MEDICINAL PLANTS : TRADE AND COMMERCE OPPORTUNITIES WITH INDIA

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Introduction

Biologicals, diagnostics, and therapeutics have a growing market reaching US$ 2,000 million profit for recombinant human growth hormones and US$ 6,000 million for therapeutic and diagnostic antibodies. Global expenditures on vaccines touch $10 billion every year, indicating the vast potential for vaccine development initiatives. In this direction creation of vaccine plants by cloning the antigenic genes in edible plants, generating edible vaccines will be a potential area for future sustainability. Biotechnology-derived products no doubt offer a great potential to the society towards improving health care that too without compromising with the environment.

There are around 20,000 species of plants, which have been documented on a world-wide basis for their medicinal value, of which approximately 5,000 species are phytochemically studied. Out of the 1,500 species identified, 1,100 species are used in different systems of medicines and out of these, 600-700 species are used in our country, mainly by the indigenous industries. About 150 species are used commercially. Many of these are exported, without any value addition, to various countries of the world. The market potential is huge and a continuous upgradation in the quality of the drugs has ensured a state of competitiveness for the domestic industry while it is globalising the business. This is proven by the fact that a lot of scientific work on various aspects of pharmacology, phytochemistry and clinical experiments are being pursued at the same time. The industry has exploited several medicinal plants for their alkaloids and have utilized the plants to extract the active components. The country has succeeded in exporting parts of plants and, in some cases, even the whole plants (Table 1). The list of plants which are imported into the country is presented in Table 2.

The availability of important medicinal plants in different bio-geographical zones of India is mentioned in Table 3.

The frequency of occurrence of plants in the herbal formulations prepared in India is shown in Table 4.

While the trend in the earlier millennia was to utilise medicinal herbs

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Table 1

Plants exported from India

Sl. No.	Plant	Parts used
1.	*Aconitum* species (Other than heterophylum)	Root
2.	*Acorus calamus*	Rhizome
3.	*Adhatoda vasica*	Whole plant
4.	*Berberis aristata*	Root
5.	*Cassia angustifolia*	Leaf & pod
6.	*Colchicum luteum*	Rhizome & seed
7.	*Hedychium spicatum*	Rhizome
8.	*Heracleum candicans*	Rhizome
9.	*Inula racemosa*	Rhizome
10.	*Juglans regia*	Bark
11.	*Juniperus communis*	Root
12.	*Juniperus macropoda*	Fruit
13.	*Picrorhiza kurroa*	Root
14.	*Plantago ovata*	Seed & husk
15.	*Podophyllum hexandrum*	Rhizome
16.	*Punica granatum*	Flower, root, bark
17.	*Rauwolfia serpentine*	Roots
18.	*Rheum emodi*	Rhizome
19.	*Saussurea lappa*	Rhizome
20.	*Swertia chirata*	Whole plant
21.	*Valeriana wallichii*	Rhizome
22.	*Zingiber officinalis*	Rhizome

as such in their crude form, fresh juices, paste, boiled extract or dried powder, with the advancement of civilization, they have been made more acceptable in easily ingestible forms such as decoctions, herbal teas, tablets, confection, syrup, tinctures, steam distillates, etc. which gradually entered into medical practice.

Table 2

Medicinal plant species being imported

Sl. No.	Plant
1.	*Glycyrrhiza glabra*
2.	*Pimpinella anisum*
3.	*Thymus vulgaris*
4.	*Operculina turpethum*
5.	*Cuscuta epithymum*
6.	*Smilax ornata*
7.	*Smilax china*
8.	*Lavandula stoechas*

It is also interesting to mention that 80% of sales of crude drug and extract categories which mainly includes 150 plants for various formulation whether classical, ethical or OTC come only from around 20% of medicinal plants whereas 80% of plants contribute only to 20% of sales. Therefore, there is a need to place more emphasis on high valued plants/extracts by way of taking up their cultivation and processing as a priority.

It is worthwhile to note that the export turn-over is around Rs. 1.1 billion in case of herbal extracts and essential oils alone, whereas another Rs.1.45 billion is from the drugs with both totalling around Rs. 2.55 billion.

The total turnover of Ayurvedic/ herbal products is approximately Rs. 23 billion of which:-

i) Major O.T.C. products contribute to Rs.12 billion;
ii) Ayurvedic ethical formulations constitute around Rs.6.5 billion, and
iii) Ayurvedic classical formulations approx. Rs.4.5 billion.

