



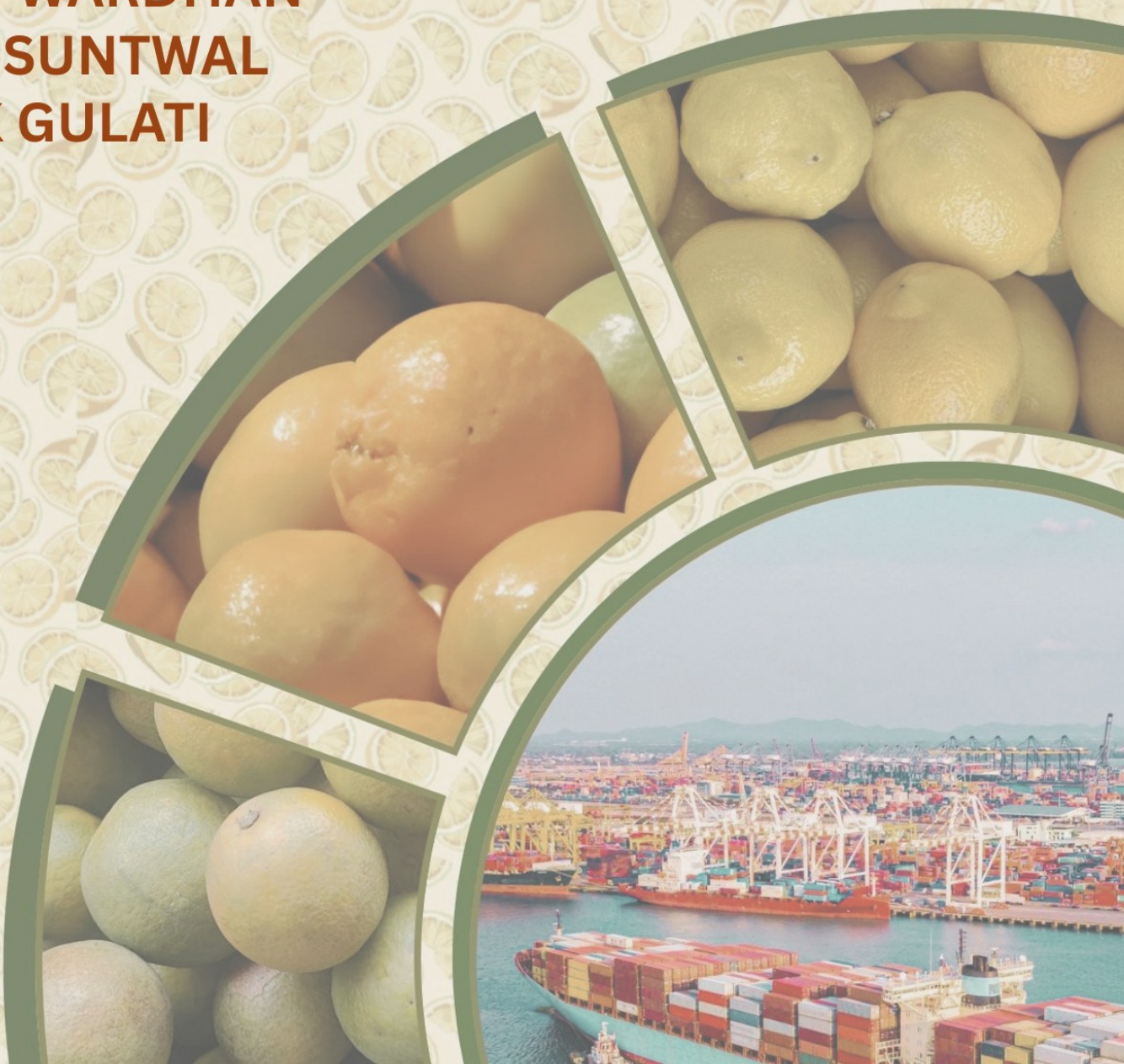
STRATEGIES TO BOOST INDIA'S CITRUS EXPORTS





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Published by: Indian Council for Research on International Economic Relations (ICRIER)
Core-6A, 4th Floor, India Habitat Centre, Lodhi Road, New Delhi – 110003

ISBN: 978-81-688166-0-2

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LIST OF ABBREVIATIONS

APEDA	Agricultural and Processed Food Products Export Development Authority
APY	Area Production Yield
ASEAN	Association of South East Asian Nations
CCRI	Central Citrus Research Institute
CEPA	Comprehensive Economic Partnership Agreement
CETA	Comprehensive Economic and Trade Agreement
CIF	Cost Insurance and Freight
CIS	Commonwealth of Independent States
DGFT	Directorate General of Foreign Trade
ECTA	Economic Cooperation and Trade Agreement
EU	European Union
FAOSTAT	Food and Agriculture Organization Statistics
FPO	Farmer Producer Organisation
FY	Financial Year
GAP	Good Agricultural Practices
GCC	Gulf Cooperation Council
GI	Geographical Indication

GST	Goods and Services Tax
HACCP	Hazard Analysis and Critical Control Points
HSN	Harmonized System of Nomenclature
ICAR	Indian Council of Agricultural Research
ICRIER	Indian Council for Research on International Economic Relations
IT	Information Technology
ITC	International Trade Centre
KII	Key Informant Interviews
LC	Letter of Credit
MERCOSUR	Mercado Comum do Sul
MFN	Most Favored Nations
MIDH	Mission for Integrated Development of Horticulture
MMT	Million Metric Tonnes
MoAFW	Ministry of Agriculture and Farmer's Welfare
MOFPI	Ministry Of Food Processing Industry
MRL	Maximum Residue level
NFC	Not-From-Concentrate
NHB	National Horticulture Board
NPC	Nominal Protection Coefficient
NTM	Non-Tariff Measures

PCT	Perishable Cargo Terminals
PIB	Press Information Bureau
PRA	Pest Risk Analysis
RCA	Revealed Comparative Advantage
SAARC	South Asian Association for Regional Cooperation
SPS	Sanitary and Phytosanitary
TE	Triennium Ending
TOI	Times of India
UAE	United Arab Emirates
UK	United Kingdom
UN	United Nations
USD	United States Dollars
USDA	United States Department of Agriculture
VAT	Value Added Tax
WITS	World Integrated Trade Solutions

FOREWORD

India is the world's third-largest citrus producer, with output of approximately 14.6 million metric tonnes in TE 2024–25, accounting for nearly 9 per cent of global production. Citrus cultivation supports the livelihoods of millions of farmers and contributes significantly to rural employment, nutrition, and value addition within the horticulture sector. Yet India's presence in global citrus trade remains disproportionately small. Export intensity across major citrus categories remains below 2 per cent and is even lower for mandarins and lemons and limes. Bridging this gap between production strength and export performance is the central focus of this study.

India's citrus sector is distinguished not only by its scale but also by its remarkable diversity. Mandarins account for about 42 per cent of national citrus production, led by the Geographical Indication-tagged Nagpur Mandarin and Kinnow of the northern plains. Sweet oranges, including Mosambi and Sathgudi, contribute a further 27 per cent, while lemons and limes account for about 26 per cent of output, making India the world's largest producer of this category. Despite this diversity and strong domestic production base, the sector remains largely oriented towards the domestic market. Processing levels are low by international standards, and only a small share of output reaches export markets. At the same time, growing global demand for fresh citrus, easy-peeling mandarins, natural juices, essential oils, and other value-added citrus products presents significant opportunities for India to expand its global footprint.

This study has been jointly undertaken by the Agricultural and Processed Food Products Export Development Authority (APEDA) and the Indian Council for Research on International Economic Relations (ICRIER). Combining ICRIER's analytical expertise with APEDA's close engagement with exporters, farmer producer organisations, and industry stakeholders, the report assesses India's citrus export competitiveness across production systems, value chain dynamics, market access conditions, and policy frameworks. It also identifies practical and actionable pathways to strengthen India's position in global citrus markets.

For India's horticulture sector, citrus represents a compelling opportunity: a crop where scale, diversity, and market potential already exist, but where competitiveness, processing capacity, quality systems, and market access can be further strengthened. Unlocking this potential can contribute meaningfully to higher farmer incomes, greater value addition, and the achievement of India's broader agri-export ambitions. We hope this report serves as a useful resource for policymakers, exporters, researchers, and farmer organisations working to realise that vision.

Shekhar Aiyar

Director & Chief Executive
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PREFACE

India's citrus sector is one of the largest segments within the country's horticulture economy, with production estimated at around 15 million metric tonnes annually. The sector encompasses a diverse range of fruits including mandarins, sweet oranges, lemons, and limes cultivated across Madhya Pradesh, Maharashtra, Rajasthan, Punjab, Andhra Pradesh, Telangana, and several North-Eastern states. Citrus cultivation plays a vital role in supporting farm incomes, generating rural employment, and contributing to nutritional security.

Despite being among the world's leading citrus producers, India's share in global citrus trade remains around 2 per cent for sweet orange and less than 1 per cent for mandarin and lemons and limes, the very category in which India commands global production dominance. With low export intensity across citrus categories compared to global standards, the sector continues to be heavily dependent on domestic fresh consumption markets. Processing levels also remain limited, with only a small share of production being converted into juice, concentrates, essential oils, pectin, and other value-added products. In contrast, several global citrus-producing countries have successfully developed integrated export and processing ecosystems that support higher value realization and greater market diversification.

At the same time, the global citrus industry is undergoing significant structural transformation. Consumer demand is increasingly shifting toward seedless and easy-peel mandarins, premium fresh fruit, natural beverages, and health-oriented citrus products. International trade is also becoming more quality-sensitive and compliance-driven, with increasing emphasis on traceability, residue management, post-harvest handling, and phytosanitary standards. Countries such as Spain, South Africa, Morocco, Turkey, and Peru have strengthened their competitiveness through varietal innovation, integrated cold-chain systems, and export-oriented production practices. India possesses several inherent strengths that can support a stronger global presence in citrus trade. Diverse agro-climatic conditions enable staggered production cycles and extended market availability. Relatively lower production costs, proximity to major import-dependent regions such as the Gulf Cooperation Council (GCC) countries and South Asia, and the growing global

demand for mandarins and processed citrus products together create important export opportunities. Furthermore, India's experience in developing export-oriented ecosystems in commodities such as grapes demonstrates that similar progress is achievable in citrus through coordinated investments in infrastructure, quality systems, processing, and market access.

However, the sector also faces important structural challenges. These include varietal limitations, inconsistent quality, fragmented supply chains, limited processing capacity, weak cold-chain infrastructure, pest and disease pressures, and stringent sanitary and phytosanitary requirements in export markets. Limited phytosanitary access to several premium markets and slow progress in Pest Risk Analysis (PRA) negotiations further constrain export diversification.

In this context, the present report provides a comprehensive assessment of India's citrus sector with a focus on production systems, processing landscape, export competitiveness, market opportunities, and policy challenges. The report is structured across seven sections. Section 1 presents the background and overview of the sector. Section 2 examines global and domestic production and trade dynamics along with value-chain analysis. Section 3 evaluates India's competitiveness across citrus categories. Section 4 analyses export potential and market access issues. Section 5 reviews the policy and regulatory environment, including tariff and non-tariff barriers. Section 6 identifies key challenges and emerging opportunities, while Section 7 proposes a set of actionable short-, medium-, and long-term strategies for strengthening India's citrus sector.

The future growth of India's citrus economy will depend not only on increasing production but also on improving quality consistency, expanding processing, strengthening export-oriented infrastructure, and enhancing integration with global value chains. The report seeks to contribute to this transition by providing evidence-based analysis and practical recommendations that can support higher farmer incomes, reduced post-harvest losses, greater value addition, and stronger export competitiveness.

AUTHORS

ACKNOWLEDGEMENT

This report was commissioned by the Agricultural and Processed Food Products Export Development Authority (APEDA) under the ICRIER–APEDA Knowledge Partnership, and we are grateful for the institutional trust that this collaboration represents. We are sincerely grateful to **Mr. Abhishek Dev**, Chairman, APEDA, who lent the project his active interest and offered perspectives throughout the course of this study. We are equally thankful to **Dr. Sudhanshu**, Secretary, APEDA, and **Ms. Vinita Sudhanshu**, General Manager, APEDA, for their support and valuable inputs at critical stages of the study.

We would like to thank **Ms. Ritika Bhaskar** and **Ms. Anu Chandel**, Assistant General Managers and **Ms. Sehreena Maqbool**, Assistant Manager, APEDA, who reviewed the draft report and offered constructive feedback. We also acknowledge the support extended by **Ms. Aditi Bansal**, Associate (Trade) and **Ms. Srishti Chitranshi**, Business Development Manager, APEDA.

The stakeholder consultations conducted in Nagpur and Amravati in Maharashtra, and in Agar Malwa in Madhya Pradesh, were among the most valuable inputs to this study. Exporters, packhouse operators, farmer producer organisations, and market intermediaries gave us their time and spoke candidly about the sector's strengths and challenges. We would like to thank **Mr. Anil Ghanwat**, Chairman, and **Ms. Seema Narode**, Farm Leader, Shetkari Sangathan, for guiding the research team during field visits across Maharashtra and Madhya Pradesh and for sharing their ground-level insights.

We would also like to acknowledge the valuable perspectives shared by officials and representatives from Sahyadri Farms and state horticulture departments. We are equally grateful to **Dr. Dilip Ghosh**, Director, and the scientific staff of the ICAR–Central Citrus Research Institute (CCRI), Nagpur, for their technical guidance and inputs on production practices, post-harvest management, and varietal performance. Their contributions were instrumental in strengthening the report's analytical rigour.

Within ICRIER, **Mr. Abhishek Kashyap**, former Research Assistant, contributed to the early phases of data collection and analysis. **Mr. Rahul Arora**, Programme Manager, managed the coordination, logistics, and production aspects of the report. **Ms. Chhaya Singh**, Library-cum-Documentation Officer, facilitated access to research materials, and **Mr. Raj Kumar Shahi**, IT Manager, ensured the team's IT needs were met throughout.

While we have benefited immensely from the contributions of all those acknowledged above, any remaining errors or omissions are solely our responsibility.

AUTHORS

EXECUTIVE SUMMARY

India's citrus sector represents one of the largest segments within the country's horticulture economy, with production estimated at around 15 million metric tonnes in 2024-25. India is the world's third largest citrus producer and has a diverse production base spanning mandarins, sweet oranges, lemons, and limes. Despite this large production scale, the sector remains predominantly domestic-market oriented, with exports accounting for only a very small share of production across most citrus categories. Processing levels also remain limited compared to global standards, constraining value addition and export diversification.

This study evaluates India's competitiveness in global citrus markets, analyses production and export dynamics, identifies structural bottlenecks and emerging opportunities, and proposes strategic interventions to strengthen India's long-term export performance. The analysis is based on secondary data from FAOSTAT, ITC Trade Map, APEDA, DGFT, NHB, and ICAR institutions, supplemented by stakeholder consultations involving exporters, scientists, processors, FPOs, and industry representatives.

PRODUCTION SCENARIO

Global Production Scenario

Global citrus production is estimated at approximately 167 million metric tonnes (MMT), making citrus one of the largest fruit categories worldwide. Oranges account for the largest share at around 68.7 MMT (41 per cent of global citrus), followed by tangerines and mandarins at 51.7 MMT (31 per cent), and lemons and limes at 22.4 MMT (13 per cent). Global citrus exports are valued at USD 15.7 billion, led by Spain, South Africa, China, Egypt, and Turkey. A key structural trend shaping global markets is the increasing preference for easy-peel, seedless mandarin varieties such as clementines and satsumas, which have grown faster in both production and trade than traditional sweet oranges.

The global citrus industry is increasingly shifting toward easy-peel, seedless, and premium-quality varieties driven by changing consumer preferences. Countries

such as Spain, Morocco, South Africa, Turkey, and Peru have strengthened their competitiveness through varietal innovation, integrated cold-chain systems, and export-oriented value chains. Brazil remains a global benchmark in citrus processing, particularly in orange juice concentrate exports.

Indian Production Scenario

India produced approximately 14.6 MMT of citrus in TE 2024–25, with mandarins accounting for around 6.2 MMT (42 per cent), sweet oranges for 3.9 MMT (27 per cent), and lemons and limes for 3.8 MMT (26 per cent). The country cultivates a diverse range of citrus varieties with strong regional specialisation including Nagpur Mandarin (GI-tagged), Kinnow in Punjab and Rajasthan, Khasi Mandarin in Meghalaya, Mosambi across Maharashtra and Andhra Pradesh, and Kagzi Lime across peninsular India.

Despite high production volumes, India's average yields and varietal profile differ from those of internationally traded benchmarks. Nagpur Mandarin and Kinnow are seeded varieties with shorter shelf life compared to globally preferred seedless clementines and satsumas; Indian sweet oranges such as Mosambi and Sathgudi have thinner peels and poorer transit tolerance relative to Navel and Valencia varieties. Bridging this varietal competitiveness gap remains a structural priority.

GLOBAL AND INDIAN EXPORT SCENARIO

Global Export Scenario

Global citrus trade remains concentrated among a few major exporters including Spain, South Africa, Turkey, Egypt, Morocco, Mexico, and Peru, that collectively command the largest shares of fresh orange, mandarin, and lemon exports. Spain remains the world's largest citrus exporter by value, supported by integrated Mediterranean supply chains, strong cooperatives, and advanced post-harvest systems. South Africa plays a critical role as a counter-seasonal supplier to Northern Hemisphere markets.

Global citrus export prices have trended upward, with average prices crossing USD 1,000 per metric tonne in recent years. Mandarins and clementines consistently

command price premiums over bulk oranges, driven by convenience-led consumption trends in Europe and East Asia. International demand continues to grow for fresh mandarins, lemons, limes, NFC juices, essential oils, citrus fibre, and nutraceutical products.

India's Export Performance

India's citrus exports remain limited in absolute scale. Orange export values peaked at USD 53.4 million in 2020 before declining to USD 17.6 million in TE25, reflecting market concentration risks and the adverse impact of Bangladesh's tariff hikes. Bangladesh, which historically absorbed over 54 per cent of India's orange exports, raised effective import duties on fresh fruit to over 136 per cent in FY 2024–25, contributing to a sharp drop in export volumes from over 141,000 MT in 2020–21 to an estimated 25,000 MT in 2023–24.

India's Revealed Comparative Advantage (RCA) for oranges improved to around 0.63 during 2020 but remains below 1, indicating that orange exports are not yet a structurally competitive category. India's Nominal Protection Coefficient (NPC) for oranges has historically remained above 1, though it moderated to around 1.2–1.3 in recent years. India's export prices for oranges (USD 700–900 per MT) remain significantly below the global average (USD 1,000–1,050 per MT), reflecting quality gaps, post-harvest limitations, and limited brand differentiation.

A major structural weakness of India's citrus sector is the low level of processing. Only around 3–6 per cent of domestic citrus production is processed, compared to 30–75 per cent in countries such as Brazil and the United States. Processing remains concentrated in small-scale units with limited capacity to absorb seasonal surpluses. As a result, post-harvest losses remain high and value realization remains low.

STRENGTHS AND OPPORTUNITIES

India's citrus sector possesses several structural strengths that provide a credible foundation for export growth:

- ◆ **Seasonal advantage:** India's mandarin harvest from October to February partially coincides with lean supply periods in Europe, offering windows for competitive entry.
- ◆ **GI-based differentiation:** Nagpur Mandarin's GI status provides a basis for origin-based branding and premium positioning in export markets.
- ◆ **Large lemon and lime production base:** India's dominance in global lemon and lime production (nearly 17 per cent of world output) provides a large feedstock base for value-added processing, including essential oils, juice concentrates, and pectin — where international demand and prices are both favourable.
- ◆ **Geographic proximity to high-growth markets:** India's location offers freight and transit advantages in supplying fresh citrus to the Gulf Cooperation Council, South Asia, and Southeast Asia.
- ◆ **Competitive farmgate production costs:** India's cost advantage at the production stage, if complemented by post-harvest investments, can support price-competitive export strategies in regional markets.

India also has substantial untapped opportunities across multiple dimensions:

- ◆ **Value-added processing exports:** Expanding into juice concentrates, essential oils, pectin, dried peel, and citrus-based ingredients can diversify export revenue, reduce dependence on fresh exports, and tap growing demand in developed markets.
- ◆ **Market diversification:** The UAE, Saudi Arabia, Malaysia, Singapore, and CIS markets beyond Russia offer strong growth potential and are currently underserved by Indian citrus exports.
- ◆ **Trade agreement leverage:** India's trade agreements with the UAE (CEPA), Australia (ECTA), UK (CETA), and the proposed India–EU FTA could improve market access for citrus exporters and reduce tariff disadvantages relative to competing origins.
- ◆ **Lemon and lime export potential:** The stark gap between India's lemon and lime production scale and its export penetration (less than 1 per cent)

represents a large untapped opportunity, particularly in Gulf fresh markets and processed ingredient segments.

