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Pomegranate Production in Karnataka: Regional Patterns, Market Linkages, and Institutional Interventions

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Abstract
This study examines the regional dynamics, market structures, and institutional support mechanisms shaping pomegranate cultivation in Karnataka, one of India's leading pomegranate-producing states. Using secondary data from government sources, academic literature, and market reports, the research analyzes district-wise production trends from 2020 to 2023, highlighting disparities in yield and cultivation practices. Key districts such as Vijayapura, Bagalkot, and Bellary emerge as dominant producers, though yield stagnation and climate-related constraints remain significant challenges. The study reveals complex market dynamics, including seasonal price fluctuations and limited export readiness, despite Karnataka's 9.5% contribution to national output. Institutional interventions—through schemes like NHM, RKVY, and PM-KUSUM—alongside agricultural extension services and cooperatives, play a crucial role in supporting the sector, though their reach is inconsistent. A modest Compound Annual Growth Rate (CAGR) of 1.36% during the study period indicates slow progress, underscoring the need for targeted interventions in pest management, irrigation efficiency, market access, and post-harvest infrastructure. The research concludes with strategic recommendations to enhance productivity, resilience, and farmer profitability in Karnataka's pomegranate sector.

Keywords: Pomegranate Cultivation, Karnataka Agriculture, Market Linkages, Institutional Interventions, Pest and Disease Management, Export Potential, Irrigation,

Introduction

The Indian horticulture sector has elevated pomegranate (Punica granatum L.) as a significant economic and dietarily valuable crop because the plant thrives in semi-arid environments and commands high market values and enjoys increasing domestic and international market interest. The Indian nation recognises Karnataka as one of its major pomegranate-producing areas where Vijayapura, Bagalkot, Belagavi, Chitradurga and Tumakuru districts lead the cultivation. Production levels differ across these regions since they exhibit distinct environmental profiles together with their cultural practices and market accessibility, which leads to separate production patterns (Gowda et al., 2019). The analysis of regional differences represents a key step to evaluate productivity gaps alongside income levels between farmers throughout Karnataka.

Varieties of pomegranate:

Ganesha	Bhagwa
	
Mrudula	**Ruby**
	

Modern large-scale commercial orchard production of pomegranates in Karnataka exists thanks to improved cultivars such as 'Bhagwa' and 'Mridula' alongside the adoption of drip irrigation systems as well as state horticultural missions. Farmers encounter many obstacles even though innovation has taken place. The severe threats to yield quality and productivity arise from pest infestations and diseases, with bacterial blight leading the list of destructive agents. Little water supply and rainfed agricultural land create more hazards for agricultural output (Naik & Kulkarni, 2021). Small-scale landholders encounter crucial barriers to development due to limited access to inexpensive funding as well as timely distribution of agricultural products combined with technical agricultural information. The business forces in the marketplace establish crucial conditions which influence pomegranate farming profitability. The pomegranate distribution network in Karnataka includes activities between local markets together with regulated mandis and private traders and exporters in the supply routes. Farmers often experience unstable prices because of several factors, such as periodic market supply surpluses, insufficient storage solutions and poor negotiating strength for their products. The export potential for pomegranates remains high, especially in West Asian and European regions, but compliance with global quality standards and proper market access requirements create extra challenges (Deshpande & Hiremath, 2020).

Government schemes such as the National Horticulture Mission (NHM), Rashtriya Krishi Vikas Yojana (RKVY), and state-level subsidies for micro-irrigation and crop insurance have aimed to strengthen horticultural production in Karnataka. In addition, agricultural extension services, research institutions, and farmer producer organisations (FPOs) are playing an increasingly important role in disseminating best practices, providing disease management training, and facilitating market linkages. However, the effectiveness and reach of these institutional interventions remain uneven and warrant a critical assessment (Rathod et al., 2022).

Research Objectives:

1. To assess the regional distribution and cultivation practices of pomegranate farming across different

districts of Karnataka.
2. To examine the market dynamics, including pricing, supply chains, and export potential of pomegranates from Karnataka.
3. To identify the key challenges faced by pomegranate farmers, including pest management, water resources, and access to credit.
4. To explore the role of government schemes, agricultural extension services, and cooperatives in supporting pomegranate cultivation.

