DEVELOPING A MARKET INFORMATION SYSTEM FOR REMOVING MARKET IMPERFECTIONS IN THE TRADE OF MEDICINAL AND AROMATIC PLANTS IN INDIA

MANMOHAN YADAV*

Introduction

Among the important products obtained from the world's forests, Non-Timber Forest Products (NTFPs) enjoy a commendable position, as a variety of products like edible products, medicines, cosmetic products, dyes, handicrafts etc. are based on them. These products are in high demand due to increasing consumer preferences in national and international markets for herb-based natural products including herbal medicines.

The global market for herbal products, including medicines, health supplements, herbal beauty and toiletry products, is estimated at $62 billion and is growing at a rate of 7 % annually. The WHO's forecast is that the global market for herbal products would be of the order of $5 trillion by year 2050. The world market for herbal remedies in 1999 was estimated to be worth US$ 19.4 billion, with Europe in the lead (US$ 6.7 billion), followed by Asia (US$ 5.1 billion), North America (US$ 4.0 billion), Japan (US$ 2.2 billion), and then the rest of the world (US$ 1.4 billion) (Liard and Pierce, 2002). However India's share in the global export market of medicinal plants related trade is just 0.5%. This is against India's rich biodiversity of 45,000 plant species spread across 16 Agro-climatic zones.

This unexpected surge in the demand for medicinal plants has led to a demand-supply gap between the manufacturing companies and the suppliers. This has resulted in over-exploitation of the medicinal wealth present in the forests. Lack of reliable information in the supply chain regarding demand, price, and supply/availability of MAPs, results in an inequitable pricing and sourcing of forest resources present in the country. The consequences of such unbalanced extraction and trade of MAPs in a country affects the whole supply chain in terms of their price and future availability.

While the production and markets for timber are structured and developed, the markets for most non-timber forest products including medicinal & aromatic plants are highly unorganized and secretive as the market information is blocked from the user side.

Such market structures are disadvantageous to the collectors and cultivators and also lead to over harvesting of the natural resource in the absence of reliable and accurate information about market demand and the price. These markets suffer from various market imperfections mainly because of, the lack of information about the demand and

* Asstt. Prof. Marketing, Indian Institute of Forest Management, Bhopal (Madhya Pradesh).

supply of the products being traded; inadequate knowledge about the herbs being collected, cultivated or traded; negation of quality in collection of medicinal herbs and the processing of final products; lack of awareness about IPR issues related to the medicinal plant products among various stakeholders; marginal cost pricing of the medicinal herbs i.e. absence of a mechanism for determining the share of the primary collectors in the final revenue obtained from the finished product.

The situation thus calls for the need of information, which is reliable and readily available to the various stakeholders of Medicinal Plants Trade including the policy makers and implementing agencies.

A conceptual framework for such a Market Information System with its various stakeholders, type of information, and the output to be generated is discussed in this paper. This suggested MIS is only a conceptual framework and has to be tested in the field at a division level before it is refined and finalized for its actual implementation. The design and implementation of such MIS on FMU level can help solve many impediments in the development of the MAP sector on a sustainable and equitable basis.

As a majority of the market supply is based on forest produce, it is equally important for the MIS to monitor the status of the forest resources to cater to the needs of the market in the long run. This brings in the issue of sustainable harvesting, constant monitoring of resources, and presentation of resource usage information to the policy and decision makers so that timely action can be taken to ensure sustainable availability of MAPs to the market.

MAPs Resources Worldwide

The medicinal plant resources found all over the world are of utmost importance to the people in general since nearly 70-80% of the world's population depends upon them for healthcare needs. From the various plant species present on earth only 10-18% species are medicinal in nature. It is evident from Table 1 that in India near about half of the plant species present possess medicinal qualities.

Table 1

Medicinal flora used in different countries

Country of Origin	No. of species of medicinal plants	Total no. of native species in flora	% of flora which is medicinal	References (to no. of spp. of medicinal plants)
China	11,146	27,100	41	Pei Shengji (2002a)
India	15,000	45,000	33	NMPB
Mexico	2237	30,000	7	Toledo (1995)
North America	2572	20,000	13	Moerman (1998)
World	52,885	297,000 - 510,000	10-18	Schippmann *et al.* (2002)

A large number of medicinal plants species are used in Folk Medicine i.e., knowledge about which is orally transmitted and associated with households, communities and ethnic groups (FRLHT, 2002). Whereas the Traditional Medicine Systems i.e., for which there exist documentation of knowledge, practitioners and institutions for training doctors employ relatively few medicinal plant species. As it is evident from Table 2, the Ayurvedic System uses highest number of medicinal plants as against any other system of medicine.

The Indian Systems of Medicine have identified 1,500 medicinal plants, of which 500 species are mostly used in the preparation of drugs. The medicinal plants contribute to cater 80% of the raw materials used in the preparation of drugs.

But 90% of these raw materials are currently sourced from the wild and 70% of such extractions involve destructive collection practices because the parts used are wood, roots, stem, bark, and even the whole plant. Only less than 20 species out of 660 wild botanicals that are in use in all India trade are under active commercial cultivation (CEE, 2003) reflecting tremendous pressures on the wild resources and the dangers of increasing threat perception levels to many a species.

Aromatic plants are used to extract essential oils, spice oils and oleoresins in India. Of the large number of plant species found in India, some 1300 species are known to contain aroma ingredients. Though out of such a large number of aromatic plants in India only 65 of the plants have large and consistent demand in the market (Sant, 1998). Among the important essential oils produced in India are extracted from the plant species Sandalwood (*Santalum album*), Lemon grass (*Cymbopogon citrates*), Palmarosa (*Cymbopogon martini*), Eucalyptus (*E. globulus* and *E. citriodora*), Khus (*Vetiveria zizanioides*), Linaloe (*Bursera delpechiana*), Musk dana (*Abelmoschus moschatus*), Davana oil (*Artemisia pallens*), Citronella grass (*Cymbopogon nardus*), Chameli (*Jasminum grandiflorum*), Menthol (*Mentha arvensis*) - Peppermint, Spearmint (*Mentha spicata*) - Spearmint oil, Screw pine (*Pandanus odoratissimus*) - Keura, Laung (*Syzygium aromaticum*) - Clove, Ginger (*Zingiber officinale*) - Adrak

