

A Comprehensive Study on the Potential of Lavender Farming in Bhaderwah

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ABSTRACT

Lavandula, also known as lavender, is a valuable flowering plant in the mint family that is used extensively in herbal medicine and aromatherapy. It is presumed to be native to the Mediterranean, the Middle East, and India, with a history dating back 2,500 years. It is widely cultivated in temperate countries as an attractive plant and also for the extraction of essential oils. Lavender is grown in India's low-rainfall regions and on the hill slopes of Himachal Pradesh, Uttarakhand, and Uttar Pradesh. It is also successfully grown in Jammu and Kashmir, primarily in the Kashmir Valley. Bhaderwah tehsil of Doda district in the Jammu region is one of the most suitable places for the cultivation of lavender plants because Bhaderwah valley is mostly hilly terrain and has a temperate type of climate. In this paper, we examine the cultivation of lavender plants in Bhaderwah. In developing nations such as India, the production of therapeutic plants such as lavender is the heart of the overall system for increasing food security and the economy. This study demonstrates how lavender plant farming is changing the traditional way of farming, i.e., from subsistence to commercial farming (cash crop farming), which has a significant impact on the economy. The potential of Bhaderwah Valley for lavender farming is explored in this study. The different initiatives taken by the Indian Government for lavender cultivation in Bhaderwah are also discussed.

Keywords: Lavender, Agriculture, Farming, Economy, Aroma Mission, Purple Revolution

I. INTRODUCTION

Lavender (scientific name: *Lavandula angustifolia*) is a flowering plant in the mint family that's easily identified by its sweet, flowery aroma. The majority of lavender grows in rocky, calcareous regions of the Mediterranean basin. Lavender grows in North Africa, the Mediterranean, Europe, and Northern India. Lavender was cultivated by the ancient Greeks and Romans and in Elizabethan England. It was first cultivated around 2,500 years ago in the Mediterranean region, the Middle East, and India. *Lavandula* is a genus of 47 known species of ornamental plants in the mint family. Several members of the genus are widely planted in temperate climates as decorative plants for gardens and landscapes, culinary herbs, and commercially for essential oil extraction. *Lavandula angustifolia* is the most extensively cultivated species, and there is a colour named after the shade of the flowers of this species. Since ancient times, lavender has been used in traditional medicine and cosmetics. It is believed that lavender has antibacterial and anti-inflammatory properties that can aid in the healing of small burns and insect bites. Tea made from lavender can be used to treat digestive problems like abdominal puffiness, nausea, gastrointestinal problems, and vomiting. In addition to aiding with digestive issues, lavender is applied topically to treat wounds, sprains, toothaches, and headaches. The *Lavandula* oil is strong and exhibits broad-spectrum antifungal activity. It greatly enhances human health and care.

The temperate zone is where lavender is most frequently grown. In India, lavender is grown in the low-rainfall regions and hill slopes of Himachal Pradesh, Uttarakhand, and Uttar Pradesh, as well as in Jammu and Kashmir. Bhaderwah is a town, tehsil, and subdistrict in the Doda district of the Jammu Region that is also known as Bhaderwah Valley. Bhaderwah is unique from the rest of the state because of its

distinctive geographic characteristics in contrast to other areas. It is also known as Chota Kashmir (Little Kashmir) owing to its picturesque surroundings. The terrain seems to be quite rough and mountainous, and the topography is uneven.

The Bhaderwah Valley is predominantly hilly and has a temperate environment, which is ideal for the cultivation of lavender plants. The vast majority of Bhaderwah's population lives in rural areas and relies heavily on subsistence farming to survive. The primary occupations of the working population include cultivators, agricultural labourers, livestock keepers, building construction workers, traders, and merchants. The study area is positioned in Jammu & Kashmir at 32.980033°North latitude and 75.713706°East longitude along the outer Himalayan range. It is situated in the eastern part of the state. The Bhaderwah tehsil shares boundaries with the Chamba district of Himachal Pradesh on the east, Ramban on the west, Kathua and Udhampur on the south, and Kishtwar on the north. With a total area of 112.17 square kilometres, this subdivision is home to 75,376 residents. According to Census 2011, the sex ratio was 930, with 39,949 men and 35,427 women in total. The tehsil has 13,994 households and 119 villages. A sizable proportion of the population lives in rural areas and relies on agriculture and related sectors for subsistence and a living. Tehsil's main agricultural products are maize, paddy, wheat, pulses (notably beans), vegetables, spices, marigolds, and mushrooms. The majority of the populace grows crops for their personal consumption and is unaware of commercial farming. Nowadays, some farmers are focusing on cash crops introduced by the Union Government's Aroma Mission. Under this mission, a small proportion of farmers are adopting the farming of unconventional aromatic plants, namely lavender.