Literature Review:

Research about pomegranate cultivation explores multiple aspects which include farming techniques along with disease approaches and market analysis as well as economic stability and agricultural practices of farmers. Many studies establish integrated crop management (ICM) as essential to enhance farming output together with economic outcomes in dry and semi-dry regions. The research findings from (Thrikala Madhavi et al., 2020) and (Kulkarni & Rathod, 2020) show that combining structured pruning and nutrients and disease protection elements increased yields by more than 18–19%, which delivered substantially higher net returns and benefit-cost ratios.

The World Marketing Research Organisation found that India holds a moderate standing in global pomegranate exports while pointing out variable market costs and inadequate produce quality (Aware et al., 2019). (Vijayakumar & Jagadeesan, 2024) identified weaknesses in digital marketing platforms that hinder farm-to-market transactions and proposed better cooperative support systems for local market success. The studies by Raja et al. (2023) and Gamangatti and Patil (2014) demonstrate the importance of knowing pathogens in different regions with their specific disease severity levels. Research shows that targeted and environmentally friendly solutions must be implemented immediately to combat bacterial blight and wilt since these diseases represent major threats to productivity.

The authors Aher and Rahane (2016) and Kumar et al. (2020) recognised pomegranate cultivation to be a significant factor in rural development through government-supported programs. Studies by Raveesha et al. (2023) and Chandra and Meshram (2010) observed strong growth in cultivation areas and production which farmers adapted well to. The international studies of (Sardar Shahraki, 2019) combined with (Kahramanoglu, 2019) demonstrated how technical efficiency and global production trends interact in relation to climatic stress and postharvest losses together with market strategies regarding sustainability and productivity. Research by Chikkalaki et al. (2024) shows that farmers possess a mixed potential for agripreneurship opportunities that can be developed through targeted agricultural training and extension services.

Methodology:

This research uses secondary data to conduct descriptive and analytical research which examines institutional interventions together with market links and regional patterns of pomegranate cultivation in Karnataka. The research data were obtained from official departments, including the Horticulture Department of Karnataka, and institutions like NHB, APEDA, APMC markets and government programs MIDH and RKVY. The research relied on peer-reviewed research articles, policy documents and institutional reports sourced from ICAR, Krishi Vigyan Kendras and academic institutions. Analysis of pomegranate sector growth patterns over time necessitated the use of the Compound Annual Growth Rate (CAGR) as a fundamental statistical method to determine prolonged sector development trends.

Regional Distribution and Cultivation Practices of Pomegranate Farming in Karnataka:

The main areas of pomegranate cultivation in Karnataka exist between the districts of Bagalkot, Bijapur, Koppal, Raichur, Gulbarga and portions of Dharwad and Belgaum. The pomegranate cultivation areas in Karnataka's northern and central regions receive semiarid conditions together with perfect soil drainage for successful farming. The key practices for pomegranate farming consist of land preparation and a drip irrigation system alongside regular pruning activities, and the Bhagwa variety dominates the predominant cultivations. The common practices for pomegranate cultivation involve organic and chemical fertilisation in addition to integrated pest management (IPM) methods. Operations for pomegranate harvesting usually take place within the period that spans from September to January. The pomegranate farming sector endures three primary difficulties, from water shortages to unpredictable markets alongside climate changes. The agriculture sector demonstrates potential for expansion through exported goods together with developed juice products and seeds.