CHALLENGES

Despite its production scale and structural advantages, India's citrus sector faces several interconnected challenges that constrain export performance:

- 1. Varietal Limitations and Export Competitiveness Gaps:** India's citrus production remains dominated by varieties primarily suited for domestic fresh consumption rather than export-oriented value chains. Compared to internationally traded benchmark varieties, many Indian citrus varieties face limitations related to seed content, shelf life, peel strength, visual uniformity, and transportability.
- 2. High Production Risks from Climate, Pests, and Diseases:** Citrus cultivation is highly vulnerable to climatic variability, pest incidence, disease outbreaks, and uneven nursery quality, all of which affect productivity, fruit quality, and export-grade recovery. The perennial nature of orchards further increases farmers' long-term exposure to climatic and biological risks.
- 3. Non-Uniform Pre- and Post-Harvest Practices and High Post-Harvest Losses:** Wide variation in orchard management, harvesting, grading, waxing, packaging, and residue management practices leads to inconsistent quality and low export-grade recovery. Inadequate cold-chain infrastructure, packhouses, and pre-cooling facilities further contribute to high post-harvest losses and reduced shelf life.
- 4. Low Processing Penetration and Weak Value Addition Ecosystem:** Only a small share of India's citrus production is processed into juice, concentrates, essential oils, pectin, and other value-added products. Limited processing infrastructure and weak industry integration constrain value realization and increase dependence on volatile fresh markets.
- 5. Logistics, Market Access, and Export Infrastructure Constraints:** High logistics costs, limited reefer availability, port-level bottlenecks, and inadequate export infrastructure reduce competitiveness in distant markets. In addition,

stringent SPS requirements, slow Pest Risk Analysis (PRA) negotiations, lack of sea export protocols, and limited availability of globally accepted fungicides continue to constrain market access.

6. Weak Aggregation, Farmer Bargaining Power, and Institutional Support:

Fragmented supply chains, weak farmer aggregation, limited access to affordable credit and insurance, and gaps in research, extension, and skilled manpower constrain the development of export-oriented citrus value chains.

STRATEGIC RECOMMENDATIONS

The study recommends a combination of short-term, medium-term, and long-term interventions, structured as follows:

Short-Term Strategies

- 1. Fast-track SPS compliance, certification, and traceability support:** Notify country-specific SPS protocols for citrus by destination market, mandate orchard registration and plot-level residue monitoring for high-compliance markets, integrate digital traceability into phytosanitary clearance, and initiate targeted bilateral engagements to streamline citrus-specific phytosanitary procedures for notified export clusters.
- 2. Targeted market diversification and export facilitation:** Prioritise the Middle East, ASEAN, and other neighbouring markets as focus destinations. Engage Bangladesh through bilateral trade discussions to address tariff impacts. Issue market-wise export advisories aligned with India's citrus harvest calendar and facilitate structured trial consignments to emerging markets in Southeast Asia.

Medium-Term Strategies

- 3. Develop export-oriented citrus clusters with integrated post-harvest systems:** Identify and develop notified export clusters in the Nagpur mandarin belt, Kinnow belt, Mosambi belt, and North East India, with dedicated integrated packhouses, mechanical grading, pre-cooling, and cold storage through convergence of APEDA, MIDH, and state horticulture funding.

- 4. Improve export logistics and perishable cargo infrastructure:** Operationalise dedicated perishable cargo handling facilities at Nagpur and Amritsar airports. Designate specific seaports for citrus exports and create fixed refrigerated road-to-port logistics corridors. Promote pilot sea freight shipments for Middle Eastern markets with validated protocols.

Long-Term Strategies

- 5. Promote varietal upgrading and orchard-level quality alignment:** Map export-preferred citrus varietal traits for major importing markets and introduce structured varietal replacement and orchard rejuvenation programmes in notified export clusters. Facilitate access to improved planting material and condition cluster infrastructure access on adherence to prescribed orchard management protocols.
- 6. Expand citrus processing and value-added export capacity:** Create regionally distributed citrus processing hubs in major producing belts with facilities for NFC juices, juice concentrates, essential oils, dried peel, and citrus-based ingredients. Link processing units to export markets through product-specific standards and assured procurement arrangements for processing-grade fruit.

1

INTRODUCTION

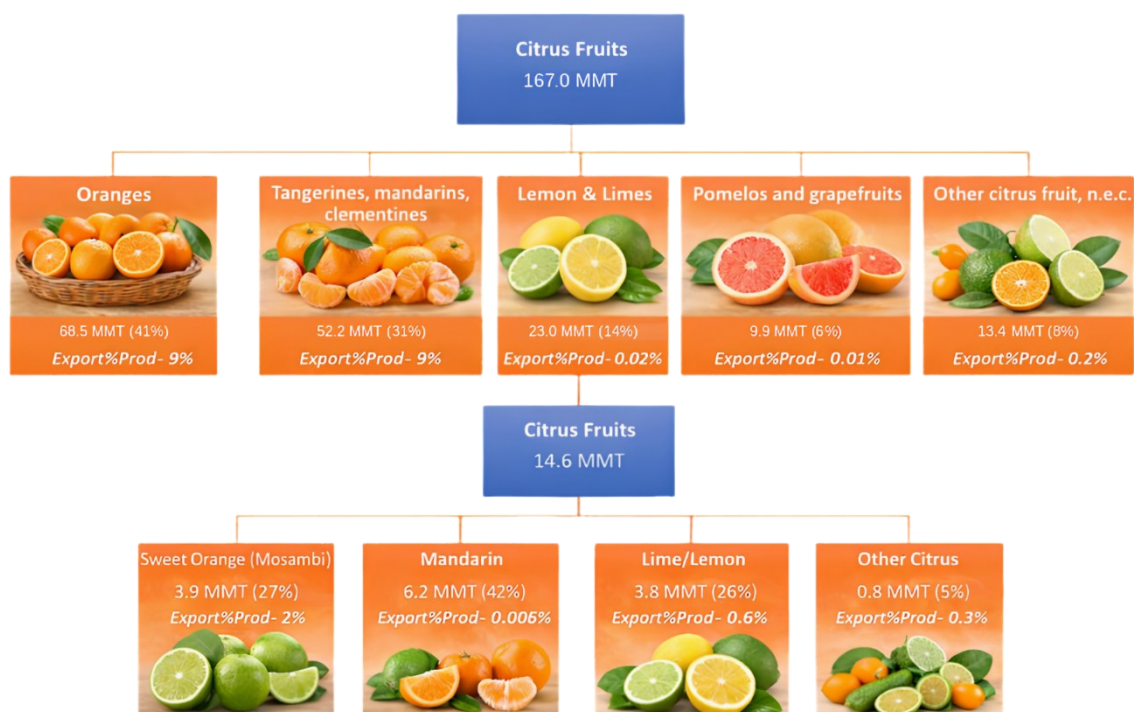
1.1 Backdrop of the Commodity

Citrus fruits represent one of the largest and most diverse fruit groups globally, encompassing oranges, mandarins and tangerines, lemons and limes, grapefruits, pomelos, and other minor citrus varieties. They are consumed widely in fresh form and as processed products such as juices, concentrates, essential oils, and food ingredients. Owing to their year-round demand, nutritional value, and adaptability across agro-climatic zones, citrus fruits play a central role in global horticultural production systems.

Global citrus production is estimated at approximately 167 MMT, with oranges accounting for the largest share at around 68.5 MMT (41 per cent), followed by tangerines and mandarins at 52.2 MMT (31 per cent), and lemons and limes at 23 MMT (14 per cent). Despite this large production base, only a limited proportion of global output enters international trade, with oranges and mandarins together dominating traded volumes at an export intensity of approximately 9 per cent of production.

Within the citrus group, oranges and mandarins differ significantly in production characteristics, consumption patterns, and export potential. Sweet oranges are larger-fruited with thicker peel and are widely used for juice processing in addition to fresh consumption. Mandarins, including tangerines and clementines, are smaller, easy to peel, and sweeter, making them particularly suited for fresh table consumption. Globally, mandarins have gained increasing prominence in international trade due to changing consumer preferences for convenient, portion-sized, and premium fruit, resulting in faster growth of mandarin exports relative to oranges in recent years (**Figure 1.1**).

Figure 1.1: Global and Indian classification of citrus fruits



Source: MoAFW and FAOSTAT

India is among the world's largest citrus producers, with total citrus fruit output estimated at around 14.6 MMT, representing approximately 9 per cent of global production (FAOSTAT, 2025). The composition of India's citrus basket differs from the global profile: mandarins account for approximately 6.2 MMT (42 per cent) of national output, followed by sweet orange at 3.9 MMT (27 per cent), and lemons and limes at 3.8 MMT (26 per cent). Citrus cultivation is geographically dispersed across Maharashtra, Madhya Pradesh, Rajasthan, Punjab, Andhra Pradesh, Telangana, and the North-Eastern states, with each region exhibiting distinct varietal strengths aligned to its agro-climatic conditions.

Despite a strong production base, India's participation in global citrus trade remains marginal. Export intensity is extremely low across all categories, barely 0.006 per cent for mandarins, approximately 2 per cent for sweet oranges, and around 0.5 per cent for lemons and limes. Lemons and limes present a particularly striking paradox: India is the world's largest producer of this category, yet exports less than 1 per cent of its output, foregoing both the fresh market premium available in Gulf and South Asian destinations and the substantial value-added

opportunity in lemon essential oil, NFC juice concentrate, and citrus pectin, which command strong and growing international demand. This sharp contrast with the global pattern of citrus tradability reflects structural constraints at the post-harvest and export stages in quality consistency, cold-chain infrastructure, grading and certification systems, and compliance with international phytosanitary standards, rather than any limitation at the production stage itself. Fragmented landholding, trader-dominated marketing channels, and weak institutional coordination between producers, processors, and exporters have further constrained the development of export-ready supply chains. Seasonality compounds these challenges: India's principal citrus harvest periods largely overlap with those of other Northern Hemisphere exporters, limiting counter-seasonal positioning in high-value markets, while concentrated arrivals during peak harvest months drive price depression and post-harvest losses in the absence of adequate storage and processing capacity.

At the same time, India possesses several structural advantages that provide a credible foundation for expanding citrus exports. India's flagship variety, Nagpur Mandarin, carries Geographical Indication (GI) status and strong consumer recognition, offering a basis for origin-based branding and premium positioning in export markets. In the lemon and lime segment, India's dominance of global production — contributing approximately 17 per cent of world output — provides a large and largely untapped feedstock base for value-added processing, including essential oil extraction, juice concentrate, and pectin production, segments where international prices and demand trajectories are both favourable.

An extended harvest window across Ambiya and Mrig Bahar crop cycles enables relatively staggered market availability compared to single-season exporters. Production costs at the farm gate remain competitive relative to Mediterranean exporters. And India's geographic proximity to large, fast-growing import markets such as the Gulf Cooperation Council, Bangladesh, Nepal, Sri Lanka, and Southeast Asia, provides a logistical advantage in fresh citrus trade, where transit time and freight costs directly determine competitiveness.

Global demand trends further reinforce this opportunity. Consumer preference is increasingly favouring fresh citrus and natural juice products, driven by rising health awareness and demand for vitamin-rich diets. Processed citrus segments,

orange juice concentrates, lemon essential oil, lime juice concentrate, pectin, and other citrus-derived ingredients, are also growing in developed markets, offering additional export diversification pathways beyond fresh fruit. India's experience in building robust export ecosystems in other horticultural commodities, most notably grapes, demonstrates that comparable value chains in citrus are achievable with the right institutional and infrastructural foundations.

Citrus cultivation also supports the livelihoods of a large number of smallholder farmers across producing states, many of whom have limited alternative high-value crop options, making the sector's development not only an export competitiveness question but a rural income and employment priority.

In this context, the present study examines India's citrus sector with a specific focus on export performance and competitiveness. By analysing global and domestic production structures, trade patterns, and category-wise export orientation, the study seeks to identify key bottlenecks and propose targeted strategies to enhance India's participation in international citrus markets.

1.2 Objectives and Scope of the Study

- ◆ The primary objective of this study is to evaluate India's citrus export competitiveness and outline strategic interventions to expand export volumes and diversify market destinations. The specific objectives are as follows:
- ◆ To analyse domestic citrus production patterns and export performance, with a focus on category-wise output and trade intensity.
- ◆ To identify emerging and high-potential international markets for Indian citrus products, evaluating demand trends, tariff regimes, SPS requirements, and competitive landscapes.
- ◆ To examine structural constraints in the citrus value chain, including post-harvest infrastructure, quality assurance systems, logistics, and export coordination mechanisms.
- ◆ To propose evidence-based strategic recommendations for improving India's citrus export performance, encompassing policy, institutional, and technological interventions.

- ◆ The scope of the study includes both fresh fruit exports and value-added citrus products where relevant. It covers market trend analysis, value chain bottleneck assessment, policy and regulatory reviews, and strategic scenario development. The timeframe of analysis spans the past decade (2010–11 to 2023–24) to capture shifts in trade patterns, with indicative projections of export potential to 2034–35 under alternative market development scenarios.

1.3 Methodological Framework

To achieve the objectives, the study adopts a mixed methodological approach, combining quantitative trade analysis, value chain assessment, stakeholder consultations, and benchmarking of best practices in citrus exporting countries. The primary components of the methodology are outlined below.

Trade and Competitiveness Analysis

First, the competitiveness of Indian oranges was assessed using two key indicators, Revealed Comparative Advantage (RCA) and Nominal Protection Coefficient (NPC).

Revealed Comparative Advantage: It is a widely used trade measure to assess a country's comparative advantage for a particular product relative to the global trade scenario. An RCA value greater than one means the country has a comparative advantage in the export of that product, whereas an RCA value less than one means the country does not have a comparative advantage. The formula for calculating India's comparative advantage in orange is given by:

$$RCA = (E_{ij}/E_i)/(E_{wj}/E_w)$$

Where:

- ◆ E_{ij} = Exports of orange by India
- ◆ E_i = Total agricultural exports by India
- ◆ E_{wj} = Exports of orange by the world
- ◆ E_w = Total world agricultural exports

Nominal Protection Coefficient: NPC assesses whether domestic prices for oranges are competitive with world prices, providing insights into export viability.

NPC measures the relationship between domestic and world prices for oranges to evaluate if domestic prices are aligned with international benchmarks, assessing the competitiveness of Indian oranges for exports. The formula to calculate NPC for orange is:

$$\text{NPC} = P_w / P_d$$

Where:

- ◆ P_d = Domestic price of orange
- ◆ P_w = World reference price (export parity price)

Value Chain Mapping

A detailed mapping of the citrus value chain identifies critical nodes from orchard to export. This includes harvesting, sorting, packing, cold chain, transport logistics, and compliance with international standards. Bottlenecks are identified through field visits and discussions with growers, exporters, and logistics service providers in principal citrus clusters such as Nagpur, Amravati, and other key producing regions.

Policy and Market Environment Review

The policy analysis examines tariff and non-tariff barriers in potential export markets, with a focus on tariff quotas, SPS measures, labelling and certification requirements, and phytosanitary protocols. Bangladesh's import duty changes and resultant trade impacts are analysed to draw lessons for other markets. Market assessments include demand trends in the Middle East, Southeast Asia, the European Union, and East Asia, highlighting import growth trajectories and competitive dynamics.

Stakeholder Consultations

Primary data is collected through key informant interviews (KIIs) with growers, exporters, government officials, and market intermediaries in key clusters including Nagpur and Amravati in Maharashtra. These consultations supplement secondary

data and provide ground-level insights on quality concerns, infrastructure gaps, regulatory challenges, and perceptions of export opportunities.

Benchmarking and Case Studies

The study benchmarks global best practices by examining successful citrus exporters such as Spain, South Africa, and Egypt. Case studies focus on varietal development, post-harvest systems, certification and traceability frameworks, and market development strategies that can inform India's citrus export push.

Export Scenario Analysis

Export scenarios are derived using historical export value data for Indian oranges sourced from ITC Trade Map for the period 2010–2024. Time-series trend models are estimated using both linear and exponential functional forms. To account for the exceptional trade disruption and surge observed during the Covid-19 period, trends are estimated both including and excluding the years 2020 and 2021.

These estimated trends are extended over the medium term (2026–2030) and long term (2031–2035) to derive indicative export paths. Short-horizon trends based on recent years are also examined to capture post-pandemic stabilisation effects. No ex-ante assumptions are imposed regarding changes in policy, technology, or market access; therefore, results should be interpreted as scenario-based indications rather than precise forecasts.

Data Collection and Sources

The study draws on data from global sources such as the International Trade Centre (ITC) Trademap, FAOSTAT, United Nations Comtrade, and national databases including DGFT, APEDA, National Horticulture Board, and state horticulture departments. Primary data derives from stakeholder interviews and field observations. While every effort has been made to ensure data accuracy, limitations arise from inconsistencies in category-wise production and trade reporting across sources, and the unavailability of disaggregated export figures for certain niche citrus segments.

2.1 Global Scenario

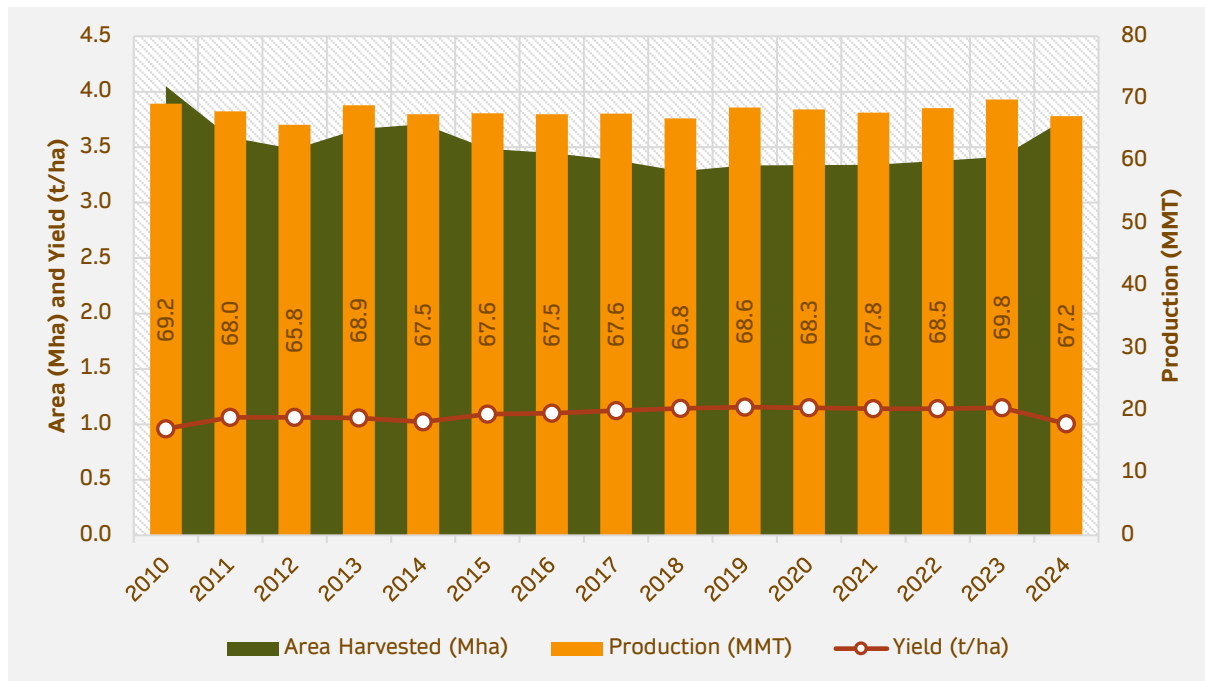
Global Production and Varietal Structure

Citrus fruits constitute one of the world's most important horticultural commodity groups, comprising oranges, mandarins, tangerines, clementines, lemons, limes, grapefruits, and pomelos. Owing to their high nutritional value, versatility in fresh and processed forms, and strong year-round consumer demand, citrus fruits occupy a prominent position in global fruit production and trade. Citrus is consumed both as fresh fruit and as a wide range of processed products including juices, concentrates, essential oils, pectin, flavouring agents, and nutraceutical ingredients.

Global citrus production is estimated at 167 MMT in TE2024 (FAOSTAT, 2025), making citrus one of the largest fruit categories worldwide. Among citrus categories, oranges account for the largest share of global output, followed by mandarins, tangerines, and clementines, which together represent the fastest-growing segment within the citrus family. Lemons and limes constitute another important segment, particularly due to their expanding use in beverages, processed foods, flavouring industries, and food-service applications.

As illustrated in **Figure 2.1**, global orange production has remained relatively stable over the period 2010–2024, fluctuating in a narrow band between approximately 65.8 MMT and 69.8 MMT, with TE2024 recording output of 67.2 MMT. The harvested area under oranges has similarly shown limited variation, hovering around 3.5–4.0 Mha across the period, while yield levels have remained broadly flat at approximately 18–20 t/ha. This pattern reflects a mature production system where neither significant area expansion nor notable yield breakthroughs have occurred, and growth has been largely driven by orchard management improvements rather than structural expansion.

