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AN EMPIRICAL ASSESSMENT OF TECHNICAL, LABOUR AND FINANCIAL CONSTRAINTS IN POMEGRANATE CULTIVATION IN BAGALKOT DISTRICT, KARNATAKA.

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Abstract
Pomegranate cultivation is an important horticultural activity that provides livelihood opportunities and income for farmers in Karnataka. However, farmers face several production-related constraints that may affect the effective management of orchards. The present study examines the production constraints experienced by pomegranate farmers in Bagalkot district, Karnataka. The study is based on primary data collected from 250 pomegranate farmers covering all taluks of the district. Eight production-related constraints were examined using frequency and percentage analysis. The findings reveal that lack of technical knowledge was reported by all respondents (100%), followed by difficulty in harvesting fruits (67.6%), non-availability of labour during peak operation periods (58.8%), high labour wages (57.2%) and lack of capital (54%). Lack of irrigation facilities was reported by 40.8 per cent of the farmers. In comparison, lack of quality planting material (20.4%) and large area to cover (16.4%) were relatively less frequently reported constraints. The study highlights the importance of strengthening agricultural extension services, improving access to institutional finance, addressing labour-related difficulties and promoting efficient orchard management practices. The findings provide an empirical understanding of the production-related difficulties reported by pomegranate farmers in Bagalkot district.

Keywords: Pomegranate cultivation, production constraints, technical knowledge, labour availability, irrigation facilities, Bagalkot district.
JEL Classification: Q12, Q13, Q16, Q18.

1. Introduction

Agriculture continues to play a significant role in India's economy by providing employment, income and livelihood opportunities to a substantial proportion of the population. In recent years, horticultural crops have gained importance as an avenue for agricultural diversification, higher-value production and improved farm income. Among these crops, pomegranate (*Punica granatum* L.) has emerged as an important commercial fruit crop because of its market demand, nutritional value and suitability for cultivation under semi-arid climatic conditions.

Karnataka is one of the important pomegranate-producing states in India. The crop is cultivated in several districts, including Bagalkot, Vijayapura, Koppal and other parts of northern Karnataka.

Bagalkot district has favourable conditions for horticultural activities, and pomegranate cultivation has become an important agricultural enterprise for a section of its farming community.

Despite its commercial importance, pomegranate cultivation involves several production-related challenges. Farmers need to manage irrigation, nutrient application, pest and disease incidence, labour requirements, harvesting and other orchard operations. The availability of adequate capital and quality planting material, together with access to technical guidance, also plays an important role in the effective management of pomegranate orchards.

Production constraints may differ across farmers depending on their resources, cultivation practices and access to agricultural services. Financial limitations can restrict the timely purchase of agricultural inputs, while inadequate technical knowledge may affect the adoption of recommended cultivation practices. Similarly, labour shortages and high wages can create difficulties in completing orchard operations, particularly during critical agricultural periods.

In this context, an empirical assessment of production constraints is necessary to understand the difficulties experienced by pomegranate farmers. The present study focuses on pomegranate farmers in Bagalkot district and examines eight major production-related constraints using primary survey data collected from 250 respondents across all taluks of the district.

2. Statement of the Problem

Although pomegranate cultivation offers opportunities for agricultural diversification and commercial production, farmers encounter several difficulties in managing their orchards. These include inadequate capital, limited access to quality planting material, lack of technical knowledge, irrigation-related difficulties, high labour wages, non-availability of labour during peak operations and harvesting-related problems.

Such constraints may create difficulties in the timely completion of agricultural operations and the effective management of orchards. However, the relative importance of these problems needs to be understood through systematic field-level investigation.

Bagalkot district has an established background in pomegranate cultivation, and previous studies have examined particular aspects such as nutrient management, bacterial blight and disease control. Nevertheless, there is a need for a consolidated assessment of the production constraints reported by farmers across the district.

Therefore, the present study attempts to identify and analyse the major production-related constraints experienced by pomegranate farmers in Bagalkot district.