District-Wise Pomegranate Production Analysis (2020-2023):

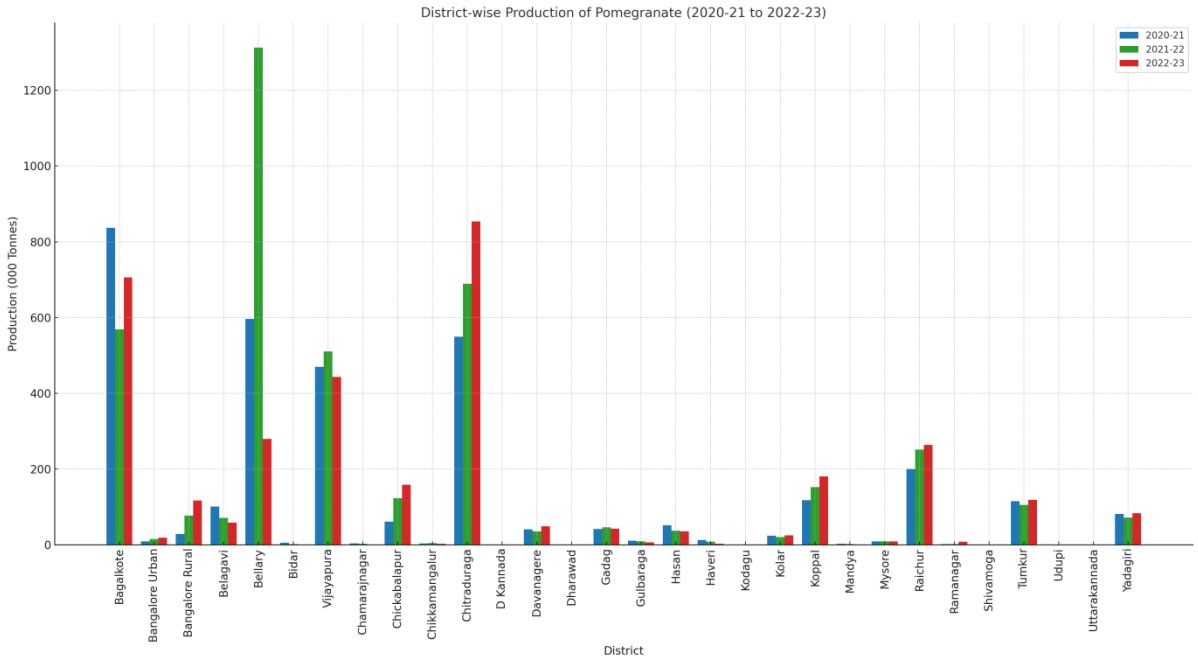
	2020-21			2021-2022			2022-2023		
Districts	**A (H)**	**P (T)**	**Yield (Per Kg Hectare)**	**A (H)**	**P (T)**	**Yield (Per Kg Hectare)**	**A (H)**	**P (T)**	**Yield (Per Kg Hectare)**
Bagalkote	34.48	836.90	242.72	28.73	568.48	197.87	33.65	705.98	209.80
Bangalore Urban	0.61	9.29	152.24	1.00	15.08	150.81	1.38	18.82	136.35
Bangalore Rural	2.05	28.56	139.30	3.78	76.98	203.65	6.14	117.42	191.23
Belagavi	9.90	100.96	101.15	8.08	70.82	87.76	5.98	59.02	98.70
Bellary	43.72	596.65	279.97	46.55	1312.52	281.96	9.68	279.41	288.65
Bidar	0.35	5.33	152.24	0.17	2.56	150.81	0.12	1.64	136.35
Vijayapura	48.21	470.19	97.53	50.36	510.70	101.41	32.51	443.27	99.90
Chamarajnagar	0.41	3.70	90.21	0.38	3.16	83.09	0.11	1.50	136.35
Chickabalapur	4.70	61.02	129.82	7.15	123.02	172.06	9.83	158.49	161.23
Chikkamangalur	2.45	4.01	16.38	2.83	4.93	17.62	1.82	3.08	16.90
Chitraduraga	41.88	549.21	131.14	46.29	688.93	148.83	56.84	853.23	150.11
D Kannada	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Davanagere	3.95	40.61	102.81	3.67	35.39	96.44	4.79	48.92	102.12
Dharawad	0.06	0.91	152.24	0.00	0.00	0.00	0.00	0.00	0.00
Gadag	3.04	41.50	136.52	3.27	46.74	142.94	3.04	42.55	139.98
Gulbaraga	1.09	10.70	98.13	6.30	9.50	150.81	4.80	6.54	136.35
Hasan	4.69	51.88	110.62	4.09	37.44	91.54	3.50	35.82	102.34
Haveri	0.83	12.64	152.24	0.56	8.45	150.81	0.24	3.27	136.35

