

A study on Present Status and Prospects for Mango Export from India

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Abstract

India occupies top position among mango productivity countries, but there is a competition for exporting due to overlapping mango season. Among the 30 commercially cultivates varieties in India, Totapuri is most exported. Quarantine treatments like radiation, vapour heat treatment and hot water immersion treatment are to be adopted before exporting. the government is providing proper planning and infrastructure for encouraging export.

Keywords: mango, export, India, quarantine, treatment.

Introduction

Mango (*Mangifera indica* L.) belonging to family Anacardiaceae is the most important and one of the choicest and most ancient fruits known to mankind commercially grown in India. It occupies a pre-eminent place amongst the sub-tropical areas. India has the richest collection of mango cultivars. Mango is the leading fruit crop of India and Alphonso produced in India is considered to be the king of fruits. India has a large opportunity to tap global trade in the export of mangoes. Beside relatively long period of availability (March to August), export worthy Mango varieties, economic liberalisation and priority to export of fresh products have opened up the possibility of boosting Mango exports from India

The present paper aims to :

1. analyze the area & production of mango in India
2. study the export performance of fresh mangoes from India

Secondary data on area, production & productivity of mango from various sources have been collected. Statistical tools like averages, percentage & growth rates

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are used wherever necessary.

World scenario

Mango covered an area of 4.946 million ha with a production of 37.12 million tons in the world during the year of 2010. India occupies top position among mango growing countries of the world and produces 40.48 % of the total world mango production. China and Thailand stood at second and third position among mango producing countries in the world with 4.366 and 2.551 million tons respectively. The other major mango producing countries in the world during 2010 were Thailand (2.550 million tons), Pakistan (1.784 million tons), Mexico (1.633 million tones) and Indonesia (1.314 million tons) respectively (Table 1).

Mango Season of major mango exporting countries

The main competitor countries for Indian mangoes are Venezuela, Costa Rica, Mexico & partially Pakistan & Ivory Coast because of overlapping mango season. The mango season of major mango exporting countries is shown in Table 2. Mexico, USA and Peru have a different mango season and, therefore, do not pose a real threat to Indian market.

Mango Production in India

Mango is grown in almost all the states of India. Andhra Pradesh tops the list in area of mango orchards. Other major mango area states are Uttar Pradesh, Odisha, Karnataka, Telangana, Tamil Nadu and Maharashtra. Rest of the states have quite less productive area. While in production Uttar pradesh is on the top. The productivity of Maharashtra is less due to emphasis on cultivation of Alphonso variety but in export value Maharashtra is on the top followed by Tamil Nadu, Gujarat, West Bengal, Karanataka and Andhra Pradesh (Table 3).

Varieties

India is home to more than 1000 varieties of mango, out of which nearly 30 varieties are grown commercially. Indian mangoes come in various shapes, sizes and colours with a wide variety of flavour, aroma and taste.

Table 1. Area (m ha), production (m t) & productivity (t ha⁻¹) of major mango producing countries in the World.

Sr. No.	Name	Area (m ha)	Production (m t)	Productivity (t ha ⁻¹)	% share
1	India	2.31	15.03	6.50	40.48
2	China	0.47	4.35	9.35	11.72
3	Thailand	0.31	2.55	8.20	6.87
4	Pakistan	0.17	1.85	10.62	4.97
5	Mexico	0.17	1.63	9.33	4.40
6	Indonesia	0.13	1.29	9.78	3.47
7	Brazil	0.08	1.19	15.83	3.20
8	Bangladesh	0.17	1.05	6.13	2.82
9	Other countries	0.83	6.58	7.95	17.72
10	World	4.95	37.12	7.51	100.00

Source : FAO 2017

Table 2. Mango season of major mango exporting countries in the World.

Sr. No.	Country	Mango Season
1	Mexico	May to August
2	Brazil	October to December
3	Venezuela	April to June
4	India	April to June
5	Pakistan	June to July
6	USA	September
7	Costa rica	April to June /July
8	Peru	December to February
9	Ivory coast	June to July

As per mango export business plan, there are about 30 varieties of mangoes which are grown commercially for export purpose namely Totapuri, Alphonso, Kesar, Dashehari, Badami, Banganpalli, Rajapuri etc. Totapuri is most exported mango variety of India followed by Alphonso, Kesar, Badami, Banganpalli and Rajapuri in the year 2017. The details about state wise mango varieties grown commercially and its season are mentioned in Table 4 given below.