Table 2

Use of Medicinal flora in different Traditional Health Systems Worldwide

Traditional Health System	No of plant species used	References
Traditional Chinese medicine	500-600	Pei Shengji (2001)
Mongolian medicine	1430	Pei Shengji (2002b)
Tibetan medicine	1106-3600	Pei Shengji (2001, 2002b)
Ayruveda	1250-1400	Dev (1999)
Unani	342	Shiva (1996)
Siddha	328	Shiva (1996)
Amchi	600	-

(Vantomme *et al.*, 2002; Gupta, 1994). Aromatic plants are of use in manufacturing of products like food flavours, fragrances, perfumes, cosmetics and related products. (Sant, 1998)

Status of MAPs Market

The global market for herbal products, including medicines, health supplements, herbal beauty and toiletry products, is estimated at $62 billion and is growing at a rate of 7 per cent annually (Exim Bank, 2003) and is expected to grow to US $ 555 billion by 2010 (Sinha, 2002). The WHO's forecast is that the global market for herbal products would be of the order of $5 trillion by year 2050 (Planning Commission, 2000). The world market for herbal remedies in 1999 was estimated to be worth US$ 19.4 billion, with Europe in the lead (US$ 6.7 billion), followed by Asia (US$ 5.1 billion), North America (US$ 4.0 billion), Japan (US$ 2.2 billion), and then the rest of the world (US$ 1.4 billion) (Liard and Pierce, 2002).

The potential for earning foreign exchange by India from the exports of medicinal and aromatic plants is estimated to be over US $ 300 million per annum. (Singh, 2002).

The domestic demand of medicinal plants in 1999-2000 was estimated at Rs.1,099 crores, which is expected to rise to Rs.2,000 crores by the year 2004-2005 as per CERPA estimates (Anon., 2001). Presently India's export from Medicinal and Herbal plants is Rs. 446 crore (2000) and efforts are made to increase it to Rs.3,000 crore annually by 2005. The domestic market of Indian Systems of Medicine & Homoeopathy is of the order of Rs. 4000 crore (2000) Of which, the Ayurvedic drug market alone is of the order of Rs. 3,500 crore (NMPB, 2003). Such resurgence in Ayurvedic preparations is the result of increasing consumer preference natural and herbal remedies. Besides this, there is also a growing demand for natural products including items of medicinal value/pharmaceuticals, food supplements and cosmetics in both domestic and international markets. The EXIM bank of India, in its report (1997) has reported the value of medicinal plants related trade in India of the order of US $5.5 billion and is growing rapidly.

It is estimated that the total world market of essential oils, aroma chemicals and fragrance chemicals in 1978 was to the tune of US $ 3.6 billion, which rose to US $ 7 billion dollars in 1987. It is hoped to cross to US $ 20 billion by 2005 (Singh, 2002).

In terms of market share in production value, India is sliding down and now ranks sixth in market share after China (30.7%), followed by Brazil (13.1%), Turkey (10.4%), Indonesia (8.7%), Morocco (9.1%), India (6.1%) and Egypt (3.1%).

India's export of Japanese Mint oil, Menthol and Lemon grass oil were Rs. 5,202.79 lacs, Rs.21, 946.87 lacs and Rs. 50.88 lacs respectively for the year 2002-2003. There had been a considerable increase in export of Palmarosa oil (Rs.92.06 lacs) and Lemon grass oil (Rs. 64.35 lacs) with a growth of 2.006% and 26.47% respectively during the term April-September (2003-2004). The export value for Piamarosa and Lemon grass oil for the year 2002-2003 was 4.37 and 50.88 respectively (Department of Commerce, 2004).

Structure and Problems of MAPs Trade

The existing trade or medicinal and aromatic plants is highly unorganized and secretive as the market information is blocked from the demand side. This results in an opaque and closed market structure where there is no reliable information available to the supply side. At the same time there is also a lack of information from the supply side on the availability of raw materials. However, the information blockage from the supply side is not intentional but because of the very structure of market, whereas the information restrictions from the demand side are intentional for the purpose or artificially manipulating the market price in their favour. Such market structures are disadvantageous to the collectors and cultivators, leading to over-harvesting of the natural resource in the absence of reliable and accurate information about market demand and price. These markets suffer from the following imperfections (Dutta, 2001) :

- Lack of proper information about the demand and supply of the products being traded.
- Lack of assured markets for the collectors and cultivators.
- Unique characters of medicinal plants and uncertainty of their availability.
- Inadequate knowledge about the herbs being collected, cultivated or traded.
- Negation of quality in collection of medicinal herbs and the processing of final products.
- Stakeholders not aware of IPR issues related to the medicinal plant products.
- Neglect for product/business promotion at lower levels of the supply chain.
- Few entrants to trade and existing new entrants inclined to exit the market due to heavy losses in a closed market with scarce market information.
- Problems in marginal cost pricing of the medicinal herbs i.e., absence of a mechanism for determining the share of the primary collectors in the final revenue obtained from the finished product.

There has also been depletion of medicinal plant resources due to irregular and unscientific collection, unscientific mining and quarrying, uncontrolled forest grazing, forest fires, shifting cultivation, and biotic pressure, beyond carrying capacity of the land.

The sale of the wild medicinal herbs is done in raw form without any significant processing or value addition. The producers'/collectors' access to consumers is limited to the sales made in local villages or in the weekly 'haats'/markets. A major portion of their collection is sold to intermediaries like contractors and commission agents who operate in the area. Thus, although the medicinal plant materials reach a much larger market, the market is geographically very limited, as far as producers or collectors are concerned. The limitation in access to market is more pronounced in the case of perishable items or items containing active principles, which change or deteriorate with time. Small amount of collection further aggravates the problem forcing the tribal population into a vicious circle of a small market, low production and (leading to) small marketable surplus. This limited marketable surplus makes them

more vulnerable and makes their exploitation possible because it continuously erodes their bargaining capacity as their need for conversion of small production into cash becomes more acute. Wide variation in active principle contents of the wild varieties of medicinal herb constitutes yet another supply side imperfection. Such variations complicate the process of manufacturing herbal medicines that affects the efficacy rates and quality control. Scientific cultivation of medicinal plants through bioengineering and modern farming techniques could overcome this problem. But that might give birth to another type of imperfect competition, having the tribal subsistence economy on the one hand, and the capitalistic return maximization through scientific farming on the other.

