

## Production and marketing of medicinal and aromatic plants : prospects and constraints-A review

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### ABSTRACT

The purpose of this paper is to review the prospects and constraints of production and marketing of medicinal and aromatic plants. Relevant and scholarly articles of various researchers were reviewed for the period of 2000 to 2023. Medicinal and aromatic plants provide a higher return compared to traditional crops. However, marketing is an important constraint in cultivation. The seed, bark, roots, flowers, leaves, and stem used as raw materials for the herbal, pharmaceutical and cosmetic industries. Medicinal and aromatic plants use to make different value-added herbal products, so farmers can cultivate on a large scale and get a remunerative return, while consumers may receive the health benefits of herbal products. This paper tries to fill the gap and contributes literature on production, marketing and constraints in cultivation of medicinal and aromatic plants, which may be helpful in improving the supply chain of medicinal and aromatic plants.

**Keywords:** Constraints, cultivation, marketing channel, medicinal and aromatic plants

### INTRODUCTION

Medicinal and aromatic plants can grow successfully in rain-fed and dry land conditions (Hanumanthappa *et al.*, 2018). Many medicinal and aromatic plants are cultivated in India. There is a huge gap in the supply and demand of medicinal plants to manufacture Ayurvedic medicines in the country (Anonymous, 2020). There is a growing demand at the global level for high-quality, certified organic herbal products, and this gap can only be minimized by the commercial production of medicinal plants at a large scale (Sanwal *et al.*, 2017; Gaurav *et al.*, 2018). The export of medicinal plants and their derivatives was 1920.41 metric tons in the year 2017-18 and it is gradually increasing over years (Anonymous, 2019). Some of the most demanded medicinal plants are Isabgol, Ashwagandha, Amla, Aloe vera, etc. Medicinal plants are a good source of income for farmers, as there use in traditional and alternative healthcare systems (Anonymous, 2016; Chhabra, 2018). There is a huge gap between demand and supply for medicinal plants for the manufacturing of Ayurvedic medicines in the country (Anonymous, 2017). Mentha species has valuable anticancer

bioactive compounds (Esmaeili *et al.*, 2023). An important medicinal plant Senna has high demand in the international market (Kumar *et al.*, 2022). Pharmaceutical properties are based on the presence and abundance of secondary metabolites, such alkaloids, and flavonoid etc. (Thokchom *et al.*, 2023) However, out of total medicinal plants, only 15 per cent are cultivated, while the remaining 85 per cent are collected from forest ecosystems and other natural habitats (Economic Times, 2022).

Medicinal and aromatic plants are important source of foreign exchange earnings for developing countries (Rao *et al.*, 2022). Siwach *et al.* (2013) concluded that various *ex-situ* and *in-situ* conservation practices need to be increased to battle the existing challenges. In India, many of medicinal plants are under threat because of excessive and unsustainable collection, utilization, over exploitation, or unskilled harvesting practices (Kumari *et al.*, 2011) Many of the medicinal plants are profusely indigenous to developing countries (Bukar *et al.*, 2016).

The Central Institute of Medicinal and Aromatic Plants launched 'Sustainable Aroma Cluster' in the Bhagauli village of Barabanki district in Uttar

Pradesh, State in India. The cluster shows the use of innovative farming technologies to maintain constant economic output levels while also protecting soil health and biodiversity (Hindustan Times, 2023). Push and pull factor are the main drivers of medicinal and aromatic plants cultivation (Mohapatra *et al.*, 2018).

Sustainable collection can be achieved through two important elements: an adequate legal framework for forest land and training and skill development of farmers. Because of its climate and natural environmental diversity, hand-picked selection or cultivation method followed for growing many medicinal and aromatic plants (Zrira, 2013). Gularia and Gupta (2020) recommended the formation of cooperatives for farmers engaged in growing of medicinal and aromatic plants so that farmers they are aware of market trends and conditions. The wholesalers augment value by drying, processing, and bulk packaging of medicinal plants. Processor mix different medicinal plants to create ready to eat products to treat diseases (Mpelangwa *et al.*, 2022).