Export of Mango from India

India is the leading producer of mangoes accounting for more than 40 per cent of mango production worldwide, but only 3.2 per cent of its production is exported. Other major mango producing countries, like Mexico, Brazil, and Pakistan export much higher quantity of their production contributing to their international trade. At present, Indian fresh mangoes reach markets of over 127 countries. Some of regular importers of Indian fresh mangoes are UAE, UK, Kuwait, Singapore, Saudi Arabia, Qatar and some countries in gulf region.

The country wise quality specification and quarantine treatment for mango export are different and these are detailed below. A summary is also provided in Table 5.

Quarantine Treatments for Mango Exports

Radiation processed mango for export to USA & Australia

To facilitate the use of radiation processing technology for export of mango from India to the USA a Framework Equivalency Work Plan (FEWP) was signed between the Department of Agriculture and Cooperation, Government of India and the United States Department of Agriculture on February 17, 2006. In India, Bhabha Atomic Research Center (BARC) has carried out R&D on the radiation processing of mango. The technology has been approved by Ministry of Health, Government of India under Prevention of Food Adulteration Act Rules. Besides overcoming quarantine barrier the radiation processing can also extend the shelf life by delaying the ripening process by 7-8 days allowing the commodity to reach destination without spoilage. Radiation processing of mango can be done at KRUSHAK and Radura, a low dose radiation processing facility at Lasalgaon, near Nashik. Facility erected at Vashi by MSAMB which is also certified by APHIS, USDA for exporting mangoes to USA and Australia.

India, in spite of being the second largest producer of fruits and vegetables in the world after China, exports only a tiny fraction. Increasing export means earning valuable foreign exchange. However, the exports of fresh fruits and vegetables are restricted because of the presence of quarantine insect pests. No country would like to import insect pests of other country along with the agricultural produce. It is for this reason, Indian mango, such as Alphonso and Kesar have not

Table 3. State wise area and production of mango in India.

Sr. No.	State	Year 2015 -16		Year 2016 -17	
		Area (m ha)	Production (m t)	Area (m ha)	Production (m t)
1	Andhra Pradesh	0.33	2.80	0.33	3.16
2	Uttar Pradesh	0.26	4.51	0.26	4.54
3	Odisha	0.20	0.78	0.20	0.87
4	Karnataka	0.18	1.73	0.19	1.83
5	Telangana	0.19	1.78	0.18	1.68
6	Tamilnadu	0.13	0.98	0.16	1.17
7	Maharashtra	0.16	0.46	0.16	0.51
8	Total				

Source: Anon. 2017

Table 4. State wise mango growing season and varieties grown commercially in India.

Sr. No.	State	Season	Important Varieties
1.	Andhra Pradesh	Mid Feb. - mid July	Banganpalli, Totapuri, Suvamrekha, Neelum
2.	Gujarat	April - July	Alphonso, Kesar, Rajapuri
3.	Karnataka	April – July	Banganpalli, Totapuri, Pairi, Neelum, Alphonso,
4.	Maharashtra	March – July	Alphonso, Kesar, Pairi
5.	Uttar Pradesh	May - August	Bombay Green, Dashehri, Langra, Chausa, Amrapali

Source: Indian Horticulture Database

reached the supermarkets in the USA. For they are likely to be infested with fruit flies and mango stone weevil. It is, however, possible to overcome these quarantine barriers by using appropriate technology. Radiation processing is a newly emerging technology that can eliminate metamorphic stages of these insect pests. It provides a number of advantages in being a non-residue forming, environment friendly and a cold process. It can also be applied to pre-packed commodity avoiding any risk of post-processing contamination.

Vapor Heat Treatment (VHT)

Vapor-heat treatment (VHT) is accepted quarantine treatment for export of mangoes to Japan, European Union and New zeland. VHT enhances ripening of fruits during storage, resulting in better marketability of fruits due to uniform peel colour development. VHT also reduces rate of fruit softening and mesocarp color development. Mango fruit apparently have capacity to recover from VHT.

In VHT, heated air saturated with water vapor is used to raise temperature of commodity to a required point and holds temperature for a specified period. Latent heat released by condensation of vapor on commodity raises pulp temperature quickly and evenly and thus prevents damage. Temperature-time relationship varies with the commodity and the pest involved. In case of treatment against fruit flies, pulp temperature of the commodity is raised by the saturated water vapor to 46-48 °C for 4 hours and then the fruits are held at required temperature for a period of 30 minutes. Exposure periods and treatment temperatures also vary with kind of fruit fly species and commodity involved.

