



**REPORT  
of  
WORKING GROUP  
on  
PROMOTION OF  
MEDICINAL AND  
AROMATIC PLANTS  
IN HARYANA**

**Haryana Kisan Kalyan  
Pradhikaran  
Government of Haryana**





**WORKING GROUP REPORT  
ON  
PROMOTION OF MEDICINAL & AROMATIC  
PLANTS IN HARYANA**

**2026**



**Submitted to:**

**Haryana Kisan Kalyan Pradhikaran  
(Government of Haryana)  
Panchkula**

## **Working Group Report on Promotion of Medicinal & Aromatic Plants in Haryana**

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### **Published by:**

Haryana Kisan Kalyan Pradhikaran

Krishi Bhawan, Sector-21, Panchkula, Tel.: 0172-2551764

Website: [www.hkcp.org.in](http://www.hkcp.org.in),

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**नायब सिंह**  
**NAYAB SINGH**



मुख्य मन्त्री, हरियाणा  
चण्डीगढ़।  
CHIEF MINISTER, HARYANA,  
CHANDIGARH

Dated ..... 02.12.2025 .....

### **Message**

Haryana holds a unique position for growing a wide range of food grains as well as horticultural crops due to diversified agro climatic conditions. In present scenario, the journey of agriculture which started from subsistence during green revolution has reached the commercial level due to globalization and industrialization. To meet the emerging challenges in agriculture, diversification is the need of the hour.

Medicinal and aromatic plants are some of the potent areas which can contribute towards diversification. Haryana has the reservoir of traditional medicinal and aromatic plants and has a long heritage of use of herbal products as medicine, cosmetics, health hygiene, toiletries, fragrance and food supplements. Plants provide the predominant ingredients of medicines used in most traditional systems of healing and also have been the source of inspiration for development of several major pharmaceutical drugs. Despite the rich heritage of knowledge on the use of plant-based drugs, not much attention had been paid for growing medicinal and aromatic plants as field crops in the state.

In recent years, due to growing recognition of natural products and processes in sustaining human and environmental health, the economic as well as environmental importance of the medicinal plant resources has increased tremendously. Increasing demand for herbal medicines has resulted in excessive collection of medicinal and aromatic plants from the wild habitat. The need of medicinal and aromatic plants can't be met with forests alone. There is a great scope for growing medicinal and aromatic plants on farmers' fields, which would require the supply of planting material, marketing assistance and technical inputs. The challenge ahead is to lead the global herbal market by recognizing and addressing the need of each category of stakeholders which requires overall development of the total herbal sector.

I appreciate the efforts made by the Chief Executive Officer, the Additional Chief Executive Officer, the officials of Haryana Kisan Kalyan Pradhikaran, Chairman and Members of the Working Group and all the stakeholders who are involved in the preparation of this valuable document.

**(Nayab Singh)**

**Shyam Singh Rana**

**Agriculture Minister, Haryana & Vice-Chairperson,  
Haryana Kisan Kalyan Pradhikaran**



## **Message**

Haryana is a treasure trove of medicinal and aromatic plants owing to its rich biodiversity and medicinal knowledge. In Haryana, a major volume of medicinal herbs come from wild sources. Unsustainable harvesting practices of medicinal and aromatic plants from the wild often result in rapid degradation of the natural biodiversity and poor regeneration capacity. These high-value plants require less inputs and hence result in better income realization for farmers along with facilitating their production in sync with nature. There is need for special attention to technological interventions for scientific cultivation of these high value crops. Only an increase in the production of these plants and that too of a good standard will not be enough. Efforts should also be made for proper utilization of these plants for different industrial purposes in a planned and scientific manner. This will also create more employment opportunities for relatively weaker sections of the society.

This sector can immensely contribute to the promotion of agribusiness globally. I hope that with an increase in the cultivation of medicinal & aromatic plants our exports will go up and it will be possible for us to meet the increasing demand of MAPs. It is my firm conviction that this sector can play a crucial role in doubling farmers income in Haryana.

The report published by Haryana Kisan Kalyan Pradhikaran is a maiden effort in the state that may guide the stake holders in choosing the medicinal plant species, their processing, infrastructure support and meeting the training requirements. This report will certainly encourage the cultivation of medicinal plants which can provide alternative income sources to farmers while supporting sustainable agriculture besides boosting the availability of raw materials for the growing herbal and pharmaceutical industry.

I extend my congratulations to the members of the Working Group, farmers, scientists, stakeholders and the officials of Haryana Kisan Kalyan Pradhikaran for bringing out this report, which will greatly contribute to the promotion and development of the Medicinal farming sector in Haryana.



**(Shyam Singh Rana)**

**Pankaj Agarwal, IAS**

**Principal Secretary to Govt. of Haryana**

**Agriculture and Farmers' Welfare**



## **Message**

I am pleased to share that the Haryana Kisan Kalyan Pradhikaran has constituted a Working Group on the Promotion of Medicinal and Aromatic Plants in Haryana under the chairmanship of Dr. Ishwar Singh, Retd. Head, Medicinal and Aromatic Plants Section, CCSHAU, Hisar, along with distinguished members from academia and the progressive farming community.

The Working Group has been entrusted with an important mandate to review the present status of cultivation of medicinal and aromatic plants in the State, analyze the existing support systems and policies and recommend measures for further improvement. The terms of reference also include skill development of farmers, strengthening research and development and suggesting appropriate strategies for sustainable promotion of this sector.

At present, the cultivation of medicinal and aromatic plants in Haryana is at a nascent stage, despite the availability of diverse species and favorable agro-climatic conditions. With the increasing national and global demand for plant-based medicines, nutraceuticals and wellness products, the future prospects of this sector are highly promising. A well-planned approach involving commercial cultivation, value addition and efficient market linkages will be essential to harness this potential and to position Haryana as a key contributor in this growing sector.

I am confident that the recommendations of the Group will provide valuable guidance to the Government in developing a comprehensive roadmap for enhancing the cultivation and utilization of medicinal and aromatic plants in Haryana. This will not only diversify the cropping system but also create new livelihood opportunities for farmers and entrepreneurs in the state.

I express my deep gratitude to the Hon'ble Chief Minister and Chairperson, HKKP, for their constant guidance and support, which has been invaluable in steering the functioning of the Working Group. I place on record my appreciation for the efforts of the Chairperson and Members of the Working Group in preparing this report. I also acknowledge the valuable guidance of Dr. R.S. Chauhan, CEO and Sh. Hitesh Kumar Meena, IAS, Additional CEO, whose support and facilitation enabled the successful execution of this study. Their leadership and the logistical support extended by the Pradhikaran's office have been instrumental in bringing out this report.

**(Pankaj Agarwal)**

**Dr. Ravinder Singh Chauhan**  
**Chief Executive Officer,**  
**Haryana Kisan Kalyan Pradhikaran**



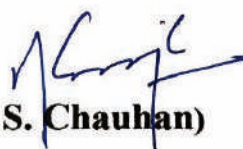
## **Message**

India is one of the largest exporters of medicinal herbs and Haryana can contribute significantly with its strategic location and agricultural infrastructure. The products of MAPs are suitable materials to develop small and medium enterprise in our state, if appropriately promoted with sustainable approaches. These crops can often be planted in waste and marginal lands with good returns and have the potential of employment generation as they involve a wide range of activities like cultivation, processing, extraction, product formulation etc.

The report published by Haryana Kisan Kalyan Pradhikaran is a maiden effort in the state that will guide the stakeholders in choosing species of medicinal plants, their processing, infrastructure support and meeting the training requirements. This report will certainly encourage the cultivation of medicinal plants which can provide alternative income sources to farmers while supporting sustainable agriculture besides boosting the availability of raw materials for the growing herbal and pharmaceutical industry.

It gives me immense pleasure to thank the Hon'ble Chief Minister, Haryana & Chairperson HKKP for their guidance and support throughout the functioning of the working group and my sincere thanks to Dr. Ishwar Singh, Chairman and other Members of the Working Group for their exceptional work and detailed study which has resulted in a report with sector specific recommendations. I am highly thankful to Vice Chancellor, CCSHAU, Hisar for his support and assistance. I also would like to thank Dr. Sanjay Yadav, Nodal officer of the working group, Mrs. Vandana, Associate Nodal Officer of the working group and all other staff of Haryana Kisan Kalyan Pradhikaran for their valuable assistance in preparing this report.

Finally, I express my sincere gratitude to all the stakeholders of the state who shared their valuable insights and suggestions, which have been instrumental in bringing out this important report. This document will serve as a vital resource for advancing the promotion, cultivation and sustainable development of medicinal and aromatic plants in Haryana.

  
**(R. S. Chauhan)**

**Hitesh Kumar Meena, IAS**  
**Additional Chief Executive Officer,**  
**Haryana Kisan Kalyan Pradhikaran**



## **Foreword**


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The promotion of medicinal and aromatic plants holds immense potential for Haryana, both in terms of crop diversification and enhancing farmers' income. These crops not only cater to the growing demand for natural products in the pharmaceutical, cosmetic and wellness industries but also opens new avenues for entrepreneurship and value addition at the grassroots level. Although Haryana has a rich diversity of medicinal and aromatic plants, this massive potential has remained largely unexplored in the absence of a well-planned and coordinated strategy for commercial cultivation, as well as integrated arrangements for processing and marketing. Comprehensive data on the actual extent of cultivation of these plants in Haryana has so far remained limited, underscoring the need for a more structured and evidence-based approach.

At the same time, there is a growing realization across the country about the role of Ayurveda and medicinal plants in maintaining individual health and strengthening preventive healthcare systems. Creating awareness among people about the use of medicinal plants in daily life is crucial for improving public health and promoting sustainable lifestyles. In this context, the present study assumes great significance, as it provides valuable insights and recommendations for scaling up cultivation and integrating medicinal plants into the broader framework of health and wellness.

In this direction, the Haryana Kisan Kalyan Pradhikaran has constituted a Working Group comprising of eminent experts and progressive farmers under the chairmanship of Dr. Ishwar Singh, Retd. Head, Medicinal and Aromatic Plants Section, CCSHAU, Hisar. I am glad that the Working Group has successfully completed this exercise and presented its recommendations in the form of this report. I sincerely appreciate the valuable contributions of the Chairperson and Members, whose expertise and commitment are clearly being reflected in the document.

I am confident that the findings and recommendations of this report will serve as a guiding framework for policymakers, researchers and farmers to work collectively for the growth of this sector in Haryana.

  
**(Hitesh Kumar Meena)**

**Dr. Ishwar Singh**  
**Chairperson, Working Group**



## **Preface & Acknowledgement**

Medicinal and aromatic plants (MAPs) have traditionally occupied an important position in the socio-cultural, spiritual, disease management, nutritional and beauty enhancement. However, over the last few decades, the availability of MAPs is declining and some of them have been disappeared due to overexploitation of cultivated land. On the other hand, demands for medicinal and aromatic plants has risen in recent years very rapidly due to increasing requirements of MAPs products as the public interest for natural products is increasing. Therefore, it may have a great risk of either their extinction and or loss of genetic diversity, if such situation of increasing commercial interest continues. Thus, there is a need for a clear policy and strategy to conserve these variable resources without delay.

Also, there is need for increasing production and productivity of MAPs to address poverty and food insecurity of the people associated with medicinal and aromatic plants in the wake of climate change impacts. This sector needs technological back-up for the development of improved varieties, mass multiplication of quality planting material, good agricultural practices, post-harvest management including processing and marketing. There is a strong need to bridge the knowledge gap and create appropriate research and development facilities. All stakeholders, including farmers must come together to build required partnership with public and private organizations to share the knowledge and know-how. Value addition is another important area in MAPs sector which requires high priority. It is necessary to develop public-private partnership models where the private sector also contribute through funding, helping in priority setting and also guiding the farmers for producing better quality material.

