



Action Plan for  
Strengthening Medicinal and Aromatic Plants (MAPs)  
Value Chain as a Climate Adaptation and  
Livelihood Diversification Strategy in  
Bundelkhand Region of Uttar Pradesh



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## Abbreviations

IPCC	Intergovernmental Panel on Climate Change
MAPs	Medicinal and Aromatic Plants
CSA	Climate Smart Agriculture
COP	Convention on Climate Change
IFS	Integrated Farming Systems
ODOP	One District One Product
WHO	World Health Organization
NMPB	National Medicinal Plant Board
SMPB	State Medicinal Plant Board
CAFRI	Central Agroforestry research institute
IGFRI	Indian Grassland and Fodder Research Institute
CIMAP	Central Institute of Medicinal and Aromatic Plants
KVK	Krishi Vigyan Kendra
SHEFEXIL	Shellac & Forest Products Export Promotion Council
PHARMEXCIL	Pharmaceuticals Export Promotion Council
BSMs	Buyer Seller Meets
MAI	Market Access Initiative
RBSMs	Reverse Buyer Seller Meets
FPC	Farmer Producer Company
FPO	Farmer Producer Organisation
NAM	National Ayush Mission
VCSMMP	Voluntary Certification Scheme for Medicinal Plant Produce
PMKSY	Pradhan Mantri Krishi Sinchai Yojana
GAPs	Good Agriculture Practices
GFCP	Good Field Collection Practices
QCI	Quality Council of India
SLF	Sustainable Livelihood Framework
TOT	Transfer of Technology
GHG	Green House Gases
NPOF	National Project for Organic Farming
NABARD	National Bank for Agriculture and Rural Development
MIDH	Mission for Integrated Development of Horticulture
MSME	Ministry of Micro, Small & Medium Enterprises.
PMFME	PM Formalisation of Micro Food Processing Enterprises
Scheme ICT	Information and Communication Technology
NGO	Non-governmental Organization
PIB	Press Information Bureau







# 1. INTRODUCTION

## 1.1 Climate change

Climate change is already happening and will accentuate in the years ahead due to increasing temperature and variability in rainfall. The impacts associated with climate change and extreme weather events (e.g., floods, cyclones, storm surges, heatwaves) are increasing in frequency and/ or intensity in many regions of the world, resulting in growing climate-related risks. Intergovernmental Panel on Climate Change (IPCC) in its yearly reports of 2018 and 2019 has mentioned the impacts of climate change.

With the world's population estimated to hit 9.8 billion by 2050 our current food production system is likely to face an enormous challenge . Experts view that agriculture must increase its output by a startling 50% in the next 30 years while halving its carbon footprint.

Many developing countries are particularly vulnerable due to financial, technical, physical, institutional, demographic and socio-economic constraints. At the same time these countries are forecasted to suffer the worst effects of climate change.

## 1.2 Consequences of the Climate change

Leading global scientific experts have recently presented the annual 10 New Insights in Climate Science to the UN climate change negotiations, COP27 (27th Conference of the Parties to the United Nations Framework Convention on Climate Change) . The key focus areas for negotiators at COP27, ranged from adaptation and mitigation to the intersections of climate and food systems, security, and finance. The 10 new insights on climate change presented at COP 27 are:

1. Questioning the myth of endless adaptation
2. Vulnerability hotspots cluster in 'regions at risk'
3. New threats on the horizon from climate-health interactions
4. Climate mobility: From evidence to anticipatory action
5. Human security requires climate security
6. Sustainable land use is essential to meeting climate targets
7. Private sustainable finance practices are failing to catalyze deep transitions
8. Loss and Damage: The urgent planetary imperative
9. Inclusive decision-making for climate-resilient development
10. Breaking down structural barriers and unsustainable practices.

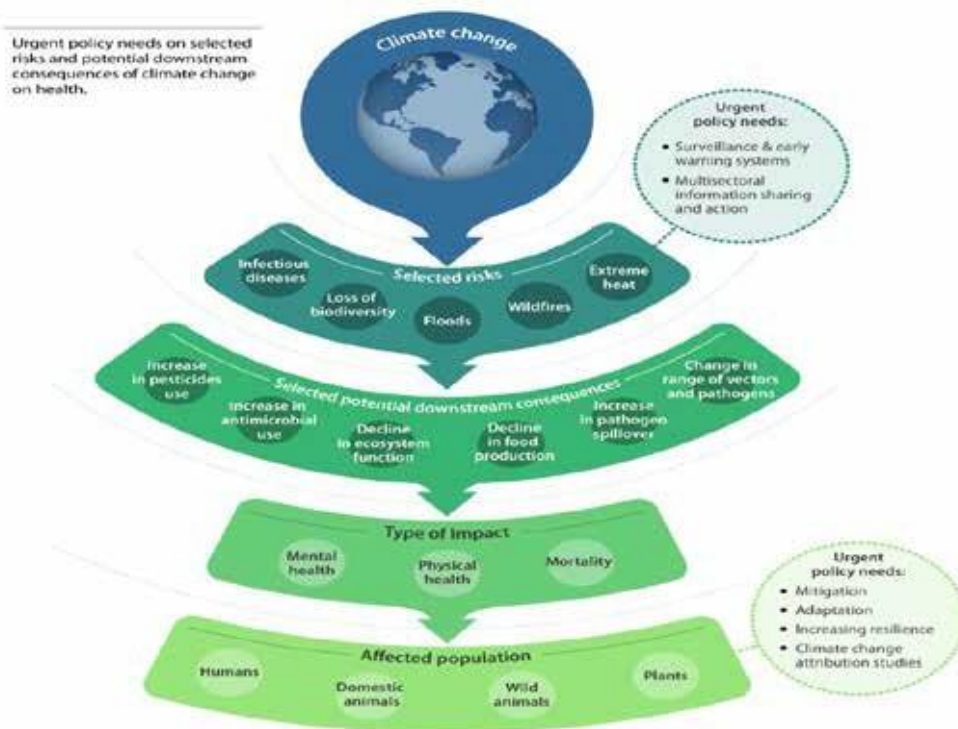
The recent studies also confirm the rising social costs of severe climate extremes and the urgent need to deviate away from risks of going beyond limits to adaptation and crossing irreversible tipping points. Thus, to address the world's ballooning food needs in the midst of a worsening climate crisis, it is essential to scale up towards climate-smart agriculture (CSA), an approach to food production that can improve productivity, increase resilience to climate change and reduce greenhouse gas emissions.

Figure 1 presented below describes the risks and potential downstream consequences of climate change on health and urgent policy needs.

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1. [https://www.fao.org/fileadmin/templates/wsfs/docs/Issues\\_papers/HLEF2050\\_Global\\_Agriculture.pdf](https://www.fao.org/fileadmin/templates/wsfs/docs/Issues_papers/HLEF2050_Global_Agriculture.pdf)
  2. [https://www.fao.org/fileadmin/templates/wsfs/docs/Issues\\_papers/HLEF2050\\_Global\\_Agriculture.pdf](https://www.fao.org/fileadmin/templates/wsfs/docs/Issues_papers/HLEF2050_Global_Agriculture.pdf)



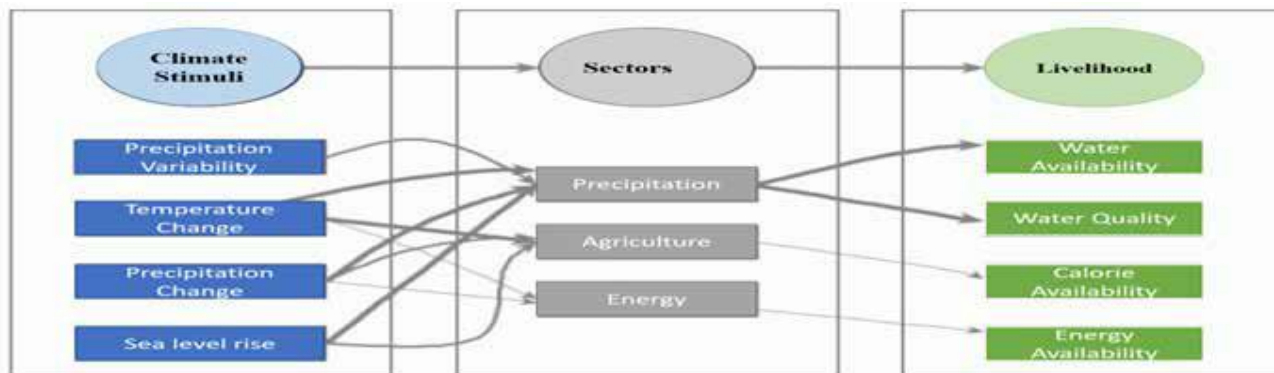
Figure 1 presented below describes the risks and potential downstream consequences of climate change on health and urgent policy needs.



### 1.3 Climate impacts and livelihood conditions

The climate change has impacts on different important sectors which in turn affects the livelihood conditions as indicated in Figure 2. This Livelihood Condition Index using an integrated multi-layered approach, takes into the consideration how sectoral climate impact will influence the human well-being and the livelihood conditions. Change in climatic factors like temperature, precipitation and rise in sea level have impact in the agriculture sector which in turn affects the quality and quantity of water along with other factors that eventually lead to lower productivity and affects the livelihood of the farmers in rural areas.

Figure 2 Climate Impact Index on various sector and livelihood



3. Ten Essential Climate Science Insights for 2022 presented at COP27  
<https://public.wmo.int/en/media/news/ten-essential-climate-science-insights-2022-presented-cop27>



## 1.4 Medicinal and Aromatic Plants – A climate change adaptation strategy

The challenges of increasing food and fodder requirements and healthcare needs in the face of growing population, natural resource degradation, climatic change, plateauing farm income, new global trade regulations and new parasites calls for development of diversified, more resilient, robust and sustainable production systems. This includes promoting non-conventional crops and plants such as MAPs (medicinal and aromatic plants) which not only have better adaptability to the changing climate but also have higher value and demand than traditional crops while at the same time catering to the twin goals of food and health care needs of the people.

Medicinal and aromatic plants are known to be available in the wild that have the potential to provide additional income to a large section of under privileged populations and tribes who are dependent on MAPs for their livelihoods. Increased adaptation of crops to withstand the changing climate is required. Introduction of medicinal and aromatic plants to the existing cropping patterns and systems can help mitigate the adversity of the changing climate. Due to availability of large number of species with diverse climatic requirements medicinal and aromatic plants can be easily introduced into existing cropping systems or grown as sole crops

Introduction of MAPs as intercrop, mixed crops, companion crops, shade providers, boundary markers etc. can help maximize resource use efficiency and productivity and generate additional income and overcome economic loss caused due to adverse climatic conditions. Some of the MAPs can successfully grow in barren/wastelands, degraded, eroded and problematic (saline, alkaline and acidic) soils and help reclamation of such underutilized lands for better remuneration to the farming community. Therefore, cultivation of MAPs serves as an alternative and a supplement for small and marginal farmers who cannot afford the high input cost of traditional and commercial crops. They can also help in upgrading and building more resilient, resource efficient and productive systems which can adapt to the changing climate and meet the challenges of food and health security

Medicinal plants have a great deal of importance for India as these are not only a major resource base for herbal and medicine industry but support livelihood and ensure health security for a large segment of Indian population. There is a reported huge gap between the supply and demand of medicinal plants to manufacture Ayurvedic medicines in India. According to the 'All India Trade Survey of Prioritized Medicinal Plants, 2019', demand for high-value medicinal plants increased by 50 per cent, while the availability declined by 26 per cent. This led to increased habitat degradation and levels of over-exploitation by pharmaceutical industries. Therefore, cultivation of medicinal and aromatic plants in a commercial mode is one of the most profitable agri-businesses for farmers in India with triple bottom line impacts-economic, social and environmental. Uttar Pradesh, especially the Bundelkhand region, which is the focus of this study is aligned in this respect in terms of agro-climatic suitability for production and addressing the issue of climate change at micro level.

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4. <https://www.pik-potsdam.de/cigrasp-2/lhc/climate-impacts-and-livelihood-conditions.html>
  5. Journal of Medicinal Plants Studies 2018; 6(1): 150-155



## 2. MARKET POTENTIAL OF MAPs – AN INSIGHT

There is increasing evidence on the significant value and potential of Medicinal and Aromatic Plants (MAPs) worldwide. MAPs have been an integral part of the Indian cultural heritage and key element for the bio-based industrial sector. Besides their economic value, MAPs enhance social integration and maintain gender balance as harvesting and processing MAPs have been female dominated task. Despite the prominent contribution of MAPs to local development and conservation of biodiversity, many challenges and knowledge gaps have hindered its development.

India has been considered as treasure house of valuable medicinal and aromatic plant species. Ministry of Environment, Forest and Climate Change, Government of India has identified over 9500 plant species and documented them for their use in various industries like pharmaceutical industry, healthcare, cosmetics, organic food items etc.

### 2.1 Global Market Overview

The global export market for MAPs totaled an estimated US\$2.59 billion in 2016. This figure represents only a subset of MAPs, defined in the Harmonized Commodity Description and Coding System (HS) under the code HS 121190, or plants and parts of plants (including seeds and fruits) ‘used primarily in perfumery, pharmacy or for insecticidal, fungicidal or similar purposes, fresh, chilled, frozen or dried, whether or not cut, crushed or powdered.’ Growth in demand has shifted production to new countries over the past two decades, as MAPs have moved from relatively minor products to crops worth cultivating. As per the estimates of the World Health Organization (WHO), the global herbal industry is projected to be worth US\$ 5 trillion in 2050 and about 80 per cent of the world’s population depends on herbal medicine for their primary healthcare. Furthermore, Covid-19 pandemic has brought a big change in health care system particularly on usage pattern of herbal medicines

### Global Market Demand

Demand for Indian aromatic plants for essential oils, aroma chemicals and spices are increasing rapidly, and the global market is expanding. The export of herbs and value-added extracts of medicinal herbs has been gradually increasing over years. About 80% of the world population is dependent on medicinal plants for healthcare and 20% of the pharma drugs are of plant origin, either extracted from the plants or synthetic derivatives of these plant species. The demand for herbal/value-added extracts of medicinal herbs is gradually increasing in foreign countries, especially in European and other developed countries.

### 2.2 India Market Overview

India is one of the major exporters of crude drugs primarily to the six developed countries: USA, Germany, France, Switzerland, UK and Japan who share between them 75 to 80% of the total export of crude drugs from India.

The export of herbs and value-added extracts of medicinal herbs are gradually increasing over the years. India exported USD 330.18 million worth of herbs and herbal products during 2017-18 with a growth rate of 14.22% over the previous year. Also, the export of value-added extracts of medicinal herbs/ herbal products during 2017-18 stood at USD 456.12 Million recording a growth rate of 12.23% over the previous year as per the table 1.

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<https://www.rgics.org/wp-content/uploads/Working-Paper-on-Development-and-Trade-of-MAPs-1.pdf> <https://www.rgics.org/wp-content/uploads/Working-Paper-on-Development-and-Trade-of-MAPs-1.pdf>



**Table 1 Export of Herbs and Herbal Products for last three years and the current year in value<sup>7</sup>**

Commodity	2015-16	2016-17	2017-18
			Value in USD Million
Plant and Plant Portion (Herbs)	274.14	289.07	330.18
AYUSH and Herbal Products	364.00	401.68	456.12

### **The demand for MAPs in the domestic market**

India is rich in biodiversity and is endowed with 45,000 plant species out of which about 15,000-20,000 plants are known to have medicinal properties. The Indian market has 1650 herbal formulation involving 540 major plant formulations.

The market for medicinal plants in India stood at INR 4.2 billion (US\$ 56.6 million) in 2019 and is expected to increase at a CAGR 38.5% to INR 14 billion (US\$ 188.6 million) by 2026. The Indian annual production of herbal drugs is estimated around INR 1000 million, while the medicinal plant value is about INR 50.0 billion and the anticipated export is around INR 5500 million.

NMPB (National Medicinal Plant Board) has extensively surveyed the herbal market of India in collaboration with ICFRE, Dehradun in the year 2015. The consolidated commercial demand of herbal raw drugs for the year 2014-15 was estimated at 5,12,000 MT. Exports of herbal raw drugs, including extracts have been estimated at 1,34,500 MT in 2014-15. Domestic herbal industry has been estimated 1,95,000 MT 2014-15. An estimated 1,67,500 MT of herbal raw drugs are also used by rural households every year.

About 1178 medicinal plant species are recorded in the practices of trade. Out of which, 242 plant species are used in annual quantities of more than 100MT .

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<https://pib.gov.in/Pressreleaseshare.aspx?PRID=1558955#:~:text=India%20exported%20USD%20330.18%20Million,12.23%25%20over%20the%20previous%20year.>

<https://www.ibef.org/blogs/high-demand-for-medicinal-plants-in-india>

<https://nmpb.nic.in/content/demand-and-supply-position-medicinal-plants>



### 3. PROJECT BRIEF

With the opening of new income generating opportunities, there is an expanding interest in medicinal and aromatic plants (MAPs) by rural populations and extremely poor households. They grow and collect MAPs from wild plants and sell which provide complementary source of income. Economic profitability from the cultivation of MAPs is significantly higher compared to the cultivation of traditional crops.

In India alone, 270 million people depend directly or indirectly on NTFPs, including medicinal and aromatic plants (MAPs), for their livelihoods. Several studies suggest that MAPs can help sustain and improve rural livelihoods through sustainable harvesting, improved market access, and value chain development. Diverse economic actors are involved in value chain activities such as collecting, domesticating, harvesting, trading, processing, and marketing MAPs. The sustenance and livelihoods of these actors depend directly and indirectly on MAPs. MAPs are selected as a notable livelihood-focused venture along with traditional farming system, which can provide farmers a regular income.

#### 3.1 Region under study – Bundelkhand

Bundelkhand is a rainfed, diverse, under-invested and climate vulnerable region with extreme weather conditions, like droughts, short-term rain and flooding in fields. The region has scarcity of water, with poor soil and low productivity. Although the rainfall pattern and the extent of irrigation in Bundelkhand theoretically favors kharif (monsoon) cultivation, most of the land is cultivated in the rabi (post-monsoon) season.

However, the region is endowed with wide range of favorable agro-climatic conditions that makes it ideal for producing and collecting medicinal and aromatic plants (MAPs). The diverse agro-climatic conditions in the region offer excellent scope for growing different horticultural crops like fruits, vegetables, spices, plantation crops, medicinal and aromatic plants. Medicinal and aromatic plants provide raw materials for use in the pharmaceuticals, cosmetics and drug industries. The indigenous systems of medicines, developed in India for centuries, make use of many medicinal herbs. These systems include Ayurveda, Siddha, Unani and many other indigenous practices.

Agriculture is the predominant occupation in Bundelkhand as majority of the population lives in rural areas. The land available and used for cultivation in the region is considerably lower than in other agriculture zones of the country. Secondary agricultural activities viz. animal husbandry and dairying, poultry, fisheries, bee-keeping and sericulture are also being taken up by a large number of people. Keeping in view the topographic and climatic condition of Bundelkhand, MAPs (Medicinal and aromatic plants) have better adaptability to climate change and have higher value and demand.

The report focuses on the comprehensive mapping of various components during the production (input supply, extension & financial services) and post-production stage (processors, marketers). This will be followed by the development of a road map for strengthening the MAPs value chain that includes the possible integrated farming systems and implementable business plans with the underlying focus on climate adaptation and livelihood diversification.

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Rasul G, Karki M, Sah R. 2008. The role of non-timber forest products in poverty reduction in India: Prospects and problems. *Development in Practice* 18(6):779–788.



## 3.2 Objective of the Study

The purpose of the assignment is to develop an action plan to:

1. Understand the current state of knowledge on MAPs cultivation and supply chain within Uttar Pradesh and UP's Bundelkhand region
2. Study the feasibility, economic and environmental profitability of promoting MAPs cultivation in the region.
3. Identify integrated farming models
4. Identify Stakeholders (both private & government) in the entire MAPs value chain from production to processing, sales & marketing in the region.
5. Recommend possible business models taking into consideration interventions at the production and post-production stage.

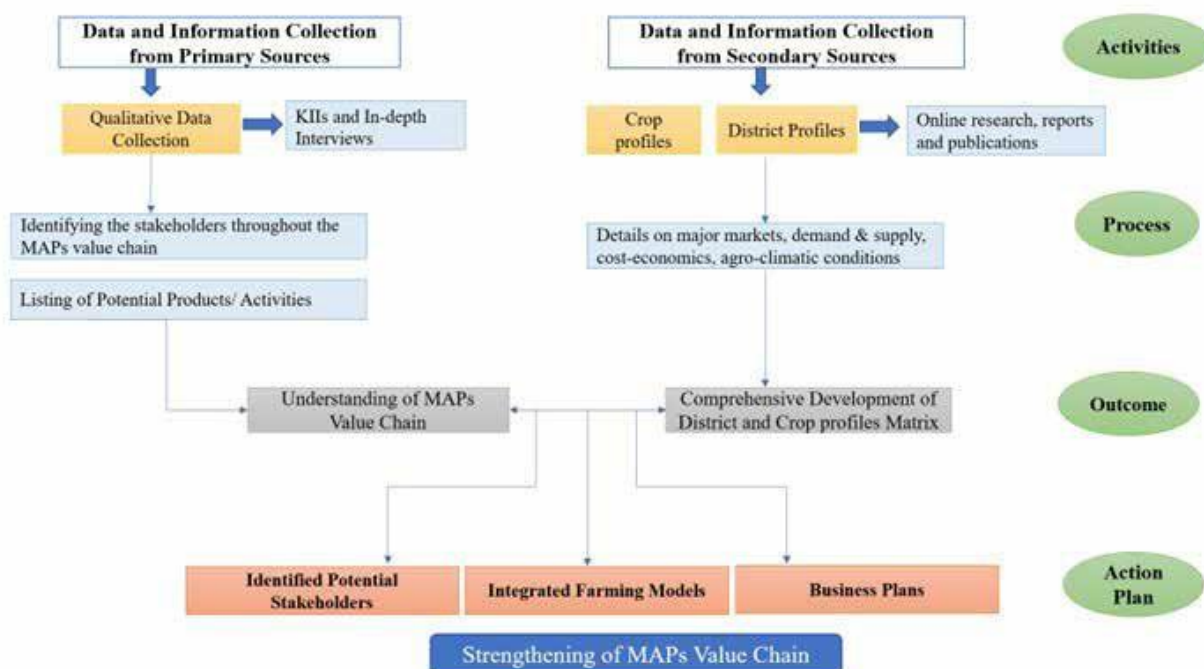
## 3.3 Approach:

For the developing the road map, a comprehensive approach focusing mainly on the consultative research with multi-level stakeholders including farmers, collectors, wholesalers, traders, government officials and researchers.

Based on the terms of the reference for the assignment, a step-by-step approach is adopted to undertake the comprehensive mapping of all the stakeholders, the preparation of integrated farming models and business models for the identified target groups.

To develop the road map on strengthening the value chain, a schematic of the approach and methodology followed for undertaking the assignment is presented in Figure 3.

**Figure 3 Approach & Methodology Framework**



### **3.4 Methodology:**

For getting the desired information from all the stakeholder, qualitative method of data collection to gather the primary information along with the secondary research has been adopted. The methodology focusses on collecting the information for the preparation of the integrated farming models, business plans and road map. The main data points collected are information on market, mapping of relevant stakeholders, comprehensive preparation of crop profiles and district profiles. Comprehensive desk research through secondary resources including reports, research papers, publications and data available on government web sites and portals has been organized to get the desired information on the identified crops and the districts. The consultants have also triangulated the data collected using both primary and secondary methods to accomplish the study.

#### **1. Secondary Data Collection**

Secondary information has been collected to prepare the district and crop profiles in order to gather a general understanding of the area, agro climatic conditions, forestry, livestock and the crops. Authentic sources have been used for the data collection i.e., NMPB (National Medicinal Plant Board), NABARD PLP (Potential Linked Credit Plan) Reports, ICAR (Indian Council of Agriculture Research) documents, Research papers, CIMAP reports, reputed journals and publications. (Details of papers is attached in the annexures).

#### **2. Primary Data Collection**

The primary data collection mainly focused on gathering information and findings from the different stakeholders to get a measurable output. To get the primary information, qualitative method of data collection has been adopted. The major part of the study has focused on the primary data collection from the field visit to all the seven districts. (List of all stakeholders mentioned in the annexure).

#### **Qualitative data collection**

For the specific group of stakeholders, face to face interviews/ meetings/ discussions have been undertaken with the government departments (Horticulture, Agriculture and Medicinal Board), processors, traders, buyers, industries & institutions like CIMAP, Central Agroforestry Research Institute, Indian Grassland and Fodder Research Institute(IGFRI). A semi-structured questionnaire has been administered for conducting the discussions and meetings with the stakeholders to get the desired measurable output.

### **3.5 Limitations of the Study**

- Data unavailability on individual crops production and area. The data on MAPs is clubbed under the category of horticulture crops, spices and herbs.
- No major information about the key buyers and trade practices from the farmers.
- Reluctance of some of the beneficiaries and unwillingness to share the information on their major sources of raw material and traders/agents.

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Questionnaire is attached in the annexure below.

