



Mini Review

Volume 9 Issue 1 - July 2017
DOI: 10.19080/ARTOAJ.2017.09.555753

Agri Res & Tech: Open Access J

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Medicinal Plants: Treasure Trove for Future



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Submission: May 24, 2017; **Published:** July 31, 2017

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Abstract

Asia has abundant species of medicinal and aromatic plants (MAPs) and traditional medicine has been practiced in Asia since ancient times. The Chinese and the Indians have made use of medicinal plants to cure ailments for thousands of years. Medicinal plants also play an important role in the lives of rural people in India with few health facilities. The plants that possess therapeutic properties or exert beneficial pharmacological effects on the animal body are generally designated as "Medicinal Plants". They play a significant role in providing primary health care services to rural India. They serve as therapeutic agents as well as important raw materials for the manufacture of traditional and modern medicine. Substantial amount of foreign exchange can be earned by exporting medicinal plants to other countries. In India there are 880 medicinal plants species involved in all India trade. Of this, 48 species are exported and about 42 spices are imported. The Ministry of Environment and Forests, Government of India, reveals that there are over 8000 species of medicinal plants grown in the country. About 70 percent of these plants are found in the tropical forest; spread across the Western and Eastern Ghats. The Export-Import Bank of India, in its report for the year 1997, puts medicinal plants related trade in India at \$5.5 billion and the same is growing rapidly. According to World Health Organization (WHO) the international market of herbal products is around \$6.2 billion, which is poised to grow to \$5 trillion by the year 2050. Unfortunately, India's share in the global medicinal plants related export trade is just 0.5 percent. The export of Medicinal plants is Rs.33453.23 lakhs during 1991-92 to 2002-2003. Its overall trend has been increased in 0.21 percent. And the average Import of Rs.2827.01 lakhs. Also its trend has been increased in 0.39 percent.

Introduction

A medicinal plant is any plant which, in one or more of its organ, contains substance that can be used for therapeutic purpose or which is a precursor for synthesis of useful drugs. This definition of Medicinal Plant has been formulated by WHO [1,2].

WHO suggest that increase in many Medicinal plants industries although old and vast are still being managed on traditional ethos and practices and lack a proactive and socially responsible image. Many studies have confirmed that traders and pharmaceutical companies are responsible for inefficient, imperfect, informal and opportunistic marketing of medicinal plants. As a result, the raw material supply situation is shaky, unsustainable and exploitative. It is in the best interest of the industry to develop a long term "social contract" with the collectors or growers.

The medicinal plant sector has traditionally occupied an important position in socio-cultural, spiritual and medical area of rural and tribal lives of India. In recent years, due to growing recognition of natural products and process in sustaining human as well as environmental, importance of medicinal plant

resources have increased tremendously. Cultivation of medicinal plants in wasteland can improve the ecology and economy of the area.

WHO has issued several guidelines pertaining to quality control, assessment of herbal medicines, programme on traditional medicine, and for evaluating the safety and efficacy of herbal medicines. In view of the present trends of commercialization in the preparation and marketing of Aryurvedic, Siddha, Unani and Homoeopathic medicines, the existing Drug & Cosmetic Act needs revision and further amendment. Furthermore, patenting of plant product should be handled with great care.

The quality of medicinal plant material is usually high when derived from the cultivated plants of standard varieties. Concerted efforts are necessary in the area of biotechnology and agro-technology for encouraging cultivation. Marketing which is one of the most important item in the development of any product should get a major attention in formalizing and organizing the markets. Quality control and standardization have to be organized to boost the export.

There are extremely diverse stakeholders in the medicinal plant sector, spanning the formal sectors of forestry; agriculture, health and industry (as well as actors outside of these formal sectors). Medicinal plants fall into segments of these formal sectors and receive meagre attention. Indigenous pharmaceutical industry lack interest in providing feed back or financial support to the sector. Circumstances warrant creation of a central agency (Medicinal Plant Board) for coordination and motivation of all agencies.

Over 7500 species of plants are estimated to be used by 4635 communities for human and veterinary health care. About 1000 plants have been used in the Indian System of Medicines. The majority of medicinal plants are higher flowering plants representing around 15\$ families. Among the total, one third are trees, equal proportion shrubs and the remaining one third of medicinal plants are herbs, grasses and climbers. A very small proportion of medicinal plants are lower plants like pichens, ferns algae etc. Macro analysis of the distribution shows that medicinal plants are distributed across diverse habitats. Around 70% of medicinal plants are found in tropical areas mostly in evergreen, moist and dry forests. About 30 °c of medicinal plants are found in the temperate and alpine forests [3].

