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Production, export performance and trade dynamics of pomegranate in India: An economic analysis

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Abstract

India is one of the leading producers of pomegranate in the world, with Maharashtra being the major producing state due to its favorable agro-climatic conditions. The present study was undertaken to analyze the growth, export performance, direction of trade, instability, and constraints in the production and export of pomegranate in India during the period 2008-09 to 2022-23. Both primary and secondary data were used for the study. Primary data were collected from pomegranate growers through a pre-tested interview schedule, while secondary data related to area, production, productivity, and exports were collected from government reports and published sources. Tabular analysis, compound growth rate analysis, transitional probability matrix, instability index, and Garrett ranking technique were employed for analysis.

The results revealed that pomegranate production in India increased substantially from 5.87 lakh tons in 2008-09 to 30.97 lakh tons in 2022-23. However, export growth was inconsistent and remained comparatively low in relation to total production. The compound growth rate of export quantity and export value was estimated at 9.64 per cent and 14.55 per cent per annum, respectively, both significant at the 1 per cent level. The transitional probability matrix indicated that Saudi Arabia and Nepal were stable markets for Indian pomegranates, whereas Bangladesh and the Netherlands showed higher fluctuations in trade patterns. Instability analysis revealed comparatively higher instability in exports to Bangladesh and the Netherlands.

Keywords: Pomegranate, production, export performance, compound growth rate, trade direction, transitional probability matrix, instability index, export constraints, international trade, India

Introduction

India has diverse climatic conditions that are suitable for the cultivation of various horticultural crops. Fruit cultivation has been practiced in the country for centuries and plays an important role in improving farmers' income, nutritional security, and rural employment. Fruit crops are considered highly profitable compared to many traditional crops and can be successfully grown in dry, hilly, coastal, and semi-arid regions. Properly managed orchards provide stable income and productive use of wastelands with relatively low investment.

India is one of the largest fruit-producing countries in the world. Major fruits grown include mango, banana, citrus, guava, grapes, apple, pomegranate, pineapple, and ber. However, fruit consumption in India remains below the recommended dietary level, especially in rural areas. This highlights the need to increase fruit production and improve nutritional availability.

Fruit crops in Indian economy

The horticulture sector has become an important component of Indian agriculture. India ranks second in global horticultural production, with significant contribution from fruit crops. Fruit cultivation provides employment opportunities, supports agro-processing industries, and contributes to export earnings. India cultivates fruits over a large area with steadily improving productivity.

Maharashtra scenario

Maharashtra is one of the major fruit-producing states in India due to its favorable agro-climatic conditions. The state produces important fruits such as mango, banana, grapes, pomegranate, oranges, guava, and papaya. Districts like Nashik, Ahilyanagar, Solapur,

Sangli, Nagpur, and Pune are well known for commercial fruit cultivation. Among these crops, pomegranate has gained major importance because of its profitability and export demand.

Pomegranate

Pomegranate (*Punica granatum*) is an important commercial fruit crop cultivated in semi-arid regions. The fruit is valued for its nutritional, medicinal, and processing qualities. It contains essential minerals and antioxidants and is widely used for juice, syrup, and processed products. Maharashtra follows different flowering seasons such as Mrig Bahar, Ambia Bahar, and Hasta Bahar depending on water availability and market demand.

Area, production and export of pomegranate

India is one of the leading producers of pomegranate, with Maharashtra being the major producing state. Pomegranates are exported to countries such as UAE, Bangladesh, Saudi Arabia, Netherlands, and other Gulf and European markets. Indian pomegranates have strong export potential due to their quality and year-round availability. Ahilyanagar district is one of the important pomegranate-growing regions, where farmers have widely adopted drip irrigation and modern cultivation practices.

Need of the study

Pomegranate cultivation requires substantial investment and proper management. Information regarding production costs, returns, financial feasibility, and export performance is limited. Farmers also face challenges in marketing, price fluctuations, pest management, and export procedures. Therefore, studying the economics and export potential of pomegranate cultivation is important for improving farmers' profitability and supporting policy planning.

Objectives of the study

1. To analyze the growth and instability in pomegranate exports from India.

2. To identify the major constraints in production and export of pomegranate.

Methodology

Maharashtra is one of the major horticultural states in India due to its favorable agro-climatic conditions. The state has a tropical monsoon climate and supports the cultivation of several fruit crops, including pomegranate. Major pomegranate-growing districts in Maharashtra are Nashik, Ahilyanagar, Solapur, Sangli, Pune, and Satara.

