

EX-SITU CONSERVATION OF MEDICINAL AND AROMATIC PLANTS IN INDIA WITH SPECIAL REFERENCE TO MADHYA PRADESH

A.K. BHATTACHARYA* AND REGINA HANSDA**

*Indian Institute of Forest Management,
Bhopal (Madhya Praedsh).*

Introduction

Rise in population, inadequate supply of drugs in certain parts of the world, prohibitive costs of treatment for common ailments, side effects of several allopathic drugs in current usage and development of resistance to currently used drugs for infectious diseases have led to increased emphasis of plant materials for a wide range of human ailments. As a result, interest among people the world over in the use of plant based pharmaceuticals is growing at a very fast pace. According to an estimate by World Conservation Union (IUCN) the global market for Medicinal and Aromatic Plants (MAPs) is estimated to be worth US\$ 800 billion a year. International trade in medicinal plants has been dominated by China, which exports 1,21,900 tonnes a year, and on the contrary India exports about 36,000 tonnes in toto (Rajashekharan and Ganeshan, 1999).

The gap in growing demand with depleting resource base has propelled the *ex-situ* cultivation of MAPs and more so to take the pressure off from the wild. MAPs constitute a very important national resource and India has one of the richest plant-based ethno-medicinal traditions in

the world. The growing importance as a bio-cultural resource on the one hand and the threats to its survival on the other has necessitated action plans on the national level. Setting up of the National Medicinal Plants Board of India in November 2000 was a step in this direction to explore the problems and prospects of this sector. Madhya Pradesh with its wide variety of soil and climatic conditions is especially suited to the growth and cultivation of a large number of MAPs and emerging as a herbal State.

Conservation through cultivation as an alternative

Until a decade ago, no large-scale cultivation of MAPs had taken place. There are two major reasons for this : (i) Lack of institutional support for production and dissemination of key species for cultivation; and (ii) Lack of organized market for the trade of MAPs.

If cultivation is to succeed in providing an alternative source of supply for the present medicinal plants based manufacturing units and traditional health practitioners, then plants have to be produced cheaply and in large quantity.

* Associate Professor

** Senior Project Research Associate

In all cases where cultivation has taken place, whether in Europe, Asia or Africa, the crops chosen are those yielding good economic returns (Cunningham, 1997). Also these are either fast growing species or species with multiple benefits. The trend is almost similar in India with adoption of fast growing aromatic plants, which yield profits over consecutive years. In India, cultivation for profit is therefore restricted to a small number of high priced and fast growing species such as Safed Musli (*Chlorophytum borivillianum*), Lemon Grass (*Cymbopogon flexuosus*), Mentha (*Mentha arvensis*), Palmarosa (*Cymbopogon martini*), Ashwagandha (*Withania somnifera*) etc.

MAPs under *ex-situ* cultivation in India and Madhya Pradesh

In India, agro-technology for only about 100 species and agronomics of just 40 species have been developed by the premier research organizations in MAPs research like Central Institute of Medicinal and Aromatic Plants (Hussain, 1994), Indian Council of Agricultural Research, New Delhi and various Regional Research Laboratories.

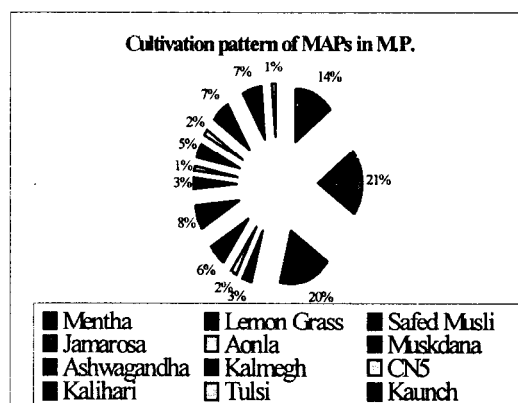
In actual practice, however, very few species are grown on a large scale. For instance, in MP only about 15-20 species are commonly cultivated by the traditional and neo-farmers, though on experimental basis, farmers also try species with non-standardized agro-techniques. There are species with great international demand and tremendous potential for growth in the Indian sub-continent, e.g. *Matriacaria chamomilla*, but not much research has gone into it; and whatever research work has been done, the extension work has not been satisfactory enough for the

enterprising farmers at least to adopt and be a role model for other farmers. Moreover the farmers resort to mono-cropping especially in aromatic plants rather than adopting any kind of inter-cropping models for the sake of convenience as far as management of crop is concerned and also because of lack of knowledge of different inter-cropping models that has been researched upon with satisfactory results without hampering the medicinal properties of the intended main crop.