Kodagu	0.00	0.00	0.00	0.05	0.75	150.81	0.00	0.00	0.00
Kolar	1.57	23.90	15224.00	1.39	20.96	150.81	1.85	25.22	136.35
Koppal	11.60	117.77	152.24	9.61	152.36	158.54	11.86	180.65	152.32
Mandya	0.21	3.20	152.24	0.16	2.41	150.81	0.07	0.95	136.35
Mysore	0.58	8.83	152.24	5.90	8.90	150.81	6.70	9.14	136.35
Raichur	16.68	200.21	152.24	16.43	251.81	153.26	17.49	264.26	136.35
Ramanagar	0.16	2.44	152.24	1.60	2.41	150.81	0.06	8.20	136.35
Shivamoga	0.04	0.61	152.24	0.00	0.00	0.00	0.00	0.00	0.00
Tumkur	34.70	115.34	33.24	33.30	105.39	31.65	33.61	119.08	35.43
Udupi	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uttarakannada	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Yadagiri	5.37	81.75	152.24	4.79	72.24	150.81	5.66	83.89	148.21
TOTAL	**273.33**	**3378.11**	**18608.18**	**286.44**	**4131.93**	**3476.72**	**251.73**	**3470.35**	**3260.42**

Note : Area in '000 Hector

Production in '000 Tonnes

Source: Horticulture department of Karnataka



Since 2020–21 to 2022–23, the district-level agricultural statistics from Karnataka demonstrate substantial spatial and temporal shifts within pomegranate cultivation acreage and output alongside production yields while considering this horticultural crop as important in the region. A maximum of 286.44 thousand hectares in 2021–22 became the highest cultivated area in the region and then decreased to 251.73 thousand hectares in 2022–23. The pomegranate cultivation output rose significantly from 4.13 million tonnes in 2021–22, yet it dropped to 3.47 million tonnes in 2022–23,

possibly due to climatic factors alongside input variations which might have affected all crops in the region. The pomegranate field in Bellary produced more than 279 kg of yield per hectare every year and achieved its highest yield of 288.65 kg/ha in 2022–23 at a time when the cultivated land area experienced significant reduction. Well-organised pomegranate plantations in Bellary's supportive agro-climatic zone probably explain the farm production efficiency which leads to high yields. The two traditional agricultural districts, Bagalkote and Vijayapura, continued to preserve substantial cultivation land despite their reputations as primary pomegranate growing regions. The decrease in crop yield suggests low productivity in these districts, although their increasing yield numbers show signs of improvement due to pest infestations as well as soil health deterioration and water supply issues known for severely harming pomegranate cultivation. The data suggests that better management techniques and increasing commercial interest in fruit cultivation, especially pomegranate, have proven beneficial for the dryland conditions of the region. The pomegranate cultivation appears less feasible in Tumkur district, where yields remained between 31.65 and 35.43 kg/ha and sub-20 kg/ha in Chikkamagaluru district due to unfavourable crop conditions and inadequate quality input access.

Farmers in Bangalore urban and rural areas and surrounding locations increased their cultivation of pomegranates and urban agricultural lands while showing signs of transitioning toward profitable crops. Three districts, Udupi and Uttara Kannada together with Dakshina Kannada, showed no pomegranate cultivation because of their unsuitable arid to semiarid terrain for pomegranate cultivation. The state endured a substantial drop in its overall yield statistics from 18,608.18 kg/ha in 2020–21 to 3,260.42 kg/ha in 2022–23, yet some selected areas within individual districts maintained stable performance. The significant decline in pomegranate production during 2022–23 shows that Karnataka requires compelling policies to enhance soil health, irrigation infrastructure, premium seed materials and environmental reliability for high-value pomegranate cultivation.