Table 3

Availability of medicinal plants in different bio-geographical zones of India

Sl. No.	Biogeographical Zones	No. of known medicinal plants	Occurrence of some important plants
1	2	3	4
1.	Trans Himalayan zone	700	*Arnebia euchroma, Ephedra gerardiana, Hippophae rhamnoides, etc.*
2.	Himalayan Zones (A) North West Himalaya (B) Western Himalaya	1,700	*Aconitum* spp., *Berberis* spp., *Dactylorhiza hatagirea, Ferula jaeschkeana, Gentiana kurroo, Inula racemosa, Picrorhiza kurroa, Poduphyllum hexandrum, Rheum australe, Saussurea costus* (Cultivated), *Swertia chirata, Taxus wallichiana.*
	(C) Central Himalaya (D) Eastern Himalaya	1,200	*Coptis teeta, Entada pursaetha, Gaultheria fragrantissima, Nardostachys grandiflora, Panax pseudo-ginseng, Picrorhiza kurroa, Podophyllum hexandrum, Rheum australe, Swertia chirata, Taxus wallichiana.*
3.	Desert Zones Kutch and Thar	500	*Convolvulus microphyllus, Cressa cretica, Tecomella undulata, Citrullus colocynthis.*
4.	Semi-arid Zone	1,000	*Alhagi pseudalhagi, Commiphora wightii, Salvadora* spp.
5.	Western Ghats (A) Western Ghat mountain (B) Malabar coasts	2,000	*Coscinium fenestratum, Garcinia indica, Myristica malabarica, Utleria salicifolia, Vateria indica*
6.	Deccan Peninsula (A) Deccan Plateau South (B) Central Plateau (C) Eastern Plateau (D) Chhota Nagpur (E) Central Highlands	3,000	*Aristolochia* spp., *Decalepis hamiltonii, Mesua ferrea, Pterocarpus santalinus, Terminalia pallida.*
7.	Gangetic Plains (A) Upper Gangetic plain (B) Lower Gangetic plain	1,000	*Chlorophytum* spp., *Holarrhena pubescens, Mallotus philippinensis, Pluchea lanceolata, Peganum harmala, Rauvolfia serpentina, Saraca asoca.*
8.	North East India (A) Brahmaputra Valley (B) Assam hills	2,000	*Aquilaria malaccensis, Abroma augusta, Hydnocarpus kurzii, Smilax glabra.*

Contd...

1	2	3	4
9.	Islands (A) Andaman Islands (B) Nicobar Islands (C) Lakshadweep Islands	1,000	*Adenanthera pavonina, Aisandra butyracea, Barringtonia asiatica, Calophylllum inophyllum.*
10.	Coasts (A) West Coast (B) East Coast	500	*Acanthus ilicifolius, Avicennia marina, Rhizophora mucronata, Sonneratia caseolaris.*

Table 4

The frequency of occurrence of plants in 1,145 important herbal formulations in India

Sr. No.	Common Name	Botanical Name	No. of herbal formulations
1.	Triphala (Haritaki) (Bibhitaka) (Amla)	*Terminalia chebula* *Terminalia bellirica* *Emblica officinalis*	219
2.	Yashtimadhu	*Glycyrrhiza glabra*	141
3.	Pipali	*Piper longum*	135
4.	Vasaka	*Adhatoda vasica*	110
5.	Ashwagandha	*Withania somnifera*	109
6.	Mastak	*Cyperus rotundus*	102
7.	Gulacha	*Tinospora cordifolia*	88
8.	Daruharida	*Berberis aristata*	65
9.	Gokhshura	*Tribulus terrestris*	65
10.	Kutata	*Holarrhena antidysenterica*	59
11.	Punarnava	*Boerhaavia diffusa*	52

The trend in the export market appears to be encouraging and growing at a faster rate than the domestic market. However, lack of quality control measures in value added products and problems like admixture, adulteration, spoilage, poor storage conditions in case of crude drugs are adversely affecting exports from growing even faster. If one concentrate more on standardized herbal extraction procedures and isolation of active principles, the growth of value added products will go up further and a lot of problems pertaining to crude drug exports may be obviated.

The prices of important phytochemicals in India carry great relevance since many of them are sought internationally for their high quality and potency. The recent prices of the important phytochemicals are listed in Table 5.