Cultivation of MAPs in Madhya Pradesh

Madhya Pradesh with its wide variety of agro-climatic zones is a home to a large number of MAPs occurring naturally in various ecosystems such as the Satpura and Maikal Ranges, the Narmada and Sone river valleys and the Vindhyan plateau of Rewa, Panna and Malwa. Species such as *Cholorophytum*, *Withania* and various aromatic grasses occur in great abundance in these regions. Therefore, cultivation of MAPs is being done as easily as any other agricultural crops, the inputs being more for medicinal plants as the cost of planting material is comparatively higher.

Fig. 1



For capacity building in cultivation of MAPs, approximately 5,000 farmers have been formally trained in M.P. alone and are practicing cultivation of MAPs successfully along with traditional crops. The estimated total area under MAPs cultivation is more than 4,000 ha (Anon., 2000) and there are farmers who have also resorted to MAPs cultivation without any formal training but on the basis of inputs from neighbouring farmers.

Impact of commercial cultivation of MAPs

It is evident that the commercial cultivation and trade in MAPs will have long term implications for the different stakeholders. If one considers the fact that 70-90% of materials exported are harvested from wild (Holley and Cherla, 1998), the survival of some of these species may be under threat, given the increasing demand for MAPs. Although there are only a relatively small number of species that are traded in significant volume, the fact that so few species (<40) are produced entirely under cultivation is a matter of great concern. (Anon., 2002).

Impact of MAPs cultivation on the people :

The study on the economics of the few species for which agronomics has been developed as per validation on field indicates that though the initial investments are higher as compared to the traditional crops but the profits realized are manifold. The unpredictable monsoons and drought in the last few years have resulted in loss in income from many of the traditional crops. Cultivation of MAPs of late is being preferred because of the following reasons :

- Most of the species are not browsed or grazed.

- Crops are not prone to attack by diseases and do not require constant monitoring as in case of traditional crops.
- There is very little danger of theft of crops mainly because lack of knowledge about the market and processing becomes as hindrance factor.
- Profits realized are on the higher side.

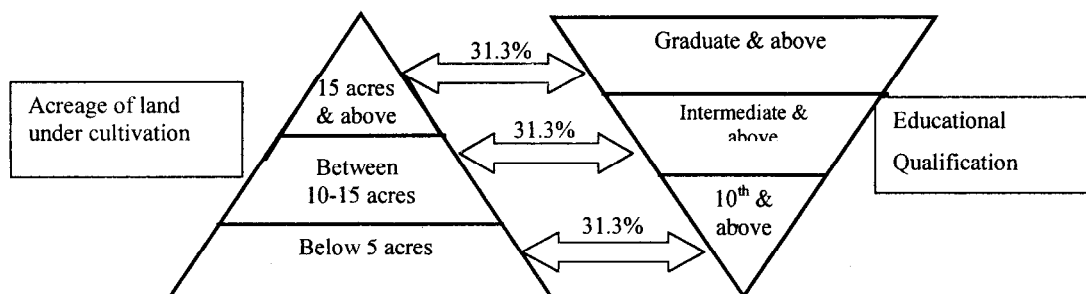
No doubt cultivation of MAPs holds much opportunity and promise for the farmers provided proper marketing linkages are determined prior to their cultivation.

The proverb "The early bird catches the worm" holds good even in the MAPs sector; people have 'minted' money in this sector – especially the early innovators. The educational profile of cultivators has got a lot to convey. A significant number of cultivators are neo-farmers having professional degrees like medical, engineering and management apart from those in service or holding an alternative business. These respondents have adopted the cultivation of MAPs on their ancestral land as this sector is considered to be an unbeaten track, opportunities are immense but people into its cultivation are few.

MAPs trade : With large scale cultivation of MAPs on private or public lands either through individual or community-based initiatives, the MAPs trade is sure to benefit from it, both for domestic consumption as well as international trade.

