

Market Access Plan for Mango

TA-6782 IND: Enhancing Market Linkages for Farmer Producer Organizations

November 2023



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1 Crop Background

Mango is an edible tropical stone fruit produced from the tree scientifically known as *Mangifera indica*, is a native crop of South Asia. There are various cultivars of mango worldwide depending on which the fruit varies in size, color, taste, aroma, and weight.

Mango is a rich source of carbohydrates, Vitamin C and folate, and small quantity of protein.

Mangoes are mostly eaten as a table fruit (ripened). Ripened mangoes are also converted into various processed products such as pulp, juice, jams, and jellies. Raw mangoes are mostly used for making pickle, powder, traditional beverages, etc. The current market access plan is only focused on ripened mango.

1.1 Global Scenario¹

1.1.1 Production

India is the largest producer of mango in the world, followed by China and Indonesia. India accounts for almost 44% of the total mango production in the world. However, average productivity of mango in India is lower as compared to countries like Brazil and Malawi.

S. No.	Country	Production (MT)	Area (MT)	Productivity (MT/ha)
1	India	24,968,000	2,625,000	9.51
2	China	3,961,662	386,165	10.26
3	Indonesia	3,561,867	266,699	13.36
4	Pakistan	2,677,017	213,514	12.54
5	Mexico	2,441,496	215,591	11.32
6	Brazil	2,057,765	98,198	20.96
7	Malawi	1,696,121	69,999	24.23
8	Thailand	1,635,233	204,008	8.02
9	Bangladesh	1,458,554	139,798	10.43
10	Vietnam	1,439,273	113,608	12.67
11	World	57,011,283	5,974,437	9.54

As evident from the below table, India has maintained its global leadership position in mango production over the years.

Countries	2017	2018	2019	2020	2021
India	23,332,000	24,966,000	25,631,000	24,678,000	24,968,000

¹ Source: FAOSTAT; includes mango, mangosteen, and guava

Countries	2017	2018	2019	2020	2021
China	3,177,878	3,301,507	3,449,791	3,969,537	3,961,662
Indonesia	2,566,046	3,083,621	3,294,817	3,617,271	3,561,867
Pakistan	2,331,736	2,320,050	2,270,229	2,344,647	2,677,017
Mexico	2,283,192	2,178,927	2,396,675	2,373,111	2,441,496
Brazil	1,547,928	1,899,261	2,002,849	2,135,304	2,057,765
Thailand	3,087,479	1,576,419	1,643,058	1,657,589	1,635,233
Malawi	1,323,680	1,694,448	2,070,924	1,976,075	1,696,121
Bangladesh	1,517,691	1,407,308	1,456,331	1,448,396	1,458,554
Egypt	1,404,232	1,429,367	1,396,540	1,544,350	1,327,865
World	52,620,298	54,307,128	56,532,219	56,685,547	57,011,283

1.1.2 Important Global Varieties²

Kent - Aroma: Peach and tropical fruit; Flavor: Sweet with hints of sour notes; Texture: Juicy, tender flesh with limited fibers; Color: Dark green and often has a dark red blush over a small portion of the mango; Shape: Large oval shape; Primary Source Country: Mexico, Peru, Ecuador

Keitt - Aroma: High in citrus notes; Flavor: Sweet and fruity; Texture: Firm, juicy flesh with limited fibers; Color: Dark to medium green, sometimes with a pink blush over a small portion of the mango; Shape: Large oval shape; Primary Source Country: Mexico, Ecuador, Brazil, United States

Ataulfo/Honey - Aroma: Tropical fruit and peachy notes; Flavor: Sweet and sour with tropical fruit notes; Texture: Smooth, firm flesh with no fibers; Color: Vibrant yellow; Shape: Small, flattened oblong shape; Primary Source Country: Mexico, Peru, Ecuador, Brazil

Tommy Atkins - Aroma: Small hints of tropical fruit and citrus; Flavor: Tart with sweet notes; Texture: Firm flesh due to fibers throughout; Color: A dark red blush often covers much of the fruit with green and orange-yellow accents; Shape: Medium to large with oval or oblong shape; Primary Source Country: Mexico, Brazil, Ecuador, Guatemala

Alphonse - This Indian variety is a mild tasting mango with firm flesh that can range in skin color from purple to yellow and is oblong in shape.

Edward - This fiber-free sweet and tangy flavored mango can range in color from pink to yellow and is round or oblong in shape.

² Source: National Mango Board, Florida, USA

Kesar - This Indian variety is a fiber-free sweet mango that can vary in color from green to yellow with a round shape.

Manila - This fiber-free sweet mango can range in color from orange to yellow to pink, and has a narrow shape

Palmer - This mild flavored, firm flesh mango ranges from purple to red to yellow, and is oblong in shape

1.1.3 Global Trade

Amongst all the continents, South America is the largest exporter of mangoes followed by Asia. Mexico is the largest exporter of mangoes, followed by Thailand and Brazil. While India is the largest producer of mangoes in the world, it is also the leading consumer and thus its exports are relatively lower placing it at 8th position.

S. No.	Countries	Quantity (MT)	Value ('000 USD)
1	Mexico	429,391	506,151
2	Europe	409,826	813,360
3	Thailand	382,093	665,280
4	Brazil	273,071	250,134
5	Netherlands	265,935	506,683
6	Peru	253,042	315,635
7	Pakistan	189,690	164,719
8	India*	170,212	185,236
9	Vietnam	96,000	286,000
10	Spain	66,535	129,637
11	World	2,597,573	3,678,059

Countries	2017	2018	2019	2020	2021
Mexico	435,815	395,539	412,504	421,636	429,391
Thailand	244,480	260,081	495,452	391,280	382,093
Netherlands*	184,896	218,744	221,323	239,007	265,935
Brazil	179,744	170,630	216,048	243,466	273,071
Peru	162,938	209,734	201,068	239,391	253,042
Vietnam	204,999	197,579	196,860	105,356	96,000
India	172,441	153,284	147,242	128,018	170,212
Pakistan	35,616	70,781	97,099	107,195	189,690
Ecuador	58,994	59,825	53,116	60,102	62,681

Table 4: Mango Export trend of Top 10 Countries					
Countries	2017	2018	2019	2020	2021
Spain	41,523	69,665	47,174	60,159	66,535
World	2,136,333	2,164,614	2,425,009	2,344,272	2,597,573

*Transit country

USA, Netherlands, Germany, UAE, and Saudi Arabia are the top five mango importing countries of the world. Major countries of origin for imports for various importing countries depend upon the transit distance and regional taste preferences. Accordingly, USA imports primarily from Mexico, Peru, Ecuador, Brazil and Guatemala. Imports in Europe are mostly from Brazil, Peru, and Spain.