II. AN OVERVIEW

Like people in other areas of Jammu and Kashmir, folks who live in the Bhaderwah tehsil of the Doda district rely largely on agriculture for their means of subsistence. With a total area of 11,220 hectares, 3,085 ha are netly cultivated and 6,171 ha are grossly cultivated. The Bhaderwah sustains 13,994 families, despite the fact that all of its major crops produce production levels that are far lower than those of the entire nation. The main reasons for the low output and productivity can be attributed to resource-poor agricultural populations paired with rain-fed farming, which makes it challenging for them to adjust to fluctuating consumer wants and preferences and reduce production anxiety. Agriculture is the mainstay of Bhaderwah Tehsil in the Doda district of Jammu, where about 85% of the population lives in rural regions and is primarily dependent on agriculture and allied industries. Crop productivity fluctuates in this state's hilly tehsil due to varying climatic conditions. Bhaderwah experiences a somewhat cool, wet winter with the highest snowfall due to western disturbances and a very mild, dry summer with very little monsoon.

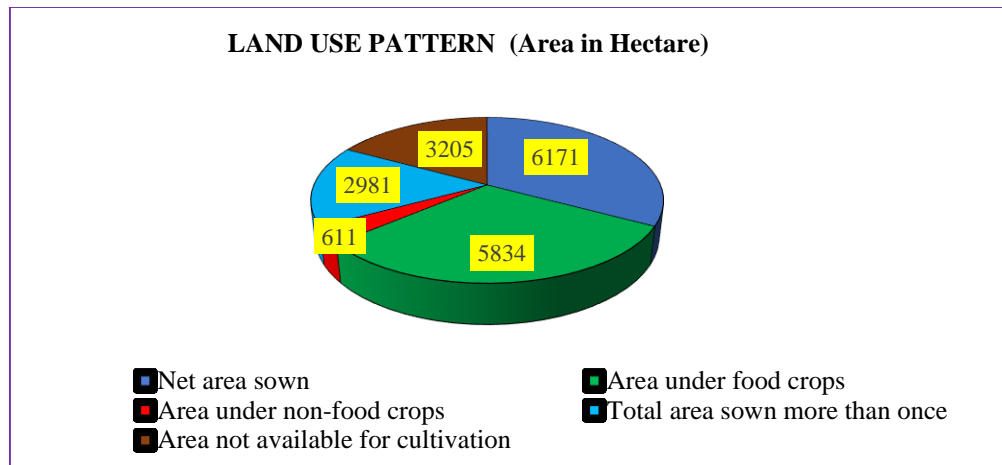
Lavender farming started in Bhaderwah in 2016–17 by a dozen farmers. By January 2023, about 200 farmers from the following villages: Tapri, Lehrote, Killar, Koundla, Himote, Saringal, Butla, Nalthi, and Nakshari were now practising lavender farming in their fields. The majority of the crops grown by the farmers in Bhaderwah are maize, which has a low yield and low market value. Nevertheless, thanks to its great commercial value, lavender growing has the potential to completely transform the livelihood of local farmers in Bhaderwah. The market price for lavender oil is good, costing around Rs. 10,000 per litre. On May 25 and 26, 2022, Bhaderwah, J&K, hosted the first lavender festival in India. Scientists, technologists, progressive farmers, and agribusiness owners from all across the country, including Jammu and Kashmir, attended the Bhaderwah Lavender Festival. Bhaderwah is the cradle of India's Purple Revolution since it has the ideal soil and environment for lavender growing.

LAND USE PATTERN OF BHADERWAH TEHSIL

S.NO	PARTICULARS	AREA
1	Total geographical area as per village papers	11220 Ha
2	Net area sown	6171 Ha
3	Area under food crops	5834 Ha
4	Area under non-food crops	611 Ha