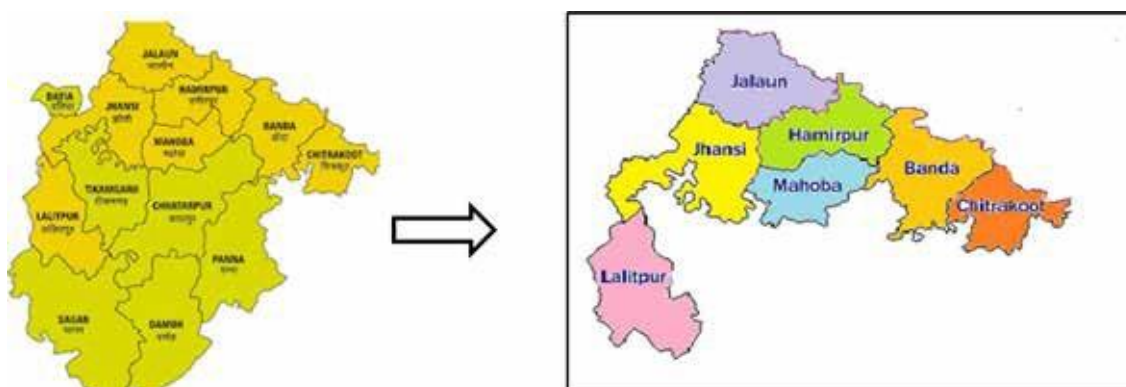




#### 4. ASSESSMENT OF THE TARGET AREA FOR CLIMATE ADAPTATION AND LIVELIHOOD DIVERSIFICATION

Bundelkhand region of India has distinct agro-climatic environment as compared to other parts of the country. The region is spread covering a large boundary in two states namely Uttar Pradesh and Madhya Pradesh. Altogether, 16 districts from both the states constitute Bundelkhand region. However, the present study is confined to the situation of seven districts viz., Jhansi, Jalaun, Hamirpur, Banda, Lalitpur, Mahoba and Chitrakoot of Bundelkhand region of Uttar Pradesh (UP) only.

**Figure 4 Project Area showing the 7 districts of Bundelkhand region, UP**



Bundelkhand region, situated in North-Central India is a notable example of semi-arid regions in India. The region is highly prone to the impacts of climatic variabilities. It is also one of the most underdeveloped regions of the country with poor human development indices. The region is a rainfed, diverse, under-invested, climate vulnerable, socio-economically heterogenous, culturally unique, agrarian part with extreme weather conditions, like droughts, short-term rain and flooding.

##### 4.1 Land Use Classification & Agro climatic conditions of Bundelkhand

The region comprises gently sloping uplands with the highly undulating landscape which includes rocky outcrops and plateaus as well as fertile plains, rivers, and ravines. Table 2 below shows land use classification in the region.

**Table 2 Land Use Classification<sup>12</sup>**

District	Total area in hectares	Percentage (%) of total area under different uses						
		Notified forest land	Non-agrius e	Barre n land	Grazing land	Under misc. tree crops	Cultiva- ble waste- land	Net sow n
Jhansi	5,01,329	6.9	8.4	6.3	0.1	0.2	3.1	68
Lalitpur	5,07,500	15	7.7	3	0.6	0.2	11.9	54.8
Jalaun	4,54,434	5.6	8	2.7	0.1	0.8	0.4	0.4
Hamirpur	3,90,178	6.2	8	2.4	0	0.2	1	79.1
Mahoba	3,27,429	4.9	11.3	2.6	0.1	0	3.5	72.8
Banda	4,38,767	1.2	6.7	2.6	0	0.3	2.5	80.1



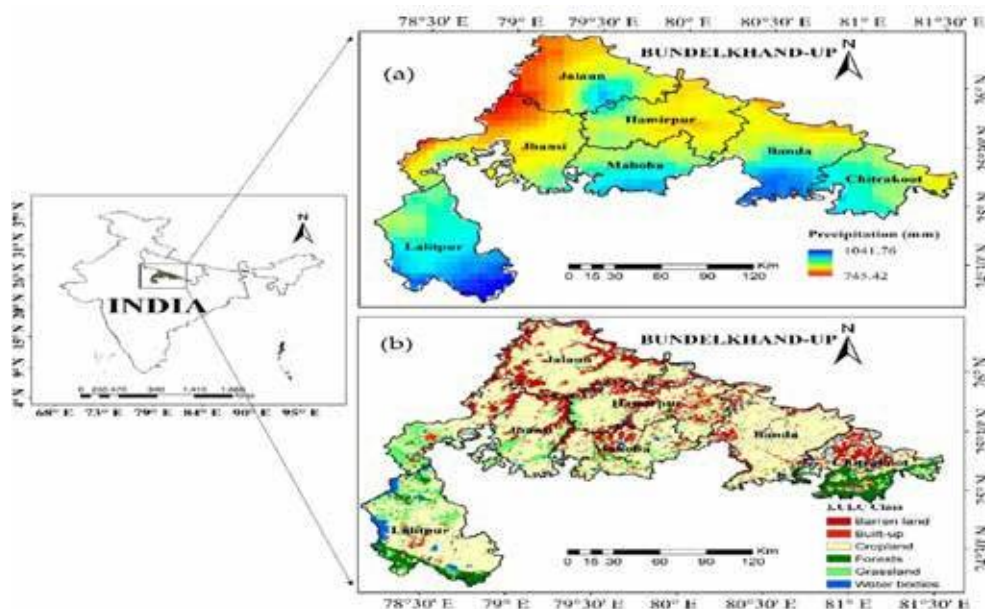
Chitrakoot	3,38,897	16.4	8.3	7.1	0	8.4	3.2	51.3
UP Bundelkhand	29,48,534	8	8.2	3.8	0.2	1.2	3.9	69

- Wastelands found in Bundelkhand can be grouped as: land affected by shallow, medium or deep gullies, wastelands with or without scrub in lowlands or uplands; degraded notified forest lands and barren, rocky and totally uncultivable land.
- Around 7% of cultivable land lies fallow in any year.
- Average number of rainy days in Bundelkhand is 52 days (metrological department of India) but during recent years it is restricted to 24 days.
- Average precipitation is 800-900 mm but the occurrence and distribution of rainfall did not have any definite pattern.
- The minimum and maximum temperature ranges between 5–10 °C and 35–48 °C respectively. This region encounters a repetitive uncertain and erratic precipitation pattern.

#### 4.2 Soil and Irrigation status of Bundelkhand

- The region has 16.81 million ha of cultivated area, constituting 70% of the total geographical area. The irrigated area is over 73%. The declining soil health due to multi-nutrient deficiencies, soil salinity/alkalinity and low input use efficiency has led to declining food grains production.
- The principal rivers are the Sindh, Betwa, Shahzad River, Ken, Bagahin, Tons, Pahuj, Dhasanand Chambal. The Kali Sindh, rising in Malwa, marks the western frontier of Bundelkhand. Parallel to this river, but further east, is the course of the Betwa. The Yamuna and the Ken are the only two navigable rivers.

Figure 5 (a) long-term CHIRPS data derived annual average precipitation map, and (b) the land use



Drought conditions are frequent in the region, leading to unstable socio-economic conditions. The varying temperature conditions influence the crop productivity in summers as well as in winters (due to frost). Monsoon is a critical determinant of the sowing time, which has been varying drastically in the past few years, causing big loss to the farmers due to the paucity of correct and timely information. The ecosystem stability is at a loss due to deforestation, resource exploitation (Figure 5 a, b).



### 4.3 MAPs Cultivation as a Climate Adaptation Strategy in the Region

The pattern of rainfall has shown tremendous fluctuation both in terms of quantity and distribution of precipitation. Thus, the agro-climatic conditions and the availability of wasteland in the region indicates that it is under environmental stress. Not only the amount of rainfall has reduced immensely (up to 50%) but also the amount of rainfall is increasing during the non-beneficial period of Feb-March indicating an adverse effect of climate change in the region.

A study conducted by ICAR-Central Soil Salinity Research Institute, Karnal has generated very useful data on the adaptability of various varieties of MAPs that can be commercially cultivated under the environmentally stressed situation and polluted soil conditions.

**Table 3 Suitable MAPs under various environmental stress and polluted soil conditions**

<b>Stress Category</b>	<b>Intensity of stress</b>	<b>Recommended MAPs</b>
<b>Moisture</b>	Moderate	Andrographis paniculate (Kalmegh)
	Severe	Cymbopogon martini, C. flexuosus, Vetiveria zizanioides (Vetiver/Khas)
<b>Salinity</b>	Moderate	Vetiveria zizanioides (Vetiver/Khas)
	Severe	Cymbopogon martini (Palmarosa), Cymbopogon flexuosus (lemongrass)
<b>Polluted soils/ degraded</b>	Gullied and/or Ravenous areas	Cymbopogon flexuosus, Vetiveria zizanioides
	Undulating upland	Cymbopogon flexuosus, Vetiveria zizanioides
	Surface water logged/ marshy area	Vetiveria zizanioides, Cymbopogon martini,
	Mining industrial Wasteland	Cymbopogon flexuosus (lemongrass)
	Forest, pasture, non-forest soils	Cymbopogon flexuosus, C. martinii, Vetiveria zizanioides,

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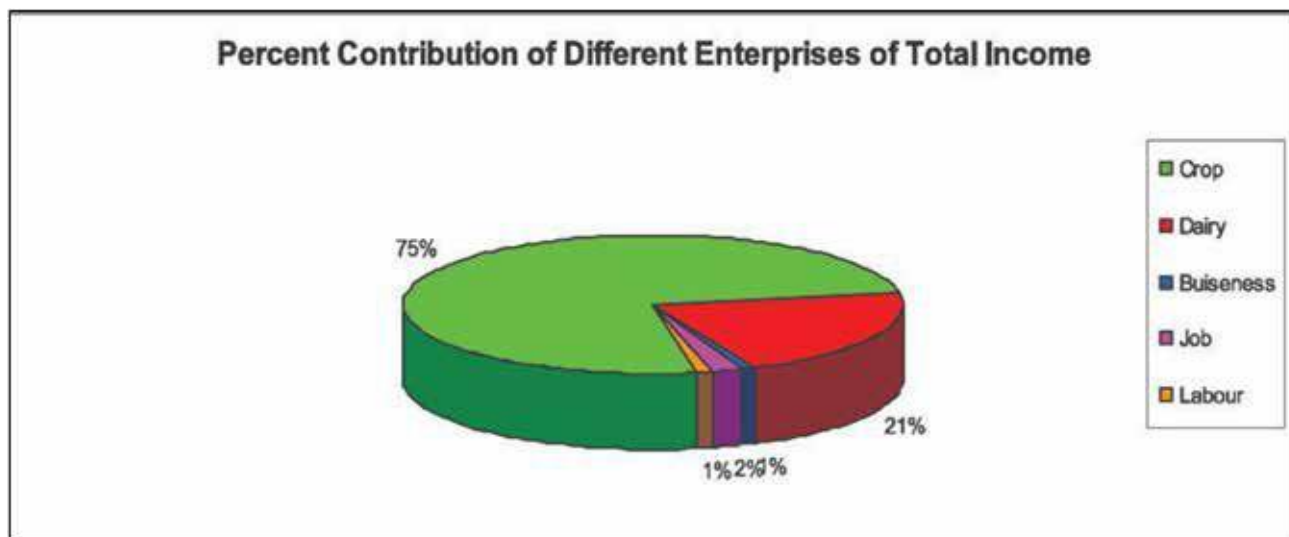
ICAR-Central Soil Salinity Research Institute, Karnal  
 ICAR-Central Soil Salinity Research Institute, Karnal



#### 4.4 Impact of Climate Change on the Region's livelihood

The economy of Bundelkhand region is predominantly agrarian; over 80% of population is dependent on agriculture, livestock, taking advantage from forest and outsourcing income by seasonal migration after Rabi sowing. Livelihood analysis carried out in 2002 for Jhansi District in Uttar Pradesh is quite a representative of Bundelkhand region. On an average 96% of the farmers' income in the region is being earned from crop and livestock enterprise alone.

Figure 6 Percent Contribution of Different Enterprises in total income



The impact of climate change was evidently visible

- Agriculture-based livelihoods and food grain production has decreased by 58%, it is very serious for the agriculture-based society and economy.
- Series of drought spell of 4 to 5 years in the last 2 decades creating crisis to the land and the people of the region.
- The dry topography of Bundelkhand is coupled with underprivileged socio-economic conditions.
- The incidence of poverty in the state is among the highest in the country, with people living below the poverty line increasing from 44.6% in 1993-94 to 48.6% in 2004-05.
- Agricultural losses and frequent droughts force the vulnerable communities to migrate to the cities. The drought period of 2003-2009 witnessed a migration of 40% of region's population.

Thus, it requires mainstreaming climate change adaptation in the current planning process in order to address the issues of growing vulnerabilities and threatened livelihood security of poor communities.

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***And the current study focusses on medicinal and aromatic plants value chain as a cross-cutting and overarching approach which will not only address climate resilient development in future planning processes but will offer opportunities for livelihood diversification.***

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<https://hindi.indiawaterportal.org/content/iwrm-rehabilitation-bundelkhand-region-uttar-pradesh/content-type-page/51072>

Report on Drought Mitigation Strategy for Bundelkhand Region of Uttar Pradesh and Madhya Pradesh, Inter Ministerial Central Team, Government of India, 2008



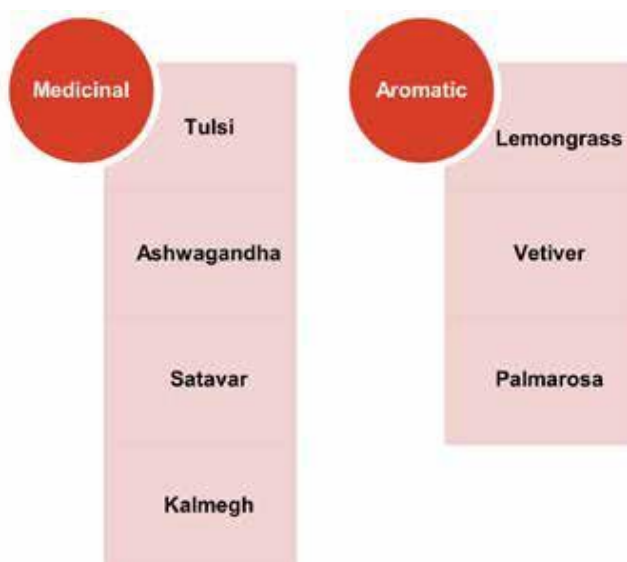
## 5. AN ASSESSMENT OF VALUE-CHAIN OF MAPs

A value chain is a vertical alliance of stakeholders and enterprises collaborating to various degrees along the range of activities required to add value to a product from the initial input supply stage, through the various phases of production, to its final market destination. However, in case of MAPs, it is very complex and not linear in nature since product range is unique.

MAPs commercialization involves a complex network of activities starting from plant harvesting, first processing at farm level, secondary processing, packaging, and commercialization to final consumers. Several stakeholders are involved in the MAPs supply chain. The presence of various stakeholders and many intermediaries often reduce transparency and put coordination between actors at risk. Collectors and growers are recognized as the most important element in the supply chain. This group includes the local population (self-employed workers), organized into FPOs in few cases or working independently. The growers often carry out the basic processing at the farm level so that they can sell it further to the processors and the wholesalers for further processing like distillation, drying or extraction in order to obtain a commercial product.

In the MAPs industry for processing purpose, usually the processors receive the raw material from the growers through big traders, or they also receive the fresh or semi-dried plant materials from the collectors and complete the further processing themselves as per the product requirements. These processors or manufacturers process the raw material into essential oils, dried plants, or extracts.

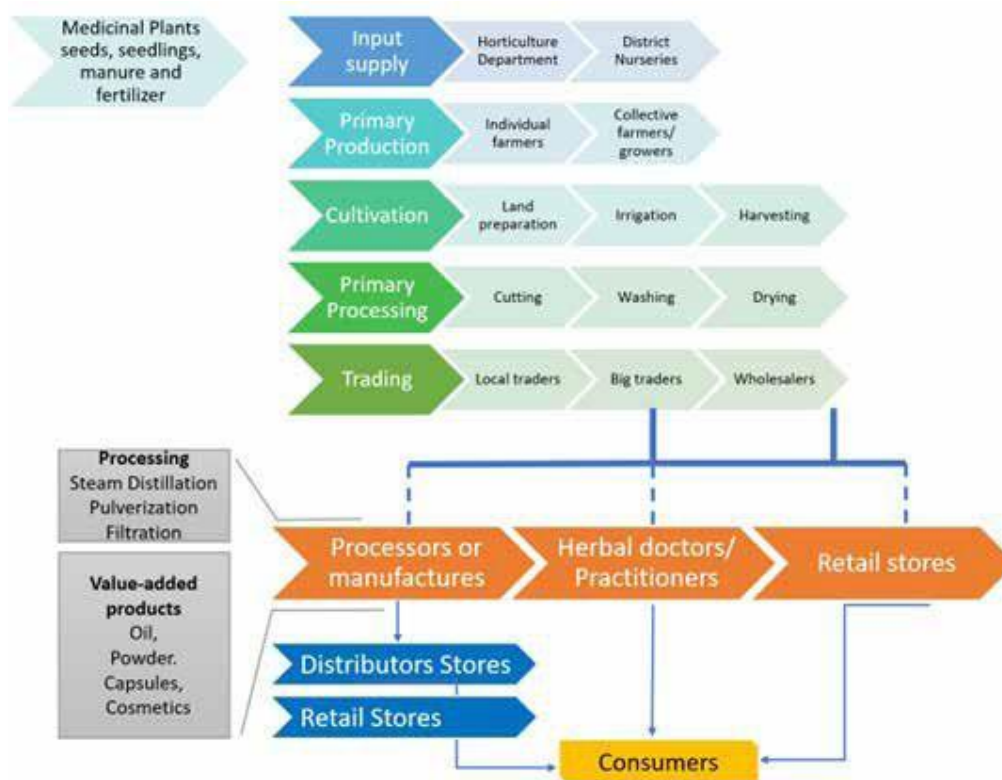
Mentioned below are the value chains of the seven crops selected for the current project based on the primary study by Central Institute of Medicinal and Aromatic Plants (CIMAP). They are categorized into two categories i.e., medicinal and aromatic plants. The existing value chains of each of the MAP's produce is presented graphically.



## 5.1 Value-Chains of Medicinal Plants

The present study involved the value-chain analysis of the following medicinal plants i.e., Tulsi, Ashwagandha, Satavar, and Kalmegh. Described below is the schematic representation of the value chain for medicinal plants from the primary survey findings.

Figure 7 Value Chain of Medicinal Plants



### 1. Tulsi

Scientific name: *Ocimum sanctum*

Parts used: Leaves, Roots or the Whole plant

Major value-added products:

- Tulsi oil
- Tulsi capsules
- Tulsi leaf powder
- Tulsi syrup

Climate change adaptability features:

1. Requires warm and humid climate
2. Can be cultivated in varied soil-types
3. Minimum water requirement
4. Can be grown in adverse agro-climatic conditions such as dry, semi-arid and arid.

#### Key findings:

1. One of the majorly growing medicinal plants in the districts of Bundelkhand.
2. Among the 7 districts, Jhansi district has the maximum cultivation of Tulsi (Shyam variety) mainly in Bangra, Gursrai and Mauranipur blocks.
3. Progressive farmers in Jhansi are cultivating Tulsi on a large scale.



## 2. Ashwagandha

Scientific name: *Withania somnifera*

Parts used:

- Root,
- Panchang – Whole Plant

### Major value-added products:

- Ashwagandha root powder
- Capsules
- Root extract
- Herbal tea

### Climate change adaptability features:

1. Subtropical and tropical climates
2. Annual rainfall of 600 to 750 mm
3. 1-2 late winter rains are sufficient for its roots to develop fully

### Findings

1. Majorly cultivated in the districts of Jhansi and Jalaun
2. High fluctuation in prices and is primarily determined by the quality of the roots
3. 5 to 6 cuttings are taken in a year
4. Low fertilizer requirement

## 3. Satavar

Scientific name : *Asparagus racemosus*

Parts used : Tuberous root

Major value-added products:

- Satavar root powder
- Capsules
- Juice

Climate change adaptability features:

1. Sub-tropical to sub temperate climate
2. Less irrigation

### Key Findings

1. Low area under the commercial cultivation in the region.
2. The adoption rate for its cultivation is low due to its long duration.
3. Lack of technical knowledge.
4. In Hamirpur district few progressive farmers are cultivating Satavar with support from the horticulture department as mentioned during the meeting with DHO, Hamirpur.

## 4. Kalmegh

Scientific name: *Andrographis paniculata*

Parts used: Whole Plant

Major value-added products:

- Kalmegh powder
- Capsules

Climate change adaptability features:

1. Hot and humid conditions with ample sunshine.
2. Temperature-20°C



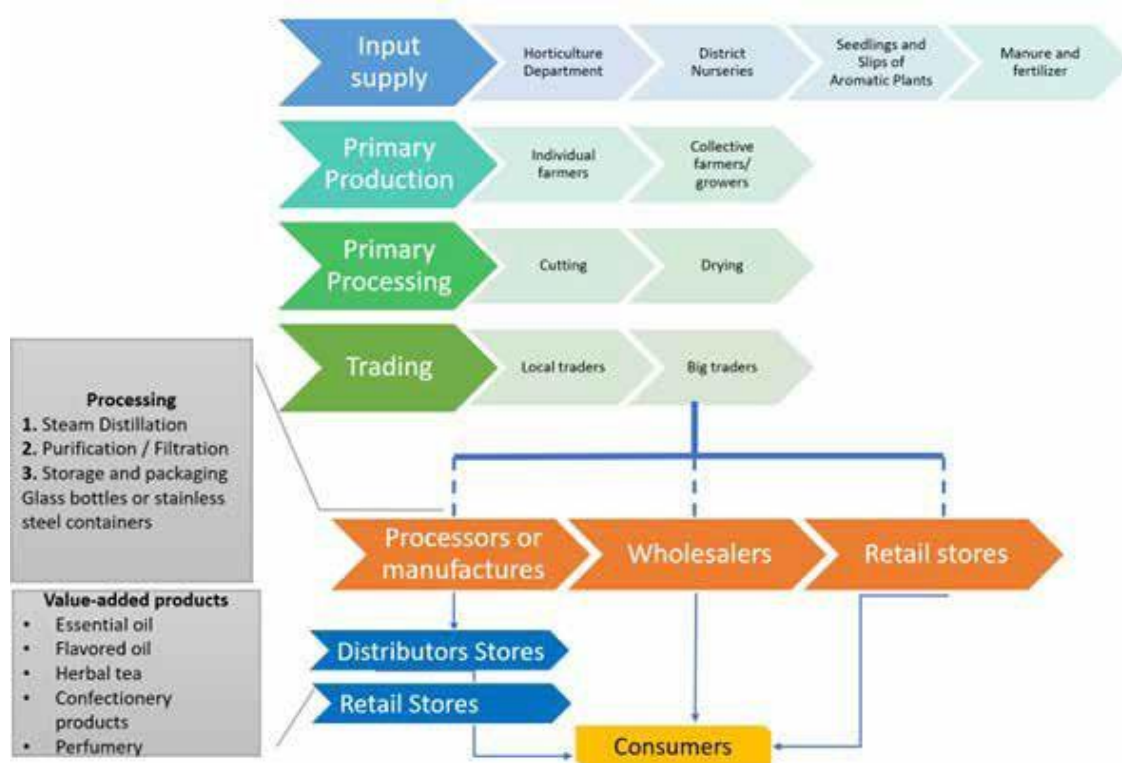
## Key Findings

1. Low area under the commercial cultivation in the region.
2. A suitable crop for intercropping with pigeon pea that can be adopted in the integrated farming models.

## 5.2 Value-chains of Aromatic Plants

The present study involved the value-chain analysis of the following aromatic plants i.e., Lemongrass, Palmarosa and Vetiver. Described below is the schematic representation of the value chain for aromatic plants from the primary survey findings.

Figure 8 Value chain of Aromatic Plants



### 1. Lemongrass

Scientific Name: *Cymbopogon flexuosus*

Parts used: Leaves

Uses and Value-added products:

- Essential oil
- Flavoured oil
- Herbal tea
- Confectionery products etc.

Climate change adaptability features:

1. Tropical and subtropical climates at an elevation up to 900m.
2. Warm and humid climate with sufficient sunshine
3. Rainfall 250-330 cm and temperature ranging from 20-30°C.





## Key Findings

1. One of the major growing crops in the region along with Tulsi
2. Many FPOs in the region are cultivating lemongrass on a large scale. One of the FPO, named Dev Baba Bio-Energy FPC is involved in the cultivation of lemongrass.
3. Majorly cultivated in the districts of Chitrakoot (Ramnagar and Karbhi block), Banda (Baveru, Narayani and Tilwari block)
4. A suitable crop for intercropping with fruit crops that can be adopted in the integrated farming models.

## 2. Vetiver

Scientific Name: *Vetiveria zizanioides*

Parts used:

Roots

### Uses and Value-added products:

- Perfumery
- Fragrance industries- scenting of soaps
- Herbal drinks

### Climate change adaptability features:

1. Temperature ranges -15 °C to +55 °C
2. Optimum temperature 25 °C
3. Climate moderately humid
4. Annual rainfall -1000 to 2000 mm.

## Key Findings

1. Low area under the commercial cultivation in the region.
2. Farmers are aware of the potential of the aromatic plants but very few are adopting its cultivation because of no proper information on the market.

## 3. Palmarosa

Scientific Name: *Cymbopogon martini* var. *motia*

Common Name: Palmarosa

Parts used: Whole plant

### Uses and Value-added products:

- Essential oil
- Flavouring tobacco
- Blending of soaps.