Figure 2.1: Global Scenario for Oranges

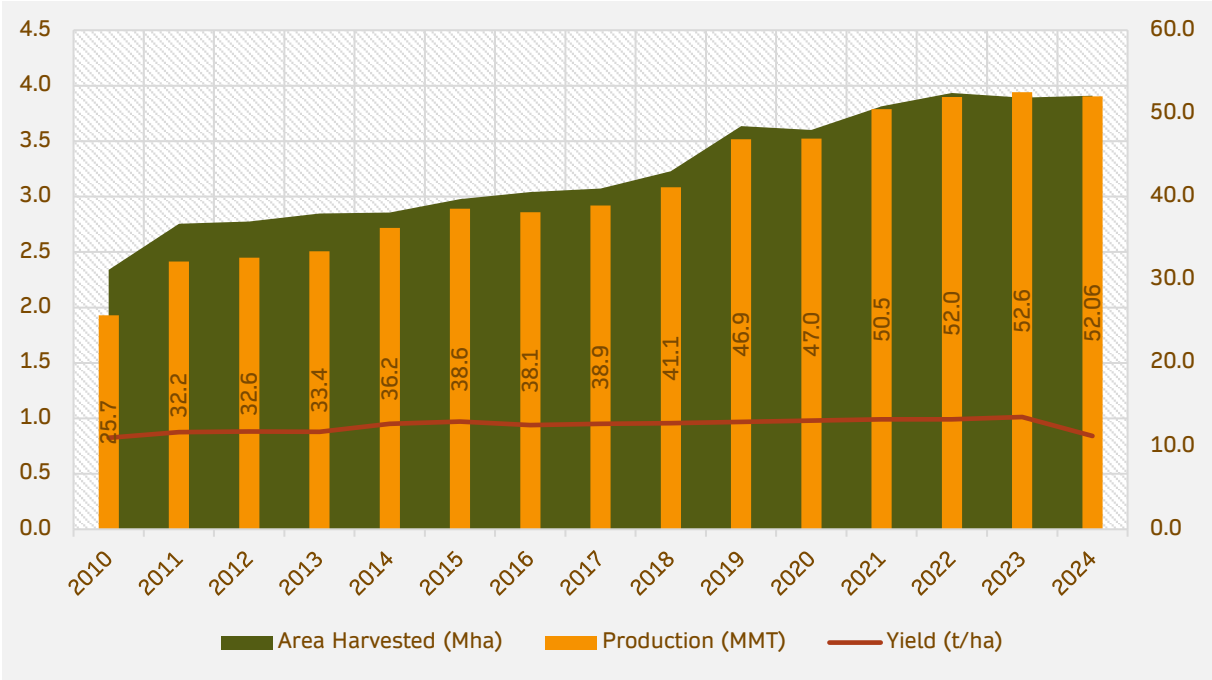


Source: FAOSTAT, 2025

Production for mandarins, tangerines, and clementines grew substantially from 25.7 MMT in 2010 to 52.06 MMT in 2024, more than doubling over the period (**Figure 2.2**). The harvested area also expanded steadily from approximately 2.3 Mha to nearly 3.9 Mha, reflecting active investment in new plantings globally. Despite this area expansion, yield levels remained area-driven rather than productivity-led. This sustained growth underscores the structural shift in global citrus toward easy-peel, convenience-oriented varieties driven by evolving consumer preferences for seedlessness, sweetness, and snack-sized fruit.

Analysis of long-term Area, Production, and Yield (APY) trends suggests that global citrus growth has been driven less by expansion in cultivated area and more by productivity improvements, technological adoption, and varietal diversification. While the total area under citrus cultivation has expanded only moderately over the past two decades, improvements in planting material, irrigation systems, orchard management practices, disease control, and post-harvest infrastructure have supported sustained production growth across major producing countries.

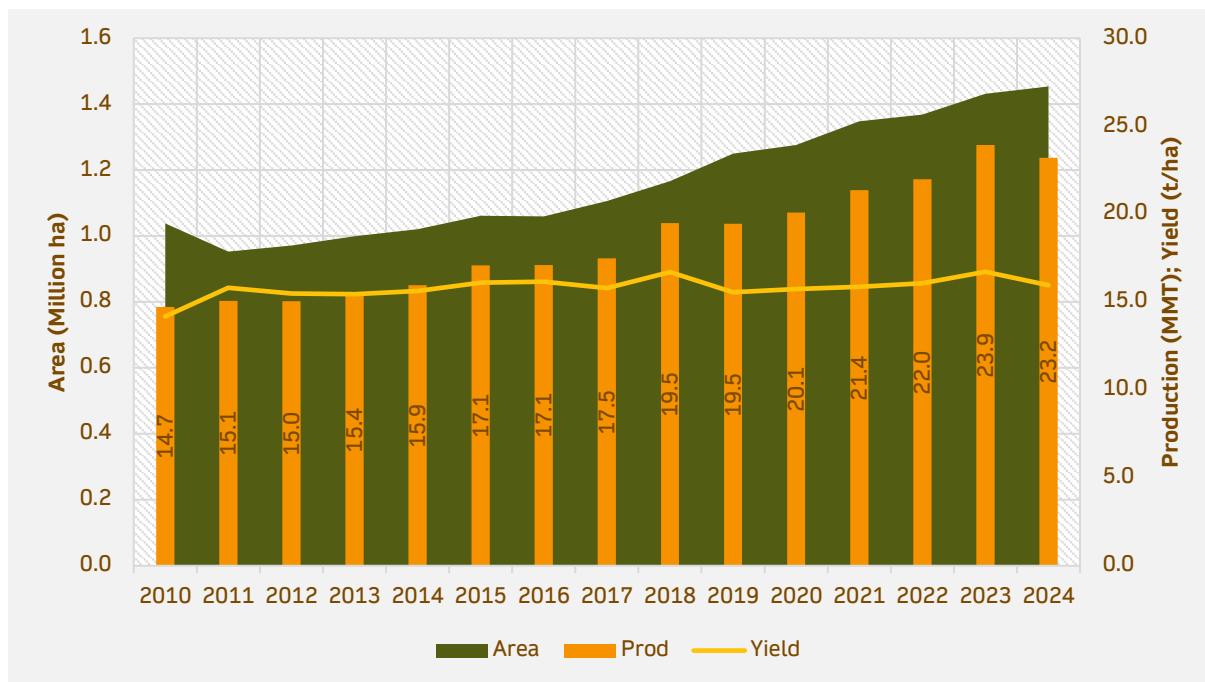
Figure 2.2: Global Scenario for Tangerines, mandarins, clementines



Source: FAOSTAT, 2025

Figure 2.3 presents area and production trends for lemons and limes, which exhibit a growth pattern broadly similar to that of mandarins. Production expanded progressively from around 14.1 MMT in 2010 to 23.2 MMT in 2024, reflecting rising global demand driven by expanding use in beverages, food processing, flavouring, and food-service sectors. Both harvested area and production registered consistent upward trends across the period, with yield levels remaining relatively stable, pointing again to area expansion as the primary driver of output growth in this segment. India, Mexico, and China together account for over 40 per cent of global production

Figure 2.3: Global Scenario for Lime and Lemon



Source: FAOSTAT, 2025

A particularly significant structural trend has been the increasing global shift toward easy-peel citrus varieties, especially mandarins and clementines, which have recorded faster growth in both production and productivity relative to traditional sweet oranges. This transition reflects evolving consumer preferences toward convenience, seedlessness, sweetness, and snack-sized fruit, particularly in urban and high-income markets. Consequently, several major citrus-producing countries have increasingly diversified away from conventional orange varieties toward premium mandarin segments with higher retail value and export demand.

Global citrus production is geographically concentrated, with a limited number of countries accounting for a substantial share of output. China, Brazil, India, the European Union, the United States and Mexico together dominate global citrus production (FAOSTAT, 2025). China has emerged as the world's largest citrus producer, with a production base heavily skewed toward mandarins and tangerines. Over the past decade, China's citrus sector has benefited from varietal innovation, expansion of commercial orchards and strong domestic consumption growth.

Brazil, while also a major orange producer, is structurally distinct in that a significant proportion of its citrus output is directed toward processing rather than the fresh market, particularly for orange juice concentrate. This processing orientation has positioned Brazil as a global benchmark for vertically integrated citrus value chains. The European Union and the United States maintain relatively stable citrus production levels, characterized by high productivity and advanced orchard management practices. In these regions, growth has been constrained by land availability, labour costs and environmental regulations, but supported by technological adoption and strong domestic market demand.

Mexico plays a dual role as both a major producer and exporter, supplying fresh citrus primarily to the United States market. Overall, APY data at the global level highlights a maturing citrus sector, where productivity improvements and varietal shifts are more critical than horizontal expansion.

Global Trade Dynamics

From a trade perspective, citrus is one of the most actively traded fruit categories globally. International citrus exports are estimated at USD 15.7 Billion in TE25, reflecting steady growth in both volume and value terms over the past decade. Trade patterns within citrus, however, vary significantly by fruit type. Mandarins, tangerines and clementines account for USD 4.51 Billion of global exports, making them the fastest-growing citrus export category (UNcomtrade, 2024). In contrast, oranges, while growing more slowly in volume terms, continue to dominate export value at around USD 5.8 billion, due to their widespread consumption, established supply chains and importance in both fresh and processing markets. In case of lemon and lime, trade remains relatively limited compared to production, with global exports accounting for only around 0.02 per cent of total production, reflecting the highly domestic-oriented nature of consumption and processing in many producing countries.

For HSN 080510 (Fresh or Dried Oranges), global exports in TE25 were valued at USD 5.51 billion, while imports reached USD 6.06 billion (**Figure 2.4**), reflecting strong international demand for fresh oranges across major consumer markets. The global orange trade is dominated by a few highly competitive exporting countries,

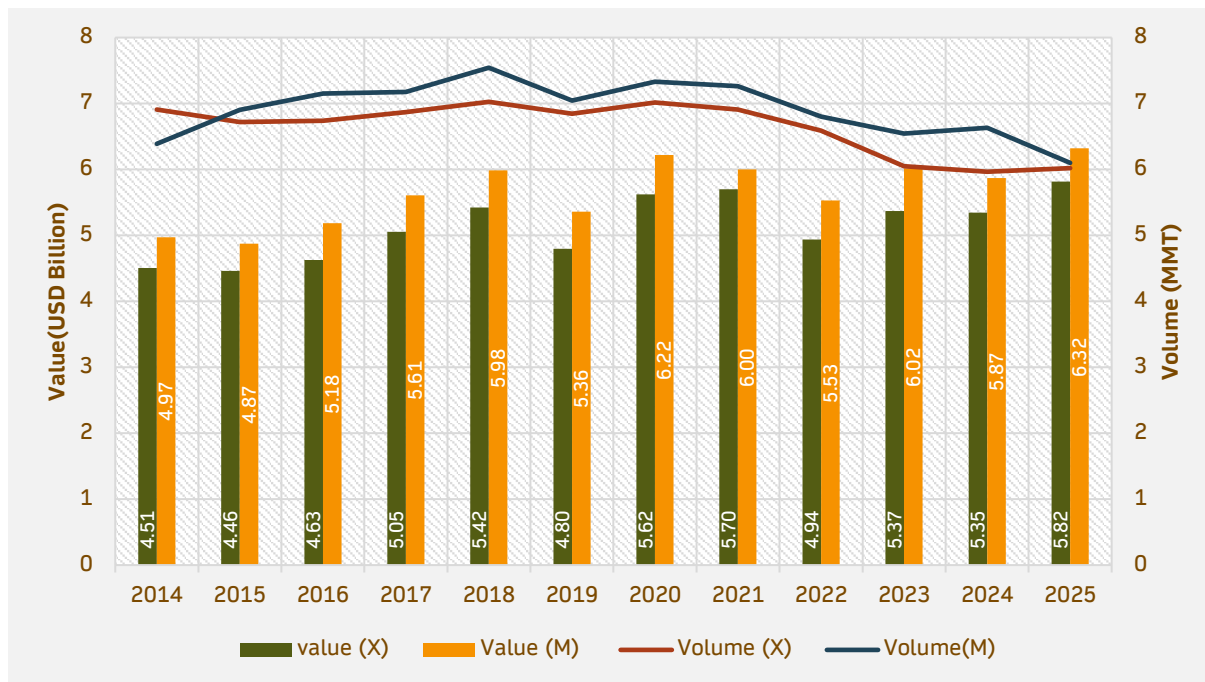
led by Spain (23.7 per cent), followed by South Africa (15.5 per cent), Egypt (15.4 per cent), and the United States (9.4 per cent). Other notable exporters include the Netherlands (5.5 per cent), Greece (4.3 per cent), Australia (4.1 per cent), and Italy (2.8 per cent) (UN COMTRADE, 2024).

Spain remains the world's largest exporter of fresh oranges, supported by its highly organized production system, strong farmer cooperatives, advanced post-harvest infrastructure, and seamless access to European markets. Spanish exporters benefit from robust quality assurance, traceability mechanisms, and strict compliance with European Union sanitary and phytosanitary standards, allowing them to command premium prices in international markets. South Africa and Egypt have strengthened their positions through large-scale commercial production, competitive pricing, and counter-seasonal supply advantages that enable them to serve Northern Hemisphere markets during off-season periods. Meanwhile, the United States, Australia, and Mediterranean producers such as Greece and Italy continue to play important roles in supplying high-quality oranges to premium export destinations.

On the demand side, major importing countries include Germany (8.7 per cent), France (8.1 per cent), the Netherlands (7.0 per cent), the United States (5.0 per cent), Russia (4.8 per cent), Canada (3.7 per cent), the United Kingdom (3.4 per cent), Saudi Arabia (3.3 per cent), China (3.2 per cent), South Korea (3.1 per cent), and the United Arab Emirates (2.8 per cent), highlighting the broad geographic spread of orange consumption across Europe, North America, Asia, and the Middle East.

For HSN 080550 (Fresh or Dried Lemons and Limes), global exports in TE25 were valued at USD 4.34 billion, while imports stood at USD 4.74 billion (**Figure 2.5**), reflecting robust international demand driven by fresh consumption, food processing, and beverage industries. The global lemon trade is concentrated among a few major exporting countries, led by Spain (21.4 per cent), Mexico (18.1 per cent), South Africa (9.4 per cent), the Netherlands (8.8 per cent), and Türkiye (8.7 per cent). Other significant exporters include the United States (4.4 per cent) and Brazil (4.4 per cent) (WorldBank, 2025).

Figure 2.4: Global Trade of Fresh or Dried Oranges



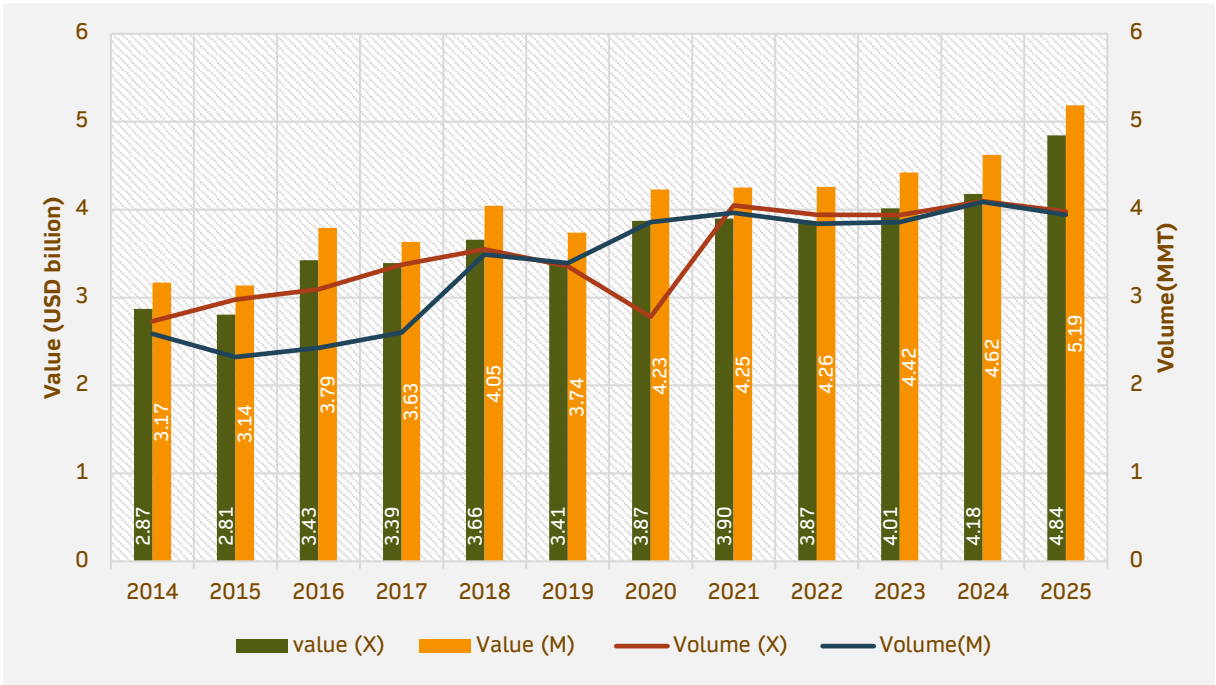
Source: ITC Trademap, 2025

Spain is the world's leading exporter of lemons, benefiting from favorable agro-climatic conditions, advanced cultivation practices, strong producer organizations, and well-developed post-harvest and logistics infrastructure. Its proximity to major European consumer markets, coupled with stringent quality and traceability standards, enables Spanish lemons to maintain a dominant position in global trade. Mexico has emerged as another key supplier, leveraging year-round production, competitive costs, and strong access to the North American market, particularly the United States. South Africa and Türkiye have expanded their export presence through growing production capacities and strategic access to European, Middle Eastern, and Asian markets. The Netherlands plays a crucial role as a trading and re-export hub, facilitating the distribution of lemons across Europe.

On the demand side, the United States is the largest importer, accounting for 23.1 per cent of global imports, followed by Germany (9.6 per cent), the Netherlands (7.0 per cent), France (5.4 per cent), the United Kingdom (4.1 per cent), Poland (4.0 per cent), and Iraq (3.3 per cent). The prominence of European countries among the leading importers underscores the region's strong consumer demand for fresh

lemons, while growing imports in North America and the Middle East continue to support the expansion of global lemon trade.

Figure 2.5: Global Trade of Lemons



Source: ITC Trademap, 2025

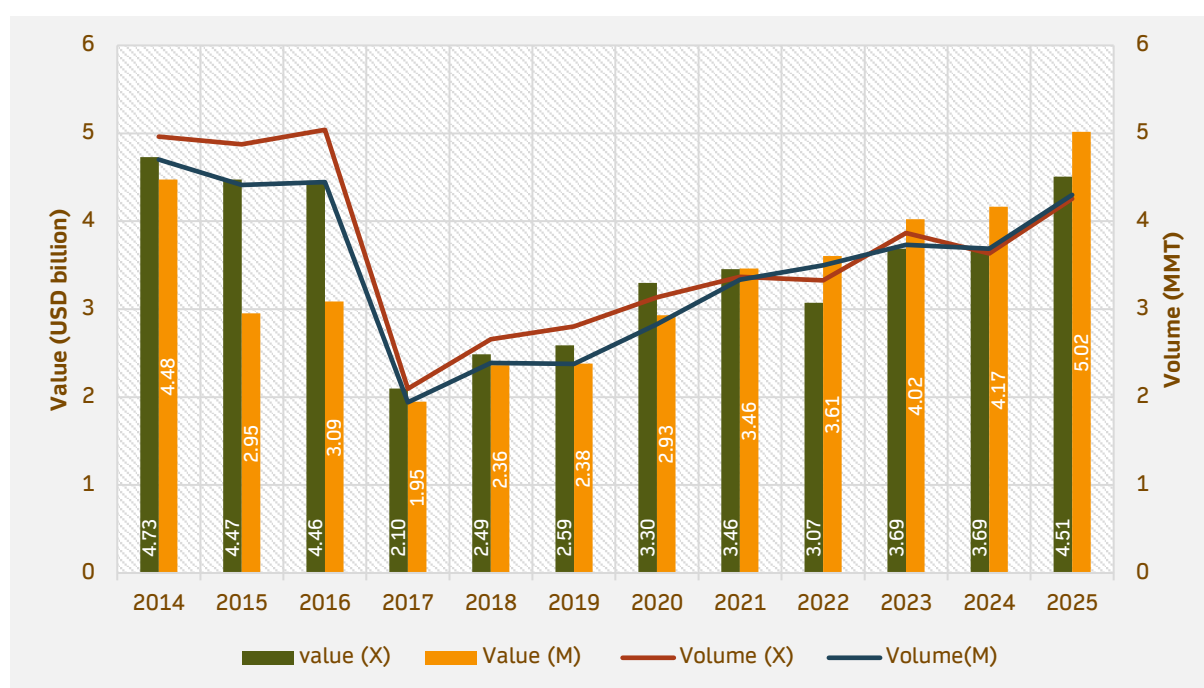
For HSN 080521 (Fresh or Dried Mandarins, Including Tangerines), global exports in TE25 were valued at USD 4.40 billion (**Figure 2.6**), while imports stood at USD 3.96 billion (UNcomtrade, 2024), highlighting the importance of mandarins as one of the fastest-growing segments within the global citrus trade. International trade in mandarins is driven by strong consumer preference for easy-to-peel, seedless, and convenient citrus varieties, particularly in Europe, North America, and Asia.

Key supplying countries in the global mandarin market include China (23.3 per cent), South Africa (16.5 per cent), Türkiye (15.7 per cent), Spain (8.7 per cent), Morocco (7.0 per cent), Australia (4.4 per cent), Chile (4.0 per cent), and the Netherlands (3.0 per cent). China dominates global mandarin production and trade owing to its vast cultivation area, diverse mandarin varieties, and expanding export-oriented supply chains. South Africa, Türkiye, Spain, and Morocco have strengthened their positions through large-scale commercial orchards, modern

packing infrastructure, and counter-seasonal supply advantages that enable them to serve key markets throughout the year.

On the demand side, major destination markets include the Russian Federation (11.6 per cent), the United States (11.4 per cent), the United Kingdom (6.2 per cent), France (6.0 per cent), Germany (5.6 per cent), Indonesia (5.0 per cent), Iraq (4.5 per cent), Canada (3.5 per cent), Poland (3.5 per cent), and Viet Nam (3.0 per cent). Demand in these markets is supported by increasing consumer preference for healthy snack options, rising fruit consumption, and the availability of premium mandarin varieties with superior taste, shelf life, and convenience. The continued expansion of modern retail channels and improvements in cold-chain logistics are further supporting growth in the global mandarin trade.