About 95% of medicinal plants used are collected from the wild. Over 70% of plant collection involve destructive harvesting because of the use of parts like roots, bark, wood and whole plants: A guestimate of the parts used by Ayurvedic industry are- roots 29.6%, leaves 5.8%, bark 13.5%. Wood 2.8%, whole plant 16.3 and rhizome 4%.

Confusion exists in the identification of plant materials where the orgin of a particular drug is assigned to more than one plant, sometimes having vastly different morphological and taxonomical characters. There are few others, where the identity of plant sources is doubtful or still unknown; therefore, adulteration is common in such cases. The quality of medicinal plants depends on the geographical origin, time and stage of growth when collection has been done and post harvest handling completed.

The true source of the crude drug in such cases can be located only after detailed chemical and pharmacological studies. Detailed chemical investigation on Bacopamonnieri and Centellaasiatica, the two plants variously-’ described by the name Brahmi has revealed entirely different phytochemical compositiop. The former contains alkaloids brahmine, herpestine, gama amino butyric acid and bacoside A&B which have been found to have important action on brain function, while Centellaasiatica contains asiaticosidc. brahmoside. hydrocotyline. etc. which have hardly any relationship with the properties ascribed to the drug Brahmi in the text.

The quality of medicinal plants depends on the geographical origin, time and stage of growth when collection has been done and post harvest handling completed [4]. The collections in most cases are done by villagers/tribals residing in the vicinity of

forests in their spare time. The plant part is collected without paying attention to the stage of maturity, dried haphazardly and stored for long periods under unsuitable conditions. The quality of collected material as such is often degraded.

There is a vast, secretive and largely unregulated trade in medicinal plants mainly due to involvement of petty traders .As the prices paid to the gatherers tend to be very, low, they often “mine” the natural resources than manage them, as their main objective is to generate an income. A critical factor in the wild harvesting is the availability of cheap labor to undertake the very labor intensive work of gathering. Such harvesting is bound to erode biological diversity of the country. Cultivation is difficult to establish when prices for wild source material are so low that there is little incentive for investment in cultivation of many species [5].

Threat assessment exercise as per latest IUCN guidelines has listed around 200 species of medicinal plants under various degrees of threat CITES has notified 11 Indian medicinal plants species in its schedule and in 1998, the Government of India restricted export of 19 species which are believed to be threatened in the wild.

Table 1: Medicinal Plants Processed to Isolate Therapeutically Active Chemical Constituents.

Name of the Plant	Major Chemical Constituents
1. Adhtoda	Vascicine
2. Ammi majus (Leaf)	Xanthotoxine
3. Atropha acuminata (Leaf, root)	Atropine, hyoscyamine
4. Berberis asiatica (root)	Berbezine
5. Carica Papaya (fruit lateax)	Papain
6. Cassia angustifolia (leaf)	Sennosoids
7. Catharanthus roseus (leaf, stem root)	Vinblaastine, Vincristim, Ajmaline
8. Cephaelis ipecacuanah (root)	Emetine, Cephaeline
9. Cinchona sps. (steam bark)	Quinine, Quinindine
10. Datura mete (leaf, seed)	Hyoscine
11. Datura sloramonium (lead)	Hyoscyamine
12. Dioscorea deltoidea (rhizome)	Diosgenin
13. Ephedra gerardiana (stems)	Ephedrine/Pseudoephedrine
14. Gloriosa superba (seed)	Colchicines
15. Heracleum candicans (root)	Xanthotoxine
16. Paparar somniferum (latex)	Morphine & other opium alkaloids
17. Podophyllum emodi (root)	Podophyllotoxin
18. Rauwolfia serpentine	Reserpine and othe alkaloids
19. Silybum marianum	Silymazines
20. Strychnos nux-vomica	Strychnine, Brucine
21. Texus wallichiana	Taxol
22. Valeriana jatamansi	Valpotriates

There are usually the dried parts of medicinal plants (roots, stem wood, bark, leaves, flowers, fruits) that form the essential raw materials for the production of traditional remedies of Ayurveda and Siddha, Unani, Homoeopathy, Amchi, Tibetan and other systems of medicine including the folklore ethno or tribal medicines. The crude drugs are also used to obtain therapeutically active chemical constituents by specialized methods of extraction, isolation, fractionation and purification and are used as phytochemicals for the production of modern allopathic medicines or herbal/ phytomedicines [6]. Some of the important plants with major chemical constituents are as per Table 1.