3. Objectives of the Study

The major objectives of the study are:

1. To identify the major production-related constraints faced by pomegranate farmers in Bagalkot district.
2. To examine the extent of financial, technical and irrigation-related constraints experienced by the farmers.
3. To analyse labour availability, labour costs and harvesting-related difficulties in pomegranate cultivation.
4. To suggest appropriate measures for addressing the identified production constraints.

4. Research Methodology

Study Area: The present study was conducted in Bagalkot district of Karnataka. The district was selected purposively considering the importance of pomegranate cultivation as a horticultural activity in the region. The study covered all taluks of Bagalkot district to obtain a comprehensive understanding of the production-related constraints experienced by pomegranate farmers.

Sampling Technique and Sample Size: A multistage sampling technique was adopted for the selection of respondents. In the first stage, Bagalkot district was purposively selected based on the importance of pomegranate cultivation. In the second stage, all taluks of the district were covered to ensure geographical representation. In the subsequent stage, pomegranate farmers were selected from the identified study areas. A total of 250 pomegranate farmers constituted the sample for the study.

Nature and Sources of Data: The study is based on primary data collected directly from 250 pomegranate farmers through a field survey. Information was collected on eight selected production-related constraints affecting pomegranate cultivation. The responses of the farmers were recorded in binary form, namely, Yes and No, indicating whether they experienced each of the identified constraints.

Tools of Data Analysis: The collected data were systematically classified, tabulated and analysed using descriptive statistical techniques, particularly frequency and percentage methods. The percentage of respondents reporting each constraint was calculated using the following formula:

$$\text{Percentage} = \frac{\text{Number of respondents reporting the constraint}}{\text{Total number of respondents}} \times 100$$

The analysis was conducted separately for each of the eight production constraints. Frequency and percentage distributions were used to identify the major problems experienced by pomegranate farmers and to assess the relative prevalence of each constraint.

5. Review of Literature

Raveesha et al. (2025) examined production and marketing constraints among pomegranate farmers. Their findings showed that pest and disease incidence was reported by all respondents, followed by high pesticide costs, inadequate knowledge of recommended pesticide and fertiliser application, and labour unavailability. The study highlights the importance of technical guidance, plant protection and labour availability in improving pomegranate production. Chikkalaki and Krishnamurthy (2023) investigated constraints among fruit crop growers, including pomegranate farmers, in Vijayapura district, Karnataka. The study identified inadequate irrigation, high input costs, delayed credit, high labour wages and labour shortages as important constraints. Its findings demonstrate the significance of financial, irrigation and labour-related difficulties in Karnataka's fruit cultivation sector. Kerutagi et al. (2020) compared pomegranate cultivation using Darakshak bioconsortium with conventional chemical practices in Karnataka. They observed lower cultivation costs and higher yields among Darakshak users. Farmers also identified bacterial blight, irrigation difficulties and declining yields as major production problems. The study emphasises the importance of sustainable disease management and efficient resource utilisation. Marathe and Dhinesh Babu (2017) studied irrigation scheduling and its influence on pomegranate growth,