Figure 2.6: Global Trade of Mandarins



Source: ITC Trademap, 2025

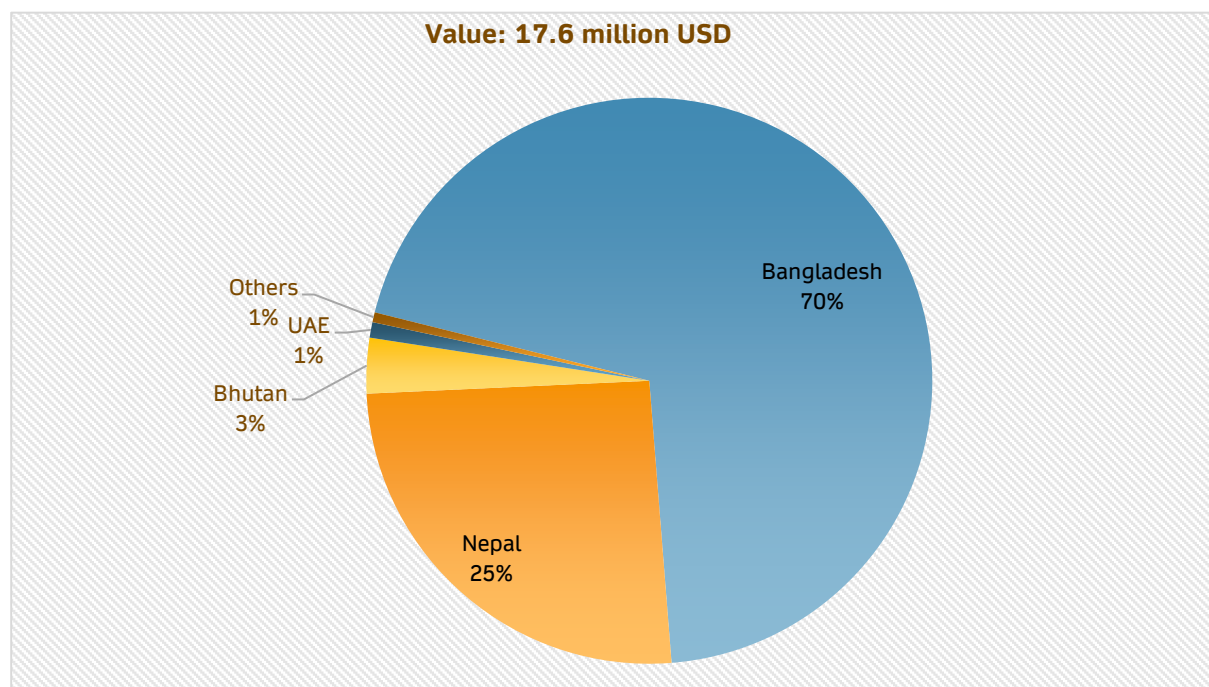
A key emerging trend in global citrus markets is the rising demand for value-added and processed citrus products. Health awareness, changing lifestyles and institutional consumption have driven growth in citrus juices, concentrates, essential oils and citrus-based ingredients. While fresh fruit continues to dominate

global citrus trade by volume, processed citrus products account for a growing share of export value, particularly in developed markets.

India's Trade Dynamics

India's exports of fresh or dried oranges (HSN 080510) were valued at USD 17.6 million in TE25 (**Figure 2.7**), with exports highly concentrated in neighbouring South Asian markets. Bangladesh emerged as the largest destination, accounting for 70 per cent of India's orange exports, followed by Nepal (25 per cent). Together, these two markets absorbed 95 per cent of India's total orange exports (UNcomtrade, 2024), indicating a strong regional orientation of India's orange trade. Other destinations included Bhutan (3 per cent), while the UAE and other markets accounted for only 1 per cent each. The heavy dependence on a few neighbouring countries highlights both the strength of India's regional market access and the need to diversify export destinations to enhance resilience and expand its presence in global orange markets.

Figure 2.7: India's Exports of Oranges in TE2025



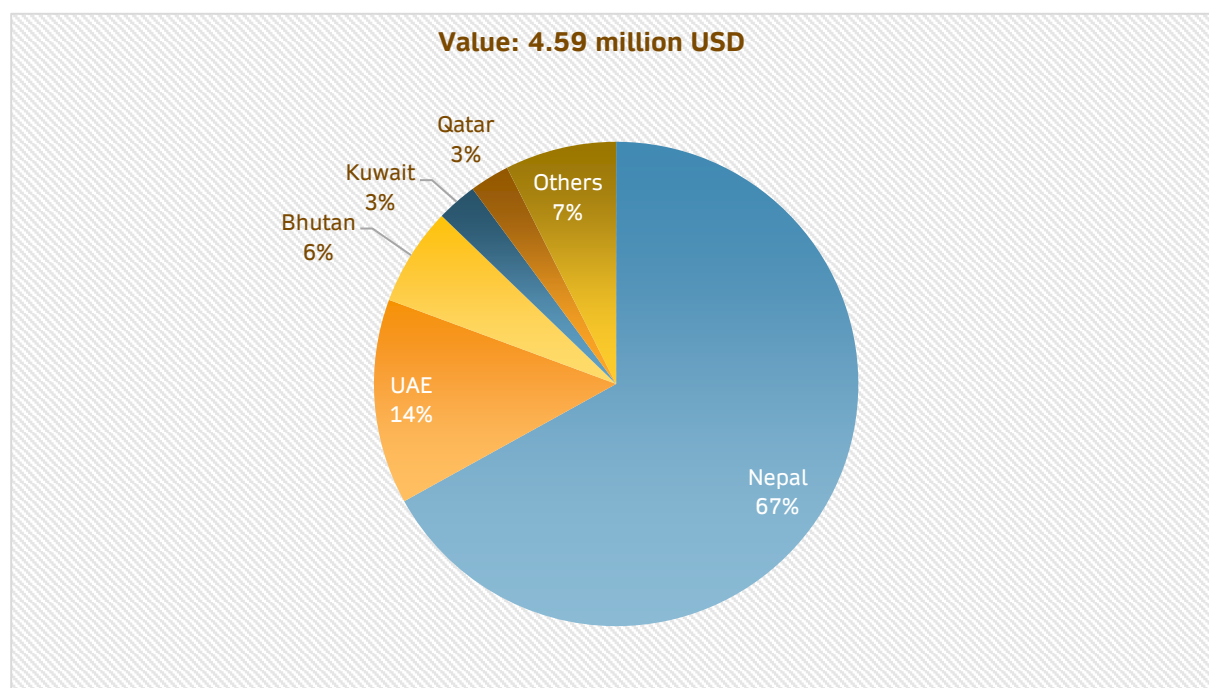
Source: ITC Trademap, 2025

India's exports of fresh and dried lemons (HSN 080550) were valued at USD 4.59 million in TE25 (**Figure 2.8**), with exports concentrated primarily in neighbouring

and Middle Eastern markets. Nepal was the dominant destination, accounting for 67 per cent of India's lemon exports, followed by the UAE (14 per cent) and Bhutan (6 per cent) (UNcomtrade, 2024). Together, these three markets absorbed nearly 87 per cent of India's total lemon exports, highlighting the importance of regional and Gulf markets for Indian lemon shipments.

Other export destinations included Qatar (3 per cent) and Kuwait (3 per cent), while the remaining 7 per cent was distributed across various smaller markets. The strong dependence on Nepal underscores India's competitive advantage in serving nearby markets through geographical proximity and lower logistics costs. However, the narrow export base also suggests significant opportunities for diversification into larger global lemon-importing markets, particularly in Europe and North America, where demand for fresh citrus fruits remains robust.

Figure 2.8: India's Exports of Fresh or Dried Lemons in TE25



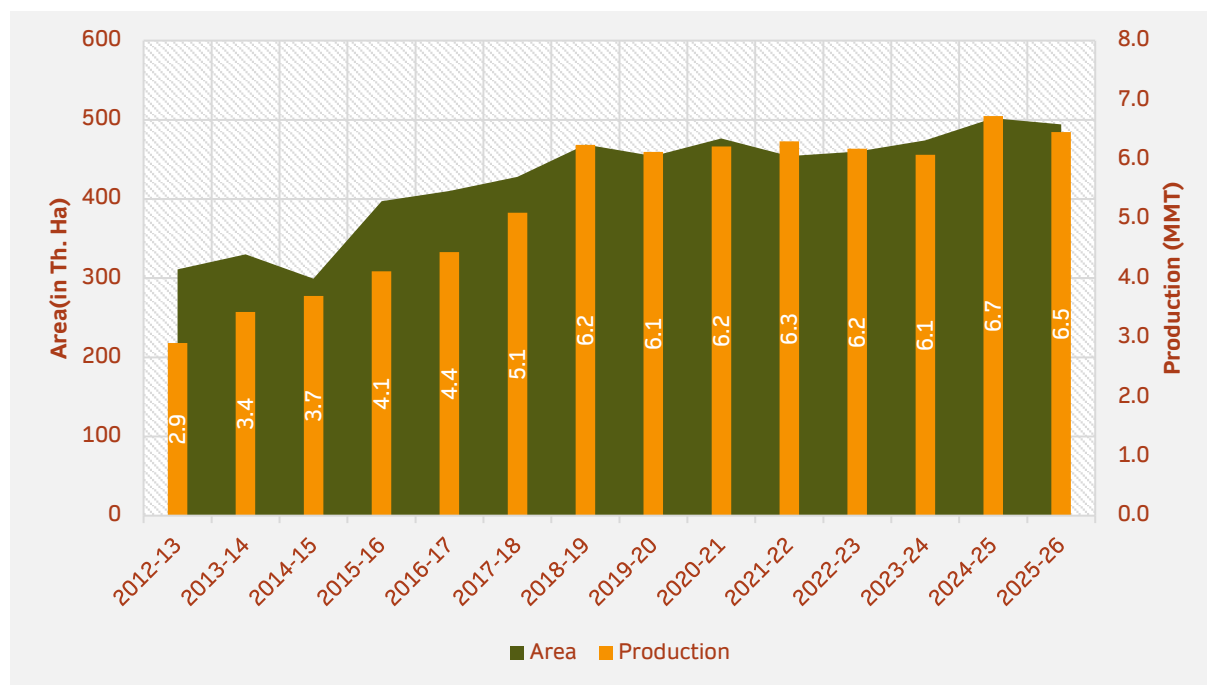
Source: ITC Trademap, 2025

2.2 Domestic Scenario

Production Profile and Regional Distribution

India is a major citrus-producing country, ranked third globally after China and Brazil, and accounting for approximately 9 percent of total world citrus production (FAOSTAT, 2025). Citrus cultivation in India plays a significant role in the horticulture sector, contributing to farmer livelihoods, regional agri-economies, and nutritional security. Despite this strong production base, India's participation in global citrus trade remains limited. Fresh citrus exports account for less than 2 percent of total domestic output, indicating a substantial gap between production potential and export realization. This disparity reflects structural challenges across post-harvest handling, processing, quality standardization, and export-oriented infrastructure rather than constraints at the production stage.

Figure 2.9: All India Area and Production of Mandarins

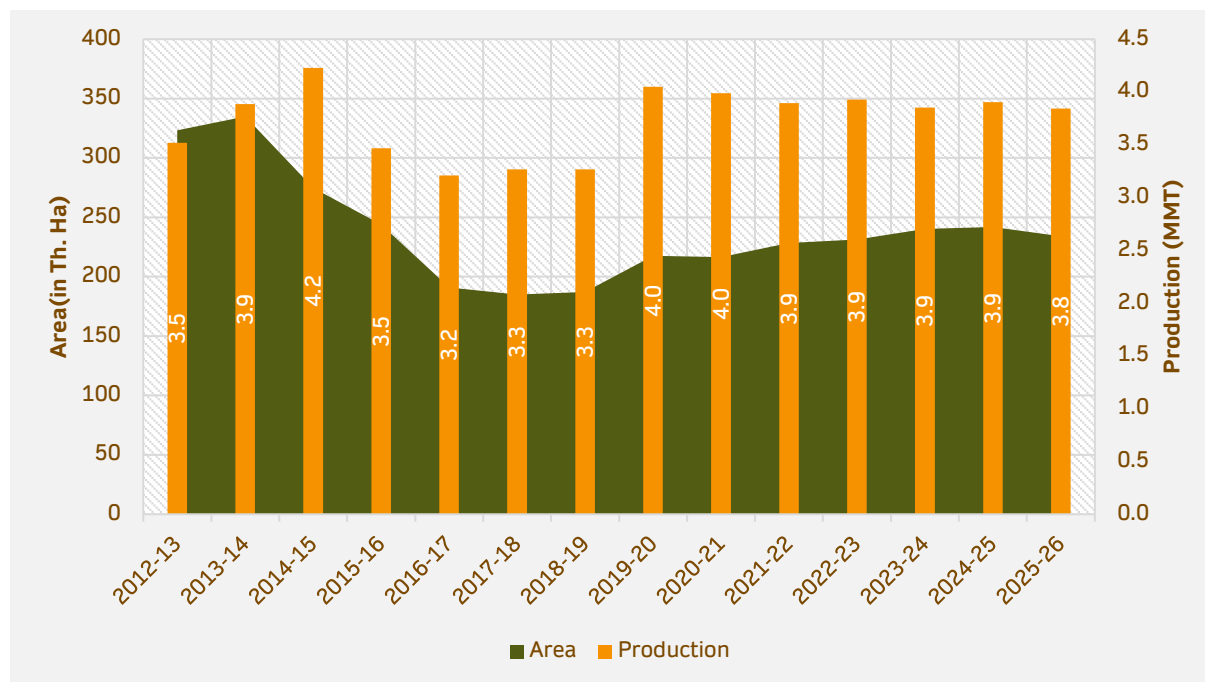


Source: MoAFW, 2026

India's citrus production is dominated by oranges, mandarins and lemon/lime, supported by a wide diversity of agro-climatic zones ranging from subtropical northern plains to tropical and semi-arid central and southern regions. Area, Production and Yield (APY) trends at the national level indicate that Mandarin area

has expanded gradually over time from 311 Th. Ha in 2012-13 to 494 Th. Ha in 2025-26 (**Figure 2.9**), while productivity growth has been uneven across regions while in case of sweet orange, area has decreased from 323 Th. Ha in 2012-13 to 234 Th. Ha in 2025-26, while production has been somewhat stable in the last 10 years (**Figure 2.10**) (MoA&FW, 2026).

Figure 2.10: Sweet Orange Domestic Scenario



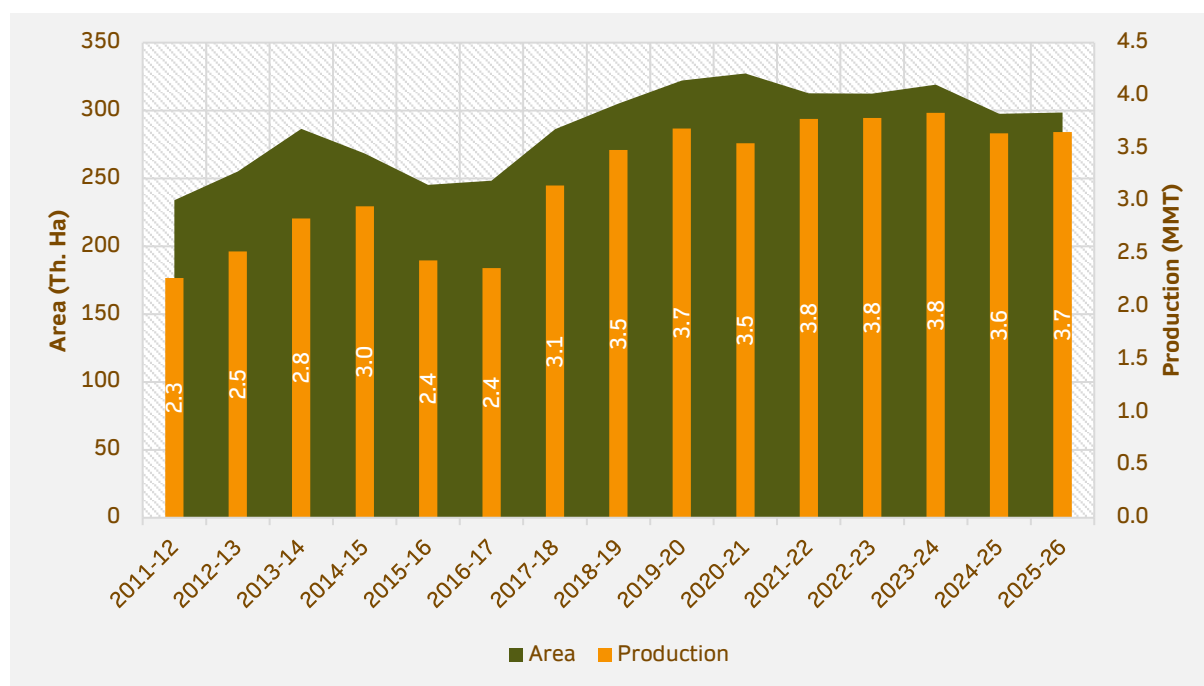
Source: MoAFW, 2026

Yield variability is influenced by factors such as planting material quality, orchard management practices, pest and disease pressure, irrigation availability, and climatic variability. While certain commercial clusters have achieved relatively high productivity, large sections of citrus orchards continue to operate below global yield benchmarks.

In case of lemons and lime, India is the world's largest producer, accounting for approximately 17 per cent of global production, with output estimated at around 3.8 MMT in 2025-26 (MoA&FW, 2026). This places the lemon and lime category as the third-largest component of India's citrus basket, after mandarins (6.5 MMT) and sweet oranges (3.8 MMT), and a crop of significant importance for farmer

livelihoods, particularly in the Deccan Plateau, semi-arid central India, and parts of the North-East.

Figure 2.11: All India Area and Production of Lime and Lemon



Source: MoAFW, 2026

Varietal Diversity and Seasonality

India cultivates a wide range of citrus varieties with strong regional specialization (**Table 2.1**). Prominent varieties include Nagpur Mandarin, Kinnow Mandarin, Mosambi (sweet lime), Khasi Mandarin, among others, several of which carry Geographical Indication (GI) status.

Among Indian citrus varieties, Nagpur Mandarin occupies a unique position due to its distinct flavour profile, easy-peel nature and balanced sweet and acidic taste. The variety has been accorded Geographical Indication (GI) status, reinforcing its market identity and potential for premium positioning in both domestic and export markets. Nagpur Mandarin production is concentrated primarily in the Vidarbha region of Maharashtra, with Nagpur, Amravati and Wardha districts forming the core production belt along with some districts of Madhya Pradesh. This cluster benefits

from suitable soil conditions, established cultivation practices and historical market recognition, making it one of the most important mandarin hubs in the country.

Table 2.1: Indian varieties of major citrus fruits

Variety	Citrus Type	Major Producing State(s)	Whether GI Tagged	Peel / Pulp Colour	Harvest Months
Nagpur Orange	Mandarin	Maharashtra, Madhya Pradesh	Yes	Peel: Orange; Pulp: Deep orange	December–February (Ambiya), February–March (Mrig)
Jalna Sweet Orange	Sweet Orange	Maharashtra	Yes	Peel: Orange; Pulp: Orange	December–March
Sathgudi	Sweet Orange	Telangana, Andhra Pradesh	No	Peel: Light orange; Pulp: Orange-yellow	December–March
Coorg Orange	Mandarin	Karnataka (Kodagu)	Yes	Peel: Greenish-orange; Pulp: Orange	December–February
Devanahalli Pomelo	Pomelo	Karnataka (Devanahalli taluk)	Yes	Peel: Pale green to yellow; Pulp: Pinkish-white	September–December
Kagzi Lime/Acid Lime	Lime/Lemon	Andhra Pradesh, Telangana, Karnataka, Maharashtra	Yes	Peel: Green Pulp: Greenish-Yellow (when ripe)	Year round

Galgal (Hill Lemon)	Lime/Lemon	Himachal Pradesh, Uttarakhand	No	Peel: Bright yellow; Pulp: Light yellow	November to January
Kinnow	Mandarin	Punjab and Himachal Pradesh, Rajasthan	No	Peel: Orange to yellow; Pulp: Orange	Mid-January to mid-February.
Malta Orange	Sweet Orange	Uttarakhand, Himachal Pradesh	No	Peel: Orange; Pulp: Orange	December–February
Darjeeling Mandarin	Mandarin	West Bengal (hill districts) and Sikkim	No	Peel: Orange; Pulp: Orange	November–January
Khasi Mandarin	Mandarin	Meghalaya (Khasi Hills)	Yes	Peel: Deep orange; Pulp: Bright orange	November–January
Memong Narang (<i>Citrus indica</i>)	Wild / Indigenous Citrus	Meghalaya (Garo Hills)	Yes	Peel: Orange; Pulp: Orange	October–December

Source: Compiled by authors from various sources

Jalna has emerged as an important sweet lime producing cluster in Marathwada, with growing interest in export markets, particularly the Middle East. However, farmers face constraints related to post-harvest handling, cold storage availability and grading infrastructure. Field evidence highlights the need for collective cold storage and scientific grading facilities to reduce post-harvest losses and ensure compliance with APEDA's quality and traceability requirements. Strengthening cultivation-stage investments through adequate financing is therefore a prerequisite for improving export readiness of Jalna's citrus sector.