I express my sincere thanks to Dr. Ravinder Raina, Dr. Pawan Kumar and Sh. Mukesh Soni, members of this working group for their useful inputs in the preparation of this report. I also place on record my sincere gratitude to Dr. Ravinder Singh Chauhan, Chief Executive Officer and Dr. Sanjay Yadav, Nodal officer, Mrs. Vandana, Associate Nodal Officer of the working group and other officials of HKKP for facilitating the visits and meetings.



**(Ishwar Singh)**



**Dr. Ravinder Raina**



**Dr. Pawan Kumar**



**Sh. Mukesh Soni**

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## **Constitution of Working Group**

The Haryana Kisan Kalyan Pradhikaran has constituted a Working Group for the Promotion of Medicinal and Aromatic Plants in Haryana and make recommendations for improvement, as under: -

1	Dr. Ishwar Singh, Retd. Head, Medicinal and Aromatic Plants Section and GBP, CCSHAU, Hisar	Chairperson
2	Dr. Ravinder Raina, Retd. Professor, Medicinal, Plants, UHF, Solan	Member
3	Dr. Pawan Kumar, Section Head, Medicinal Aromatic and Potential crops, Department of Genetics and Plant Breeding, CCSHAU, Hisar	Member/Convener
4	Sh. Mukesh Soni, Progressive Farmer, Village-Choudhariwas, Hisar	Member

### **Terms of Reference:-**

1. To review the current status of cultivation of Medicinal and Aromatic Plants in Haryana and suggest measures for improvement.
2. To analyze the current support system (schemes, policies, technical and infrastructural support) for promotion of cultivation of Medicinal and Aromatic Plants in Haryana from the State /Central Governments and propose measures/ methods for further improvement in this area.
3. To assess the present status of training programs and extension facilities for farmers and suggest measures for skill development of persons engaged in cultivation of Medicinal and Aromatic Plants in Haryana.
4. To review the status of research and development and suggest measures to address current gaps as per the specific needs of the farmers.
5. To recommend most appropriate strategies for promotion of cultivation of Medicinal and Aromatic Plants in the State.

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## **Executive Summary**

Most of the MAPs grow wild and are collected from forests. A very large number of plant species are being harvested by poor rural population and used by millions around the world for treating a variety of illnesses. As a result, documenting their population levels or ascertaining the impact of their uncontrolled extraction for use and trade on sustainability has proven to be difficult. However, in the absence of any significant efforts having been made so far at their conservation, serious concerns have often been raised about the increasing threat of depletion and the potential endanger to the survival of plant species in the wild as a result of their uncontrolled extraction. Due to continuing increase in the demand for herbal medicines and with little control over their collection or trade regulation, the only way to protect wild populations of MAPs and minimize threats to sustainability is to increase the supply of equally effective cultivated crops.

Encouraging farmers to cultivate MAPs through a diversification of their cropping pattern in favour of these crops requires information on a number of underlying economic and non-economic variables. Some of the information needs include the relative economics of cultivation of these crops vis-à-vis alternative crops the farmers are currently cultivating, the demand for these crops, the availability of markets for disposal of these crops etc. Given that efforts at promoting cultivation of MAPs are still in their early stages in the state and some of the basic reliable information on some of the underlying economic variables associated with their cultivation is not easily available.

Although in Haryana there is a rich variety of species of MAPs however this massive potential has remained largely unexploited in the absence of a well-planned and coordinated strategy for commercial cultivation and integrated arrangements for processing and marketing. The National Medicinal Plant Board has identified 32 species for cultivation out of which Government of Haryana has laid emphasis on about 10 which have been chosen for cultivation in Haryana while we could not obtain the data on actual extent of cultivation of MAPs in the state.

Despite the multifarious advantages associated with cultivation of MAPs, their adoption for cultivation by farmers has not however so far been encouraging. This is in large part due to the fact that MAPs sector in the state operates in a near policy vacuum. Encouraging cultivation of these crops require concurrent policies and effective actions ; research, development and extension efforts aimed at developing newer plant varieties suitable for cultivation and their propagation and adoption by farmers; organizing effective post harvesting marketing and trade operations including their processing and exports and developing an efficient marketing

infrastructure and building an efficient information base, including marketing intelligence and its proper and timely dissemination.

Farmers would switch over to cultivation of these plants, besides other factors, if returns from these crops are substantially better than the alternative crops being cultivated by the farmers. While relative crop profitability depends upon several factors an important consideration in developing suitable crop varieties and package of practices for such crops should be to ensure minimization of the cost of cultivation and maximization of the crop yields. Currently, the cost of planting material is the major drawback in cultivation of these crops. Efforts need to be made to cut down on the cost of planting material so that relative crop economics can be improved. Given the growing demand for organic products, more so for MAPs, efforts should be directed towards development of such species which are suitable for cultivation under organic farming conditions. Lack of analytical laboratories capable of handling detailed analysis are not easily available. There is a need for setting up a network of regional analytical labs to facilitate the analysis of the constituents of the MAPs so that quality certification could be done. This will help to build buyer's confidence and encourage farmers to go in for cultivation of MAPs. Some of the labs could be authorized to issue certification as a means of building buyer confidence as also for product standardization.

**Need for Strengthening Database & Market Intelligence:** Any systematic and realistic planning for cultivation and marketing of MAPs and promoting their sustainable development requires sincere efforts aimed at developing an authentic statistical data base in respect of cultivated species of these crops. Unfortunately, an authentic data base in respect of MAPs is not available in Haryana. The current agricultural statistics collection in the State is confined only to the major field crops and few horticulture crops. Similar database pertaining to area and production of MAPs need to be developed. In addition, there is also a need for creating a data base on such variables as species wise demand, supply, end users etc. As of now there appears to be little or no direct contacts between farmers and processors/ final consumers. This is in large part attributed to lack of knowledge and awareness about markets with no institutional arrangement available to bridge this information gap. Generally, traders or their representatives, visiting local areas are the only source of market information available to these people. Lack of availability and access of market information is thus an important factor constraining improvement of returns to producers of MAPs. Apart from this creating the data base on extent of cultivation of these plants, there is a need to set up a market intelligence unit to regularly collect, analyze and widely disseminate latest and reliable information relating to markets, marketing channels,

prices, trade including imports and exports and make this information available to all concerned in a timely fashion.

**Inadequate Processing Facilities:** The processing of MAPs is generally done in either one or two stages. The first stage is semi-processing while the second stage is conversion into formulations. While conversion in to formulations requires appropriate infrastructure facilities and technical knowhow and may be beyond the reach of an ordinary farmer, however semi-processing involving such functions as cleaning and grading and undertaking such activities as drying, powdering, making concentrates, boiling and distilling etc. can be done at the local level. Some farmers are already doing some semi-processing of the MAPs for their self-consumption. Marketing of semi-processed product rather than raw crop can lead to value addition and improve the profitability of the farmers. Efforts thus need to be made to encourage semi processing of these crops by encouraging setting up of diversified small-scale enterprises/ cottage industries in rural areas either through formation of cooperatives or through encouragement of small private entrepreneurs. This will also help in reducing the transportation and packing costs of raw materials and also provide additional employment to local people. Haryana has many reputed pharmacies preparing formulations, however these are not sufficient. Efforts need to be made to encourage entrepreneurs set up more processing facilities for preparation of formulations in rural areas.

**Marketing:** Marketing of MAPs in general and those of cultivated species in particular is erratic in Haryana. Institutional efforts are confined up to cultivation and propagation but are almost totally absent for development of marketing. The trade is currently non-transparent, inefficient, imperfect, informal and opportunistic and often carried out in a hush-hush manner. As a result, the farmers are able to realize only a very small fraction of the price paid by the ultimate consumer of final product resulting in lower crop profitability and not providing enough incentive to the farmers to go in for its cultivation. Policy intervention aimed at promoting cultivation of MAPs has thus to consider marketing as a major component. The important constraints for marketing of MAPs in Haryana arise as a consequence of several factors: the thinly spread, inadequate infrastructure development in relation to these characteristics, generally small size of farm holding of which farmers have currently devoted only a small portion for cultivation of these plants and low levels of production that too realized over three to four cuttings in a year. In the absence of any institutional support for marketing, coupled with lack of any market intelligence and the fact that production of individual farmer in each cutting is very small, the farmer has no option but to fall in the trap of agents of dealers and sell his crop at whatever price is being offered to him. The only price mechanism he has at his disposal

to guide him is the previous year's sales price. These un-organized market channels have led to monopoly of few individuals and industries controlling and dictating the market and depriving the farmers of a more remunerative price for his produce. To promote large scale cultivation of these crops the state would have to intervene either through formation of farmers marketing cooperatives or promoting contract farming under a legally binding enforceable contracts and monitored by a regulatory authority. In addition, to meet the domestic as well as international quality standards, post-harvest marketing operations e.g., harvesting, grading and standardization, system of certification, packing and transportation need to be improved. For international regulations it may also be necessary to have ISO systems of certification.

## Introduction

Agriculture has been and continues to be the major pillar of Haryana. Our state holds a unique position for growing a wide range of food as well as horticultural crops. In older times, agriculture was stagnant at subsistence level has now reached commercial levels due to green revolution, globalization and industrialization. However, all this has thrown some great challenge in agriculture and a need is felt for crop diversification.

Medicinal and Aromatic Plants (MAPs) are one of the potent options for crop diversification. Haryana is blessed with huge variety of MAPs because of which they occupy a prominent position not only in our holy and historical books but also in Indian medical systems.

MAPs are botanical raw materials that are mostly utilized for therapeutic, aromatic and/or culinary purposes as components of cosmetics, health, medicinal products and other natural health products. Medicinal plants also known as medicinal herbs can be defined as the plants possessing therapeutic properties or exerting beneficial pharmacological effects on the human or animal body. Aromatic plants provide products which are extensively used as flavoring in perfumes as well as in herbal medicines. MAPs are considered pro poor, pro nature and ecofriendly with minimum input requirements, having scope for diversification of land use pattern, providing remunerative returns to growers and health security to users. There is a vast treasure of untapped medicinal plants which have tremendous scope in Indian medical system and economy.

There are so many MAPs cultivated as a crop in Haryana as well as in other states. There is a growing tendency all over the world to shift from synthetic to natural based products including medicinal and aromatic plants. Cultivation of MAP crops can provide sustainable natural source of high value industrial raw material for pharmaceutical, agrichemical, food & cosmetic industries and opens up new possibilities for higher gains for farmers. Though, these plants have been known and used since ancient times to heal and cure diseases, recently, technological advancements and validation of traditional knowledge and usage are leading to consumer inclination towards naturals and high market value for these crops.

The indigenous system of medicine namely 'Ayurveda', 'Siddha' and 'Unani' have been in existence for several centuries. These systems of medicine cater to the needs of nearly seventy per cent of our population residing in villages. Besides the raw material demand from advanced traditional medicine systems, as well as such from the modern pharmaceutical industries has also increased manifold. Several aromatic grasses and other species like lemongrass, palmarosa, citronella, Mentha, vetiver, Tulsi etc. are the potential crops suited for salt affected soils providing subsistence profits to the poor farmers. Many varieties of MAPs like ashwagandha,

senna, kalmegh, tulsi, lemongrass and palmarosa have been developed to grow well under rainfed/dry land conditions providing profits within a short crop period. Moreover, many such MAPs can be successfully cultivated in areas prone to destruction of crops by wild animal. Government of India through National Medicinal Plants Board (NMPB), CSIR-Central Institute of Medicinal and Aromatic Plants (CIMAP), Lucknow, ICAR- Directorate of Medicinal and Aromatic Plants Research (DMAPR), Anand and State governments (through their Horticulture/Agriculture Departments, Agriculture/Horticulture Universities and other institutions) have taken the initiative for all-round development of promising species and has developed technology packages for cultivation of important MAPs including genotypes producing quality material acceptable in international market.