Calculate Compound Annual Growth Rate (CAGR):

To calculate the Compound Annual Growth Rate (CAGR), the formula is:

$$CAGR = \left(\frac{Vf}{vi}\right)^{\frac{1}{n}} - 1$$

Where ------

- V_f = Find value
- $v_{i=}$ Initial value
- n = Number of years

The Total Production across all districts:

2020-21: 3378.11

2022-23: 3470.35

n=2 years

$$CAGR = \left(\frac{3470.35}{3378.11}\right)^{\frac{1}{2}} - 1$$

$$= (1.0273)^{0.5} - 1$$

$$= 1.0136 - 1$$

$$= 0.0136$$

To convert **0.0136** into a percentage:

$$0.0136 \times 100 = 1.36\%$$

CAGR=1.36% (for total production from 2020-21 to 2022-2023)

According to Compound Annual Growth Rate analysis, the total pomegranate production in Karnataka increased by 1.36% from 2020–21 to 2022–23. The total pomegranate production in Karnataka experienced a growth from 3,378.11 thousand tonnes in 2020–21 to 3,470.35 thousand tonnes in 2022–23. The gradual farming output growth indicates marginal improvement even if it remained minimal in quantity. The data shows minimal transformation in agricultural conditions during this period, thus indicating future growth needs improvements, including supporting farmers, better farming practices and a desirable farming climate.

Market Dynamics and Export Potential of Karnataka's Pomegranate Industry: Trends, Pricing, and Supply Chain Developments:

Market Dynamics: The pomegranate sector of India witnesses substantial participation from Karnataka, where the state contributes 9.5% to the entire national output. The central production region for pomegranate agriculture in Karnataka consists of Bagalkote, Bijapur together with Koppal and the inclusion of Chitradurga and Tumkur districts. The combination of Kushtagi-Koppal-Yelbarga areas produces yearly yields that reach between 500–600 tonnes.

Pricing Trends: Seasonal and geographical areas determine the price movement of pomegranates throughout Karnataka. Zebra-type pomegranates experienced prices between ₹10,000 and ₹15,000 per quintal at market levels throughout February 2025, while kilogram retail prices ranged between ₹100 to ₹150 depending on market location and quality type. The combination of high wholesale supplies created pressure on wholesale prices, which fell down to ₹15–₹45 per kilogram, however, retail prices stayed higher.

Supply Chain and Export Potential: The pomegranate supply chain of Karnataka passes through five sequential stages from cultivation to harvesting, and then packaging before distribution occurs. State authorities have made post-harvest management improvements and minimised middlemen presence in order to increase farmer profits. Coordinated efforts to build cold storage units and packaging facilities and pre-cooling logistics in Kushtagi and Bagalkot regions work to improve export capabilities of India's pomegranate industry. During fiscal year 2022–2023, pomegranate exports from India amounted to 62,280 metric tonnes valued at USD 58.36 million. The major export markets for Indian pomegranates exist in the United States and the United Kingdom, along with Netherlands United Arab Emirates and Saudi Arabia.

India's Pomegranate Export Boom: Market Trends, Top Buyers & Growth Strategies:

Key Aspect	Details
Global Market Projection (2030)	USD 367.52 million (from USD 248.17 million in 2022).
India's Exports (2023-24)	- 120,641 shipments (120.6K metric tons). - 3,133 exporters, 8,106 buyers. - Top destinations: USA, UK, Netherlands, UAE, Saudi Arabia, Qatar, Kuwait, Bahrain, Oman, Malaysia.
India's Production (2022-23)	- 31.87 lakh metric tons (7th globally). - Maharashtra contributes >50%, followed by Karnataka and Gujarat.
Export Value	62,280 metric tons worth USD 58.36 million (6.4% of global exports).