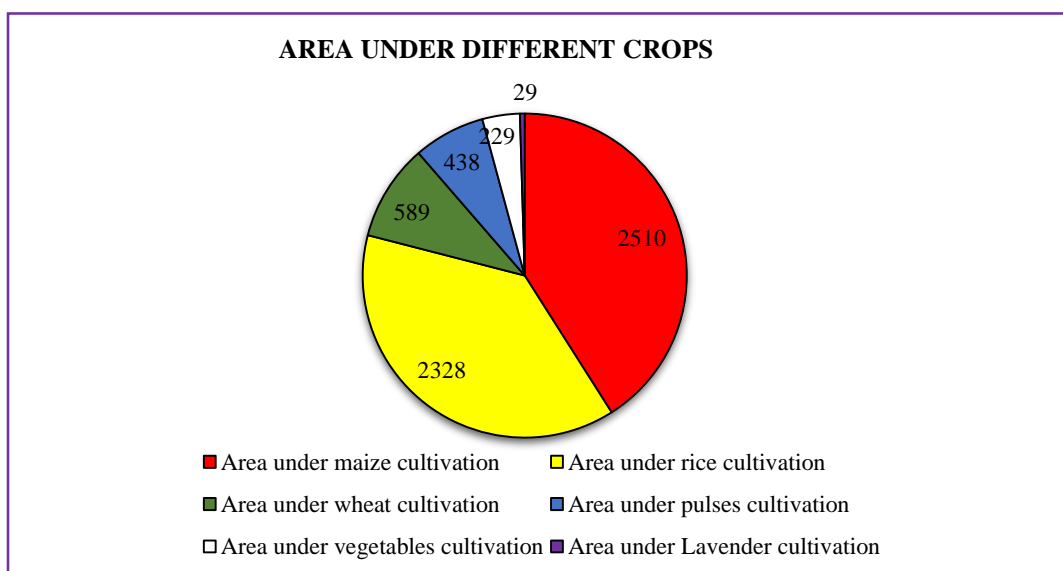
5	Total area sown more than once	2981 Ha
6	Area not available for cultivation	3205 Ha

Source: comprehensive district plan Doda.



AREA UNDER DIFFERENT CROPS CULTIVATION

S.NO	PARTICULARS	AREA
1	Net area sown	6171 Ha
2	Area under maize cultivation	2510 Ha
3	Area under rice cultivation	2328 Ha
4	Area under wheat cultivation	589 Ha
5	Area under pulses cultivation	438 Ha
6	Area under vegetables cultivation	229 Ha
7	Area under Lavender cultivation	29 Ha



III. THE POTENTIAL OF LAVENDER FARMING IN BHADERWAH

If the conditions are ideal, the perennial plant lavender can survive up to 20 years. It is a lovely, fragrant shrub that grows to a height of about two feet (60 cm). It produces purple flowers with a lot of essential oil. Lavender essential oil is revered as a valuable product all over the world. It can be used for both medicinal and non-medical purposes. It exhibits outstanding antibacterial and antimicrobial effects while having very low toxicity. Lavender flowers provide a lot of nectar, which attracts bees and other pollinators. Lavender blossoms are used in the production of fragrant lubricants after being chopped and dried. Depending on the location, management, and cultivar, lavender yields 8 to 30 kilogrammes of true lavender, 40 to 60 kg of lavender essential oil, and 500 to 1000 kg of dried flower stems per hectare (ha).

There is potential for lavender cultivation in Bhaderwah Tehsil. The potential of lavender farming can be seen from a geographic perspective, i.e., the many geographic conditions that influence the growth of the lavender plant. The lavender plant needs a temperate climate with warm, dry summers and cool, moist winters. Lavender can tolerate moderate frost and drought. High humidity can harm all varieties of lavender. The quality of oil is negatively impacted by high summer temperatures. In an annual rainfall range of 300 to 1400 mm, lavender can grow successfully. True lavender can be found growing up to 1700 metres above sea level in its natural environment. At elevations between 700 and 1000 metres above sea level, lavender is regularly encountered. As plants flower more profusely in cooler climates, oil output tends to rise with altitude. Lavender needs soils that are well-drained, light, sandy, sandy loam, gravelly, or even dark forest soil that receives direct sunlight. Low-fertility soils can still be used. The pH of the soil should range from 5.8 to 8.3. Plant infections and poor growth are both brought on by overly wet soils. Slopes are suitable for planting lavender as long as practical farming activities can still be done there. There will be advantages to oil production when placed on sloping land facing north or north-west to receive the most sunlight and heat.

All such factors that are responsible for the cultivation of the lavender plant can be found in Bhaderwah Valley. The climate of Bhaderwah is temperate, with warm and dry summers and cool and wet winters. The average annual precipitation varies between 600 and 800 mm, which is favourable for its cultivation. The Bhaderwah Tehsil lies at an average elevation of about 1,613 metres above sea level. As said earlier, Bhaderwah Tehsil is hilly terrain with gentle to steep slopes, and the soils vary from brown forest to sandy loam. Thus, the physical setup of Bhaderwah Valley is favourable for lavender cultivation. Tapri, Lehrote, Killar, Koundla, Himote, Saringal, Butla, Nalthi, and Nakshari are the localities where lavender farming is being done. Chinta, Ghata, Bhalra, Kursari, Seri, Balote, Khalu, Khaleni, Dradu, Lamote, and Puneja are some important places in Bhaderwah that have potential for the cultivation of the lavender plant.

