Phoenix: International Multidisciplinary Research Journal
Vol 4, No. 4, Oct-Dec, 2026
ISSN: 2583-6897

PRODUCTION CONSTRAINTS IN POMEGRANATE CULTIVATION: AN EMPIRICAL ASSESSMENT OF FARMERS' EXPERIENCES IN BAGALKOT DISTRICT, KARNATAKA

Dr. A.R Kulakarni

Associate Professor, Centre for Multi-disciplinary Development Research, Department of Economics, Karnataka University Dharwad, Karnataka.

Mr. Mookappa Channadasar

Research Scholar, Centre for Multi-disciplinary Development Research, Department of Economics, Karnataka University Dharwad, Karnataka

Abstract

Pomegranate cultivation is an important horticultural activity in Bagalkot district of Karnataka. However, farmers face several production-related constraints that affect orchard health, fruit quality and agricultural returns. The present study examines the major production constraints experienced by pomegranate farmers across all taluks of Bagalkot district. The study is based on primary survey data collected from 250 pomegranate farmers. Six major production constraints were examined, namely the menace of birds and animals, fruit fly attacks, parasite attacks, premature falling of fruits, weather-related problems and drying of trees. Frequency and percentage analysis were employed to assess the prevalence of these constraints. The findings reveal that fruit fly attacks and weather-related problems were the most frequently reported constraints, each affecting 81.6 per cent of respondents. Parasite attacks were reported by 70.4 per cent, followed by premature falling of fruits (58.4 per cent), drying of trees (54 per cent) and the menace of birds and animals (33.6 per cent). The study highlights the importance of integrated pest management, climate-resilient agricultural practices and improved orchard management. It recommends strengthening agricultural extension services, scientific plant protection measures and timely dissemination of weather information to improve the sustainability of pomegranate cultivation in the district.

Keywords: Pomegranate cultivation, Production constraints, Fruit fly attack, Weather problems, Orchard management, Bagalkot district, Karnataka.

JEL Classification: Q12, Q16, Q18.

1. Introduction

Agriculture continues to play an important role in India's rural economy by providing employment, income and livelihood opportunities to a substantial section of the population. In recent decades, horticulture has emerged as an important component of agricultural diversification, offering farmers opportunities to improve farm income through high-value commercial crops. Among horticultural crops, pomegranate (*Punica granatum L.*) has gained considerable importance

because of its nutritional value, commercial demand, adaptability to relatively dry climatic conditions and export potential.

Karnataka is one of the important pomegranate-producing states in India. Within Karnataka, Bagalkot district has emerged as an important centre of pomegranate cultivation. The crop provides income-generating opportunities for farmers and contributes to the development of horticultural activities in the district.

Despite its commercial importance, pomegranate cultivation is associated with several production-related challenges. Farmers frequently encounter insect and pest attacks, plant diseases, premature fruit falling, unfavourable weather conditions and drying of trees. These problems may affect flowering, fruit setting, fruit development, quality and marketable production. Consequently, they can increase cultivation costs and expose farmers to production and income uncertainties.

Biotic constraints such as insect infestation and plant diseases can damage different parts of the pomegranate plant, including leaves, flowers, fruits, branches and roots. Similarly, abiotic constraints such as irregular rainfall, temperature fluctuations and water stress may affect crop development and fruit quality. The interaction between these factors makes orchard management increasingly challenging.

Earlier studies have examined specific aspects of pomegranate production, including pest management, bacterial blight, wilt disease, nutrient management, irrigation and marketing constraints. However, there remains scope for a comprehensive empirical assessment of multiple production constraints experienced by farmers across all taluks of Bagalkot district.

Against this background, the present study examines six major production problems reported by 250 pomegranate farmers. It attempts to identify the relative prevalence of these problems and provide an empirical understanding of the production challenges faced by pomegranate growers in the district.

2. Statement of the Problem

Although pomegranate cultivation offers considerable economic opportunities, its sustainability depends on effective management of production-related risks. Farmers in Bagalkot district face several challenges associated with biological, climatic and orchard-health factors.

Fruit fly attacks and parasite-related problems may adversely affect crop health and fruit quality. Premature falling of fruits can reduce marketable production, while unfavourable weather conditions may affect flowering, fruit setting and fruit development. Drying of trees may result in the loss of productive plants and additional expenditure on orchard maintenance.

