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INDUSTRIAL AND EXPORT POTENTIAL OF MANGO IN INDIA: A REVIEW

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ABSTRACT

India is the world's largest producer of mangoes, accounting for approximately 41% of the global output, yet contributing only 5–6% to the international mango trade. This gap highlights the challenges of converting production strength into export success. Key constraints include high post-harvest losses (25–40%), limited cold chain infrastructure, poor quality grading, and low adoption of processing technologies. Despite the rising global demand, less than 2% of India's mangoes are processed into value-added products, such as pulp, juice, or dried slices. Export-focused varieties such as Alphonso and Kesar have a strong demand in markets such as the USA, UK, and UAE, whereas Totapuri is primarily used in processing. India's rich varietal diversity offers opportunities for industrial differentiation and market segmentation in the wine industry. However, to boost competitiveness, significant improvements are needed in logistics, post-harvest handling, packaging and phytosanitary compliance. Government initiatives, such as Agricultural Export Zones (AEZs), One District One Product (ODOP), and support from APEDA and MIDH, are working to address these issues through cluster development, infrastructure funding, and export facilitation. The sector's potential can be unlocked through integrated value chains, farmer training, enhanced packaging and branding, and wider adoption of quality certifications. Strengthening processing capacity and promoting value-added exports can transform India from a production giant into a global mango export hub, contributing significantly to rural income, employment, and foreign exchange earnings.

***Keywords*:** Mango export, post-harvest losses, value addition, mango processing, agro-ecological zones (AEZ), APEDA , ODOP.

Introduction

India is the world's largest producer of mangoes, contributing approximately 41% of the global production (FAO, 2021). Despite this, its share in global mango exports is only approximately 5–6% (APEDA, 2021), mainly due to poor post-harvest management, limited cold chain infrastructure, and lack of value addition (Reddy & Reddy, 2020).

Mango cultivation has grown from 2.0 million hectare in 2001–02 to 2.6 million hectare in 2020–21, with production rising from 11.9 to 21.1 million tonnes (NHB, 2021). Major producing states, such as Uttar Pradesh, Andhra Pradesh, and Maharashtra, contribute over 75% of the national output (DES, 2021). However, post-harvest losses remain high (25–40%) due to inadequate storage and handling (Sharma & Jha, 2017), and less than 2% of mangoes are processed into value-added products (Bhosale *et al*., 2020).

Government initiatives, such as Operation Greens, MIDH, and the Agricultural Export Policy (2018), aim to improve infrastructure and export competitiveness (MoA & FW, 2020). India's rich varietal diversity Alphonso, Kesar, Dashehari, etc. offers scope for branding and premium positioning in global markets,

provided that integrated efforts in quality, processing, and marketing are enhanced.

Factors Affecting Industrial and Export Potential of Mango

Climate & Soil: Mango thrives in tropical/subtropical zones with 24–30°C temperature and well-drained soils; states like AP, Maharashtra, and UP are ideal (Sharma *et al*., 2016).

Post-Harvest Losses: 25–40% losses due to poor storage, transport, and infrastructure (Jha *et al*., 2018; NHB, 2021).

Processing Gap: Less than 2% processed; low technology adoption in rural areas (Bhosale *et al*., 2020).

New technologies, such as freeze-drying, canning, and hot-fill packaging, have boosted product variety (Yadav *et al*., 2021; ICAR-CIPHET, 2020).

Logistics: Nearby ports and better cold chains help export delicate varieties like Alphonso (APEDA, 2022).

Govt Support: ODOP, APEDA, MIDH aid processing and export infrastructure (MoA&FW, 2021).

Varietal Innovation: ICAR-IIHR varieties, such as Sindhu and Arka Anmol, support exports (ICAR-IIHR, 2021).

Skill Development: KVKs and NIFTEM train rural youth in value addition (NIFTEM, 2020).

Trade Barriers: SPS norms limit exports; GlobalGAP. and irradiation needed (Umali-Deininger & Sur, 2007; APEDA, 2022).