### Climate change adaptability features:

1. High temperature of 15 to 35°C
2. Warm and humid climate
3. Annual rainfall of 90-150 cm



## Key Findings

1. Low area under the commercial cultivation in the region.
2. Major challenge in the cultivation of Palmarosa as mentioned by the Horticulture Inspector, Banda district is that in the district the cultivation was not successful because of the two reasons i.e., the stray animals mostly graze on them and there are many instances of fungal infection in the roots of the plant.
3. The district Mahoba has some area under cultivation for Palmarosa crop.

### 5.3 Key Takeaways from the Value-Chains Assessment of MAPs

In the value chain systems of the 7 MAPs examined as above, it is found that intermediaries/ agents manipulate the pricing from both farmers and end manufacturers due to very few buyers in the region. To increase the value chain efficiency and competitiveness improvements in production system alone will not necessarily improve the lives of the rural poor. Value chain strengthening is a potentially powerful tool for promoting and strengthening livelihood and diversification strategy. Therefore, well planned and targeted interventions are crucial to create opportunities for the rural growers and collectors and young agripreneurs. Thus, strategies for strengthening the value chain are necessary which are described below:

Product/Process Upgrading	Functional Upgrading	Strengthening Horizontal and Vertical Linkages
Product diversification and improved product characteristics Improvement in certification, food safety and traceability Increased efficiencies through the reduction of unit production costs	Increasing/ upgrading or reducing/ downgrading the number of functions Introducing value-added activities in processing, grading, packaging etc. Eliminating non-value added functions	Improving horizontal linkages at the same functional level (producer mobilization, aggregation and capacity building) Improving vertical linkages among stakeholders at different functions (Infrastructure development, MSPs, market infrastructure)

Growers- Farmers and collectors of medicinal and aromatic plants have history of selling products as sourcing material at the farm gate sometime even without drying at the lowest market level. Therefore, such raw material fetches minimum possible price, which is often not enough to sustain the production cost. Under such circumstances, value addition is the only possible answer for economic survival of production as well as the sustainable supply of the sourcing material. Value addition means, anything that is done to raise the value of the product in the market. The value-added practices are going to be the key for the future of sustainable farming as well as sourcing since it will enable the growers to advance economically without targeting the unsustainable increase in productivity from the land.

Building social capital for improving efficiency of the chain and strengthening of medicinal plant chain both vertically (e.g., producer–industry), as well as horizontally (e.g., strengthen the producer organizations) is essential to increase people’s trust and ability to cooperate, and expand access to markets by networking of actors involved in the chain.



## 5.4 The Current area under Medicinal and Aromatic Crops in Bundelkhand

It is estimated from a market research study that an approximately 2.5 lakh hectares area is under the cultivation of medicinal and aromatic plants in Uttar Pradesh (Table 4). Among this, mint or Mentha occupies the maximum area of 2 lakh hectares. Other medicinal and aromatic crops that are mostly cultivated on comparatively smaller scale by the small and marginal farmers are lemongrass, Palmarosa, Tulsi, Satavar, Ashwagandha, Kalmegh and Sarpagandha. These crops are combinedly grown/ cultivated in an approximate are of 50,000 hectares as indicated in the table 4 below.

**Table 4- Area under MAPs in Uttar Pradesh**

S.No.	Name of Crop	Estimated area (Ha)
1	Mentha arvensis	2,00,000
2	Khas (Vetiver)	15,000
3	Lemongrass	10,000
4	Rosha Ghas (Palmarosa)	10,000
5	Tulsi	10,000
6	Shatavari	2,000
7	Kalmegh	1,000
8	Sarpagandha	1,000
9	Ashwagandha	1,000
	Total estimated area	2,50,000

## 5.5 Major Clusters of the identified MAPs in the region

The 7 identified districts have a reasonable base of MAPs production and thus a cluster-based approach brings a direction to look at clusters which are defined as those areas where the concentration of any commodity geographic-wise, production-wise, area-wise are clubbed together.

For network formation specific areas are first identified that are growing same plants or has the potential for growing the plants. Then such areas are clubbed together and formed as cluster, in each network, there are collection centers for aggregation and upward movement of the produce to the market.

Through the primary study, for each of the crops all the districts are listed where the cultivation of the plants is maximum and can be formed as a cluster for that particular crop and all the stakeholders involved in the value-chain of that particular plant can achieve higher returns by forming larger farmers groups, aggregating products, improving quality, enabling larger scale buyers to directly purchase from the market, and/or take products up the value chain. Table 5 shows the major districts for each of the identified MAPs.

**Table 5 District-wise major crops**

Medicinal Crop	Districts
Ashwagandha	Jhansi, Jalaun
Tulsi	Jhansi, Lalitpur, Jalaun, Mahoba, Hamirpur
Satavar	Jhansi, Hamirpur
Kalmegh	Mahoba, Jalaun

Status of Medicinal and Aromatic Plants in Uttar Pradesh- their production, marketing, current status & future projections, Market Intelligence Survey Report, 2019-20

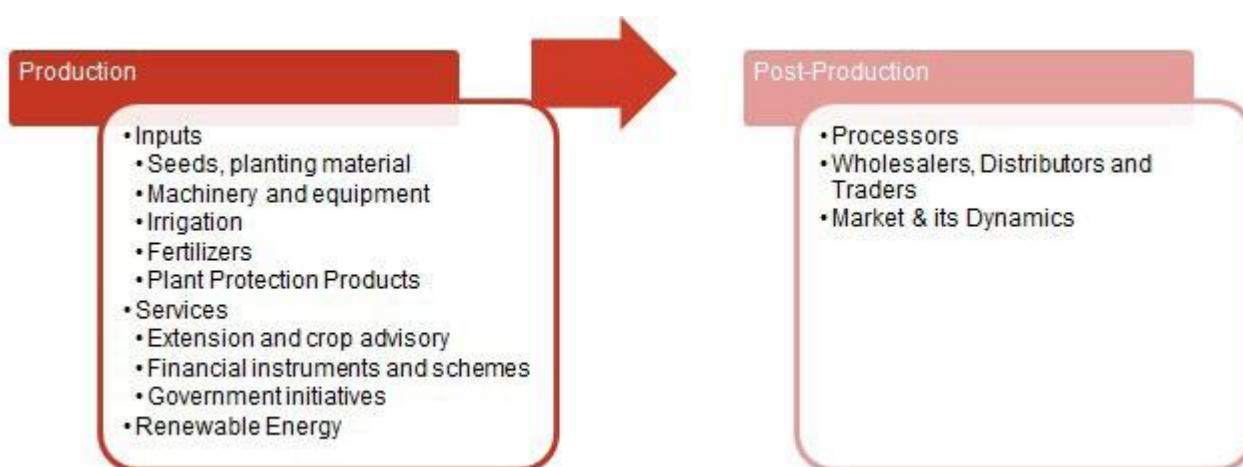


Aromatic Crop	Districts
Lemongrass	Chitrakoot, Banda
Vetiver	Hamirpur, Lalitpur
Palmarosa	Banda, Lalitpur, Hamirpur

## 6. COMPREHENSIVE MAPPING OF VARIOUS COMPONENTS IN THE MAPs VALUE CHAIN

The importance of cultivation of medicinal and aromatic plants is increasing steadily nowadays. This section of the report focuses on the production side of the value-chain that includes the stakeholders involved at the various stages during the production of medicinal and aromatic plants.

Figure 9 Comprehensive Mapping



### 6.1 Comprehensive mapping at Production stage

#### 6.1.1 Input Providers

Availability of quality seeds and planting material are essential for the cultivation of medicinal and aromatic plants. Provision of superior seeds to farmers should be a key focus area. The present scenario in Bundelkhand region reveals that all the inputs such as seeds, fertilizer, pesticides and herbicides, the farmers are mostly sourcing the from the horticulture department through district nurseries.

A reputed Research institute, CIMAP that has been declared as the Centre for Quality Planting Material of Medicinal Plants is also one of the key providers of high-quality planting material. The list of departments visited is attached in the annexure.

Table 6 Mapping of Input Providers

Components	Existing input providers
Seeds and Planting material	Horticulture Department (district nurseries), CIMAP
Fertilizers	Agriculture department and Existing chains of whole- salers, retailers, and village level stores.



Agrochemicals (Pesticides, weedicides and insecticides)	The requirements for agrochemicals are very minimal and the existing input channel like wholesaler, retailer and village level stores meets the requirement.
Machinery and equipment	There is no specific machinery requirement for the cultivation of MAPs and farmers are using the existing facilities for the farming practices. *The list of CHCs for the district of Hamirpur is attached in the annexure.
Irrigation	The water requirement for the medicinal and aromatic crops are minimal. The state government runs the subsidy scheme for PMKSY for the adoption of micro-irrigation (drip and sprinkler) for all the crops as mentioned in the table 7 below. This will help farmers to adopt the Integrated farming models, if they want to set-up a micro-irrigation facility for fruit orchards & MAPs.

**Table 7 Components of PMKSY scheme**

S.no.	Program	Name of crop	Planting (m)	Unit cost per ha	Grant per ha.	
1)	Drip	Mango, Amla	10x10	26507	23854	21203
		Guava,	6x6	35114	31603	28091
		Lemon,	4x4	42046	37841	23637
		Pomegranate	2x2	84109	75698	67287
		Vegetable	105x1.5	98443	88599	78754
			1.8x0.6	62689	83420	74151
1.2x0.6	115000		103500	92000		
2)	Sprinkler	Cereal & Pulses	63mm.	22473	20226	17918
			75/90mm	25186	22667	20149
			75mm	39690	35721	31752
			90mm	21780	19602	17424
3)	Mini Sprinkler	Vegetable	8x8	94028	84625	75222
			10x10	85212	76690	68169

## 6.2 Comprehensive mapping of Support Services

### 6.2.1 Facilitators and Extension and Crop Advisory Service Providers

During the primary visit to the districts in Bundelkhand, different stakeholders mapped at the beginning have been consulted who are providing the extension and crop advisory services for medicinal and aromatic plants.

These include primarily, various research and educational institutes, KVKs, and departments.

Following are the different stakeholders mapped for this purpose and tabulated below:



**Table 8 List of extension and crop advisory service providers**

<b>Research and Educational Institutes</b>	<b>KVKs</b>
CAFRI (Central Agroforestry research institute, Jhansi)	KVK (Krishi Vigyan Kendra), Jhansi
IGFRI (Indian Grassland and Fodder Research Institute)	KVK, Jalaun
Banda University of Agriculture and Technology	KVK, Chitrakoot
Institute of Agriculture and Research, Jhansi	KVK, Banda

## 6.2.2 Financial Instruments and Schemes

### 1. Ministry of AYUSH

#### Central Schemes- NMPB (National Medicinal Plant Board)

NMPB has several promotional and commercial schemes for providing technical and financial assistance to government organizations, NGOs, R&D institutions, industrial units, associations of growers/traders, individual growers etc. Following schemes are being implemented by the NMPB for production, processing and infrastructure development for overall development of medicinal plants sector :

#### a) Central Sector Scheme for Conservation, Development and Sustainable Management of Medicinal Plants, Ministry of AYUSH, Government of India

Components relevant under this scheme:

- Herbal garden
- Training and capacity building
- Other promotional activities

The details of the components are mentioned in the annexure no.2.

#### b) National AYUSH Mission (NAM)

NMPB is Promoting commercial cultivation of medicinal plants. The board now supports commercial cultivation of 116 listed species under 3 sets of subsidy regimes i.e., 50%, 30% and 70%. Following (Table 9) is the list of identified species of the project. List of Prioritized Plants for Cultivation Under Scheme of NMPB.

#### Plants eligible for Subsidy

**Table 9 Plants eligible for 50% subsidy**

<b>Botanical Name</b>	<b>Common Name</b>	<b>Cost per Acre for 2016-17</b>	<b>Subsidy Eligibility</b>
Rauwolfia serpentina Benth. ex Kurz	Sarpagandha	36602.5	50% Subsidy

<https://pib.gov.in/newsite/PrintRelease.aspx?relid=187278>

National AYUSH Mission, Operational Guidelines, Medicinal Plants, Department of AYUSH, Government of India  
National AYUSH Mission, Operational Guidelines, Medicinal Plants, Department of AYUSH, Government of India



Andrographis paniculata (Linn.) Burn	Kalmegh	14641	30% Subsidy
Asparagus racemosus Wild.	Shatavari	36602.5	30% Subsidy
Ocimum sanctum Linn.	Tulsi	17569.2	30% Subsidy
Withania somnifera (Linn.) Dunal	Ashwagandha	14641	30% Subsidy

### c. Voluntary Certification scheme for medicinal plant produce (VCSMMP)

To encourage Good Agricultural Practices (GAP) and Good Field Collection Practices (GFCP) in medicinal plants and enhance quality and safety of these plants, the National Medicinal Plants Board (NMPB), in collaboration with the Quality Council of India (QCI), has launched a Voluntary Certification Scheme for Medicinal Plant Produce (VCSMPP).

The steps for voluntary certification scheme of NMPB are as follows:

- Application for certification: The first step is to submit an application for certification to the NMPB. The application form can be obtained from the NMPB website.
- Inspection of the farm: After the application is received, an inspection of the farm is conducted by the NMPB. The inspection is conducted to check the quality of the plants and the farm operations.
- Certification: Once the farm passes the inspection, the NMPB issues a certificate of compliance. The certificate is valid for 3 years.
- Renewal: The certificate must be renewed after 3 years by reapplying for certification and passing another inspection.
- Surveillance: The NMPB conducts random surveillance of certified farms to ensure that the standards are being maintained.

### 6.2.3 Government Initiatives for Medicinal and Aromatic Plants

- The National Medicinal Plants Board (NMPB), Ministry of AYUSH facilitates market linkage for medicinal plant raw materials rather than AYUSH products. The National Medicinal Plants Promotion Board (NMPB) has launched the e-CHARAK mobile application as well as a web portal for the promotion and marketing of medicinal plants/herbs.
- 'e-CHARAK' is a platform for information exchange among various stakeholders, primarily farmers, involved in the medicinal plant sector throughout the country. The "e-CHARAK" application supports various local languages and provides a fortnightly market price of 100 Medicinal Plants from 25 herbal markets throughout India. (Source: Meeting with Market Head, Mr. Saurabh, NMPB).
- Department of Commerce and Industry has set up Export Promotion Councils for promoting exports of various product groups / sectors. The mandate of export promotion of Herbs and Medicinal Plants has been assigned to Shellac & Forest Products Export Promotion Council (SHEFEXIL), headquartered at Kolkata.
- The export promotion of several Herbal Products has been assigned to Pharmaceuticals Export Promotion Council (PHARMEXCIL), besides others. These EPCs facilitate the exporting community and undertake various export promotional measures for promotion of export of their products
- Under Market Access Initiative (MAI) Scheme of the Department of Commerce and Industry, the EPCs / Trade Bodies are provided financial assistance for participation and organizing Trade Fairs, Buyer Seller Meets (BSMs), Reverse Buyer Seller Meets (RBSMs), Research & Product Development, Market Studies, etc.
- Ministry of Ayush through its Quality Certification programme like Ayush mark and Premium mark



is also assisting industry in setting up of quality standards.

- Ministry of Ayush has entered into MoUs with few countries for promotion of traditional medicine which will help exports in long run.

### 6.3 Potential for Renewable Energy Application in Medicinal and Aromatic Plants Value Chain

Among all the available renewable energy sources, solar energy is the most preferred one, owing to its nature, abundant availability, and cleanliness. Solar thermal applications can be used for drying, heating, cooling, cooking, and power generation. Research and development activities of solar dryers have been focused by many researchers because drying sector is a large energy consumer.

At present MAPs farmers in Bundelkhand are doing open sun drying as it is the most common method adopted for drying the medicinal and aromatic plants. However, the quality is mainly affected by different foreign particles such as dust, dirt, and infestation by insects, rodents, and animals.

The quality of the dried product can be protected by hot air drying or infrared drying at a constant temperature. However, the initial investment and energy consumption of these conventional drying processes are very high. Thus, the solar driers as a great scope in the better value-addition of the medicinal and aromatic plants that can help farmers fetch better prices for their produce.

<b>Benefits of Solar Drying</b>	Less operational costs
	Non-polluting process
	Minimizes the physical and chemical reactions
	Improve the qualities of dried products
	Can be used for direct and indirect heating
	Offers low energy consumption
	Better nutritional values

#### Renewable energy status in the region

The present scenario of renewable sources of energy like the solar sector is booming in Bundelkhand. Presently it accounts for 500 MW daily of the solar energy produced by Uttar Pradesh. It is part of an ambitious plan by the UP-State Government to develop the region into a solar power hub. The solar energy policy in 2017 was created to promote private participation in the field of solar energy. Under this solar park have been established and solar power is given open access to third-party sales. Eleven private solar power companies have so far set up power stations in the region.

By 2016, about 200 MW power was being supplied from private solar power plants installed at Panwadi (Mahoba) and Hamirpur. A 20 MW solar power plant at Chahitara village in Banda district has also been in operation since 2016. As of 2022, more than 500 MW is generated daily by the solar plants.

The UP government has signed an MoU with the Israeli government for the India-Israel-Bundelkhand water project. Under this project, irrigation will be carried out in the region using advanced agriculture techniques and integrated drip irrigation. Water from the Phuj Dam in Jhansi will be used for the drip irrigation facility which will be extended to all of Jhansi and some areas around it. The state government is giving a major push to drip or micro irrigation, especially in areas like Bundelkhand where water availability is limited.





Overall, the solar energy of Bundelkhand region can be tapped for a better climate adaptation strategy.

## **6.4 Comprehensive Mapping at Post-Production Stage**

### **6.4.1 Processors**

Processing of the harvested medicinal and aromatic plants are done in two stages: semi-processing and alteration in the preparations. The first stage of the processing includes activities like cleaning the organic material stuck to the herbal species by drying; building concentrates, disinfecting, boiling and grinding. Marketing processed products adds value to their produce thereby allowing them charge higher prices for the same. The processing stage involves numerous activities including the drying, packaging, storage which enhance the shelf life and assist the marketing of the medicinal plant products.

The existing network of processors is unorganized in the Bundelkhand region and is primarily done by the local traders and agents of few of the big buyers like Baidya Nath and Organic India.

### **6.4.2 Wholesalers Distributors and Retailers**

The wholesalers and the retailers constitute the organized part of the medicinal plant value chain. The assessment from the primary visit also reveals that the upstream actors in the value chain i.e., the cultivators and collectors in are unorganized and scattered in nature, while the downstream actors, the wholesalers and retailers are relatively formal in their structure.

There are some local retail shops also that plays a crucial role in connecting to the consumers. During the visit to a small retail shop in Mahoba district, it is found that the retailers also act as a small primary level processor. As stated by one retail outlet proprietor, the raw material is procured from the wholesalers and in certain cases, directly from the producers (processors) and offer the medicinal plant products in the market to the consumers for the ultimate consumption.

The retailers provide the function of connecting the producers with the consumers. The distributors, on the other hand perform, similar functions like the retailers but they interact with both the wholesalers and the retailers while the retailers interact only with the consumers.

### **6.4.3 Market Linkages Scenario**

From the discussions, it has been found that the producers of MAPs often receive relatively low prices for their products because of the low volume, remoteness, poor transportation and lack of marketing linkages, and lack of market information and storage and processing facilities.

Growers of medicinal plants have little direct access to the market, resulting in high degree of wastage, and low returns for farmers. The marketing channel for medicinal plant parts, is unorganized and unregulated. Though there are FPOs present and progressive farmers working in the region, the lack of efficient market linkages still stands as an issue for all the farmers.

Some of the market linkages that have been identified from the field visits are:

- Traders linked to industries like Organic India and Baidyanath Company in Jhansi, Jalaun and Hamirpur
- Some of the FPOs are also linked to traders in Barabanki, Lucknow, Raebareli.
- Other market linkages for the growers found are in the Neemuch Market in Madhya Pradesh.
- The growers or collectors of Lalitpur and Jhansi district can be linked with the market of Madhya Pradesh.
- From the field visit, it is found that major market points for the medicinal and aromatic plants identified



are in Lucknow, Barabanki, Raebareli in Uttar Pradesh and Neemuch in Madhya Pradesh.

#### 6.4.4 Buyers

In Bundelkhand, there are various small buyers that procure the raw materials either directly from the farmers or through agents. The leading buyers of the region are Baidyanath and Organic India Company. Some of the other major buyers in the sector of Medicinal and Aromatic Plants are:

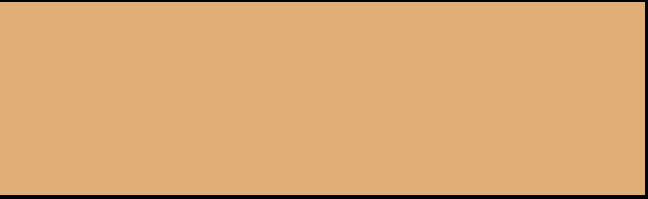
- Patanjali
- Emami
- Himalayan
- Cultivator Natural Product Ltd.
- Kunath Pharmaceutical
- Lotus Botanicals
- Mama Earth
- Herbalife Nutrition
- Dabur

#### 6.5 Market Dynamics of MAPs

Economic parameters for MAPs sector	Economic parameters for Local Market
There are various indicators or set of parameters which represents the true value, sustainable cultivation and trade of MAPs for farmer and national benefits.	Generally, there is a disproportionate and inverse relationship between price per unit and the mass of the product sold. Means, there is inverse proportion between the price and weight of the end products from the medicinal & aromatic plants
In Bundelkhand region, the main driver for the cultivation of medicinal plants could be in two components i.e., pull and push effects.	Generally, there is a disproportionate and inverse relationship between price per unit and the mass of the product sold. Means, there is inverse proportion between the price and weight of the end products from the medicinal & aromatic plants.
The pull effects refer to the factor that attract farmers to cultivate MAPs, rather than traditional crops. As mentioned during the few meetings and interactions with the farmers, it is analyzed that few factors like attractive prices, fixed market channels, price assurance by agents and monopoly of the group of producers in cultivating these crops, will promote the farmers.	One of the key constraints mentioned by most of the stakeholders during the primary visit was that the price of the medicinal and aromatic crops is determine by various factors that leads to less price realization mostly for the growers.
Whereas, push effects are dominated by the uncertainty of net income generated from the traditional seasonal crops due to various factor and product market imperfections. This makes farmers more inclined towards the cultivation of MAPs.	Volume of the product is one such factor that determines the price. Sale values are subordinate for the sales of higher quantities of the product relative to the sales of lower quantities.
Well-established market channels prompt	The price of harvesting plant species fluctuates based on access of the harvester to the resources and the distance of trading markets from the harvesting sites.



farmers to cultivate MAPs. Therefore, under the current climatic shifts, low productivity of traditional field crops has significantly pushed the farmers towards medicinal crops for profit maximization.