However, the relative prevalence of these different problems needs to be examined using systematic primary survey evidence. Without such information, it becomes difficult to identify the production constraints requiring greater attention from agricultural extension agencies, horticultural departments and farmers themselves.

Therefore, the present study attempts to examine the major production constraints experienced by pomegranate farmers across all taluks of Bagalkot district.

3. Objectives of the Study

The major objectives of the study are:

1. To identify the major production constraints experienced by pomegranate farmers in Bagalkot district.
2. To examine the prevalence of insect and pest-related problems in pomegranate cultivation.
3. To analyse the extent of premature fruit falling and drying of trees among surveyed farmers.
4. To assess the prevalence of weather-related production problems.
5. To suggest appropriate measures for reducing production constraints and improving the sustainability of pomegranate cultivation.

4. Research Methodology

The present study was conducted in Bagalkot district of Karnataka, which is an important pomegranate-growing region in northern Karnataka. The study covered all taluks of the district to obtain a broader understanding of the production constraints experienced by pomegranate farmers.

The selection of Bagalkot district is based on the importance of pomegranate cultivation and the need to understand the production challenges faced by growers in the region.

The study is based on primary data collected from pomegranate farmers. A total of 250 farmers were covered across all taluks of Bagalkot district.

The information relates to six production-related problems experienced by farmers in their pomegranate cultivation.

The study considered 250 pomegranate farmers as respondents. The same sample was used to examine all six production constraints.

The study employed descriptive statistical techniques, particularly frequency and percentage analysis, to examine the prevalence of production problems.

The percentage was calculated using the following formula:

Percentage = (Frequency of responses / Total number of respondents) × 100

Where:

- Frequency represents the number of farmers reporting a particular response.
- Total respondents represent 250 pomegranate farmers.

- Percentage indicates the proportion of farmers reporting the particular problem.

The responses were classified into two categories: Yes and No.

5.Review of Literature

The production of pomegranate is an important horticultural activity in Karnataka, particularly in Bagalkot district. However, farmers face several biotic and abiotic production constraints, including insect and pest attacks, diseases, premature fruit falling, unfavourable weather conditions and drying of trees. These constraints affect crop productivity, fruit quality and farm income.

The present study is based on primary data collected from 250 pomegranate farmers covering all taluks of Bagalkot district. The frequency distribution identifies six major production problems. The following literature review examines ten relevant studies and research publications, connecting their findings with the present empirical investigation.

Nagesh and Halakatti (2011) investigated the marketing patterns and constraints faced by pomegranate growers in Bagalkot district, Karnataka. The study covered 120 farmers from three taluks and reported that 90.83% experienced a high incidence of pests and diseases. Other constraints included labour shortages, lack of storage facilities and high pruning costs. The study establishes the importance of production-related constraints in Bagalkot's pomegranate sector. However, it did not provide a comprehensive district-wide assessment of individual biological and climatic problems. Anusree et al. (2018) conducted a survey of 150 pomegranate orchards in Bagalkot district to examine the relationship between soil nutrients, leaf nutrient status and crop productivity. The study identified significant differences between high-yielding and low-yielding orchards. Phosphorus and potassium were positively associated with productivity, while nitrogen showed a negative relationship. The findings demonstrate the importance of scientific nutrient management and orchard health. However, the research primarily focused on nutritional factors rather than farmers' perceptions of pests, fruit falling and weather-related constraints. Pavithra and Manjunath (2020) examined the economic performance of pomegranate farmers adopting Darakshak bioconsortium and conventional chemical methods in Karnataka. Their findings indicated that bacterial blight was a major production problem, followed by irrigation difficulties and declining yields. Farmers adopting Darakshak recorded comparatively lower cultivation costs and higher yields. The study highlights the importance of disease management and sustainable agricultural practices. Nevertheless, it concentrated on production economics and management comparisons rather than a comprehensive assessment of different production constraints across all taluks of Bagalkot district. Shanabhoga, Suresha and Dechamma (2021) examined the constraints experienced by 120 pomegranate growers in Hiriyur, Hosdurga and Challakere taluks of Chitradurga district. The study classified constraints into technical, labour, marketing, input and financial categories. Technical constraints were ranked highest among public extension users, whereas labour constraints were prominent among private extension users. The findings