Common factors, which can be attributed for the existence of above market imperfections/problems, is the lack of market information to the needy stakeholders and thus pose most obstacle in commercial exploitation of MAPs in a sustainable manner. Even the statistics for demand, supply and trade related to timber in India, which is a major produce from the forests is not reliable and accurate (ITTO, 2003). Similarly the statistics for Non Wood Forest Produce (NWFPs) is also just estimates and reliable data on exact inventory, extraction and trade are not just available.

The lack of reliable and accurate data base on inventory, extraction and trade volumes of MAPs is one of the major bottlenecks in tapping the world herbal market to India's true potential not withstanding the huge traditional information base on herbal health care and abundant forest resources of MAPs. This fact emphasizes the need for a market information system as a strategic option to help eliminate some of the impediments in the effective marketing MAPs in India so as to explore the expanding herbal products market worldwide.

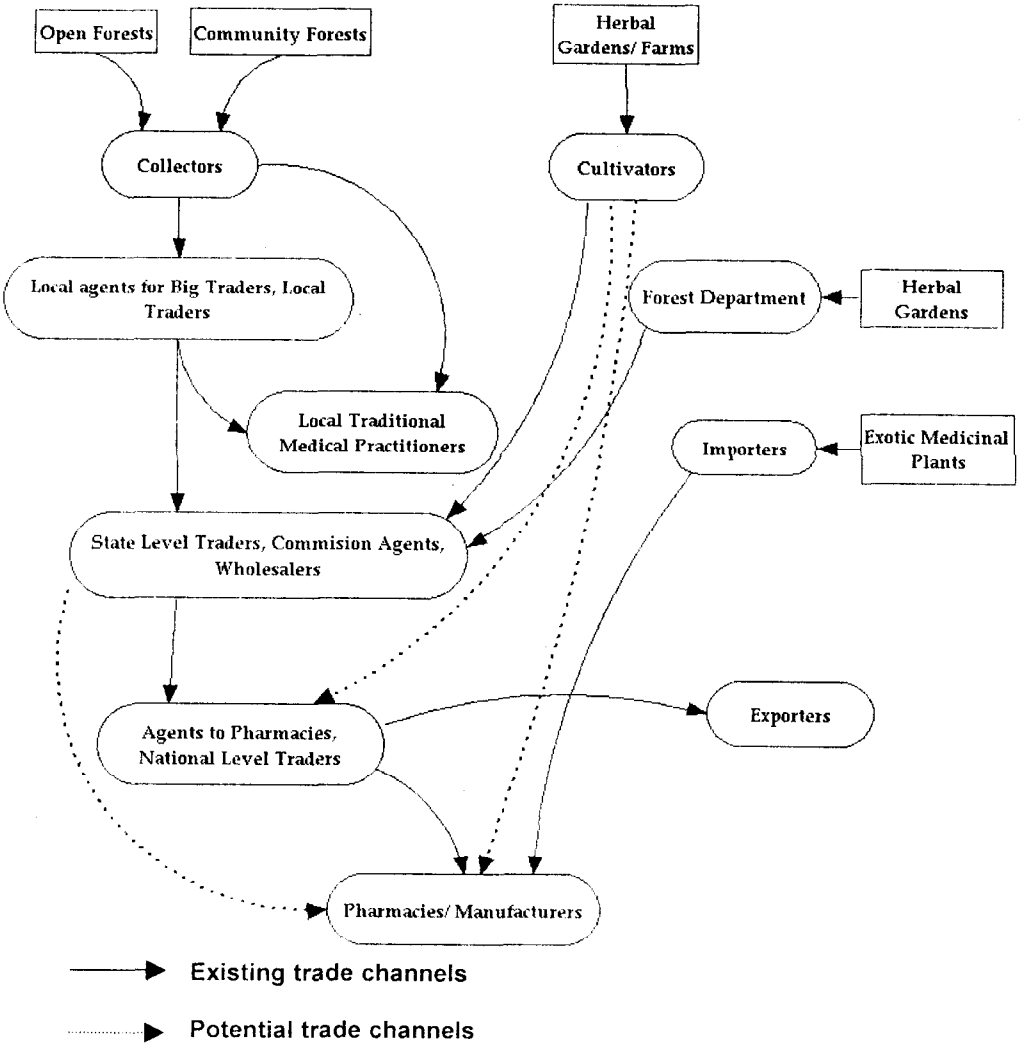
Reasons for Complexity of the MAPs Market Structure

The medicinal and aromatic plant market is highly complex with large number of players at the producer, trader and the manufacturer levels. The complexity of MAP market is further accentuated because of different forms of the herbs traded, lack of proper herb identification and final product classification, lack of governmental control and monitoring of the markets, absence of assessment of MAP inventory present in the forests. Each of these problems are further discussed in the following paragraphs.

Multiple supply chain of MAP marketing : Supply of medicinal plants comes primarily from the wild collections and to a lesser extent through cultivation of a limited number of species. The local villagers either consume part of the produce or sell it to local traditional health practitioners, local traders, local markets or buyers' agents. The middlemen/traders at various levels collect and sell the produce to the next level in a random manner with the sole objective of making maximum profit particularly in the lean seasons. Fig. 1 attempts to explain the various channels of MAPs trade existing in central India, mainly in Madhya Pradesh and Chhattisgargh.

The retailers located in big cities

Fig. 1



Market structure in medicinal and aromatic plants trade

buy the medicinal plants from the wholesalers at high prices even if the same medicinal plant is available locally with the collectors at a much lower price. This reflects the gross lack of knowledge about the source, supply and price of medicinal plants at all levels of the supply chain. The information at the lowest level of the supply chain is negligible and in most cases incomplete and even misleading. However the higher level of the supply chain does possess information but they purposefully restrict its flow to the lower level. Also, since the trade is highly unorganized and secretive, such information is not available with the government agencies

and the institutions at local, state as well as at the national level.

