuticals, cosmetics, intermediates for drug manufacturing, and galenicals are being produced



through value addition of medicinal plants by industrial units (Planning Commission, 2000).

More than 800 plant species are used by the herbal industry, out of which less than 20 plant species (only 2.5%) are being cultivated. In India, more than 90% of medicinal plants are collected from the wild and collection methodology is very primitive and destructive. Threats to genetic diversity as well as species survival has been increased due to these medicinal plant collection practices from wild associated with habitat destruction, over-exploitation, land use changes and other pressures (Engels and Arora, 1993).

2. Medicinal and Aromatic Plants (MAPs) and its Trade

The proportion of different plant parts used by ayurvedic industries is: 29.6% as roots, 25.8% as leaves, 13.5% as bark, 2.8% as wood, 16.3% as whole plant, 4% as rhizome and 8% include seeds, flowers etc. Presently a large number of herbal firms in India are producing herbal drugs; most of these firms are dependent on the natural forests as they do not have their own or other source of raw materials required for processing. It is estimated that herbs of value over US\$ 300 million are being extracted for drug manufacturing. This kind of unsustainable wild collection of medicinal plants has resulted in the devastation of a large number of wild medicinal plant species leading to their extinction. As per the Red Data Book of India which was released in 2012, there are 3947 species as 'critically endangered', 5766 as 'endangered', and more than 10000 species as 'vulnerable' (Chaudhary and Singh, 2010).

At present collection of MAPs is regularly done by contractual workers or migrant labourers with permits provided by state forest departments. Collection is done to get more incentives from more wild collection on hourly-paid basis. There are certain international agencies such as the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), International Union for Conservation of Nature (IUCN), World Wide Fund for Nature (WWF) and the Wildlife Trade Monitoring Network which are framing standards for ensuring sustainability and quality of planting material.

There are specific legal requirements for exporting medicinal products from natural sources to Europe and some other developed countries. All matters related to conservation and cultivation of MAPs, policies and programmes to enhance their national and international trade are under the primary mandate of National Medicinal Plants Board (NMPB).

According to International Union for Conservation of Nature (IUCN) guidelines: 57 species were assigned threat status for Himachal Pradesh, out of which 47 species are threatened and 10 species are near threatened and not evaluated (National Medicinal Plant Board, 2014).

There are about 25000 licensed pharmacies in India which are based on Indian system of medicine. Formulations registered in India include about 1000 single drugs formulations and 3000 compound drug formulations. About 8000 medicinal plants are being used by the Indian herbal industry to manufacture

different categories of herbal medicines. In India, there are 14 large, 86 medium and 8000 small scale (licensed) herbal drug manufacturing units. Some of the highly consumed medicinal plants are Amla, Mulathi, Ashoka, Senna, Luchia, Guduchi, Satavatri etc. (Kalia, 2005).

As per the estimates of World Health Organization (WHO), about 80% person residing in developing countries depends on herbal medicines for their primary health care needs as shown in Table 1.

Table 1: Use (in %) of traditional medicine for primary health in few developing countries

Sl. No.	Country	% Use
1.	Uganda	60
2.	Tanzania	60
3.	Rwanda	70
4.	India	70
5.	Benin	80
6.	Ethiopia	90

Source: WHO, Traditional Medicine Strategy 2002–2005, World Health Organization, Geneva

Traditional medicine is basically a source of alternative medicine, new pharmaceutical products, and other healthcare products. Medicinal plants are not only important when plant constituents are used directly as therapeutic agents but are also having immense use for pharmacological research and are also used as starting materials for the synthesis of drugs (drug development) or as models for pharmacologically active compounds (Mukherjee, 2003). In India, about 70% of modern medicines are derived from natural products having little or no side effects (Choudhary, 2002).

Ayurvedic medicines in India are having very complex formulations consisting of 30 or more ingredients as compared to those of Chinese traditional medicines. A number of ingredients from different herbs are properly processed and chosen to balance the three humoral doctrines ('Vata', 'Pitta', and 'Kapha') in ayurvedic medicine formulations (Pan et al., 2014).

3. Market Trends and Global Scenario of Herbal Products

The evolution and existence of herbal processing units is directly related to the availability of domestic and international markets for raw material and sale of finished products. New York, Singapore, Rotterdam, Hamburg and London are the major trade centers. India and China are acting as main exporters as developing countries have more export potential. India and China being most prominent herbal exporters whereas European and Northern American countries are acting as main importers of the herbal products.