demonstrate the importance of extension services in addressing cultivation difficulties. However, the study did not separately quantify the incidence of specific problems such as fruit fly attacks, premature fruit falling and tree drying. Elango et al. (2021) reviewed arthropod pests affecting pomegranate cultivation in India and identified 91 insect species, six mite species and one snail pest associated with the crop. The authors explained that these pests damage flowers, fruits, twigs and leaves, thereby reducing fruit quality and productivity. They also highlighted the emergence of secondary pest problems associated with excessive insecticide use. This review provides an important scientific foundation for understanding the pest-related constraints identified in the present study, particularly fruit fly and parasite-related problems. Mallikarjun et al. (2016/2019) Have documented an invasive scale insect, *Lopholeucaspis japonica*, affecting pomegranate plantations in India. The study reported that severe infestation damaged branches, trunks and young shoots, resulting in premature leaf falling, dieback and eventual death of individual trees. These findings are particularly relevant to the present investigation because 54% of surveyed farmers reported drying of pomegranate trees. The study provides biological evidence of pest-related tree deterioration, although it does not estimate the prevalence of tree drying among farmers in Bagalkot district. Raja, Sunkad and Amaresh (2023) investigated the management of pomegranate wilt caused by *Ceratocystis fimbriata*. The researchers evaluated chemical fungicides and biological control agents under laboratory and field conditions. Their findings demonstrated that integrated treatments involving fungicides and biological agents could effectively reduce wilt incidence. This research is relevant to the present study because tree drying was reported by 54% of surveyed farmers. It highlights the importance of identifying the actual causes of tree deterioration and adopting scientifically appropriate disease-management strategies. Manjunatha et al. (2024) investigated the use of native endophytic *Bacillus* species to control bacterial blight in pomegranate. Their two-season field experiments demonstrated that selected biological agents reduced disease severity by approximately 47–68%. The research highlights the potential of biological disease-management approaches as alternatives to excessive chemical applications. These findings support the importance of addressing parasite and disease-related production problems identified in the Bagalkot survey. However, the study focused on disease-control technology rather than the socioeconomic distribution of production constraints among farmers. Rashmi et al. (2024) investigated the damage caused by adult *Schizonycha ruficollis* beetles to pomegranate flowers in Devanahalli, Karnataka. Their study estimated a potential yield loss of 7%, equivalent to approximately ₹53,215 per acre at the farm-gate price. The research demonstrated that insect attacks during flowering can prevent fruit setting and cause considerable economic losses. This finding is relevant to the present investigation because pest-related problems are prominent among Bagalkot farmers. However, the study examined a specific insect and geographical location rather than multiple production constraints. Galindo et al. (2014) investigated the relationship between rainfall, irrigation and fruit cracking in water-stressed pomegranate trees. The study demonstrated that rainfall following water-deficit conditions increased fruit turgor pressure, creating stress on the fruit peel and encouraging cracking. The findings establish an important relationship between water management and weather-related

production problems. This research supports the present study's observation that 81.6% of farmers experienced weather-related problems. However, its experimental focus was fruit cracking and water relations rather than district-level farmer experiences of multiple climatic constraints.

6. Research gap

The review of previous studies reveals several geographical, empirical and methodological gaps in understanding the production constraints faced by pomegranate farmers. Earlier researchers have primarily focused on specific issues such as pest infestation, bacterial blight, wilt disease, nutrient deficiencies, irrigation management and fruit damage. However, comprehensive empirical evidence covering multiple production constraints across all taluks of Bagalkot district remains limited. Studies conducted by Nagesh and Halakatti (2011) and Anusree et al. (2018) covered selected taluks, villages and orchards, indicating the need for wider geographical coverage. Similarly, studies by Elango et al. (2021), Raja et al. (2023) and Manjunatha et al. (2024) mainly examined technical and biological aspects of pest and disease management. Galindo et al. (2014) investigated weather-related fruit cracking, but farmers' experiences of broader climatic constraints require further investigation. Furthermore, limited attention has been given to the prevalence of premature fruit falling and drying of trees from farmers' perspectives. Addressing these gaps, the present study examines six major production constraints using primary data collected from 250 pomegranate farmers across all taluks of Bagalkot district. Frequency and percentage analysis are employed to identify and compare the prevalence of these constraints, providing district-level empirical evidence to support appropriate agricultural interventions.