Table 5

Prices of important phyto-chemicals

Product and Application	Botanical/common name Source plant	Rate (Rs./kg)
Berberis extracts (Berberine hydrochloride and Berberine sulphate) for eye and skin diseases, diarhhoea, diabetes, cholera	*Berberis lycium* (Kashmal) *B. asiatica* (Chothar) *B.aristata* (Daruhaldi)	150
Zanthotoxin (used in leucoderma)	*Heracleum candicans* (Padara, Patrala)	*
Diosgenin and steroids (used in various preparations including birth control pills)	*Dioscorea deltoidea* (singli-mingli) *Trillium govanianum* *Costus speciosus* (Kemuk) *Gloriosa superba* (Kalihari) *Solanum indicum* and other spp. of *Solanum*	800
Ephedrine (useful in Asthma)	*Ephedra gerardiana* (Soma. Chhedang)	2,225
Santonin (Wormicide)	*Artemisia brevifolia* (Sainski, Nurcha)	700
Hyoscyamine & Atropine (Antidote, sedative, narcotic, dilation of pupils)	*Hyoscyamus niger* (Khurasani ajwain) *Datura metel* (Kala Dhatura) *Atropa acuminata* (Indian belladonna) *Physochlaina praealta* (Laltang)	22,000
Rutin (useful in capillary fragility)	*Fagopyrum esculentum* (Ogla) *Flataricum* (Chabru), *Sida cordifolia* *Sophora japonica*	*
Katha	*Acacia catechu* (Khair, Khadir)	300
Taxol	*Taxus baccata* (Talish patra)	*
Quinine salts	*Cinchona ledgeriana*	2,530-4,100
Morphine	*Papavar somniferum* (opium poppy)	5,750
Codeine salts(opium poppy)	*Papaver somniferum*	7,400-27,000

*Current prices not available

Future role of Indian Medicinal Plant Industry

There is currently a revival of interest in the advanced countries for natural products and this has given immense scope for the exports of the range of products based on natural herbs and plants. India's herbal industry has a bright future for exports of medicinal plants and their

products. However, to boost exports further, cultivation of the plants of superior quality must be taken up. In addition, it is necessary to educate the farmers and provide superior quality plants to them and their products must also be procured at reasonable prices.

Export potential

There are quite a few medicinal plants/plant products from India which carry substantial export potential. Some of these are in demand as crude drugs, drug produce (like aromatic oil or gum) or for their active principles. Such drugs may be taken up for commercial cultivation on a large scale to fulfil international demand. Some of the species are listed in Table 6.

The cosmetic industry as well as aroma therapy are other important areas where Indian medicinal plants or their value added extracts/essential oil etc. can

Table 6

Medicinal plants/plant products from India which carry substantial export potential.

Common Name	Botanical Name	Uses
Isabgol / Psyllium	*Plantago ovata*	Both husk and seed for their bulk forming laxative activity
Sada-bahar	*Vinca rosea*	For Vincristine and Vinblastin contents–useful in treating cancers
Kumari	*Aloe vera / A. barbadensis*	For pentosides, chrysophanic acid, coumarin, resin and emodin – useful in treating liver conditions and as a skin tonic
Kokum	*Garcinia cambogia*	For hydroxy citric acid salts – useful in treating obesity
Madhunashini	*Gymnema sylvestre*	For the Gymnemic acid content proved to be a safe hypoglycaemic agent
Tulsi	*Ocimum sanctum*	For its Eugenol content and other principles in leaves used as an economical substitute for clove oils; also has antimicrobial/immuno-modulator properties
Kutki	*Picrorhiza kurroa*	For Picrorrhizin/Kurkin content endowed with hepatotropic properties
Bhumiamalaki	*Phyllanthus nirula / amarus*	For the crystalline lignins and Flavonoids known for anti-viral (Viral-agglutinating, lipotropic and hepatotropic properties
Kutaja	*Holarrhena antidysenterica*	For holarrhenine, Kurchine, Kurchicine and conessine. Useful in treating chronic colonic conditions.