Beyond Nagpur Mandarin, India cultivates several other prominent citrus varieties with strong regional specialization. Kinnow mandarin, the most commercially important citrus variety in northern India, is extensively grown in Punjab, Haryana and parts of Rajasthan, where it forms the backbone of regional citrus economies. Kinnow production systems are characterized by relatively high yields and better integration with domestic markets, though export penetration remains limited due to quality consistency and post-harvest constraints. Khasi Mandarin, grown primarily in Assam and other north-eastern states, represents an indigenous citrus variety with strong domestic demand but limited commercialization due to infrastructure and logistics challenges.

Mosambi (sweet lime) is cultivated across Maharashtra, Andhra Pradesh, Telangana and parts of central India, catering largely to domestic fresh consumption and juice markets. Citrus production in India is therefore geographically dispersed, with each region exhibiting distinct varietal strengths aligned to local agro-climatic conditions and consumption patterns. This regional diversity provides resilience to the national citrus sector but also complicates standardization for export markets. Unlike major global exporters that focus on a limited set of export-oriented varieties, India's citrus landscape is fragmented, with significant heterogeneity in fruit size, appearance, maturity cycles and quality attributes.

The Kagzi Lime (acid lime) is the most commercially significant lemon and lime variety, owing to its year-round production cycle, high juice recovery (approximately 52–55 per cent), and robust demand in domestic fresh and processing markets.

Seasonality further shapes the domestic citrus production profile. In the Nagpur mandarin belt, production is structured around *Ambiya Bahar* and *Mrig Bahar* cycles, with harvesting largely concentrated between October and November. While this seasonality allows for concentrated market arrivals, it also leads to periodic oversupply, price volatility and post-harvest losses in the absence of adequate storage and processing capacity. Under ambient conditions, the shelf life of fresh citrus remains limited to 8–15 days, constraining long-distance domestic movement and export feasibility. Access to cold storage can extend shelf life to one to one-and-a-half months, but such facilities remain scarce in major producing clusters.

Indian Citrus Varieties vs. International Citrus Varieties

A comparison of India's commercially cultivated citrus varieties with the varieties that dominate international trade highlights important differences in quality, shelf life, handling characteristics, and export suitability. In the mandarin segment, India's Nagpur Mandarin and Kinnow are benchmarked against Clementines and Satsumas, which dominate premium fresh mandarin trade in Europe and East Asia. While Nagpur Mandarin is well known for its flavour profile and Geographical Indication (GI) identity, it remains predominantly seeded and exhibits relatively lower shelf life and size uniformity compared to internationally traded seedless mandarins. Similarly, Kinnow, though commercially important in northern India, faces limitations related to seed content, peel characteristics, and occasional bitterness, which affect its suitability for premium retail markets.

In the sweet orange segment, India's Mosambi and Sathgudi are commonly compared with globally traded Navel and Valencia oranges. International benchmark varieties are generally characterised by better peel strength, longer cold-storage life, improved transport tolerance, and greater visual uniformity — attributes that are particularly important for long-distance exports and organised retail supply chains. By contrast, Indian sweet orange varieties have traditionally been cultivated primarily for domestic fresh consumption and juice markets rather than export-oriented value chains.

The comparison presented below highlights that India's citrus production system is largely centred around varieties suited to domestic market preferences, whereas international trade increasingly favours seedless varieties with longer shelf life, better transportability, and stronger visual appeal. Bridging this varietal competitiveness gap through targeted breeding programmes, introduction of low-seed and export-oriented varieties, and orchard rejuvenation will be important for strengthening India's long-term export competitiveness in citrus.

Table 2.2: India's Citrus Varieties vs. Internationally Traded Varieties

Segment	India's Variety	International Benchmark Variety	Seedlessness	Shelf Life (Cold)	Key Gap for Export
Mandarin	Nagpur Mandarin	Clementine (Spain/Morocco)	Seeded	2–3 weeks	Seeds, size variability, shelf life
Mandarin	Kinnow	Satsuma (Japan/Spain)	Seeded	3–4 weeks	Seeds, peel adherence, bitterness risk
Sweet Orange	Mosambi	Navel Orange (Brazil/USA)	Seedless	8–12 weeks	Thin peel, poor transit tolerance, short shelf life
Sweet Orange	Sathgudi	Valencia Orange (South Africa)	Few seeds	6–10 weeks	Visual colour, peel thickness, yield per tree
Lime/Lemon	Kagzi Lime	Persian Lime (Mexico)	Seeded	1–2 weeks	Seededness, thin peel, very short shelf life

Source: NHB, ICAR-CCRI, Citrus Research Institute Spain (IVIA), USDA; compiled by authors

2.3 Domestic Value Chain of the Commodity

India's citrus value chain spans multiple stages, beginning with nursery development and orchard establishment and extending through cultivation, harvesting, aggregation, post-harvest handling, processing, logistics and final marketing. While the country possesses a strong and diverse production base, the citrus value chain remains fragmented and weakly integrated, particularly in the post-harvest and export segments. The structure of the value chain differs significantly between domestic and export markets, with limited overlap in quality standards, infrastructure and institutional linkages.

The citrus value chain begins at the nursery stage, which plays a critical role in determining orchard productivity, fruit quality and disease resistance. In India, citrus nurseries supply both traditional and improved planting material, including

region-specific varieties such as Nagpur Mandarin, Kinnow and Mosambi. However, the nursery ecosystem remains uneven in terms of quality assurance, varietal purity and certification. Inconsistent access to disease-free, high-quality planting material has direct implications for orchard longevity, yield stability and export suitability (Ken Research, 2026). Orchard establishment involves high initial investment and a long gestation period, typically four to six years, before commercial yields are realized (GoM, 2024). Citrus cultivation in major producing regions follows structured seasonal cycles. In the Nagpur mandarin belt, Ambiya Bahar (monsoon–autumn) and Mrig Bahar (post-winter) are the two dominant harvesting cycles, allowing for staggered fruit availability but also leading to concentrated arrivals during peak harvest months.

At the farm level, citrus production is largely undertaken by small and medium growers using a mix of traditional and semi-modern practices. Input usage, orchard management and productivity vary widely across regions and farm sizes. While progressive growers have adopted drip irrigation, high-density planting and improved nutrient management, a large proportion of orchards continue to operate under sub-optimal agronomic conditions (MOFPI, 2021). Yield realization improves significantly after the sixth year of plantation; however, quality consistency remains a challenge due to pest pressure, weather variability and uneven orchard management. Harvesting practices are predominantly manual and labour-intensive, with limited on-farm grading or quality segregation. Fruits are typically harvested and sold in bulk, without differentiation by size, colour or residue profile. This lack of primary grading at the farm gate constrains value realization and limits traceability, which is increasingly required in export markets.

The midstream segment represents the most critical bottleneck in India's citrus value chain. After harvest, citrus fruits are aggregated through local traders, commission agents and market intermediaries, who dominate domestic marketing channels. Aggregation is largely informal, with limited transparency in price discovery and minimal incentives for quality improvement. Post-harvest handling infrastructure such as grading, waxing, sorting and packing facilities is available only in select clusters and is often operated by private traders or a small number of Farmer Producer Organisations (FPOs) (GoM, 2024). In the absence of

standardized grading and packaging, quality deterioration during handling and transportation is common. Under ambient conditions, the shelf life of fresh citrus is limited to 8–15 days, which significantly restricts market reach and export feasibility. Cold-chain infrastructure is a key determinant of value chain efficiency. Access to cold storage can extend shelf life to one to one-and-a-half months, enabling better price realization and long-distance marketing (Agriculture Institute, 2024). However, cold storage capacity for citrus remains severely inadequate in major producing regions. In addition, the absence of integrated packhouse, cold storage, transport linkages limit the effectiveness of existing infrastructure.

Citrus Processing Landscape and the Under-Utilisation Gap

A central structural weakness of India's citrus sector is the large mismatch between production scale and processing capacity. Despite being the world's third-largest citrus producer, only about 5–6 percent of domestic output is processed, far below the 30–75 percent observed in major citrus-processing economies such as the United States, Spain, and Brazil (Tambuwala & Agrawaal, 2025). As a result, a significant volume of potentially processable fruit is either channelled into low-margin fresh markets or lost due to inadequate post-harvest handling.

Processing therefore represents a major missed opportunity within India's citrus value chain. Currently, only 3 to 4 percent of total citrus production is processed into products such as juice, squash, concentrates and other derivatives (ICAR-CCRI, 2021). This stands in sharp contrast to global citrus-producing countries, particularly Brazil, where processing absorbs a substantial share of production and provides a stabilizing outlet for surplus and lower-grade fruit. Processing units are geographically concentrated and operate at relatively small scales, restricting their ability to absorb seasonal surpluses. The underdevelopment of processing has two major implications: high post-harvest losses, estimated at 20–25 percent, and limited value capture within the domestic value chain (ICAR-CCRI, 2021).

Within the citrus processing landscape, different varieties are suited for different value-added products. Mosambi (sweet lime) and Sathgudi are among the most suitable varieties for juice processing because of their high juice recovery and

balanced sweetness-acidity profile, making them appropriate for Not-From-Concentrate (NFC) juices and blended beverages. Kinnow is also processed in Punjab for juice concentrate and blended juice products. In the lemon and lime segment, Kagzi Lime is preferred for lime juice concentrate and citrus beverages due to its high juice content and strong natural acidity. Certain citrus varieties are also suitable for high-value by-products. The peel of Kagzi Lime and Galgal (Hill Lemon) is considered suitable for essential oil extraction, while Mosambi and sweet orange varieties possess peel characteristics suitable for pectin extraction used in the food and pharmaceutical industries. In the lemon and lime segment, processing is limited but growing. Juice squash, pickles, and lemon concentrates constitute the primary processed outputs, largely targeting the domestic food and beverages sector. Essential oil extraction from lemon peel, a high-value product with strong international demand is practised on a very small scale in India, despite the country's large production base

Globally, demand is increasing for value-added citrus products such as NFC juices, juice concentrates, cold-pressed essential oils, citrus pectin, dried citrus peel, and citrus fibre used in the food, beverage, cosmetic, and nutraceutical industries. However, despite India's large citrus production base and varietal diversity, commercial-scale processing of these products remains limited. Expanding processing capacity, particularly in products such as juice concentrates and essential oils, can help diversify exports, reduce wastage, stabilise prices during glut periods, and improve value realisation for farmers.

The domestic citrus value chain continues to be characterised by high volumes, low differentiation, and price-driven transactions, whereas export-oriented and processing value chains require quality consistency, traceability, certification, and infrastructure-intensive handling systems.

2.4 Export Value Chain of the Commodity

Domestic citrus marketing is predominantly trader-driven, with produce flowing from farms to wholesale markets and retailers with minimal branding or differentiation. Export-oriented value chains, in contrast, require additional layers of quality assurance, certification and logistics. Export markets demand uniform

size, appearance, residue compliance, phytosanitary certification and traceability, which only a limited share of Indian citrus supply currently meets. Export logistics constitute a significant constraint. While sea freight is suitable for certain markets, fresh citrus exports often require air cargo to maintain quality and shelf life. In key producing regions such as Nagpur, the lack of dedicated cargo handling facilities at airports significantly constrains export potential (MOFPI, 2021). As a result, Indian citrus exports remain concentrated in proximate and regional markets, such as Bangladesh and the Middle East, where shorter transit times and relatively lower compliance thresholds offset infrastructural gaps.

The limited overlap between the domestic and export chains results in a narrow export funnel, with only a small proportion of total production meeting export standards. Quality differentiation at the farm gate is minimal, and grading, waxing, and certification are undertaken by only a limited number of FPOs and private packhouses. Farmer participation in export markets remains limited, and the benefits of export premiums are largely captured by intermediaries with access to post-harvest infrastructure rather than by producers themselves.

3

ASSESSING COMPETITIVENESS

3.1 Global Price Scenario

The global citrus market exhibits dynamic price behaviour shaped by production volumes, varietal segments, seasonal supply patterns and trade flows. Understanding international export price trends is critical for assessing competitiveness, gauging market access opportunities, and identifying the relative price positioning of major exporting countries. In recent years, export prices for citrus fruits including oranges, mandarins, tangerines, clementines and other soft citrus have shown modest but consistent growth, reflecting structural shifts in demand for high-quality fruit and value-added products, as well as supply chain constraints in major producing regions.

Export Price Differentials by Country

Citrus export prices also vary markedly across major source countries, driven by differences in fruit quality, logistics, market access agreements, production costs, and strategic positioning within export value chains. According to global trade data (Table 3.1):

- ◆ **The USA:** while not a volume leader in fresh citrus exports, often records higher average export prices, with figures exceeding USD 1,500 per ton in some price benchmarks. This premium reflects strong quality standards, branding, and market segmentation in high-value export streams (Indexbox, 2025).
- ◆ **Spain:** The world's largest citrus exporter by volume, maintains competitive yet premium pricing relative to many peers, supported by integrated Mediterranean supply chains and deep market penetration across Europe and North Africa. Export values from Spain consistently reflect strong demand and high compliance with EU food safety and residue standards.
- ◆ **Egypt, South Africa and Turkey:** Major exporters of soft citrus, display mid-tier export pricing, often driven by competitive production costs, counter-seasonal supply advantages and growing trade diversification. Egypt, in particular, has recorded notable export price increases, underscoring improving quality and global market acceptance.

- ♦ **Turkey:** Frequently registers lower export price points among major exporters, though its strong comparative advantage in certain citrus lines, such as lemons, supports volume-oriented market penetration.

Table 3.1: Global Export Prices of Citrus

Exporting Country	Average Export Price (USD/MT)	Relative Position	Key Markets
United States	1,400 – 1,600	Very High (Premium)	Japan, South Korea, Canada
Spain	1,150 – 1,300	High	EU, UK, Middle East
South Africa	1,050 – 1,150	Medium–High	EU, China, Middle East
Mexico	1,000 – 1,100	Medium	USA
Egypt	950 – 1,050	Medium	EU, Russia, Middle East
Turkey	900 – 1,000	Medium–Low	EU, Russia
India	700 – 900	Low–Medium	Bangladesh, Middle East, SAARC

Source: ITC Trade Map

Table 3.2: Export Price Comparison by Citrus Product Category

Citrus Category	Global Avg Export Price (USD/MT)	India Export Price Range (USD/MT)	India's Position
Oranges (Fresh)	1,000 – 1,050	700 – 850	Below global average
Mandarins / Clementines	1,080 – 1,120	800 – 900	Competitive in regional markets
Processed Citrus / Juice	Price-linked to commodity	Limited participation	Low scale
GI / Branded Citrus	Premium segment	Minimal penetration	Untapped

Source: ITC Trade Map, FAO, APEDA, ICAR-CCRI

India enjoys a strong cost advantage at the production stage, but this advantage diminishes along the value chain due to post-harvest losses, logistics costs and

limited quality differentiation. While India's citrus export prices remain below global benchmarks, particularly for premium fresh markets, there is clear scope to bridge the price gap through investments in packhouses, cold-chain, GI branding and compliance-driven market access.

Global citrus export prices exhibit a moderate but sustained upward trend, with average prices crossing USD 1,000 per metric ton in recent years. Price differentiation across countries reflects quality positioning, seasonality, logistics efficiency and market access, rather than production volume alone. Mandarins, tangerines and clementines consistently command a price premium over bulk oranges, driven by convenience-led consumption trends in Europe and Asia. Exporting countries with integrated packhouse infrastructure and counter-seasonal supply advantages, such as Spain and South Africa, achieve higher realized prices compared to volume-oriented exporters. These benchmarks indicate that export competitiveness is increasingly shaped by post-harvest capability, compliance and timing, rather than farm-gate cost alone.

Price Influencers & Market Dynamics

Global citrus export prices are influenced by several interacting factors beyond simple supply and demand:

- ◆ **Seasonality and counter-seasonal flows:** Citrus markets are highly seasonal. For example, Southern Hemisphere exporters (South Africa, Egypt) can supply fresh citrus during Northern Hemisphere off-seasons, creating price premiums in major import markets during those windows. Europe's import price spikes in certain quarters highlight how seasonal supply constraints can lift price benchmarks, particularly for high-quality fruit (Eurofruit, 2025).
- ◆ **Logistics costs and infrastructure:** Transportation, cold-chain reliability and handling costs add to CIF value and shape price competitiveness. Countries closer to major markets or with stronger logistics networks often have narrower freight cost implications, sustaining better net export prices after landing charges.
- ◆ **Trade policy and tariffs:** Emerging global tariff measures have significant price implications. For instance, new tariffs on South African citrus entering

the U.S. market have raised export costs by several dollars per carton, potentially reducing competitiveness for a key exporter (Reuters, 2025).

- ◆ Value addition and quality segmentation: Processed citrus products and branded fruit consignments attract different pricing than bulk fresh shipments. Exporters capable of aligning with segment-specific requirements (e.g., residue limits, size grade, organic labels) often realize higher price acceptance in developed markets.

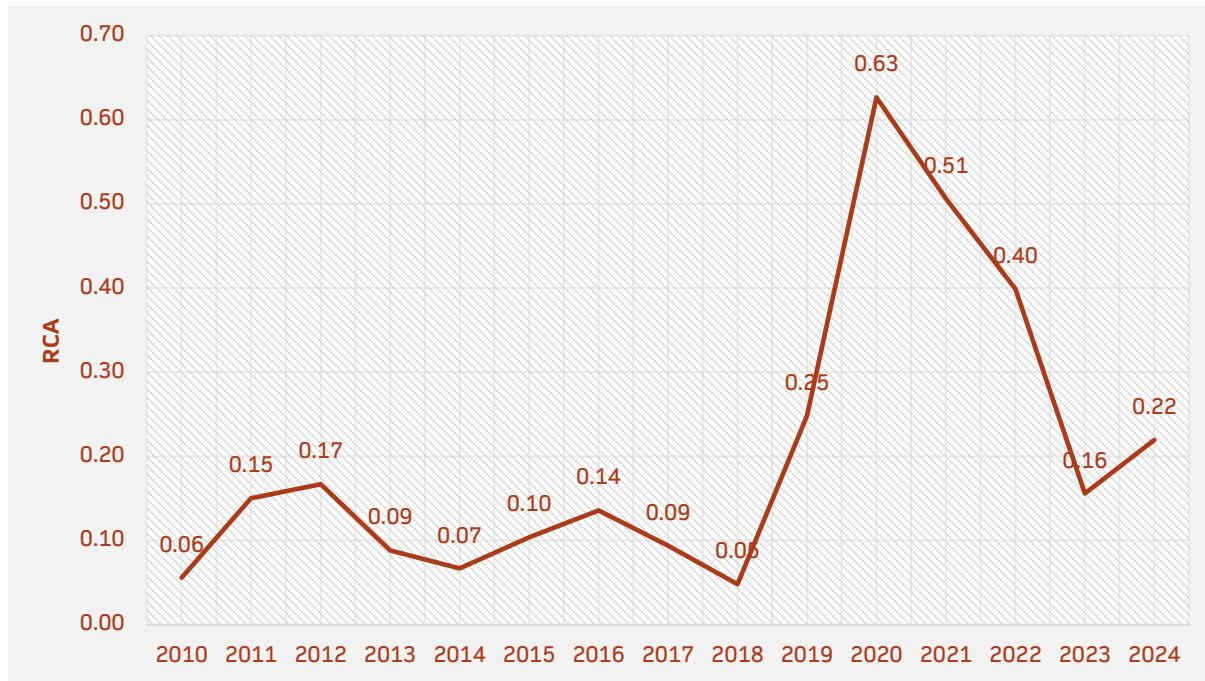
Implications for Export Competitiveness

For potential and existing citrus exporters, including India, understanding these price benchmarks is essential. Current global export price levels, clustering around USD 1,000 per ton, suggest that exporters targeting premium fresh markets must align with quality, logistics and compliance thresholds to secure such pricing (Indexbox, 2025). Meanwhile, exporters focusing on value-added or processed citrus products may confront different pricing curves, influenced by processing margins, commodity juice pricing, and packaging standards.

3.2 Assessing Comparative Advantage through RCA

Revealed Comparative Advantage (RCA) is a standard trade competitiveness indicator used to assess whether a country has a relative export advantage in a particular commodity compared to global trade patterns. An RCA value greater than one indicates that a country is relatively specialized and competitive in exporting that product, whereas values below one suggests that exports remain underrepresented in the national export basket. In the context of India's citrus sector, RCA analysis is particularly relevant for oranges, as the country is among the world's largest producers but remains a marginal exporter, indicating a potential disconnect between production strength and export performance.

Figure 3.1: RCA for Oranges (080510)



Source: Author's Compilation from ITC trademap, UN COMTRADE

India's RCA for oranges has historically remained below unity (Fig.), indicating that oranges have not yet emerged as a structurally competitive export commodity. Between 2010 and 2018, RCA values remained low and volatile, largely ranging between 0.05 and 0.17. This period reflects limited export orientation, with citrus trade largely confined to neighbouring markets and constrained by inadequate post-harvest infrastructure, high domestic absorption, and minimal export-grade sorting. During this phase, India's citrus exports were opportunistic rather than strategically positioned in global markets.