Table 5: Top Mango Importers - 2021			
S. No.	Countries	Quantity (MT)	Value ('000 USD)
1	United States of America	558,198	628,147
2	Netherlands	297,256	433,595
3	Germany	110,099	242,412
4	United Arab Emirates	104,818	97,643
5	Saudi Arabia	86,586	70,367
6	United Kingdom	84,552	230,192
7	Spain	78,823	129,061
8	Malaysia	76,839	30,585
9	Iran	67,921	49,576
10	France	66,165	153,623
11	World	2,203,770	3,088,199

Table 6: Mango Import trend of Top 10 Countries					
Countries	2017	2018	2019	2020	2021
United States of America	485,477	476,891	493,030	549,210	558,198
Netherlands	212,916	250,036	250,253	277,727	297,256
Germany	87,349	102,580	91,191	97,713	110,099
United Arab Emirates	87,504	78,723	89,852	91,466	104,818
United Kingdom	83,567	84,793	77,946	73,227	84,552
Saudi Arabia	70,377	53,572	54,723	79,584	86,586
France	62,145	67,073	70,350	60,520	66,165
Spain	43,428	53,513	59,738	70,290	78,823
Malaysia	61,389	62,411	38,029	63,054	76,839
Vietnam	84,848	69,481	63,208	7,622	34,196
World	1,740,346	1,859,615	1,819,568	1,919,807	2,203,770

1.2 Indian Scenario³

1.2.1 Production

Mango is recognized as the national fruit in India. India is the largest producer of Mango in the world with more than 20 million MT.

Year	Production (MT)	Area (ha)	Productivity (MT/ha)
2022-23 (1st Estimate)	20,770,343	2,396,487	8.67
2021-22	20,772,330	2,350,297	8.84
2020-21	20,385,993	2,316,811	8.80
2019-20	20,264,901	2,281,116	8.88
2018-19	21,378,091	2,295,849	9.31

Andhra Pradesh is the largest mango producing state in India, followed by Uttar Pradesh and Karnataka.

States	Production (MT)	Area (ha)	Productivity (MT/ha)
Andhra Pradesh	4,727,316	393,943	12.00
Uttar Pradesh	4,578,740	319,930	14.31
Karnataka	1,717,425	176,717	9.72
Bihar	1,549,973	160,237	9.67
Telangana	979,849	120,297	8.15
Tamil Nadu	943,368	147,983	6.37
West Bengal	942,985	113,896	8.28
Gujarat	917,196	166,325	5.51
Madhya Pradesh	860,229	61,818	13.92
Odisha	850,299	219,287	3.88
Maharashtra	449,230	164,403	2.73
Total	20,772,330	2,350,297	8.84

2022-23	2021-22	2020-21	2019-20	2018-19
Andhra Pradesh	Andhra Pradesh	Andhra Pradesh	Andhra Pradesh	Andhra Pradesh
Uttar Pradesh	Uttar Pradesh	Uttar Pradesh	Uttar Pradesh	Uttar Pradesh
Karnataka	Karnataka	Karnataka	Karnataka	Karnataka
Bihar	Bihar	Bihar	Bihar	Bihar
Telangana	Telangana	Telangana	Telangana	Tamil Nadu
Tamil Nadu	Tamil Nadu	Gujarat	Gujarat	Gujarat

³ Source: Ministry of Agriculture & Farmers' Welfare, Government of India; APEDA Agri Exchange; AGMARKNET; Department of Agriculture, Maharashtra

2022-23	2021-22	2020-21	2019-20	2018-19
West Bengal	West Bengal	West Bengal	West Bengal	Telangana
Gujarat	Gujarat	Odisha	Madhya Pradesh	West Bengal
Madhya Pradesh	Odisha	Madhya Pradesh	Odisha	Odisha
Odisha	Madhya Pradesh	Tamil Nadu	Tamil Nadu	Madhya Pradesh

Maharashtra accounts for 2% of India's production and ranks 11th in total output.

Year	Production (MT)	Area (ha)	Productivity (MT/ha)	% of India's
2022-23 (1st Estimate)	449,230	164,403	2.73	2.16%
2021-22	459,149	164,403	2.79	2.21%
2020-21	442,347	162,755	2.72	2.17%
2019-20	450,593	155,528	2.90	2.22%
2018-19	526,515	165,955	3.17	2.46%

District-wise production of mangoes in Maharashtra is provided in the table below. Ratnagiri, Sindhudurg and Raigad are the top 3 mango producing districts in Maharashtra.

Districts	Production (MT)	Area (ha)	Productivity (MT/ha)
Ratnagiri	62,280	132,880	0.47
Sindhudurg	33,920	38,500	0.88
Raigad	14,568	31,450	0.46
Palghar	12,277	10,721	1.15
Ahmednagar	5,890	27,939	0.21
Nashik	4,935	7,846	0.63
Pune	4,846	38,767	0.13
Osmanabad	3,865	28,160	0.14
Kolhapur	3,020	8,850	0.34
Thane	2,479	2,425	1.02
Total	459,149	164,403	2.79

1.2.2 Important Varieties and production clusters

India produces different varieties of mangoes spread across various states.