Biodiversity conservation : The first and foremost challenge for any country or state is of preserving the natural wealth it

Fig. 2



Cultivation of MAPs vis-à-vis educational accomplishment

Source: Primary data

possesses, to stop further loss and utilize biotic common resource for larger common good of the society.

Large-scale cultivation on private or public lands, as it is obvious and anticipated too, will take pressure off harvesting MAPs from the wild.

Marketing trend *vis-a vis* the current cultivation practices

It is evident from the projections made on the demand aspect of a few of the medicinal plants (Table 1) that this sector offers lot of opportunities. However, no such statistics are available for aromatic plants sector, which is also an emerging field, and especially in MP, the cultivation of aromatic plants such as Mentha and Lemon Grass are done more compared to other crops with Safed Musli being an exception.

Fluctuations in demand and supply are characteristic of this sector owing mainly to the unorganized nature of trade but the wide variations in domestic and international prices (Table 2) is a cause of concern. Supply of crude drugs and lack of value addition could be few of the reasons

for these fluctuations, but certification of the product could be an alternative, which could help the Indian stakeholders of MAPs, realize better proceeds from their cultivation and trade.

Problems and Prospects

Cultivation of MAPs is one of the major mechanisms whereby conservation, sustainable harvesting as well as utilization can be drawn simultaneously (Hussain, 1994).

Though there are many risks associated with large-scale commercialization of MAPs, but through proper marketing strategies and appropriate cost-effective technologies, *ex-situ* cultivation is likely to be successful, sustainable and rewarding.

With the increasing demand for herbal products for health cure and cosmetics (Table 1), there are good prospects for the large-scale production and use of MAPs.

The experience has not been that easy for these farmers who have adopted the cultivation of MAPs. Some of the problems

Table 1*Demand supply gap: 2001-2002 and 2004-2005 of top 8 Medicinal Plants*

Botanical name	Common name	Quantity (tonnes)	
		2001-2002	2004-2005
<i>Emblica officinalis</i>	Aonla	7582.8	26636.2
<i>Asparagus racemosus</i>	Shatawar	2678.4	8412.2
<i>Withania somnifera</i>	Ashwagandha	1123.6	3222.4
<i>Ocimum sanctum</i>	Tulsi	925.1	3038.4
<i>Aloe barbadensis</i>	Gheekwar	641.5	2684.5
<i>Swertia chirata</i>	Chiraita	167.5	487.0
<i>Andrographis paniculata</i>	Kalmegh	118.8	311.1
<i>Rauwolfia serpentina</i>	Sarpagandha	83.5	248.6

Source: Ministry of Health and Family Welfare (Anon., 2002)

Table 2*Market trend in domestic and international prices*

Essential Oils (Rs/kg)	June 1998	June 1999	September 2000	June 2001	March 2002
Basil Oil	4,685	4,685	3,930	4,204	4,204
Chamomile Oil	35,610	35,610	36,450	38,963	39,000 (18,000)
Citronella Oil	490 (300)	490 (300)	480 (300)	411 (300)	353 (325)
Lemon Grass	930 (650)	955 (450)	910 (450)	1,016 (450)	1,060 (450)
Palmarosa	960 (450)	960 (450)	990 (450)	1,051 (450)	1,075 (560)
Mentha Oil	400 (375)	400 (375)	400 (360)	356 (350)	356 (350)
Tulsi Oil	-	-	-	-	2,100

Figures in brackets: Domestic Indian Prices

Sources : International : New York Market Price, Chemical Marketing Reporter
 Indian : CIMAP Records, Chemical Weekly.

Table 3*Some of the major Commercial Cultivation Areas of MAPs in India*

Crop	Common Name	Area (ha)	Production (tonnes)	Exported (tonnes)	Value (Rs. lakhs)
<i>Ocimum basillicum / sanctum</i>	Basil	500	-	215.65	25.55
<i>Mentha arvensis</i>	Japanese mint	15,000	(12,500)	1095.40	3929.87
<i>Cymbopogon flexuosus</i>	Lemon grass	20,000	1300 (600)	22.63	125.55
<i>Cymbopogon maritini</i>	Palmarosa	2,000	-	12.90	82.46
<i>Cymbopogon winterianus</i>	Citronella	2,000	1800 (600)	-	-

Sources: Compilation of data from Amruth, CEDMAP Bhopal, CIMAP Records, and Centre for Planning, Research and Action, New Delhi (2000-2001); Monthly Statistics of the Foreign Trade of India, Vol-1, Exports, April 2000, March 2001.