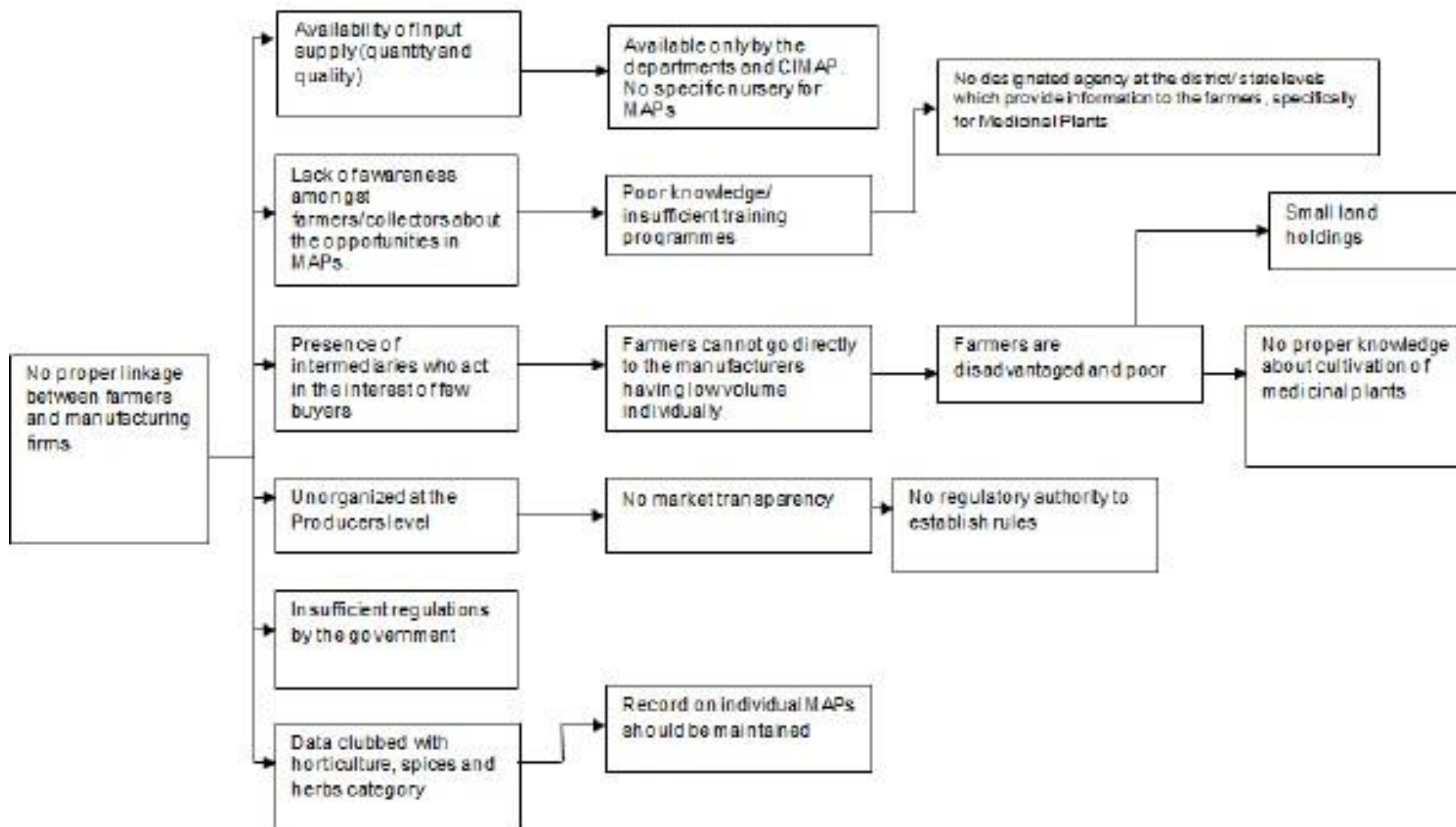




## 7. GAP ANALYSIS AND CONCLUSIONS

Based on the primary study conducted through KIIs (key-informant interviews) and interaction with the farmers and the major stakeholders involved in the value-chain of medicinal and aromatic plants, following major gaps have been identified and depicted below:

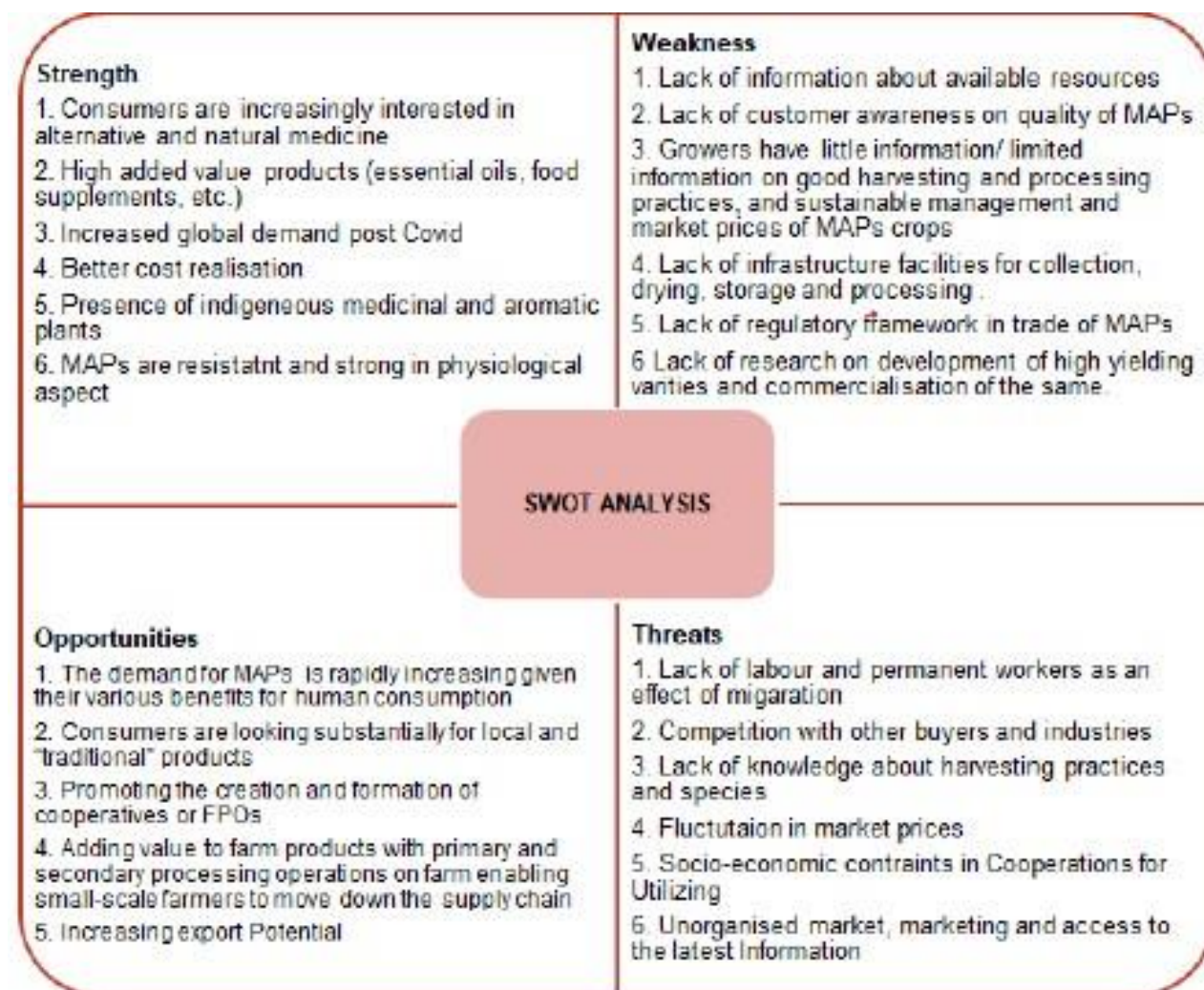
**Table 10 Activities for cultivation of MAPs**



**Figure 10 Gaps in the medicinal and aromatic plants value-chain**

## 7.1 SWOT Analysis for adopting MAPs for commercial cultivation

A SWOT analysis looks at future possibilities through a systematic approach of introspection into both positive and negative concerns.



## 7.2 Contribution of MAPs to Livelihood Enhancement

Medicinal and Aromatic Plants (MAPs) are important elements for economic development and are a key generator of rural employment. MAPs comprise an important source of income to families living within forest areas, consolidate food security, satisfy nutrition needs, and provide various medicinal remedies. Medicinal and aromatic plants provide better remuneration than other crops and therefore a very excellent for livelihood diversification.

### 7.2.1 Opportunities

Today, in many developing and transition countries like India, MAPs make an essential contribution to health care, providing the only effective medicine for the significant proportions of the population, where other forms of medication are either unavailable or unaffordable. Most of these species are used only in folk medicine and the majority of the Medicinal and aromatic plants trade occurs within countries at local level. These local markets provide a potential lucrative trade opportunity for small-scale farmers.



Medicinal and Aromatic Plants have become essential in supporting farm households with income generating activities, and also provides a 'safety-net' if other anticipated incomes fail, and overall can help the rural economy by contributing to subsistence medicine and health care provision. With many MAPs, cultivated and/or sustainably wild harvested, their marketing can provide a complementary source of much needed ready cash for small-scale farmers. Furthermore, activities related to the farming, collection and primary processing of medicinal and aromatic plants represent primary opportunities for rural women to engage in income generating activities.

Bundelkhand region is one of the most backward regions in India. The economy of the region remains backward as compared to the national average. The economy of this region remains substantially low to the national average (Human Development Report, Bundelkhand; 2012). The level of living conditions was assessed separately for Housing Index (HI), Physical Capital Index (PCI) and Asset Index (AI). Effective actions should be taken to enhance the agricultural production in low developed districts by providing fertilizer, irrigation facilities creating the job opportunities and other facilities for improvement of the socioeconomic status of the households of backward districts.

The collection and marketing of these plants provides an important source of income for communities living in local areas. Medicinal and aromatic plants (MAPs) are traded both as raw materials and as processed finished products. Demand for wider variety of species is increasing day by day as more and more people are turning towards Ayurvedic treatment for complex ailments.

## 7.2.2 Key hurdles in the adaptation of MAPs

### 1. Market Development

- Presence of few buyers in the region leading to monopoly on the buying of raw materials from the growers and eventually leads to lower prices to the farmers and collectors.
- Development of networks between producer and processors.
- Product branding or trademark development that links the product with the geographical area of origin, tradition or culture and history
- Lack of local markets for primary processed products
- Lack of access to latest technological and market information and no market infrastructure
- In most cases, they do not have a guaranteed market and price premiums for cultivated material.
- Farmers do not get reliable market information about demand and pricing, which puts them in a vulnerable position when they go for sale.

### 2. Processing

- Primary processing done at the farmers' level needs significant improvement

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Mahapatra, A.K., Albers, H.J. & Robinson, E.J.Z. *The Impact of NTFP Sales on Rural Households' Cash Income in India's Dry Deciduous Forest. Environmental Management* 35, 258–265 (2005). <https://doi.org/10.1007/s00267-003-8203-9> *Assessing the level of living condition in Bundelkhand region of Central India: a households level analysis* Manob Das. Arijit Das. Ashes Mandal *Geoportal* [https://doi.org/10.1007/s10708-020-10220-5\(0123456789\(\).,-volV\)](https://doi.org/10.1007/s10708-020-10220-5(0123456789().,-volV))  
*Study of Aromatic and Medicated Plants in Uttarakhand, India: With Focus On Role In Employment Generation And Supply Chain Management* R. Pangriya (2015) *Int. J. Soc. Sci. Manage. Vol-2, issue-2: 148-156* DOI: 10.3126/ijssm.v2i2.12396



- Farmers are not aware on the process of valorization of the by-products produced in the distillation and drying processes
- Poor harvesting and post-harvest treatment practices
- Inefficient processing techniques leading to low yields and poor-quality products
- Poor quality control procedures followed

### **3. Procurement Problem**

The major problems faced by the farmers cultivating MAPs are

- Unavailability of enough quantity and good quality planting material.
- Lower price remuneration to the farmers because of very few buyers in the region.
- Risk of delayed supply.
- Damages occurring while transporting the materials from far off destinations.
- Risk involved in identifying and selecting the right supplier.
- Problems associated with low productivity, poor availability of inputs and loss of genetic purity.

### **4. Heavy metal contamination**

- Mining either by opencast or by underground methods damages the water regime and thus causes a reduction in the overall availability of water in and around the mining areas. Mining is also a major activity causing water pollution.
- The presence of heavy metals such as Mn, Ni, Fe, Cu, Si and Pb in high concentration in groundwater causes an adverse effect on human health and making that water not potable and fit for drinking and irrigation purpose. Leaching of heavy metals during the rainy season to the surface water bodies as well as to the groundwater systems also affects the water quality.
- Health and safety risks associated with the usage of this groundwater for the cultivation of crops is immense. This affects the crop growth and quality and leading to difficulty in adopting the organic cultivation of the MAPs.
- During the visit to the Biofach Exhibition one of the traders mentioned about the concern of increasing heavy metal contamination in the water that is affecting the quality of the plants and eventually leading to difficulty in the adoption of organic farming.

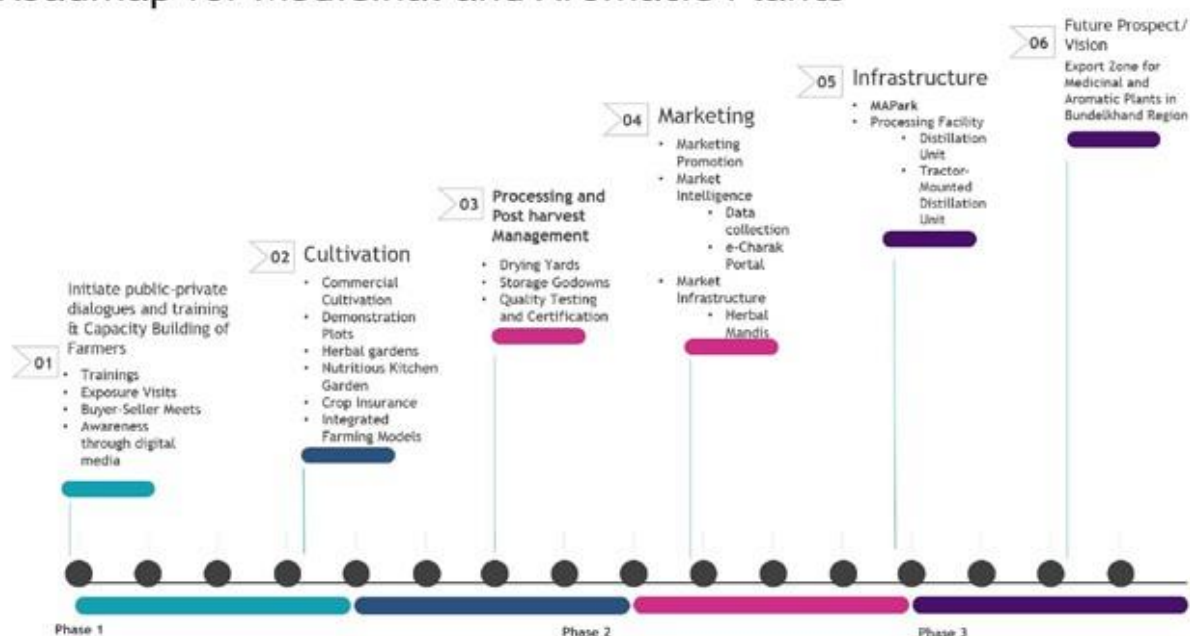


## 8. PROPOSED INTERVENTIONS

### 8.1 Strategies and Recommendations for the strengthening of medicinal and aromatic plants value chain- the road map

The road map for the strengthening of MAPs value-chain takes into account 3 premises - the strategic planning, focus on the climate-change adaptation and livelihood diversification. Therefore, an integrated approach is required to promote the medicinal plants right from the stage of cultivation, collection, storage, processing, packaging to marketing in an organized manner for selected medicinal plant species. Innovative institutional mechanism to organize small producers and link them to the market is required, which can also take the responsibility of training and capacity building as well as introducing the required technology. Therefore, the concept of cluster development has been evolved to integrate the medicinal plant production at the village level to national and international markets.

#### Roadmap for Medicinal and Aromatic Plants



#### 1. *Initiate Public-Private dialogues and training & capacity building of farmers*

The interventions for the road map identified require policy or public sector action, many challenges faced by the sector can be addressed directly by the private sector and/or in partnership with the government as well. Thus, it is suggested to initiate public-private dialogues to begin the interventions.

Research institutes like CIMAP, CAFRI, and other agriculture universities along with the KVKs, Horticulture department can conduct various awareness programmes and campaigns for the farmers on the importance of the cultivation of the MAPs. This will ensure more mobilization and conversion of the farmers towards the cultivation. The campaigns can be organized on various themes ranging from cultivation to marketing (Table 11).





**Table 11 Activities for awareness campaigns**

<b>S.no.</b>	<b>Recommendation</b>	<b>Action Points</b>
1.	Publicity through regular participation in Exhibitions/Fairs.	Implementing national campaign by engaging NGOs/KVKs/Aaganwadi etc.
2.	Organizing Workshops/Seminars/Conferences/Arogya Fair etc.	Ministry of Environment, Forest & Climate Change (MoEF&CC), Govt. of India can also facilitate conducting the workshops/ seminars to create awareness on the use of MAPs as a climate adaptation strategy. NMPB also provides support in conducting workshops and seminars.
3.	Launching mobile exhibitors or spreading the message of medicinal plants through role plays, audio visuals, expert advice on medicinal plants conservation, cultivation and uses.	Organizing weekly Haats for medicinal plants to facilitate marketing of produce by collectors and cultivators. Preparing video clips at ground level/ farmer experience which can be displayed in Arogya (s) at outdoor venues.
4.	Demonstration of technologies developed by institutions at farmer's fields/conservation areas and natural habitats.	KVKs can provide the extension services for showcasing the technologies to the farmers.

Training and Capacity building of farmers and all the other stakeholders across the value chain is necessary from cultivation to marketing of medicinal and aromatic plants through various activities like exposure visits, buyer-seller meets and trainings is recommended.

It is recommended to develop training modules for all the stakeholders to ensure maximum efficiency without sacrificing quality. Training in nursery techniques, methods of planting and sustainable harvesting, storage, drying, distillation, pressing, maceration, and extraction. The training of the farmers and the development of the training modules can be done in coordination with the CIMAP, CAFRI (Central Agroforestry Research Institute), other research institutes and agriculture universities, KVKs (Krishi Vigyan Kendra) and SMPB (State Medicinal Plant Board).

Every year at least two training sessions can be organized by the universities and KVKs on production and processing.

## ***2. Promotion of commercial cultivation of medicinal and aromatic plants***

The MAPs cultivation programs will provide great opportunity to farmers and unemployed youth to get employment locally. It has been shown that medicinal and aromatic plants have better remuneration than the other crops thus, it can increase the livelihood of the farmers. Indeed, given the demand for a continuous and uniform supply of Medicinal and Aromatic Plants and the accelerating depletion of forest resources as well, increasing the cultivation of Medicinal and Aromatic Plant species is an important strategy for meeting the growing demand. Activities that can support these interventions are:



S.no.	Recommendation	Action Point
1.	Support development and production of high-quality planting material of medicinal plant species to be promoted for commercial cultivation	No. of farmers targeted could be 20 farmers from each of the cluster.
2.	Support establishment of institutional medicinal plant nurseries for commercial production of initial stock of high-quality planting material.	A small/hi-tech nursery in 1 ha area can be set up. Identification of the location and registration of nursery
3.	Promotion of herbal gardens. Women farmers can be promoted.	No. of farmers targeted can be 20-50 farmers in each cluster.
4.	Support setting up of on-farm demonstration trials of different Integrated Farming Models (agro-forestry models, Horticulture based and Livestock models) with medicinal plants.	No. of demonstration plots: 10 plots in each cluster. Research institutes along with the KVKs & members of FPOs can do the demonstration plots as a collaborative program.
5.	Promotion of Community Nutritious Garden	This model can be adopted as an integrated farming model by the farmers.
6.	Crop Insurance	Medicinal plants are a new activity under farming and therefore, farmers need to be covered with crop insurance. This component seeks to provide assistance towards payment of 50% of the premium for the particular crop.

Outcome: Through the interventions of these activities under the cultivation, around 150-200 farmers can be benefitted from each of the cluster. This will lead to increased production and generation of good quality planting materials for medicinal & aromatic plants.

### 3. Processing & Post-Harvest Management

Farmers and collectors of medicinal and aromatic plants have history of selling products as sourcing material sometime even without drying at the lowest market level. Therefore, such raw material fetches minimum possible price, which is often not enough to sustain the production cost. Under such circumstances, value addition is the only answer for economic survival of production as well as the sustainable supply of the sourcing material. Thus, it is recommended to train the farmers about the importance of processing at the farm level.

Processing of the Medicinal and Aromatic Plants add value, stabilize properties for a longer shelf life, and improve hygiene and increases the product value. Drying is the most commonly important processing technique for these plants. Thus, it is recommended that drying or shade drying should be done by the farmers. This is the lowest cost option for the farmers in which they have to chop the plant material into small pieces and place onto permeable material that allows airflow from all directions and dried away from air pollution and dust.



Lack of adequate post-harvest infrastructure is another key bottleneck in promotion of the strengthening of the value chain of medicinal and aromatic plants. Hence, it is recommended to develop large-scale and small-scale infrastructures (distilleries/oil extraction unit) at cluster-level approach under Public Private Partnership mode.

**I) Drying yards:** Drying yards are set-up to accomplish the primary task of drying the products in hygienic conditions. In addition, cleaning and grading infrastructure is an essential activity to be linked to drying to increase the shelf life and the market price of herbs. Since herbs have to be dried in shades, drying yards with shade net provision or facilities for low temperature drying will have to be created.

**ii) Storage godowns:** The storage godowns are expected to receive produce from nearby drying yards. The storage godowns act as a link between drying yards and processing units. Storage godowns have to be adequately ventilated and set up at strategic locations. The storage godowns and drying yards have to be located in such a manner that they are not very far from the farmlands and cater to the identified clusters of cultivation.

**Table 12 Infrastructure facilities**

S.No.	Recommendation	Action Point
1.	Support in setting up common drying yards.	No. of drying yards: 5 for each cluster. Drying yards can be set up under the NMPB scheme of central sector scheme for conservation of medicinal & aromatic plants.
2.	Support in the development of post-harvest handling infrastructures like storage godowns.	No. of godowns: 5 godowns for each cluster. It can be set up under the central sector scheme.
3.	Support in setting up mobile laboratories for quality, testing and certification.	Setting up of lab or certification from research institutes can be done. On pilot basis also mobile laboratories equipped with necessary equipment can be set up.
4.	Strategies for better or improved value-addition practices for MAPs.	Training of farmers on various methods of value-addition and post-harvest handling practices. It includes: Direct Value- addition: grading & sorting; cleaning; proper drying; packaging. Indirect Value-addition- organic certification & quality testing. Semi-processing of medicinal plants- powder, extract formulations.

**Outcome:** Through these interventions there will be improved post-harvest practices for handling medicinal & aromatic plants. The facilities like drying yards and storage godowns can help farmers to fetch better market prices if they sell better value-added products. Increased value-addition leads to increased market value of the produce.



#### 4. Marketing

Very few farmers participate in commercial markets due to lack of access to market information and understanding as to how the market operates. The inability to access agricultural marketing information has denied most of the farmers, the opportunity to effectively plan and market their produce. Furthermore, lack of access to market information is one of the contributing factors to the slow development of market opportunities. During field survey most of the farmers reported inadequate market information owing to which they were dependent on local traders.

S.No.	Recommendation	Action Points
1.	Market promotion	Conducting trade fairs, exhibitions and display facilities of value-added products from medicinal & aromatic plants.
2.	Market Intelligence	<ul style="list-style-type: none"> <li>• Awareness on the e-Charak portal by NMPB.</li> <li>• Making available product intelligence.</li> <li>• Providing information on high price markets.</li> <li>• Improving the dissemination of market intelligence.</li> <li>• Providing price forecast before sowing and during harvesting of selected farm commodities</li> </ul>
3.	Market Infrastructure	Setting up of herbal mandis. Site selection for setting up the mandi.

Outcome: Through these interventions following outcomes can be achieved:

- Awareness of market prices and better market outreach.
- Exploring different marketing options.
- Improved market linkages between growers and the traders/industry.

#### 5. Infrastructure

The infrastructure facilities for medicinal and aromatic plants are an integral part of the industry. Setting up these facilities will be strengthening the value chain. Following recommendations are proposed for the infrastructure facilities:

S.No	Recommendations	Action Points
1.	Setting up of a mobile distillation unit.	Tractor-mounted mobile distillation unit can be set up. CIMAP has already initiated this technology and this can be taken up by an FPO for improved distillation facility.
2.	MAPark (Medicinal and Aromatic Park) in Bundelkhand Region.	Dialogues with the relevant ministries for setting up the MAPark. (MOFPI, Ministry of Environment & climate change are some indicative names that can initiate the process. Under this MAPark, the identified MAPs varieties can be taken and the necessary infrastructure facilities i.e, processing units, storage godowns, drying yards, herbal mandis,



**Note:** MAPark: Similar concept of setting up of a TRIFOOD by MOFPI (Ministry of Food Processing Industries) and Ministry of Tribal Affairs & TRIFED has been initiated.

## 6. Institutional Research and Development

Research and development aspects related to medicinal and aromatic plants sector in the country have been significant. However, the past efforts on the subject have been far too scattered, too small and too short-lived failing to make the desired mark. Thus, the following recommendations should be taken up by all the research organisations involved in the sector for the strengthening of the overall value-chain.

- Sustainable preservation of wild species of MAPs is extremely important. MAPs exploitation and proper ecosystem management and conservation can stand together.
- Improving cultivation techniques.
- Knowledge dissemination and training.
- Explore new applications of MAPs in many different fields.
- Research into new MAPs-based products
- ToT (Transfer of technology) to farmers for better adaptability.
- Focused research is lacking for the cultivation of medicinal and aromatic plants.
- New species that are suitable for the climate require further research.
- Commercial adaptation of the MAPs is recommended.



## 8.2 Recommended Integrated Farming Models

In India, MAPs are considered as a notable livelihood-focused venture along with traditional farming systems, which can provide farmers a regular income (Source 4). Various factors such as habitat destruction, over exploitation, illegal exploitation, changing climate, etc. decreased the availability of MAPs in wild. Cultivation of MAPs is therefore, considered as one of the important methods for conservation and uplifting the socio-economic conditions of rural inhabitants. Studies have shown that this will ensure regular supply of raw material to industries and uplift economy of local farmers as well.

The DFID has developed a ‘Sustainable Livelihood Framework’ (SLF) which is one of the most widely used livelihoods frameworks in development practice. Sustainable Livelihood Approach focusses on people-centered, holistic, dynamic, building on strengths and sustainability as its core principles. Through this approach all the factors that influence the vulnerability context are analyzed and various livelihood strategies are implemented to achieve more income, increased well-being, reduced vulnerability, improved food security and more sustainable use of natural resource base as its major outcomes.

By adopting from this model, the inclusion of cultivation of medicinal and aromatic plants to bridge the income gap of the growers, the adoption of integrated farming models is one such approach to livelihood diversification.