### **Cultivation of Medicinal Plants:**

Out of the many species (excluding species that are used by Ayurveda, Unani, Siddha and Tibetan medicine industry), less than 20 species are under large scale cultivation and a number of superior varieties of medicinal plants have been developed. From the cultivated materials mostly, the modern medicines are derived. Cultivation of medicinal plants faces many constrains like lack of standardized agronomic practices for most of the species and non-availability of quality planting materials of improved varieties, lack of development and extension support in the cultivation and processing, prevalence of easy and cheap collection from the wild overlooking their inferior quality, cost of production usually high for the cultivated crops, unorganized marketing, mostly dependent upon traders and middlemen and absence of industry's interest in providing buy-back guarantees, or contract farming. Therefore, policy measures are needed to promote cultivation of medicinal and aromatic plants.

### **Selection and Prioritization of Medicinal and Aromatic Plants for Cultivation:**

With a view to prioritise and select medicinal plants for development many medicinal plants have been identified for cultivation in the state which includes Amla, Ashok, Ashwagandha, Bael, Bhumi amla, Brahmi, Giloe, Gudmar, Guggal, Isabgol, Kalmegh, Mulethi, Sarpagandha, Senna, Shatavar, Tulsi etc. and aromatic plants like Mentha., Lemon grass, Palmarosa, Citronella, Vetiver, Tulsi, Haldi etc. In order to develop the medicinal and aromatic plants sector in different agro-climatic zones across the state, there is a need for a coherent approach linking all the stakeholders of the medicinal and aromatic plants viz., farmers, traders, manufacturers, exporters and others.

### Market Scenario:

The share of Haryana in the global export of herbs and herbal products is negligible due to less area under cultivation, unsophisticated agricultural and quality control procedures, poor facilities of processing, meagre research & development, standardization in products and regulatory framework in trade of medicinal plants. The demand for herbal/value-added extracts of medicinal herbs is gradually increasing in foreign countries, especially in European and other developed countries.

### E-charak: Online Market Place of Medicinal Plants:

NMPB has launched an online portal and mobile application “e-charak” for creation of interaction and trade linkages among various stakeholders’ viz. farmers, traders, manufactures. The portal and application is acting like a virtual market place for medicinal plants. It has the option to register the users and fill the details about the medicinal plants produce, planting materials, etc. cultivated by farmers or required by traders and drug manufactures. Creation of “e-charak” is a way forward of Digital India.

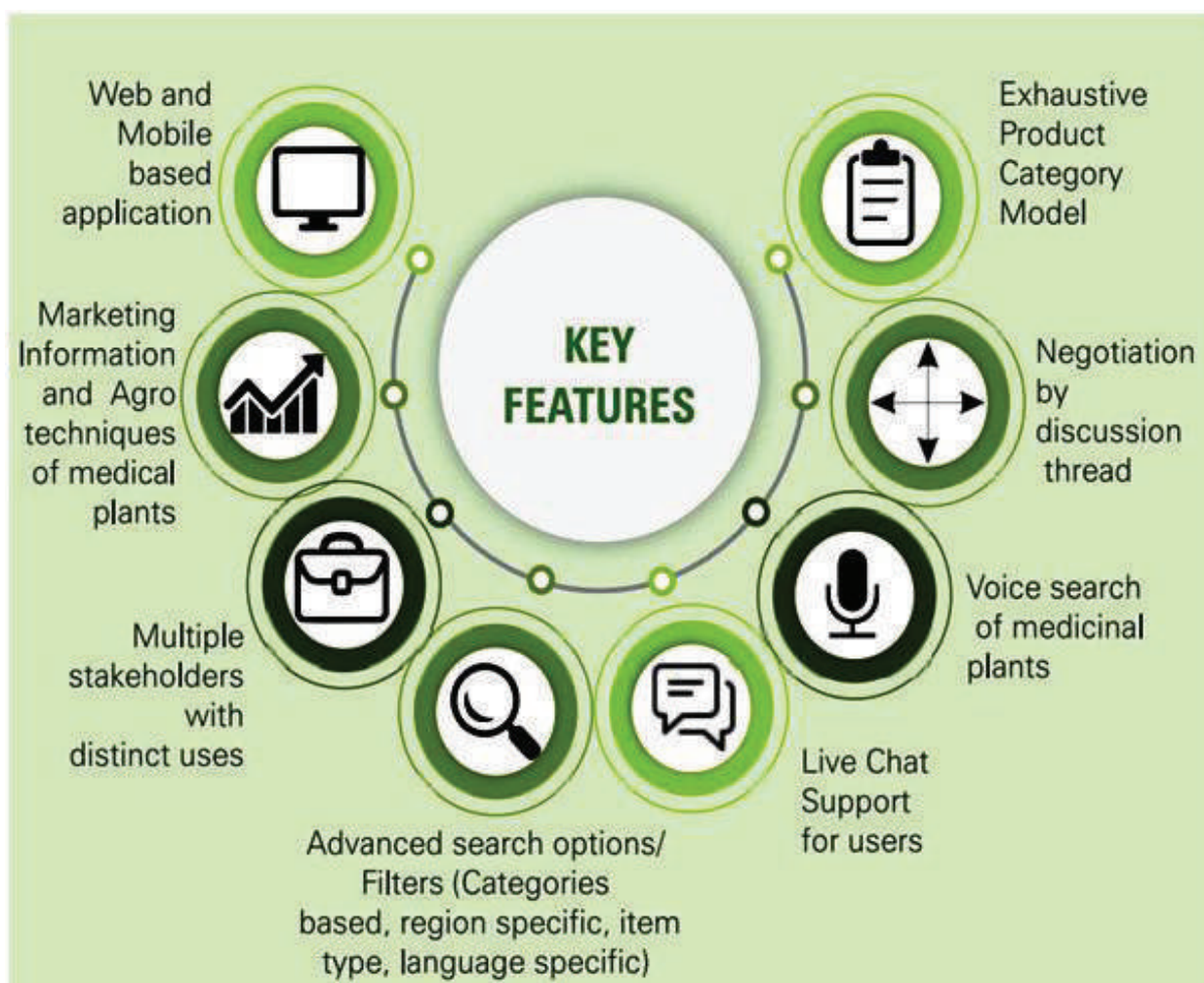
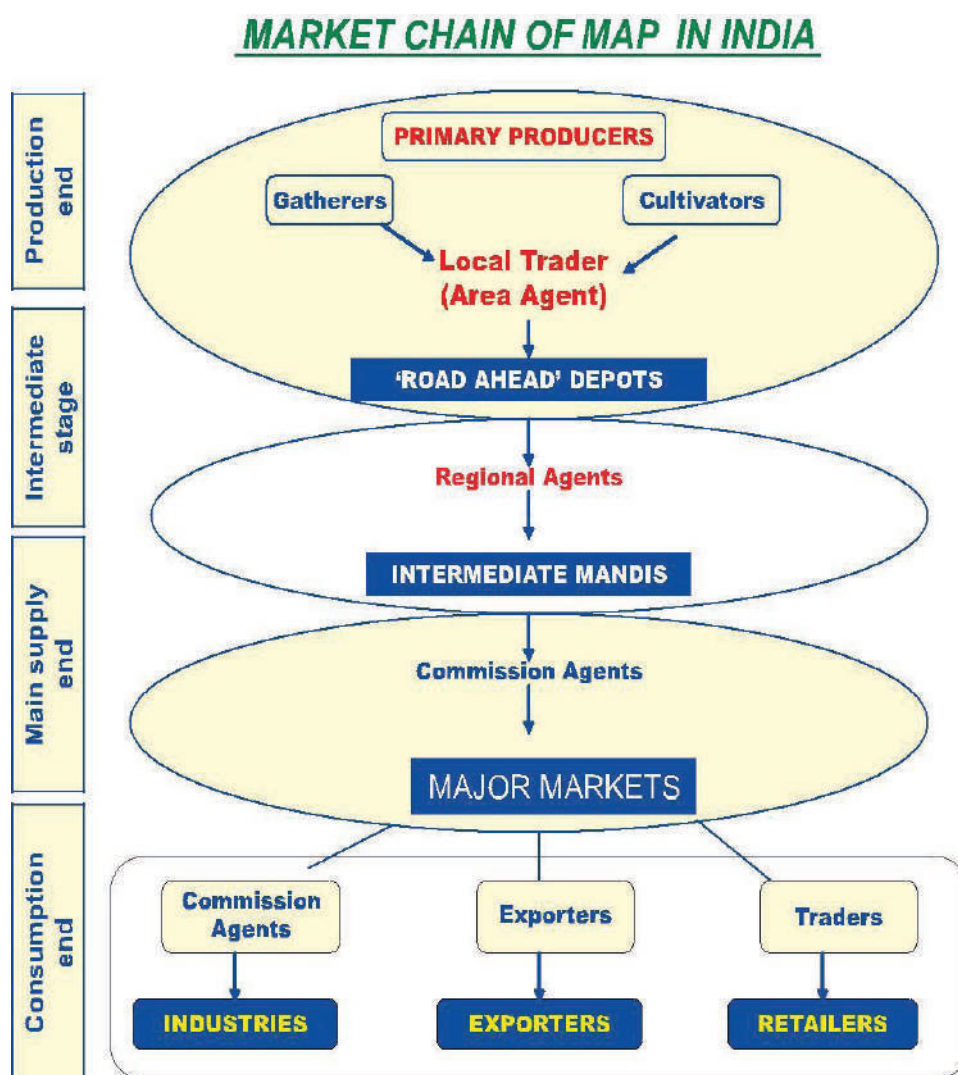


Figure : Key features of e-Charak, Source: NMPB

## Marketing Chain of MAP

Raw drugs marketing chain can be classified into different categories based on annual transactions turnover by volumes of botanicals traded as well as type of transactions (Ved and Goraya, 2008).



### **Future of Medicinal and Aromatic Plants in Haryana:**

In Haryana, the production and cultivation of MAPs is mostly unorganized. An equipped supply chain management and formation of farmer associations will improve the production and sales of MAPs in the state. The sector has observed recent entries of start-ups bringing in technology upgradation. These start-ups are using precise farming techniques by integrating artificial intelligence (AI) and data analytics for crop profiling, seed analysis for better germination, among others.

The demand, production and trading information on essential oils of major aromatic crops for flavors and fragrances, compiled by Essential Oil Association of India (EOAI) and Flavours and Fragrances Association of India (FFAI) can be taken as a base advisory. According to this database India ranks fourth after Brazil, China and Egypt in amount of essential oils annually produced in the world. Besides consumption in the domestic sectors, large quantity of essentials oils is also exported to USA, Japan and European Union States. This survey also suggests that nearly 300 different types of essential oils are globally traded, out of which 110 contribute to 95% of world consumption by fragrance and flavor industry. Number of by-products are also produced during the distillation of crops such as hydrosols spent biomass, ash, biochar etc. Methods for the utilization of such by-products must be worked out for enhancing the farmers' income or reducing the cost of cultivation. Utilization of distilled biomass of aromatic crops for vermi-composting may constitute an important strategy in this direction, Haryana can be a strategic player in this area.

## **CHAPTER 1: TO REVIEW THE CURRENT STATUS OF CULTIVATION OF MAPS IN HARYANA AND SUGGEST MEASURES FOR IMPROVEMENT.**

### **Current Status of Cultivation of MAPs in Haryana**

Haryana State has excellent geographical location with its climate and is ideally suitable for a wide range of MAPs. While the State has made significant progress in agriculture, the SWOT analysis reveals that the State has lot of strengths for promoting diversification to MAPs which have been identified to play an important role in the future growth of economy of the State. However, the soil health of the State is declining. Rising salinity, depleting ground water and declining water quality are some challenges. There is also lack of quality control on seed and planting material. Besides, post-harvest management and marketing infrastructure are poor. Despite the above, Haryana State has also scope for development of MAPs with several programmes under operation.