Table 7

Approximate domestic sales of individual medicinal plants inclusive of extracts: (Food additives of high medicinal values included)

Sr. No.	Local name	Scientific name	Rs. (million)
1.	Amla	*Emblica officinalis*	200-250
2.	Asawa-gandha	*Withania somnifera*	100-120
3.	Lahsun	*Allium sativum*	70-30
4.	Haridra	*Curcuma longa*	50-60
5.	Kutki	*Picrorhiza kurroa*	20-30
6.	Guduchi	*Tinospora cordifolia*	20-30
7.	Tulsi	*Ocimum* sp.	20-50
8.	Shunthi	*Zingiber officinale*	50-60
9.	Nimbe	*Azadirachta indica*	60-70
10.	Shankha-pushpi	*Convolvulus pluricaulis / Evolvulus alsinoides*	20-30
11.	Shatavari	*Asparagus racemosus*	40-60
12.	Guggul	*Commiphora mukul*	60-80
13.	Vatsanbh	*Aconitum ferox*	15-20
14.	Kokum	*Garcinia cambogia*	10-15
15.	Isabgol	*Plantago ovata - Psyllium*	60-100
16.	Kutaja	*Holarrhena antidysenterica*	10-15
17.	Daru-haridra	*Berberis aristata*	10-15
18.	Kalmegh	*Andrographis paniculata*	25-35
19.	Kushth	*Saussurea lappa*	10-15
20.	Ashok	*Saraca indica*	15-20
21.	Vasa	*Adhatoda vasica*	25-35

*Market potential may be higher by 60-70% than existing sales.

contribute a lot globally provided serious research work is undertaken. It is well known that baths with herbs and their aromatic oils have been popular for many centuries. Some of the important species are Kumari (*Aloe* sp.), Tarunj (*Rosa* sp.), Babuna (Chamomilie), Tulsi (*Ocimum* sp.), Mehndi/Henna (*Lawsonia inermis*), Japa (*Hibiscus rosa sinensis*), Nagkesar (*Mesua ferrea*), Marigold (*Calendula sp. / Tagetes erecta*), Ustekhuddus (*Lavandula stoechas*), Pudina (*Mentha arvensis*).

Certification for raw materials

Today, many of the medicinal plants available in the market are adulterated and contaminated. This is due to absence of raw-material certification requirements for the industry by the FDA and absence of suitable post-harvest technologies, especially related to drying of medicinal plants. There is an urgent need to promote regional certification facilities to set standards for raw drugs. Initially, however, certification need not be made compulsory. An Agmark or ISO-9000 like standard for medicinal plants can be immediately promoted to create quality awareness in industry and amongst consumers.

Banned Medicinal Plants for Export

The Director General, Foreign Trade (DGFT), New Delhi vide the Foreign Trade Development Act-1992, has prohibited exports of some medicinal plants, plant portions, their derivatives and extracts if obtained from wild sources. Some of the commonly used plants which appear in the negative list of export are the following (the list is not exhaustive) :

1. *Aconitum* species
2. *Aquilaria malaccensis*
3. *Ceropegia* species

4. *Coptis teeta*
5. *Cosciniuim fenestratum* (Columba wood)
6. *Cyatheaceae* species
7. *Cycas beddomei*
8. *Dactylorhiza hatagirea*
9. *Dioscorea deltoidea*
10. *Frérea indica*
11. *Gentiana kurroo*
12. *Gnetum* species
13. *Kaempferia galanga*
14. *Nardostachys* species (jatamansi)
15. *Nepenthes khasiana*
16. *Orchidaceae* species
17. *Panax pseudo-ginseng*
18. *Paphiopedilium* species
19. *Picrorhiza kurroa*
20. *Podophyllum hexandrum*
21. *Pterocarpus santalinus*
22. *Rauwolfia serpentina*
23. *Renauthera imschootiara*
24. *Saussurea costus*
25. *Swertia chirata*
26. *Taxus wallichiana*
27. *Vanda coerulea*

The above plants are commonly used in many herbal formulations that are presently manufactured and exported from India. However, it has been clarified in the Notification that if these plants are cultivated and the cultivation source is certified by the competent authority i.e forest officials of Centre/State concerned and prescribed procedure is followed as per notification, it is allowed for export.