The cost of cultivation per acre of Isabgol and Patchouli in Maharashtra was calculated ₹ 3,994.46 and ₹ 32,707.17, and the return was ₹ 5,172 and ₹ 1,01211, respectively. The returns from Patchouli were higher than Isabgol (Jadhav *et al.*, 2001). The cost of cultivation of henna in the Pali district of Rajasthan especially skilled labour is required for its transplanting, and 55 per cent of labour costs alone account for the total establishment cost. The overall cost incurred was ₹ 8,464 per hectare, with labour accounting for 94 per cent (Chand *et al.*, 2002). The production cost was ₹ 12.76 per kg of the sweet flag leaves, which gives ₹ 8.09 profits to the farmer (Deshpandey *et al.*, 2008). In Palmarosa, production costs are higher, and net returns are also higher due to good demand in the market. The farmer gets a net profit of ₹ 24117 per acre in the first year, ₹ 43676 in the second year, ₹ 45631 in the third year, and ₹ 39422.24 in the fourth year (Mounika, 2015). The cost of cultivation is ₹ 15000 per hectare, and the net profit is ₹ 20000 per hectare. The yield of the raw straw of the Isabgol may be about 1000-1600 kg per hectare (Jat *et al.*, 2015).

The cultivation of rosemary can produce good-quality essential oil in the subtropical province of northern India (Verma *et al.*, 2020). High-quality

seed production and export are the best choices (Padma, 2019). Plants part such as leaves and flowers are the main source of phytochemicals, whereas fruits, seeds, leaves (Srinivasan *et al.*, 2022) stems, roots, and rhizomes, are ancillary sources (Prasathkumar, 2021). The antimicrobial compounds present in medicinal plants used in essential oils, folk medicine or isolated compounds such as flavonoids, alkaloids, and antioxidant agents (Rios and Recio, 2005; Ortega Ramirez *et al.*, 2014). Medicinal plants are useful in safe antiviral materials (Vimalanathan *et al.*, 2009). Indigenous people and local communities used herbs to treat malaria, collected from the nearby forest area (Kumar *et al.*, 2020). There are needs of chain of actors at the local and regional level, national and international levels (Padulosi *et al.*, 2008).

Medicinal and aromatic plants will continue to be potential sources of active, useful chemicals compounds that are used in the cure of various ailments. The cultivation of medicinal and aromatic plants provides a livelihood for the people. The role of government is pivotal in the overall cultivation, conservation, marketing, and sustainability of the sector.

Medicinal and aromatic plants are good source of income to farmers and it's demanded by many industries for various herbal products. However marketing of medicinal and aromatic plants is important constraint for farmers. This paper contributes literature on production, marketing and constraints in cultivation of medicinal and aromatic plants, which may be helpful in improving the supply chain of medicinal and aromatic plants.

## **METHODOLOGY**

The present study followed a literature review methodology to collect the data and information. The data were collected using the keywords "medicinal plants" along with marketing, cultivation, good agricultural practices, marketing channel, constraints in production, and marketing. Scientific platforms such as Google Scholar, Scopus, and the National Medicinal Plant Board website were explored, along with websites, annual reports, magazines, newspapers, etc. The collected information presented in the paper. This paper highlights the production prospects and marketing

of medicinal and aromatic plants, prevalent marketing channels, and constraints in production and marketing of medicinal and aromatic plants.

## DISCUSSION

### 1.1 Status of medicinal and aromatic plants

The fluctuation in the area and production of medicinal and aromatic plants was observed during 2005-06 to 2015-16 in India. The coefficient of variation was found to be 47.87 per cent (Chowti *et al.*, 2018). Production of mentha subsequently increased over the years (Singh, 2013). Rajasthan shares 90 per cent of the total production of henna in the country (Chand *et al.*, 2002). Major part of the henna production exported to Europe, African countries, the Middle East, and the USA (Gaur *et al.*, 2017). India is a traditional exporter of essential oils like sandalwood, lemongrass, palmarosa, spices, etc. (Kumar and Jnanesha, 2017). India is the second-largest exporter of medicinal and aromatic plant-based commodities after China (Tripathi *et al.*, 2017).