Cultivation of MAPs have rich potential for diversification like land use pattern, remunerative returns, increased employment opportunities, optimum utilization of waste lands, ensuring health security, attraction of entrepreneurs and upliftment of rural farming communities. Cultivation of MAPs needs to be encouraged as it provides numerous advantages over wild harvest viz., botanically correct raw material; sustainable source of raw material; quality raw material and proper post-harvest handling. State of Haryana offers several advantages like conducive soil and climatic conditions for the cultivation of wide range of MAPs needs to be exploited by providing Quality planting material, latest technical know-how, extension support, post-harvest handling techniques, processing & value addition and organized marketing avenues to the growers.

Conventional arable land that is mainly used for food and cash crops cannot be diverted for MAPs as food grain production cannot be compromised. Hence, need is therefore to utilize large chunks of suitable cultivable lands appropriate for different types of MAPs.

### **Area, Production and Productivity**

There is no commercial or large-scale planting of MAPs in Haryana and hence no marketing network exists. There is only small-scale production of essential oils that too is limited to domestic market. The area under MAPs in Haryana declined sharply from 3035 ha in the period 2003-04 to 169 ha during 2022-23. With the expansion of irrigation facilities, extensive use of seed of improved high yielding variety (HYV), fertilizers, plant protection chemicals and mechanical power, there had been a shift of area in favour of more remunerative and less risky crops like wheat and paddy. The data on area and production of MAPs in Haryana is lacking or not authentic because no girdawari of Medicinal & Aromatic Plants (MAPs) in Haryana is done by Department of revenue (Patwari). As per Department of Horticulture, MAPs area in Haryana is less than actual area or mismatching. It appears that department officials focus on those who

have taken subsidy under any scheme and could not collect the data from other farmers who have not availed any subsidy from Department of Horticulture.

**Table1: Area and Production of MAPs in Haryana**

Crop Year	Area under cultivation(ha)	Production(tonnes)
2002-03	529	238
2003-04	3035	739
2004-05	2316	348.4
2005-06	2104	378.2
2006-07	1785	795.8
2007-08	1395	96,6
2008-09	947	271.0
2009-10	1010	284.5
2010-11	1020	590
2011-12	1731	1133
2012-13	1750	1135
2013-14	1760	1145
2014-15	1040	618
2015-16	290	1058
2016-17	332	1156
2017-18	463	3211
2018-19	315	1088
2019-20	290	585
2020-21	430	4870
2021-22	306	3547
2022-23	169	2176
2023-24		

**Medicinal plants suitable for cultivation region-wise:**

- **Medicinal plants of low input requirements:** Some of the important plants which can be grown under South-Western Region of Haryana with low rainfall, dry climate and light soil types are Isabgol, Senna, Mulhatti, Ashwagandha, Satawar, Aloe vera, Kalmegh, Aonla, Guggal, Bael etc.
- **Medicinal plants of high input requirements:** The important plant species which require high irrigation facilities, soil fertility and medium to heavy clay soil types are Buch, Brahmi, Mandukparni, Kalihari, Amahaldi, Haldi, Giloe, Kawanch, Coleus, Akarkara, Sarapgandha, Tulsi etc.

**Cultivation of MAPs under intercropping systems:** Arable farm land scarcity in the country as well as in Haryana has motivated scientists to evolve new and better remunerative cropping systems to utilize efficiently the land and climatic conditions/resources. Owing to shrinking land resources per capita in the state, promoting the cultivation of medicinal trees in smallholder agroforestry/Horticultural system offers a convenient strategy for promoting their cultivation and conservation. Several approaches are feasible of growing trees with MAPs like silvi-medicinal, horti- agro-silvi-medicinal agroforestry systems depending upon the conditions in the field.

As there is no scope for horizontal expansion of cultivated area, it is viable to grow MAPs as intercrops with the predominant crops of the region by devising suitable cropping schedules. It is observed that MAPs like Mentha, Lemon grass, Palmarosa, Citronella, Vetiver, Sarpagandha, Haldi, Tulsi etc. performed better as intercrops in agroforestry system with Eucalyptus, poplar etc and many fruit plants. Studies conducted on the agro-forestry of medicinal plants elsewhere suggest that since many MAPs prefer to grow under forest cover, agro-forestry offers a convenient strategy for their cultivation as well as conservation through: -

- a) Integrating shade tolerant MAPs as lower strata species in multi-strata system,
- b) Cultivating short cycle MAPs as intercrops in existing stands of tree crops,
- c) Growing medicinal tree as shade providers and boundary markers and
- d) Inter-planting MAPs with food crops.

The selection of species and plant varieties should certainly be based upon the available resources, irrigation facilities and existing cropping systems/crop rotations.

#### **Medicinal plants as intercrops in oilseeds / vegetables:**

Intercropping of celery with vegetable pea is highly economical in Kurukshetra district while relay cropping of kasni is done in mustard (Raya) in some pockets of Rewari, Gurugram and Nuh districts. At the time of last irrigation, the seed of kasni is broadcasted in the standing crop of mustard. After the harvesting of mustard crop, the growth of kasni increases and it can give an additional income to the farmers.

#### **Growing medicinal trees on bunds/ boundary of field:**

The trees are grown for shade, fodder, fuel wood, fruit, small timber and medicinal uses. Traditionally Neem, Aonla, Harar, Bahera, Arjun, Jamun etc are grown on farm bunds/ boundary in the state and this should continue.

#### **SWOT Analysis of the State**

##### **A) Strengths:**

- State's agro-climatic conditions are suitable for growing a large number of MAPs.
- The State has good cultivable land with high cropping intensity, progressive farming community and rich traditional knowledge and hardworking farmers.
- Farmers in the State are innovative and willing to shift profitable cultivation.
- State level institutes available like CCSHAU, MHU, State Medicinal Plant Board, Ayurvedic University and colleges, Department of Horticulture, Department of Forest etc.
- Neighboring State having national level institutes for R & D like CSIR- Central Institute of Medicinal and Aromatic Plants, Lucknow; CSIR-IHBT, Palampur, NMPB, New Delhi, ICAR-NBPGR, New Delhi which can provide technical support to the State.

## **B) Weaknesses:**

- Due to ever increasing population pressure of human being, arable land is mainly used for food and cash crops, thus there is little chance of having good quality arable land for production of MAPs.
- The investment in promotion of MAPs is negligible.
- Poor post-harvest and marketing facilities like grading and packaging, storage and processing units.
- Non-availability of improved varieties of important MAPs and their planting material.
- Non-availability of authenticated statistical information about area, production, productivity consumption, post-harvest management, processing and manufacturing etc.

## **Opportunities:**

- Large scope exists for setting up oil extraction / distillation units from MAPs produce.
- Certain MAPs can grow in the problematic soils and can provide higher returns than traditional crops.
- Good export opportunities for some MAPs grown in the State.
- Ever increasing global acceptance especially to herbal products.

## **D) Threats:**

- Risks from natural disasters not covered by insurance.
- Poor post-harvest management and weaker marketing system.
- Lack of interest among young generation to adopt agriculture/horticulture as a profession.
- Highly perishable nature of fresh produce.
- Produce cannot be sold to end users hence in this sector there is a monopoly of buyers.
- Market is not suitable for small farmers.
- Synthetic materials having identical therapeutic effect and cost involvement is cheaper.

## **Constraints attributed to low productivity in Haryana:**

### **Cultivation constraints:**

- Non-availability of seed/quality planting materials of improved varieties suitable for different agro-climatic situations and no financial help is given to the producers of quality planting material.
- Lack of suitable varieties for specific agro-climatic zones. Entry of the MAPs is not done in revenue record due to lack of girdawari. Therefore, there is no provision of insurance coverage of MAPs in the state. Unsuccessful contract farming system.
- The cost of production is usually high for the cultivated crops as compared to those collected from the wild.
- Industries prefer cheap raw material collected from the forest overlooking their quality.

- Long gestation period and high risk are serious constraints. Many MAPs can be harvested only after three years or more eg Mulhati. As most farmers are poor, have small landholdings and lack credit, they cannot wait so long for returns.

#### **Constraints in Transfer of technology and HRD:**

- Lack of regular training programs for the field functionaries to keep the abreast of technological advancements. Lack of training centers for capacity building of farmers in advanced /modern practices, entrepreneurship development, marketing skills, financial management, quality standards and biosafety measures for export, IPR issues etc.

#### **Constraints in Processing and post-harvest technology:**

- Lack of knowledge about post-harvest handling of raw plant material. Most of the time collected materials are dumped with the traders of MAPs resulting fungal and pest contaminations. Many of these plants require specific controlled storage condition. This aspect remained neglected by the farmers. Since the international market is highly conscious about the quality aspects, our success in capturing export market will depend upon how quickly we are going to establish credibility in the quality.
- Poor quality standards of finished product due to no control over the quality of raw material and absence of good laboratory practices (GLP) and good manufacturing processes (GMP).
- Lack of proper adoption of harvesting, threshing and post-harvest technology adversely affecting the quality and thereby prices of the produce.
- One of the major constraints in the development of this sector being experienced by the farmers is unavailability of processing units in rural areas.
- Lack of proper facilities for drying, grading and packing of produce of the MAPs for final sale to traders/pharmaceutical industries at the best market price.

#### **Constraints in marketing of medicinal Herbs:**

- Total quantity of MAPs produces seen in the market at a given time is not significant and enough when compared to the quantity of other agricultural produce. The Marketing Cooperative/Federation also does not consider procuring these items and lack of government purchase agencies as in case of other major crops.
- Farmers do not get reliable market information about demand and pricing, which puts them in a vulnerable position when they go for sale. Local traders often transfer the price risks to them.
- GACP certification although introduced but, premium price for such certified material is not offered by the traders.
- Statistics on demand and supply of each component of MAPs are lacking in Haryana because no planning is going to be successful until and unless demand and supply is

balanced. Prices of these crops vary with demand and supply. Physical appearance of the raw material forms the quality in trade. Trading on the basis of active principles is absent.

- Lack of organized marketing system resulting frequent and steep fluctuations in prices affects the coverage of area, production and export. In most cases, they do not have a guaranteed market and price premiums for cultivated material. Open price is decided by the traders on the basis of collected material from the forest ignoring that cultivated material will have input cost.
- Most of the time supply is regulated by middlemen on the basis of market demand, not on the basis of availability of quality material.
- One of the major constraints in the development of this sector being experienced by the farmers is unorganized marketing. Moreover, since there is no organized distribution and marketing network, the farmers have to depend on the middlemen and often being exploited.
- The collected material is passed on to the traders in towns and cities. Each of the major traders has one or more indigenous drug manufacturers and private pharmacies as their customers of raw plant material. These companies also purchase raw plant material from their contractors and other farmers of MAPs in different parts of the state. In the absence of any regulatory mechanism, the trade of these plants, particularly medicinal plants is very secretive.
- In a number of cases the produce has to be used fresh for which instant transportation is a must and in many cases it cannot be stored for long periods as this would entail fumigation which at times, results in chemical contamination of the raw material and eventually the final product, because of its residual effect. Generally, the maximum period for which plant material should be stored is around 5-6 months and no more.
- Most of the medicinal herbs do not find an immediate consumption market locally, so farmers of medicinal herbs are compelled to sell their produce to local traders who serve as the sole disposal outlet. These traders have direct link with other wholesale market and probably with the pharmaceutical industry too, often deal in variety of raw drugs including spices and condiments and other agricultural produce. Many of them deal with medicinal herbs only during a particular season. Many of them also serve as pooling agents for other big traders in the cities. Thus, in the absence of an outlet that exclusively deal with particular medicinal plants or group of medicinal plants, the farmers constantly remains at the mercy of these general traders to get their produce sold in time.
- These traders who are otherwise regular buyer of prime produce sometimes exhibited no buying the same and concoct various reasons to keep the farmer under a constant threat and compelling them to sell the produce for price quoted. In absence of marketing support from

the Government the farmers again role back into the strangle holes of the middlemen in the market.