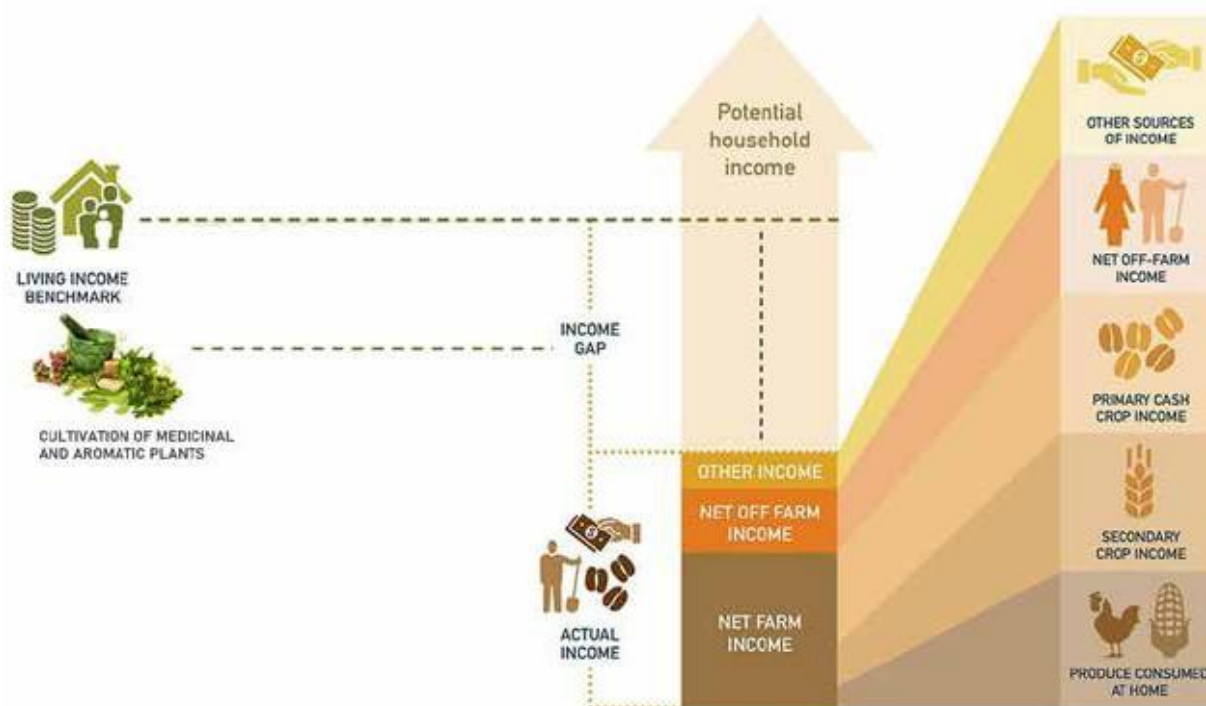


Figure 12. Integration of MAPs to bridge the income gap (Adapted from DFID Model)

## Possible Integrated Farming Models

Integrated farming system or integrated farming is the type of farming in which various types of agricultural production activities or agricultural enterprises take place simultaneously. It delivers more sustainable agriculture, provides a dynamic approach and can be applied to any farming in the world. The benefits and goals of integrated farming aim at enhancing productivity per unit area, profitability, proper waste management, soil health management, livelihood improvement, fight against deforestation and overall environmental safety. The practice of integrated farming also includes promotion of agroforestry, increased input efficiency, cost minimization, employment generation, energy saving and continuous income round the year to name a few.

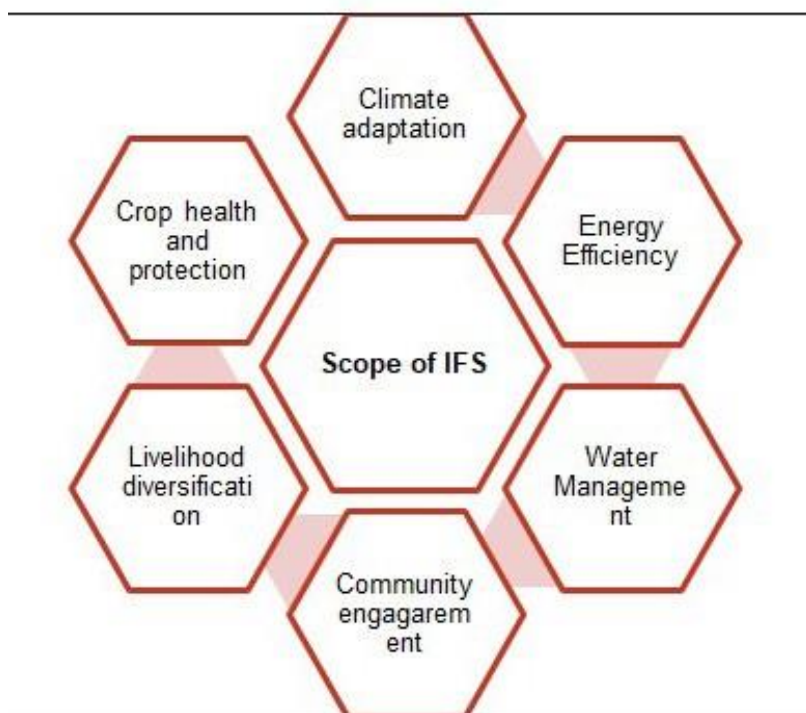


Figure 16. Scope of IFS

The cultivation of Medicinal and Aromatic Plants (MAPs) requires proper integration into the existing cropping systems as complementary rather than supplementary systems are more desirable. Through this study it is also recommended that in addition to the advancement in R&D domains, it is also necessary to generate data on potential inter or mixed-cropping systems of medicinal and aromatic plants that have high demand and suitable to the climate of Bundelkhand region. This new paradigm will not only provide extra returns to the farmers without disturbing the food production but would also provide an attractive alternative to land and resource usage optimization. This integration process focusses on the identified seven medicinal and aromatic plants that can fit into the agro-calendar, have high environmental adaptability, with simple post-harvest primary processing requirements, better physiological and agronomic computability with the food crops.

The integrated farming models were mostly suggested during the meeting with Dr. Ashok Yadav, CAFRI Institute, Jhansi. Based on the findings from research institutes, horticulture department and combined with secondary research the following integrated farming models are suggested. The integrated farming models are categorized in the following categories mentioned below. A brief explanation of each of the category is also presented in the report.



**Table 14 Recommended Integrated Farming Models**

<b>Cultivation Domains</b>	<b>Combination</b>	<b>Major Advantage</b>
MAPs + Agro-forestry	Lemongrass/Palmarosa + Poplar	More carbon sequestration*; enhanced microbial diversity in the soil; ecosystem sustainability; safety to main crop from wild animals
MAPs + Horticulture Crops	Lemongrass + Guava Lemongrass + Aonla	More income from the underutilized land; early returns; sustainability; enhanced productivity
MAPs + Rainy season Crops	Palmarosa + Cowpea Tulsi + Pigeon pea Kalmegh + Pigeon Pea Palmarosa/Vetiver + Urd and Moong Tulsi + Jowar	Assured and regular income from rainfed farming; Natural and cost-effective weed management in rainy season
MAPs + Winter season Crops	Lemongrass + Peas	Less competitive production in sub-tropical & irrigated plains; optimal resource utilization; better land utilization for sustaining soil fertility
Other Domains	Combination	Major Advantage
MAPs + Goatry	Ashwagandha + Goatry	Assured regular income and resource utilization, reduction in production cost
MAPs + Dairy	Tulsi + Dairy	Assured regular income and resource utilization, reduction in production cost

### 8.2.1 MAPs + Horticulture



#### Introduction

Agriculture is the principal occupation of the farmers in Bundelkhand region. They mostly cultivate cereals and pulses along with the cultivation of the horticulture crops like fruits and vegetables. The commonly growing fruits in the area are aonla, guava, citrus, pomegranate and mango. Integration of these fruit crops with lemongrass will result in increased income and better utilization of the available resources.





## Details of IFS

**Land size:** The average landholding for the integrated farming model is proposed for 1 hectare of land.

**Horticulture plot:** Guava can be planted at the standard spacing of 6m X 6m. In case of aonla, planting is also done at a spacing of 6m X 6m in pits of 1m X 1m.

**Medicinal and Aromatic Plot:** Lemongrass will be planted on the same land in between the spacing of the fruit crops.

**Irrigation:** Drip irrigation for both the crops will be set-up for efficient water management during the irrigation period.

## Impact of IFS

- More income from the underutilized land
- Early returns
- Sustainability
- Enhanced productivity

## Cost benefit analysis of both the crops (Agro-economics / ha)

Table 15 Cost Benefit Analysis for MAPs and horticulture

Lemongrass	Guava	Aonla
Essential oil yield: 200-250 kg	Yield: 3 T / 2700 kg	Yield: 150 q (15000 Kg)
Market Price of Oil: Rs. 850-900/Kg	Market price: Rs. 60-100/kg	Market Price: Rs. 30-32/kg
Gross return: Rs. 1,80,000	Gross return: Rs. 2,70,000	Gross return: Rs. 4,50,000
Cost of Cultivation: Rs. 60,000	Cost of Cultivation: Rs. 1,70,000	Cost of Cultivation: Rs. 4,20,000
Net Return: Rs. 1,20,000	Net Return: Rs. 100,000	Net Return: Rs. 30,000



Lemongrass/ Palmarosa and Poplar

## 8.2.2 Maps +

### Agroforestry

#### Introduction:

The dwindling supplies from natural sources and increasing global demand, the cultivation of MAPs needs to be increased to ensure the regular supply as well as conservation. Since many of the MAPs are grown under forest cover and are shade tolerant, agroforestry offers a convenient strategy for promoting their cultivation and conservation. Several approaches are feasible: integrating shade tolerant MAPs as lower strata species, cultivating short cycle MAPs as intercrops with existing plantation crops or new forest plantation. For agroforestry integrated system, alley cropping is one much used method for integration.

#### Type of cropping system

**Alley Cropping:** An agroforestry practice where agricultural or horticultural crops are grown in the alleyways between widely spaced rows of woody plants.

The aromatic grasses such as vetiver, lemongrass and Palmarosa can be grown on field bunds and soil conservation bunds.

#### Tree species:

Poplar (*Populus deltoides*) is a deciduous tree. These are very fast-growing trees under ideal climatic conditions. Poplar's wood and bark are used for making plywood, boards, matchsticks and for making sports goods and pencils. In India, plant can grow up to a height of 85 feet or above with in life span of 5 to 7 years.

The tree will be planted at a spacing of 5m X 5m or 6m X 2m. For the first two years, intercropping can be done with lemongrass or Palmarosa. It will help farmer to earn more income during the initial years of poplar cultivation.

Other tree species: Plants like arjuna (*Terminalia arjuna*), drumstick (*Moringa oleifera*) and curry leaf (*Murraya koenigii*) are common backyard plants with varied uses and can be introduced as mixed cropping pattern with medicinal plants and crop land as field bunds and live fences.

#### Medicinal and Aromatic Plants:

Lemongrass or Palmarosa will be planted as both are shade-tolerant MAPs species. They grow well under the shade making it a good choice for integrated with tree species.

#### Impact of IFS

- More carbon sequestration\*
- Enhanced microbial diversity in the soil
- Ecosystem sustainability
- Safety to main crop from wild animals



- High level of biomass
- Higher economic return

The selection of Poplar trees species for agroforestry based integrated farming systems is based on a research study conducted by CIMAP (Chauhan, H.S) and in consultation meeting with a professor from CAFRI research institute. The study conducted revealed that growing aromatic species as intercrops with Poplar (*Populus deltoides*) has made it possible to produce a very high level of biomass with a higher economic return. Performance of lemongrass was observed to be the best with respect to sustained herb and oil yield during entire growth period. Average net returns were Rs. 25,690/ha/yr. from sole plantation of trees and Rs. 43,590/ha/yr. from lemongrass, Rs 39,670/ha/yr. from Palmarosa using poplar-based agroforestry system in a period of five years.

### **\*MAPs as carbon sequesters**

Ecologically and environmentally the function and utility of MAPs is notable and remarkable. These tree species have large potential for carbon sequestration. The estimation of carbon sequestration potential of medicinal tree species has remained a neglected aspect in view of mitigating the effects of climate change. The reduction of GHGs (greenhouse gases) through plantation of medicinal tree species adds up a new dimension to the sustainable use of medicinal trees, which can provide additional benefits in the form of recurring income to poor and marginal farmers through carbon revenues. Planting tree species of medicinal value offers a profitable source of carbon sequestration.



**Palmarosa and Cow Pea**

### **8.2.3 MAPs + Rainy Season**

#### **Crops Introduction**

Agriculture is the principal occupation of the farmers in Bundelkhand region. Along with the cereal crops, farmers mostly cultivate pulses. These include cow pea, pigeon pea, urad, moong etc. Integration of these crops with medicinal and aromatic plants like Palmarosa, vetiver, Kalmegh and Tulsi are some integrated models that have been taken up in various research studies by CIMAP and resulted in increased income and better utilization of the available resources.



**Land size:** The average landholding for the integrated farming model is proposed for 1 hectare of land.

**Crops:** Pulses like cow pea, pigeon pea will be sowed during the rainy season.

**Medicinal and Aromatic Plants:** The MAPs crop i.e., Palmarosa and vetiver will be intercropped with the main crop on the same land.

## Impact of IFS

- Assured and regular income from rainfed farming
- Natural and cost-effective
- Weed management in rainy season

## Cost benefit analysis of both the crops (Agro-economics / ha)

**Table 16 Cost benefit analysis for MAPs and Rainy crops**

Palmarosa	Cow pea
Essential oil yield: 120-150 Kg	Yield: 40-70 q or 63502 kg
Market Price of Oil: Rs. 1400-1500/Kg	Market price: Rs. 78/kg
Gross return: Rs. 1,65000-2,00,000	Gross return: Rs. 4,953,156
Cost of Cultivation: Rs. 60,000	Cost of Cultivation: Rs. 4,875,156
Net Return: Rs. 1,10,000	Net Return: Rs. 78,000

For the other integrated farming systems within this category the cost benefit analysis of the crops is mentioned below:

## Cost benefit analysis of other integrated system for rainy season crops (Agro-economics / ha)

Kalmegh	Pigeon Pea
Dry herb yield: 30 – 35 Kg	yield: 2T or 1814 Kg
Market Price: Rs. 30 – 35 Kg	Market price: Rs. 135/kg
Gross return: Rs. 90,000	Gross return: Rs. 244,890
Cost of Cultivation: Rs. 35,000	Cost of Cultivation: 109,850
Net profit: Rs. 55,000	Net Return: 1,35,000

Vetiver	Urad/Moong
Dry root yield: Rs. 20-25 quintal Essential oil yield: 22-25 Kg	Yield: 2T or 1814 Kg
Market price of oil: 14000/Kg	Market price: Rs. 135/kg
Gross return: Rs. 3,08,000	Gross return: Rs. 244,890
Cost of Cultivation: Rs. 1,00,000	Cost of Cultivation: 109,850
Net profit: Rs. 2,00,000	Net Return: 1,35,000



### 8.3 Recommended Business Plans

A business plan is like a roadmap; it provides direction to a business enterprise or a collective enterprise such as FPOs to plan for the future and avoid bumps in the road. Creating a good business plan requires substantial investment of time and human resources, but it is a worthwhile investment that pays off in the long run. A business plan is a set of business goals and contains defined ways for achieving those goals. For the project, the following business plans have been prepared that focuses on the climate adaptation and can be taken up by the FPOs, private organizations to strengthen the market for medicinal and aromatic plants.

1. Setting up of a distillation unit/ Lemongrass oil extraction unit
2. Vermicompost unit with residual bio-mass

#### 8.3.1 Distillation Unit / Lemon Grass Oil Unit

### BUSINESS PLAN ON SETTING UP A DISTILLATION UNIT/ LEMON GRASS OIL UNIT



## **Product Introduction:**

Lemongrass oil has a strong lemon-like odor due to high citral content (75-90%). The minimum commercial requirement is 70% citral content. The major quality checking measures are its citral content and its solubility in alcohol. This is an essential ingredient in toiletry products such as toilet soaps, bath salts, etc. Through this business plan, we intend to explore how to start a small-scale lemongrass oil manufacturing business that can also be combined with vetiver oil extraction as well.

## **Scenario in Bundelkhand:**

Among the seven districts of the Bundelkhand region of Uttar Pradesh following three districts i.e., Chitrakoot, Banda and Hamirpur have the major concentration in terms of lemongrass cultivation as compared to other districts. In Mahoba district there is comparatively less cultivation of lemongrass. Thus, setting a distillation unit for lemongrass oil will be a profitable business plan for the growers in the mentioned three districts.

## **Market Potential:**

The growing demand for lemongrass is stimulated by its therapeutic benefits such as for antifungal, anti-antiseptic, anti-inflammatory properties. Growing awareness of the therapeutic benefits of essential oils has spurred the utilization of lemongrass for commercial use in personal care industry and food industry.

The present scenario in the districts depicts that the farmers have no direct connectivity with the markets for the end-product. During the meeting with the horticulture inspector in Banda, it was mentioned that the present scenario is that the farmers cultivating lemongrass can have market opportunity in Lucknow, Barabanki and market in Delhi can also be explored by the farmers.

In metro cities, the growing popularity of aromatherapy for therapeutic end is also boosting the prospects in the lemongrass market.

## **The Project**

The distillation unit project for the lemongrass oil envisages the processing of raw lemongrass which will be collected from the members of an FPO in the Chitrakoot district. The proposed business plan will begin its capacity initially from the 30 liters capacity per day and eventually will increase its capacity. Considering the increasing demand of lemongrass oil in the market, the business plan is proposed for setting up a distillation unit. The farmers will sell their produce to the FPC and tie-ups with the market in Lucknow and Barabanki can be made.

## **Process Flow Chart:**

A primitive processing is already included in harvesting which includes partial cleaning, packaging and sorting of required part of crop, but oil extraction takes it a step further and extracts the required oil out of the harvested crop. This is essentially true for aromatic crops which may lose the essential oils after a particular period of harvest. For aromatic plants this primary processing includes pre-processing of Field Distillation and Field Distillation itself.



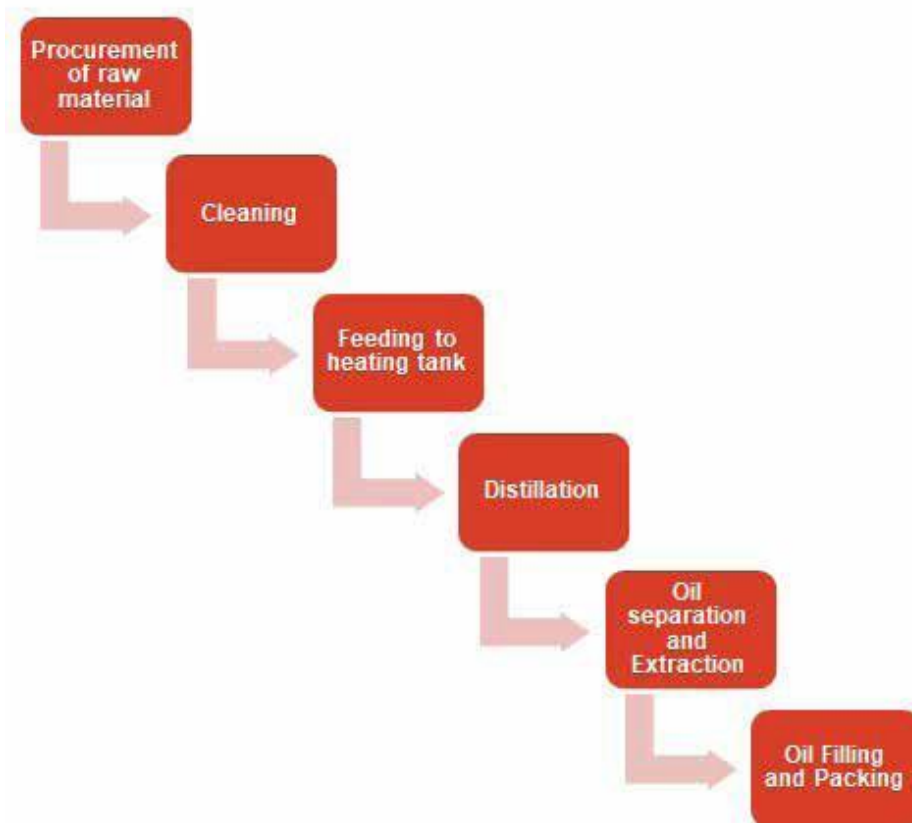


Figure 17 Process Flow of Oil Extraction

## Selected District

The project is proposed to be set up in Chitrakoot district as there is good scope of lemongrass cultivation and even the farmers in Chitrakoot are presently involved in the cultivation of lemongrass. An already existing FPC named Dev Baba Bio Energy FPC is undertaking the cultivation of lemongrass in Chitrakoot. Other districts like Banda, Mahoba and Hamirpur can also adopt the same unit for implementation. However, for the present project, Chitrakoot district is taken as the base for the preparation of the business plan.

## Project Concept

The unit will be owned by the FPC and the raw material can be procured from the members and as well as non-members in the district. The unit will be set-up by the farmers and the members of FPC will be trained for the usage and maintenance of the unit.

## Project Components




### Raw Material Description:

The major raw material is lemon grass. And the grass plants grow well in soils not suitable for richer production plants. From sandy and rather dry soils yield relatively more oil and oil of higher citral content than plants from very fertile soils. The raw material will be procured from the members of the FPC as well as non-members.



## Machinery and Equipment

**Table 17 Machinery and Equipment for Oil Extraction Unit**

Machine Name	Description	Machine Image
Water Supply System	2000 litres water tank at 14 ft height, STW boring, 3 hp diesel pump set, pipes and fittings are required that provide water and store water in required quantity.	
Distillation Unit	Hydro-steam and lifting type, capacity 1.0 MT/ batch, made of 304 grade stainless steel with all accessories is required where the oil is finally extracted from Lemon grass.	
Material handling and other Equipment	These Equipment are used for material handling. Other equipment like water pumps, weighing machine, etc. are also used.	

### Basis and Presumptions for the project

- Production capacity of lemon grass oil is 30 liter per day. First year the capacity has been taken @50%.
- Working Shift of 8 hours per day has been considered
- Raw Material stock is for 7 days and finished goods closing stock has been taken for 7 days.
- Interest on working capital loan and term loan has been taken at 11%.
- Salary and wages are taken as per the current market scenario.
- Power consumption has been taken at 6KW.
- Increase in sales and raw materials costing has been taken @5% on yearly basis.

### Capacity, Utilization, Production and Output for the Unit

**Table 18 Capacity of Unit**

Particulars		
Machine capacity Per day	30	liter
Working days in a month	25	Days
Working days per annum	200	
Wastage Considered	5%	300
Raw material requirement	6000	ltr
Final Output per annum after wastage	5700	ltr
Number of bottles per annum	57000	
Bottle cost	285000	





## Project Financials

Table 19 Project Cost

<b>COST OF PROJECT</b>	<b>(RS IN LAKHS)</b>
PARTICULARS	Total
Land (owned/rental)	-
Plant & Machinery	7.14
Misc. Fixed Assets	2.63
Net Current Assets	9.77
Working Capital	1.81
<b>TOTAL PROJECT COST</b>	<b>11.58</b>

## Revenue

Considering various limitations and operational problems, the revenue realization has been assumed at 50% from the 1st year of operation for the purpose of calculation of profitability of the project.

<b>Particulars</b>	
Sale price of lemongrass oil per 100ml bottle	550
Annual oil production	5700

Table 20 Revenue in INR lakhs

<b>Year</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Year 4</b>	<b>Year 5</b>	<b>Year 6</b>	<b>Year 7</b>
% Utilisation	50%	55%	60%	65%	70%	75%	75%
Oil sale (Value in Lakhs)	15.675	17.242 5	18.81	20.377 5	21.945	23.512 5	23.512 5

## Means of Finance

For the proposed business plan, the means of finance will include 10% equity or farmer's own contribution, along with the 35% subsidy under the scheme of Pradhan Mantri Formalization of Micro Food Processing Enterprises Scheme (PMFME) and the remaining amount as loan from the bank.

Table 21 Means of Finance

<b>Means of Finance</b>	<b>Rs. In Lakhs</b>	<b>% Contribution</b>
Equity	1.16	10%
Subsidy	4.05	35%
Unsecured Loan		
Term Loan	6.37	55%
Total	11.58	



## Key Indicators

A suitable financial model has been proposed to facilitate investment and the profitably and other financial statements have been worked out accordingly.

*Table 22 Key Indicators*

KEY INDICATORS		
Net Profit After Tax	1.40	Envisaged As per 5th Year
Internal Rate of Return	21.08%	Envisaged Over 10 Year period
Break Even Point (% of Total Sale)	80.19	Envisaged As per 5th Year

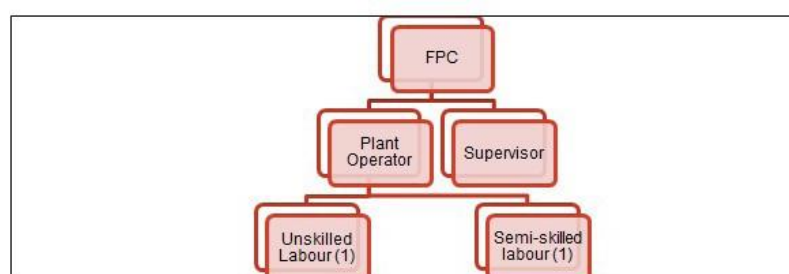
## OPEX (Operational Cost)

*Table 23 Operational cost*

Administrative Expenses	Particulars	In INR lakhs	
		Monthly	Yearly
	Travel & Conveyance	1,000.00	0.12
	House keeping	1,000.00	0.12
	Total		0.24
Salary	Nos	Monthly	Yearly
	Plant operator	1	15,000
	Supervisor	1	12,000
	Semi-Skilled	1	10,000
	Unskilled	1	7,000
	Total		4.51

## Operations and Management

Operations and Management is a critical component of the overall functioning of the proposed business plan. The overall Operation & Management of the distillation unit for lemongrass oil unit business would be looked up by the FPC. The FPC will help in the management of the business. Plant operator will provide with technical and advisory services. The supervisor will manage the daily activities of the unit.