### 1.2 Prospects of medicinal and aromatic plants cultivation

- Cultivation of *Aloe vera* plant is economically attractive (Bali *et al.*, 2015).
- Diverse flora can use in local medicinal plants as medicine or as an additional income source for local livelihoods (Yadav *et al.*, 2018; Gupta *et al.*, 2022; Handa, 2022)
- Collection, primary processing and selling of medicinal plants contribute to the cash income of the poor men and women people (Gaurav *et al.*, 2018).
- Good agricultural practices (GAP) for medicinal plants are important to regulate the quality and production of the plants and many countries are implementing it (Singh *et al.*, 2021; Bisht *et al.*, 2022).
- Medicinal plant enterprises are employment-generating, profitable, and income-generating sources with foreign exchange earnings (Palash *et al.*, 2021).

### 1.3 Production of medicinal and aromatic Plants

Vanilla production in India showed significant growth in the area, production, and productivity of the crop. Among the major producers of vanilla,

Indonesia ranks first, Madagascar ranks second, China ranks third, and India ranks fourth. In India, Karnataka is the major producer of vanilla, followed by Kerala and Tamil Nadu (Balamurugan, 2009).

Before enter into commercial cultivation of medicinal plants, an understanding of agro-ecological zone, good agricultural practises, quality targets, and agro-economics is required (Singh *et al.*, 2022). Singapore, Japan, Germany, Malaysia, and United States have the highest importing advantages. The global market for medicinal and aromatic plants is mostly competitive (Roosta *et al.*, 2017). A good fraction of India's population depends on medicinal plants for their health care requirements (Jeelani *et al.*, 2018). Leaf sap sucking insects and pests, leaf diseases, and insects attacking on flowers are important insect pests (Ghakur, 2018). A diversified cropping system with basil, peas, and menthol mint is suitable and sustains higher yields and returns to farmers (Khan and Verma, 2018). The newly developed variety of menthol mint "CIM-Kranti" is cold and frost tolerant and it has potential to produce 10 to 15 per cent more oil up to 145 to 160 kg per hectare in the summer as compared to other popular commercial grown variety of menthol mint (Sharma *et al.*, 2019). Traditional methods of conservation of medicinal plants have made an immense contribution (Msuya and Kideghesho, 2009).

Medicinal plants grown in the Himachal Pradesh region are of enormous use in the herbal as well as in pharmaceutical industries (Samant *et al.*, 2007). Based on favourable climatic conditions and high market demands, Rosemary ranked first in the Himalayan region of Uttarakhand State in India. Agroforestry helps in cultivation as well as the conservation of many medicinal plants (Rao *et al.*, 2004). The research on medicinal plants with respect to climate change is very erratic and insignificant compared to commercial crops (Das *et al.*, 2016)

### 1.4 Marketing of medicinal and aromatic Plants

Value-chain embodies an important change in development and the relationships among producers, processors, traders, and consumers (Devaux *et al.*, 2018). The growers sell their entire produce in its raw form to the different processing

industries rather than processing it (Malik, 2007). There are two key marketing channels involved in the marketing of this crop. Channel I was producer to a local trader to industry, and channel II was producer to processor to industry. Most of the aromatic plants are marketed through the channel I, and only one-fourth of the produce is marketed through channel II (Suresh *et al.*, 2012).

Madhavji (2009) reported three important marketing channels for Coleus medicinal plant marketing in Gujarat: Channel I, Producer—wholesaler—retailer—consumer in regulated market. Channel II Producer—wholesaler—consumer in cities and Channel III Producer—consumer. Most of Coleus (85 per cent) is marketed by the channel Producer to Wholesaler in regulated markets and Retailer to Consumer. Producers received a higher share of consumers' rupees in channel III, which was producer-to-consumer.