nutrient uptake, water-use efficiency and yield under semi-arid conditions. Their experiment found that irrigation at 70 per cent cumulative pan evaporation was beneficial during the bearing period. The findings demonstrate the importance of scientific irrigation management for improving orchard productivity and reducing water-related production difficulties. Anusree et al. (2018) assessed soil and leaf nutrient status in 150 pomegranate orchards across seven villages of Bagalkot district, Karnataka. Their study examined the relationship between major nutrient concentrations and pomegranate yield. It establishes the importance of balanced nutrient management and orchard-level technical assessment, providing a useful local research background for understanding production-related challenges among Bagalkot farmers. Surliya and Meena (2024) examined post-harvest management problems among 120 pomegranate farmers in Barmer district, Rajasthan. Using Garrett ranking, they identified environmental, technical, infrastructure, financial and market-related difficulties. Their analysis also considered the relationship between farmers' education and technical problems. The study highlights the importance of technical knowledge, appropriate harvesting practices and post-harvest infrastructure. Sudha et al. (2021) investigated integrated disease management practices for controlling bacterial blight in Karnataka's pomegranate orchards. The authors reported substantial bacterial blight incidence in Bagalkot district and discussed management practices to control the disease. Their findings demonstrate that plant diseases constitute an important production challenge and underline the need for effective plant protection, farmer awareness and locally appropriate disease-management interventions. Doddaraju et al. (2019) developed sensitive PCR-based techniques for early diagnosis of bacterial blight in pomegranate caused by *Xanthomonas axonopodis* pv. *punicae*. Conducted by researchers associated with the University of Horticultural Sciences, Bagalkot, the study highlights the importance of timely disease identification. It supports the need for technical knowledge and accessible diagnostic services among pomegranate growers. Elango et al. (2021) reviewed arthropod pests affecting pomegranate cultivation in India. The authors documented numerous insect and mite pests damaging flowers, fruits, twigs and leaves, thereby affecting fruit quality and productivity. They also discussed the consequences of excessive insecticide use, including secondary pest outbreaks. The study reinforces the importance of integrated pest management and appropriate technical guidance. Singh et al. (2023) examined the antagonistic potential of endophytic bacteria against *Xanthomonas axonopodis* pv. *punicae*, the pathogen responsible for bacterial blight in pomegranate. Their investigation evaluated biological control under laboratory and plant-based conditions. The findings contribute to sustainable disease-management research and indicate the potential role of beneficial microorganisms in reducing dependence on conventional chemical plant-protection methods. Manjunatha et al. (2024) investigated the potential of native endophytic *Bacillus* species for controlling bacterial blight in pomegranate under field conditions. Their research explored biological control as an alternative disease-management approach. The findings are relevant to farmers experiencing disease-related production difficulties and highlight the potential contribution of locally adapted biological agents to integrated and sustainable pomegranate cultivation. Raja et al. (2023) studied bio-intensive disease-management strategies against pomegranate wilt caused by *Ceratocystis fimbriata*. Their

research evaluated fungicides and biological agents through laboratory and field investigations. The study is relevant to tree-drying problems because wilt disease can seriously affect orchard health. It highlights the importance of early disease identification and integrated management practices. Galindo et al. (2014) examined the relationship between water stress, rainfall and fruit-peel cracking in pomegranate trees. Their findings showed that rainfall following water-stress conditions can increase fruit turgor and favour cracking. Although fruit cracking differs from premature fruit falling, the study demonstrates how changing moisture conditions can adversely affect fruit quality and emphasises the importance of appropriate irrigation management. Rashmi et al. (2024) documented damage caused by adult *Schizonycha ruficollis* beetles feeding on pomegranate flowers in Devanahalli, Karnataka. Their study estimated a potential yield loss of seven per cent due to flower damage and consequent failure of fruit setting. The findings demonstrate the economic importance of insect pests and the need for timely monitoring and protective measures. Lokure et al. (2024) investigated the incidence and management of pomegranate wilt caused by *Ceratocystis fimbriata* in Karnataka. Their study reported considerable variation in wilt incidence and evaluated fungicides, biological agents and botanicals for disease management. The findings are relevant to tree-drying constraints and demonstrate the importance of orchard surveillance and effective disease-control strategies.

6. Research Gap

The reviewed literature indicates that pomegranate cultivation is affected by several interconnected production-related difficulties, including inadequate technical knowledge, irrigation problems, pest and disease incidence, financial limitations, labour shortages and harvesting-related challenges. Previous studies have examined several of these issues in Karnataka, particularly in Bagalkot and Vijayapura districts. However, many studies have concentrated on specific aspects such as nutrient management, disease control, irrigation scheduling or post-harvest problems.

There remains scope for a consolidated empirical assessment of the production constraints reported by pomegranate farmers across all taluks of Bagalkot district. The present study addresses this gap by examining eight production-related constraints using primary survey data collected from 250 farmers. It provides a combined assessment of financial, technical, irrigation, labour and harvesting-related difficulties experienced by the respondents.