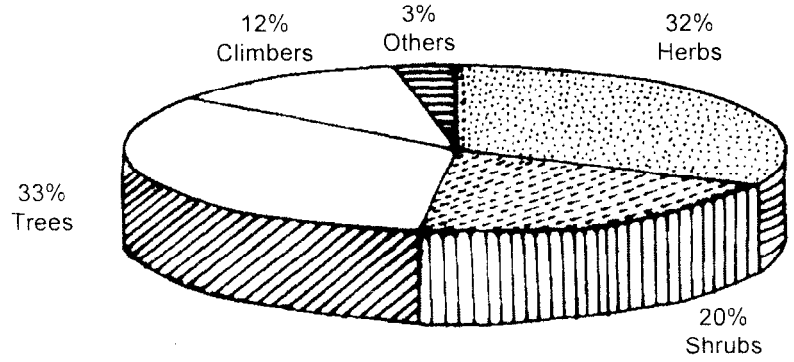
Institutional Capacities

At present few developing countries have the resources or institutional capability to advise on policy and regulatory mechanism and to provide the level of research required to guarantee a production of medicinal plants to sustain local pharmaceutical industries and provide for healthcare needs. The subject tends to fall into two government ministries that normally do not deal directly with each other : agriculture and health. They would have to coordinate programmes if medicinal plants are to be cultivated.

Overall view of the global market

The trade in herbal medicine is estimated at several billion dollars. The

Fig. 1



Distribution of medicinal plants by habit (based on analysis of 1079 South Indian species) (Source : FRLHT)

world market value of pharmaceuticals derived from plants used in traditional medicines exceeds US $ 20 billion. The size of the European Union (EU) herbal market in particular has grown substantially in the past 10 years, fuelled by growing awareness and support from consumers increasingly concerned about the environment and the possible side effects of conventional medicines. The details of some important North American and European markets are discussed below :

(a) ***Canada***

All drugs marketed in Canada are subject to the Food and Drug Act and Regulation. A drug product, ingredient or a preparation bearing a drug claim for a single or combination of ingredients presented for the first time in the Canadian market are considered to be a new drug. The medicinal products fall into two categories i.e. prescription drugs and non-prescription drugs. The latter including proprietary medicines, require a GP number and prescription; medicines require a DIN (Drug Identification Number).

All drugs are also subject to GMP. For all imported drugs, an agent located in Canada and assuming responsibility for the products is mandatory and must cause his (her) name and address to appear on containers. The agent is also subject to requirements of GMP.

All drugs marketed in Canada must be labelled in accordance with legislation. Products containing vitamins and minerals in sufficient quantities are considered to be drugs and will have to meet general requirements of the FDA.

A herbal ingredient that is acceptable as a food is one that can be consumed more or less as desired due to the absence of pharmacological activity. When a herbal ingredient possesses pharmacological properties which leads to its promotion or use for diseases prevention or treatment, the product is regulated as a drug. In Canada, the distribution of prescription and non-prescription drugs is governed by the provinces. The sale of medicinal products is restricted to pharmacies only. Prescription drugs are sold only in pharmacies pursuant to a prescription .

(b) ***United States of America***

In the United States of America, the situation of herbal medicines is not very easy at the moment, in view of the lack of specific regulations presently governing the labelling and sale of herbs and plants. Most of the herbs and herbal medicines are not regulated as medicines but are considered as "food" and as such no therapeutic claims are allowed to be made. Inspite of problems inherent in the US market, sales of herbal medicines are still significant and what is more telling is the rate of growth, estimated at 15%. A study carried out in 1990 provides further evidence of the extent to which herbal medicines are now being used. The study found that in 1990, Americans used an estimated US $ 425 million worth of herbal medicines. This figure, however, excludes beverage herbal teas which were sold to the tune of US $ 180 million and homoeopathic remedies which were sold to the extent of US $ 27 million. Overall, the annual sale of medicinal plants in USA amounts to US $ 1,400 million.

The Food, Drug and Cosmetic Act was passed in the 1930s and since then the US

Food Drug & Administration (FDA) had regulated drug product which claims to treat, cure, mitigate of prevent a disease as a "Drug". Thus, for any herbal medicine claim to be allowed, the very same procedure has to be followed as that for an allopathic drug.

In 1990, the US Congress passed the Nutrition, Labelling and Education Act (NLEA) requiring that all food products must have mentioned labelling and that the FDA established criteria for approving *health benefit labelling for foods*. An exemption to the NLEA was introduced noting that "Vitamins, minerals, herbs and similar nutritional substances are consumed differently from conventional foods and thus should be subject to more lenient standard of evidence for their health benefit".