State	Districts	Important Varieties
Andhra Pradesh	Chittor, Ranga Reddy, Medak and Parts of Mahaboob nagar, Krishna	<i>Banganpalli, Bangalora, Cherukurasam, Himayuddin, Totapuri, Kesar, Suvarnarekha, Dasherri, Himayat, Peddarasam, Ratna,</i>

State	Districts	Important Varieties
		<i>Chinnarasam, Manjeera, Neeleshan, Amrapali, Mallika, Sindhu, Arkapuneet,</i>
Uttar Pradesh	Lucknow, Unnao, Hardoi, Sitapur, Barabanki, Sahranpur, Bijnaur, Meerut, Muzaffarnagar, Baghpat, Bulandshar and Jyotifulenagar	<i>Bombay Green, Dasherri, Fajri, Langra, Safeda Lucknow, Chausa, Ratual, S.Saurabh, Amrapali, Malihabadi, Bombay yellow</i>
Maharashtra	Ratnagiri, Sindhudurg, Raigad and Thane, Aurangabad, Jalna, Beed, Latur, Ahmednagar and Nasik	<i>Alphonso, Kesar, Mankurad, Mulgoa, Pairi, Rajapuri, Neelam, Totapuri</i>
Gujrat	Ahmedabad, Kheda, Anand, Vadodra, Surat, Navsari, Valsad, Bharuch and Narmada	<i>Alphonso, Kesar, Rajapuri, Vanraj</i>
Kerala	Thrissur, Ernakulam, Kottayaam, Alappuzha, Pathanumthitta, Kollam, Thiruvanthapuram, Idukki and Palakkod	<i>Mundappa, Olour, Pairi, Neelam, Nadassala, Suvarnarekha, Muthalamookkam</i>
Tamil Nadu	Madurai, Theni, Dindigul, Virudhunagar and Tirunelveli	<i>Banganpalli, Bangalora, Neelum, Rumani, Mulgoa, Alphonso, Kalepad, Sendurga, Malguavo, Immampasant, Kallmai</i>
Gujrat	Ahmedabad, Kheda, Anand, Vadodra, Surat, Navsari, Valsad, Bharuch and Narmada	<i>Alphonso, Kesar, Rajapuri, Vanraj</i>

1.2.3 Trade – International

In 2022-23, India exported 22,964 MT of mangoes, UAE, UK, Qatar, Oman and Nepal being the major import destinations.

Year	Quantity (MTs)	Value (INR Crs)
2022-23	22,964	378
2021-22	27,873	327
2020-21	21,034	272
2019-20	49,659	400
2018-19	46,510	406

Table 13: Top 10 Export Destination (2022-23)		
Country	Quantity (MTs)	Value (INR Crs)
UAE	12,140	175
UK	2,769	58
Qatar	2,026	29
Oman	1,123	21
Nepal	1,007	3
Kuwait	930	22
USA	814	34
Bhutan	393	3
Singapore	352	7
Canada	328	8

Table 14: Exports to Top 10 Destination (Quantity-wise) from 2018-19 to 2022-23					
Country	2018-19	2019-20	2020-21	2021-22	2022-23
UAE	16,398	16,567	12,756	12,924	12,140
Nepal	6,975	11,975	385	4,659	1,007
UK	4,014	4,356	2,472	3,377	2,769
Oman	3,618	3,637	1,478	1,693	1,123
Qatar	2,878	2,745	1,762	2,117	2,026
Bangladesh	4,814	3,038			
Kuwait	1,057	1,171	516	773	930
Saudi Arabia	1,639	1,517	166	337	187
Singapore	1,125	688	373	350	352
USA	951	1,095	1	17	814
Total	46,510	49,659	21,034	27,873	22,964

Alphonso and Kesar are the major varieties of mango exported from India and following tables year and destination-wise trade details of these two varieties.

Table 15: India Exports - Only Alphonso		
Year	Quantity (MTs)	Value (INR Crs)
2022-23	2,830	61
2021-22	5,995	75
2020-21	3,196	46

Table 16: Top 5 Export Destination in 2022-23 - Only Alphonso		
Country	Quantity (MTs)	Value (INR Crs)
UAE	1,495	17
UK	554	9
Kuwait	248	7

Table 16: Top 5 Export Destination in 2022-23 - Only Alphonso		
Country	Quantity (MTs)	Value (INR Crs)
Qatar	337	4
Oman	194	2

Table 17: Exports to Top 5 Destination (Quantity-wise) from 2020-21 to 2022-23 - Only Alphonso			
Country	2020-21	2021-22	2022-23
UAE	1,495	1,563	966
Nepal		2,185	
UK	554	560	447
Kuwait	248	438	338
Qatar	337	359	287
Total	3,196	5,995	2,830

Table 18: India Exports - Only Kesar		
	Quantity (MTs)	Value (INR Crs)
2022-23	1,750	39
2021-22	2,319	51
2020-21	984	22

Table 19: Top 5 Export Destination in 2022-23 - Only Kesar		
Country	Quantity (MTs)	Value (INR Crs)
UK	1,294	25
USA	157	7
Canada	97	2
UAE	35	.45
Oman	34	1

Table 20: Exports to Top 10 Destination (Quantity-wise) from 2020-21 to 2022-23 - Only Kesar			
Country	2020-21	2021-22	2022-23
UK	808	1,804	1,294
Nepal		2,185	
Canada	25	88	97
UAE	47	87	35
USA			157
Total	984	2,319	1,750

1.2.4 Trade – Domestic

Government notified APMC (Agricultural Produce Marketing Committee) markets / mandis are one of the important channels of mango trade in India. Below table provides arrival and modal price details of mango in the major markets in 2022.