*Figure 18 Operations and Management*



## Business Model Canvas

Business Model Canvas		Distillation Unit/ Lemon grass oil unit		
<b>Key Partners</b> Horticulture Department CIMAP SIRD	<b>Key Activities</b> Cultivation of Lemongrass Procurement of raw material	<b>Value Propositions</b> Value-addition Preparation of lemongrass oil	<b>Channels</b> Direct Sales Sales to small retail shops	<b>Customer Segments</b> Rural-urban population
	<b>Key Resources</b> PMFME NABARD MSME			
<b>Cost Structure</b> <b>Fixed Costs:</b> land, plant and machinery, distillation unit <b>Variable Costs:</b> miscellaneous fixed costs, power, rent <b>Operational cost:</b> administrative costs, salary, packaging and material cost		<b>Revenue Streams</b> Procurement of raw material Selling of lemongrass oil		

Table 24 Business Model Canvas- Distillation Unit

### 8.3.2 Vermicompost Unit

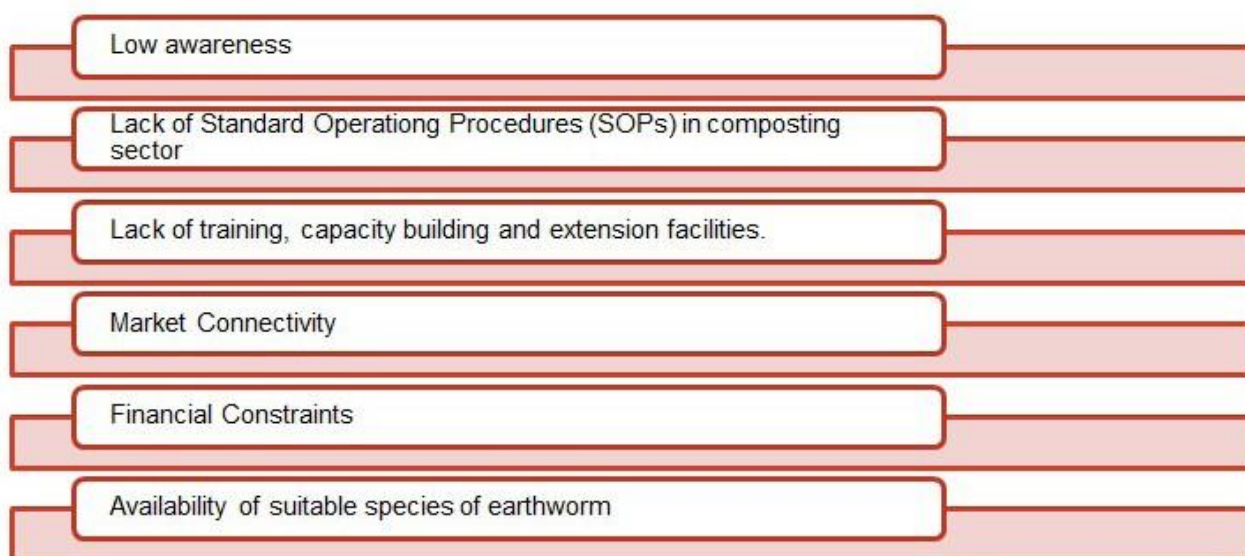


## Product Introduction:

Vermicomposting is a process of preparing enriched compost with the use of earthworms. It is one of the easiest methods to recycle agricultural wastes and to produce quality compost. Earthworms consume biomass and excrete it in digested form called worm casts. Worm casts are popularly called as Black gold. The casts are rich in nutrients, growth promoting substances, beneficial soil micro flora and having properties of inhibiting pathogenic microbes. Vermicompost is stable, fine granular organic manure, which enriches soil quality by improving its physicochemical and biological properties. It is highly useful in raising seedlings and for crop production

## Purpose and Objective:

The present scenario in Bundelkhand reveals that the use of vermicompost can be well utilized by the farmers cultivating medicinal and aromatic crops. Even though it is an emerging sector, there are still certain challenges that needs to be addressed. Following are the challenges in the vermicompost sector:



To address these challenges and make farmers adopt good cultivation practices that involves the use of organic vermicompost preparation and its use in the cultivation of MAPs crops, the project envisages the importance of organic cultivation and waste management in the cultivation of medicinal and aromatic plants.

## Market Potential

With a growing focus on organic/zero budget natural farming, the demand for vermicompost is also expected to increase significantly in the years to come. Thus, the establishment of commercial enterprises/units for production and sale of vermicompost have significant potential. Vermicompost is an emerging sector and has great significance in the market. There is a lot of demand for vermicompost among farmers as its use increases the quality of crops and there is a demand among common people as well who are interested in home gardening.

For the business activity of setting up a vermicompost unit, the prepared vermicompost will be packed and sealed in the bag for selling under the name of the FPC. The potential customers can include:



- The FPC can do direct selling to farmers within the district and in the near-by districts by their brand name.
- The prepared product can also be sold by creating multiple marketing linkages. The FPC can sell the compost prepared in bulk to the local seeds and fertilizers wholesalers or retailer shops in the district.
- It can be sold to the local nurseries or local garden centers in the district.
- Tie-ups can be made with the other FPCs of the programme as well for creating more marketing linkages.
- Promotional activities can also be taken up by the members of FPC for better access to the market. During kisan melas, they can sell their products.
- Word of mouth strategy can also be used for the promotion of product prepared.

## The Project

The proposed project aspires to set up a Vermicompost Unit in Jhansi District. The business activity will be managed by a Farmer Producer Company Limited (FPC). The project aims at setting up the unit initially with 15 vermi-beds. It is advantageous to start with a smaller number and later expand the unit after gaining production experience and developed market. It is also advantageous if the location of the unit is near to the farm where the progressive farmers who have adopted the integrated farming models for better availability of raw material at low cost. Also, nearness to a commercial dairy unit is also advantageous for the raw material.

## Process flow Chart- Vermicompost Preparation

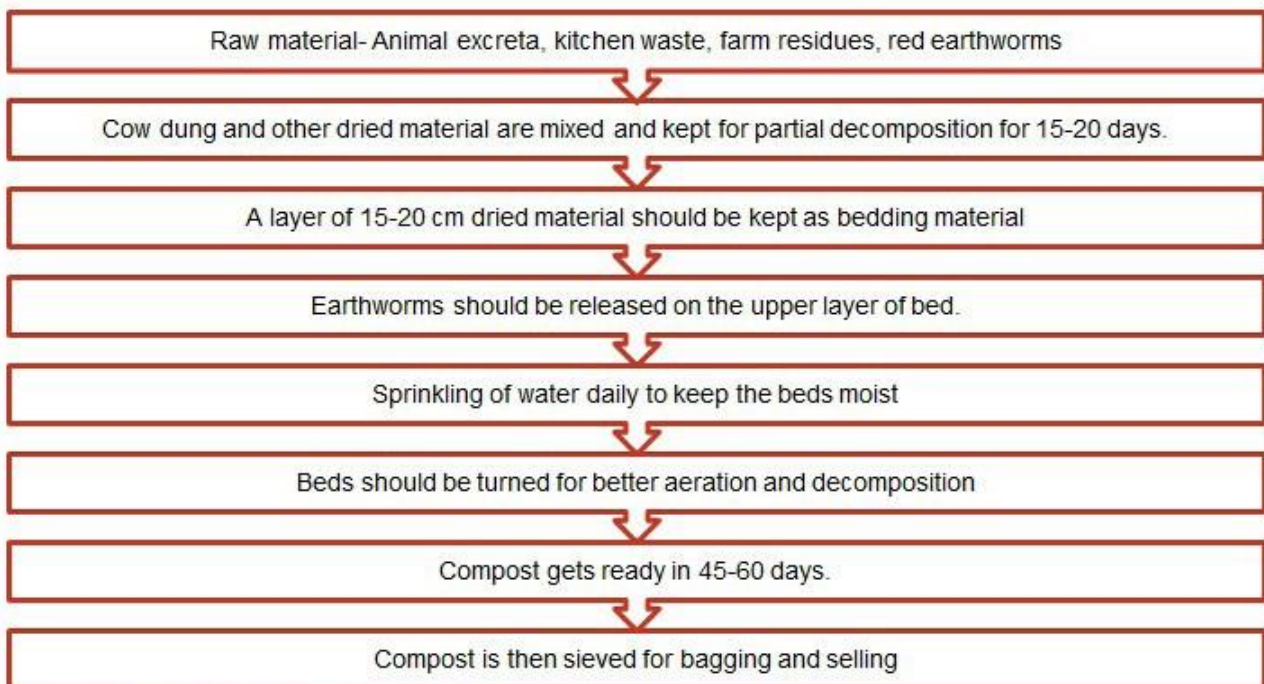


Figure 19. Process Flow- Vermicompost Preparation



## Selected District





The project is proposed to be set up in Jhansi district as the district is the main hub for all the departments, commercial dairy unit that will help in getting the raw material at low cost. The cultivation of Tulsi in Jhansi can be a good source for the residual bio-mass availability at low cost. Other districts in the Bundelkhand region like Jalaun, Banda, Mahoba and Hamirpur can also adopt the same unit for implementation. However, for the present project, Jhansi district is taken as the base for the preparation of the business plan.

## Project Concept

The unit will be owned by the FPC and the raw material can be procured from the members and as well as non-members in the district. The unit will be set-up by the farmers and the members of FPC will be trained for the usage and maintenance of the unit. They will be provided with technical, financial and logistical support for the unit. This will enable the farmers to enter into a commercial business leading to livelihood diversification and good practices for cultivation of MAPs.

## Project Components

*Table 25 Project Components- Vermicompost Unit*

Component	Description	Image
Sheds	They could be of thatched roof supported by bamboo rafters and purlins, wooden or steel trusses and stone/ RCC pillars.	
Vermi Beds	Normally the beds have 0.3 to 0.6 m height depending on the provision for drainage of excess water. The FPC should start with 15 Vermi-beds.	
Land	About 0.5-0.6 acre of land will be needed to set up a vermiculture production. It is proposed that land should be taken on lease.	
Seed Stock	Worms @ 1 kg per m <sup>3</sup> of bed volume are adequate to start with and to build up the required population in about two or three cycles. The mother earthworms or the seed stock can be purchased. Also, it can be procured from the district's KVK.	
Water supply	As the beds have to be kept moist always with about 50% moisture content, there is a need to plan for a water source	
Plant & Machinery	Machinery is required for cutting the raw material into small pieces. A power-operated shredder and a sieving machine is required for the current activity.	



## Basis and Presumptions for the project

For the proposed business plan of setting up a vermicompost unit following assumptions have been taken:

- The land for setting up the unit will be obtained on lease.
- It is assumed that in the first year there will be around 3 cycles of production.
- From the second year onwards 6 cycles of production are assumed.
- Sale of vermicompost- Rs. 8000/MT
- Sale of worms- Rs. 350/kg
- For the first year the production per cycle is taken as 35 MT.
- Cost of cow dung is taken as Rs. 250/MT
- Cost of agriculture waste is taken as Rs. 200/MT
- The prices taken can vary over time.

## Project Financials

Table 26 Project Cost

TOTAL PROJECT COST						
Particulars	Unit/ Basis	Qty	Unit Rate	Cost (In Rs. Lakhs)	Contingencies (5%)	Total Cost
<b>Land &amp; Site Development</b>						
Land (On Lease)	Acres	0.50	-	-		-
Land Development	Ls	1.00	75000	0.75	0.04	0.79
General Civil Works						
Fencing And Gate	Ls	1.00	25000	0.25	0.01	0.26
<b>Sub-Total</b>				<b>1.00</b>	<b>0.05</b>	<b>1.05</b>
<b>Technical Building</b>						
Open Shed with Brick Lined Bed Bottom & Platform with Rcc Pipe Post & Truss and Thatch Locally Available Roof						-
Vermicompost Beds (15 m*1.5 m*15 Nos)	Sqm	245	2,500	6.13	0.31	6.43
For Finished Products	Sqm	50	2,500	1.25	0.06	1.31
Godown/ Store Cum Office	Sqm	50	8,000	4.00	0.20	4.20
<b>Sub-Total</b>				<b>11.38</b>	<b>0.57</b>	<b>11.94</b>
<b>Plant &amp; Machinery</b>						
Power Operated Shredder	Ls	1	25,000	0.25	0.01	0.26
Sieving Machine With 3 Wire Mesh Sieves- 0.6 M X 0.9 M Size	Ls	1	45,000	0.45	0.02	0.47
Internal Electrification	Ls	1		0.57	0.03	0.60
<b>Sub-Total</b>				<b>1.27</b>	<b>0.06</b>	<b>1.33</b>
<b>Miscellaneous Fixed Assets</b>						
Weighing Machine (Platform Type)	Ls	1	6,000	0.06	0.003	0.06
Bag Sealing Machine	Ls	1	5,000	0.05	0.003	0.05
Water Provision – Borewell with Hand Pump, Pipe, Dripper	Ls	1	75,000	0.75	0.038	0.79
Shovels, Spades, Crowbars, Iron Baskets, Dung Fork, Buckets, Bamboo Baskets, Trowel,	Ls	1	5,000	0.05	0.003	0.05
Wheel Barrows - 2 Nos.	Ls	2	6,000	0.12	0.01	0.13
Miscellaneous Expenses & Fire Fighting	Ls	1	10,000	0.10	0.01	0.11
<b>Sub-Total</b>				<b>1.13</b>	<b>0.06</b>	<b>1.19</b>
Working Capital						0.59
<b>Total Project Cost</b>						<b>15.1</b>



## Revenue:

Considering various limitations and operational problems, the revenue realization has been assumed at 60% from the 1st year of operation for the purpose of calculation of profitability of the project. The revenue is generated from the selling of vermicompost.

Table 27 Revenue in INR lakhs

Year	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
% Utilization	60%	70%	80%	90%	100%	100%	100%	100%	100%	100%
Vermicompost sale	11.55	8.085	9.24	10.395	11.55	11.55	11.55	11.55	11.55	11.55
Total revenue (lakhs)	6.93	5.6595	7.392	9.3555	11.55	11.55	11.55	11.55	11.55	11.55

## Means of Finance

For the proposed business plan of Vermicompost Unit, the means of finance will include 17% equity and 33% subsidy (NABARD assistance) and 47% loan from bank.

Table 28 Means of Finance

Means of Finance	(Rs. In Lakhs)	% Contribution
Equity	3.05	17%
Subsidy	5.93	33%
Term Loan	8.98	50%
Total	17.96	

## Key Indicators

A suitable financial model has been proposed to facilitate investment and the profitably and other financial statements have been worked out accordingly.

Table 29 Key Indicators

Table 29 Key Indicators

KEY INDICATORS		
Net Profit After Tax	3.57	Envisaged As per 5th Year
Internal Rate of Return	20.73%	Envisaged Over 10 Year period
Break Even Point (% of Total Sale)	50.59	Envisaged As per 5th Year
Pay-back period (years)	5.54	





## OPEX (Operational Cost)

Table 30 Operational cost

Administrative Expenses		In INR lakhs	
Particulars		Monthly	Yearly
Travel & Conveyance		500.00	0.06
House keeping		500.00	0.06
Total			0.12
Salary	Nos.	Monthly	Yearly
Unit In charge	1	12,000	1.44
Semi-Skilled	1	10,000	1.20
Unskilled	1	6,500	0.07
<b>Total</b>			<b>2.71</b>

## Operations and Management

Operations and Management is a critical component of the overall functioning of the proposed business plan. The overall Operation & Management of the vermicompost unit business would be looked up by the FPC. The FPC will help in the management of the business. The unit in charge will provide with technical and advisory services and manage the daily activities of the unit.



Figure 20 Operations and Management

For the proposed project of setting up a vermicompost unit, following assistance from the government is provided.

- NABARD Support: Capital Investment Subsidy Scheme- Commercial Production of Organic inputs under National Project for Organic Farming (NPOF): The financial assistance up to 33% of the total financial outlay, which is subjected to a maximum ceiling amount of 63 lakh per individuals or the private agencies as back-ended subsidy through NABARD is provided. For the business activity this scheme has been taken for calculation. There is one other scheme as well in this sector, but its calculation is not taken in the financial.
- MIDH: Financial assistance is provided for establishing Vermi-compost units is 50% of the total cost of the project and subjected to a maximum amount of Rs.50,000/- per beneficiary for a unit having a size of 30'X8'X2.5' per unit.



## Business Model Canvas

Business Model Canvas		Vermicompost Unit		
<b>Key Partners</b> Horticulture Department CIMAP SIRD NABARD	<b>Key Activities</b> Procurement of raw material (Cow dung, agriculture waste, residual bio-mass from Medicinal and Aromatic Plants)	<b>Value Propositions</b> Waste Management Organic Cultivation Selling of vermicompost	<b>Channels</b> Direct Sales Sales to small retail shops Through kisan melas, fairs etc.	<b>Customer Segments</b> Rural-urban population Nurseries Input shops (seeds and fertilizers)
	<b>Key Resources</b> NABARD MIDH			
<b>Cost Structure</b> Fixed Costs: land, plant and machinery, vermi beds Variable Costs: miscellaneous fixed costs, power, rent Operational cost: administrative costs, salary, packaging and material cost		<b>Revenue Streams</b> Procurement of raw material Selling of vermicompost Selling of worms		

Table 31 Business Model Canvas- Vermicompost Unit

## 8.4 Action Plan

Although some of the issues identified and discussed in this report require policy or public sector action, many challenges faced by the sector can be addressed directly by the private sector and/or in partnership with the government. The actions required addressing the issues raised in the analysis and therefore to mitigate or reduce their negative impact on the competitiveness of the sector is summarized in the action matrix. The following recommendations are offered with a vision to near-term results (within three years).

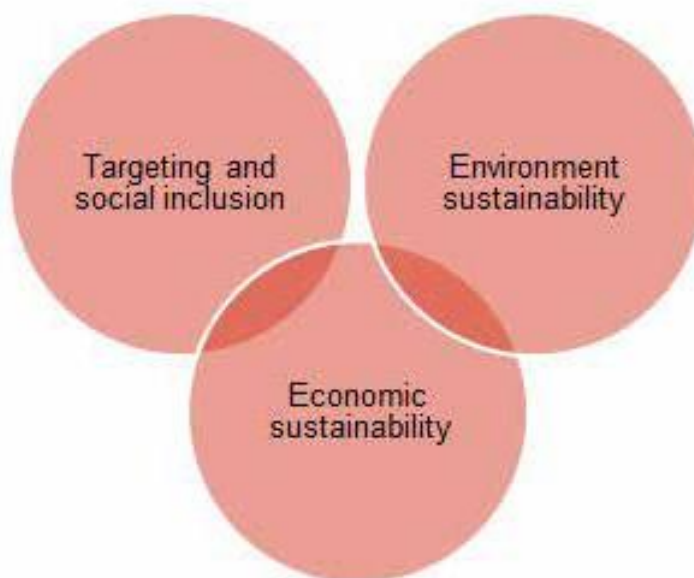
Table 32 Action Plan

Action Required	Responsible Entity		
	Government	Private	Joint
<b>Short-Term Interventions (&lt;1 year)</b>			
Capacity Building	●		
Training Programmes	●		
FPOs registration and formation	●		
Develop Technical material	●		
<b>Medium-Term Interventions (1-2 year)</b>			
Small-scale processing units	●	●	
<b>Long-Term Interventions (&gt;2 year)</b>			
Infrastructure Set-up			●



## 8.5 Outcomes

The overall outcome of the project for the strengthening of the medicinal and aromatic value chain is for the climate adaptation and livelihood diversification. The project outcomes thus focus on target and social inclusion along with environment and economic sustainability.



### 1. Targeting and Social Inclusion

- Gender-mainstreaming interventions need to encompass strategic actions that address gender inequalities in access to assets, resources, services and information at household and community levels. specific interventions are needed to improve their active participation through different and complementary measures, including changing membership requirements and by-laws for farmer organizations, introducing mandatory quotas, developing women’s committees, implementing focused capacity-building and offering women targeted access to affordable credit.
- Vulnerable groups can be more effectively reached when commodities with limited land and investment requirements are selected

### 2. Economic Sustainability

- Public and private investment in community and market infrastructure (e.g., roads, storage facilities, including cold storage for perishable crops, marketplaces, information and communications technology [ICT] infrastructure) leads to market access improvements and contributes to the economic viability of value chains, while having wide multiplier effects on entire communities.

### 3. Environment Sustainability

Improving environmental sustainability includes the following elements:

- diversification through the inclusion of a wider set of crops, crop varieties and mixed farming systems, as well as a broader set of income-generating options (e.g., on- and off-farm activities) to increase farmers’ livelihoods and reduce risks related to monocropping and market shocks;



- climate proofing– specific interventions to make key stages of the value chain more climate-resilient, for instance through better design of infrastructure, roads, bunds and elevated storage structures to manage and harvest water from heavy rainfall and the introduction of drought-tolerant seeds; and
- supply chain efficiencies- investments in energy-efficient infrastructure and processing/production equipment and machinery such as drip irrigation schemes and solar-powered processing equipment to deliver efficiencies and higher profitability.

## Conservation

One of the major takeaways from the study is that along with the cultivation and collection of medicinal and aromatic plants, conservation of MAPs is equally the focus. Conservation of MAPs is necessary for the posterity of the future generation. There is a need for a coordinated conservation action based on both "in situ" and "ex situ" strategies.

- In-situ conservation deals with the on-site conservation of the wild genetic resources/genetic diversity in natural habitat.
- ex-situ conservation practices like medicinal plant gardens, nurseries, home-gardens, school nurseries, private nurseries etc.).

This will lead to a more sustainable approach for the medicinal and aromatic plants.

## Annexures

Reference reports and links to websites used

References to the Publications/ Report

- Medicinal Plant Management and Trade in India: Policy and Regulatory Framework
- <https://businessdunia.in/steps-taken-to-farming-conservation-processing-and-promotion-of-medicinal-plants/>
- climaticcrisesanalysis.pdf
- 20210473971.pdf
- 4-2-12.pdf
- MRD-JOURNAL-D-11-00112.1.pdf
- STATUSOFAROMATICCROPSININDIA.pdf
- MAPSB\_5181-86o.pdf
- SeminarPaperonValueadditioninMAPs.pdf
- amp\_inet\_roadmap.pdf
- <https://www.rroj.com/open-access/folklore-claims-on-some-medicinal-plants-used-in-jhansi-district-uttar-pradesh-india-by-rawat-and-sahariya-tribes-1-4.pdf>
- <https://www.phytojournal.com/archives/2018/vol7issue3S/PartG/SP-7-3-65-937.pdf>
- [https://echarak.in/echarak/templates/medicinal\\_plants\\_assessment/chapter12.pdf](https://echarak.in/echarak/templates/medicinal_plants_assessment/chapter12.pdf)

## Websites

- [nabard.org/auth/writereaddata/tender/1101211628UP\\_Jhansi.pdf](http://nabard.org/auth/writereaddata/tender/1101211628UP_Jhansi.pdf)
- <https://updes.up.nic.in/>
- <https://nhb.gov.in/Statistics.aspx?enc=WkegdyuHokljEtehnJJoq0KWL79sOQCy+W4MfOk01GFOWQSEvtp9tNHHoiv3p49g>
- <https://nmpb.nic.in/content/regional-centre>
- [https://dmapr.icar.gov.in/Medi\\_hub/Home.html](https://dmapr.icar.gov.in/Medi_hub/Home.html)
- <https://www.ayush.gov.in/>
- <https://jhansi.kvk4.in/contact-us.html>



## National Medicinal Plant Board Scheme Components

### a. Training and Capacity Building

Training plays an important role in spreading best practices on conservation, cultivation, good agricultural practices, good field collection practices, post-harvest management, marketing etc. Trainings will be provided to various stakeholders like cultivators, conservationists, traders, supply chain intermediaries, policy makers and end users.

#### Activities

- To organize training programmes for capacity building of stakeholders on medicinal plants (including cultivation, conservation, GAPs, GFCPs, GMPs, Storage, PHM and Market Information).
- Demonstration of technologies developed by Institutions at farmers field/ conservation areas and natural habitats.

#### Eligibility

- Central and State Government organizations.
- Recognized Research/Academic/Educational institutions
- Registered professional and other philanthropic organizations working on non- profit basis.
- Registered Non-Government Organizations (NGO)/Voluntary Organizations/ Trusts with infrastructure and specific experience in the field of medicinal plants

#### Norms of Assistance

- Rs. 2,000/- per trainee for a minimum of two days within the state and Rs. 5,000/- per trainee outside the state will be provided which will include exposure visits.
- For officers training/exposure visit within the State Rs. 5,000/- per trainee and outside their state the cost will be limited to Rs. 10,000 per trainee.
- Travel cost will be additional to the above cost.

### b. Promotion of Herbal Gardens

Herbal Gardens of various kind will be promoted under the scheme to create awareness about traditional usage of medicinal plants. This would include Herbal Gardens of National and State importance as well as at the level of institutions, schools, universities, colleges and homes.

#### Eligibility

- Government organizations, universities, research institutes, government aided colleges and schools.
- Non-government Organizations (NGOs), Public Sector Undertakings, Federations, Co-operatives, and Societies including Housing Societies etc.

#### b. 1 Home Herbal Gardens

Encouraging herbal gardens in the homes is a good way to promote use of medicinal plants for primary health care at the household level.