(c) ***France***

The size of the French phytomedicine market (branded products) was estimated during 1990 at around US $ 210 million i.e. 1% of the EC market with per capita consumption of US $ 3.7. Two thirds of the total quantum of herbal products sold is through French pharmacies and the remaining one-third is through herbal shops, super markets, etc. However, pharmaceutical product can not be sold without a marketing authorization from the Ministry of Health. Herbs and herbal products need a marketing authorization which is granted by the Agency Medicaments. For getting marketing authorization, Indian manufacturers need to provide the requisite pre-marketing authorization data.

Presently, in France, drugs based on 174 medicinal tests, listed in the French Pharmacopiea, are accepted. For getting other herbs included in the approved list, it would be necessary for manufacturers to submit a detailed dossier giving all published and unpublished experimental data, quality control data, toxicological data and clinical efficacy data. It normally takes around 3 months to get a marketing authorization after the documents are filed. The French government has formulated a Transparency Committee which decides whether a particular product can be included for recommendation to the *Economics Committee* which decides and fixes the selling prices of drugs.

A French company could file the product document, although the product and the rights of registration can be held by a company other than French. A pharmaceutical company in France or an importer who want to market medicines need a specific permission from the medical agency. Regarding herbal cosmetics, if there is any claim for medical indication, the product would need a marketing authorization.

The market for Ayurvedic/herbal products in France is quite substantial provided the quality and packing of the products is of a very high standard and to the exacting requirement of the importing country.

(d) ***United Kingdom***

The size of the phytotherapeutical market in the United Kingdom during 1990 was estimated at US $ 104 million, which was about 2% of the total pharmaceutical market of US $ 5 billion in UK.

The main therapeutical groups in the UK phytotherapeutical market were cough

and cold, pain relievers, digestives, tonics and stimulants and circulatory products. Britain is one of the more difficult countries to obtain a product licence. The main reasons for this are :

(a) Each application is individually negotiated between the Medicines Control Authority (MCA) and the manufacturer,
(b) As there are no published monographs to work from, the dossier that has to be submitted by each manufacturer to safety, efficacy and quality is enormous.
(c) The Government charges a significant amount for processing each licence application.
(d) Although references to published scientific literature can be presented if the product has an established medicinal use with an acceptable level of safety, there tends to be a lack of published clinical evidence which is acceptable to MCA.

As a result of the MCA's very conservative interpretation of the EC directives, new product innovation, to say the least, has been very limited with very few new firms entering the market.

(e) ***Hungary***

All the conditions are ensured in Hungary for the successful and profitable production of medicinal plant extracts and products. Because of the country's unique geographical and climatic features, the natural flora contains an exceptionally large number of medicinal plants. These currently provide the drugs of 180-200 species. One of the best known of these is chamomile and it has now been proven scientifically that its excellent quality can be attributed to the unique ecological qualities of the Hungarian soil. Traditional purchasing and processing practices have arisen in the areas where the most important species grow and are gathered (e.g., chamomile, rose tips, linden, juniper, etc).

Medicinal and aromatic plants have a high market potential as the world demand for herbal products is growing at the rate of 7% per annum. The domestic market demand for these products is expected to be three to five times more than the export figures.

In the past three years, exports have grown by 60%. The increase in exports of these plants is attributed to rising demand from countries like USA, Germany, France, UK, Japan, etc.

Constraints

According to a UNIDO study, the following constraints are associated with the use of traditional medicine sector in developing countries including India.

- Poor agricultural practices;
- Poor harvesting and post harvest practice;
- Lack of research on development of high yielding varieties;
- Poor propagation methods;
- Inefficient processing techniques leading to low yields and poor quality products;
- Poor quality control procedures;
- High energy losses during processing;
- Lack of current good manufacturing practices;
- Difficulties in marketing;
- Lack of local market for primary processed products;

- Lack of trained personnel and equipment;
- Lack of facilities to fabricate equipment locally, and
- Lack of access to latest technological and market information.

India is sitting on a gold mine of well recorded and well practiced knowledge of traditional herbal medicine. But unlike China, India has not been able to capitalize on this herbal wealth by promoting its use in the developed world despite their renewed interest in herbal medicines. This can be achieved by judicious product identification based on diseases found in the developed world for which no medicine or only palliative therapy is available, such herbal medicines will find speedy access into those countries.