Table 4

Distribution of respondents as per their opinion on the prevalent state of affairs on MAPs in Madhya Pradesh

Opinion on the prevalent state of affairs on MAPs	Per cent of respondents (n = 32)*
Lack of marketing facilities	92.1
Lack of availability of certified seeds / planting material	88.9
Lack of testing facilities.	36.4
Lack of availability of market information on demand of the produce and production by other farmers	35.7
Lack of financing schemes by the government.	15.3

*The percentage response is higher because of multiple responses for a particular parameter by an individual farmer.

Source: Primary data

as articulated by the farmers are enlisted in Table 4.

The major bottleneck in the cultivation of MAPs, as is evident from Table 4, is the lack of proper marketing facilities (92.1%) along with the lack of availability of certified planting material (88.9%) and market information (35.7%)

about the product. Though a few organizations have come forward to provide training inputs to interested cultivators, but it is mostly restricted to the resourceful few having alternative means of income.

Though at present agro-technologies are available for over 100 MAPs but very

little of technology has been disseminated or is in practice and the same 100 odd plants continue to be harvested from the wild. The main reason for non-implementation of agro-technology is the lack of agronomics especially for undertaking mixed cropping and also for saving on the expenditure part. Thus focused efforts are required to ensure that proper knowledge about these species are disseminated to the farmers.

As is evident from Table 5, marketing facilities and up-to-date information about trade and cultivation of MAPs are the core issue areas where institutional level interventions are required. Therefore, to address all these problems, various support services need to be arranged through various schemes of the government from time to time, such as structures for processing and marketing. Considering the large scope for improvement in this sector, it would not be possible for any government agency to provide all the services efficiently and hence efforts towards roping in

independent private players could be worked out.

Measures for achieving a thriving MAPs Industry

Since medicinal plants fall under the purview of many departments, such as Horticulture, Medicinal Plants Board, Forest Department and other allied branches of Agriculture, formation of an exclusive wing in each of these departments to look into the various issues plaguing this sector is imperative and needful too.

Problems should be tackled with a multi-pronged approach in to ensure integrated development of MAPs. The various tasks, which should be addressed in a well-planned and co-coordinated manner, include the following :

- Research and Development
- Training
- Extension
- Follow up actions.

Table 5

Distribution of respondents as per their expectations from a regional level institution set up by the government

Expectation	Per cent of respondents (n = 32)*
Proper marketing facilities	84.6
Monthly publication of cost-effective and up-to-date literature on MAPs cultivation and trade	77.9
Adequate arrangements for standard testing laboratories	48.5
Declaration of support prices at least in the initial stages as a confidence building measure	32.5
Supply of quality planting material at reasonable prices	25.2
Playing the role of a responsible third party mediator in case of any trade related problems	22.3

Source: Primary data

* Percentages are higher and not tallying to be hundred due to multiple responses.

Apart from these, attention should also be paid to address following issues :

- Strong support and commitment are needed if cultivation is to succeed as a means of meeting the requirements of pharmaceuticals (whether for local consumption or export). If cultivation does not take place on a large scale to meet demand, then it would merely be 'window dressing', and the continued exploitation of wild populations will go on unabated.
- Improvement in the trade and marketing practices while giving due considerations to the institutional aspects as well.

Making sense of the domestic market : Most essential for developing the industry and the sector will be the gathering and dissemination of information. Currently little is known about the market except for the places where MAPs are sold and the prevalent market rates of a few of the products. Consolidation of this information on a regular basis will be essential for the co-coordinated planning for this sector in order to deal effectively with all the stakeholders.

Dissemination of market information and making provisions for value-addition at the local level towards information collection and dissemination : The Minor Forest Produce Federation of Madhya Pradesh has recently created a website (www.mfpfederation.com) for maintaining an inventory of all the farmers in the trade of MAPs, for putting up any offer for sale and procurement of different produce etc. Though the initiative is commendable but some cheaper alternatives which are up-to-date as well as cost-effective need to be devised and made functional both at the state- and national-level, projecting the

current status with demand and supply statistics and trend.