### **1.5 Price, cost and margin**

Gondalia and Patel (2007) reported that producers' net share in the consumer rupee and marketing efficiency was found to be 58.26 per cent and 1.40 respectively. The share of value addition and primary processors of the fruit is very small, and the alternative models of production and processing should improve to better realize the ecological and economic benefits of underutilized fruit species (Daniel, 2009). Contractual as well as non-contractual systems, their nature, and performance were examined in the study for policy concerns and the net earnings benefit of the small farmers' producer (Singh, 2009). Training should also be providing to all the intermediaries involved in the marketing of medicinal plants (Gondalia and Patel, 2007).

Guleria *et al.* (2014) identified channels involved in marketing of medicinal plants in the Mid Hills of Himachal Pradesh and found most of *Ghrithumari* was marketed (43.60 per cent) through the channel → Producers → Cooperative Societies → Local processor, and 24.75 per cent of aloe vera was marketed through the channel → Producer → Local Traders → Processing units outside the state. Choudhry *et al.* (2017) identified marketing channel of mentha channel I Producer, Processor, Industry (company) and channel II Producer, Local Trader, Industry (company). The

cost incurred by the producer in marketing Mentha was found to be 162 per kg in channel II and 156 per kg in channel I. The overall gross price received by the farmers was highest in Channel I and lowest in Channel II. The cost incurred by farmers was higher in Channel II. Major marketing channel of medicinal and aromatic plants are Collector/growers to local traders to commission agent to wholesaler to Industry/Company and to Consumer (Chaubey, 2011).

### **1.6 Constraints in production and marketing of medicinal plants**

Lack of technical knowledge and awareness for increasing oil recovery from the crop, low price (Anonymous, 2020) in the market, and lack of storage and market facilities near the production area of the crop are important constraints. The mint crop is highly sensitive to lower and higher temperature. Lack of processing and value-added facilities was major constraints reported by 80 per cent of the mint growers (Pawar and Hange, 2008). Lack of information, high cost of input, lack of supply of electricity, and a regulated market were the major problems faced by farmers (Kumar and Venkatesan, 2011).

Lack of proper marketing information, pest and disease problems, higher cost of cultivation, and fluctuation in market price, low price which are major challenges faced by producers during the crop production and marketing phase, lack of a minimum support price, lack of a regulated and organized market (Ajjan *et al.*, 2008; Bhattacharya *et al.*, 2008; Ahmed and Sharma, 2012; Ram *et al.*, 2012; Pangriya, 2015; Balaji *et al.*, 2016; Mohapatra *et al.*, 2018). To understand the farming system and the success of the value chain of the plants, a thorough financial feasibility and technical study are required (Alam and Belt, 2009). The widespread price difference was found to be the most important marketing problem in vanilla production (Balamurugan, 2009).

Most of the farmers felt that the lack of a minimum support price, the lack of subsidies, the lack of good credit facilities (Luan, 2020) and shortage of human labour during peak season observed major challenges faced by them (Guleria *et al.*, 2014;). Supply chain management, consultancy, processing, and trading are the major

areas for entrepreneurship in the medicinal and aromatic plant sector (Rathore and Mathur, 2018). Local collectors have well-known, steady supply relationships with processors. Sustainability is another challenge for medicinal and aromatic plants (Chandra, 2020) due to over-exploitation (Vidhyarthi *et al.*, 2013). Poor knowledge of the package of practice, and inadequate domestication are important constraints of the sector (Nwafor *et al.*, 2021). Marketing is a major issue for medicinal and aromatic plant cultivators.

## CONCLUSION

Lack of improved production technology and an unregulated market are major constraints in the sector. Understanding the production and marketing of medicinal and aromatic plants is an important step in designing future policies to deal with to overcome the challenges and formulate a suitable and sustainable strategy for the sector. There is a need for an organised supply chain for medicinal and aromatic plants. In addition, the results of the present study are significant for policymakers and industrial personnel engaged in the entrepreneurship and business of medicinal and aromatic plant-based resources. Overcoming the identified challenges would benefit both primary producers and actors involved in the medicinal and aromatic plants supply chain.

## CONFLICT OF INTEREST STATEMENT

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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