(2022-23)	
Top HS Codes	1. **08109010**: Edible fruit and nuts. 2. **33030090**: Essential oils/perfumery. 3. **08111090**: Fruit/nuts (unspecified).
Global Top Exporters	1. Iran 2. Canada 3. Poland 4. Chile 5. USA 6. Serbia 7. Netherlands 8. Belgium 9. Mexico 10. China.
Leading Indian Exporters	ABC Exports, Dev Exports, Himalaya Agro, Kandhari Beverages, Kaushal Agro, Sanghvi Quality Products, Tasty Bite Eatables Ltd., Vezlay Foods Pvt. Ltd., INI Farms, Sam Agri Fresh.
Key Drivers for Demand	- High nutritional value (antioxidants, vitamins C/E). - Health benefits (diabetes, heart disease, anti-inflammatory). - Growth in food/beverage industries.
Additional Insights	- Canada is listed as the world's largest exporter, though Iran ranks first in the top 10. - Pomegranate exports from India surged due to global demand for "super foods" and quality production facilities.

Source: exportimportdata.in

Barriers to Sustainable Pomegranate Farming in Karnataka: Challenges and Opportunities:

The pomegranate farming in Karnataka struggles with important hurdles that impact quantity and earnings output. Pest and disease control stands as the main problem for pomegranate growers in Karnataka. The combination of pests, including the pomegranate butterfly (Virachola isocrates), together with mealybugs and aphids, attacks pomegranate trees and causes damage to fruits and leaves, which deteriorates yield and marketable quality of produce. The crop suffers additional damage from widespread fungal infections which include Alternation together with anthracnose. Small farmers face difficulties in pest and disease protection because effective methods usually need costly chemical solutions which they cannot afford. Farmers remain unable to adopt Integrated Pest Management (IPM) techniques because they lack both proper knowledge and sufficient resources (Chand et al., 2020). Water shortage, along with inadequate irrigation systems, presents major difficulties to pomegranate farmers. The frequent droughts in Karnataka create problems for farmers who need these water resources for agricultural purposes. Pomegranate trees need a regular water supply most profoundly at flowering and fruit ripening times. The quality of pomegranate fruits deteriorates and the crop yield diminishes when farmers fail to provide enough water for their orchards. The efficient water management system of drip irrigation gets limited usage because not all farmers possess this cutting-edge technology, and traditional ways of water distribution fail to produce results. The unpredictability of rainfall resulting from climate

changes intensifies the agricultural water scarcity issue because numerous farmers must adapt to unpredictable weather patterns (Patil et al., 2019).

The willingness to receive loans stands as a primary challenge that faces Karnataka pomegranate producers. Farmers who work on small farms find it challenging to get loans because they do not have enough collateral, and they have poor financial skills along with weak access to banking institutions. Farmer loan repayments become harder because of excessive interest rates which create major difficulties for financial recovery during poor harvest conditions. Farmers frequently encounter difficulties in accessing government support programmes, which turn out to be complicated and lengthy, especially in areas with low scheme awareness (Sharma et al., 2018). The cultivation of pomegranates faces challenges due to both financial problems and steady access to markets and changing prices of their produce. Pomegranate price stability faces substantial market volatility because it depends heavily on the quantity produced by other regions and worldwide market needs and middleman activities within supply routes. The farmers struggle to negotiate fair prices because they experience restricted power when dealing with market purchasers and middlemen. The export possibilities of pomegranates face difficulties because farmers must pass international standards tests and meet packaging requirements and certification procedures, which restrict their access to international lucrative markets (Singh et al. 2021).

Diverse weather patterns, along with temperature changes, negatively influence the operations involved in pomegranate cultivation. Unexpected weather patterns along with rising temperatures and rainfall disruptions negatively affect how pomegranates develop through their life cycle. The temperature sensitivity of pomegranates results in reduced yield numbers because it affects both flowering and subsequent fruit formation. Unforeseen climate conditions restrict farmers from developing quality strategies for their agricultural operations (Chand et al., 2020). The main challenge for pomegranate growers involves substantial post-harvest commodities that disappear after the harvest season. Pomegranate fruit maintains its sensitive state during its entire journey from harvest through shipping before needing store requirements. Inadequate infrastructure, such as the lack of cold storage and transportation facilities, results in significant post-harvest losses. Farmers fail to acquire processing facilities because they do not have juice products or packaged fruit, which prevents them from increasing their production value (Patil et al., 2019).