7.Results

Table 1: Menace of Birds/Animals

Response	Frequency	Percentage (%)
Yes	84	33.6
No	166	66.4
Total	250	100.0

Source: Primary data

The frequency distribution indicates that out of 250 pomegranate farmers surveyed across all taluks of Bagalkot district, Karnataka, 84 farmers (33.6%) reported that they faced problems due to the menace of birds and animals, whereas 166 farmers (66.4%) stated that they did not experience this problem. The findings reveal that the majority of farmers were not significantly affected by birds and animals in their pomegranate cultivation. However, nearly one-third of the respondents

reported this as a production-related constraint. This suggests that the menace of birds and animals remains a concern for a considerable proportion of pomegranate farmers in the district.

Table 2: Fruit Fly Attack

Response	Frequency	Percentage (%)
Yes	204	81.6
No	46	18.4
Total	250	100.0

Source: Primary data

The table reveals that out of 250 pomegranate farmers surveyed across all taluks of Bagalkot district, 204 farmers (81.6%) reported that they faced fruit fly attacks, while only 46 farmers (18.4%) stated that they did not experience this problem. The findings indicate that fruit fly attack is one of the major production constraints affecting pomegranate cultivation in the study area. A substantial proportion of farmers are affected by this pest-related problem, which may adversely influence fruit quality, marketability and overall agricultural income. The high percentage of affected farmers highlights the importance of effective pest management practices and appropriate agricultural extension services to reduce fruit fly infestation.

Table 3: Parasite Attack

Response	Frequency	Percentage (%)
Yes	176	70.4
No	74	29.6
Total	250	100.0

Source: Primary data

The frequency distribution shows that 176 farmers (70.4%) out of the total 250 respondents surveyed across all taluks of Bagalkot district reported experiencing parasite attacks in their pomegranate cultivation, whereas 74 farmers (29.6%) stated that they did not face this problem. The findings indicate that parasite attacks constitute a significant production constraint among pomegranate farmers in the study area. More than two-thirds of the respondents reported being affected by this problem, suggesting considerable challenges in maintaining crop health and productivity. Therefore, the findings highlight the need for appropriate pest and disease management measures to minimise agricultural losses.

Table 4: Premature Falling of Fruits

Response	Frequency	Percentage (%)
Yes	146	58.4
No	104	41.6
Total	250	100.0

Source: Primary data

The table indicates that out of 250 pomegranate farmers surveyed across all taluks of Bagalkot district, 146 farmers (58.4%) reported premature falling of fruits as a major problem in their cultivation, whereas 104 farmers (41.6%) stated that they did not experience this issue. The findings reveal that more than half of the respondents were affected by premature fruit falling. This problem may lead to a reduction in marketable fruit production, lower farm income and economic losses to farmers. The relatively high percentage of affected respondents indicates that premature fruit falling is an important production constraint among pomegranate farmers in the district.

Table 5: Weather Problems

Response	Frequency	Percentage (%)
Yes	204	81.6
No	46	18.4
Total	250	100.0

Source: Primary data

The frequency distribution reveals that 204 farmers (81.6%) out of 250 respondents surveyed across all taluks of Bagalkot district reported facing weather-related problems in pomegranate cultivation, whereas 46 farmers (18.4%) stated that they were not affected by such problems. The findings clearly indicate that weather conditions represent one of the most significant challenges faced by pomegranate farmers in the study area. Unfavourable weather conditions may affect flowering, fruit setting, fruit development and overall crop productivity. The high proportion of affected farmers highlights the vulnerability of pomegranate cultivation to climatic variations. Therefore, climate-resilient agricultural practices, improved irrigation management and timely weather information are important for reducing production risks.