Mandis	District	State	Arrivals (MT)	Average Modal Price (INR / Qtl)
Azadpur	Delhi	Delhi	134574	7255
Jainath	Adilabad	Telangana	122879	918
Mumbai Fruit Market	Mumbai	Maharashtra	104592	21600
Gaddianaram	Hyderabad	Telangana	86901	4178
Ajmer (F&V)	Ajmer	Rajasthan	83547	4566
Kanpur (Grain)	Kanpur	Uttar Pradesh	72965	4124
Jagtial	Karimnagar	Telangana	57472	4023
Srinivasapur	Kolar	Karnataka	20059	2600
Bulandshahar	Bulandshahar	Uttar Pradesh	19160	1968
Nagpur	Nagpur	Maharashtra	13792	3960

Mandi	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Azadpur	8566	11251	9640	7764	4512	4328	3430	5841	12692	11827	11823	12112
Jainath	0	0	0	854	919	1000	0	0	0	0	0	0
Mumbai Fruit Market	3254	61558	32171	22880	13473	9565	7148	9800	14309	9609	4711	4111
Gaddianaram	4688	5250	6420	5939	3198	2966	3286	3907	0	0	0	0
Ajmer (F&V)	0	5232	4915	5126	4601	3050	3539	5677	6750	6500	6625	6750
Kanpur (Grain)	0	0	0	0	3264	2654	3525	6544	0	0	0	0
Jagtial	0	0	0	6170	2929	4243	0	0	0	0	0	0
Srinivasapur	0	0	0	0	2167	2762	3433	0	0	0	0	0
Bulandshahar	0	0	0	0	0	1856	2153	0	0	0	0	0
Nagpur	0	9100	5223	5213	4275	3511	3860	2362	0	0	0	0

Within Maharashtra, Mumbai, Nagpur, Amravati, Nashik and Pune are the major markets for mango.

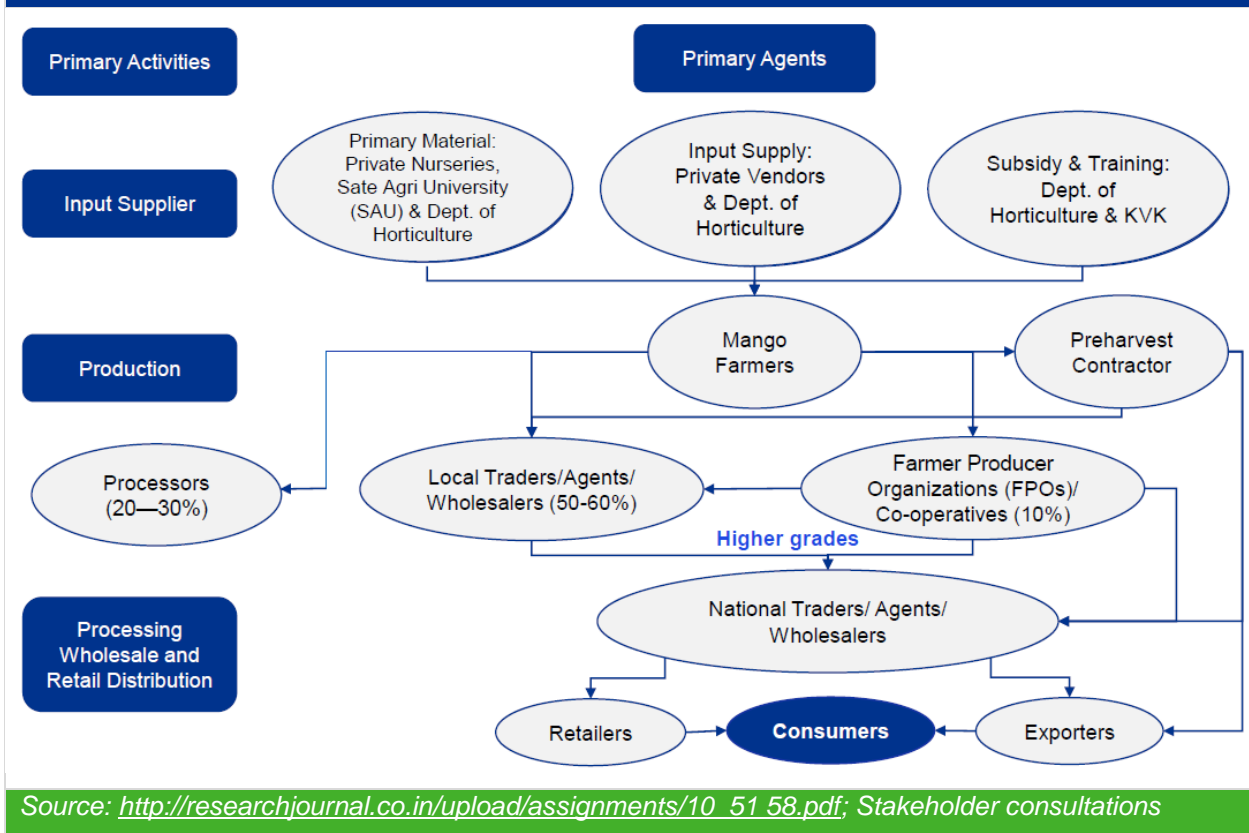
Table 23: Top 5 Mandis for Mango in Maharashtra			
Mandis	District	Arrivals (MT)	Average Modal Price (INR / Qtl)
Mumbai Fruit Market	Mumbai	104592	21600
Nagpur	Nagpur	13792	3960
Amravati (F&V)	Amravati	4348	3989
Nashik	Nashik	3878	14098
Pune	Pune	3517	4068

Table 24: Price Trend for Mango in Top 5 Mandis in Maharashtra (INR / Qtl)												
Mandi	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mumbai Fruit Market	3254	61558	32171	22880	13473	9565	7148	9800	14309	9609	4711	4111
Nagpur	0	9100	5223	5213	4275	3511	3860	2362	0	0	0	0
Amravati (F&V)	0	0	5847	3783	3860	3767	4365	4750	0	0	0	0
Nashik	0	0	18357	20150	13571	7833	4808	4000	0	0	0	0
Pune	5667	7364	5981	2588	1973	1978	2940	4125	4917	6250	4933	5054

1.2.5 Value Chain Map

The mango value chain starts from nurseries / institutions supplying saplings to farmers. Trainings are provided through Government Departments and Krishi Vigyan Kendras. Mango farmers sell their produce to local traders / aggregators, processors, FPOs / cooperatives, and contract farming players. Majority farmers sell their produce to local traders and aggregators. Mangoes are supplied from traders / wholesalers to major consumption markets across the country and thereby to processors. The structure of mango value chain is provided in the figure below.