Fruits, before subjecting to VHT, should be conditioned, usually at a relative humidity less than 100 per cent. Fruits should be cooled immediately after VHT by allowing the fruits to simply stand for at least 30 minutes after removal from the VHT chamber in insect proofed and well-ventilated chambers. After cooling, mangoes are stored at 55 °F to 57 °F (12.8 °C) at 85 to 90 % relative humidity. Adequate safeguards must be maintained to prevent re-infestation or contamination of treated commodities or their containers. Packing rooms must be fly-proof and only treated host material permitted therein.

VHT is mandatory operation to insure export of fruit-fly-free fruits. However, in order to avoid excessive incidence of spongy tissue due to VHT, it is recommended to harvest Alphonso mango fruits three days before scheduled VHT date. This also insures fruit-fly-free fruits with reduced stem-end-rot fruits without impairing fruit quality.

Hot water Immersion treatment

Hot-water immersion consists of submerging the fruit in a hot-water bath at a specific temperature for a specified time, based on the weight of the commodity being treated and which helps to control the pests like fruit-fly with exposure times varying from 60 to 90 minutes. Variations are noted as per requirement of importing country, pest species and life stages of insect pests. Hot water is an effective heat transfer medium and, when properly circulated

Table 5. Export specifications for mangoes.

Specification	Countries/Regions				
	Middle East	Netherlands / Germany	U.K.	Japan	USA/Australia
Alphonso weight (g)	200-250	250-300	250-300	250-30	250-300
Kesar weight (g)	200-250	225-250	225-250	250-300	250-300
Packing (doz kg ⁻¹)	1 / 2.5	1 / 2.5	1 / 2.5	1 / 3.5	1 / 3.5
Storage Temperature (°C)	13	13	13	13	13
Export by	Sea	Air	Air	Air	Air
Quarantine Treatment	- (Residue Report)	VHT/HWT	VHT/HWT	VHT	Radiation

Source: National Horticulture Board

through the load of fruit, quickly establishes a uniform temperature profile. Hot-water immersion also has the additional benefit of controlling post-harvest microbial diseases such as anthracnose and stem-end-rot. Hot-water immersion is currently used to successfully treat mangoes infested with the Mediterranean fruit fly and several different *Anastrepha* species of fruit fly before importation into New zeland, EU and Mauritius for 48 °C for 60 minutes for mango fruits having weight less than 500 g. However, it was observed that 48 °C for 60 minute treatment is not suitable for Alphonso variety produced in Konkan region.

Country-wise Mango export from India

United Arab Emirates is the main export market for India followed by Nepal, United Kingdom, Saudi Arabia & Qatar in term of quantity. The doors of USA, Australia & Japan markets were opened recently, but due to limited infrastructure facilities, the share of Indian mangoes in these markets are limited. MSAMB has developed 43 export facility centers along with HWT, radiation treatment and VHT facilities in last five years which will definitely help to increase export of mangoes from India. The country wise status of mango export from India is given in Table 6.

At present the share of India in mango trade in UAE, Kuwait, Qatar and Bahrain is more than 30 % while in other major mango importing countries it is very negligible. Due to availability of radiation facility at Vashi, New Mumbai, the export to USA and Australia has increased in last two years. The main competitors are Pakistan, Egypt & Thailand. The India's export scenario of fresh mangoes for 2016 is given in Table 7.

Table 6. Country-wise mango export during 2016-17 and 2017-18.

Country	Year 2016-17		Year 2017-18 (April-Oct)	
	Quantity (t)	Value (₹ Lakhs)	Quantity (t)	Value (₹ Lakh)
Total	52,761	44,366	46,148	34,445
UAE	28,483	24,747	21,956	16,159
UK	3,031	4,957	3,695	4,738
Saudi Arabia	2,372	2,446	2,531	2,074
Qatar	2,254	2,147	1,998	1,575
Kuwait	1,100	1,911	1,148	1,312
Nepal	9,415	1,604	7,840	1,496
USA	616	1,549	798	1,770
Bahrain	1,086	979	1,227	811
Singapore	841	878	793	785

Source: DGCIS, Calcutta

World Mango Import

Mango import is a thriving activity especially in the developed countries of America and Europe. Top ten mango importers are USA, Netherlands, China, Germany, the UK, Canada, France, Japan, Hong Kong and Spain in that order, clearly pointing to the fact that developed countries are the main importers. Of the ten top importing countries, USA, the Netherlands, UK and Germany account for 44.65 % of total world imports. The main suppliers for these countries are Mexico, Brazil and Peru. The share of India in world export is only 3.25 % though India ranks first in production. Global Import

Table 7. India's export scenario of fresh mangoes (2016).