The study was based on secondary data for the agricultural year 2023–24. Primary data were collected from selected pomegranate growers through a pre-tested interview schedule. Information regarding orchard management, production, marketing, export practices, and constraints faced by farmers was collected.

Secondary data related to area, production, productivity, and exports of pomegranate were collected from government reports, horticulture departments, research publications, and statistical records.

The collected data were analyzed using appropriate statistical and economic tools to achieve the objectives of the study.

Tabular analysis

Tabular analysis was used to summarize and present the data in the form of tables, percentages, and averages for easy interpretation.

Compound growth rate analysis

The compound growth rate was used to study the growth in area, production, productivity, and export of pomegranate over time.

Results and Discussion

Production and export details of pomegranate from India during 2008-09 to 2022-23 are presented in Table no.

Table 1: Export of pomegranate from India

Sr. No.	Year	Production (tons)	Export (tons)	Export as % of Production
1	2008-09	587000	34811	5.93
2	2009-10	638900	33369	5.22
3	2010-11	705230	18211	2.58
4	2011-12	772450	30162	3.90
5	2012-13	744963	36027	4.84
6	2013-14	587000	24505	0.01
7	2014-15	1789307	21030	1.18
8	2015-16	2306437	44723	1.94
9	2016-17	2612817	49852	1.91
10	2017-18	2844525	52392	1.84
11	2018-19	2915321	69537	2.39
12	2019-20	3186396	85430	2.68
13	2020-21	3270503	68556	2.10
14	2021-22	3086424	99210	3.21
15	2022-23	3097722	62492	2.02

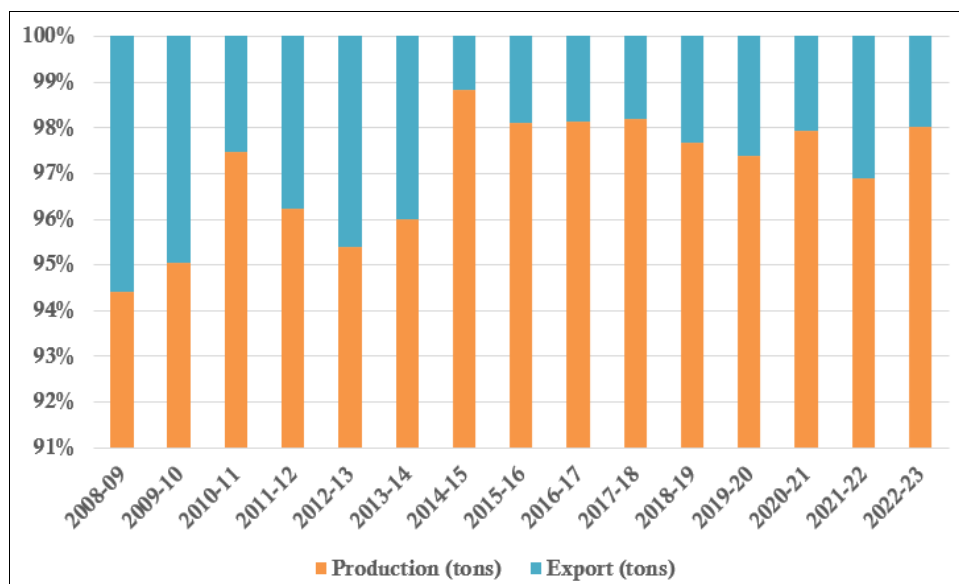


Fig 1: Export of pomegranate from India

The data on production and export of pomegranate from India during 2008-09 to 2022-23 indicate a substantial increase in production over the years. Production rose from 5.87 lakh tons in 2008-09 to 30.97 lakh tons in 2022-23, showing continuous growth in the sector. A remarkable rise in production was observed during 2014-15, which may be due to the expansion of cultivated area, improved farming practices, and favorable climatic conditions. The highest production was recorded in 2020-21, after which a slight decline was noticed. Compared to production, exports showed an uneven trend during the study period. Export quantity fluctuated from year to year, with the lowest export recorded in 2010-11 and the highest in 2021-22. Although exports increased gradually over time, their growth was slower than the increase in production. As a result, the share of exports in total production remained low throughout the period. Overall, the analysis shows that India has achieved considerable growth in pomegranate production, but export performance has not increased proportionately. Strengthening export infrastructure, improving quality standards, expanding international markets, and adopting better storage and transportation facilities can help increase India's share in the global pomegranate trade.