3.1. Asian countries

Total global market for herbal products is estimated of value



\$ 85 billion out of which \$ 45 billion accounts for the share of herbal pharmaceuticals. Asian continent accounts for about 30% share in the global herbal market. After China, India is the second largest exporter of herbal medicines. Indonesia (with herbal market more than \$ 970 million) and Malaysia (with herbal market more than 9 billion Malaysian rupees) are the other two Asian countries performing with high registered growth in herbal sector (<http://www.ukessays.com>).

3.2. European countries

European countries act as biggest importers of herbal health products. Germany occupies the first position in European herbal industry with a share of about 30% followed by France. In England, about 20% of its population uses herbal health products having market value of about 126 million pounds.

3.3. American countries

In South America, Brazil and Argentina emerged as the dominant players of herbal market. Since 2008, Brazil's herbal market is growing at more than 15%. United States of America registered a growth of 1% which is good sign for herbal industry in its recession hit economy and the herbal market stands at \$ 4.8 billion despite the recession (<http://www.ukessays.com>).

3.4. Indian scenario

Utilization as well as market demand for herbal drugs is increasing day by day (Kamboj, 2000). It is estimated that the

Indian herbal medicinal industry has an annual earnings of INR 2300 crores which has a growth rate of 15%, whereas turnover of pharmaceutical industry is INR 14500 crores (Sharma et al., 2008). Substantial amount of medicinal plants and herbs have been exported from India during the last few years. In the recent years, major pharmaceutically exported items from India include: isabgol, opium alkaloids, senna derivatives, vinca extract, cinchona alkaloids, menthol, gudmar herb, mehndi leaves etc. (Kokate et al., 2005). India's turnover from herbal medicines include: (i) turnover of \$ one billion from over-the-counter (OTC) products, classical formulations and home remedies under conventional systems of medicine, and (ii) turnover of \$ 80 million from export of herbal based crude extracts (Kamboj, 2000).

As per the estimates of the World Health Organization (WHO), the demand for medicinal plants is approximately US \$14 billion per year (Sharma, 2004). The demand for herbal raw material is increasing @ 15 to 25% annum⁻¹. As per estimates by World Health Organization (WHO), demand for herbal raw material from medicinal plants is likely to be more than US \$5 trillion in the year 2050. In India trade of medicinal plants is estimated to be approximately US \$1 billion year⁻¹ (Joshi et al., 2004). The details of herbals export from India are given in Table 2.

According to the Pharmaceutical Export Promotion Council, exports of herbals from India registered compound annual

Table 2: Category-wise exports of pharma products from India

Category	2007-08 (INR in Crores)	2008-09 (INR in Crores)	2009-10 (INR in Crores)	CAGR	% Share	2013-14 expected growth (INR in Crores)	2013-14 (in bn US \$)
Total Sector	29824	40416	42449	19.30%	100.00%	71173	15.81
Bulk Drugs	12648	16361	17307	16.98%	40.77%	25641	5.70
Formulations	16706	23460	24571	21.27%	57.88%	44617	9.91
Herbals	470	595	571	10.19%	1.34%	941	0.2 0

Source: Strategy for Doubling Exports in Next Three Years (201-12 to 2013-14), Govt. of India, Ministry of Commerce and Industry, Dept. of Commerce

growth rate of 10.19% with herbal exports increasing from INR 470 crores in 2007-08 to INR 571 crores in 2009-10. India's herbal export to top ten export destinations during last three years is presented in Table 3. Medicinal plants and their parts being used in Indian herbal drugs for import-export management (Tare et al., 2011) are presented in Table 4.

4. Classification of Herbal Markets in India

In India, there are 6 major, 21 medium and 37 minor herbal markets dealing with medicinal raw materials (Subrat et al., 2002). Herbal market is classified as follows:

- A major market: Generally, there are more than 25 big traders dealing with raw material of medicinal plants and each trader's annual income is INR 5 million or more;
- A medium market: Mostly there are 25 to 50 big traders

having annual income ranges from INR 2.5 to 5 million;

- A minor market: Centres with lesser numbers (less than 25) of big traders and lower income (less than INR 2.5 million annum⁻¹) have a greater volume of trade for herbal raw material dealing with only a few species of medicinal plants.

Delhi, Mumbai, Chennai and Tuticorin are the major export centres for medicinal herbs. The medicinal raw material is supplied from the minor to the medium and then to the major markets from where these are exported.