The MAPs produce is traded in various forms such as raw, semi-processed or processed, and also through various channels and thus make the demand assessment at the local level almost unfeasible. While in most cases the processing is done by the traders/ processors, some primary processing is also done by the collectors or cultivators level. The intermediate processing is mostly carried out by local traders and/or processors or the manufacturers themselves. The present statistics doesn't take into account the demand generated by local processors. The demand generated by national level traders can be seen as a direct manifestation of the demand generated by the manufacturers of herbal products and exporters or herbal plant material.

Thus the presence of multiple levels of processors and users, traders, manufacturers and exporters put together makes the MAPs market structure complex and the reliability of data at stake.

Lack of Proper Herb Identification and Final Product Classification : When viewed at a national level, a single herb may be identified by different names at different locations and in different languages. This may lead to incorrect quantity figures in case the local name for each herb is not correctly identified to its equivalent scientific name. Presence of large number of species and varieties and languages makes the generation of national level statistics a challenge, thus relying more on estimates than the exact data. In case of the final products manufactured from herbal plants, there exist no national or international standard for classification, which if available can help in monitoring the MAPs trade. Development of HS code for herb based trade will help proper segregation of data related to trade on herbal based products.

Lack of Government Control and Monitoring of the Markets : Unlike the control and monitoring mechanisms of the government on production, pricing and supply of the staple food commodities, the MAPs are not covered under such control and monitoring mechanisms. Government intervention in developing infrastructure for market places, leading to an open market for MAPs, apart from increasing the MAPs trade will also facilitate the monitoring of prices, supply and demand.

Absence of Assessment of MAPs inventory Available in the Forests : At present government institutions have no provisions for assessing the forest inventory of MAPs. Assessment of inventory of MAPs like in case of timber will lead to sustainable use of the forest MAPs resources by means of better policy decisions based on the accurate data. This is very important not only for long-term commercial availability of the medicinal and aromatic plants but also for bio-diversity conservation of many a critical species with high demand.

Role of Market Information System in Removing Market Imperfections : In a broad sense, market information is any information that is relevant to the production and marketing of a commodity. Most stakeholders would find it useful to have regular access to information on production trends, prices for specific product lines, market channel opportunities, and any other information of potential competitive value.

The above discussion about the present status of information availability and reliability qualifies the need for a market information system (MIS) for the MAPs sector at local, state and national level. As in case of staple food commodities, timber and in some cases NTFPs, the establishment of a market information system has proven effective in providing reliable and consistent information (Banana; FAO, 2000; IGAD, 1996; Koppel, 1995). The need can be justified by the following applications and feasibility of the MIS :

MIS Application in Eliminating the Demand - Supply Gap

Delay or non-availability of demand information at the supply side can result in time lags or failure in meeting customer demands. Thus the lack of real-time information can be the causes for the gap between demand and supply of MAPs. Similarly poor cultivation and collection practices, inefficient processing and storage, and other market imperfections contribute to the demand-supply gaps. The MIS can help in minimizing the demand-supply gaps in MAPs markets in the following ways:

Help in Improving Cultivation and Collection Practices : This problem by and large exists due to lack of proper knowledge among the stakeholders in the supply side and is mainly on account of the following reasons :

- The improper knowledge about the types of plants to be collected, their parts to be collected, and the form in which they are to be collected in order to preserve their active principles are the factors which adversely affect supply quantity and quality. The MIS can disseminate the information to the collectors and cultivators about the quantity and quality demanded by the purchasers.

- Yet another impact of lack of knowledge is the continuation of unsustainable practices of collection by the collectors. According to the CERPA demand and supply study (2001-2002), the supply of some of the medicinal plants is going to dwindle due to unsustainable practices. The role of MIS lies herein as a system to bring awareness about endangered species of medicinal plants by means of negative lists.

- Lack of captive cultivation by industries limits their capacities to respond to sudden market changes. Captive cultivation by industries can act as a buffer stock in case abrupt market changes. Presently some of the manufacturers are avert to captive cultivation due to limited knowledge about the species and their characteristics. According to a study (Majumdar, 2001) manufacturers require the MIS to provide for information regarding identifying the species (66%), new uses of herbs (68%) and Alkaloid analysis (55%). The information so provided in an organized manner and at accessible location can motivate more manufacturers to go for captive cultivation.

- Limited cultivation of medicinal plants, as cash crops by farmers tend to be yet another problem. The reasons for this could be attributed to (i) High initial investment for irrigation, pest

control and fertilizers which limits the scope for cultivation to rich farmers only, and (ii) The low price of material collected from the wild and thus the price-incompetitivenss of cultivated material. Many companies come out with cheap synthetic substitutes for natural products, which suddenly results in reduced demand for medicinal and aromatic plants.

For more extensive cultivation to take place, the Forest Department can take administrative measures for placing a "Reserve price" for medicinal plants collected from wild. The role for MIS lies here in disseminating information regarding the reserve prices set so by the Forest Departments. Also MIS may lead to initiation of buy-back schemes through regular interaction between the Manufacturers and the farmers (farmer co-operatives).

Improving Processing and Storage Techniques : Value addition by the collectors and cultivators to the generated primary product can increase their bargaining power as well as will help them get fair prices for the produce. Knowledge about value addition techniques regarding cultivation and proper handling of perishable herbs, cultivation of herbs with maximum active contents, and minimization of loss of active contents during processing can be best disseminated through a MIS (preferably in booklet form).

Another market imperfection of marginal-pricing system can be solely attributed to the presence of large number of middlemen between the collector/ cultivator and the end-user. Implementation of an MIS will lead to flow of data regarding demand and price changes to the collectors/ cultivators, and to other stakeholders. This will result in a transparent and demand-pull based supply chain, ensuring due share of benefits to the primary collectors/ cultivators.

MIS Application in Generating Awareness about Quality and Property Rights

At present quality whether it is of the primary input material or the final product, is the least considered factor among the medicinal plant. Though the manufacturers tend to be somewhat concerned about the quality of the product, but are not able to maintain quality because of the following reasons:

Because of more demand and less supply, manufacturers are more inclined to meet the growing demand without paying heed to the quality aspects.