#### Activities

- Around 20 Medicinal and Aromatic species of which around 10 species (which in addition to medicinal plants could also include a few aromatic/food plants), based on locality specific need and demand will be distributed to interested households. A note on each species, usage and benefit of each species will be provided to the beneficiary by the implementing agency



A database of all such households, including photographic documentation at various stages of implementation will be submitted to NMPB along with a writeup on the process/approach adopted, benefit accrued and the sustainability mechanism.

- The implementing agency will take steps for raising awareness in the identified locality.
- In case of dense urban localities potted plants and terrace rearing of medicinal plants should be encouraged.
- These initiatives should be dovetailed with activities like Swachh Bharat, use of bio fertilizers, vermicompost etc.

### Norms of Assistance

Financial assistance of Rs. 2500/- per Home Herbal Garden including cost of raising seedling, transportation, awareness raising, documentation, development, dissemination and use of publicity material, folk theatre, special campaigns, etc.

### c. Other Promotional Activities

Support for establishing nursery and development of quality planting material/ germ plasm banks activities  
Support for establishing nursery as a part of any project proposal will be provided

### Norms of Assistance

For creation of nursery covering an area of 1 ha Rs. 6.25 Lakhs per unit to be given in two installments. The assistance will be to the extent of 100% to public sector/SHGs and 50% of the cost subject to a ceiling of Rs.3.125 Lakhs in private sector. The nursery will have appropriate infrastructure facility (net house, beds, vermi-compost, signage, irrigation system) to hold 50,000 to 70,000 plants. The organization must have a sustainability plan.

### Submission of Proposals

Eligible Organizations can apply to NMPB where the proposal will go through scrutiny by the Project Screening Committee (PSC) before approval by Standing Finance Committee (SFC).

### d. National AYUSH Mission (NAM) Nodal Officers and Controlling Officers of Implementing Agencies as of November, 2016

Name of the State	Name of Nodal Officers Address/phone No./Fax No./ Mobile No. and E-mail Id's	Name of Controlling Offices Address/ phone No. /Fax No. Mobile No/Email Id's
<b>Uttar Pradesh</b>	Sh. S. P. Joshi Director of Horticulture & Mission Director, Government of Uttar Pradesh, Department of Horticulture & Fruit Processing, Udyan Bhawan, 2, Sapru Marg, Lucknow – 22600 (U.P) Tel: 0522-4044414, 2623277, Fax: 0522-2621382 Mob:09451062169 horticulture.up.nic.in dirhorti@rediffmail.com Dr. R. P. Singh, Joint Director Mob: 09415258637	Sh. Arun Singhal Principal Secretary (Horticulture), Government of Uttar Pradesh 1st Floor, Civil Bhawan, UP Civil Secretariat, Lucknow (Uttar Pradesh) Tel: 0522- 2238102 Fax: 0522- 2236392 Email: psrd.up@gmail.com



## Cost-Benefit Analysis

### A. Kalmegh (*Andrographis paniculata*)

Genetically improved varieties available for cultivation	
CIM-Megha, Anand Kalmegh-1 (ideally suited for cultivation under shade in fruit orchards and forest cover; 4-month crop)	
<b>Agro-economics/ha</b>	
Dry herb yield:	30 – 35 Kg
Market Price:	Rs. 30 – 35 Kg
Gross return:	Rs. 90,000
Cost of Cultivation:	Rs. 35,000
Net profit:	Rs. 55,000

### B. Satavar (*Asparagus racemosus*)

Genetically Improved Varieties available for Cultivation	
CIM- Shakti suitable for cultivation under shade	
<b>Agro-economics/ha</b>	
Dry herb yield:	5000 kg
Market Price:	Rs. 125-150/Kg
Gross return:	Rs. 6,25,000
Cost of Cultivation:	Rs. 2,00,000
Net profit:	4,25,000

### C. Khus (*Vetiver zizanioides*)

Genetically Improved Varieties available for Cultivation	
KS-1, Kesari, Dharni, Gulabi, CIM-Vridhhi, CIM-15, CIM-22 Suitable for cultivation under drought stress, water logging, saline and high pH soils (10-18 months crop)	
<b>Agro-economics/ha</b>	
Dry root yield:	Rs. 20-25 quintal
Essential oil yield:	22-25 Kg
Market price of oil:	14000/Kg
Gross return:	Rs. 3,08,000
Cost of Cultivation:	Rs. 1,00,000
Net profit:	Rs. 2,00,000





## List of Stakeholders visited for primary study

District	Government officials			FPOs			Traders			Progressive farmers			KVKs			Institutes		
	Name	Designation	Contact No.	Name	Name of FPO	Contact No.	Name	Contact No.	Name	Contact No.	Name	Contact No.	Name	Contact No.	Name	Contact No.		
Jhansi	Mr. Prashant Singh	DHO	885321 2008															
	Ashish Chaurasia	Additional District Agriculture Officer	883968 3523	Snyam Bihari Gupta	Amolik Jaiv Jogi Krishi Utpadak Sanghatan	988919 6787												
Lalitpur																		
	Dr. Parvez Khan	DHO	882291 2033		Shree Yash Farmer producer company Limited	988928 0065	Rajendra Jain Shanti Lalan van aushadhi Roadak	941511 3924	Mr. Anuj Choubey	988928 0065								
	Dr. Sheeran	Sub-Divisional Forest Officer	933505 2197				Mr. Ajay Jain, Modi Traders	941541 2347	Mr. Alok Jain	639471 2886								
Jalaun																		
	Mr. Ashish Katiwal	DHO	955935 7172															
Banda																		
	Mr. Rajendra Kumar Digvijay	DHO	989788 1959															





	Singh	ure Inspector																
<b>Mahoba</b>	VP Singh	District Agriculture Officer	761990 4291	Dhwajpal Singh	Burdeik Jagoo Organic Farmer Producer Company	630778 4912	Veon Suresh Raj	790553 0944	Mahendra Singh	739867 0634								
	Sandeep Gautam	District Develop ment Manage r	831897 0548		Shree Shankar Bholey Producer Company	739867 0634												
<b>Chitrakoot</b>	Mr. Piyush	Assistant Horticult ure Inspector	902638 4114	Luv Singh	Dev Baba Bio Energy Farmer Producer Company	991990 8114			Mr. Ram Naresh, Cluster In charge, NAFCC Scheme	993518 7252								
	R.K. Dikshit	District Forest Officer	700714 1544															
	Hari Shankar Singh	Assistant Range Forest Officer	945016 7202															
<b>Hamirpur</b>	U.C. Ramesh Pathak	DHO	945330 9310						Ragnaveer	638820 4833								



## List of Traders/Processors and Buyers- Biofach Exhibition

S.NO.	COMPANY NAME	KEY PERSON ANS DESIGNATION	CONTACT NO.	EMAIL ID	OFFICE ADDRESS	BRIEF DISCRIPTION
1)	AGS Herbsals Asha Gramodyog Sangshen	Dileep Rai-Director	7607003154, 6387174191	<a href="mailto:ashagraomodiyog@gmail.com">ashagraomodiyog@gmail.com</a>	647 B/C 114/1 P-18, Jankipuram Garden, Meerut, Lucknow	AGS is engaged in contract and corporate farming of high quality Medicinal and Aromatic Plants. They are working on the subject of rural upliftment through cultivation of medicinal and aromatic plants. Their organization is cultivating more than 800 acres of Medicinal plants and annually producing 600 tons of Herbs and botanicals through contract and corporate Farming in India.
2)	Basant Agro Tech (I) LTD	Rajesh Jadhav- head-Organic Division	9766013989	<a href="mailto:r.jadhav@basantagro.com">r.jadhav@basantagro.com</a>	Plot No. 178, Chhatrapati Shivaji Co-op. Housing Society, Chhatrapati Nagar, Nagpur- 440015, Maharashtra, INDIA	Basant Agro Tech is part of the 130-year-old "Bhartiya Group" of Akola (India). It came out with its public issue in 1990. From then on, skilled entrepreneurship and marketing techniques ensured the company grew exponentially. Presently Basant Agro Tech (I) Ltd. has a multi-product portfolio which includes various grades of fertilizer, seeds, agriculture plastics, organic products and recently ventured into chemicals.
3)	Earth kind Eco Ventures Pvt. Ltd	Faiz Siddiqui- Director	7991878732	<a href="mailto:contact@mittlese.com">contact@mittlese.com</a>	208/229, Janta Nagji, Chowk, Lucknow, U.P. 226003	Earth Kind Eco Ventures Private Limited is a Private incorporated on 01 September 2014. It is classified as non-govt company and is registered at Registrar of Companies, Kanpur. Its authorized share capital is Rs. 500,000 and its paid-up capital is Rs. 100,000. It is involved in Forestry, logging and related service activities.
4)	Geo-Cem Laboratories Pvt. Ltd	Roshan Asnoikar- Assistant Manager Business Development	8976604818	<a href="mailto:roshan.a@geochem.net.in">roshan.a@geochem.net.in</a>	Pragati Building, Adjacent to Crompton Greaves, Kanjumarg, Mumbai-400042.	GEO-CHEM, founded in 1964, is an independent inspection and testing company. With our headquarters in Mumbai and branches across India, they are today one of the largest and reputable inspection and testing organizations in India. Their services are available through a network of branch



5)	<b>Prajakta</b> Technology Pvt. Ltd.	Madhavi-Sr. Manager Business Development	9011781622	<a href="mailto:madhavi.otp@gmail.com">madhavi.otp@gmail.com</a>	sr. no. 50, 1, Shree Ganesh Heights, Narhe Road, Pune- 411041, India.	They are India's Leading, professionally managed Post Harvest Processing and Value Addition Company, working since last decade offering diversified dehydrated food ingredients. We play a vital role in Value Chain Development of Indian Horticultural Produce since 2004. They craft ingredients for their products with all technicalities, making them pertinent to all your desires to help turn them into realities.
6)	Green bay Organics	Vijendra Singh Bhatia- Managing Director	7772090888	<a href="mailto:greenbayorganics@gmail.com">greenbayorganics@gmail.com</a>	Plot no. 1, Bungalow No. 13 Near Convent School <b>Neerach</b> , MP 458441 India.	They are India's one of the finest and fastest growing Organics products company - green bay Organics®, a subsidiary of Verde roots Services Private Limited. They are a NPOP, NOP and EU certified company. At Green Bay Organics, they are connected to thousands of farmers and suppliers across India, primarily involved in the cultivation of variety of herbs and spices through Organics means of sustainable farming.
7)	<b>Ayush</b> Herbs Pvt. Ltd.	Sachin Thakur- Manager	8988121757	<a href="mailto:pharma@ayushherbs.com">pharma@ayushherbs.com</a>	25, Industrial Area, <b>Nagrota Bagwan</b> , Distt. Kangra-176047 (HP)	They believe in providing the best quality product of what Mother Nature has to offer. Provide their customers with the highest potency, batch to batch consistency, free from all kinds of toxic loads like heavy metals, pesticides, microbial, and toxic solvent residues. Manufactured with the safest third-generation human-friendly organically certified ethanol as solvent.



8)	<p><b>Agro Export Pro Ltd.</b></p> <p>Abhishek Vishwak Retail Head</p>	8094019713	<a href="mailto:retail@farmorganicindia.com">retail@farmorganicindia.com</a>	<p>G1-197-198 Agro Food Park, Boranada Jodhpur 342012 (Raj.) India.</p> <p>Farm Organic was founded with a vision to provide certified organic products to households in India. India is a key market for Farm Organic because it is one of the world's most populated countries, with a large number of households only starting to go online. This will give them more opportunities to sell their products. Farm Organic's focus is on providing high-quality, organic products that are Made in India.</p>
9)	<p><b>Adept Impex Private Limited</b></p> <p>Rahul Gupta- Director</p>	9897662984	<a href="mailto:AIPL@ADEPTIMPEX.COM">AIPL@ADEPTIMPEX.COM</a>	<p>Adept Impex Private Limited is established in 2011, "Adept Impex Private Limited", is an ISO 22000:2005, GMP and NPOP-NOP certified company and the noteworthy Manufacturer &amp; Exporter of supreme grade Organic and Conventional Dried Herbs and Flower, Dried Medicinal Herbs and Dried Aromatic Plants. Being a quality-oriented organization, they focus on quality of each product. They have a separate in-house quality testing unit that is supervised by our experienced team of quality analysts.</p>
10)	<p><b>Aromatic &amp; Allied Chemicals</b></p> <p>Sales &amp; Marketing</p>	9528329262	<a href="mailto:sales@aromaticsallied.com">sales@aromaticsallied.com</a>	<p>H.Q: B-8, 9, 10 Industrial Estate, CB Ganj Bareilly (U.P.) India, Pin 243502 factory Unit-2: plot no. A1/A2, Sector 59, Baleshwar Faridabad-121004, Haryana.</p> <p>AAC is one of the leading producers and exporters of 100% Pure &amp; Natural Essential Oils, USDA/NOP/EU Organic Certified Essential Oils, Carrier Oils, Natural Aroma Chemicals, Floral absolutes and Natural Perfumes. AAC is committed to responsible sourcing by reviewing our plant materials, harvesting sites and work with our family of farmers for cultivating many aromatic crops in different parts of India for extracting the purest form of Natural Essential Oils.</p>
11)	<p><b>Som Phyto pharma (India) Limited</b></p> <p>P. Sai Kumar - Technical officer</p>	9493545543	<a href="mailto:exports@agnilife.in">exports@agnilife.in</a>	<p>Established in the year 1993 at Hyderabad, Telangana, they "Som Phyto pharma India Limited" are a Medium Enterprises based firm, engaged as the</p>



12)	Prajapati Natural products	Ganesh Prajapati- managing Director	9782379916	<a href="mailto:ganeshoraisapati16@gmail.com">ganeshoraisapati16@gmail.com</a>	(Hyderabad), T.S., India.	foremost Manufacturer of Bio Fertilizer, Bio Insecticide etc. Their products are high in demand due to their premium quality and affordable prices. Furthermore, they ensure to timely deliver these products to Their clients, through this they have gained a huge clients base in the market. Their Company concepts is wholly focused on using purest form of material, process it without harming its basic properties and nutrients, keeping its aroma and purity intact. They produce raw material organically just organically. All process done is a chemical free surrounding. They process raw material of herbs each step hygiene and disinfection according to GMP Guideline. Here at <b>NutriQuick</b> , we share a passion for tasty and healthy food. Their mission is to make healthy eating more exciting, convenient and affordable and inspire, encourage and fuel everyone to lead active, healthy lives. The time we save in the kitchen is more time we can spend in the gym, on the pavement, in the pool or at the studio — wherever it is that gets your heart pumping, they are here every step of the way. Each <b>NutriQuick</b> meal is made from scratch and seasoned with their special herbs and spices, allowing us to enjoy a delicious lunch or dinner without sacrificing the nutritional value. Nishant Aromas Private limited is now a second-generation family-run organization specializes in Fragrance and Flavours Materials. Beside Conventional and Organic Essential Oils and Aroma Ingredients, they also offer Natural Extracts, Absolutes, Resinoids and Isolates. Being an ISO 9001 certified company
13)	<b>NutriQuick</b>	Jaimin Prajapati - Business Development Manager	8877224416	<a href="mailto:nutnquickfoods@gmail.com">nutnquickfoods@gmail.com</a>	180374 Phase-IV, Road A 32 GIDC Estate, VU Nagar, Anand, Gujarat 388121	
14)	Nishant Aromas Private Limited	Neha Bais - Marketing & Sales Coordinator	9997388361	<a href="mailto:neha@nishantaromas.com">neha@nishantaromas.com</a>	plot no. 30, 31, 61, Sec 1B, IIE, Sidcul, Haridwar-249403	



15)	Bokraj Agro Organic Producer Company limited	Dubai Goswami- Director (Marketing)	7002160175	<a href="mailto:baopcl2017@gmail.com">baopcl2017@gmail.com</a>	Bugaia, Kazirga National Park, Golaghat, Assam, India.	<p>They are committed to sustaining quality. Their R&amp;D Lab and QC Lab are equipped with GC, GCMS and other modern instruments for providing support to our research team.</p> <p>BAOPCL has organic clusters consisting 1000 hectares of organic certified land in the vicinity of World Heritage Site, Kazirga National Park, where these farmers are practicing organic farming of black rice, red rice, ginger, turmeric, Assam lemon, banana, pineapple etc. BAOPCL has its own rice processing unit and spice processing unit in contract.</p>
16)	True Elements	Avinur Mukhagadhyax- Lead- Category	9152780386	<a href="mailto:avinur@true-elements.com">avinur@true-elements.com</a>	S. No 254, Juyamella Industry Estate, Phase 2 Road, Hingawadi, Pune, Maharashtra, 411057	<p>True Elements provides food that is packed with the goodness of nature and taste that will keep you wanting for more. With a range of food items across categories like Breakfast Cereals, Grains &amp; Raw Seeds, Roasted Snacks and other healthy items, each of their products is not only 100% Natural but is also made of 100% Whole Grains. While they stand strongly for Health, where in their products have a clear functional benefit, they believe that Taste is the most important element when it comes to Snacks. They strive to bring the best range of snacks to you.</p>
17)	Anand Traders	Govind Pratap Singh	9754005350		Near Police Station, Chitarkoot Road, Majhgawan dist.- Satna - 485331, Madhya Pradesh	<p>Anand Traders has made a name for itself in the list of top suppliers of in India. The supplier company is located in Satna, Madhya Pradesh and is one of the leading sellers of listed products. Anand Traders is listed in Trade India's list of verified sellers offering supreme quality of etc. Buy in bulk from us for the best quality products and service.</p>
18)	Bhogmagadi Farmer Producer Company Ltd.	Lisha Crastig- Lead sales & Business Development	8779682168	<a href="mailto:lisa_sadim@gmail.com">lisa_sadim@gmail.com</a>	Dantewada, Chhattisgarh 494449	<p>Bhogmagadi Organic Farmers Producer Company Limited - Wholesale Supplier of organic rice, kodo, millet &amp; pulses since 2016 in Dantewada, Chhattisgarh.</p>



19)	Ambe Phytoextracts Pvt. Ltd.	Vijay Kumar - Assist. Manager- Marketing	9911454376	<a href="mailto:vijaykumar@ambe-group.com">vijaykumar@ambe-group.com</a>	A-144, Sector-63, Noida Uttar Pradesh- 201305 (INDIA)	Ambe Phytoextracts Pvt. Ltd. has gained regard among the prominent manufacturers and exporters of best quality Herbal Extract and Condiment Powder within the few years of its starting in 2000. They are offering a large assortment of Herbal Extract, Condiment Powder, and Fruit Powder.
20)	Vallon Fermodirect Pvt. Ltd.	Bhavesh Rajpurohit	9549097666	<a href="mailto:operations@vallon.in">operations@vallon.in</a>	G-314, 315, phase III Bopnada, Jodhpur- 12, Rajasthan, India	Founded in 2014 by the sheer passion of an investment banker who turned into a farmer with a dogged determination to provide access to Indian farmers on a global platform, the Vallon team has come a long way in building scale and dedicated itself to producing and processing the finest quality organic ingredients and foods for the global consumer.
21)	Herbal Strategi Homecare Pvt. Ltd.	Balasubramanian	9901427427	<a href="mailto:herbal@herbalstrategi.com">herbal@herbalstrategi.com</a>	65/1, Modi court, 2nd floor, Millers Road, Bangalore - 560046	Herbal Strategi is an organization that has brought to the market an innovative range of homecare herbal / natural products. It is a well-documented and accepted fact that herbal / natural solutions are unique and score over chemical formulations in many ways. Taking advantage of this fact many herbal based products are available in the market place
22)	Aditi Organic Certification Pvt. Ltd	Vertika Singh - Manager- Quality Department	9728142270	<a href="mailto:singhvertika@aditocert.net">singhvertika@aditocert.net</a>	Ho: No.38, 1st Floor, 20th Main Road 1st Block, Rajajinagar, Bengaluru-560010, India	ADITI provides certification services, guaranteeing the rigorous respect of the applied standards on products, systems, and services, leading its operators to meet the growing requirements and face challenges of higher standards in Quality, Health and Safety, Environment and Social Responsibility.

**List of Traders (Identified from NMPB)**

Traders Name & Address	Landline No.	Mobile No.	Email-id	State
Ayurveda <u>Vikas Sansthan</u> , C-83, Gandhi Nagar, Moradabad-244 001	591-2491321	9359702566, 9897475531	energic31@gmail.com, avs@sanchamet.in	Uttar Pradesh
Essa Kay Herbs, "Kunti Niwas" HIG-A1/11, Tikrit Rai Talab, LDA Colony, Mohan Road, Lucknow-226 017	522-2648854, 2648855,2648854	9335906714, 9415012901	esskay111us@yahoo.com, esskayherbs123@yahoo.com	Uttar Pradesh
Indian Herbs Specialities Pvt. Ltd., Sharda Nagar, Saharanpur-247 001	132-2615010, 30 lines,2726288		info@indianherbs.org, purchase@indianherbs.org	Uttar Pradesh
Laxmi and Company, Opp. Annapurna Mandir, Saadat Ganj, Lucknow-226 003	0-9616593951, 9598710387	9616593951, 9598710387	laxmiandcompany.lko@gmail.com	Uttar Pradesh
Rhuto India Pharmaceuticals Pvt. Ltd., Nadrai Gate, Kasganj, Distt. Kashiram Nagar-207 123	5744-243739,	9837111251	rhuto@rhutoindia.com	Uttar Pradesh
Uma <u>Ayurvedics Pvt. Ltd.</u> , <u>Madhavpuri</u> , <u>Panchvati</u> , Nadrai Gate, Kasganj-207 123	5744-244563, 243362,243361	9837355109, 9837355110	umaayurved@hotmail.com	Uttar Pradesh

**List of buyers in Ghaziabad**

S. No	Buyer Name	Address	Mobile No.
1.	Shri <u>shryansh</u> Goyal	Agrasen Bazar, Choupal Mandir, Ghaziabad	9958279035

**List of buyers in Barabanki**

S.No.	Name of Buyer	Address	Mobile no.
1.	Shakeel Smile trading company	<u>Masoli</u> , <u>Barabanki</u>	9935330140
2.	Herbo Chem Industries	<u>Jahangirabad Road</u> , <u>Barabanki</u>	7607003038







## List of Custom Hiring Centres and Farm Machinery bank, Hamirpur

क्र. सं.	उत्पादकों का नाम	पिता/अध्यक्ष का नाम	पंजीकरण संख्या	उत्पादकों का पुरा पता	विकास खण्ड	कस्टम हायरिंग सेंटर/फार्म मशीनरी बैंक	अन्य तक विविध विषय पर लेख लेख लेख लेख लेख	वित्तीय वर्ष
29	RAJDEVENDRA SINGH	श्री जगत कर्न सिंह	8591892347100	हमीरपुर	सुमेरपुर	कस्टम हायरिंग सेंटर	लेख लेख लेख	2019-20
30	SHEELKUMA PRIYATP SINGH	श्री संभरसो सिंह	8591904860700	पंचकुला नुर्ग	सुमेरपुर	कस्टम हायरिंग सेंटर	लेख लेख लेख	2019-20
31	HIMANSHU	श्री राजेन्द्र अग्रवाल	8591885176300	दंडा	सुमेरपुर	कस्टम हायरिंग सेंटर	लेख लेख लेख	2019-20
32	SHANU PRIYATP SINGH	श्री सुनेन सिंह	859786613882923	विशाल मेढवा	सुमेरपुर	कस्टम हायरिंग सेंटर	लेख लेख लेख	2019-20
33	Mamji Kumar	श्री विरसारी	8591200622000	गौरी	सुमेरपुर	कस्टम हायरिंग सेंटर	लेख लेख लेख	2019-20
34	Rajpal	श्री सुतादीन	8591200622000	पौषिया नुर्ग	सुमेरपुर	कस्टम हायरिंग सेंटर	लेख लेख लेख	2019-20
35	MAHENDRA PAL SINGH	श्री नारायण	859186546784666	बनडा	गोहाण्ड	कस्टम हायरिंग सेंटर	लेख लेख लेख	2019-20
36	ASHAMAM	श्री प्रदान सिंह	8591932170000	जठहर	गोहाण्ड	कस्टम हायरिंग सेंटर	लेख लेख लेख	2019-20
37	Bhajan Kumar	श्री सुरेन्द्र सिंह	8591576324000	रडक	गोहाण्ड	कस्टम हायरिंग सेंटर	लेख लेख लेख	2019-20
38	DEADLOCK STATE ENGINEER FARMER PRODUCER COMPANY LMT	श्री अनुपम पांडक	55555934739112	पुराण	पुराण	फार्म मशीनरी बैंक	लेख लेख लेख	2019-20
39	JAGRATI SAMUL GRAM SANGHMAN	श्रीमती मनु देवी	55555934739123	सराई	कुशा	फार्म मशीनरी बैंक	लेख लेख लेख	2019-20
40	JANRAJSHY PRODUCER COMPANY LMT	श्री अमित कुमार	55555934739324	सकराव	गौडहा	फार्म मशीनरी बैंक	लेख लेख लेख	2019-20
41	KARU MATI SWAM SANGHAT SAMUL	श्री मणल देवी	55555934739116	मुसल नुर्ग	राठ	फार्म मशीनरी बैंक	लेख लेख लेख	2019-20
42	संदेश एगो प्रोड्यूसर कंपनी लि	श्री जगन्ध सिंह	55555934738332	सुमेरपुर	सुमेरपुर	फार्म मशीनरी बैंक	-	2020-21
43	विशाल कर्नस प्रोड्यूसर कंपनी लि	श्री राजेन्द्र सिंह	55555934737601	सिकरवा	सोपडा	फार्म मशीनरी बैंक	-	2020-21
44	सुनील मंडल ग्राम सभा संघ	श्रीमती सुनील देवी	55555934738786	विशाल	सोपडा	फार्म मशीनरी बैंक	-	2020-21
45	जय काल श्री राम साहाय संघ	श्रीमती लक्ष्मणा देवी	55555934738807	सोपडा	राठ	फार्म मशीनरी बैंक	-	2020-21
46	श्री रामसुनी मंडल ग्राम साहाय संघ	श्रीमती लक्ष्मणी	55555934738809	सोपडा	गोहाण्ड	फार्म मशीनरी बैंक	-	2020-21
47	एगो ग्राम एगो एगो एगो एगो एगो एगो	श्री सुजदीन सिंह	55555934738813	इमरुडा	सुमेरपुर	फार्म मशीनरी बैंक	-	2020-21
48	विशाल कर्नस प्रोड्यूसर कंपनी लि	श्री सुनील सिंह	55555934737608	सोपडा	मुसल	फार्म मशीनरी बैंक	-	2020-21
49	सुनील मंडल ग्राम सभा संघ	श्री मणल कुमार	55555934739100	पुराण	पुराण	फार्म मशीनरी बैंक	-	2020-21
50	सुनील मंडल ग्राम सभा संघ	श्री मणल देवी	55555934739104	राठ	राठ	फार्म मशीनरी बैंक	-	2020-21
51	सुनील मंडल ग्राम सभा संघ	श्री ली पांडक	55555934739108	सोपडा	मुसल	फार्म मशीनरी बैंक	-	2020-21
52	सुनील मंडल ग्राम सभा संघ	श्री ली देवी	55555934739112	सोपडा	मुसल	फार्म मशीनरी बैंक	-	2020-21
53	सुनील मंडल ग्राम सभा संघ	श्री ली देवी	55555934739116	सोपडा	सुमेरपुर	फार्म मशीनरी बैंक	-	2020-21
54	सुनील मंडल ग्राम सभा संघ	श्री ली देवी	55555934739120	सोपडा	मुसल	फार्म मशीनरी बैंक	-	2020-21
55	सुनील मंडल ग्राम सभा संघ	श्री ली देवी	55555934739124	सोपडा	मुसल	फार्म मशीनरी बैंक	-	2020-21
56	सुनील मंडल ग्राम सभा संघ	श्री ली देवी	55555934739128	सोपडा	मुसल	फार्म मशीनरी बैंक	-	2020-21
57	सुनील मंडल ग्राम सभा संघ	श्री ली देवी	55555934739132	सोपडा	मुसल	फार्म मशीनरी बैंक	-	2020-21
58	सुनील मंडल ग्राम सभा संघ	श्री ली देवी	55555934739136	सोपडा	मुसल	फार्म मशीनरी बैंक	-	2020-21