- The existing marketing network of medicinal plants is generally more confined and restricted unlike the agriculture produce. In absence of an alternative and competitive market farmer have to rely upon the existing narrow market and the prevailing pricing policy decided by traders.
- Local lending phenomenon developed and introduced by the trader's community many decades ago still alive keeping the farmers under the constant and recurrent debt while ensuring the traders a sustain supply of the required quantity of the produce.
- Non-availability of space to store the produce until it fetches a good price and the dire necessity to recover the money invested on the crop force the farmer to sell their produce immediately after harvest.

#### **Constraints in Export Development:**

- Poor agricultural practices and lack of knowledge about proper time and methods for plant identification, collection/harvesting, storage and post-harvest treatment practices, propagation, transportation etc. Almost 70% of the collections of medicinal plants/parts involve destructive harvesting. These practices have led to depletion of certain wild growing plants due to over exploitation by local contractors.
- Irregular availability and inconsistent quality due to dependence on wild sources which are subject to vagaries of weather and plant diseases in tropical climate. Inefficient processing techniques including lack of trained personnel, outdated technologies and equipment.
- Poor quality control procedures and inadequate adoption of Good Manufacturing Processing results in low yields and poor quality of products, as well as lack of consistency between quality of bulk supplies and the samples.
- Lack of regulatory mechanism in trade of medicinal plants, because of which it is unorganized and very secretive. The situation is further compounded by irregular availability (vagaries of weather, plant diseases etc.) leading to cyclic prices variations. Besides availability, prices also vary with demand and quality and are therefore unpredictable. The farmers find it difficult to plan their cropping pattern and cannot meet the market demands. Often, stocking by importers leads to glut, resulting in a sudden fall in demand and drop in prices, thus making it un-remunerative for the farmers.

## **CHAPTER 2: TO PROPOSE MOST APPROPRIATE STRATEGY FOR ACCELERATING PRODUCTION OF MAPS CULTIVATION PRACTICES IN HARYANA.**

### **Selection criteria for cultivation of MAPs:-**

While selecting MAPs for cultivation, certain criteria are to be followed such as location, topography agro-climatic conditions and communication and transportation factors.

### **Selection of plants:**

These plants are appropriate to the agro-climatic conditions available at the place of collection and must be genuine cultivar. These are easy to grow and process, adopting simple technology appropriate to the skill of rural people. The plants are of short gestation period. The products i.e. essential oil or dry parts are high value and low volume commodity having sufficient shelf life. The products find ready market in national and international markets. The active components are not likely to be manufactured synthetically. The cultivation is directly related to the actual socio-economic upliftment of rural people.

The second step will be to identify suitable locations appropriate to cultivate potential MAPs and their agro-technology for large-scale organized cultivation. Genuine planting material must be obtained to avoid low price of final produce. Finally, the farmers should be helped in marketing their produce at reasonable rate. It would be very much encouraging if some sort of collection centre and buy-back arrangement could be made for assured market.

### **Establishment of Centre of excellence on MAPs which will be responsible for the following function:**

It will collect information about demand and supply of medicinal herbs and essential oil in national and international markets. Based on this, it will inform the cultivators for taking up those MAPs which will fetch remunerative price. It will disseminate all information regarding agro-technology, availability of basic planting materials, post-harvest technology and any other relevant information on MAPs to the farmers. The agency may get this information from various R&D organizations, universities and websites. It will arrange contract farming and buy-back arrangement of MAPs herbs. It will help in properly drying, grading and packing the MAPs for final sale to traders/ pharmaceutical industries at the best market price. It will organize awareness and training programmes on MAPs, with the help of district sub-centers of the state, in different blocks so that more and more farmers can be benefited. The centre can invite experts as resource person from different organizations. If this can be materialized the farmers of the state will not only get encouragement in taking up commercial cultivation of MAPs but also get proper value of their produce. This responsibility may be given to MHU, Karnal with provision of sufficient funds from state government.

- Large scale motivation and training of educated unemployed youths in the field of MAPs

cultivation in Haryana.

- Large scale production and distribution of healthy seed and planting material to the large section of farmers on nominal price.
- Government should support and promote MAPs cultivation in cluster approach.
- Develop suitable varieties for MAPs cultivation. Where ever possible promote organic production of MAPs.
- Subsidies for promotion of MAPs cultivation need to be linked with the produce. The government should provide incentives and support to the farmer for MAPs cultivation as alternate of traditional crops.
- Assured procurement by state Government at Minimum Support Price.
- Distribution of quality seed / planting material of superior varieties on subsidized to popularize the MAPs in the state.
- Government should promote to develop input hubs for MAPs cultivation in multi-locations in PPP mode.
- Marketing is the key for success of MAPs cultivation. Electronic auctioning of produce through cluster representatives may be initiated. In major grain markets, some shops should be mandatorily allotted to farming clusters of MAPs cultivation.
- A special cluster club of MAPs farmers may be established.
- Practical demonstration units at each district level may be established for ensuring the production and plant protection management strategies. Establishment of various ongoing and planned government programmes in the field of MAPs cultivation and development.
- To ensure adequate, appropriate, time bound and concurrent attention to all links in production under MAPs conditions, post production on farm value addition and processing chain.
- Awareness, incentives, training, better sustained return, continuous support to the venture in cluster production mode would constitute appropriate strategy for accelerating production of MAPs cultivation in Haryana.
- Vertical integration is essentially critical for accelerated development of MAPs value chain and contract farming could be one of the best options to promote farmers linkages with market and industry. The industries can be given incentives for adoption of villages for MAPs cultivation.
- Due to the changing life style and emerging uncommon health problems, there is a need for focused attention of policy planners and R&D organizations for overall development of MAPs sector.
- There is an urgent need for higher investment in R&D of MAPs at state level to undertake the

focused activities to address the emerging issues of MAPs sector.

- The institutional support to undertake R&D work and trained man power in the area of MAPs is very meager in the state.
- It calls for the prioritization of species for cultivation, value addition and conservation efforts leading to sustainable use.
- The R&D activity should be reoriented and it should be demand driven, vibrant and capable of addressing the emerging concerns.
- There is a great need to develop effective R&D program on crop improvement, crop production and post-harvest management, developing good agricultural practices (GAP) and adopting organic farming.
- All herbal products need to be labeled suitably with required information on content and quality to fetch premium price in the market.
- The MAPs sector comprises several stakeholders like farmers, local commission agents, primary processors, industry, NGOs, R&D organizations and policy makers in participatory mode to effectively address the operational management issues related to the MAPs. There is a need to have an effective mechanism in place for networking of all stakeholders and a nodal organization should also be identified to coordinate the activities of MAPs in Haryana.
- A mechanism needs to be in place for growing the MAPs having buy-back arrangements with the user industry. It will ensure fair price of the produce to farmers and enhance their income to livelihood security.
- Efforts should be made to grow the MAPs organically and an appropriate certification system should also be in place.
- The suitable intercropping system needs to be developed in order to use inter-row space effectively and make the system more remunerative.
- There is a need to understand and document the ITK and based on this knowledge, the R&D efforts need to be initiated. The funding support needs to be enhanced manifold and R&D efforts should be demand-driven and private sector should also participate with funding support to the R&D efforts. Efforts are also needed to train the staff engaged in different sectors of MAPs for their skill development. There is an urgent need to prioritize 10 species having comparative advantage of high market demand and high value for cultivation and value addition.
- The rare, endangered and threatened MAPs need to be brought for their R&D.
- The impact of herbal products depends on quality. Therefore, quality management should be done at all stages starting from the raw material through the value chain to finished product.

Hence, suitable policy needs to be developed to implement good agricultural practices (GAP), good manufacturing practices (GMP) and good laboratory practices (GLP).

#### **Public-private partnership:**

- Private sector can play an important role in the promotion and adoption of MAPs cultivation in Haryana. Certain global private companies already operating with considerable success in the country can be roped in for MAPs cultivation on turnkey projects in certain clusters with public funding. Supply of seed and planting material of high yielding varieties of MAPs can be considered in PPP mode.
- The clusters of MAPs production can work as pockets of excellence not only producing quality material, but also generating the demand of inputs, thereby creating a multi-layered business hub conducive to all the stakeholders – producers, suppliers, marketers and exporters.
- By intelligent and transparent handling of marketing possibly on the lines of electronic auctioning of such high-quality produce, ultimately ensuring much better profit margins for the farmers. It will be pragmatic to develop clusters of MAPs cultivation by consolidating entrepreneurial ventures of farmers which will be real empowerment of the marginal farmers for not only sustainable development but also their economic empowerment and skill development in many ways. This aspect can be discussed at appropriate level enabling harvesting benefits of potential resource.
- Through constructive linkage development of public-private partnership such as marketing, processing and export industries can be linked up for progressive empowerment of people and the areas of the state. Efforts may be taken up to develop such clusters of MAPs cultivation with holistic production system approach. Public and private partnership in MAPs cultivation must ensure fulfillment of interest of farmers, consumers, private partner

#### **Linkages with the markets:**

Marketing is one of the great weaknesses of farmers in their overall constraints in realizing the profitable and reliable buyers/markets. Farmers are not able to get higher prices due to small holdings, sporadic location, non-adherence to quality and GAP standards and more than above all, the non-availability of scientific guidance on production technologies including plant protection, less knowledge of production technology and often do not have any access to organized marketing mechanisms.

- It is imperative to work out effective solutions for holistic growth of market sector especially for the MAPs cultivation farmers. Marketing centres across different districts of Haryana should be established for FPO/ SHG/ farmers' association /cluster partners of the MAPs cultivation so that farmers have a direct role in market price mechanisms.

- Every district market/mandi should have ample space allotment to various farmer clusters with due care for the representation of all the stake holding farmer groups.
- Post-harvest technology facilities should be available on subsidized rates to the farmers so that they are not dependent on prevalent market rates.
- At higher level of technology, the state may develop a transparent electronic auction mechanism that should have cluster leaders as well as representation of marginal farmers for effective access to different strata of farmers.
- The farmer clusters should be facilitated with certification agencies for diagnostic and GAP standards so that the quality produce of the farmers could fetch higher prices through organized and up-markets and preferably for export.
- Development of MAPs cultivation clusters, their intra and inter cluster co-operative group approach has been suggested to have better linkages with markets for export of produce.
- Competitive retailing through electronic auctions involving multinational branches at one hand and cluster farmers on other for both pre-production tie-ups and post production auctions may be developed to splice out middle men to achieve transparency for better price realization to farmers.
- Some marketing mechanism of MAPs produce has to be developed by agriculture economists to ensure at least 60% of customer price to reach back to the farmers.

**Future Training and Manpower needs:**

- The training infrastructure for MAPs available in Haryana state should further be strengthened by providing sufficient funds to CCSHAU and MHU by state government.
- In order to adopt the emerging technologies, exposure visits of extension workers and farmers to other institutions within India need to be given priority.
- There is a need to strengthen extension facilities to train farmers in the field of MAPs, identification and better control of insects, diseases and quality seed production of MAPs. Trained manpower for crop production may be deployed to look after the crop and a demonstration centre should be established in that area which should be maintained by a team of experts.