In a market with large number of small collectors/ cultivators and few traders capable of supplying in huge quantities the manufacturers can't dictate quality terms to the suppliers.

Sourcing of the raw materials of good quality from many locations may not be a profitable option for the manufacturers who rather prefer bulk sourcing from big suppliers, which is rather an economical proposition.

It can be inferred from the above discussion that there is a need for timely information to be provided to the producers about the quantity and quality requirements of the purchasers. This can ensure that producers gather/ cultivate MAPs according the quantity and quality specifications of the purchasers.

MIS Services in Documentation of Traditional Knowledge

In India traditional knowledge of plant based medicines/formulations have long been practiced by various sections of the society, but such knowledge has not yet been properly documented. This vast domain of knowledge lies scattered among practicing Vaidyas, researchers, and among the tribals, the documentation of which is a mammoth task. This has resulted in the loss and restricted availability of the traditional knowledge and thus needs proper documentation.

Apart from .the traditional ones, there are new uses of medicinal plants devised by amateur physicists which have proven beneficial in curing certain ailments. The continuous documentation of such new uses can help build knowledge resources for the consumers as well as manufacturers. Such efforts will popularize the use of herb based remedies which in turn will ensure sustainable demand for herbal products in the future.

MIS Application for Better Economic Returns to Collectors/ Cultivators

The UN Conference on Environment and Development (UNCED) held in 1992 has already recognized the role of Non-Wood Forest Products (NWFP) in sustainable management of forests. One of the important steps in realizing these prospects is to ensure better economic returns to collectors of medicinal plant parts. Middlemen often exploit collector's ignorance of market information and claim a disproportionate share of producer's value for themselves. With increased availability of market information, producers will have the potential to strengthen their position in markets and possibly get higher prices.

MIS Application in National Trade Database Creation and Policy Making

The adoption of a national level MIS which is seamlessly integrated with the local and state level MIS, will enable establishment of a national level database on the supply, demand, prices, and uses of MAPs. Such an authentic database can form the basis for making policies related to trade of MAPs at both national and state level.

Suggested Goals and the Framework of Market Information System for MAPs Sector

The present reporting framework for production and consumption of timber and NTFPs in the country do not generate the true picture of market. Similarly there is lack of market information about the MAPs trade going on at the national level as well as at the state level. The lack of such vital trade information gives way to closed markets, thus increasing the probability of the poor collectors and cultivators not getting the right prices for their produce.

On the other hand in an open market factors such as demand, supply and quality may determine the price of the product traded in the market, with each market player posing a competition for the other. Thus, the primary objective of the Market Information System may be to transform the market from a closed market to an open market where each stakeholder whether an established one or a new one, at his supply chain level gets a level playing field in terms of market information which he uses to market his products

competitively. Such competitiveness by the power of knowledge may benefit all the stakeholders at each level of the supply chain.

As majority of the market supply being based on the forest produce, it is equally important for the MIS to monitor the status or the forest resources to cater to the needs of the market in the long run. This brings in the issue of sustainable harvesting, constant monitoring of resources, and presentation of resource usage information to the policy and decision makers so that timely action can be taken to ensure sustainable availability of MAPs to the market.

Goals of the Medicinal Plant Marketing Information System

To achieve the above said market transformation the primary goals of the MIS envisioned as follows :

- Mobilizing the export of ISM&H drugs to other countries and providing the share or the profits to all the concerned channel members.
- Ensuring the availability or information throughout the medicinal plant supply channel as well as to the policy makers.
- Ensuring sustainable extraction of medicinal plants from the forest resources.
- Guiding the decision making process of the channel members and policy makers by means of projected information provided by the Marketing Information System (MIS).
- Eliminating the information gaps found between suppliers and the ultimate manufacturers of herb based medicines, resulting in a transparent open market as opposed to the present closed market.
- Encouraging new entrepreneurs to take up business in medicinal plant trade by providing them with necessary information about market structure, prices, trends and future projections through training organization like CEDMAP.
- Scaling up the medicinal plant information system up to international standards by proper classification of raw as well as finished products. (Incorporation the HS-Code system of international trade will help proper monitoring of the medicinal plant trade).
- Disseminating critical information like medicinal plant identification, uses and processing techniques to existing stakeholder and to new entrepreneurs.
- Disseminate information regarding quality standards, government regulations regarding quality, packaging and labeling etc.

To achieve the goals of the Market Information System it has to be effective in the sense that it should remove the information barrier present between the stakeholders present at the lower level of the supply chain (Collectors/ Cultivators) and those present at the higher level (Processors/ Manufacturers).