क्र. सं.	नाम	पिता / अमाता का नाम	संस्थागत संकेत	समाप्ति का सूत्र नाम	विभाग	आ. वि. संस्था का नाम / संस्था / संस्था का नाम	आ. वि. संस्था का नाम	आ. वि. संस्था का नाम
27	Manish	Ganesh	81978673826699	Cheruvu	MUSKAMA	अरुण आर्यन संस्था	-	2023-24
28	CHETAN	MALUVA	8192318109000	KUNTHA	RATH	अरुण आर्यन संस्था	-	2023-24
29	CHAKRA	STODHYA	859158020800	KUNTHA	RATH	अरुण आर्यन संस्था	-	2023-24
30	HARSHAN	GANGU	8191864803000	KUNTHA	RATH	अरुण आर्यन संस्था	-	2023-24
31	SHAZEN	DALLA	8591370214000	NORANGA	RATH	अरुण आर्यन संस्था	-	2023-24
32	LODHAGAL	KAMDEVAR	85918837147000	BAJOPUR	RATH	अरुण आर्यन संस्था	-	2023-24
33			8592672219000					2023-24
34			8191668615					2023-24
35	SALU ALI	MAGD ALI	8191618346000	RATH	RATH	अरुण आर्यन संस्था	-	2023-24
36	DHIRENDR KUMAR JOSHI	DURG PRAJAP	8191921500500	BAJOPUR	RATH	अरुण आर्यन संस्था	-	2023-24
37	MAIL PRATAP BISHN	KAMDEVAR	8592954781200	MALWA	RATH	अरुण आर्यन संस्था	-	2023-24
38	DEVPAL	UOHL	85935615810200	GRISAR	RATH	अरुण आर्यन संस्था	-	2023-24
39	RAJENDRA KUMAR	SUNY NANDAN	81918637988340	MALWA	RATH	अरुण आर्यन संस्था	-	2023-24
40	KARAN	ATUDHYA	819190501924500	KAMTHA	RATH	अरुण आर्यन संस्था	-	2023-24
41	DINESH	CHHATRAPAL	859186592231250	KITHUR	RATH	अरुण आर्यन संस्था	-	2023-24
42	KALKARAN	BHUPRAJAD	859385355647100	NORANGA	RATH	अरुण आर्यन संस्था	-	2023-24
43	RAJESH	SHANDRAM	8591848588000	PRAHARGARH	RATH	अरुण आर्यन संस्था	-	2023-24
44	SHREYA	VIRENDRAKUMAR	8592810834000	ATHASADH	RATH	अरुण आर्यन संस्था	-	2023-24
45	ANAND	BHOORA	8591188187000	KAMTHA	RATH	अरुण आर्यन संस्था	-	2023-24
46	UMMA J DEV MISHRA	VIRENDRA KUMAR BISH	819186191915020					2023-24
47	SHYAM BISHN	BABURAM	85938522070415	BAJOPUR	RATH	अरुण आर्यन संस्था	-	2023-24
48	PRASANT KUMAR	DHARAMPAL	85933014	KURISA	RATH	अरुण आर्यन संस्था	-	2023-24
49	Suresh Kumar	Emendash	8593862010019000	BAJOPUR	RATH	अरुण आर्यन संस्था	-	2023-24
50	Dharm	Latharash	8591996017000	Tubhmagarh	RATH	अरुण आर्यन संस्था	-	2023-24
51	JAYRAM	LODDAN	81928016219000	KARIYAS	SARLA	अरुण आर्यन संस्था	-	2023-24
52	KADHIRA	PAPASAD	8591996016000	CHHOMALU	SARLA	अरुण आर्यन संस्था	-	2023-24
53			859186191915020					2023-24
54			8593862010019000					2023-24
55	MURHARA	NATHU	8591188626	NORANGA	SARLA	अरुण आर्यन संस्था	-	2023-24
56	BHUBHET	SHAWAN DEEN	8591914452000	PACHORHURA	SARLA	अरुण आर्यन संस्था	-	2023-24
57	KUMAR	SHEEPAT	8592911717000	HARCHHIA	SARLA	अरुण आर्यन संस्था	-	2023-24
58	POORAN BISHN	TEJARAM	859121110000	BAJOPUR	SARLA	अरुण आर्यन संस्था	-	2023-24
59	Prashant	PUSA	8191668615					2023-24



## राज्य आयुष मिशन योजनान्तर्गत तुलसी कार्यक्रम की सूची

वर्ष 2021-22 जनपद-हमीरपुर



क्र.सं.	समाप्ती का नाम	पिता/पति का नाम	ग्राम	डिवीजन	जाति	संबाहल नम्बर	कमल शीटनं०	कुल शीटनं०	बैंक का नाम/शाखा	आका संख्या	आईएफएसएन कोड
1	श्री गुणधर	श्री गुणधर	4	5	6	7	8	9	10	11	12
1	श्री गुणधर	श्री गुणधर	तुलसी	सरीला	विशुडी	7107655308	तुलसी	1.0	आर्योता बैंक, उमरिया	610770100002879	BKID00ARYAGB
2	श्री अमरपाल	श्री अमरपाल	तुलसी	सरीला	साम्बारा		तुलसी	1.0	बैंक ऑफ़ सदीय, मुलकन	56550100000753	BAID00MULSKAR
3	श्री महेश्वर सिंह	श्री कर्णेश	तुलसी	सरीला	विशुडी		तुलसी	1.0	आर्योता बैंक, उमरिया	6107701000044209	BKID00ARYAGB
4	श्री राजेश कुमार	श्री नन्दराम	तुलसी	सरीला	विशुडी	8887993361	तुलसी	1.0	आर्योता बैंक, उमरिया	610770100006523	BKID00ARYAGB
5	श्री तुलसी शिखर	श्री रामधर	तुलसी	सरीला	विशुडी	9198703773	तुलसी	0.5	आर्योता बैंक, उमरिया	610770100003300	BKID00ARYAGB
6	श्री अरुण कुमार	श्री नन्दराम	तुलसी	सरीला	विशुडी	8887993361	तुलसी	0.5	आर्योता बैंक, उमरिया	610770100004410	BKID00ARYAGB
7	श्री देवकीनन्दन	श्री कर्णेश	तुलसी	सरीला	विशुडी	0	तुलसी	1.0	आर्योता बैंक, उमरिया	610770100002944	BKID00ARYAGB
8	श्री सीताराम	श्री चन्द्रराम	तुलसी	सरीला	विशुडी	8756721491	तुलसी	1.0	आर्योता बैंक, उमरिया	610770100004270	BKID00ARYAGB
9	श्री चन्द्रराम	श्री रामधर	तुलसी	सरीला	विशुडी	6307419723	तुलसी	1.0	आर्योता बैंक, उमरिया	610770100004411	BKID00ARYAGB
10	श्री गुण सिंह	श्री रामधर	तुलसी	सरीला	विशुडी	8885792254	तुलसी	1.0	युको बैंक, राठ	251791100390020	UCBA00002517
11	श्री जय सिंह	श्री अरुण	तुलसी	सरीला	विशुडी		तुलसी	1.0	भारतीय स्टेट बैंक, राठ	107993363945	SBIN00000206
12	श्री रामधर	श्री अरीराम	तुलसी	सरीला	अनुपटा	9794371137	तुलसी	1.0	इंदिरा बैंक, राठ	21532520064	IDIB00000612
13	श्री मनोज कुमार	श्री रामर	तुलसी	सरीला	विशुडी	8957383585	तुलसी	1.0	भारतीय स्टेट बैंक, राठ	55659483074	SBIN00000206
14	श्री रामधर	श्री हरिय	तुलसी	सरीला	विशुडी	9794409853	तुलसी	1.0	आर्योता बैंक, उमरिया	6107701000002757	BKID00ARYAGB
15	श्री जगेश्वर	श्री गोकुलनाथ	तुलसी	सरीला	विशुडी		तुलसी	1.0	सेण्ट्रल बैंक, राठ	3004967858	CBPS00033393
16	श्री जगेश्वर	श्री रामर	तुलसी	सरीला	विशुडी	8957383585	तुलसी	1.0	भारतीय स्टेट बैंक, राठ	50192390001	SBIN00000206
17	श्री गोकुलनाथ	श्री सुदेव	तुलसी	सरीला	विशुडी		तुलसी	1.0	बैंक ऑफ़ सदीय, राठ	455181000026234	BAID00MULSKAR
18	श्री रामधर	श्री सुदीप	तुलसी	सरीला	साम्बारा		तुलसी	1.0	बैंक ऑफ़ सदीय, राठ	455181000017998	BAID00MULSKAR
19	श्री रामधर	श्री सुदीप	तुलसी	सरीला	विशुडी	9005810932	तुलसी	1.0	इंदिरा बैंक, राठ	21532442835	IDIB00000612
20	श्री देवकीन	श्री सुदीप	तुलसी	सरीला	अनुपटा		तुलसी	1.0	इंदिरा बैंक, राठ	000502200006669	UCBA00002517



21	શ્રી સરના ગુજાર	શ્રી વાળુ મિત્ર	ગુજરાત	સરના	સુરતી	0555087216	ગુજરાત	1.0	સરનાઈ ટ્રસ્ટ, સરનાઈ	610770100002787	BKID00ARYAGB
22	શ્રી વાપ મિત્ર	શ્રી સરનાઈ	ગુજરાત	સરનાઈ	સુરતી		ગુજરાત	1.0	સરનાઈ ટ્રસ્ટ, સરનાઈ	610770100002369	BKID00ARYAGB
23	શ્રી સરનાઈ	શ્રી સરનાઈ	ગુજરાત	સરનાઈ	સુરતી		ગુજરાત	1.0	સરનાઈ ટ્રસ્ટ, સરનાઈ	6107701000062943	BKID00ARYAGB
24	શ્રી સરનાઈ	શ્રી મિત્ર	ગુજરાત	સરનાઈ	સુરતી		ગુજરાત	1.0	સરનાઈ ટ્રસ્ટ, સરનાઈ	36923407832	SHNS0000206
25	શ્રી સરનાઈ	શ્રી સરનાઈ	ગુજરાત	સરનાઈ	સુરતી		ગુજરાત	1.0	સરનાઈ ટ્રસ્ટ, સરનાઈ	6107701000003590	BKID00ARYAGB
26	શ્રી મિત્ર	શ્રી સરનાઈ	ગુજરાત	સરનાઈ	સુરતી		ગુજરાત	1.0	સરનાઈ ટ્રસ્ટ, સરનાઈ	21532512984	IDH0000R612
27	શ્રી સરનાઈ	શ્રી સરનાઈ	ગુજરાત	સરનાઈ	સુરતી	9294096798	ગુજરાત	1.0	સરનાઈ ટ્રસ્ટ, સરનાઈ	6107701000001953	BKID00ARYAGB
28	શ્રી સરનાઈ	શ્રી સરનાઈ	ગુજરાત	સરનાઈ	સુરતી	2607666504	ગુજરાત	2.0	સરનાઈ ટ્રસ્ટ, સરનાઈ	6107701000045234	BKID00ARYAGB
29	શ્રી વા વા વા વા વા	શ્રી સરનાઈ	ગુજરાત	સરનાઈ	સુરતી	7754866906	ગુજરાત	2.0	સરનાઈ ટ્રસ્ટ, સરનાઈ	610770100077947	BKID00ARYAGB
30	શ્રી સરનાઈ	શ્રી સરનાઈ	ગુજરાત	સરનાઈ	સુરતી		ગુજરાત	1.0	સરનાઈ ટ્રસ્ટ, સરનાઈ	610770100002110	BKID00ARYAGB
31	શ્રી સરનાઈ	શ્રી સરનાઈ	ગુજરાત	સરનાઈ	સુરતી		ગુજરાત	1.0	સરનાઈ ટ્રસ્ટ, સરનાઈ	9154010276166384	UTTB0000768
32	શ્રી સરનાઈ સરનાઈ	શ્રી સરનાઈ	ગુજરાત	સરનાઈ	સુરતી	160713536	ગુજરાત	1.0	સરનાઈ ટ્રસ્ટ, સરનાઈ	45330100001749	BARB00RATHXX
33	શ્રી સરનાઈ મિત્ર	શ્રી સરનાઈ	ગુજરાત	સરનાઈ	સુરતી	2000460790	ગુજરાત	1.00	સરનાઈ ટ્રસ્ટ, સરનાઈ	6107701000069509	BKID00ARYAGB
34	શ્રી સરનાઈ સરનાઈ	શ્રી સરનાઈ	ગુજરાત	સરનાઈ	સુરતી		ગુજરાત	1.0	સરનાઈ ટ્રસ્ટ, સરનાઈ	6107701000069368	BKID00ARYAGB
35	શ્રી સરનાઈ	શ્રી સરનાઈ	ગુજરાત	સરનાઈ	સુરતી		ગુજરાત	1.0	સરનાઈ ટ્રસ્ટ, સરનાઈ	610770100002313	BKID00ARYAGB
36	શ્રી સરનાઈ સરનાઈ	શ્રી સરનાઈ	ગુજરાત	સરનાઈ	સુરતી	6388787943	ગુજરાત	1.0	સરનાઈ ટ્રસ્ટ, સરનાઈ	6107701000069780	BKID00ARYAGB
37	શ્રી મિત્ર	શ્રી સરનાઈ	ગુજરાત	સરનાઈ	સુરતી	9294249363	ગુજરાત	1.0	સરનાઈ ટ્રસ્ટ, સરનાઈ	20190616401	IDH0000R612
38	શ્રી સરનાઈ	શ્રી મિત્ર	ગુજરાત	સરનાઈ	સુરતી		ગુજરાત	1.0	સરનાઈ ટ્રસ્ટ, સરનાઈ	610770100002702	BKID00ARYAGB
								<b>40.0</b>			

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## Scoping Visits

S.No.	Date	Location	Brief Description	Major Findings	Photo
1.	26 <sup>th</sup> August, 2022	Khari Baoli Market	Khari Baoli is a market in Chandni chowk Delhi, India known for its wholesale grocery and Asia's largest wholesale spice nuts, herbs, and food products like rice and tea.	Kalmegh, Satavaj, ashwagandha are the major medicinal plants that are in great demand in the market. In aromatic plants lemongrass and vetiver have great demand and these are dealers of these essential oils in the market.	
2.	1 <sup>st</sup> September, 2022	Profach Exhibition	Profach India expo was held on 1 <sup>st</sup> Sept. to 3 <sup>rd</sup> Sept. 2022 in Knowledge Park Greater Noida Uttar Pradesh. More than 50 exhibitors were dealing in the medicinal and aromatic plants trading, processing, manufacturing and export.	Ashwagandha, Tulsi, and shatawari in medicinal and Vetiver and lemon grass in aromatics are the main crops in economic point of view.  Most of the companies are having their own ICS – Internal Control groups, farmer groups, and farms for the raw material and crop fulfilment	

## Questionnaire for Department Officials (District Horticulture Officer)

1. Information about District-
  - a. major crops
  - b. major medicinal and aromatic crops
  - c. soil condition/ requirement for MAPs crops?
  - d. Percentage of distribution of land under cultivation- cereal crops, MAPs
  - e. Is there any statistics on production (quantity) available for the MAPs?
2. What is the climate condition of the district?
3. Does the climate of this district support the MAPs cultivation or not?
4. What is the present scenario of MAPs cultivation in the district?
5. What can be the future development/ area for scope in the MAPs sector in the region?
6. Which blocks of the district has the higher potential for MAPs growing?
7. Are there any nurseries registered under the department/ NHB/NMPB that provide input materials to the farmers?
8. Are farmers aware about these nurseries, what do you think about the accessibility of them to farmers?
9. Any information on
  - a. Inputs providers
  - b. Custom Hiring Centers



10. What are the schemes provided by the state and central government in the MAPs/Horticulture sector?
  - a. Convergence with other departments or ministries (Animal husbandry, agroforestry, APEDA, NABARD)
11. What is the status of infrastructure development in the district for the farmers?
  - a. Distillation units
  - b. Storage units
12. What is the future scope for infrastructure developments in the district for the farmers?
13. How the department can support for training of the farmers about the MAPs crop
  - a. Cultivation
  - b. Harvest
  - c. Storage
14. Many studies suggest that Bundelkhand region have high potential for MAPs cultivation so is there any ongoing govt. project/ programme in the district for the same?
15. What are the Key challenges have you observed in the sector of medicinal and aromatic plants in this region?
16. According to you what should be the suitable integrated farming model for this district with MAPs?
17. Are there any FPOs/ FPCs working for medicinal and aromatic plants?
18. Do you think MAPs cultivation can improve the current status of the farmers in the district?
19. Which are the govt/Non govt financial institutions working for the welfare of the farmers and provide credits for the production related inputs like seeds, fertilizers, pesticides and machinery?
20. Do you think that the present contribution of medicinal and aromatic plants enough for the development of economy and farmers' welfare?

### Questionnaire for the traders.

1. Information on Raw material procurement:
  - a. From farmers
  - b. From tribes
  - c. Type- cultivated or collected
2. In MAPs which have more demand (value and volume)
  - a. Medicinal- Ashwagandha, Tulsi, Satavari, Kalmegh
  - b. Aromatic- Lemongrass, Vetiver, Palmorasa
3. Who are the major buyers
  - a. Local markets within the state
  - b. Markets in other state
  - c. Any industries
4. Is processing done at the trader's level? And how it is done
  - a. Sorting and grading
  - b. Value-addition
5. Do you procure/ source raw materials from the Bundelkhand region?
6. Will you be interested in having/developing market linkage from Bundelkhand region of UP? If no then why?
7. Is there any specific kind of infrastructure required during storage and transportation?
8. Is there any present infrastructure facility available?
9. Are there any specific certifications requirements, and what are the challenges in getting the certification.
10. Is there any specific requirement for the crop
  - a. In terms of quality
  - b. In terms of quantity
  - c. Grades (Grade A, Grade B etc. and what are the target buyers for that)



11. In mandis and herbs market what are the basis of price determination?
  - a. Auction
  - b. Fixed rate
12. What is the profit margin or selling margin of the crops?
13. What are the major challenges or constraints faced in the value chain of medicinal and aromatic plants?
  - a. Quantity wise (in volume)
  - b. Product quality-wise
  - c. Marketing challenges
14. What are your suggestions to improve the market linkages in this sector?

## Questionnaire for the K.V.K

1. Information about district-
  - a. Soil type
  - b. Climate
  - c. Rainfall
2. What are the major crops of this district?
3. Any farmers who are linked with this KVK are growing MAPs crops like (Ashwagandha, Kalmegh, Shatavari, Tulsi, Vetiver, Lemon grass, Palma Rosa)?
4. Which crops are suitable for intercropping with the following MAPs (Ashwagandha, Kalmegh, Shatavari, Tulsi, Vetiver, Lemon grass, Palma Rosa)?
5. Source of inputs for these crops
6. What is the cost of soil testing?
7. What is the status of Organic farming in this particular district?
- 8.1 How many farmers have adopted organic farming?
- 8.2 Area under organic farming.
- 8.3 Difficulty faced by the farmers in organic farming practices?
- 8.4 Crops which are grown organically in the district?
- 8.5 MAPs crops which are grown organically?
8. Farmers/FPOs who are already cultivating MAPs in the region?
9. What is the suitable cultivation practices and post-harvest practices for MAPs crops?
  - a. Medicinal- Ashwagandha, Tulsi, Satavari, Kalmegh
  - b. Aromatic- Lemongrass, Vetiver, Palmorasa
10. What is the impact of the climate change in the district?
11. Which nutrient's deficiency is higher in soil of this region?
12. Status of N.P.K. in the district
13. What is the cost of cultivation of the following crops (Ashwagandha, Kalmegh, Shatavari, Tulsi, Vetiver, Lemon grass, Palma Rosa)?
14. How the training and capacity building of farmers can be done, what support the KVK can provide on this?
15. A suitable integrated farming model for MAPs.
  - a. MAPs+ Agroforestry
  - b. MAPs+ Livestock
  - c. MAPs+ fruit orchards
  - d. MAPs+ Fisheries
16. What kind of integrated farming models can be adopted for MAPs?
  - a. Intercropping with fruits
  - b. With livestock
  - c. With agroforestry





17. Are farmers practicing any of the above-mentioned farming system?

### **Questionnaires for the Farmers?**

1. What are the major crops you grow?
2. What are the major MAPs that you cultivate or collect?
3. From where do you get your inputs from
  - a. Seeds,
  - b. Seedlings
  - c. Fertilizers
4. What is the cultivation practice you adopt?
5. What are the machineries required in the cultivation operation?
6. Do you own the farm machinery or take on rent as per needed?
7. To whom you take machineries on rent from the custom hiring centers or the Individual machinery owners?
8. What kind post harvesting practices you adopt for the MAPs?
9. Major pests/diseases of the MAPs crops?
10. Who are major buyers of MAPs crops?
11. In what form traders and buyers demand for the raw materials?
12. Which plant part of these MAPs (Ashawagandha, Kalmegh, Shatavari, Tulsi, Vetiver, Lemon grass, Palma Rosa) are having higher demand?
13. Who are the frequent buyers of the crops
  - a. Local traders
  - b. Big traders or wholesalers
14. Do you sell your produce by your own or you take help of the middle men?
15. Do you know about the integrated farming models?
  - a. MAPs+ Agroforestry
  - b. MAPs+ Livestock
  - c. MAPs+ fruit orchards
  - d. MAPs+ Fisheries
16. Suggestion that you could provide to adopt these farming systems?

### **Questionnaires for the FPOs**

1. Name of the FPO.
2. Members in the FPO
3. Main objectives and activities.
4. Registration of the FPO (Month/ year)
5. Percentage of farmers that are involved in the collection and cultivation of MAPs crops?
6. Area under cultivation for the MAP s crops.
7. Are MAPs also grown as intercrops?
8. If yes, then with which crops they are usually intercropped with?
9. From where do you purchase inputs?
10. What business activities the FPO is involved in.
11. Any challenges that you face at
  - a. Cultivation
  - b. Marketing
  - c. Training
  - d. Post-harvest
12. Do you have easy accessibility to the markets?



13. In what form traders and buyers demand for the raw materials?
14. Which plant part of these MAPs (Ashwagandha, Kalmegh, Shatavari, Tulsi, Vetiver, Lemon grass, Palma Rosa) are having higher demand?
15. Who are the frequent buyers of the crops?
16. Which integrated farming models you know about?
  - a. MAPs+ Agroforestry
  - b. MAPs+ Livestock
  - c. MAPs+ fruit orchards
  - d. MAPs+ Fisheries
17. Suggestion that you could provide to adopt these farming systems?