Figure 1: Structure of Mango Value Chain



2 Marketing Strategy

Individual farmers and FPOs face issues in accessing profitable markets for their produce. Key challenges for them are their remote locations, low volumes, high transportation costs, limited market information / knowledge of requirements, and the lack of marketing skills. The following market strategy has been prepared with a focus on providing information that helps FPOs in accessing reliable and profitable markets, while ensuring their produce meets market standards. In addition, it is envisaged that the FPOs have better bargaining power, some of the value chain activities are shifted towards them and there is a win-win situation for both FPOs and associated value chain actors / market players. Also, while providing information on opportunities, associated risks have also been highlighted. Prior to a detailed market segment-wise strategy, some of the common and cross-cutting interventions that are required at the end of FPOs for better market access are given below:

Commodity resource mapping and Know Your Farmers (KYF): FPOs should keep information on acreage of cultivable land under different crops, approximate marketable crop available with the farmers in the season, etc. This will help FPOs to have an idea of the volumes to be handled in the season and plan to effectively market their produce eventually.

Aggregate large volumes of produce: FPOs can establish long-term business relationship only if they are able to consistently supply sufficient quantity of produce, as per the buyer's quality requirements. FPOs can increase procurement catchment area to consistently meet minimum requirement quantities.

Flexibility with payment terms: Many markets function on credit cycle, which can vary from as low as 5-7 days to as high as 30-60 days. FPOs should have sufficient working capital to made credit cycle and farmer payments.

Have good market intelligence: FPOs should have good market intelligence to decide on store / sell decisions and to determine which market to send the produce to. Market intelligence can be collected through online sources such as Government data and news articles, and through on-ground network of contacts in different parts of the country. Keeping a tab on market situations in target export markets will help FPOs in market entry and expansion.

Appointment of manager: FPOs can appoint a manager for its market linkage business. This will help in better sales planning, coordination with buyers for purchase and payment timelines. It can also appoint a manager for procurement activities. For FPOs to expand its business and supply to more buyers, it is necessary to have strong procurement, and appointment of manager can help in establishing the same.

Diversify supply options: All types of markets and customers come with both opportunity and risks for FPOs. This document also details on potential risks that FPOs might face in each market. To mitigate risks, FPOs should ensure that it deals in multiple markets and with multiple customers in each market. In addition, to get quality commensurate pricing, FPOs need to supply each market with its required quality of produce.

This section details out the strategy that the FPOs can adopt to supply mangoes in the major market segments, namely, 1) Export Markets, 2) Domestic Markets, 3) Organized retail and eCommerce, and 4) Processors. Key components of this section are:



2.1 Export Markets

Regions / countries covered under export markets are those to which mango is mostly exported from India. Export markets are classified as 1) Europe, 2) Middle East, and 3) United States of America (USA).

2.1.1 Europe⁴

2.1.1.1 Characteristics of the Segment

In the European market, mangoes are mostly imported by specialized traders. Common forms of mangoes popular in the supermarkets are ready-to-eat / ripened and fresh cut mangoes. Most popular varieties are Kent and Keitt. Some importers also have packing and ripening infrastructure to cater to the growing demand of ready to eat mangoes. Market for mangoes in Europe is divided into four main segments.

- 1) Top segment: Class I or Extra Class
- 2) High segment: tree ripened mangoes, freshly cut mangoes, organic mangoes, Class I or Extra Class
- 3) Normal segment: ready to eat mangoes (ripened in destination), Class I

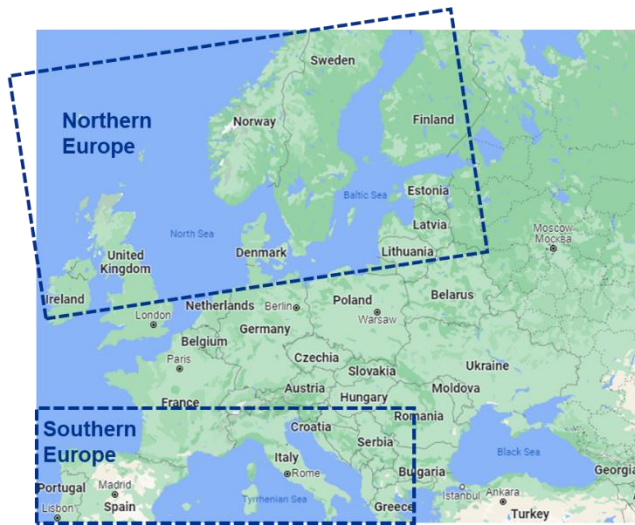
⁴ Source: Centre for the Promotion of Imports from developing countries (CBI), Ministry of Foreign Affairs, The Netherlands and Stakeholder consultations

- 4) Low segment: odd sizes, Class II. Not very common but odd sizes or mangoes that fail to meet the usual specifications are sold for any acceptable price

To integrated with the retail value chain in Europe, the exporters need to tie-up with an importer / service provider that has local infrastructure and supply contracts with retailers.

2.1.1.2 Competitors

Most buyers in Europe prefer fibreless mango varieties. Thus, Kent, followed by Keitt are the most



appreciated varieties imported from Latin⁵ and South America. Besides being fibreless, Kent is also valued for its taste and easy ripening. Keitt comes in the market a little later in the season. Another famous variety is the Palmer variety which is almost fibreless and is grown mostly in Brazil. Commercialization of Tommy Atkins variety is at a decreasing pace due to its fibrous flesh.

While above mentioned varieties are most popular, the demand for mangoes is much more and thus there is huge potential for other varieties also. Consumption of Indian mango is not yet fully

exploited in the European market and there is scope for the same.