7. Results

1. Lack of capital

Response	Frequency	Percentage
Yes	135	54.0
No	115	46.0
Total	250	100.0

Source: Primary data

The above table indicates that 54 per cent of the surveyed pomegranate farmers in Bagalkot district reported lack of capital as a production-related constraint, while 46 per cent did not experience this problem. The findings suggest that access to adequate finance remains an important concern for a considerable proportion of pomegranate growers in the district. Insufficient capital may

restrict farmers' ability to purchase agricultural inputs, maintain orchards and undertake essential cultivation operations. Therefore, improving access to institutional credit and timely financial assistance is important for supporting pomegranate cultivation in Bagalkot district.

2. Lack of quality planting material

Response	Frequency	Percentage
Yes	51	20.4
No	199	79.6
Total	250	100.0

Source: Primary data

The table reveals that 20.4 per cent of the pomegranate farmers in Bagalkot district reported a lack of quality planting material, whereas 79.6 per cent did not identify it as a production constraint. This indicates that the availability of planting material is not a major concern for most surveyed farmers. However, a proportion of growers continue to face difficulties in accessing suitable planting material. Ensuring the availability of quality and disease-free saplings through reliable nurseries and agricultural institutions could help address this constraint and strengthen pomegranate cultivation in the district.

3. Lack of technical knowledge

Response	Frequency	Percentage
Yes	250	100.0
No	0	0.0
Total	250	100.0

Source: Primary data

The findings indicate that all 250 respondents, representing 100 per cent of the surveyed pomegranate farmers in Bagalkot district, reported a lack of technical knowledge as a production-related constraint. This is a significant finding, suggesting a widespread perceived need for technical guidance among pomegranate growers across the district. Farmers may require greater access to scientific cultivation practices, pest and disease management, irrigation techniques and orchard maintenance guidance. Strengthening agricultural extension services, conducting practical demonstrations and organising farmer training programmes could help address this reported technical knowledge gap.

4. Lack of irrigation facilities

Response	Frequency	Percentage
Yes	102	40.8
No	148	59.2
Total	250	100.0

Source: Primary data

The table shows that 40.8 per cent of the surveyed pomegranate farmers in Bagalkot district reported a lack of irrigation facilities, while 59.2 per cent did not consider it a production constraint. The findings indicate that irrigation access remains a concern for a substantial proportion of pomegranate growers in the district. Since orchard cultivation requires appropriate

water management at different crop stages, inadequate irrigation facilities may create difficulties in maintaining regular cultivation practices. Improving access to water resources, promoting efficient irrigation systems and encouraging water conservation practices could help address this constraint.

5. High wages of labour

Response	Frequency	Percentage
Yes	143	57.2
No	107	42.8
Total	250	100.0

Source: Primary data

The table reveals that 57.2 per cent of the surveyed pomegranate farmers in Bagalkot district reported high labour wages as a production-related constraint, whereas 42.8 per cent did not experience this problem. The findings indicate that labour costs are an important concern for more than half of the respondents. Higher wage expenditure may increase the operational costs associated with orchard maintenance and other cultivation activities. Promoting appropriate labour-saving technologies, improving access to farm equipment and encouraging collective arrangements for agricultural operations may help pomegranate growers manage labour-related expenses.

6. Non-availability of labour during peak operation periods

Response	Frequency	Percentage
Yes	147	58.8
No	103	41.2
Total	250	100.0

Source: Primary data

The table indicates that 58.8 per cent of the respondents faced non-availability of labour during peak agricultural operations in pomegranate cultivation in Bagalkot district, while 41.2 per cent did not report this problem. This suggests that labour availability is a considerable production challenge for pomegranate farmers across the district. Timely completion of orchard operations may become difficult when sufficient workers are unavailable during critical periods. Developing local labour networks, encouraging farm-level mechanisation and facilitating access to agricultural labour services could help reduce difficulties associated with seasonal labour shortages.