IV. PURPLE REVOLUTION

The Purple Revolution, or Lavender Revolution, launched by the Ministry of Science and Technology seeks to advance the domestic aromatic crop-based agro-economy through the 'aroma mission' of the Council of Scientific and Industrial Research (CSIR). The project aims to boost farmers' incomes and encourage lavender farming on a commercial basis. The major product is lavender oil, which costs at least Rs. 10,000 per litre. The majority of farmers in Bhaderwah used to grow maize. Then, in 2016, the Centre introduced the Aroma Mission to promote the production of plants with aromatic medical characteristics, such as lavender. As they switched from growing maize to the perennially blooming plant, some 200 farmers in the Bhaderwah Valley saw greater gains. Lavender gradually displaced maize plants from additional nearby land as the profits rolled in, until the flowers eventually covered an area that was nearly ten times larger than it had been eight years earlier.

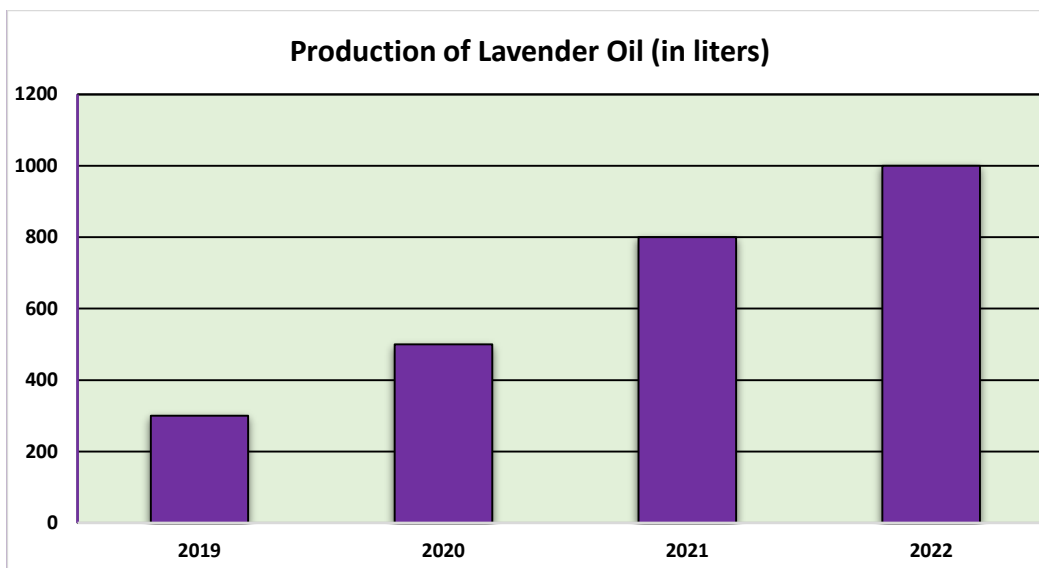


Figure: View of Purple Revolution in Bhaderwah

V. PURPLE ECONOMY

The Aroma Mission is being carried forward by scientists from the Council of Scientific and Industrial Research (CSIR) and the Indian Institute of Integrative Medicine, Jammu (IIIM Jammu). Lavender planted on one hectare of land yields at least 40 litres of lavender oil. However, because Doda is flatter than desired, 32–40 litres of lavender oil can be collected per hectare from the local crop. Incense sticks are made from lavender water, which separates from lavender oil. The hydrosol produced following flower distillation is used to make soaps and room fresheners. Lavender production not only increased farm income but also employed the district's women farmers. In the Indian market, the cost of lavender oil made in J&K is approximately Rs 10,000 per kg. In the Indian market, dried lavender flowers sell for between 1000 and 1500 rupees. Lavender growing, which once brought in about Rs 2500 per kanal per year, has been effectively adopted by many small and marginal maize farmers in the temperate area of the Jammu division. Between 40 and 60 litres of lavender oil are produced per hectare each year in the region, with 50 litres per hectare being the norm. Lavender growers now get between Rs 3,50,000 and Rs 6,00,000 per hectare in net annual revenue, up from roughly Rs 40,000 to Rs 60,000 per hectare previously.