Other countries:

Brazil and Peru dominate the mango supply to Europe in the northern hemisphere winter owing to their large volumes, good quality and supply consistency. In the European summer, supply shifts to Central America, Dominican Republic, West Africa, and Israel, followed by Spain

Brazil is the most dominant supplier for the European market between September and October and exports after which Peruvian suppliers start exporting. Most of the countries other than India export mangoes by sea due to proximity and good keeping quality of the variety. Hence the prices are low due to minimum freight cost compared to India from where mangoes are being exported only by air.

The Peruvian season runs from November to March, with supply peaking in the months of December, January, and February.

⁵ Entire continent of South America (countries such as Brazil, Ecuador, and Peru) in addition to Mexico, Central America (countries such as Costa Rica and Dominican Republic)

Popular mango varieties from India are Alphonso and Kesar which are supplied to ethnic and specialist buyers, mostly in the United Kingdom. Pakistan also supplies varieties such as the Chaunsa and Anwar mango. These special varieties are air freighted, so 2020 became a tough year because air-freight rates were very high due to the COVID-19 pandemic.

Indicative supply calendar globally for mangoes:

Country	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Brazil												
Peru												
Ecuador												
South Africa												
Costa Rica												
Mali / Burkina Faso												
Ivory coast												
Mexico												
Dominican Republic												
Pakistan / India												
Senegal												
Israel												
Spain												
			Peak arrivals						Low arrivals			

Mangoes face competition from local seasonal fruits in Europe, such as stone fruits, soft fruits / berries, and melons. During the summer season, consumers prefer to local fruits, which are extensively available in good quality and are economically priced.

Within India:

Alphonso, Kesar and Badami are the most popular mango varieties in European markets. Besides Maharashtra, other major producing states for Alphonso are Karnataka and Gujarat and for Kesar is Gujarat. Gujarat produces good quality of Kesar mangoes. Indicative supply calendar within India for mangoes with high export potential:

S. No.	States	Season of availability	Important cultivars
1.	Andhra Pradesh	Mid Feb – mid July	Banganpalli, Totapuri, Suvarnrekha, Neelum
2.	Gujarat	April – July	Alphonso, Kesar, Rajapuri
3.	Karnataka	April – July	Banganpalli, Totapuri, Neelum, Alphonso, Pairi
4.	Maharashtra	March – July	Alphonso, Kesar, Pairi

2.1.1.3 Maintaining quality standards and supply

For mangoes, the default pesticide Maximum Residue Level (MRL) applies, which is 0.01 mg/kg. Lead contamination in mangoes should remain below 0.10 mg/kg and cadmium below 0.050 mg/kg.

For fresh pre-cut fruit (ready-to-eat), the following microbiological criteria apply:

- 1) E. coli contamination must be below 100 cfu/g during the manufacturing process.
- 2) Salmonella in cut fruit must be absent throughout their shelf life, at least in five samples of 25 g.

Mangoes are a high-risk fruit concerning fruit flies (Tephritidae). Thus, a phytosanitary document is required for exporting mangoes to Europe and hydrothermal treatments (also called hot water treatment) prior to export are mandatory.

Information on quality, size, packaging, and labelling requirements for mangoes can be found in:

- The UNECE standards for mangoes
- The Codex Alimentarius Standard for mangoes ('Food code' of WHO and FAO)

Mangoes should comply with the minimum general quality requirements for all classes as given in below table. Europe almost exclusively requires Class I mangoes. Mangoes in this class must be of good quality and within the permissible tolerance levels. In no case may the defects affect the fruit flesh, the general appearance of the produce, the quality, the keeping quality and presentation in the packaging.

Table 25: General quality requirements for mangoes in Europe (all classes)
intact;
sound, not affected by rotting or deterioration;
clean, practically free of any visible foreign matter;
fresh in appearance;
practically free from pests and damage caused by pests;
free from black stains or trails which extend under the skin;
free from marked bruising;
free from damage caused by low temperature;
free from abnormal external moisture;
free from any foreign smell or taste;
able to withstand transport and handling.

Fresh mangoes are classified according to Size Codes A, B, C and D. Size is determined by the weight of the fruit or by count.

Table 26: Size codes for mangoes		
Size code	Weight in grams	Maximum permissible difference between fruit within the package in grams
A	100-350	75
B	351-550	100
C	551-800	125
D	>800	150

Mangoes are mostly traded in packing size 7 or 8, meaning 7 to 8 mangoes per 4 kg cardboard box, which is the preferred size in the Netherlands, the United Kingdom and France. In Germany, size 6 or 7 is also common, since large mangoes are popular. In Scandinavia, mostly smaller size mangoes are sold individually. All sizes are acceptable in Spain.

Mangoes should be packed in new, clean, and quality packaging to prevent damage and protect the product properly. To protect the fruit, coatings can be used, such as beeswax (white or yellow), carnauba wax, shellac, or microcrystalline wax. When supplying organic mangoes, the coating should also be organic such as organic beeswax or carnauba wax.

Common certifications for mangoes include GlobalG.A.P. for good agricultural practices and BRCGS, IFS or similar HACCP-based food safety management systems for packing and processing facilities. Management systems recognized by the Global Food Safety Initiative (GFSI) are most recommended.

Organic certification for mangoes is required by the niche market. Organic mangoes are mostly traded by specialized organic fruit importers, such as ProNatura (France), Biotropic (Germany), Eosta and OTC Organics (Netherlands).

2.1.1.4 Pricing

The market for mangoes can be unstable with fluctuating availability and prices. European prices (selling prices by importers) for sea-freighted mangoes generally range between Euro 3-8 for 4 Kg. The wholesale prices for tree-ripened, airfreighted mangoes are generally higher by at least three times of sea-freighted mangoes, mostly due to the extra transport costs. In retail, mangoes usually sell for between Euro 6-8 for 4 Kg. Airfreighted whole mango sells for a value slightly below Euro 5 per piece.