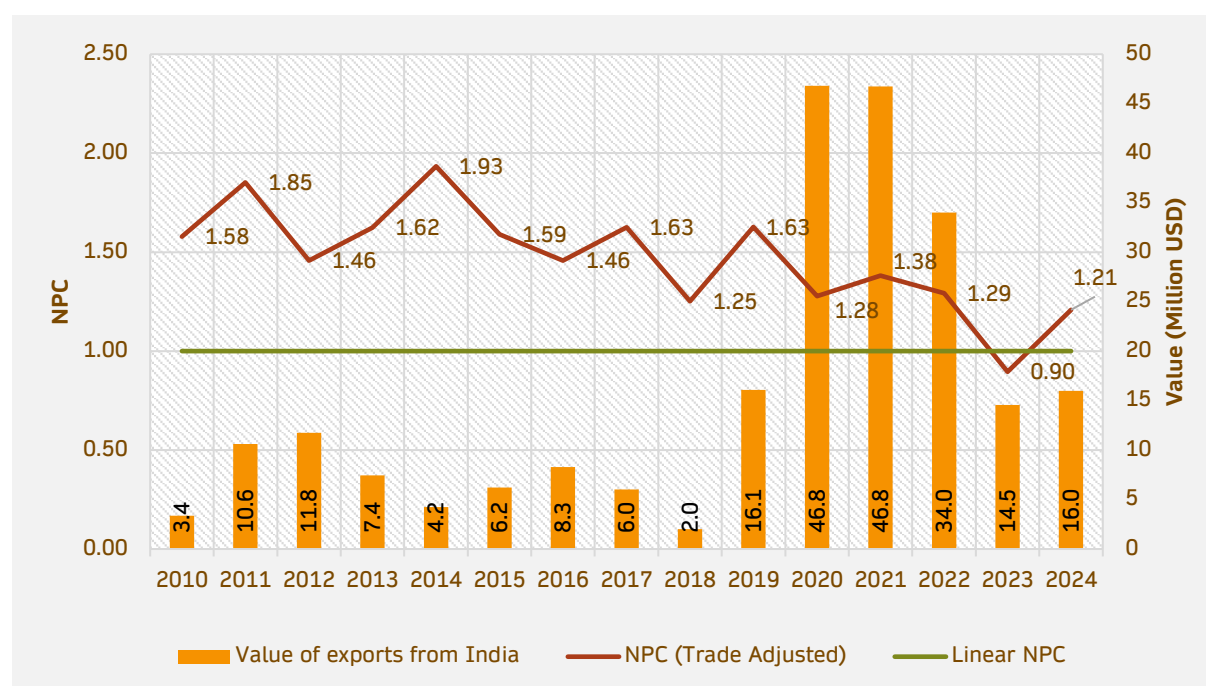
The RCA trajectory suggests that India possesses an emerging but under-realised comparative advantage in oranges. The persistence of RCA values below one does not imply inefficiency at the production level; rather, it reflects systemic constraints along the value chain that limit export scaling. High domestic consumption, limited processing capacity, insufficient cold-chain infrastructure, and dependence on a narrow set of destination markets have prevented India from achieving sustained export dominance. Nonetheless, the post-2019 improvement demonstrates that

when logistics, aggregation and market access improve, Indian oranges are able to compete effectively in international markets.

3.3 Assessing Comparative Advantage through NPC

The Nominal Protection Coefficient (NPC) is a key indicator used to assess the price competitiveness of a commodity in international trade by comparing domestic prices with international reference prices. An NPC value less than one indicates export competitiveness, implying that domestic prices are lower than international prices, whereas an NPC greater than one suggests that domestic prices are higher and exports may require policy or market support. In the context of India's orange exports, NPC analysis provides a complementary perspective to RCA by capturing price competitiveness relative to a key competitor i.e., Egypt in major importing markets.

Figure 3.2: NPC for Oranges



Source: Author's Compilation from ITC trademap, UN COMTRADE, Tridge

India's NPC for oranges has predominantly remained above unity during the period 2010–2024 (**Figure 3.2**), indicating that domestic prices for oranges have generally been higher than international reference prices when adjusted for trade costs. NPC

values fluctuated between 1.46 and 1.93 during 2010–2017, suggesting limited price competitiveness in export markets. This aligns with earlier findings from the RCA analysis, where India's orange exports were marginal and primarily limited to nearby markets, reflecting higher domestic absorption and limited export surplus during this period. A notable moderation in NPC is observed during 2018–2019, with values declining to 1.25 to 1.63, indicating gradual improvements in price alignment with international markets. This phase coincides with improved aggregation, early adoption of export-oriented grading practices, and increased participation of FPCs in citrus marketing, particularly in Maharashtra.

The period between 2019 and 2022 represents a critical phase in India's orange export trajectory. During this time, export values rose sharply, peaking at USD 46.8 million in both 2020 and 2021, while NPC values moderated to a range of 1.28–1.38. Although NPC remained above unity, the narrowing gap indicates that Indian oranges became more price-competitive relative to Egypt in the importing markets during this period. This phase also corresponds with the peak in RCA values, highlighting a convergence of improving price competitiveness and rising export participation. The improvement can be attributed to temporary supply disruptions in competing origins, favourable regional demand conditions, and increased export diversion from domestic markets due to price volatility. However, India's inability to push NPC below one during this period underscores the continued impact of logistics costs, post-harvest losses and limited shelf-life extension, which eroded price advantages at the border.

The NPC analysis underscores the need for targeted interventions to reduce export price wedges and enhance sustained competitiveness. Investments in cold-chain, export packhouses, and logistics optimisation are critical to lowering trade-adjusted domestic prices. Aligning production planning with export demand cycles and expanding processing capacity for lower-grade fruit can further stabilise domestic prices and improve export parity. Strengthening GI-based branding and direct buyer linkages can also help Indian oranges command better prices, reducing reliance on cost-based competition.

4

EXPORT POTENTIAL

India is the third-largest producer of citrus globally, accounting for approximately 9 percent of world citrus production, with annual output exceeding 10 MMT, yet its participation in global citrus trade remains limited, with exports accounting for less than 2 percent of total production (FAOSTAT, 2025). In contrast, leading exporters such as Spain, South Africa, Egypt and Turkey collectively dominate over 50 percent of global citrus exports, supplying major importing markets including the European Union, Russia, Middle East, USA and East Asia, where annual citrus imports exceed 16 million metric tons in value and volume terms (UNcomtrade, 2024).

India's productivity levels for oranges and mandarins are comparable to global averages, particularly in major clusters such as Nagpur & Amravati, while the export prices of USD 700–900 per MT for Indian oranges, compared with USD 950–1,150 per MT for competing origins such as Egypt and South Africa. Competitiveness indicators further reveal that India's Revealed Comparative Advantage (RCA) for oranges improved sharply from below 0.2 during 2010 to 2018 to a peak of 0.63 in 2020, while Nominal Protection Coefficient (NPC) values narrowed from above 1.8 in early years to around 1.2–1.3 in recent periods, indicating improving but still constrained price competitiveness in key importing markets.

Major importers such as the Middle East and South Asia, which together account for over 30 percent of global fresh orange imports (UNcomtrade, 2024), present near-term opportunities for India due to geographic proximity, freight advantages and seasonal alignment, while medium-term potential exists in East and Southeast Asia, where demand for easy-peel citrus is growing at over 4–5 percent annually. The integration of APY trends, export values, RCA and NPC indicators in this analysis provides a robust empirical basis to identify how India can move from a production-driven citrus economy to an export-oriented supplier, by targeting price-competitive regional markets, strengthening post-harvest infrastructure, and progressively upgrading quality to access higher-value global destinations.

4.1 Realised and Untapped Potential

Realised Export Potential

India's realised export potential in oranges is particularly evident in regional markets such as Bangladesh and the Middle East, driven by geographic proximity, freight advantages and moderate compliance requirements. A significant share (54.2 per cent) of India's citrus exports in 2025 went to Bangladesh and 38.3 per cent went to Nepal, with daily truckloads reaching up to 60 trucks per day during peak season. Export values peaked around USD 47 million in 2020–21, and India's RCA for oranges improved to around 0.63 during this period, indicating enhanced relative export performance fuelled by strong seasonal demand and competitive prices.

However, India's realised potential in Bangladesh has been significantly impacted by rising import duties. In mid-2024, Bangladesh raised the import duty on Indian oranges from approximately Tk 88 per kg to Tk 101 per kg (Pinjarkar, 2024), which translates to one of the highest tariff levels on fresh fruit in the region, constraining export flows and price competitiveness. This duty hike, part of a broader increase in fruit tariffs over recent years, has been reported to reduce export volumes from over 141,000 MT in 2020–21 to an estimated 25,000 MT in 2023–24. Indian exporters and associations have highlighted that these tariff increases have shrunk exports to Bangladesh, disrupting established seasonal export streams and threatening producer incomes.

These tariff increases are part of a broader escalation of duties on imported fruits in Bangladesh, where total tax rates including customs duty, regulatory duty, VAT and supplementary duties, have risen significantly in recent years. Duty levels on imported fruits climbed to over 130 percent, contributing to a sharp decline in fruit import volumes and reduced consumer access. The impact of these measures is evident in declining import volumes, reduced Letter of Credit (LC) issuance by Bangladeshi banks due to higher entry costs, and slowing fresh fruit trade, all of which have dampened the traditionally strong export corridor for Indian citrus (Hossain, 2022).

Untapped Export Potential

Despite these regional shifts, India's broader export potential in global citrus markets remains substantially under-utilised relative to its production strength. India accounts for around 9 percent of global citrus production, yet its share in global citrus exports remains below 2 percent, highlighting a large untapped opportunity. Global citrus imports exceed 16 million metric tons annually, with major demand centres in the European Union, Russia, the Middle East, East Asia and North America. These markets are supplied by major exporters such as Spain, South Africa, Egypt and Turkey, which benefit from advanced supply chains, stronger cold-chain infrastructure and consistent compliance with international phytosanitary standards.

Indian citrus productivity, especially in cluster hubs such as Nagpur–Amravati–Wardha is comparable to many leading producers globally. However, structural inefficiencies in post-harvest handling, grading, cold storage and export logistics limit the volume of export-ready fruit that can meet the quality and residue standards of premium markets. Post-harvest losses of 20–25 percent, coupled with limited processing (only 3–4 percent of output currently processed), further constrain India's ability to convert production into sustained export volumes (Ladaniya).

India's citrus exports show significant realised potential in neighbouring markets, though recent tariff increases in Bangladesh have eroded price competitiveness and reduced export volumes. A broader and more resilient export strategy is needed to tap the substantial global demand for citrus, especially in high-value markets where strong quality systems, cold-chain integration and brand differentiation are critical. Strategic investments in export infrastructure, stronger trade diplomacy to address tariff barriers, and targeted market diversification are central to unlocking India's untapped citrus export potential under APEDA's export promotion framework.

4.2 Market Access Issues

Market access for Indian citrus, particularly oranges, is shaped by a combination of policy, regulatory and infrastructure barriers that affect both the volume and

value of exports. While India has made notable progress in production and export readiness, persistent market access constraints, ranging from trade policy barriers to technical standards and logistics gaps continue to limit India's ability to capture higher shares in key global markets.

1. Tariff Barriers and Trade Policy Restrictions

Tariffs imposed by importing countries directly influence India's export competitiveness by increasing landed prices and reducing demand elasticity. A stark example is the recent increase in import duties by Bangladesh on Indian oranges, which has significantly constrained export flows. Reports indicate that Bangladesh raised duties on fresh oranges (including import duty, supplementary duty and VAT) to over 130 percent in some cases, making Indian citrus comparatively more expensive than competing origins and dampening market demand. This aligns with field observations of declining export volumes to Bangladesh despite historically strong demand linkages (WorldBank, 2025).

Beyond South Asia, India faces tariff heterogeneity in other potential markets. For example, the European Union (EU) applies a tariff quota system on certain fruit categories, and while fresh citrus enters under preferential tariff schemes for some partners, Indian citrus does not benefit from wide-ranging free trade agreements comparable to those enjoyed by ASEAN or MERCOSUR exporters. This limits India's access to high-value markets where premium pricing is possible.

2. Sanitary and Phytosanitary (SPS) Standards and Technical Barriers

Stringent sanitary and phytosanitary (SPS) measures remain a major market access challenge for Indian citrus exports, particularly in the European Union (EU), which is among the world's most important premium fresh citrus markets. Indian exporters are required to comply with the EU Plant Health Regime and strict Maximum Residue Limits (MRLs) for pesticides and fungicides. Several agrochemicals commonly used in Indian citrus orchards are either not approved for citrus use in the EU or are subject to extremely low residue thresholds, increasing the risk of consignment rejection. As a result, exporters require robust residue monitoring, traceability systems, and access to EU-compliant plant

protection practices. However, residue testing and compliance infrastructure across major citrus clusters in India remains limited (EU, 2025).

India currently does not have phytosanitary market access for fresh citrus exports to Japan and South Korea, as Pest Risk Analysis (PRA) processes and bilateral export protocols for Indian citrus varieties have not yet been concluded. This remains a separate issue from MRL compliance applicable to EU exports. Moreover, the slow pace of PRA negotiations with several potential importing countries continues to constrain India's citrus export diversification. PRA approvals are a prerequisite for market access in most regulated markets, but negotiations with countries such as Japan, South Korea, Taiwan, and Australia have remained pending for extended periods. Delays in finalising export protocols restrict India's ability to access new high-value markets.

In addition, several importing countries require approved mitigation measures such as cold treatment protocols, orchard-level pest management systems, packhouse inspection, and phytosanitary certification to manage quarantine pest risks. Strengthening India's capacity in residue compliance, phytosanitary surveillance, orchard certification, and export-oriented packhouse systems will therefore be critical for expanding SPS-compliant citrus exports.

3. Non-Tariff Measures (NTMs) and Regulatory Complexity

Non-tariff measures, including differing packaging norms, traceability requirements and import documentation protocols, increase transaction costs and entry barriers. Multiple importing markets apply specific standards for fruit size, firmness, colour and labelling, which require consistent quality segregation and grading. In the absence of widespread quality assurance systems at farm and packhouse levels, India's citrus consignments may be rejected or face delays at port clearance.

Additionally, certain markets impose quota restrictions or licensing requirements that restrict the annual entry quantities of fresh fruit, including citrus, thereby creating bottlenecks for scaling exports. These quotas often favour countries with existing trade agreements or established market presence.

4. Infrastructure and Logistics Barriers Affecting Market Access

While it is not strictly a policy barrier, deficiencies in export logistics infrastructure, particularly cold-chain and cargo handling effectively constrain Indian citrus's ability to meet market access conditions in distant and high-value markets. Fresh citrus is highly perishable with a typical shelf life of 8–15 days under ambient conditions; extension to exportable life requires cold storage, controlled atmosphere facilities and reliable air/sea freight logistics. India's cold-chain capacity for horticulture is growing but remains patchy, especially in key citrus clusters of Vidarbha and Central India (NHB, 2025).

Cargo handling facilities at airports in production hubs such as Nagpur remain inadequate, limiting the ability to dispatch export consignments promptly and cost-effectively. Regulatory facilitation of perishable cargo terminals (PCTs) remains a priority in government transport policy, and the Ministry of Civil Aviation has schemes to support such infrastructure; however, uptake in citrus clusters remains low.

5. Compliance Costs and Quality Assurance Gaps

Meeting market access requirements for quality, safety and traceability incurs compliance costs that disproportionately impact small and medium exporters. Many citrus packhouses lack GlobalGAP / HACCP / ISO certification, which are often prerequisites for entry into developed markets. Adoption rates remain limited due to upfront costs and operational complexity (APEDA, 2025e).

4.3 Export Scenario Analysis

India's citrus export trajectory is framed by a strong domestic production base, its evolving export performance, and rising global demand for fresh fruits. Citrus, including oranges forms part of the fresh fruits export basket that together contributed significantly to India's horticultural export growth during recent financial years. In 2024–25, India's fresh fruits and vegetables exports were valued at USD 1,818.56 million, with oranges, along with other fruits such as grapes, bananas and pomegranates, featuring among the major contributors to this segment. India's current share in global citrus exports remains modest, accounting

for only about 1–2 percent of total global citrus trade, despite the country's sizeable production volumes (APEDA, 2025b).

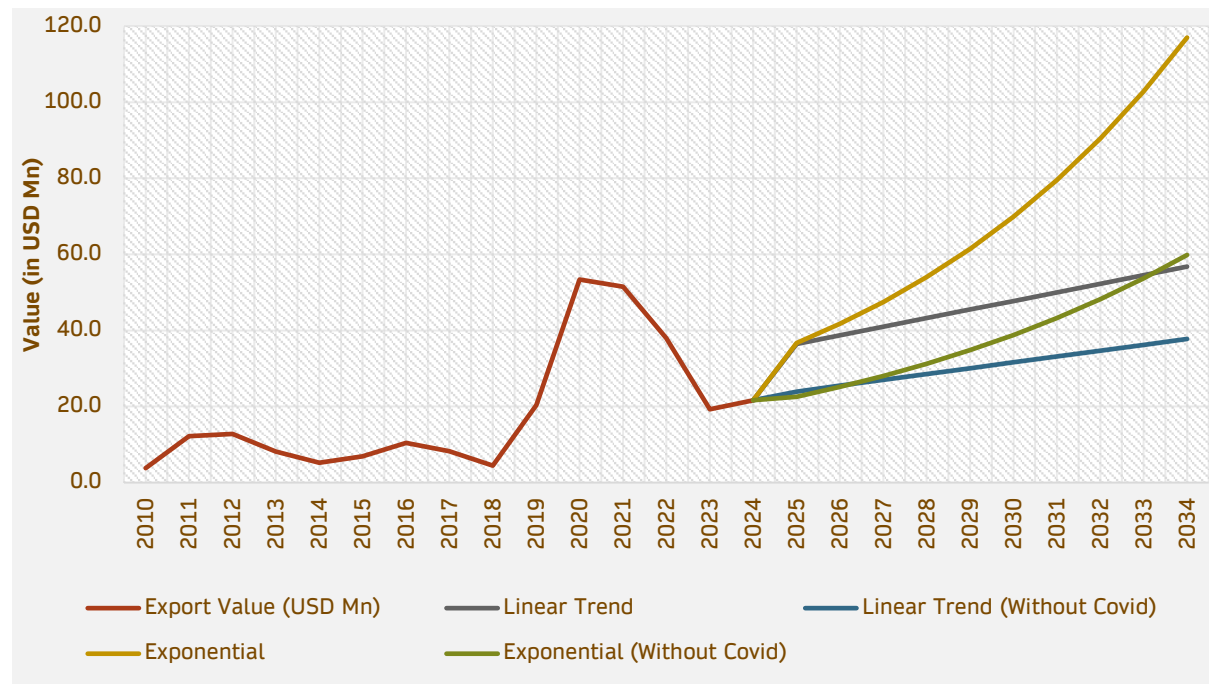
India's orange export values have exhibited considerable volatility over the past fifteen years, increasing from USD 3.8 million in 2010 to a peak of USD 53.4 million in 2020, before declining to USD 21.7 million in 2024 (**Figure 4.1**). This pattern reflects episodic export surges interspersed with periods of stagnation, indicating that export growth has not followed a stable long-term trajectory.

Based on alternative trend specifications applied to historical export values, multiple export paths emerge over the medium to long term. When longer-term trends incorporating the Covid-period surge are extended forward, export values rise rapidly, reflecting the influence of low-base effects and short-term demand shocks. Under this path, export values increase sharply over time, suggesting a high-growth outcome if favourable market conditions persist.

A more moderate path emerges when the Covid-period distortion is excluded from trend estimation. In this case, export values increase gradually, reflecting underlying structural conditions that have historically constrained India's citrus exports. This path implies slower expansion, consistent with limited growth in export volumes and gradual improvements in unit value realisation.

Short-horizon trend estimates based on recent post-2019 data indicate a relatively stable export performance, with modest increases in export values over time. When Covid-affected years are excluded, the resulting trend is flatter, suggesting that recent export levels largely represent stabilisation rather than the onset of a sustained growth phase. Taken together, these alternative paths indicate a wide range of potential export outcomes, with realised performance depending on the pace of market access, quality upgrading, and supply-chain improvements.

Figure 4.1: Projections for Indian Oranges exports



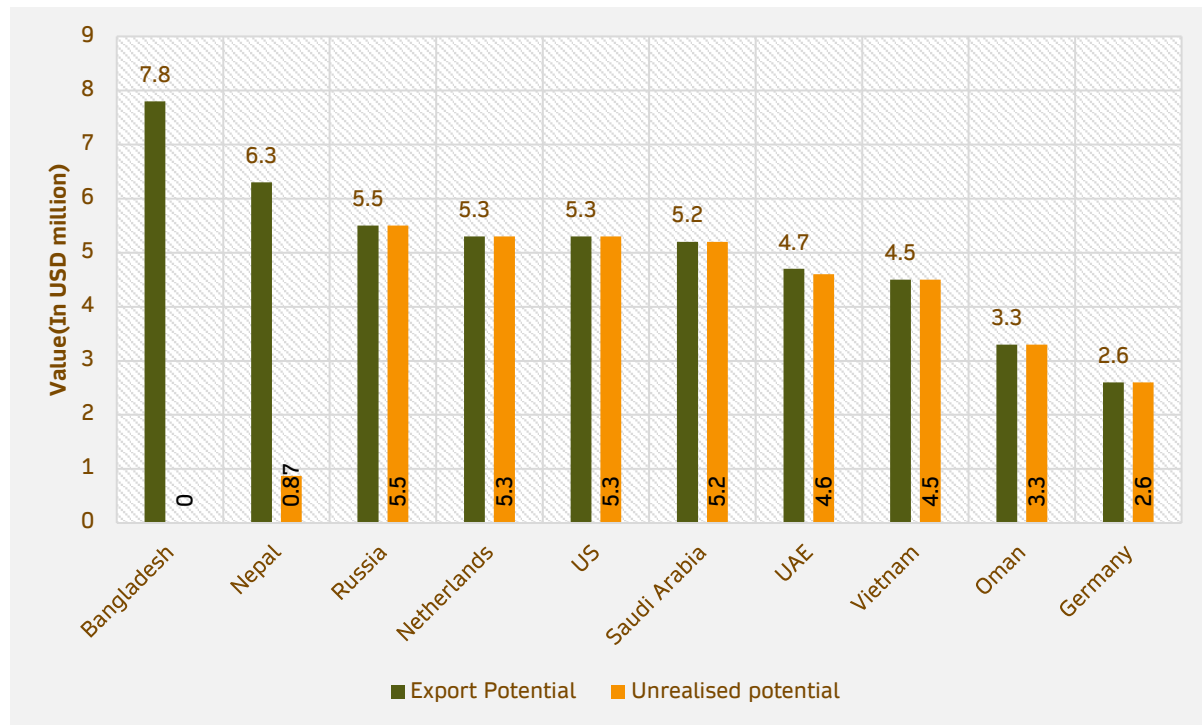
Source: Author's own using data from ITC trademap

Medium-Term Export Growth Outlook (2026-2030)

Over the medium term, India's orange export performance is expected to evolve in line with broader trends observed in horticultural exports. APEDA data indicate that between 2019–20 and 2023–24, the volume of fruits and vegetables exports increased by 47.3 percent, while export value rose by 41.5 percent, pointing to gradual improvements in competitiveness and international acceptance (PIB, 2025).