### **CHAPTER 3: TO ANALYZE THE CURRENT SUPPORT SYSTEM (SCHEMES, POLICIES, TECHNICAL AND INFRASTRUCTURAL SUPPORT) FOR PROMOTION OF CULTIVATION OF MAPS IN HARYANA FROM THE STATE/CENTRAL GOVERNMENTS AND PROPOSE MEASURES/METHODS FOR FURTHER IMPROVEMENT IN THIS AREA.**

Government of Haryana is currently promoting MAPs cultivation in a big way through subsidized financing of such projects under Central Government projects/programs and its own projects.

#### **Status of Institutional Support:**

##### **National Medicinal Plant Board (NMPB):**

The NMPB provides financial assistance to farmers for cultivating MAPs. It provides technical support to farmers on cultivation practices, post-harvest management and marketing. NMPB supports R&D in the field of MAPs by funding research projects, providing grants to research institutions and promoting the exchange of information between researchers.

The NMPB works to promote the trade of MAPs by providing information on the market for MAPs, organizing trade fairs and exhibitions and facilitating the export of MAPs. Very little benefit is being drawn by the farmers of Haryana from NMPB.

##### **State Medicinal Plant Board (SMPB):**

The SMPB is responsible for promotion of medicinal plants in Haryana state. It is under the administrative control of Ayush department of Haryana. It is doing all activities for the state which NMPB is doing for the country. The grant to the SMPB is provided by NMPB. Now it is nodal agency of the state. It has granted financial support to R&D institutions/ universities for establishment of herbal garden and for Ashwagandha awareness programme etc. Negligible benefit is being drawn by the farmers from SMPB.

##### **Council of Scientific & Industrial Research (CSIR):**

Council of Scientific & Industrial Research (CSIR), through its constituent laboratories namely CSIR-Central Institute of Medicinal and Aromatic Plants (CSIR-CIMAP), Lucknow; CSIR-Indian Institute of Integrative Medicine (CSIR-IIIM), Jammu; CSIR-National Botanical Research Institute (CSIR-NBRI) Lucknow; and CSIR-Institute of Himalayan Bioresource Technology (CSIR-IHBT), Palampur are providing training to the farmers about Good Agricultural Practices (GAP) for MAPs in order to promote the production and processing of herbs/MAPs. CSIR-CIMAP, Lucknow and CSIR-IHBT, Palampur are conducting awareness programme for farmers for cultivation of MAPs and also providing distillation units for extraction of essential oil from aromatic crops.

### **ICAR-Directorate of Medicinal and Aromatic Plants Research, Anand, Gujarat:**

Directorate of Medicinal & Aromatic Plants Research was established with the aim to facilitate efficient forward and backward integration of basic, strategic and applied research in various agro-climatic regions. In Varietal Development Multi-location evaluation trials conducted under the AICRP on MAPs have resulted in the identification and release of new improved varieties of MAPs.

A scheme has been granted to CCSHAU, Hisar under All India Coordinated Research Project on Medicinal and Aromatic Plants. Three scientists and supporting staff have been provided.

### **Department of Horticulture, Haryana:**

Department of Horticulture has network of officers at district and block levels that help in dissemination of technologies and collection of data on various horticultural crops including Aromatic plants. For the proper implementation of schemes, the Directorate of the Department has 23 district offices across the State. These offices provide all the extension services in the field of horticulture including those related to Aromatic plants (Not Medicinal Plants). Little benefit is being taken by farmers from these schemes.

### **Measures/ methods for further improvement in this area:**

- Government of Haryana is currently promoting MAPs cultivation in a big way. The subsidy-linked promotion of different components of MAPs cultivation needs transparency.
- The SMPB is currently not so active because earlier it was under the administrative control of Department of Forests and now it has been under the administrative control of Department of Ayush. Therefore, it is very much necessary to start work for the promotion of medicinal plants in the state (Aromatic Plants are under Department of Horticulture).
- Three monthly seminars of two-days duration of all the clusters should be held independently, where in such identified panel of experts handle all the pre- and during crop operations and crop production and protection issues.
- Each cluster can be linked with GAP certification laboratories for sample testing and certification on franchise basis. GAP certification agencies can be linked with each of the state funded laboratories for facilitating entire cluster for credible produce management. This may ultimately lead to promotion of export of high-quality produce.
- Besides, promoting the MAPs cultivation technology, the marketing aspect has to be equally promoted. Considering such high level of funding by the state government on MAPs cultivation, why not approx. 20% of the state funding be diverted for developing marketing and export hubs in the state including Transparent Electronic Auction Management system. In this system, only cluster approach should be promoted. Each cluster of production system should be connected with the Central Body headed by state officials and farmers themselves. Each

decision has to be 'LIVE' recorded on video. Graded produce from various clusters should be subjected to electronic auction, splicing out the middle men from marketing chain.

- Any mechanism helpful in elimination of middle men in marketing of MAPs produce would be welcomed. The purpose of promotion of MAPs cultivation needs to be measured not by area coverage but the produce obtained. This support totally or partially should be linked to the actual production of MAPs. Policy of the Government besides being proactive should be result oriented. If feasible promotional support should be linked to production only.
- The Aroma Mission for cultivation of aromatic plants has benefitted thousands of farmers by creating Farmer Entrepreneurship. CSIR has contributed significantly in the development, nurturing and positioning of the essential oil-based aroma industry in the country. This has led to creation of an ecosystem benefitting the farmers, industry and next generation entrepreneurs.
- The training infrastructure for MAPs available in state should further be strengthened:
- The state level training institutes should be upgraded to widen the horizon. In order to adopt the emerging technologies, exposure visits of faculty members and farmers to other institutions within India need to be given priority.
- There is a need to strengthen extension facilities to train farmers in the field of MAPs, identification and better control of insects, diseases and quality seed production of planting material of MAPs.
- Trained manpower for crop production may be deployed to look after and a demonstration centre should be established in that area which should be maintained by a team of experts.
- HTI should organize on an average one training/ month on MAPs.

There are however several aspects which require the attention to ensure continued development of MAPs in the State. These are as follows:

- Implementation of Cluster Development Concept: The State does not seem to have adopted the cluster development concept for MAPs. The minimum area of a crop in a cluster and the area spread needs to be clearly defined and followed.
- Planting Material: While efforts are underway to set up more nurseries and upgrade the present ones, the accreditation process is very slow. Much remains to be done as far as the quality of planting material and procurement process is concerned.
- Increase in Subsidy for MAPs: There is need for parity in the rate of assistance given for promotion of cultivation of MAPs in the state.

## **CHAPTER 4: TO ASSESS THE PRESENT STATUS OF TRAINING PROGRAMMES AND EXTENSION FACILITIES FOR FARMERS AND SUGGEST MEASURES FOR SKILL DEVELOPMENT OF PERSONS ENGAGED IN CULTIVATION OF MAPS IN HARYANA**

### **Status of Training Programmes and Extension Facilities in Haryana:**

Human Resource Development (HRD) is the key to success of any venture. There is very few manpower/ persons in the govt. sector exclusively meant for promoting MAPs. However, the role specificity of Extension system in promotion of MAPs remained limited and needs to be addressed. The current training programme on MAPs production is going on at the Horticulture Training Institute, Karnal by Department of Horticulture, CCS HAU, Hisar, MHU, Karnal, State Department of Horticulture and several NGOs. SMPB has also started doing work on Medicinal Plants These are helping farmers in this important self-employment MAPs cultivation activity.

### **Training Programmes:**

Status of trainings imparted by some major organizations in the state is as below:

- In CCS HAU on an average two to five trainings are conducted on MAPs every year.
- The KVKs working under administrative control of CCS HAU, Hisar are playing major role in providing trainings on MAPs. In general, each KVK organized one or two trainings every year.
- One training on MAPs in each district was conducted by Department of Horticulture, Haryana every year.
- Horticulture Training Institute (HTI), Karnal, a part of Department of Horticulture has a focused mandate of imparting training to the growers and improving the skills of extension personnel. In the last ten years, the Institute organized on an average two trainings/year on MAPs.
- MHU, Karnal and SMPB are also imparting trainings on these crops.

### **Extension activities:**

CCSHAU, Hisar had organized/coordinated several training programmes for farmers, researchers, students and various stake holders on various aspects of MAPs. On an average two exhibitions per year had also been organized at Krishi Mela to create awareness among the farmers on various aspects of MAPs. MHU, Karnal is also working on extension activities by providing trainings etc. In addition, the several Radio talks and Television talks have been recorded and aired/broadcasted through mass media (All India Radio and Doordarshan). Popular articles on various aspects of MAPs have been published in various far magazines. Extension Literature like technical bulletins and pamphlets on many crops have been published and distributed to the farmers. SAUs like CCSHAU, Hisar, MHU, Karnal, SMPB, Horticulture Training Institute, Karnal and Department of Horticulture carried out extension work for

transfer of technology to the end users. The scientists as well as extension specialists provided advisory services to the MAPs farmers. Farmers' Training, Kisan Mela and Farmers' Field Visits were also organized for MAPs cultivating farmers. Various dignitaries made their visits at Herbal Garden to CCSHAU, Hisar which maintains an herbal garden with a collection of about 350 plant species of MAPs including some endangered species.

#### **Transfer of technology and HRD:**

The extension work on promotion and popularization of MAPs is not found so sound due to lack of extension professionalism as well as lack of manpower adequately trained in extension placed in technology transfer of MAPs. Lack of regular training programmes for the field functionaries/ Extension personnel to keep the abreast of technological advancements. Lack of training centers and experts on cultivation of MAPs for capacity building of farmers in advanced /modern practices, entrepreneurship development, marketing skills, financial management, quality standards and biosafety measures for export, IPR issues etc. Lack of policy and infrastructure support for small farmers and womenfolk in terms of subsidy, credit, market integration etc. hinders the promotion and popularization of MAPs cultivation.

#### **Measures for skill development of persons engaged in cultivation of MAPs in Haryana:**

In order to overcome the above lacunae, the following measures are suggested.

There is need for Human Resource Development for carrying out MAPs extension with fully recognized and specific components relating to HRD and this should be incorporated in schemes of MAPs development. The main responsibilities may be given to MHU, Karnal with sufficient financial assistance from state Government of Haryana.

#### **Awareness and Education Programmes:**

Regular awareness programmes, short duration trainings, workshops, seminars etc should be organized for the benefit of the farmers. Under technology transfer, the Trainings and demonstrations to rural women and youth should be organized at their farms and at their households/places for employment income and employment generation. Social and Electronic media like mobile phones having facilities like Facebook, WhatsApp Channels, SMS services of mobile phones etc. should also be used for extension work on MAPs. Development of ICT materials like multi-media, portals, videos, self-learning modules for effective dissemination of latest technologies of MAPs. The research findings particularly of MAPs research should be disseminated to the farmers through publishing and distributing literatures, Frontline Demonstrations, On Farm Trials on farmers' fields, exhibition in Kisan Mela & Technology Week, publishing popular articles in magazines and newspapers.

### **Applied Research and Validation of Technology:**

There should be applied research in respect of Critical Storage Conditions of fresh MAPs produce, prescribing technical standards for PHM in respect of drying, grading and transport solutions and automation of value addition processes farm mechanization etc. makes the related HRD programmes too much dependent on inputs from International Organizations and bookish knowledge.

### **Distortions in Implementation of HRD Programmes in Participatory Mode:**

The programme implementations for HRD and MAPs extension through tools of Workshops/ Seminars and Exhibitions should be done on large scale. A large number of Workshops / Seminars should also be organized with financial assistance from SMPB/ department of Horticulture, GOH for MAPs Development and extension.

### **MAPs Extension Services:**

The Working Group endorses the view that MAPs extension is not only dependent on strength and high academic qualification of manpower appointed as extension workers/personnel but it also depends on quality & relevance of extension messages/methodologies, capacity of extension workers in understanding the technological needs of the target-stakeholders and selecting most appropriate technology solution to the problem and finally in conveying the same to MAPs farmers.