Table 6: Drying of Trees

Response	Frequency	Percentage (%)
Yes	135	54.0

No	115	46.0
Total	250	100.0

Source: Primary data

The table indicates that out of 250 pomegranate farmers surveyed across all taluks of Bagalkot district, 135 farmers (54%) reported drying of trees as a problem in their cultivation, while 115 farmers (46%) stated that they did not experience this issue. The findings reveal that slightly more than half of the respondents faced tree-drying problems in their pomegranate orchards. This indicates that tree drying is a considerable production constraint in the study area. It may result in the loss of productive trees, reduced orchard productivity and additional expenditure on replacement and maintenance. The findings emphasise the importance of proper orchard management, irrigation practices and timely identification of plant health problems.

8.Discussion

The empirical findings indicate that pomegranate farmers in Bagalkot district experience a combination of biological, climatic and orchard-health-related production constraints.

The high incidence of fruit fly attacks (81.6%) is consistent with the broader findings of Elango et al. (2021), who highlighted the extensive range of arthropod pests affecting pomegranate cultivation in India. Similarly, Rashmi et al. (2024) demonstrated that insect attacks on pomegranate flowers can result in measurable yield losses. These studies establish the importance of systematic pest surveillance and integrated pest management.

Parasite attacks were reported by 70.4 per cent of the respondents. Earlier studies by Raja et al. (2023) and Manjunatha et al. (2024) demonstrated the importance of scientific disease-management practices in controlling wilt and bacterial blight. Their findings support the need for improved plant protection measures and the promotion of biological disease-management approaches.

Premature falling of fruits was reported by 58.4 per cent of farmers. This is an important production concern because premature fruit loss may reduce the quantity of marketable produce. Galindo et al. (2014) demonstrated that water stress and subsequent rainfall can contribute to fruit peel cracking. Although fruit cracking and premature fruit falling are different problems, the study illustrates how environmental and water-related factors can affect fruit development and quality.

Weather-related problems were reported by 81.6 per cent of farmers, indicating that climatic uncertainty is a major concern in the study area. This finding highlights the importance of climate-responsive orchard management, efficient irrigation and access to timely meteorological information.

Tree drying was reported by 54 per cent of the respondents. The findings of Mallikarjun et al. (2019), who documented tree deterioration associated with invasive scale insect infestation, and

Raja et al. (2023), who examined pomegranate wilt, provide relevant scientific explanations for some possible causes of orchard deterioration. However, the actual causes of tree drying in the surveyed orchards require further diagnostic investigation.

The menace of birds and animals was reported by 33.6 per cent of farmers. Although it was the least frequently reported constraint, it remains relevant for farmers experiencing fruit damage and associated production losses.

Overall, the discussion indicates that production constraints in pomegranate cultivation are multidimensional. Addressing them requires an integrated approach involving pest management, disease diagnosis, irrigation management, climate adaptation and effective agricultural extension.

9. Suggestions and Policy Implications

The study recommends strengthening integrated pest and disease management through farmer training, pest monitoring and scientific plant-protection practices. Climate-resilient cultivation should be promoted through timely weather information, efficient irrigation, mulching and water conservation. Appropriate orchard nutrition, irrigation scheduling and crop-management practices should be encouraged to minimise premature fruit falling. Regular orchard inspections and scientific diagnosis are necessary to address tree drying. Farmers should also adopt non-harmful physical protection measures against birds and animals. Furthermore, the Horticulture Department, Krishi Vigyan Kendras and agricultural universities should strengthen extension services through demonstrations, field visits and awareness programmes across all taluks of Bagalkot district.

10. Limitations of the Study

The present study has certain limitations.

1. The investigation is restricted to 250 pomegranate farmers in Bagalkot district.
2. The analysis is limited to six production-related constraints.
3. The study employs frequency and percentage analysis and does not estimate the actual economic losses associated with individual constraints.
4. The responses are based on farmers' reported experiences and do not constitute independent scientific verification of pest species, diseases or climatic causes.
5. The study does not examine differences in production constraints across individual taluks, farm-size categories or irrigation methods.
6. The study does not establish causal relationships between production constraints and crop yield.

Future research may incorporate econometric analysis, orchard-level observations, crop productivity data and meteorological information to understand the economic consequences of production constraints more comprehensively.

11. Conclusion

The present study examined the major production constraints experienced by pomegranate farmers across all taluks of Bagalkot district, Karnataka, using primary survey data collected from 250 respondents.