Applying this experience to citrus suggests a moderate expansion in export activity, driven primarily by incremental gains in quality compliance, diversification of destination markets, and improvements in post-harvest handling. Export volumes, which have remained low in absolute terms, are likely to increase gradually, while export values rise through a combination of volume growth and improved unit prices. At the same time, the persistence of infrastructure gaps, SPS compliance costs, and fragmented supply chains may limit the pace of expansion, leading to a scenario in which export growth remains uneven across years and sensitive to external demand conditions.

Figure 4.2: India's Export Potential



Source: ITC Trademap

Long-Term Export Potential (2031–2035)

In the longer term, India's orange export potential is linked to structural changes in the horticulture export ecosystem. Ongoing investments in cold-chain infrastructure, packhouses, residue testing facilities, and traceability platforms such as APEDA's HortiNet enhance export readiness for perishable commodities (Figure 4.2). These interventions improve the enabling environment for citrus exports and reduce transaction costs associated with meeting international standards (APEDA, 2026). Global demand for citrus is expected to expand moderately, supported by rising health awareness and consumption of fresh fruit. Given India's currently small share in global citrus trade, even incremental improvements in export competitiveness could translate into noticeable gains in export value over time. However, the scale of such gains will depend on the extent to which productivity improvements, varietal standardisation, and market access negotiations are successfully aligned (APEDA, 2025c).

Market and Policy Considerations for Achieving Projections

Realisation of the export outcomes described above requires parallel progress on supply-side and market-access dimensions. APEDA and the Ministry of Commerce & Industry provide support for exporters through financial assistance for packhouses, cold storage, quality testing laboratories, traceability systems, and international marketing activities. These measures play a critical role in aligning Indian citrus exports with global market requirements (PIB, 2025). Strengthening SPS compliance, improving post-harvest management, and facilitating sustained buyer–seller linkages in high-value markets such as the European Union, the United States, and East Asia remain central to translating production potential into export performance (APEDA, 2026).

The global trade in fresh oranges is characterised by a highly concentrated exporter base and region-specific market dominance, where a limited number of countries command significant market shares across key importing regions. Major exporters such as Egypt, Spain, South Africa and Turkey have built strong competitive positions through scale efficiencies, integrated post-harvest infrastructure, and preferential market access, allowing them to supply large volumes consistently across Europe, the Middle East, Russia and East Asia. In comparison, India, despite being the third-largest producer of citrus globally, remains a selective and regionally concentrated exporter, with its orange exports primarily directed towards South Asian and proximate markets. Understanding India's competitive position therefore requires a market-wise assessment of exporter concentration, relative market shares, and the presence of competing origins across major importing countries. Such an analysis helps identify markets where India already enjoys a revealed advantage, markets where it faces intense price and quality competition, and markets where policy, logistics and infrastructure constraints currently limit participation.

5.1 Tariff Measures

Tariff measures play a decisive role in shaping India's competitive positioning in global orange markets, particularly when viewed alongside exporter concentration patterns across major importing regions. Global orange trade is dominated by a small group of exporters, most notably Egypt, Spain, South Africa and Turkey which benefit from scale, integrated supply chains, and preferential or stable tariff access in key destination markets. India's export presence, in contrast, remains regionally concentrated, with strong performance in South Asia and limited penetration in high-value markets such as Europe and East Asia.

Bangladesh: High and Rising Tariffs on Indian Citrus

Bangladesh has consistently increased duties on imported fresh fruits including oranges, over the past several years, substantially raising the effective tax burden on imports and dampening both volume and consumer demand. Fresh citrus (HS 080510) carries a customs duty of 25 percent as part of the base tariff on fruit imports. However, this applied rate is only one component of the overall tax incidence. Additional levies such as supplementary duties, regulatory duties, VAT, advance income tax, and advance trade VAT have progressively compounded the total burden on orange imports. The combined applied duty burden on fruits including oranges reached approximately 136.20 percent in FY 2024-25, up from about 89.32 percent in FY 2021-22, due to successive increases in supplementary, regulatory and other duties. This means that for every Tk 100 worth of imported oranges, an additional Tk 136.20 in duties and taxes must be paid before other costs are added (TBS, 2025).

Indian exporters report that Bangladesh has increased the import duty on oranges from Tk 88 per kg to Tk 101 per kg, translating into a significant increase in cost for importers and consumers alike and contributing to declining export shipments from India to Bangladesh. Exports to Bangladesh, which once exceeded 141,000 MT in 2020-21, fell to an anticipated 25,000 MT in 2023-24, partly due to these tariff hikes (GoB, 2024).

Regional Tariff Context and Impacts

The high duty regime in Bangladesh has had measurable impacts on import volumes, with regions dependent on timely and cost-competitive imports seeing declines in fruit imports and reduced consumer availability. For example, in FY 2023-24, Bangladesh imported roughly 339,894 MT of fresh fruits, down from 417,365 MT in FY 2020, a decline attributed in part to higher duties and declining local purchasing power (FreshPlaza, 2025).

While Bangladesh's tariff regime illustrates an extreme case of compounded duties, policies in Middle Eastern and CIS countries also impose varying tariff structures on fresh fruit imports. Many Gulf Cooperation Council (GCC) countries maintain moderate MFN tariffs (in the zero to 5 percent range on basic agricultural products

under GCC harmonised tariffs), (**Table 5.1**) but local excise, security, handling charges and port tariffs can add to landed cost.

Indian oranges therefore face non-uniform tariff and para-tariff burdens across destinations, a complexity that Indian exporters must navigate through pricing strategies and logistics optimisation. In high-value markets such as the European Union and East Asia, tariffs are typically predictable and applied at moderate levels (e.g., EU MFN duties), but they are coupled with stringent Sanitary and Phytosanitary (SPS) requirements and border inspection fees that effectively raise the cost of compliance and access. In these markets, the tariff component may be smaller but, when combined with non-tariff measures, it contributes to high entry costs relative to competitors with preferential trade agreements.

Table 5.1: Competitor Analysis of Oranges

Importing Region / Market	Major Competing Exporters	Typical Tariff Regime on Fresh Oranges (HS 080510)	Key Non-Tariff / Para-Tariff Measures	India's Competitive Position & Implications
European Union (EU)	Spain (intra-EU), Egypt, South Africa, Turkey	MFN tariffs applied; intra-EU trade at zero duty; preferential access for some partners	Stringent SPS standards, pesticide residue limits, border inspections, compliance and certification costs	India faces limited access due to high SPS compliance costs, lack of preferential access, longer transit times and strong dominance of Spain and Egypt
Middle East (GCC)	Egypt, South Africa, Turkey, Spain	Low MFN tariffs, generally 0–5% under GCC Common External Tariff	Port handling charges, municipality fees, inspection fees, logistics and cold-chain costs	India benefits from proximity and freight advantage but faces strong price and quality competition from Egypt and South Africa
Bangladesh (South Asia)	India (primary supplier), Egypt (limited), South Africa	Base customs duty 25%, but effective duty 136.20% (FY 2024–25) due to	Supplementary duty, regulatory duty, VAT, advance income tax, advance trade VAT	Sharp erosion of India's competitiveness; exports declined from >141,000 MT (2020–21) to ~25,000 MT

		compounded taxes		(2023–24) due to high duties
Other South Asian Markets	India, Pakistan, South Africa	Moderate MFN tariffs; country-specific duties	Seasonal restrictions, port inefficiencies, informal trade barriers	India retains proximity advantage but volumes remain limited and price-sensitive
East & Southeast Asia (China, Japan, ASEAN)	South Africa, Australia, USA, Egypt	Generally moderate MFN tariffs	Strict SPS protocols, phytosanitary access conditions, pre-clearance requirements	India's participation limited due to lack of protocols and SPS market access rather than tariffs alone
Russia & CIS	Egypt, Turkey, South Africa	MFN tariffs with seasonal variations	Currency risks, logistics costs, quality and consistency requirements	Potential opportunity for India, but constrained by logistics and inconsistent supply volumes

Source: Compiled from UN COMTRADE, APEDA, Bangladesh Tariff Commission / National Board of Revenue (Bangladesh), GCC tariff schedules, EU TARIC database

5.2 Domestic Policies

Domestic policy frameworks play a central role in supporting citrus production, post-harvest infrastructure, quality enhancement and export readiness. Both Central government schemes and Maharashtra state initiatives contribute to strengthening India's orange value chain, from production and planting material quality to processing and export quality compliance.

i. Central Government Policies and Programmes

Mission for Integrated Development of Horticulture (MIDH)

The Ministry of Agriculture & Farmers Welfare implements the Mission for Integrated Development of Horticulture (MIDH) as a flagship, centrally sponsored scheme aimed at holistic growth of the horticulture sector, including citrus fruits like oranges. MIDH supports area expansion, varietal improvement, post-harvest

management, protected cultivation, grading, packaging and market linkage creation for high-value horticulture commodities across all states and UTs. This scheme has been in operation since 2014-15 and is pivotal in providing financial incentives for enhancing both production and marketability of fruit crops such as oranges (MoC, 2023).

APEDA Schemes for Export Promotion

The Agricultural and Processed Food Products Export Development Authority (APEDA), under the Department of Commerce, provides dedicated financial assistance and institutional support for export promotion of scheduled products including citrus. APEDA's export promotion schemes cover three broad support areas:

- ◆ Infrastructure Development – financial assistance to establish packhouses, pre-cooling units, cold storage, refrigerated transport and missing logistics gaps for perishables such as oranges
- ◆ Market Development – participation in buyer-seller meets, trade fairs, and promotional activities in target export markets
- ◆ Quality Development – support for sanitary and phytosanitary (SPS) compliance, residue testing and certification

To facilitate traceability and compliance with major importing countries' standards (e.g., EU, USA, Japan), APEDA operates HortiNet, an electronic certification and traceability platform covering citrus and other fresh horticultural produce (APEDA, 2025d). APEDA's financial assistance under the Agriculture Export Promotion Scheme (AEPS) has been linked to the surge in India's overall fruits and vegetables export value, which grew by 47.3 per cent over the 15th Finance Commission cycle (2021-22 to 2025-26), aided by support for infrastructure and export facilitation (PIB, 2025).

Clean Plant Programme / Quality Planting Material Support

To improve productivity and planting material quality, the Central government is investing in clean plant facilities in major citrus regions. For Maharashtra, an INR 300 crore initiative has been announced to set up advanced horticulture facilities,

including one focused on orange saplings in Nagpur, under the broader clean plants programme to produce virus-free and disease-resistant planting material for citrus and other horticultural crops (TOI, 2025).

ii. Maharashtra State Government Policies

Maharashtra, as India's primary mandarin belt, has several state-level policy measures and schemes tailored to enhance citrus productivity, reduce post-harvest losses and support value addition.

State Support for Orange Processing Infrastructure

The Maharashtra cabinet has approved extensions and budgetary support for establishing modern orange processing centres in Vidarbha, including in Nagpur, Katol, Kalameshwar, Morshi and Sangrampur. Originally allocated Rs 20 crore, the initiative's budget has been revised to INR 39.9 crore and extended through 2025-26 and 2026-27 to curb high post-harvest losses (estimated at 25–30 per cent) and strengthen processing and secondary product units for citrus growers in Vidarbha (Ganjapure, 2025).

Proposed Regulatory Strengthening for Orange Nurseries

Addressing a critical production constraint, quality of planting material, the Maharashtra government is preparing an ordinance to regulate and strengthen fruit nurseries, specifically for citrus, to ensure availability of high-quality, disease-free saplings for growers. This policy initiative follows directions from state and central agriculture authorities and aims to improve the scientific standard and supply chain for nursery stock in regions such as Nagpur and Amravati.

State-Level Farmer Support and Plantation Growth

State schemes such as the Bhausahab Fundkar Falbagh Lavgad Scheme have facilitated financial assistance to horticulture farmers in Maharashtra, contributing to an expansion of fruit plantation areas; for example, fruit plantation area in the state increased by nearly 68,541 hectares in 2024-25, reaching 14 lakh hectares, with citrus included among the beneficiary fruit crops. The state assisted over

27,000 farmers under this scheme, demonstrating proactive support for high-value horticulture (TOI, 2025).

The interplay between Central policies like MIDH, APEDA export schemes and quality infrastructure development and state-level initiatives in Maharashtra underscores a multi-tier policy environment aimed at enhancing India's citrus sector competitiveness. Policies targeting nursery quality, processing infrastructure, export facilitation, and plantation expansion are particularly significant for addressing the structural constraints identified in earlier sections, and are essential for translating India's production strength into a sustained export presence.

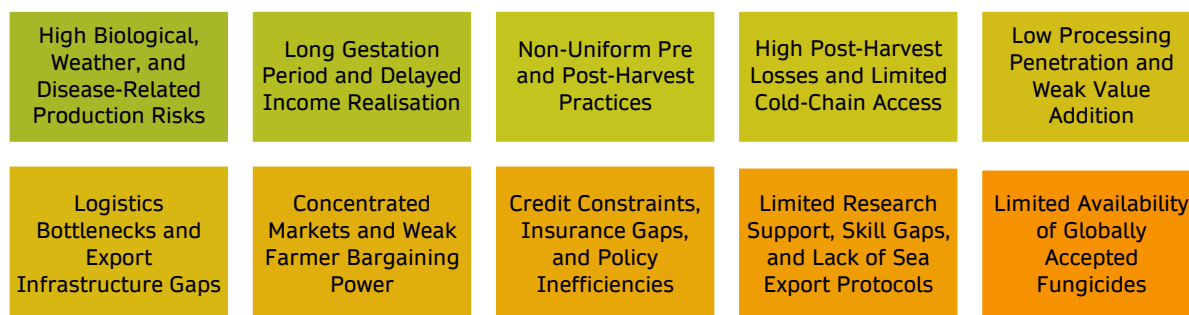
6

CHALLENGES AND OPPORTUNITIES

6.1 Emergent Challenges

Despite India being among the world's largest citrus producers, export performance remains limited and volatile, constrained not by production potential but by structural weaknesses across cultivation, post-harvest management, processing, logistics, and finance. High biological risk, low processing penetration, concentrated export markets, and persistent institutional gaps continue to suppress value realisation. The following section outlines the key challenges affecting India's citrus export competitiveness, based on field evidence from Maharashtra (Nagpur, Amravati, Jalna) and Madhya Pradesh (Agar Malwa).

Figure 6.1: Key challenges in the citrus sector



Production Related Challenges

i. High Biological, Weather, and Disease-Related Production Risks

Citrus cultivation in India is highly vulnerable to climatic variability, pest incidence, and disease pressure, all of which affect productivity, fruit quality, and export competitiveness. Weather conditions during critical stages such as flowering and fruit setting have a significant impact on yield outcomes. Field interactions indicate that even minor deviations in rainfall or humidity during the June flowering period

can sharply reduce fruit set and quality. Citrus orchards are also vulnerable to prolonged dry spells followed by sudden rainfall, which often increases pest incidence, fruit drop, and disease outbreaks.

At the same time, pest and disease pressure remains a major constraint to the production of export-grade fruit. Citrus psylla, fruit fly, mites, phytophthora, and other sucking pests require multiple spray cycles annually, increasing production costs and raising the risk of residue non-compliance in export markets. The problem is further aggravated by uneven nursery quality and the use of poor-quality planting material from unaccredited nurseries, leading to weak orchard performance and premature tree decline.

In addition, limited awareness regarding varietal selection, rootstock suitability, and disease management continues to constrain productivity improvements, particularly in older orchards. These risks are amplified by the perennial nature of citrus cultivation. With orchards remaining productive for 25–30 years, farmers face long-term exposure to climatic and biological shocks, while recovery from weather- or disease-related damage is often slow and costly compared to annual crops. Beyond episodic weather and disease shocks, India's average citrus productivity remains structurally below that of leading global producers. While well-managed orchards in established clusters can achieve competitive yields, national average productivity is held down by ageing orchards, poor planting material, and uneven adoption of improved agronomic practices, a gap that directly limits the volume of export-grade fruit available even in good seasons.

ii. Long Gestation Period and Delayed Income Realisation

Citrus orchards begin commercial bearing only after five to six years, creating a prolonged period of negative cash flow for farmers. During this phase, cultivation costs related to irrigation, plant protection, and nutrient management are incurred without corresponding income. Field evidence suggests that this long gestation discourages fresh plantation and orchard rejuvenation, particularly among small and medium farmers. The absence of structured income support or risk-sharing mechanisms during the non-bearing years significantly weakens the sector's capacity to expand export-oriented acreage.

POST-HARVEST, PROCESSING, AND INFRASTRUCTURAL CONSTRAINTS

i. Non-Uniform Pre and Post-Harvest Practices

One of the major challenges in India's citrus sector is the lack of uniform farming and post-harvest practices. Farmers often follow different methods for irrigation, fertiliser use, flowering management, and pest control, even within the same production cluster. As a result, fruit quality varies significantly in terms of size, colour, maturity, and chemical residue levels. This reduces the share of fruit that meets export standards. In many cases, only about 20–30 per cent of the harvested fruit is suitable for exports, compared to much higher levels in countries such as Spain and South Africa.

Post-harvest handling also remains weak and inconsistent. Inadequate practices related to pre-cooling, grading, waxing, packaging, and storage often lead to rapid quality deterioration after harvest. This increases the risk of rejection in export markets due to poor appearance or failure to meet quality standards.

ii. High Post-Harvest Losses and Limited Cold-Chain Access

Post-harvest losses in citrus are estimated at 20–25 percent, reflecting inadequate grading, waxing, pre-cooling, and cold storage facilities near production clusters. Shelf life under ambient conditions is limited to 8–15 days, severely constraining export options. While cold storage can extend shelf life to over a month, access remains limited and costly, especially for small growers. Field discussions highlighted the absence of decentralised, tehsil-level cold storage as a major bottleneck, resulting in distress sales and quality deterioration during peak harvest periods.

iii. Low Processing Penetration and Weak Value Addition

India processes only 3–4 percent of its citrus output, compared to nearly 70 percent in major global producers such as Brazil. Processing activity currently absorbs only a portion of available production, limiting the sector's ability to stabilise prices and utilise the full production base, limiting the sector's ability to absorb surplus

production or stabilise prices. Although Amravati hosts multiple processing units, overall capacity remains insufficient relative to production volumes, while Nagpur, despite its branding advantage, has minimal processing infrastructure. The absence of integrated “peel-to-pulp” value chains constrains by-product utilisation and reduces resilience against fresh market volatility.

iv. Logistics Bottlenecks and Export Infrastructure Gaps

Logistical constraints significantly weaken citrus export competitiveness. The lack of dedicated cold-chain cargo facilities at Nagpur airport emerged as a critical constraint during field visits. Exporters rely heavily on road transport, increasing transit time and quality risks. Compliance with export specifications, such as uniform fruit size and appearance, is difficult without integrated packhouses and pre-cooling facilities. High costs of waxing, grading, and storage further erode margins, making Indian citrus less competitive in distant markets.

MARKET, FINANCIAL, AND POLICY RISKS

i. Concentrated Markets and Weak Farmer Bargaining Power

Citrus marketing is dominated by intermediaries, with farmers possessing limited bargaining power and price discovery mechanisms. Export dependence on Bangladesh provides volume absorption during the season but exposes the sector to policy and demand shocks. Limited penetration into higher-value markets in the Middle East and East Asia reflects inconsistent quality, phytosanitary compliance challenges, and weak branding beyond Nagpur Mandarin. As a result, the margin between farmgate and retail prices remains wide, with most of the value captured by intermediaries rather than producers.

ii. Credit Constraints, Insurance Gaps, and Policy Inefficiencies

Institutional finance is poorly aligned with the biological and economic characteristics of citrus cultivation. Credit availability during the initial non-bearing years is limited, forcing reliance on informal sources. High non-performing assets in horticulture lending have led to tighter bank norms, particularly for smallholders and FPOs. Despite the presence of insurers, citrus lacks effective crop insurance

coverage, leaving farmers fully exposed to climatic shocks. Subsidy delivery inefficiencies, especially for drip irrigation and GST refunds on inputs, further strain farm economics and discourage long-term investment.

iii. Limited Research Support, Skill Gaps, and Lack of Sea Export Protocols

India's citrus sector also faces important gaps in research, technology, and skilled manpower. Most commercially cultivated citrus varieties such as Nagpur Mandarin, Kinnow, and Mosambi have remained largely unchanged for decades, with limited development of export-oriented traits such as seedlessness, better shelf life, and improved peel quality. In contrast, competing countries such as Spain and Morocco have introduced improved citrus varieties that are better suited for global markets and command premium prices.