Table 2: Compound growth rate of export of pomegranate from India (2008-09 to 2022-23)

Sr. No	Particulars	Compound growth rate (%)
1	Quantity (Kgs)	9.64*
2	Value (Rs.)	14.55*

* Significant at 1 per cen

Table no.2 presents the compound growth rates of pomegranate exports from India in terms of quantity and value during the study period. Compound growth rate is an important indicator used to measure the average annual growth over time by considering year-to-year variations. The export quantity of pomegranate recorded a compound growth rate of 9.64 per cent per annum, which was significant at the 1 per cent level. This indicates a continuous increase in export volume over the years. The positive growth may be attributed to expansion in cultivation area, improvement in production practices, better irrigation facilities, and rising international demand for Indian pomegranates.

The statistical significance of both growth rates confirms that the increase in export quantity and value was consistent during the study period. Overall, the results reveal that India's pomegranate export sector has shown considerable progress in terms of both volume and value. However, sustaining this growth requires improvements in quality standards, export infrastructure, storage facilities, and international market access.

2. Direction of trade and changing pattern of exports

The transitional probability matrix for pomegranate exports from India during 2008-09 to 2022-23 explains the movement and stability of exports among major importing countries. The matrix indicates the probability of retaining export share in the same country or shifting to other importing countries over time. This analysis

Table 3: Transitional probability matrix of pomegranate export from India during (2008-09 to 2022-23)

Countries	Saudi Arab	Netherland	UAE	Qatar	Bangladesh	Other
Saudi Arab	0.8446	0.0000	0.0000	0.0000	0.0225	0.1329
Netherland	0.1000	0.6536	0.0070	0.0700	0.0843	0.0851
Nepal	0.0000	0.9172	0.0000	0.0000	0.0828	0.0000
Qatar	0.2356	0.0000	0.1091	0.6011	0.0000	0.0542
Bangladesh	0.5000	0.4931	0.0000	0.0000	0.0069	0.0000
Other	0.0000	0.0024	0.6223	0.0000	0.3753	0.0000

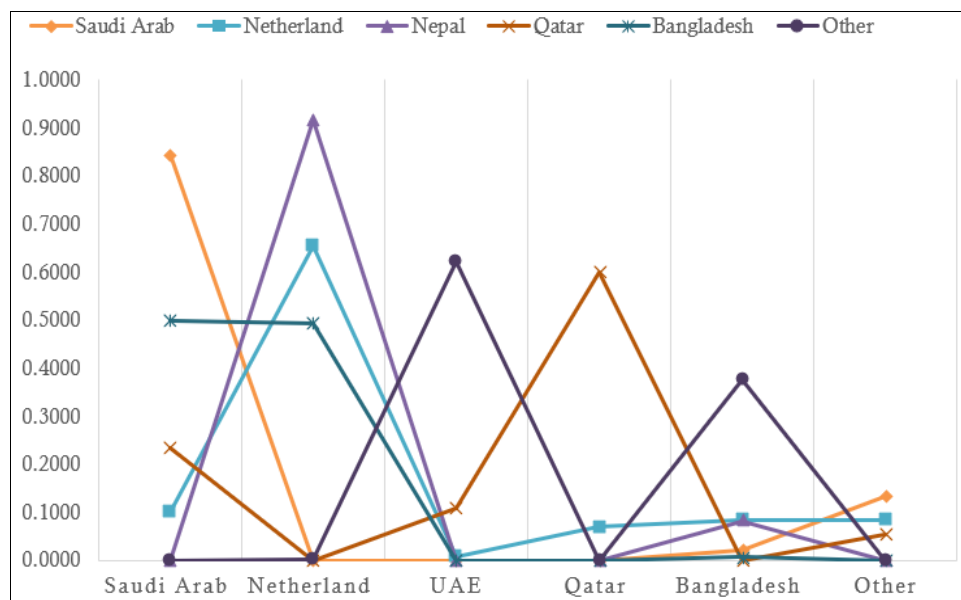


Fig 2: Transitional probability matrix of pomegranate export from India during 2008–09 to 2022–23

Saudi Arabia recorded the highest retention probability of 84.46 per cent, indicating that Indian pomegranate exports to this market remained highly stable over the study period. Only a small proportion of exports shifted towards Bangladesh (2.25%) and other countries (13.29%). This reflects the importance of Saudi Arabia as a reliable and well-established market for Indian pomegranates.