Majorly, 12 pieces of mangoes in 3.5 Kg boxes are exported to Europe and mangoes are mostly air freighted. Various costs involved for maintaining the required quality standards for supplying mangoes from India to Europe include Hot water treatment @ Rs. 8 per Kg, Washing, cleaning, and grading @ Rs. 4-5 per Kg, Ripening @ Rs. 5-6 per Kg, Packaging @ Rs. 10-20 per Kg, Unloading and custom clearance @ Rs. 2 per Kg, and transport cost @ Rs. 130 per Kg. Total time to export retail market is approximately 36 hours.

Below table provides the estimated cost of various packaging material used for exporting mangoes to different regions across the world.

Packaging Material	Quantity per unit (kgs per box, kgs per bag)	Markets – Middle East, Indian Sub-continent, Europe, etc.	Cost of the material
Corrugated boxes with proper ventilation	3 Kg or 4 Kg	UK, USA, The Netherlands, Australia	Rs. 25-45 per box
Foam mesh	1	All countries	Re. 1 each (Rs. 12 for 12 mangoes in box)
Strapping tape	1	UK, The Netherlands, Middle East	Rs. 300 per roll
Self-adhesive tape	1	All countries	Rs. 45 per piece
Label			Rs. 4 per piece

2.1.2 Middle East

The Middle East is a geographical region consisting of a group of countries including Saudi Arabia, UAE, Kuwait, Qatar, Oman, Bahrain, Yemen, Iran, Iraq, Turkey, Jordan, Israel, Egypt, Algeria, and few other surrounding countries.

2.1.2.1 Characteristics of the segment

Below table provides the mango variety-wise preference in various Middle Eastern countries⁶.

Variety	Countries
Alphonso	UAE, Kuwait, Saudi Arabia
Totapuri	Kuwait, Saudi Arabia, UAE, Oman, Yemen
Kesar	Kuwait
Badami	UAE, Kuwait, Qatar, Bahrain
Banganpalli	Bahrain, UAE

2.1.2.2 Competitors⁷

Below table provides the variety-wise competing states within India for export of mangoes to the Middle East.

Variety	Countries	Competing states within India
Alphonso	UAE, Kuwait, Saudi Arabia	Gujarat, Karnataka
Totapuri	Kuwait, Saudi Arabia, UAE, Oman, Yemen	Tamil Nadu
Kesar	Kuwait	Gujarat
Badami	UAE, Kuwait, Qatar, Bahrain	Karnataka
Banganpalli	Bahrain, UAE	Karnataka, Tamil Nadu, Andhra Pradesh

Peak supply months for India are March, April, and May. Between June-July, competition from Pakistan increases. It is also easier and cheaper for Pakistan to supply mangoes in country crafts. Common varieties exported from Pakistan are Sindhri and Anwar.

2.1.2.3 Maintaining quality standards and supply

For supplying to the Middle East, mangoes are graded in the sizes of 12, 14 and 16 and most preferred size is 12 pieces for a packaging of 3-3.5 Kg box. Production date or harvest year and packaging date must be printed on the box. Preferred weight per piece is above 200 g. Mangoes are exported in weight terms

⁶ Source: Bijak.com

⁷ Source: Bijak.com

(Kg). Alphonso is the most preferred variety, followed by Kesar and Banganpalli. General quality specification requirements include clear skin and absence of sap damage, blemishes, and aphid marks.

2.1.2.4 Pricing⁸

The retail price range for United Arab Emirates (UAE) mangoes is between USD 3 and USD 4 per Kg. The import price per kilogram of Mangoes into the United Arab Emirates (UAE) has seen a steady increase over the last five years. The import price ranges from USD 1-2 per Kg.

Various costs involved for maintaining the required quality standards for supplying mangoes from India to the Middle East include Washing, cleaning, and grading @ Rs. 2-3 per Kg, post-harvest treatment and pre-cooling @ Rs. 3-4 per Kg, Packaging @ Rs. 10-20 per Kg, reefer road transport cost @ Rs. 1-2 per Kg and transport cost @ USD 7000 per 15 MT (sea freight, port clearance, clearing & forwarding cost). Total time to export retail market is approximately 24 hours.

Below table provides the estimated cost of various packaging material used for exporting mangoes to different regions across the world.

Packaging Material	Quantity per unit <i>(kgs per box, kgs per bag)</i>	Markets – Middle East, Indian Sub-continent, Europe, etc.	Cost of the material
Corrugated boxes with proper ventilation	3 Kg or 4 Kg	UK, USA, The Netherlands, Australia	Rs. 25-45 per box
Foam mesh	1	All countries	Re. 1 each (Rs. 12 for 12 mangoes in box)
Strapping tape	1	UK, The Netherlands, Middle East	Rs. 300 per roll
Self-adhesive tape Label	1	All countries	Rs. 45 per piece Rs. 4 per piece

⁸ Source: Selina Wamucii, Stakeholder Consultations

2.1.3 United States of America⁹

2.1.3.1 Characteristics of the segment

Demand for mangoes is rapidly growing in the U.S. market. Reportedly, this trend is expected to continue as new generations seek to include mango in their diet seeing it less as an exotic fruit.

In 2022, U.S. consumers consumed more than 1.1 billion pounds (453592 MT) of mangoes from 14 different regions of the world showing its increasing popularity. From 2021 to 2022 alone, the market grew almost 11% from 1.05 billion pounds in 2021 to 1.17 billion pounds in 2022.

2.1.3.2 Competitors

The most popular mango varieties in USA are Ataulfo, Keitt, Kent and Tommy Atkins. The main suppliers include Mexico, followed by Peru, Ecuador, Nicaragua, and Guatemala and Brazil.

Indicative supply calendar globally for mangoes:

Country	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Brazil												
Peru												
Ecuador												
Mexico												
Dominican Republic												
Guatemala												
Pakistan / India												
<div style="display: flex; justify-content: space-between; align-items: center;"> Peak arrivals Low arrivals </div>												

Alphonso, Kesar and Badami are the most common varieties being exported to the USA from India. Besides Maharashtra, other major producing states for Alphonso are Karnataka and Gujarat and for Kesar is Gujarat. Gujarat produces good quality of Kesar mangoes. Badami is primarily grown in Karnataka.