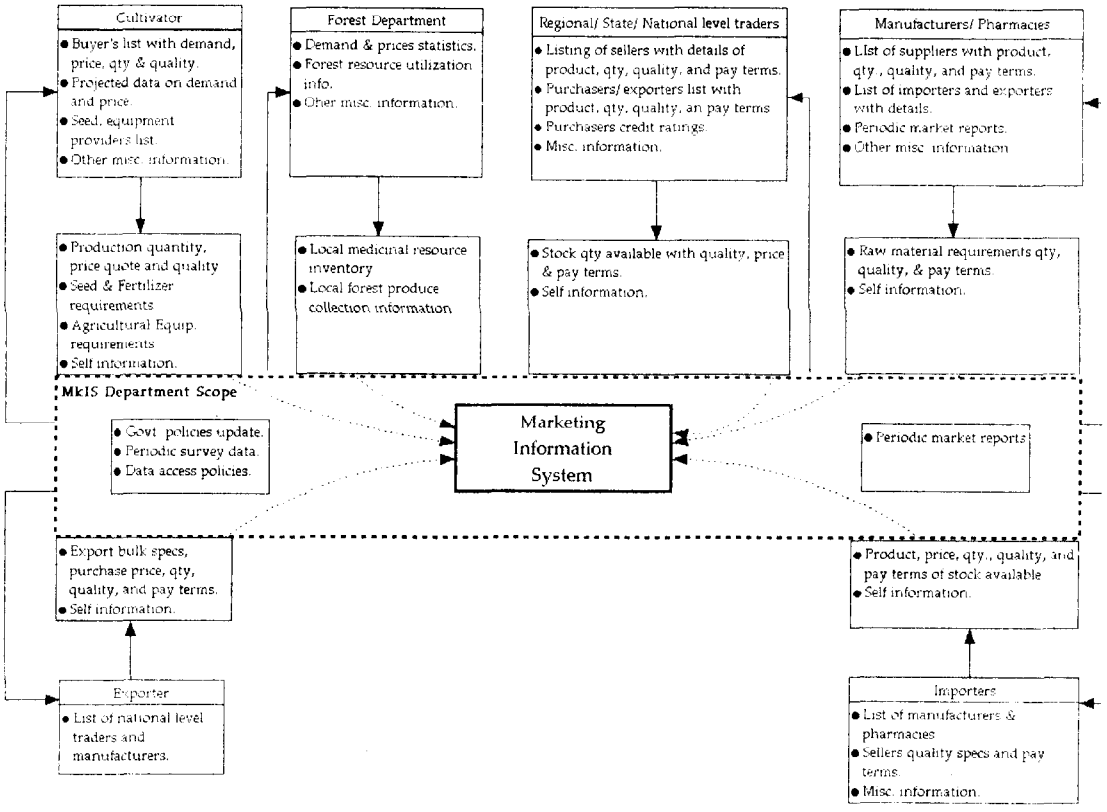
Therefore the suggested MIS

framework shall be primarily based at the district/forest division level, which then must be aggregated at the state level from where it is to be connected to the national information system. The various stakeholders and the type of information needed/supplied at each level in the suggested MIS framework is shown in Fig. 2.

The marketing information system receives the input data (enlisted in the following paragraphs) from Cultivators, Forest Department, Importer, Exporter, Traders, Manufacturer, and Seed/ mother plant providers. Fig. 2 also describes the specific data flows between the marketing information system and the various stakeholders.

Similar to the other users communicating with the system, the Market Information Services (MIS) Department itself is also considered as a user to the Market Information System. The MIS department uses the system resources to enter the periodical survey data, Data access policies for the registered stakeholders, and information on recent government policies. The MIS department

Fig. 2



Input of Data and Output of Information from the proposed MIS

also queries the system for periodical market reports and for frequent customized reports.

The System Inputs

Inputs to the system define all the data, which flows from the stakeholders to the central system. The survey data is received as soft copies or printed copies from the nodal centres. Following are the type of data proposed to be required for generating any useful output for the users.

- *Prices, Quality requirements,* and Availability of products in a region at different marketing channel members like Cooperatives, regional traders, national traders, middlemen etc.
- Quantity requirements and Terms of payment proposed by the buyers and sellers.
- Name and addresses of traders and other stakeholders.
- Information regarding cultivation agronomics, sustainable harvesting, data about medicinal plants inventory/ resource assessment and uses of medicinal plant species.
- Information regarding medicinal plant identification, ongoing promotional activities, changes in taxes & octroi, distribution channel facilities, storage facilities, seed, fertilizer, pesticide, and agricultural implement provider.

***The Analysis of* Inputs**

The above input received by the system will be analyzed along the following criteria for generating the output.

- Aggregation of supply, price, terms of payment, and quality requirements for MAPs at each marketing channel level in different markets.
- Aggregation of demand, proposed purchase price, terms of payment, and quality of MAPs required at each marketing channel level in different markets.
- Price trend analysis for different products in different markets.
- Spatial (Horizontal and Vertical space) price difference for each product in different markets at and along the supply chain levels.

The System Output

The analyzed information will be output by the system in the form of reports, which may be online, or in published form. The frequency of the reports may depend upon the type of information and the medium through which they are disseminated to the stakeholders :

- Price and quality information along with explanation for changes in price in a market for each MAPs.
- Trade leads of different stakeholders present in each market.
- Demand & Price trend analysis for different products varying in quality and processing at different markets.
- Information of status or MAPs in forests and thus the sustainability or usage.
- Information on addresses of MAPs buyers and sellers, availability or fertilizers and pesticides, seeds and mother plants, agricultural implements, transportation alternatives and storage.
- Information on recent researches on MAPs, promotional activities, and other processed information from the data archives as required by the stakeholders.

This suggested MIS is only a conceptual framework and needs to be tested in the field at a division level before it is refined and finalized for its actual implementation.

Conclusion

An open market is a market where market factors such as demand, supply and quality may determine the price or the products traded in the market, with each market player posing a competition for the other. Thus, the primary objective of the Market Information System may be to transform the market from a closed market to an open market where each stakeholder whether an established one or a new one, at his supply chain level gets a level playing field in terms of market information which he uses to market his products in a competitive manner. Such competitiveness by the power of knowledge/information may benefit all the stakeholders at all levels of the supply chain.

As majority of the market supply being based on the forest produce, it is equally important for the MIS to monitor the status or the forest resources to cater to the needs of the market in the long run. This brings in the issue of sustainable harvesting, constant monitoring of resources, and presentation of resource usage information to the policy and decision makers so that timely action can be taken to ensure sustainable availability of MAPs to the market. The policy approach for augmentation of supply position and sustainable use of medicinal plants should include a combination of institutional, economic, administrative and legal agenda.

While the increasing demand for herbal products will further pressures on the already overexploited forest resources, it is high time to promote cultivation of MAPs on the farm and /or degraded lands. This alternative supply source will not only reduce pressures on the wild collection but will also help in standardization or the raw material quality, which has been one of the major obstacle in establishing the efficacy and credibility of the traditional health formulations.

The setting up of the National Medicinal Plants Board by the Government of India is certainly the first step in the right direction but much more needs to be done to collate all the available information regarding medicinal plants development in the country in order to obtain a comprehensive overview which will provide the necessary insight for coordinated and effective action to replan India's participation in the expanding global herbal market. Such an overview could form the basis of a renewed development of India's medicinal plants sector, and a strategic exploitation of her comparative advantage in the global market on a sustainable and equitable basis.