Mango Export Promotion through AEZs and Institutional Support in India

The Agri Export Zones (AEZs) initiative, launched in 2001 under the EXIM Policy, aimed to boost agri-exports through product-specific clusters. For mango, AEZs were set up in regions such as Malihabad (UP), Ratnagiri (MH), Krishna (AP), and Salem (TN), integrating farmers, exporters, and processors (APEDA, 2005). By 2004–05, 60 AEZs were notified, with mango as a key focus because of its export potential. These zones improved infrastructure, handling, and market linkages (MoC&I, 2005). Although no new AEZs have been declared since then, APEDA continues to promote GAP, support FPOs, and upgrade export infrastructure (APEDA, 2023). India's agri-exports touched $50 billion in 2023–24, with mango as a priority (MoC&I, 2024). Recent initiatives, such as the reactivation of Ahmedabad's Center for Perishable Cargo and the Sardar Vallabhbhai Patel Niryat Suvidha Kendra in UP, have further strengthened mango export logistics and facilitation. These efforts align with AEZ goals and national policies, such as the Agricultural Export Policy (2018) and ODOP, reinforcing India's push to expand the global mango trade.

Table 1: Mango export zones of India

State	Fruit	District/Areas (AEZs)
Maharashtra	Mangoes (Alphonso)	Ratnagiri, Sindhudurg,
	Kesar Mango	Aurangabad, Beed, Jalna, Ahmednagar, Latur
Uttar Pradesh	Mangoes	Lucknow, Sitapur,
West Bengal	Mango	Maldah
Andhra Pradesh	Mango	Rangareddy
Tamil Nadu	Mangoes	Madurai, Theni,
Gujarat	Mangoes	Ahmedabad, Anand, Vadodara, Surat, Navsari, Valsad, Bharuch, Narmada

Source: MoCI, 2019

Country-wise mango export from India

Table 2: Country-wise mango export from India (2021-22)

Country	Quantity (MT)	Value (Lakh)
United Arab Emirates	12756.4	15104.24
United Kingdom	2471.69	5128.25
Qatar	1762.11	1916.17
Oman	1478.27	1684.36
Others	908.21	1278.43
Kuwait	515.96	962.3
Singapore	373.41	593.38
Baharain	382.63	421.26
Nepal	492.59	147.57
Total	21141.3	27236

(Source: MoA&FW, 2025)

This table lists the top destinations for Indian mango exports, such as the UAE, UK, USA, Saudi Arabia, and Qatar. The data demonstrate the fruit's international appeal, especially among the South Asian diaspora and gourmet consumers. Despite India's production dominance, its global market share in mango exports is limited because of competition from countries such as Mexico and Peru. Export destinations highlight the need for targeted trade strategies, customized packaging, and air-freight logistics to maintain freshness. It also reflects consumer preferences for premium varieties such as Alphonso and Kesar. With improved phytosanitary compliance and certification, India can increase mango penetration in high-value markets.

Export destinations of mango products export from India

The top ten export destinations for different mango-based goods exported by India are shown in table. It emphasizes how several product categories, including fresh mangoes, pulp, jam, juice, and dried slices, are regularly purchased in large quantities by nations, including the United Arab Emirates, the United Kingdom, the United States, and Kuwait. This demonstrates the wide-ranging demand for Indian mango products worldwide. India's increasing potential in the global mango trade is demonstrated by these exports, which comprise not only fresh fruits but also value-added processed goods, including pulp, jam, juice, squash, and dried slices.