The findings reveal that fruit fly attacks and weather-related problems are the most frequently reported constraints, each affecting 81.6 per cent of surveyed farmers. Parasite attacks were reported by 70.4 per cent, while premature falling of fruits affected 58.4 per cent. Furthermore, 54 per cent of respondents experienced drying of trees, whereas 33.6 per cent reported problems associated with birds and animals.

The findings demonstrate that pomegranate cultivation in Bagalkot district faces considerable biological, climatic and orchard-health-related challenges. Among these, pest management and weather-related agricultural risks deserve particular attention.

The study emphasises the need for integrated pest management, scientific disease diagnosis, efficient irrigation, climate-resilient cultivation and improved agricultural extension services.

It also highlights the importance of strengthening collaboration between farmers, horticultural departments, agricultural universities and research institutions to develop location-specific solutions.

In conclusion, improving the sustainability of pomegranate cultivation requires not only increasing production but also reducing production risks and protecting orchard health. Addressing the identified constraints can contribute to improved productivity, better fruit quality and more sustainable economic returns for pomegranate farmers in Bagalkot district.

References

1. Nagesh, B., & Halakatti, S. V. (2011). Pattern of marketing of pomegranate and constraints faced by the growers. *Advance Research Journal of Social Science, 2*(2), 259–260.
2. Anusree, T., Suma, R., Nagaraja, M. S., & Nekha, T. (2018). A survey study to assess soil and leaf major nutrient status in relation to pomegranate yield. *International Journal of Current Microbiology and Applied Sciences, 7*(9), 2597–2605. https://doi.org/10.20546/ijcmas.2018.709.323
3. Kerutagi, M. G., Pavithra, A. S., & Manjunath, G. (2020). Economic comparison of pomegranate production with Darakshak (bioconsortium) and conventional chemical use

in Karnataka. *Indian Journal of Economics and Development, 16*(2), 271–277. https://doi.org/10.35716/IJED/19093

4. Shanabhoga, M. B., Suresha, S. V., & Dechamma, S. (2021). Constraints faced by pomegranate growers using public and private extension service. *Indian Research Journal of Extension Education, 21*(1), 78–82.
5. Elango, K., Sridharan, S., Vijayalakshmi, G., Arunkumar, P., & Suryaraj, R. (2021). Arthropod pests of pomegranate (*Punica granatum* L.) and their management. *Journal of Entomological Research, 45*(1), 125–134. https://doi.org/10.5958/0974-4576.2021.00020.7
6. Mallikarjun, M. H., Joshi, S., & Pal, R. K. (2016). Invasive scale insect on pomegranate – A first report from India. *Indian Horticulture, 61*(5). Published online in 2019. ICAR article.
7. Raja, Sunkad, G., & Amaresh, Y. S. (2023). Bio-intensive disease management strategy as a way to control pomegranate wilt caused by *Ceratocystis fimbriata* Ell. and Halst. *International Journal of Environment and Climate Change, 13*(10), 2596–2609. https://doi.org/10.9734/IJECC/2023/v13i102926
8. Manjunatha, N., Pokhare, S. S., Agarrwal, R., Singh, N. V., Sharma, J., Harsur, M. M., & Marathe, R. A. (2024). Possible biocontrol of bacterial blight in pomegranate using native endophytic *Bacillus* spp. under field conditions. *Frontiers in Microbiology, 15*, 1491124. https://doi.org/10.3389/fmicb.2024.1491124
9. Reference: Rashmi, M. A., Sreedevi, K., Verghese, A., & Raghavendra, V. G. (2024). Potential yield losses caused by the adults of *Schizonycha ruficollis* on pomegranate (*Punica granatum*) flowers. *The Indian Journal of Agricultural Sciences, 94*(4), 437–439. https://doi.org/10.56093/ijas.v94i4.143861
10. Galindo, A., Rodríguez, P., Collado-González, J., Cruz, Z. N., Torrecillas, E., Ondoño, S., Corell, M., Moriana, A., & Torrecillas, A. (2014). Rainfall intensifies fruit peel cracking in water stressed pomegranate trees. *Agricultural and Forest Meteorology, 194*, 29–35. https://doi.org/10.1016/j.agrformet.2014.03.015