The crude drug is either used singly or in combination with other materials of plant, animal or mineral origin. Such medicines are prepared under special methods of heating and roasting, extraction with water, oil, milk, fat or even animal urine; fermentation under specifically controlled conditioning or regulated grinding [7]. The final products used in traditional systems of medicine are powders (Chumams). Concentrated extracts (Avalehas), fermented liquors (Asavas and Arishtas) and medicated oils and fats (Tail and Ghrita).

Table 2: Therapeutically Active Compounds Isolated from Medicinal Plants.

Class	Alkaloid	Plant Source
Pyridine alkaloids	Nicotine, arecolene	Nicotiana, Areca
Tropane alkaloids	Hyoscyne, atropine	Duboisia, Atropa,
	Hyoscyamine	Dalura, Hyoscyamus
Quinoline alkaloids	Quinine, quinidine	Cinchona
Isoquinoline alkaloids	Emetine, cephaelene	Ipecac, opium poppy
	codeine, morphene	
Indole alkaloids	Ergot alkaloids.	Ergot, Rauwolfia
	reserpine, ajmaline.	Catharanthusroseus,
	vincristine, vinblastine.	nuxvomica
	strychnine, brucisne	>
Amines alkaloids	Ephedrine, pseudoephedrine	Ephedra
Steroidal alkaloids	Solasodine	Solanumkhasianum
Glycosides		
Class	Alkaloid	Plant Source
Anthraquinones	Aloins, sennosoides	Aloe, Senna
Spaonins	Diosgenin, glycyrrhizine	Dioscorea, Liquorice
Flauanoids	Rutine, quercetine	Sophora, tea
Cardiac glycosides	Digoxine, lanatosides	Digitalis
Furanocoumarins	Xantholoxine, psoralene	Ammi, Heracleum, Psoralea
Garbohydrates	Gums, mucilages	Acacia, psyllium

The modern system of medicine uses extracts, spirits and therapeutically active compounds isolated from crude drugs. The main chemical compounds so isolated include alkaloids, glycosides, steroids and carbohydrates. Some of the major chemical compounds isolated from crude plant materials are as per Table 2.

Exports

Herbs are traded internationally in the dried form. The main product groups of the herb markets are:

- I. Natural products ingredients/ extractives which include herbal teas, dietary supplements, hydroalcoholic extract etc.
- II. Speciality extract-food ingredients, photochemical and their salts and derivatives with health benefits;
- III. Medicinal plants-International conventional medicines, phytomedicines and pesticides.
- IV. Traditional medicines.
- V. Preventive medicines-cosmetic ingredients etc.

The main export items from India are Psyllium seeds and husks. Cassia angustifolia leaves and parts. Vincarosea flowers, Chlorophytum arundinaceum roots, Withania somnifera roots, Erminalia chebula fruits, Phyllanthus emblica fruits, Papaver somniferum. Opium, Ocimum basilicum etc.

For continuous and uniform supply of crude drugs cultivation of medicinal plants has to be given priority. However, research support is needed in providing superior genotype, agronomical practices and linking of production with industries to ensure buy back guarantee to the farmers. Important species to be cultivated are as per Table 3.

Table 3: Medicinal Plant Species to be cultivated.

S. N.	Botanical Name	Local Name	Uses
1	Aeglemarmelos	Bel	Root is an ingredient of Dasmoor. Fruit pulp treats diarrhoea, leaves treat diabetes.
2	Andrographis paniculata	Kalmegh	A bitter tonic, and as a febrifuge and used in liver diseases.
3	Asparagus racemosus	Shatawar	Extensively used as nutritive tonic and in various formulations.
4	Azadirachta indica	Neem	A biopesticide and used in many diseases.
5	Bacopamonnieri	Brahmi	Brain tonic in nervous disorders such as insanity, epilepsy, neurasthenia and nervous breakdown and memory enhancing.