### **Extension Work by State Directorate of Horticulture:**

The skilled staff in the Department of Horticulture is heavily loaded with fruits, vegetables, protective cultivation activities etc. and finds less time to train and demonstrate the farmers about the activities related to cultivation of MAPs which must be taken care of.

### **Extension Services by CCSHAU, Hisar, MHU, Karnal, SMPB and KVKs:**

CCSHAU, Hisar and MHU, Karnal basically concentrate on education, research and extension education. KVKs had also shown some positive result in improving quality in technology transfer area by conducting some training programmes on promotion of MAPs in the state.

### **Role of Radio, TV, Press and Mobile Phones:**

Extension needs of farming community have been recognized by media including radio and TV also who offer meaningful programmes on pre-determined schedule basis. However, radio, TV and newspapers depend heavily on inputs from public-sector extension workers. A number of initiatives should be taken for putting SMS facility through mobile phones to use of MAPs extension services. This may emerge as one of the most potent tools for this purpose.

### **Cluster based extension for targeted deliverables:**

There is a need to move away from mode of extending component-wise assistance to project-mode of extension and accordingly, extension messages for every target cluster may be worked

out in details; the same may be transferred to the producer farmers in the selected cluster. For this purpose, it is also necessary to set out deliverables of technology interventions such as increased productivity, increased quality of MAPs, organic farming, GAP certification, PHM practices, marketing etc. The extension messages should be designed accordingly with practical tips.

#### **Innovative Methods of Extension- MAPs Herbal Fair:**

Govt. should start organizing MAPs Herbal Fair – an innovative Extension Method for effecting hands-on training for adoption of recommended production and post-harvest management technologies and product promotion and market development. This exercise is also used for field trials and validation of technologies.

#### **Field Demonstration of Technology, Field trials of new Inputs:**

This is another innovative method of transfer of technology. Under this method CCSHAU, Hisar/ MHU, Karnal, SMPB, ICAR Institutions other R&D institutions and Industry Associations should be called upon to jointly identify the farm inputs, transport and storage technology etc. for carrying out field demonstration and field trials at farmers' fields/State farms, as the case may be.

#### **Publicity of MAPs:**

Publicity for cultivation and promotion of MAPs through newspapers, extension literature like technical bulletins and pamphlets etc., community radios, Prabhat Feries by Village Panchayats including villagers, slogans should be done. The publicity material should contain the potential benefits of MAPs cultivation, availability of technologies, training schedule and government policy support etc.

#### **Organisation of “Herbal Divas”**

Herbal Diwas should be organized for transfer of technology on MAPs and also for demonstrate the technology for farmers. This should be organized at Block level. This Extension methodology increased the adoption level of demonstrated technology in the area. Harbal Diwas should be organized with systematic and advanced planning. In Herbal Divas, the farmers should be provided relevant literature and inputs like seed/ planting material as a token of encouragement.

#### **Development of Model Demonstrational Herbal Farms, Herbal -village and Herbal Seed Production Centre:**

For demonstration of technologies and ensuring easy availability of seed/ planting material of MAPs in the state, one or two of its farms under CCSHAU/MHU or under Department of Horticulture may be converted as seed production-cum-demonstrational farms on MAPs.

### **Development of linkages with stakeholders:**

All stakeholders of the MAPs value chain like farmers, industries, CCSHAU, MHU, KVKs, SMPB, NGOs, Farmer Organisations, etc. need to be involved and engaged in MAPs promotion. Creation of awareness among the farmers about MAPs production technology showing the monetary gain and benefit of cultivation of high yielding MAPs.

HTI should organize on an average one training per month on MAPs production technology.

Varietal trials should be conducted by CCSHAU, Hisar and MHU, Karnal at farmers' fields. Seed/Planting material of the latest varieties should also be distributed to the farmers at nominal price. FLDs should be conducted with latest technology of crop production at farmers' fields. Pamphlets on almost every crop suitable for Haryana should be published and distributed to the farmers. CCSHAU, Hisar should provide regular guidance to farmers during their visits to herbal garden/ phone calls, personally and through ATIC etc.

Scientist – farmer interface meetings, farmers' melas, exhibitions, advisory services etc. should be organized for farming community through diverse ICT Platforms i.e Mobile Apps, Facebook and WhatsApp Channels. Special efforts should be made for technology dissemination among farmers and entrepreneurs by conducting various awareness and skill development programmes on production, primary processing and marketing aspects of MAPs.

CCSHAU, Hisar and MHU, Karnal should organize several trainings programmes for farmers, researchers, students and various stake holders on various aspects of MAPs every month in different districts of Haryana. Exhibitions at Kisan Mela should also be organized per year to create awareness among the farmers on various aspects of MAPs.

## **CHAPTER 5: TO REVIEW THE STATUS OF RESEARCH & DEVELOPMENT (R&D) AND SUGGEST MEASURES TO ADDRESS CURRENT GAPS AS PER SPECIFIC NEEDS OF THE FARMERS.**

### **Status of R&D on Medicinal and Aromatic Plants:**

Work on MAPs is being carried out at MAP section of the CCS HAU, Hisar in the Department of Genetics and Plant Breeding. Besides, the section is the main centre for production and generating quality planting materials of these crops. Research and Development plays major role in manufacturing the products of highest quality with most effective manner and brings more profit margins of products on a very competitive price.

The research work on MAPs was initiated during 1979-80 under a state funded project and Ad-hoc Cess Fund Project on Isabgol during 1982-83. All India Coordinated Research Project of ICAR on MAPs was started during 1993-94 and a Central Sector Scheme on “Development of MAPs” by Directorate of Arecanut and Spices Development, Calicut (Kerela) during 1994-95. A large number of plant species of medicinal and aromatic values were introduced, acclimatized and evaluated so far for the yield of their end products of economic importance i.e. roots, seeds, leaves, herb yield and oil yield etc. Presently, about 350 plant species of MAPs are surviving and being maintained in the Herbal Garden established at this centre.

### **Research done so far:**

Research on MAPs is done almost in all universities. In traditional universities the focus is on diversity or molecular aspects. Some of the organizations doing farmer centric research on MAPs in the state are CCS HAU Hisar and MHU Karnal (Planning to start work on MAPs).

### **CCS HAU Hisar:**

Research has been carried out at CCS HAU on various aspects ranging from cultivation technologies, genetic improvement, plant protection management, post-harvest management and economic aspects. Research done in different departments of CCS HAU has not been included into package of practices. There is a need for a review of all the work done in the university and developments of inter- departmental research programme.

### **All India Coordinated Research Improvement Project on Medicinal and Aromatic Plants- CCS HAU, Hisar:**

All India Coordinated Research Improvement Projects on Medicinal and Aromatic Plants is run from its Headquarter at ICAR-Directorate of Medicinal and Aromatic Plants Research, Anand, Gujarat. The Director of Medicinal and Aromatic Plants Research, Anand, Gujarat also functions as the Project Coordinator of the Project. CCS HAU Hisar was included as coordinating centre during 1993-94, is having good lab equipped with most of the research facilities; and research farm, equipment required etc. University has good facilities and

expertise to develop different types of processing, value added products of MAPs, which can go a long way to popularize and aid in marketing of MAPs. Centre has been regularly evaluating genotypes of various MAPs, developed at different centers of All India Coordinated Research Improvement Projects on Medicinal and Aromatic Plants.

### **Salient Achievements of practical significance:**

CCSHAU, Hisar has achieved success in developing cultivation friendly varieties as well as agronomical practices. Availability of rich collection of germplasm of major MAP crops like Aloe vera (33), Isabgol, (83), Satawar(36), Ashwagandha (72), Sadabahar, (6) , Kalmegh (13), Giloe (20), Celery (13) Gurmar(10) , Kasni(20) , Chandersur (18) , Vetiver (20), Palmarosa (64), Citronella grass (6), Lemongrass (40), Tulsi (19) etc. and has been evaluated for development of superior cultivars for commercial cultivation of MAPs in Haryana.

Besides this, CCSHAU, Hisar is maintaining about 350 plant species of MAPs in its Herbal Garden. Herbal Museum displays charts, photographs, seed samples, plant part samples of various medicinal plants, essential oil from aromatic plants. This museum and herbal garden serve as first place of interaction between interested farmers and university scientists for motivation to take up their cultivation. Attached nursery of commercially important MAPs serves as a major centre of seedling as well as seed distribution to interested farmers.

The Regional Analytical Laboratory (RAL) established in the university has so far, based on quality parameters of individual species. CCSHAU has achieved the development and release of six high yielding varieties namely i) HM-1 of Mulethi, ii) HI-5 of Isabgol, iii) Prabhat of Sadabahar , iv)RH-49 of Palmarosa , v)HLS-4 of Chandersur and vi) AGH-2 of Ashwagandha and others in pipe line. Adhoc Package of practices of various MAPs for cultivation in Haryana state has also been published.

### **Tehnologies developed**

- Isabgol crop responded upto 25 kg N/ha in the nitrogen deficient soil of Haryana and the crop should be irrigated at 20, 40, 60 and 80 days after sowing.
- The Mulhatti/Liquorice roots (*Glycyrrhiza glabra* L.) can be harvested after 2½ years of planting because there was no significant increase in the active constituent i.e. Glycyrrhizin content between 2.5 to 3 years of plantation.
- The tubers powder of Satawar (*Asparagus racemosus*) is to be stored in air tight bags/packets due to less degradation of active constituent i.e. Saponin which is very hygroscopic.
- Ashwagandha (*Withania sominifera*) roots or its powder are to be kept in open bags for less degradation in Total Alkaloids content in comparison to air tight bags.

- Ashwagandha (*Withania somnifera*) roots may be harvested at berry ripening stage due to no significant change in Total Alkaloids content and low crude fibre content at this stage in comparison to maturity stage.
- The amount of Aloe vera powder was found to be highest by the precipitation of mucilaginous pulp with acetone followed by centrifugation. Precipitation was also faster in acetone treatment.
- On the basis of qualitative and quantitative data of essential oil of 21 genotypes, Lemongrass (*Cymbopogon flexuosus*) genotypes viz., NLG 118 (82.3%), OD 388 (81.2%), HL 3 (80.2%), HL 2 (79.9%), RRL 16 (77.7%), OD 19 (75.4%) and OD 58 (74.9%) recorded higher total citral content in comparison to CKP 25 (74.4%).
- On the basis of qualitative and quantitative data of essential oil of 16 clones, Palmarosa (*Cymbopogon martinii*) clones viz., RH-03-31 (87.4%), RH-03-35 (82.1%), RH-03-30 (80.2%), RH-03-62-I (79.6%) and RH-03-12 (79.3%) recorded higher geraniol content in comparison to control RH-49 (78.5%) as well as oil yield was 49.64% to 73.15% higher than control.
- Adhoc package of practices of various MAPs for cultivation in Haryana state has been published.

ICAR-Central Soil Salinity Research Institute, Karnal has generated very useful data on yield responses of several released varieties of *Plantago ovata* (Isabgol), *Cymbopogon flexuosus*, *C. martinii*, *Vetiveria zizanioides*, *Glycyrrhiza glabra* under saline water irrigation and cultivation in alkali soils.

Since MAPs have emerged as the important crops in the state, many other Departments have developed facilities for research and have been working on different aspects of MAPs cultivation, management, processing and value addition. For example, Plant Pathology Department has worked on management of diseases, Entomology Department has worked on management of insects, Center of Food Science and Technology and Department of Foods and Nutrition has worked on value addition, recipes, nutritive value etc, Department of Processing and Food Engineering on Processing and Agricultural Economics Department has worked on cost benefit analysis etc.

MHU, Karnal is also doing work on teaching, research and extension on MAPs.