There is also a shortage of trained manpower across the export value chain, including skilled graders, packhouse workers, cold-chain operators, and farmers trained in Good Agricultural Practices (GAP). This affects the sector's ability to consistently meet export-quality standards. Another important constraint is the absence of a standardised sea export protocol for Indian citrus. India currently lacks validated guidelines on pre-cooling temperatures, humidity management, transit duration, and container handling for long-distance sea shipments. As a result, exporters face high risks of quality deterioration and rejection during sea transport. Developing scientifically validated sea export protocols will be critical for reducing logistics costs and improving competitiveness in distant markets.

iv. Limited Availability of Globally Accepted Fungicides

India's citrus export sector also faces challenges related to pesticide and fungicide regulations. The number of fungicides approved for use in India that also meet the residue standards of major export markets, especially the European Union, is very limited. In some cases, chemicals commonly used by Indian farmers are either not accepted internationally or are subject to extremely strict residue limits, leading to rejection of export consignments.

At the same time, several fungicides widely used by competing exporters such as Spain and South Africa are not registered for use on citrus in India. This puts Indian

exporters at a disadvantage in managing post-harvest diseases and maintaining fruit quality during transportation.

6.2 Opportunities

India's comparative advantage in citrus exports lies in latent surplus, extended seasonality, cost competitiveness and proximity to growing markets, apart from the expanding production volumes. The challenge is therefore not one of production capacity, but of converting existing strengths into export readiness through targeted investments in post-harvest infrastructure, compliance systems, logistics and market development. Several opportunities exist in the citrus sector for an expanded export:

i. Large and Diverse Citrus Production Base with Surplus Availability

India's opportunity in citrus exports is fundamentally anchored in the scale and diversity of its production base combined with exceptionally low export penetration. According to the report, India produces in excess of 15 million tonnes of citrus annually, spanning mandarins, sweet oranges and limes, placing it among the world's leading citrus producers. However, exports account for well below 1 percent of total production, a figure that is substantially lower than that of major exporting countries. For comparison, countries such as South Africa, Spain and Turkey export between 20 and 50 percent of their citrus output. This contrast suggests that India's export performance is constrained not by availability of produce but by weak export orientation of the value chain. From an opportunity perspective, even diverting 1–2 percent of domestic production towards export markets would result in a several-fold increase in export volumes, without requiring additional land, water or major production-side investments.

ii. Extended Harvest Window Offering Seasonal Market Advantage

A second major opportunity arises from India's long and staggered harvest window, which provides a natural seasonal advantage in global markets. The report notes that citrus harvesting in India spans roughly October to June, with regional variations across central, northern and southern states. Mandarins alone are harvested over five to six months, compared to a much shorter export season of

three to four months in major competitors such as Spain, Turkey and Morocco. This staggered availability allows India to supply citrus during shoulder or off-season periods in importing markets, when prices are typically firmer and competition is relatively limited. In regions such as West Asia and Southeast Asia, where citrus consumption is year-round and imports bridge seasonal gaps, India is well positioned to act as a complementary supplier rather than a direct peak-season competitor.

iii. Cost Competitiveness in Production and Primary Handling

Cost competitiveness represents another important source of comparative advantage. The report highlights those costs of cultivation and labour in Indian citrus orchards are significantly lower than in developed exporting countries. Labour constitutes a major share of citrus production and post-harvest handling costs, particularly in harvesting, grading and packing. In India, relatively low wage rates and abundant labour availability reduce per-unit production costs. Farmgate prices for citrus in India are often 30–50 percent lower than landed prices in importing markets, even after accounting for domestic marketing margins. This cost cushion provides India with the ability to absorb additional expenditures on quality compliance, certification and cold-chain logistics while remaining competitive, especially in price-sensitive markets. In contrast, exporters from the EU and the United States face rising labour and compliance costs, which increasingly constrain their competitiveness in mid-priced citrus segments.

iv. Proximity to High-Growth Import Markets

India's geographic proximity to high-growth citrus-importing regions further strengthens its export potential. The report notes that a significant share of India's current citrus exports is directed towards West Asia, South Asia and neighbouring countries, reflecting natural freight and transit advantages. These regions are among the fastest-growing importers of fresh fruits due to population growth, urbanisation and changing dietary patterns. Shorter shipping distances translate into lower freight costs, reduced transit time, and lower quality deterioration, all of which are critical for fresh citrus with limited shelf life. Compared to exporters in Latin America or Southern Africa, India enjoys a structural logistics advantage in

serving these markets, even in the absence of advanced controlled-atmosphere shipping technologies.

v. Strong Potential for Value Addition and Processed Citrus Exports

A particularly underexploited opportunity highlighted in the report is the expansion of citrus processing and value-added exports. Currently, only about 3–4 percent of India's citrus production is processed, compared to 30–40 percent in leading citrus-exporting countries such as Brazil. As a result, a large volume of lower-grade fruit, which does not meet fresh export standards due to size or cosmetic issues, is sold at depressed prices in domestic markets. Expanding processing capacity would allow India to channel this surplus into juice, concentrates, essential oils and citrus-based ingredients. These products typically face lower SPS barriers, have longer shelf life, and offer more stable export demand. Given India's large raw material base and expanding food processing ecosystem, processing-led exports can play a stabilising role for both farm incomes and export earnings.

vi. Scope for Premium Positioning through Regional and GI-Based Branding

There is a growing scope for product differentiation and origin-based branding in international citrus markets. Certain Indian citrus varieties, such as Nagpur Mandarin, already enjoy strong domestic recognition and geographical identity. At the global level, consumer preferences are increasingly shifting towards produce that is traceable, origin-linked and differentiated by taste or seasonality. This creates an opportunity for India to move beyond undifferentiated, price-based competition and position select citrus products in premium or niche segments. Compared to mass exporters that rely on standardised varieties and large-scale branding, India can leverage regional diversity and varietal specificity, provided quality consistency and traceability systems are strengthened.

7

STRATEGIES AND POLICY RECOMMENDATIONS

This section outlines a phased strategic framework for strengthening India's citrus export performance, grounded in the constraints and opportunities identified in the preceding analysis. Given that the bottlenecks in citrus exports are largely structural and institutional rather than production-related, the proposed strategies are sequenced across short-, medium-, and long-term horizons. The short-term measures focus on immediate actions that can be undertaken by government agencies and APEDA to ease market access and compliance constraints. Medium-term strategies address critical gaps in post-harvest infrastructure, logistics and cluster-level organisation that require coordinated investment and implementation. The long-term strategies aim at deeper structural transformation through varietal upgrading, processing expansion and stronger institutional governance to ensure sustained competitiveness in global citrus markets.

7.1 Short-Term Strategies

i. Fast-track SPS compliance, certification, and traceability support

Rationale: The report identifies country-specific sanitary and phytosanitary (SPS) measures as one of the most binding constraints on India's citrus exports, particularly for entry into high-value markets such as the European Union, Japan and South Korea. These markets impose stringent requirements related to Maximum Residue Limits (MRLs), pest-free status, phytosanitary inspections and traceability under regimes such as the EU Plant Health Regulation. While APEDA and the National Horticulture Board have expanded residue testing and certification facilities in recent years, compliance remains uneven across citrus clusters. Limited adoption of PHYTOS certification, inadequate residue monitoring at the orchard level, and the absence of mutual recognition arrangements for phytosanitary certificates continue to raise transaction costs and risk of consignment rejection, especially for mandarins.

Action points

- ◆ Notify country-specific SPS protocols for citrus by destination market (EU, Japan, South Korea) and require exporters to follow market-linked production and pre-export treatment protocols at the orchard and packhouse level, starting with notified export clusters from the 2025–26 season.
- ◆ Mandate orchard registration and plot-level residue monitoring for citrus exports to high-compliance markets, with responsibility placed on exporters to ensure pre-harvest sampling and documentation prior to harvest, rather than at the shipment stage.
- ◆ Make digital traceability a pre-condition for phytosanitary clearance for select markets, integrating orchard records, harvest dates, residue test results and packhouse details into a single export dossier for each consignment.
- ◆ Initiate targeted bilateral engagements with priority importing countries to streamline citrus-specific phytosanitary procedures, including recognition of India's inspection and certification processes for designated export clusters.

ii. Targeted market diversification and export facilitation

Rationale: India's citrus exports have been heavily concentrated in neighbouring and regional markets, with Bangladesh emerging as a major destination in earlier years. However, recent tariff measures imposed by Bangladesh have reduced India's price competitiveness in that market. While these markets have provided a stable outlet, such concentration limits export growth and value realisation and exposes exporters to demand and policy risks. The analysis identifies scope for expanding exports to select Middle Eastern and Southeast Asian markets where demand growth, seasonal complementarities and logistics proximity provide a more favourable outlook. A calibrated market diversification strategy is therefore required, balancing efforts to stabilise traditional markets with targeted expansion into new destinations.

Action points

- ♦ Prioritise the Middle East, ASEAN and other neighbouring markets especially United Arab Emirates, Saudi Arabia, Qatar, Malaysia, Singapore and Sri Lanka as focus markets for expanding fresh citrus exports over the next three export seasons.
- ♦ Engage with Bangladesh through bilateral trade and tariff discussions to address the impact of tariff increases on citrus imports, while treating the market as a stabilisation rather than expansion destination in the medium term.
- ♦ Map India's citrus harvest calendar against import seasonality and competing suppliers for each of the identified focus markets and issue market-wise export advisories to exporters ahead of each export season.
- ♦ Facilitate structured trial consignments to Malaysia and Singapore, with predefined quality, packaging and logistics specifications, to assess India's competitiveness and build buyer confidence in higher-value Southeast Asian markets.

7.2 Medium Term Strategies

Structural improvements requiring coordination, investment, and behavioural change at the cluster level

i. Develop export-oriented citrus clusters with integrated post-harvest systems

Rationale: Export-oriented aggregation and post-harvest infrastructure are the most critical structural constraint in India's citrus value chain. Despite adequate production volumes, a large share of citrus output does not meet export-grade requirements due to lack of grading, sorting, waxing, pre-cooling and cold storage at the cluster level. Unlike grapes, citrus exports remain opportunistic, with limited ability to consistently assemble uniform-quality volumes. Addressing this gap

requires the creation of clearly demarcated export clusters with dedicated post-harvest systems linked directly to export markets.

Action points

- ◆ Focus on key citrus clusters: the Nagpur mandarin belt (Maharashtra, Madhya Pradesh), the Kinnow belt (Punjab–Rajasthan), Mosambi belt (Maharashtra–Telangana), Darjeeling Orange and Khasi Mandarin (North East) based on exportable surplus and proximity to logistics nodes.
- ◆ Establish one integrated export packhouse in each cluster, equipped with mechanical colour-based grading, waxing, sorting, pre-cooling and cold storage facilities, through convergence of APEDA, MIDH and state horticulture funding within a two-year timeframe.
- ◆ Mandate routing of export consignments through the designated packhouses in the notified clusters to ensure uniform grading, traceability and compliance with market-specific quality standards.
- ◆ Link each export packhouse to a defined logistics corridor (road–airport or road–seaport) with assured refrigerated transport to minimise transit time and quality deterioration prior to shipment.

ii. Improve export logistics and perishable cargo infrastructure

Rationale: Logistics and perishability-related constraints significantly erode the competitiveness of Indian citrus exports, particularly for distant and higher-value markets. These constraints are more pronounced in regions with emerging export potential such as the North Eastern states, where citrus production is geographically dispersed and poorly connected to export gateways. The absence of perishable cargo handling facilities near major citrus-producing clusters, coupled with limited availability of temperature-controlled transport, results in quality losses and restricts market reach. Current export flows rely heavily on ad hoc arrangements, which are inadequate for scaling citrus exports in a consistent and cost-effective manner.

Action points

- ◆ Operationalise dedicated perishable cargo handling facilities at Nagpur and Amritsar airports, aligned with citrus export seasons, to serve the Nagpur mandarin and Kinnow clusters respectively. Upgrade Guwahati airport with citrus-specific cold handling and pre-cooling facilities to support exports from Darjeeling and North Eastern states.
- ◆ Designate specific sea ports for citrus exports, including Nhava Sheva and Mundra, and develop standard operating procedures for handling refrigerated citrus consignments at these ports.
- ◆ Create fixed road–air and road–sea refrigerated logistics corridors linking notified citrus clusters to the designated airports and ports, with defined transit time and temperature standards.
- ◆ Promote pilot shipments using refrigerated sea containers for Middle Eastern markets, with defined protocols on pre-cooling, container loading and transit duration to assess cost competitiveness vis-à-vis air freight.

7.3 Long Term Strategies

Foundational changes aimed at sustaining competitiveness and value realisation

i. Promote varietal upgrading and orchard-level quality alignment for exports

Rationale: India's citrus export performance is constrained not by aggregate production but by limited alignment between existing orchard varieties and the quality, appearance and shelf-life requirements of international markets. A large proportion of citrus orchards are planted with mixed or ageing varieties, leading to heterogeneity in fruit size, colour and storability. In the absence of export-oriented varietal planning and orchard management practices, exporters face difficulties in assembling uniform consignments that meet market specifications. Addressing this constraint requires planned varietal upgrading and systematic alignment of orchard practices with export requirements. Initiatives such as Sahyadri Farms's efforts to

introduce patented citrus varieties like Tango demonstrate that varietal upgrading linked with organised farmer aggregation can improve export readiness, and scaling such approaches is critical for long-term competitiveness.

Action points

- ◆ Map export-preferred citrus varieties and varietal traits for major importing markets, including colour, size, seedlessness and shelf-life parameters, and issue cluster-wise advisories on suitable varieties and rootstocks.
- ◆ Introduce a structured varietal replacement and orchard rejuvenation programme in notified export clusters, drawing on models used by organised FPOs and private aggregators, with phased adoption targets over a five-year horizon.
- ◆ Facilitate access to licensed or patented citrus varieties for export clusters, through public-private collaboration with entities experienced in varietal introduction and orchard management, while ensuring compliance with intellectual property requirements.
- ◆ Condition access to export packhouses and cluster-based infrastructure on adherence to prescribed orchard management protocols, including pruning cycles, harvest maturity standards and uniformity requirements aligned with export markets.

ii. Expand citrus processing and value-added export capacity

Rationale: India's citrus sector remains heavily skewed toward fresh market sales, with only a small share of production entering processing streams. This limits value realisation, increases exposure to seasonal price volatility, and contributes to high post-harvest losses during peak harvest periods. In contrast, global citrus leaders use processing to absorb surpluses, stabilise markets, and supply export destinations with standardised, shelf-stable products. Expanding citrus processing in India would enable diversification into higher-value products such as concentrates, oils, pectin, and fibre, reduce wastage, and strengthen India's ability to participate in global value chains beyond fresh fruit exports.

Action points

- ◆ Operationalise and integrate the existing citrus processing facility at Nanded into the export value chain, by linking it with nearby mandarin and sweet orange clusters and establishing assured procurement arrangements for processing-grade fruit.
- ◆ Create regionally distributed citrus processing hubs in major producing belts, including Vidarbha and Marathwada in Maharashtra and the Kinnow belt in Punjab–Rajasthan, with facilities sized to handle seasonal peaks in arrivals.
- ◆ Develop processing capacity across a defined product mix, prioritising fresh citrus juice, juice concentrates, citrus pulp and puree, essential oils from peels, dried citrus peel, and citrus-based ingredients for food and beverage applications.
- ◆ Link processing units to export markets through product-specific standards and contracts, ensuring that processed citrus products meet importing country requirements for food safety, packaging and labelling.

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ANNEXURES

Annex 1: Comparison between Global and Indian citrus classification

FAO	MoAFW	Description	HSN Code	Global Varieties	Indian Varieties	Key Producing States	Remarks
Oranges	Sweet Orange (Malta, Mosambi)	Large, sweet, juice-rich; mainly for fresh use and juicing.	080510	Valencia, Navel	Mosambi, Sathgudi, Hamlin, Malta, Blood Red	Andhra Pradesh, Maharashtra, Telangana, Madhya Pradesh	41% share in global production of citrus fruits
Tangerines, mandarins, clementines	Mandarin (M.Orange, Kinnow, Orange)	Small, sweet, easy to peel; often seedless and consumed fresh.	080521	Clementine, Satsuma, Kinnow	Nagpur,	Madhya Pradesh,	31% share in global production of citrus fruits
			/		Kinnow,	Punjab,	Maharashtra, Haryana
			080522		Khasi,		
			/		Coorg,		
			080529		Darjeeling		
Lemons & Limes	Lemon/ Lime	Sour, acidic; used for juice, culinary, and industrial purposes.	080550	Eureka lemon, Persian lime	Galgol, Baramasi, Assam Lemon, Kagzi	Andhra Pradesh, Gujarat, Madhya Pradesh, Maharashtra	13% share in global production of citrus fruits
Grapefruits & Pomelos		Large, semi-bitter or sweet-tart; eaten fresh or juiced.	080540	Ruby Red, Shaddock			6% share in global production of citrus fruits
Other Citrus (nes)	Other Citrus	Miscellaneous citrus; includes bitter or aromatic varieties not widely traded.	080590	Bitter orange, citron, hybrids	Pomelos and grapefruits	Bihar, Rajasthan, West Bengal, Uttarakhand	8% share in global production of citrus fruits

Source: MoAFW, FAOSTAT

Annex 2: Key Global and Indian Citrus Trade Firms

Major Exporting and Importing Firms (Global and Indian)

Global Firms

At the global level, the citrus value chain is supported by a network of large, vertically integrated firms and cooperatives that span production, processing, logistics and international marketing. Among fresh citrus exporters, Spain has long held the lead, accounting for roughly 25 percent of the world's citrus exports, with advanced post-harvest infrastructure and a wide distribution network that extends into Europe, the Middle East and Asia (Trend Economy, 2023). Spain's citrus export portfolio includes oranges, mandarins and lemons backed by strong quality, sustainability certifications and producer cooperatives.

Other major exporters include South Africa, which serves as a key counter-seasonal supplier to Northern Hemisphere markets and has well-developed packhouse and cold-chain systems; China, exporting a range of citrus including mandarins, grapefruits and oranges to Asia and Western markets; Turkey, Egypt, Mexico and the Netherlands, each holding notable shares of global citrus export volumes. Collectively, these countries constitute over 60 percent of global citrus fruit export value, with mandarins, oranges and related types dominating trade flows.

In the processed citrus segment, Brazil remains the benchmark for global orange juice production and export, with over three-quarters of the world's orange juice trade originating from Brazilian mills. Major Brazilian firms such as Citrosuco and Sucocitricio Cutrale dominate this landscape (GoN, 2025). Citrosuco is widely recognized as the world's largest producer of orange juice concentrate and related by-products, with operations extending into the United States, Europe and Asia, supported by a global logistics footprint. Cutrale, another Brazilian giant, controls a significant share of the global orange juice market and operates integrated plantations and processing units in Brazil and the U.S., collectively contributing a large proportion of global citrus juice exports. Alongside them, global commodity traders such as the Louis Dreyfus Company (LDC) have leveraged citrus supply chains to launch branded juice offerings and expand market reach. These firms also

play a key role in supporting the global citrus juice market and ingredient supply chains.

South African processors and exporters further add diversity to the global citrus supply chain. While not as large as the Brazilian juice processing clusters, companies such as Ceres Fruit Juices operate global distribution of juice products made from citrus and other fruit, contributing to South Africa's role as a meaningful exporter of both fresh and processed citrus.

Indian Firms

On the Indian side, export participation is primarily driven by mid-to-large packhouse operators, trader-exporters and FPO-led enterprises that aggregate fresh fruit from major production clusters. Unlike global citrus exporters, India's citrus firms are mostly focused on fresh fruit export rather than large-scale processing. APEDA's recognized packhouses list includes a range of India-based exporters and packhouse operators involved in fruits and vegetables, many of which handle citrus consignments under APEDA accreditation and phytosanitary compliance frameworks. These include entities such as Vishwa Shobha International, Sapphire International, Prime Export, M&S Fruits Company and Dharsini Exports, which have been identified as active participants in India's citrus export trade (APEDA, 2025a).

In addition to these exporter firms, domestic processing players such as Sahyadri Farms, Patanjali and Jeev Udyam are active in producing citrus-based processed products for the domestic market, though their scale is modest relative to global juice clusters and they currently contribute limited volumes to export-oriented processed output. Institutional support from bodies such as APEDA, the Indian Council of Agricultural Research – Central Citrus Research Institute (ICAR-CCRI) and various state horticulture boards aims to strengthen export-oriented supply chains by facilitating certification, packhouse development, residue testing and compliance with international standards (APEDA, 2025a).

While importers of citrus fruit and citrus products are more diffuse and vary by market segment, major citrus importing regions include Europe, East Asia and the Middle East, with stringent quality, residue and phytosanitary requirements that

influence sourcing strategies for both fresh and processed citrus products. These markets are served by diversified supplier bases that include the major exporting countries and firms listed above, and also increasingly involve global trading houses that link citrus supply from developing countries to retail and industrial buyers in high-value markets (GoN, 2025).



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