Acknowledgements

This paper is a Revised Version of a presentation made by the author at a workshop on "Building National Strategy for Development of Medicinal Plants Sector in India" Feb 27-29, 2004 at Bangalore by FRLHT and MoEF, Govt. of India. Author is thankful to the workshop participants for their valuable contributions during the discussions that helped in improving this paper.

SUMMARY

Increasing consumer awareness and preference for herb-based natural products including herbal medicines, has resulted in an unexpected surge in the demand for Medicinal and Aromatic Plants (MAPs) and thus over-exploitation of the medicinal wealth present in the forests. The markets for most Non-Timber Forest Products including MAPs are highly unorganized and secretive and thus suffer from various market imperfections mainly due to the lack of information about the demand and supply of the products being traded to the disadvantage to the collectors and cultivators and sustainable resource availability. The situation thus calls for the need of information, which is reliable and readily available to the various stakeholders of medicinal plants trade including the policy makers and implementing agencies. A conceptual framework for such a Market Information System (MIS) with its various stakeholders, type of information, and the output to be generated is discussed in this paper. The suggested MIS is at a conceptual framework and has to be tested in the field at a division level before it is refined and finalized for its actual implementation. The design and implementation of such MIS on Forest Management Unit (FMU) level can help solve many impediments in the development of the MAPs sector on a sustainable and equitable basis.

भारतवर्ष मे चिकित्सीय और सौरभिक पौधों के व्यापार की बाज़ार न्यूनताओं को दूर करने के लिए बाजारगत सूचना प्रणाली का विकास करना

मनमोहन यादव

सारांश

उपभोक्ताओं की वर्धमान जागरूकता और जड़ी-बूटियों पर आधारित प्राकृतिक उत्पादों के प्रति वरीयता, जिसमें जड़ी-बूटियों से बनी दवाइयां भी आती हैं, का परिणाम औषध-पादपों की मांग में अप्रत्याशित उछाल हुआ है जिसके फलस्वरूप वनों में इस समय मिलने वाली औषध-सम्पदा का अति-समुपयोजन हो रहा है । अधिकांश गैर-प्रकाष्ठ वनोत्पादों का बाजार, जिसमें चिकित्सीय और सौरभिक पादप भी आ जाते हैं, अत्याधिक उव्यवस्थित और गोपनीयता भरा है और उसमें व्यापार किया जाने वाले उत्पादों की मांग और आपूर्ति के बारे में ठीक-ठीक जानकारी न मिलने के कारण कई तरह की बाजारगत न्यनताएं झेलनी पड़ती है जिसका दुष्प्रभाव संग्रहकर्ताओं, उत्पादनकर्ताओं तथा लम्बे समय तक मिलते रहने की उन संसाधनों की उपलभ्यता पर पड़ता है । इस स्थिति में सुधार लाने के लिए ऐसी जानकारी चाहिए जो विश्वसनीय और औषध-पादपों के व्यापार में हित रखने वाले विविध स्वार्थो को उपयोगार्थ जिनमें नीतिनिर्माता और उसे क्रियान्वित करने वाले अभिकरण भी आ जाते हैं, तत्काल उपलब्ध रहे । ऐसी बाजार सूचना प्रणाली का वैचारिक ढांचा, इसमें स्मार्थ रखने वाले विविध हितधारियों सहित, सूचना का प्रकार और उससे तैयार होने वाली जानकारी का विवेचन इस अभिपत्र में किया गया है । सुझाई गई बाजार सूचना प्रणाली एक वैचारिक ढांचा ही है और परिष्कृत करने और अन्तिम रूप दिया जाने से पूर्व इसे प्रभागीय स्तरों पर क्षेत्र में परीक्षित करना आवश्यक होगा । ऐसी प्रणाली का आकल्पन और क्रियान्वयन यदि वन प्रबन्धन इकाई स्तर पर किया जाए तो उससे लम्बे समय तक चल सकने वाले और सम्यक् आधार पर चिकित्सीय और सौरभिक पादपों का विकास करने में आने वाली बहुत सारी अड़चनों को भी सुलझाने में सहायता मिलेगी ।

References

Anon. (2001). *Demand study for selected medicinal plants*, Vol-I. Centre for Research, Planning and Action (CERPA), Hailey Road, New Delhi.

Banana, Abwoli Y. *Non-timber forest products marketing : Field testing of the marketing information system methodology*, Kampala, Uganda, http://www.fao.org/DOCREP/w3735e/w3735e28.htm.

CEE (2003). *Does Government need to prepare a Negative List of Medicinal Plants?* Message posted Dec 2003 in the Electronic Forum hosted by the The Centre for Environment Education site, http://www.envirodebate.net/forums/forum.asp?forumid=10

Deptt. of Commerce (2004). *Export Import Data Bank - Export :: Commodity wise'*, http:// commerce.nic.in/eidb/ecomq.asp', site last visited on 16-July-2004.

Dev, S. (1999). Ancient-modern concordance in Ayurvedic plants: some examples. *Environmental Health Perspectives* **107** : 783-789.

Dutta, S.K. (2001). Marketing of Wild Medicinal Plants - Tribal Economy in India, *Economic and Political Weekly*, p.3598.

EXIM Bank (2003). *Export Potential of Indian Medicinal Plants and Products, A Study Report*, Planning & Research Group, Export-Import Bank of India, India.

FAO (2000). *Handbook for Defining and Setting up a Food Security Information and Early Warning System (FSIEWS),* Food and Agriculture Organization of the United Nations, Rome, http://www.fao.org/docrep/003/X8622E/x8622e00.htm#TopOfPage, site last visited on 16-Feb-04.

Farnsworth, N.R. and D.D. Soejarto (1991). Global importance of medicinal plants. *The conservation of medicinal plants* (O. Akerele, V. Heywood and H. Synge, eds.). Cambridge University Press, Cambridge, UK. pp. 25-51.

Farnsworth, N.R., O. Akerele, A.S. Bingel, D.D. Soejarto and Z.G. Guo. (1985). Medicinal plants in therapy. *Bull. WHO,* **63**: 965-998.