7. Difficulty in harvesting the fruits

Response	Frequency	Percentage
Yes	169	67.6
No	81	32.4
Total	250	100.0

Source: Primary data

The table reveals that 67.6 per cent of the surveyed pomegranate farmers in Bagalkot district reported difficulty in harvesting pomegranate fruits, whereas 32.4 per cent did not identify harvesting as a constraint. This is one of the most frequently reported production-related problems

in the study. The findings highlight the importance of appropriate harvesting arrangements and skilled labour in orchard management. Difficulties in harvesting may arise from labour requirements and operational conditions within orchards. Training workers in proper harvesting techniques and improving access to suitable harvesting equipment may help farmers overcome this constraint.

8. Large area to cover

Response	Frequency	Percentage
Yes	41	16.4
No	209	83.6
Total	250	100.0

Source: Primary data

The table indicates that 16.4 per cent of the respondents reported covering a large area as a production-related constraint in pomegranate cultivation in Bagalkot district, while 83.6 per cent did not consider it a significant problem. This suggests that the extent of cultivated area is a relatively less frequently reported constraint among the surveyed farmers. However, managing larger orchard areas may require additional labour, time and supervision. Farmers cultivating extensive areas may benefit from improved farm planning, efficient resource allocation and appropriate mechanisation to manage orchard operations effectively.

8. Discussion

The findings of the present study reveal that pomegranate farmers in Bagalkot district encounter multiple production-related constraints, particularly in technical knowledge, harvesting operations, labour availability, finance and irrigation. These findings are broadly consistent with earlier studies on pomegranate cultivation and horticultural production in Karnataka and other regions.

The most significant constraint identified was the lack of technical knowledge, reported by all respondents (100%). This finding highlights the need for strengthening agricultural extension services and providing practical training on scientific orchard management, nutrient application, pest and disease control, and improved cultivation practices. In this context, Anusree et al. (2018) examined soil and leaf nutrient status in relation to pomegranate yield, emphasising the importance of scientific nutrient management. Similarly, Sudha et al. (2021) highlighted the significance of integrated disease management practices for controlling bacterial blight in pomegranate. These studies demonstrate the importance of technical knowledge in addressing crop management challenges.

Difficulty in harvesting fruits was reported by 67.6% of respondents, making it the second most prominent constraint. This finding draws attention to the need for improved harvesting techniques, appropriate equipment and skilled labour. Furthermore, the non-availability of labour during peak agricultural operations (58.8%) and high labour wages (57.2%) indicate considerable labour-management difficulties. Chikkalaki and Krishnamurthy (2023), in their study of fruit crop growers in Vijayapura district, also examined the constraints affecting horticultural production, providing a relevant regional context for the present findings.

Lack of capital was reported by 54% of farmers, suggesting difficulties in financing various orchard operations. Irrigation-related constraints, reported by 40.8%, further indicate the importance of efficient water management. Marathe and Dhinesh Babu (2017) examined irrigation scheduling and water-use efficiency in pomegranate cultivation, demonstrating the relevance of scientific irrigation practices.

In contrast, relatively fewer respondents identified quality planting material (20.4%) and large area coverage (16.4%) as constraints. Overall, the findings reinforce the importance of technical training, harvesting support, labour management, institutional credit and efficient irrigation facilities in improving the production environment of pomegranate farmers in Bagalkot district.

9. Conclusion

The present study examined the production-related constraints experienced by pomegranate farmers in Bagalkot district, Karnataka, using primary data collected from 250 respondents across all taluks. The findings reveal that lack of technical knowledge is the most widely reported constraint, followed by difficulty in harvesting fruits, non-availability of labour during peak operation periods, high labour wages and lack of capital. Irrigation-related difficulties also affect a considerable proportion of the surveyed farmers.

The results indicate that pomegranate cultivation in Bagalkot district requires attention not only to agricultural inputs and infrastructure but also to technical guidance, labour management and harvesting practices. Strengthening agricultural extension services, facilitating institutional credit, improving access to efficient irrigation systems and addressing seasonal labour shortages could contribute to better orchard management.

The study concludes that a coordinated approach involving farmers, agricultural institutions, horticultural departments and financial agencies is important for addressing the production difficulties reported by pomegranate growers. Greater attention to farmer training, appropriate technology and farm-level support services may help strengthen the sustainability of pomegranate cultivation in Bagalkot district.

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