Table 3: Top 10 export destinations of mango products export from India

Product	Top Importing Countries
Fresh	U.A.E., U.K., U.S.A., Kuwait, Qatar, Canada, Oman, Nepal, Singapore, Bahrain
Pulp	Saudi Arabia, U.S.A., U.K., Germany, Canada, Yemen, Netherlands, Oman, U.A.E., Kuwait
Jam, Jelly	Netherlands, Saudi Arabia, Russia, U.A.E., U.S.A., France, U.K., Japan, China, Kuwait
Slice in Brine	U.S.A., Netherlands, U.K., Germany, Malaysia, Israel, Bhutan, Nepal, Australia, Japan
Squash	Saudi Arabia, U.A.E., Nepal, Netherlands, Bangladesh, Libya, Liberia, China, Spain
Juice	Netherlands, U.S.A., Korea, Australia, Bhutan, Qatar, Canada, Austria, Malaysia
Sliced Dried	U.A.E., Qatar, Nepal, Turkey, Mexico, Kuwait, U.S.A., Singapore, U.K., Saudi Arabia

Export Specifications for Mango Varieties

Fruit Weight

- Alphonso mangoes are mostly exported with a size range of 250–300 g in markets like the UK, USA, Japan, and Germany, while the Middle East prefers slightly smaller sizes (200–250 g).
- Kesar mangoes generally weigh between 225 and 300 g, with slight variations by country.

Packing Specifications

- Commonly exported in 1 dozen packs, with weight per box varying— for example, 2.5 kg (Middle East, UK) and 3.5 kg (USA, Japan).
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Storage Temperature

- All regions maintained a uniform storage temperature of 13°C to ensure freshness during transit.

Mode of Transport

- Air transport is the preferred mode for all countries except those in the Middle East, where sea transport is utilized because of proximity and cost efficiency.

Table 4: Export specifications for mango varieties

Parameter	Variety	Middle East	Netherlands / Germany	UK	Japan	USA
Weight	Alphonso	200–250 g	250–300 g	250–300 g	250–300 g	250–300 g
	Kesar	200–250 g	225–250 g	225–250 g	250–300 g	250–300 g
Packing		1	1	1	1	1
Storage Temperature		13°C	13°C	13°C	13°C	13°C
Transportation		By Sea	By Air	By Air	By Air	By Air

(Source: APEDA, 2024)

This table outlines critical export specifications, such as fruit size, maturity index, Brix (sugar) levels, packaging, and phytosanitary treatments. These parameters are essential for meeting the quality and safety standards of different importing countries. Compliance with such norms ensures fruit longevity, reduces rejection at ports, and enhances India's export credibility. The specifications also help streamline post-harvest handling and grading operations. The table reinforces that high export potential is not just about quantity but also about quality consistency, compliance, and supply chain coordination.

The figure shows that the highest Alphonso from India was exported to the United States, Kuwait, and the United Kingdom at 27%, 24%, and 20%, respectively.

The figure illustrates the country-wise share of Kesar exports from India for the year 2023-24. The largest portion of India's Kesar exports goes to the United Kingdom, accounting for 55.14% of the total exports, making it the top importer. The United States follows with 28.61%, indicating a strong demand. This distribution highlights the dominance of the UK and US markets in India's Kesar trade, while Canada, New Zealand, Germany, and Japan contribute smaller but significant shares.

Export potential of mango and processed products of mango

In 2022–23, India exported 289.78 thousand metric tonnes of mango and mango products, earning Rs. 3,519.20 crore. Of this, fresh mangoes accounted for 32.10 thousand MT worth Rs. 495.46 crore. Processed mango products made up the bulk of exports, with 257.68 thousand MT, valued at Rs. 3,023.74 crore. The top items were jams, jellies, and marmalades (Rs. 1,499.72 Cr) and pulp (Rs. 1,277.80 Cr), followed by squash, dried slices, juice, and slices in brine. This highlights the strong global demand and higher value potential of processed mango products compared to raw mangoes.

Table 5: Export potential of mango and processed products of mango (2022-23)

Product Type	Product	Quantity (‘000 MT)	Value (Rs. Cr)
Mango	Fresh Mango (Raw)	32.1	495.46
Processed Products	Jams, Jellies & Marmalades	121.14	1499.72
	Pulp	109.49	1277.8
	Squash	17.64	191.9
	Dried Slice	8.2	6.59
	Juice	1	45.44
	Slices in Brine	0.21	2.29
	Total Processed Product	257.68	3023.74
Total (All Products)		289.78	3519.2

(Source: APEDA, 2021-22)

This table provides data on the volume and value of processed mango products, such as pulp, juice, slices, and dried mangoes. This shows that while fresh mangoes dominate in appeal, the processed segment is growing rapidly because of its longer shelf life, year-round availability, and easier logistics. The major markets include the Middle East, USA, and Southeast Asia. Processed products help stabilize returns, even when fresh exports face seasonal or phytosanitary barriers. The table highlights the need for mango processing units, branding, and international certifications. It also emphasizes processed products as a hedge against perishability and export uncertainties in the fresh segment of the market.