The Netherlands retained 65.36 per cent of its import share from India. However, some exports shifted towards Saudi Arabia (10%), Qatar (7%), and other countries (8.51%). This indicates moderate stability in the Netherlands market, along with possible re-export activities and changing market demand within European countries. Nepal showed the highest market stability with a retention probability of 91.72 per cent. Only 8.28 per cent of exports shifted towards Bangladesh. The strong retention rate suggests consistent demand for Indian pomegranates in Nepal due to geographical closeness and favorable trade relations. Qatar retained 60.11 per cent of imports from India, while a considerable share shifted towards Saudi Arabia (23.56%) and the UAE (10.91%). This pattern indicates that Qatar may also function as a redistribution center for pomegranate trade within Gulf countries. Bangladesh exhibited a highly unstable trade pattern. Only a negligible share of exports remained retained, while nearly 50 per cent shifted towards Saudi Arabia and 49.31 per cent towards the Netherlands. Such fluctuations may be due to changing import demand, competition, or policy-related factors. The “Other” category retained 62.23 per cent of exports, whereas 37.53 per cent shifted towards Bangladesh and a very small share moved to the Netherlands. This reflects instability in smaller and emerging export markets.

3. Instability index of pomegranate export

Table 4.14 presents the instability index of pomegranate exports for major importing countries using the Cuddy-Della Valle method. The instability index was estimated for both quantity and value of exports to examine the degree of fluctuations in export performance over the study period. Higher values of the index indicate greater instability in exports, while lower values suggest comparatively stable trade performance.

4. Constraints in production and export of pomegranate

The study revealed that pomegranate growers and exporters face several production and marketing-related problems. Among the production constraints, financial difficulty was ranked as the most serious problem, with the highest Garrett score of 15,513 and a mean score of 77.565. This indicates that inadequate financial support and limited access to credit adversely affect pomegranate cultivation. Lack of knowledge regarding quality production for export was ranked second, with a Garrett score of 15,508. This highlights the need for proper training, technical guidance, and awareness about export-quality standards among growers. Another important issue identified was inadequate information on export and import price trends, which received a Garrett score of 15,348. Insufficient market information limits farmers' ability to take timely production and marketing decisions.

In the export sector, colour and varietal preference was identified as the most important constraint, with a Garrett score of 15,167. This indicates the importance of producing export-quality fruits that satisfy international consumer preferences and market standards. Export promotion policies were ranked second with a score of 14,765, showing the need for stronger government support, trade facilitation, and export incentives. Transportation cost was another major problem faced by exporters, with a Garrett score of 13,893. High transportation expenses reduce profitability and affect the competitiveness of Indian pomegranates in global markets. Similarly, inadequate cold storage facilities, which received a score of 13,847, were found to be a serious constraint affecting the storage and quality maintenance of fruits during export operations. Fruit size and quality standards also influenced export performance, with a Garrett score of 13,703. In addition, strict chemical residue regulations imposed by importing countries created difficulties for exporters, as reflected by a score of 13,432. Exchange rate fluctuations and delays in payment processes were also reported as important constraints, affecting the financial stability of exporters.

5. Suggestions made by pomegranate cultivators for improving production and export

The study identified several suggestions provided by pomegranate cultivators to improve production and export performance. A majority of farmers emphasized the need for financial assistance, as adequate credit support would help them manage production expenses and adopt improved cultivation practices. Farmer training and awareness programmes were given high importance by the respondents, indicating the need for technical knowledge related to quality production, export standards, and modern cultivation methods. Farmers also stressed the importance of timely market information regarding prices, demand, and export opportunities to support better decision-making. Regarding exports, the respondents emphasized the importance of producing varieties preferred in international markets. They also suggested strengthening export promotion policies, improving transportation facilities, and developing better cold chain infrastructure to enhance export performance and reduce post-harvest losses.

Summery and conclusion

The study examined the production and export performance of pomegranate from India during 2008-09 to 2022-23. The results showed a significant increase in pomegranate production, which rose from 5.87 lakh tons in 2008-09 to 30.97 lakh tons in 2022-23. However, exports did not increase at the same rate and fluctuated over the years. The share of exports in total production remained low, indicating that India's export potential is not fully utilized. The compound growth analysis revealed positive and significant growth in both export quantity (9.64%) and export value (14.55%), suggesting increasing demand and better price realization in international markets. The transitional probability matrix showed that Saudi Arabia and Nepal were stable markets for Indian pomegranates, while Bangladesh and the Netherlands experienced higher fluctuations in import shares.

The instability analysis indicated that Bangladesh and the Netherlands had high instability in export quantity and value, whereas Nepal showed relatively stable trade performance. The study also identified several production and export constraints, including financial problems, lack of export-quality knowledge, high input costs, inadequate cold storage, transportation expenses, and strict international quality standards. To improve the sector, farmers suggested financial assistance, training programmes, better market information, improved post-harvest infrastructure, reliable electricity supply, and stronger export promotion policies. Overall, the study concluded that improving infrastructure, quality standards, market access, and government support can strengthen India's position in the global pomegranate export market.

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