#### **Measures to address current gaps:**

- MAPs cultivation technology needs to be given a prioritized boost by the State Govt. of Haryana. Promotion of MAPs cultivation in the State should be of Global GAP and surety of successful production mechanisms through engagement of experts, particularly production technology, cropping systems and plant protection measures. Nursery Hubs should be promoted

for supplying healthy and disease-free planting material of MAPs at affordable price to the farmers.

- Research gaps on MAPs cultivation including plant protection, Global GAP, export requirements and development of human resources should be addressed through opening a Center of Excellence on MAPs at MHU, Karnal or its regional station on priority. The existing facilities in public sector may develop strong collaboration with the proposed Center of Excellence on MAPs cultivation for uniform handling of demonstrations, education and human resource development. The Center of Excellence should handle future requirements of the State regarding MAPs cultivation.
- Besides this, institutional and stakeholder linkages should be provided on regular basis for the spread of technical know-how and the development of competitive marketing mechanisms for input industry. Due to the changing life style and emerging uncommon health problems, there is a need for focused attention of policy planners and R&D organizations for overall development of MAPs sector. There is an urgent need for higher investment in R&D of MAPs at state level to undertake the focused activities to address the emerging issues of this sector. There is need for the prioritization of species for cultivation, value addition and conservation efforts leading to sustainable use.
- There is an urgent need to have an appropriate mechanism in place for certification of organically produced raw material with defined quality for the benefit of producers and users of MAPs. All herbal products need to be labeled suitably with required information on content and quality to fetch premium price in the market. There is a need to develop innovative system of partnership between private sector and Govt organization for reorientation of R&D efforts and also funding support from private sector organizations for major species having large turnover.
- The data on collection of raw material from forests, cultivation and production, value addition and trade is lacking in the state. Therefore, a mechanism needs to be developed to document all such information authentically. It will help in development of a regional database for the state to promote the effective coordination and partnership related to R&D and trade in MAPs sector.
- The tree MAPs remain neglected due to their long growing period and low income during the gestation period. Therefore, suitable intercropping system needs to be developed in order to use inter-row space effectively and make the system more remunerative. There is a need to understand and document the ITK and based on this knowledge, the R&D efforts need to be initiated.
- In general, there is a lack of financial support to this sector. The funding support needs to be enhanced many times. R&D efforts should be demand-driven and private sector should also participate with funding support to the R&D efforts. Efforts are also needed to train the staff

engaged in different sectors of MAPs for their skill development. There is an urgent need to prioritize 10 species having comparative advantage of high market demand and medicinal and aromatic value for cultivation and value addition. The rare, endangered and threatened MAPs need to be brought under MHU, Karnal for their R&D with financial support from state Govt.

- The impact of herbal products depends on quality. Therefore, quality management should be done at all stages starting from the raw material through the value chain to finished product. Hence, suitable policy needs to be developed to implement good agricultural practices (GAP), good manufacturing practices (GMP) and good laboratory practices (GLP). There is a need to strengthen the research on MAPs through enhanced funding to meet the requirement of both domestic consumption and export.
- There is an urgent need to have strong linkage between research institutions and pharmaceutical industry which needs to be established through appropriate linkage model.
- The public-private partnership (PPP) model needs to be adopted for implementing R&D programs for overall development of MAPs. Regulatory measures for conservation, cultivation and marketing as well as quality standards of commercial MAPs need to be developed.
- Empowerment of farmers through cluster development and farmer institutions such as Farmer Producer Companies/Organizations and supporting farmer institutions for setting up of end-to-end postharvest value chain. Developing model MAPs production clusters, model MAPs villages and model MAPs farms with end-to-end value chain up to marketing for replication. There should be planned production to meet continuous market demand. Enabling environment and support schemes for attracting investments in contract production, MAPs ware houses, processing facilities, transportation and dedicated MAPs retails.
- Development and promotion of “Haryana Herbal” brand through print and electronic media. Setting up of regulatory frame work and necessary digital platforms for certification, traceability, transparency and market connectivity and empowerment of farmers through cluster development and farmer institutions such as Farmer Producer Companies/Organizations.

## **CHAPTER 6: TO RECOMMEND MOST APPROPRIATE STRATEGIES FOR PROMOTION OF CULTIVATION OF MAPs IN THE STATE:**

### **Recommendations:**

#### **Cultivation/ Production**

- i.** There is an urgent need for scientific collection of reliable data on area and production to ensure systematic development and planning of MAPs in the state. Girdawari of MAPs should be started and remain open throughout year in Haryana to get benefit of subsidy, crop insurance etc.
- ii.** MAPs may be promoted in areas where highly remunerative crops are not prevalent and contract buying exists and these may be introduced as inter-crop, catch crop and border crop or under crop in partial shades. These aspects should be studied extensively in future.
- iii.** Since the MAPs and their plant parts are used in raw form in the traditional medical system, the important aspects which govern the quality of the drug at initial level are the correct identification of species, optimum stage of harvest and primary processing. All these important aspects need to be considered in the right earnest.
- iv.** Contract farming is an important means of linking farmers to the market and safeguarding them from wide price fluctuations. Contract farmer would invariably cultivate specified crop/variety under the strict supervision/management of the contractor/ industrialist. The inputs are invariably provided by the contracting firm. In spite of following all directives, the contractor invariably imposes some deductions in the guise of quality of the produce. This process requires proper check and balance through an appropriate regulation issued by the Government. A Memorandum of Understanding (MoU) could be devised and used with provision of dedicated disputes settlement mechanisms.
- v.** Communities at village/block level should be encouraged to undertake the tasks of drying, sorting/ grading in addition to the cultivation. Involvement of self-help groups/local entrepreneurs/ community groups for value addition at farm level to enhance the income of farmers is needed.
- vi.** Nursery hubs should be promoted for supplying healthy and disease-free planting material of MAPs at affordable price to the farmers. Development of tissue culture facility for large scale production of planting material to meet the growing demand.
- vii.** Organic cultivation of aromatic plants in clusters should be done with facilities of solar based distillation units to extract the quality essential oil which can be sold on premium price in international market on line.
- viii.** Establishment of Center of Excellence on MAPs: Research gaps on MAPs cultivation including plant protection, Global GAP, export requirements and development of human resources should

be addressed through opening a Center of Excellence on MAPs cultivation in the state by MHU either at Karnal or its regional station on priority. The existing facilities in public sector may develop strong collaboration with the proposed Center of Excellence on MAPs cultivation for uniform handling of demonstrations, education and human resource development. The Center of Excellence should also handle future requirements of the state regarding MAPs cultivation.

**Transfer of Technology and HRD:**

- ix.** The State must train its manpower in the core areas to meet the future challenges. Skill development in sophisticated production systems, operation of complex drying, sorting, grading etc. are to be given priority. There is therefore a long term need for investment in training institutes and universities to impart formal technical training programs, practical skill courses and professional degrees.
- x.** Demonstration cum - seed production centres should be established to demonstrate transfer of technology to the farmers through trainings and seminars at district and block levels and it should be maintained by a team of experts and interactive e-portals / SMS service provisions for providing real time advice to farmers must be set up for better communication between the farmers, scientists and industry.
- xi.** There is a need to strengthen extension facilities to train farmers in the field of medicinal and aromatic plants, identification and better control of pest, diseases and quality seed production of planting material of medicinal and aromatic plants.
- xii.** MAPs farmers need to be trained on good agricultural practice (GAP) for enhancing production of quality raw material and traceable supply to meet the demand of pharmaceutical companies. Appropriate farm bulletins and short video films on the Good Agricultural Practices (GAP) and Good Manufacturing Practices (GMP) of recommended MAPs cultivation models, need to be prepared in Hindi for wider publicity and adoption.
- xiii.** Empowerment of farmers through cluster development and farmer institutions such as Farmer Producer Companies/Organizations and supporting farmer institutions for setting up of end-to-end postharvest value chain. Developing model herbal production clusters, model herbal villages and model herbal farms with end-to-end value chain up to marketing. There should be planned production to meet continuous market demand.

**Post-harvest technology:**

- xiv.** Post-harvest technology facilities should be available on subsidized rates to the farmers so that they are not dependent on prevalent market rates. Efforts thus need to be made to encourage semi processing of these crops by encouraging setting up of diversified small-scale enterprises/ cottage industries in rural areas either through formation of cooperatives or through encouragement of small private entrepreneurs. This will also help in reducing the transportation and packing costs of raw materials and also provide additional employment to local people.

### **Public-private partnership:**

- xv.** Supply of seed and planting material of high yielding varieties of medicinal and aromatic plants can be considered in PPP mode. Through constructive linkage development of public-private partnership such as marketing, processing and export industries can be linked up for progressive empowerment of people and the areas of the state.
- xvi.** There is need to create an environment for private sector to develop State of the art infrastructure for post-harvest management and marketing to improve service, quality and delivery system at competitive cost to both firms and farmers. There is a need to develop innovative system of partnership between private sector and research & development organization for reorientation of research and development efforts and also funding support from private sector organizations for major species having large turnover.

### **Marketing:**

- xvii.** Through constructive linkage development of public-private partnership such as marketing, processing and export industries can be linked up for progressive empowerment of people in the state.
- xviii.** At least some shops for marketing of produce/products of medicinal and aromatic herbs should be allotted at International Horticulture Mandi, Gannaur, Sonipat.
- xix.** A mechanism needs to be in place for growing the MAPs having buy-back arrangements with the user industry. It will ensure fair price of the produce to farmers and enhance their income to livelihood security. Efforts should be made to grow the MAPs organically and an appropriate certification system should also be in place.
- xx.** Establishment of centralized collection centres and storage yards for crops produce, installation of centralized primary processing / distillation units for farmers clusters at block level/ district level, formal registration of MAPs farmers for facilitating free inter-state movement of their harvested materials.
- xxi.** Making the Self-Help Groups (SHG's) well equipped and aware of latest markets including forecasting of prices, on line auctions and market intelligence can help in proper marketing. There is need to develop reliable market intelligence system of important MAPs commodities in Haryana. Marketing centres across different districts of Haryana should be established for FPO/ SHG/ farmers' association /cluster partners of the MAPs cultivation so that farmers have a direct role in market price mechanisms. Every district market/mandi should have ample space allotment to various farmer clusters with due care for the representation of all the stake holding farmer groups.

- xxii.** Competitive retailing through electronic auctions involving multinational branches at one hand and cluster farmers on other for both pre-production tie-ups and post production auctions may be developed to splice out middle men to achieve transparency for better price realization to farmers.
- xxiii.** Promote and market a state brand: It is important to promote and market a Haryana herbal brand as the identity of Haryana's healing and beauty tradition. Local herbal products should be exported under the Haryana herbal brand. Government should work with foreign regulators to facilitate the registration of Haryana herbal products in their markets. This will reduce the need for individual companies to invest in branding and product registration.

**Some Important Medicinal Plants that can be grown in Haryana**



Giloe



Isabgol



Brahmi



Safed musli



Mulaithi



Kutki



Lemongrass



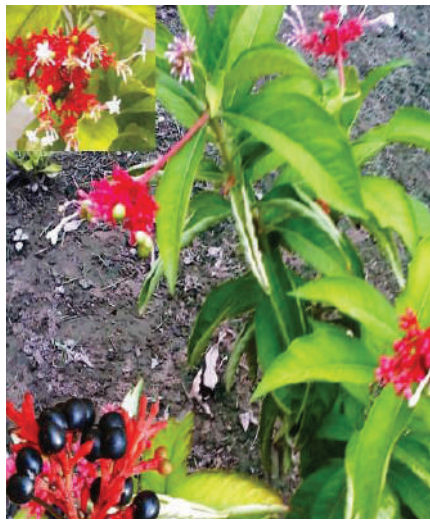
Alovera



Ashwagandha



Stevia



Sarpagandha



Mint



Satavari



Guggul



Tulsi



Kalmegh



Gurmar



Moringa

# Glimpse of Working Group Interaction Meetings with stakeholders







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