Industrial potential of mango

According to the NHB (2021), Totapuri is mainly used for industrial processing, whereas varieties such as Alphonso, Dasheri, and Langra are primarily consumed fresh. Kesar and Banganapalli showed balanced usage. The Others category had the highest total consumption, largely for direct use.

Table 6: Industrial and domestic utilization of mango varieties in India

Variety	Industrial Usage (MT)	Direct Consumption (MT)	Total (MT)
Totapuri	2.2 – 3.5	0.5 – 1.0	2.7 – 4.5
Kesar	0.6 – 1.0	1.0 – 1.5	1.6 – 2.5
Banganapalli	0.4 – 0.7	1.2 – 1.8	1.6 – 2.5
Alphonso	0.1 – 0.3	2.2 – 3.4	2.3 – 3.7
Dasheri	Negligible	2.9 – 4.3	2.9 – 4.3
Langra	Negligible	2.2 – 2.6	2.2 – 2.6
Others	0.4 – 0.7	5.0 – 6.0	5.4 – 6.7

(Source: NHB, 2021)

This table highlights the different mango varieties utilized across industrial and domestic markets. While premium types like Alphonso are used mainly for fresh consumption and exports, others, like Totapuri and Neelum, are preferred for processing into pulp, juice, and concentrates. This differentiation helps processors select the right variety for value addition, ensuring optimal yields and taste. The table supports strategic cultivation planning, as farmers and industries can align variety selection with end-use demand. This also indicates a shift towards integrated orchard-to-market models, enabling better utilization and minimizing waste. Understanding varietal utility boosts both profitability and market orientation in mango farming.

Constraints in Mango export

- Fluctuations in output due to weather conditions – Unpredictable weather, including. Droughts, excessive rainfall, and temperature variations affect mango yield and quality.
- Costly transportation – High logistics costs, including cold chain requirements, make mango exports are expensive.
- Lack of gradation and quality control – Inconsistent grading and quality standards reducing competitiveness in international markets.
- Excessive use of pesticides and insecticides – Residue levels exceeding permissible limits can lead to rejection by importing countries.
- Marketing problems – Limited market access, inadequate branding, and lack of Promotional efforts hinder exports.
- Inefficient post-harvest management – Poor handling, storage, and processing lead to spoilage, and reduced shelf life.
- Suitability of few varieties for exports – Only select mango varieties meet international preferences, and phytosanitary requirements.
- High freight charges: Expensive air and sea freight increase export costs.
- Limited cargo space – Availability of refrigerated cargo space is often insufficient for large shipments.
- High packaging cost and poor labelling – Expensive packaging and non-compliance with labelling regulations affect market acceptance.

(Source: Baliyan *et al*., 2022)

Conclusion

India, the world's top mango producer, contributes approximately 41% of the global output but accounts for only 5–6% of exports due to post-harvest losses, inadequate processing facilities, and trade barriers. Most of the export value comes from processed products, highlighting the importance of value addition. Varieties such as Totapuri are preferred for processing, whereas Alphonso and Dasheri are mainly consumed fresh.

To unlock export potential, improvements are needed in cold chain systems, post-harvest practices, varietal research, and compliance with global standards (e.g., Global G.A.P). A.P. and SPS). Government schemes such as AEZs, ODOP, and MIDH offer policy support, but greater investment in infrastructure, certification, and branding is vital. Strengthening these areas can enhance exports, reduce waste, and increase rural income, thereby reinforcing India's role in the global mango market.

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