In 2019, 2020, 2021, and 2022, farmers in the Doda district, particularly in Bhaderwah, produced 300, 500, 800, and 1000 litres of lavender oil, respectively. Selling dried flowers, QPM of lavender, and lavender oil brought in more than Rs 4.2 crore between 2018 and 2022. Lavender oil is now being produced in this area; however, it is only in the inspection stage. In the upcoming years, it is anticipated that lavender oil production will rise significantly. Lavender oil manufacturing in J&K will aid in import substitution and conserve foreign exchange. Also, because there is a high demand for lavender oil worldwide, there is great potential for exporting this product. Poor and marginal farmers' growth and development are greatly aided by lavender farming, which benefits the economy as a whole.



VI. AROMA MISSION

The Aroma Mission's intended interventions in the areas of agriculture, processing, and product development are intended to transform the aroma industry and support rural employment. The goal of the mission is to encourage the planting of aromatic plants for essential oils, which are highly sought after by the fragrance industry. On the model of menthol mint, it is anticipated to help Indian farmers and the scent business become the world's leaders in the production and export of several other essential oils. By maximising the use of wastelands, increasing earnings, and shielding the crops from grazing animals, it seeks to significantly benefit the farmers.

The nodal laboratory is the CSIR-Central Institute of Medicinal and Aromatic Plants (CSIR-CIMAP), Lucknow. The participating laboratories are the CSIR Institute of Himalayan Bioresource Technology (CSIR-IHBT), Palampur; the CSIR-Indian Institute of Integrative Medicine (CSIR-IIIM), Jammu, etc. The main agencies involved in this mission are the Council for Scientific and Industrial Research (CSIR) and the Indian Institute of Integrative Medicine, Jammu (IIIM Jammu). These two bodies are mainly responsible for making the purple revolution under the Aroma Mission a success.

In 2018, the Indian Institute of Integrative Medicine attempted to spread awareness of lavender in the districts of Doda, Kishtwar, and Rajouri of the Jammu division under the CSIR-Aroma Mission. 200 small and marginal farmers in the Bhaderwah region of the Doda district quickly seized the initiative and began growing lavender in their fields after discovering a suitable, mild environment and helpful growing circumstances. The farmers of Bhaderwah received free essential oil distillation facilities in addition to technical assistance. Since 2010, CSIR-IIIM Jammu has encouraged farmers in Bhaderwah to practise the farming of aromatic plants while taking into account their financial, physical, and conceptual demands. In addition to giving them access to the worldwide market, they have installed five distillation columns in various Bhaderwah villages.

VII. ONE DISTRICT, ONE PRODUCT

The ODOP (One District, One Product) Invest India was launched by the DPIIT, Ministry of Commerce and Industry, Delhi, in collaboration with the Jammu and Kashmir Trade Promotion Organisation (JKTPO) on June 10, 2022. The JKTPO organised a nationwide awareness campaign for the initiative in Jammu and Kashmir and interacted with manufacturers, UT government officials, and media persons. Under the ODOP initiative, 21 products have been identified from 20 districts in Jammu and Kashmir. Products like the Kani Shawl, Natural Oil (Lavender), Wicker Willow, Basmati Rice, Basohli Pashmina, and Saffron were displayed at the event. Under the One District, One Product-Districts as Export Hubs (ODOP-DEH) initiative, lavender cultivation in Jammu and Kashmir has experienced a significant boom. Lavender has been designated by the central government as a "Doda brand product" to promote the rare aromatic plant and boost the morale of farmers, entrepreneurs, and agribusinesses involved in its cultivation.

VIII. CONCLUSION

Since prehistoric times, medicinal plants have been used for medicinal purposes. Plants synthesise a large number of chemicals that act as defences against pathogens, insects, fungus, and herbivorous mammals. One of the most significant plants today, lavender, was successfully grown and processed for essential oil. Lavender oil is used in medicines, cosmetics, and aromatherapy. Up until now, no research has been carried out to document the medicinal as well as economic benefits of lavender in the Bhaderwah valley of Doda district in Jammu and Kashmir because of its initial stage. The topography and climate of Bhaderwah Valley make the area promising for lavender cultivation. The economic well-being of those living in the Bhaderwah Valley is significantly impacted by this "Purple Revolution," because it creates employment opportunities. In this work, we have highlighted various villages in Bhaderwah like Chinta, Ghata, Bhalra, Kursari, Seri, Balote, Khalu, Khaleni, Dradu, Lamote, and Puneja that also have greater potential for lavender farming. If the farmers in such villages choose to

grow lavender instead of maize, then they will surely get more revenue from the same piece of land. We have also highlighted the actions being undertaken by the state and union governments to encourage farmers to grow lavender plants. As a result of our research, we have also identified a number of geographic factors that are important for the cultivation of lavender; therefore, this study will be beneficial to both the general public and the government in relation to lavender farming.

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