5. Trade Routes or Channels for MAPs in India

Indian market is the major destination for supply of plants legally as well illegally from neighboring countries, mainly Nepal and Bhutan. MAP trade is highly secretive in nature. MAP trade in India has the following characteristics:

Table 3: India's herbal exports (INR in crores) to top ten export destinations

Rank	Country	2007-08	2008-09	2009-10	% Share in 2009-10
1	USA	202.4	250.3	203.7	35.7
2	Pakistan	42.0	48.1	60.7	10.6
3	Germany	27.7	35.1	32.9	5.8
4	Japan	24.3	30.1	47.2	8.3
5	UK	16.6	22.9	14.5	2.5
6	Spain	25.6	18.4	6.8	1.2
7	China	7.2	18.3	7.5	1.3
8	France	8.0	12.2	8.0	1.4
9	Viet Nam	4.0	11.3	13.2	2.3
10	Mexico	10.0	11.0	11.3	2.0

Source: Market Size of Herbal Medicines, Govt. of India, Ministry of Commerce and Industry, Dept. of Commerce

Table 4: Medicinal plants and their parts in import-export management of herbal drugs from India

Exporting of Herbs		Importing of Herbs	
Name of Plants	Parts Used	Name of Plants	Parts Used
Sweet Flag	Rhizome	Indian Aloe	Dried leaf
Mexican Poppy	Fruit	Malabar Nut	Whole plant
Mango Ginger	Rhizome	Wild Cinamon	Bark and leaf
Turmeric	Rhizome	Wild Turmeric	Rhizome
Wild Turmeric	Rhizome	Kokum Butter Tree	Fruit
Indian Senna	Leaves	Glory Lily	Tuber and seed
Sweet wood	Root	Juniper	Fruit
Indian Ginseng	Root	Bay Berry	Bark
Bay Berry	Leaf	Nux Vomica	Bark and seed
Long Pepper	Fruit	Stone Breaker	Fruit
Indian Madder	Root	Castor Bean	Seed
Lodh Tree	Bark	Indian Snake-root	Root
Chirata	Whole plant	Holy Basil	Leaf and essential oil
Black Myrobalan	Bark and seed	Country Ipecac	Root
Ginger	Rhizome	Periwinkle	Leaf, seed and stem
Wedelia	Leaf and root		

Source: Tare et al., 2011

- Traders have well organized but informal supply chain at different levels from farmers to the end users. Although traders have strong informal business networks, but are well aware about the market demand and prices of herbs.

- Most of the MAP trade is unorganized having no reliable information about market prices of herbs, commission charges, and marketing costs at different levels.

- No formal documentation is even attempted.

- There is also lack of knowledge about value addition if any, at various stages in the chain, as a result wastage takes place at different levels, and even that adulterants get added-on at some stage(s) in the chain. This tends to adversely affect the quality and reliability of the final herbal product.

- Lack of storage facilities for herbal raw material and semi processed products, deteriorates the quality as well as compels the collectors or farmers or traders for sales of plants even when prices may not be as competitive.

6. Main Players Involved in the MAP Supply Chain

There are number of players in the supply chain of medicinal plants which vary according to the length of the supply chain. Main players involved in MAP supply chain are: MAP producers or collectors, local collectors at village level, local merchants (covering large area), middlemen merchants (covering large area), wholesale and regional merchants, retailers and entrepreneurs, and consumers. In this supply chain, collectors share in the final price paid by the consumer varies from 10% to 58%, mostly lower than 33% (Karki et al., 2004).

7. Suggestions and Policy Measures for the Sustainability of Medicinal Plants

- Establishing a systematic database.

- Need to study the cause (genetic or ecological conditions) of intra specific variations.

- Understanding the diversity of medicinal plants, growth and other phonological needs and taxonomy.

- *In-situ* conservation of medicinal plants in their natural habitats.

- *Ex-situ* conservation of medicinal plants.

- Promoting Cultivation of Medicinal Plants as per the market needs.

- There needs a sustainable approach for wild plant material collection through adoption of good collection practices (GCP) for wild herbs.

- Implementation of Non-Timber Forest Products (NTFP) Policy.

- MAP Certification is also needed to address the problems like depletion as well as indiscriminate collection of wild MAPs and its sustainable cultivation.



- Suitable pricing strategy is required because of the unstable nature of demand, quality and availability of raw material.
- Creating single window facilitation centre for starting MAP farming.
- Encouraging contract farming of medicinal and aromatic plant (MAP) crops.

8. Conclusion

R&D institutes should work to conserve the germplasm as well as exchange of the planting material in different localities for the economic upliftment of rural masses. Conservation of germplasm and exchange of plant species will enhance the evaluation of number of plant species as well as genotypes of the same species for getting economic metabolites. conservation and cultivation of medicinal plant species will increase the supply of desired medicinal products and hence there will be fewer burdens on the naturally occurring medicinal plants which will help to conserve these important medicinal plant resources on sustainable basis.

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