Gera, Mohit, N.S. Bisht and A.K. Rana (2003). Market Information System for Sustainable Management of Medicinal Plants. *Indian Forester,* **129** (1) : 102-108.

Gupta, B.N. (1994). India. *Non-wood forest products in Asia*. Food and Agriculture Organization of the United Nations, Rome.

IGAD (1996). *The Marketing Information System (MIS) Project for food security and monitoring*. Inter Governmental Authority on Development (IGAD) Secretariat in Djibouti, http:// www.igadmis.net/mis/mission.asp, site last visited on 16-Feb-04.

ITTO (2003). *Review of the Indian timber market*. International Tropical Timber Organization. PPPD49/02 (M)

Koppel, C. (1995). Marketing information systems for non-timber forest products. *Community Forestry Field Manual 6*, FAO, Rome.

Kristina Plenderleith, Susanne Schmitt and Alan Hamilton. *Trade in Medicinal and Aromatic Plants - Factsheet 4*. WWF-UK, http://www.wwf.org.uk/filelibrary/pdf/tradeplants.pdf, site last visited on 14-Feb-04.

Laird, S.A. and A.R. Pierce (2002). Promoting sustainable and ethical botanicals: Strategies to improve commercial raw material sourcing. *Results from the sustainable botanicals pilot project, Industry surveys, case studies and standards collection*, New York, Rainforest Alliance, www.rainforestaIliance.orginews/archives/news/news44.html, site last visited on 20--Feb-04.

Majumdar, Angshuman (2001). Medicinal Plant Market Information System. *From Organizational Training OT-No. 581*, Indian Institute of Forest Management (IIFM), Bhopal, India.

Ministry of Food and Agriculture of Russia and ARIS Project Implementation Group (ARIS PIG) (1998). 'The concept of the Development of the Market Information System in the AIC (Agro-industrial complex)' (June 3). http://www.aris.ru/WIN_E/ARIS/3/sp_lit.html, site last visited on 14-Feb-04.

Moerman, D.E. (1998). Native North American food and medicinal plants: epistemological considerations. *Plants for food and medicine* (H.D.V. Prendergast, N.L. Etkin, D.R. Harris and P.J.Houghton, eds.). *Proc. Joint Conference of the Society for Economic Botany and the International Society for Pharmacology, London*, 1-6 July 1996, Royal Botanic Gardens, Kew, UK. pp. 69-74.

NMPB (2003). Introduction page, National Medicinal Plant Board. http://www.nmpb.nic.in/introduction.htm, viewed on 12-Feb-04.

Pei Shengji (2002a). A brief review of ethnobotany and its curriculum development in China. *Proc. Workshop on Curriculum Development in Applied Ethnobotany* (Z.K. Shinwari, A. Hamilton and A.A. Khan, eds.). Nathiagali, 2-4 May 2002 . WWF Pakistan, Lahore, Pakistan.

Pei Shengji (2002b). Ethnobotany and modernization of Traditional Chinese Medicine. *Workshop on "Wise Practices and Experiential Learning in the Conservation and Management of Himalayan Medicinal Plants"*, Kathmandu, Nepal, 15-20 December. Supported by the Ministry of Forest and Soil Conservation, Nepal, the WWF-Nepal Program, Medicinal and Aromatic Plants Program in Asia (MAPPA), IDRC, Canada, and the WWF-UNESCO People and Plants Initiative.

Pei Shengji (2001). Ethnobotanical approaches of traditional medicine studies: some experiences from Asia. *Pharmaceutical Botany,* **39** : 74-79.

Peter Robbins (2000). 'Design of a market information system for small scale producers and traders in three districts of Uganda - A Study report'.

Planning Commission India (2000): *Report of the Task Force on Conservation & Sustainable use of Medicinal Plants*, Government of India, New Delhi.

Poon, Bridget (2001). *Guide to the Establishment of Market Information Services*, FAO.

Ravishankar, M.G., Suneetha Chandrakanth and Rangesh Paramesh (1999). Unraveling the Mystery, Economics of Conservation and Sustainable Use of Medicinal Plants in South India. *Proc National Conference on Health Care and Development of Herbal Medicines*, Indira Gandhi Agricultural University, Raipur, M.P.

Sant, Sanganeria (1998). An overview on Indian Essential oils, Fragrance and Flavour industry. *Valedictory Function of FFDC* at Kannauj, India.,

Schippman, U., D.J. Leaman and A.B. Cunningham (2002). *Impact of cultivation and gathering of medicinal plants on biodiversity: global trends and issues.* Inter-Department Working Group on Biological Diversity for Food and Agriculture, Food and Agricultural Organisation of the United Nations, Rome, Italy.

Shepherd, A.W. (1997). *Market Information Services - Theory and Practice.* http://www.fao.org/aglags/agsm/mispdf.htm, site last visited on 16-Feb-2004.

Shiva M.P., S. Aswal, A. Sharma, P. Mathur and R. Chandra (1996). *Trends of Export & Import of Minor Forest Products in India (during 1970-71 to 1990-91).* Centre of Minor Forest Products, Dehra Dun, India.

Singh, H.P. (2002). Strategies for Augmentation of Medicinal and Aromatic Plants Wealth. Keynote address at *National Symposium on Strategies for Augmentation of Medicinal and Aromatic Plants Wealth*, Birsa Agriculture University, Kanke, Ranchi, http://www.incg.org.infCountryGateway/Agriculture/Publications/StrategiesforAugmentationofMedicinal.htm, site last visited on 20-Feb-04.

Sinha, Shatrughan (2002). India must tap herbal market. Speech delivered at the World Ayurveda Congress at Kochi, (news appearing in '*Business Line*' dated July 27, 2002).

Toledo, V.M. (1995). New paradigms for a new ethnobotany reflections on the case of Mexico. *Ethnobotany: Evolution of a discipline* (R.E. Schultes and S. von Reis, eds.). Chapman and Hall, London, UK. pp. 75-88.

Vantomme Paul, Annu Markkula and Robin N. Leslie (2002). *Non-Wood Forest Products in 15 Countries of Tropical Asia - An Overview.* www.fao.org/DOCREP/O05/AB598E/AB598E12.htm#TopofPage, site last visited on 14-Feb-04.