6	Berberisaristata	Berberis .	Roots, stem bark and Rasaut or Rasanjan are used in conjunctivities, enlargement of liver and spleen, jaundice, urinogenital disorders and ulcerative condition.
7	Catharanthusroseus	Periwinkle	Contains more than 100 alkaloids. Used for treatment of leukaemia.
8	Cassia angustifolia	Senna	Leaves and pods are purgative and laxative.
9	Celastruspaniculatus	Malkangni	Decoction and oil of seeds are stimulant for the neuro muscular system and are given in rheumatism, gout and paralysis. Also used as brain tonic and sharpens memory.
10	Chlorophytum tuberosum	Safedmusli	Used as demulcent, wholesome tonic alterative nervine. Roots are highly priced drugs.
11	Commiphorawighti	Guggul	Used in urinary infections, piles, fistula, arthirities, rheumatism and in lowering cholesterol.
12 .	Emblicaofficinalis or Phyllanthusemblica	Amla or Aonla	Fruit is used as laxative, in hair oils, and as general tonic.
13	Ephedra gerardiana	Ephedra	Used in asthma and hay fever.
14	Gloriosasuperba	Gloriosa or Kalihari	Rhizome is extensively used to induce the abortion and for painless delivery.
15	Gymnemasylvestris	Gurmar	It has antidiabetic Properties & for controlling the body weight.
16	Hydnocarpuskurzil	Chalmogra	Oil is used in treatment of leprosy.
17	Mesuaferrea	Nagkeshar	Used in bleeding piles, dysentery, cough etc.
18	Nardostachys grandiflora	Jatamansi	Used in hysteria, palpitation of heart, menopause and various nervous diseases.
19	Ocimumbasilicum	Tukmaria	In unani used as antidyscentic, antidiarrhoeal and aphrodisiac drug.

20	Plantagoovata	Isab or Psyllium	Seed and husk are used in treatment of chronic constipation control of diarrhoea and dysentery.
21	Picrorhizakurroa	Kutki	Used in the treatment of dyspesia, respiratory disorders, jaundice and anaemia.
22	Rauvoltiaserpentina	Sarpagandha	Used as desdative in insanity; it is hypotensive and tranquilizers.
23	Swertiachirayata	Chirayata	It is a tonic, febrifugal, laxative, stomachic, antihelminthic and anti-diarrhoeal.
24	Santanum album	Chandan	Oil used in various formulations.
25	Withaniasomnifera	Ashwagandha	It is sedative, alterative, antiinflammatory tonic are rejuvenative.

Conclusion

According to the World Health Organisation (WHO), the goal of 'Health for All' cannot be achieved without herbal medicines. While the demand for herbal medicines is growing in developing countries, there are indications that consumers in developed countries are becoming disillusioned with modern healthcare and are seeking alternatives. This has renewed interest by the multinational pharmaceutical industry in bioprospecting. But the lack of national legislation or effective international agreements on conservation of biodiversity has resulted in 'slaughter harvesting' of medicinal plants and massive depletion of biodiversity. This trend does not augur well for sustainable use of medicinal plants resources but there are mainly the, following constraints in developing the medicinal plants sector in the country:

- a. Depletion of the resource base, which is the foundation of entire sector;
- b. Decline of folk traditional medicine, a source of primary health care for the majority of the people;
- c. Impoverishment of rural and tribal people, who are the stewards of the resources and the holders of the ecological and medical knowledge, through inequitable marketing channels.
- d. The major opportunities in this sector are:
- e. The country is rich in biological diversity, human and medico culture and associated traditional and contemporary knowledge systems;
- f. The medicinal plants and their uses in indigenous medicine is well known to the people;

- g. Strong classical traditional medicine sector with developed industries and user base, exist in the country;
- h. Good work has been carried out in the field of cultivation and chemical processing of medicinal plants; and
- i. As a policy the country is prepared to afforest wastelands with the involvement of people giving preference to growing of medicinal plants; and attempts have been made for conservation, sustainable use, marketing and trade of medicinal plants in national and global markets.

Therefore, the use of medicinal plants for treating common ailments has assumed great contemporary release because of side effects of the chemical drugs the failure of primary health care services to course a significant.

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DOI: [10.19080/ARTOAJ.2017.09.555753](https://doi.org/10.19080/ARTOAJ.2017.09.555753)

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