The pomegranate farming sector in Karnataka deals with multiple difficulties, which include pest prevention alongside disease control as well as limited water availability and monetary obstacles in reaching markets. The necessary support needs to include superior infrastructure combined with modern agricultural practices and direct access to financial resources together with government policies that foster growth. Better pest control alongside effective irrigation systems with enhanced market opportunities will create substantial positive impacts on the farmers' living conditions.

Government Support, Agricultural Services, and Cooperatives: Strengthening Pomegranate Cultivation in Karnataka:

The development of pomegranate production in Karnataka receives continuous support through government schemes and agricultural extension services in addition to cooperatives. The National Horticulture Mission (NHM) and PM KUSUM initiative offer subsidies through NHM for pomegranate orchard development, including micro-irrigation system assistance, which promotes solar-powered irrigation systems while reducing farmers' reliance on diesel consumption and improving operational productivity. Through their partnership, Krishi Vigyan Kendra (KVK) and the Department of

Horticulture supply crucial educational support and scientific guidance to farmers about soil treatment, pest control and crop care, thus improving their farming outputs and sustainability levels. Various programmes provide farmers with modern agricultural methods that drive the expansion of their pomegranate cultivation.

Through cooperative organisations farmers receive assistance with market access opportunities alongside supportive assistance structures. HOPCOMS (Horticultural Producers' Cooperative Marketing and Processing Society) offers its members direct marketing access together with fair pricing structures and additional services which include grading and packaging and storage facilities. Through its various services the Karnataka Pomegranate Growers' Association (KPGA) defends farmers at all times and enhances agricultural practices and links producers to both Indian and international trading avenues. The combined actions between these organisations enable Karnataka farmers to boost their pomegranate cultivation results and minimise product spoilage while obtaining premium market values, thus fostering industry expansion state-wide.

Suggestions:

1. The successful implementation of Integrated Pest Management (IPM) requires targeted training and financial subsidies, which should be enhanced through promotional efforts to effectively control bacterial blight and fungal diseases.
2. The PM-KUSUM scheme should expand its programmes to implement drip irrigation and solar-powered water systems which will reduce both drought effects and water shortages.
3. Implementation of investments in cold chains and pre-cooling units with processing facilities throughout strategic agricultural production zones will decrease harvest losses and create new value-added products.
4. Boost Farmer Financing Improve access to low-interest credit for smallholders through simplified loan procedures, financial literacy campaigns, and increased outreach of credit institutions.
5. Technical support and packaging solutions for export readiness combined with customs procedure management services are provided to farmers through the organisation.
6. The extension organisation must expand its outreach programmes to increase regional sectors through KVK stations and mobile service platforms for climate-ready knowledge distribution purposes.
7. The government should give both Farmer Producer Organisations (FPOs) and cooperatives assistance to build their capability for bulk marketing partnerships with national and international buyers.

Conclusion:

Pomegranate farming across Karnataka demonstrates considerable differences in farming practices along with yield outputs and market access by sub-regions of the state. The northern districts of Karnataka, Bagalkot and Bellary, along with Vijayapura, control the majority of cultivation area and product yields, yet Bagalkot has shown setbacks in agricultural output. Chitradurga district has shown increasing trends in its land area and output numbers, meaning farmers there successfully implemented better agricultural practices. A number of southern regions, together with hilly districts, continue to operate as minimal producers because of unfavourable agro-climatic factors.

Environmental cycles in pomegranate markets, along with farmer market vulnerability and supply chain disorganisation, drive market performance. Karnataka generates national pomegranate production worth 9.5%, yet its agricultural sector faces problems in meeting export qualification standards to access international markets. The absence of post-harvest infrastructure along with insufficient cold storage facilities generates significant farm resource loss and decreases profit performance.

The adoption of NHM and RKVY and PM-KUSUM government initiatives together with training by KVKs has improved farmer capabilities. The distance as well as performance levels of these programmes differ widely across regions. Farmer cooperatives, along with producer organisations, demonstrate importance in the agricultural sector but need more development to achieve better market access for farmers and optimal pricing benefits. The findings indicate slow production growth at 1.36% annually from 2020-21 to 2022-23; however, this industry shows potential if the existing challenges receive concentrated attention.

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