Sr. No.	Country	Total Import		India's status as Exporter			Major Exporting Countries (% Share in Value)				
		Quantity	Value	Quantity	Value	% Share in value					
1	UAE	103417	106	31065	37	34.8	India (34.8)	Pakistan (28.7)	Kenya (10.1)	Egypt (7.1)	Thailand (6.1)
2	Kuwait	17232	25	8040	11	43.4	India (43.5)	Egypt (32.6)	Pakistan (4.8)	Yemen (4.3)	Indonesia (4.0)
3	U K	82937	171	3730	7	4.2	Brazil (19.5)	Peru (13.3)	Ghana (13.1)	Pakistan (8.9)	Netherlands (5.5)
4	U S A	464797	583	915	7	1.2	Mexico (55.7)	Ecuador (11.4)	Peru (11.3)	Brazil (6.6)	Philippines (6.0)
5	Qatar	9958	15	3345	5	36.2	India (36.2)	Egypt (28.3)	Pakistan (11.9)	Thailand (4.6)	Australia (4.2)
6	Bahrain	9107	14	3307	5	34.1	India (34.1)	Egypt (21.1)	Pakistan (18.3)	Kenya (7.9)	Thailand (5.7)
7	Singapore	20337	29	1128	2	6.8	Thailand (47.0)	Malaysia (15.3)	Australia (12.4)	Philippines (8.0)	India (6.7)

Source: Msamb

Table 8. Global import scenario of fresh mangoes (2016).

Sr. No.	Country	Total Import		India's status as Exporter				Major Exporting Countries (% Share in Value)				
		Quantity	Value	Quantity	Value	% Share in value	Rank					
	World Total	15,77,697	2,490	54,542	81.0	3.3	7	Mexico (16.3)	Thailand (14.3)	Brazil (13.3)	Peru (11.9)	Philippines (3.5)
1	U S A	4,64,797	583	915	7.0	1.2	9	Mexico (55.7)	Ecuador (11.4)	Peru (11.3)	Brazil (6.6)	Philippines (6.0)
2	Netherlands	1,66,017	250	443	0.1	0.1	32	Brazil (32.0)	Peru (28.7)	Cote D Ivoire (6.0)	Dominican Republic (4.1)	France (3.9)
3	Germany	73,649	174	435	1.2	0.7	19	Brazil (40.6)	Peru (19.3)	Spain (6.8)	Cote D Ivoire (6.4)	Burkina Faso (3.6)
4	U K	82,937	171	3730	7.1	4.2	8	Brazil (19.5)	Peru (13.3)	Ghana (13.1)	Pakistan (8.9)	Netherlands (5.5)
5	China PRP	72,773	169	0.00	0.0	0.0	NA	Thailand (76.7)	Malaysia (13.6)	Australia (4.3)	Other Asia (2.1)	Peru (2.0)
6	France	58,109	127	130	0.4	0.3	22	Peru (27.3)	Spain (14.7)	Israel (11.6)	Cote D Ivoire (11.3)	Brazil (8.3)
7	UAE	1,03,417	106	31,065	37.0	34.8	1	India (34.8)	Pakistan (28.7)	Kenya (10.1)	Egypt (7.1)	Thailand (6.0)

Source: Msamb

Scenario of fresh mangoes is given in Table 8.

The scenario of export of mangoes may be changed by efficient orchard management, improvements in infrastructure, use of advanced technologies, and maintaining food quality standards such as GAP, ISO 9001 and HACCP. India certainly has the potential to become the leading exporter.

Implications

Mango export has been found to be a lucrative business and there is vast scope.

To increase the export of mango, basic infrastructure facilities like pre-cooling cold storages, grading and handling systems, laboratories, reefer vans, VHT facility, Irradiation facility need to be established in production zones.

New international markets need to be identified through planned strategies in different countries as per their quality specifications, phyto-sanitary measures, codex standards and market preferences.

In India, Maharashtra holds a prominent place in the area under mango but productivity is very low. This calls for concerted efforts by the extension organizations of the

state to educate the mango growers in production and post-harvest management technologies for mango crop.

Government of India has instituted an elaborate mechanism, which includes all these operations.

The early harvested crop of mangoes (April-May) in India is well suited to international demand, as there is less competition from other countries during that period.

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