The basic requirements for gaining entry into developed countries include :

(i) Well documented traditional uses;
(ii) Single plant medicines;
(iii) Medicinal plants-free from pesticides, heavy metals etc.;
(iv) Standardization based on chemical activity profiles, and
(v) Safety and stability

The market for anti-cancer drugs from *Taxus wallichiana*, *Catharanthus roseus* and *Nothapodytes foetida* is well known. Medicinal herbs possessing penile potency properties and anti-cancer principles are the focus of illicit trade to import markets in Germany, France, Switzerland, Japan, U.K. and the U.S.A. The best-known example, in recent times, is that of 'Tetu lakda' (*Nothapodytes foetida*) commonly encountered in southern India and Sri Lanka, the herb is exploited as a source of anti-cancer drugs. Non-nutrient phytochemicals are increasingly being recognised as potential health promoters in reducing the risks of cardiovascular disease and atherosclerosis. Thus, in addition to conservation of such plant resources systematic concerted effort should be undertaken of the yield and quality improvement through modern biological tools.

SUMMARY

About 5,000 plant species have been documented for medicinal value and phyto-chemically studied. Of these, 1,100 are used in different systems of medicine, 600-700 are used in indigenous industries, but only about 150 have been commercially exploited. Besides domestic use, export potential of these plants is huge and given a quality upgadation of such drugs, competitiveness and globalization is ensured. There is, however need for doing scientific work on their pharmacology, phytochemisty and clinical experiments to develop the export potential fully. Important plant species being utilized at present, their world prices, and other potential species have been listed. Shift towards use of herbal drugs worldwide has been noted. There is good scope in developing this sector. Trade and commerce requirements relating to export and marketing in various foreign marketing eg. Canada, Hungary, France, UK, USA have been discussed with a view to developing trade in these countries in medicinal products. Various measures, which handicap expansion, have been pointed out. These are : agricultural practices like harvesting and propagation, processing high yield varieties, quality control, marketing, training of personnel, equipment and knowledge about latest advances in technology etc. where efforts need to be focussed.

औषधीय पादप – भारत से वाणिज्य – व्यापार करने के अवसर

आर०बी०एस० रावत व जी०पी० गर्ग

सारांश

लगभग 5000 पादप जातियों को चिकित्सीय गुणों के लिए प्रलेखित किया जा चुका है और उनके पादप रसायन का अध्ययन हो चुका है । 1100 विभिन्न चिकित्सा प्रणालियों में उपयोग की जाती हैं, 600 - 700 को देशी उद्योगों में काम लगाया जा रहा है परन्तु व्यापार में विदोहन लगभग 150 का ही किया जाता है । देश के अन्दर ही उपयोग करने के अलावा इन पादप जातियों की निर्यात क्षमता भी बहुत ज्यादा है और यदि उनसे बनी औषधियों की गुणवत्ता बढ़ाई जाती रहे तो विश्व बाजार में उनकी प्रतिस्पर्धा करने की क्षमता और विश्व में मांग बराबर बनी रहना सुनिश्चित है । हां, इतना अवश्य है कि उनके औषधि निर्माण पादप रसायन और चिकित्सा करने के बारे में संपरीक्षण करते रहने पर वैज्ञानिक कार्य हमें करते रहना होगा । महत्वपूर्ण पादप जातियों की, जिन्हें इस समय उपयोग में लाया जा रहा है, विश्व बाजार में उनके भाव, अन्य जातियों की, जिनमें क्षमता दिखाई पड़ती है, सूचियां दी गई हैं । विश्वभर में शाकीय औषधियों के उपयोग करने का चलन बढ़ रहा है, इस पर ध्यान दिया गया है । इस क्षेत्र में विकास करने के लिए काफी विस्तृत क्षेत्र खुला पड़ा है । विदेशी बाज़ारों में इनके वाणिज्य - व्यापार और विपणन से सम्बन्धित आवश्यकताएं जैसे कैनाड़ा, हंगेरी, फ्रांस, संयुक्त राज्य (ब्रिटेन) और सं०रा० अमेरिका में, विवेचित की गई हैं ताकि इन देशों में औषधियों का व्यापार बढ़ाने में सुविधा हो । बहुत से उपायों की ओर ध्यान दिलाया गया है जैसे कृषि करने की विधियां कटाई, प्रवर्धन, विधायन, अधिक प्राप्ति देने वाले विभेद, गुणवत्ता नियमन, कर्मचारी प्रशिक्षण, साधित्र विकास और उनकी प्रौद्योगिकी में होने वाले नये - नये विकास की जानकारी आदि । ये ऐसे विषय हैं जिनकी ओर हमारे प्रयासों को केन्द्रित किया जाना चाहिए ।