Little value addition is done both at the local as well as national level. Most of the MAPs find their way to the international market in a less processed state thereby not realizing the value it should. Lack of processing facilities and knowledge about the same also comes as a hindrance factor.

Formalising and organizing the market : Almost 90% of the respondents in the study area articulated the need for a proper marketing system of the produce and this is the scenario in the country at large. Therefore, a key task is to bring a greater degree of formality and organization to a market, which has been known to be inefficient, imperfect, informal and opportunistic most of the times. Without a certain amount of formality in this sector, especially of *ex-situ* cultivated crops, it is unlikely that all efforts towards sustainable production and consumption of MAPs would be realized.

Policy considerations : The government needs to extend support to this emerging field of herbal medical cure and herbal products either by way of subsidies, new schemes for promotion of *ex-situ* cultivation of MAPs like the one formulated by the National Medicinal Plants Board but efforts have to be made whereby small farmers can come forth to benefit from such schemes.

Existing policies remain un-enforced at every level of marketing chain. Human resource development with a focus exclusively to this sector for proper monitoring and control could be an alternative.

Acknowledgement

This study was sponsored by the M.P. Minor Forest Produce Federation as an activity to promote the cultivation of the MAPs.

SUMMARY

The paper embodies the recent trends in *ex-situ* cultivation of Medicinal and Aromatic Plants (MAPs) as an alternative to biodiversity conservation and as an additional source of income with special reference to Madhya Pradesh (MP). Efforts have been made to highlight the problems encountered in cultivation for necessary policy considerations if this emerging sector is to become a financially rewarding and ecologically sustainable one.

भारत में औषधीय और सौरभिक पादपों का उनके मूल स्थान से बाहर संरक्षण
- मध्यप्रदेश के विशेष सन्दर्भ में
ए०के० भट्टाचार्य व रेजिना हांसदा
सारांश

इस अभिपत्र में जैवविविधता संरक्षण के विकल्प तथा आमदनी के अतिरिक्त साधन स्वरूप औषधीय और सौरभिक पादपों उनकी मूलस्थान से बाहर खेती करने की विगत प्रवृत्तियों को मध्यप्रदेश के विशेष सन्दर्भ में बताया गया है। इनकी यह खेती करने में सामने आने वाली समस्याओं को उजागर करने का प्रयास किया गया है ताकि यदि इस नये उभर रहे सेक्टर को वित्तीय दृष्टि से लाभप्रद और परिस्थिकीय दृष्टि से दीर्घकाल तक चल सकने वाला बनाना है तो आवश्यक नीतिगत प्रश्नों पर भी ध्यान दिया जा सके।

References

- Anon. (2000). *How to Cultivate MAPs?* Centre for Entrepreneurship Development in Medicinal and Aromatic Plants (CEDMAP), Bhopal (MP).
- Anon. (2001). Monthly Statistics of the Vol-1, Exports, April 2000-March 2001. *Foreign Trade of India*.
- Anon. (2002). *Demand Study for Selected Medicinal Plants, Vol-1*. Centre for Research, Planning and Action, New Delhi, Govt of India, Department of ISM & H, Ministry of Health and Family Welfare, GoI and World Health Organisation
- Anon. (2002). *Cultivation practices of some commercially important Medicinal Plants*. National Medicinal Plants Board, Ministry of Health and Family Welfare, GoI (Department of ISM & H).
- Cunningham, A.B. (1997). An Africa-wide overview of Medicinal Plant Harvesting, Conservation and Health care. *Non-Wood Forest Products (11) : Medicinal Plants for forest conservation and health care*. FAO, Rome.
- Holley, Jason and Kiran Cherla (1998). *The Medicinal Plants Sector in India: A Review*. South Asian Regional Office, IDRC, Canada
- Hussain, A. (1994). *Essential Oil Plants and their cultivation*. Central Institute of Medicinal and Aromatic Plants (CIMAP), Lucknow (U.P.).
- Rajashekharan, P.E. and S. Ganeshan (1999). Conservation of Medicinal Plant Biodiversity – An Indian Perspective. *J. Medicinal and Aromatic Plant Sciences*, **24** : 132-147.