2.1.3.3 Maintaining quality standards and supply

All fruits and vegetables imported in the USA, whether in commercial or noncommercial consignments, must be free from plant litter or debris and free of any portions of plants that are specifically prohibited in the regulations. Commodities irradiated in the country of origin must meet the following labeling and packaging requirements:

Boxes or cartons must be marked with:

⁹ Source: International Fresh Produce Association- U.S. Mango Market Report: 2021-2022; Animal and Plant Health Inspection Services (APHIS)- U.S. Department of Agriculture

- Production Unit Code (PUC)
- Treatment Facility Code (TFC)
- Packinghouse Code (PHC)
- Packing date
- Lot number
- A stamp with the words "Treated by irradiation" or "Treated with radiation"
- The international radura symbol

Mangoes may be imported into the USA from India only under the following conditions.

The risks presented by *Cytosphaera mangiferae* and *Macrophoma mangiferae* fungus must be addressed in one of the following ways:

- 1) The mangoes are treated with a broad-spectrum post-harvest fungicidal dip; or
- 2) The orchard of origin is inspected prior to the beginning of harvest as determined by the mutual agreement between APHIS (Animal and Plant Health Inspection Services- U.S. Department of Agriculture) and the National Plant Protection Organization (NPPO) of India and the orchard is found free of *Cytosphaera mangiferae* and *Macrophoma mangiferae*; or
- 3) The orchard of origin is treated with a broad-spectrum fungicide during the growing season and is inspected prior to the beginning of harvest as determined by the mutual agreement between APHIS and the NPPO of India and the fruit found free of *Cytosphaera mangiferae* and *Macrophoma mangiferae*
- 4) Each consignment of mangoes must be inspected by APHIS and the NPPO of India as part of the required inspection activities at a time and in a manner determined by mutual agreement between APHIS and the NPPO of India.

Mangoes in the USA are classified in the following three categories.

1. **U.S. Fancy** consists of mangoes of similar varietal characteristics which are mature, clean, well formed, well-trimmed, and which are free from decay, overripe, freezing, internal discoloration, insects, larva, insect, or larva feeding, skin breaks which are not healed, and free from injury by healed skin breaks, bruising, scab, shriveling, external (surface) discoloration, sunken discolored areas, scars, russeting, other diseases, mechanical or other means.

Tolerances: To allow for variations incident to proper grading and handling, not more than 10 percent, by count, of the mangoes in any lot may fail to meet the requirements of this grade, including in this amount not more than 5 percent shall be allowed for defects causing damage, including in this latter amount not more than 2 percent shall be allowed for decay.

2. **U.S. No.1** consists of mangoes of similar varietal characteristics which are mature, clean, fairly well formed, well-trimmed, and which are free from decay, overripe, freezing, skin breaks which are not healed and extend into the flesh, insects or larva, and free from damage caused by insect or larva feeding, bruising, shriveling, scab, external (surface) discoloration, internal discoloration, sunken discolored areas, scars, russeting, other diseases, mechanical or other means.

Tolerances: To allow for variations incident to proper grading and handling, not more than 10 percent, by count, of the mangos in any lot may fail to meet the requirements of this grade, including in this amount not more than 5 percent shall be allowed for defects causing serious damage, including in this latter amount not more than 2 percent shall be allowed for decay.

3. **U.S. No. 2** consists of mangoes of similar varietal characteristics which are mature, clean, fairly well formed, well-trimmed, and which are free from decay, overripe, freezing, skin breaks which are not healed and extend into the flesh, insects or larva, and free from serious damage caused by insect or larva feeding, bruising, shriveling, scab, external (surface) discoloration, internal discoloration, sunken discolored areas, scars, russeting, other diseases, mechanical or other means.

Tolerances: To allow for variations incident to proper grading and handling, not more than 10 percent, by count, of the mangos in any lot may fail to meet the requirements of this grade, included in this amount not more than 2 percent shall be allowed for decay.

2.1.3.4 Pricing

Landing cost of Indian mangoes in USA is approximately USD 22 per Kg. Majorly, 12 pieces of mangoes in 3.5 Kg boxes are exported to Europe and mangoes are mostly air freighted. Various costs involved for maintaining the required quality standards for supplying mangoes from India to Europe include Irradiation treatment @ Rs. 8 per Kg, Washing, cleaning, and grading @ Rs. 4-5 per Kg, Ripening @ Rs. 5-6 per Kg, Packaging @ Rs. 10-20 per Kg, Unloading and custom clearance @ Rs. 2 per Kg, and transport cost @ Rs. 500-550 per Kg. Total time to export retail market is approximately 48 hours.

1.2.6 Establishing Connects

To export produce it is necessary to understand the major export routes and to establish connects with relevant companies / personnel. The selection of export route for an FPO should be done as per the quality of produce available for export, human capital to handle export related compliances, financial capabilities, and risk-taking ability.

Exports can be done through two routes:

Export Route	Description
Through an exporter from India	Companies / individuals specialize in exporting of agriculture and horticulture commodities to specific export markets. FPOs can supply produce as per required quality specifications to the exporters. The exporters buy the products from FPOs and then exports the products.
Through an importer at the importing country	FPOs can identify importers in the importing country. Importers are companies / individuals that obtained the necessary permissions in the importing country to import specific agriculture and horticulture commodities

Export Route	How to establish connects?
Through an exporter from India	<ul style="list-style-type: none"> ● Trade fairs (physical and virtual) conduct by APEDA. Details are published on https://apeda.gov.in/apedawebsite/trade_promotion/International_trade_event ● Other National Trade Fairs conducted by various Organizations / Association. These events are published on various platforms such as: <ul style="list-style-type: none"> ○ https://krishijagran.com/events ○ https://www.kisaanhelpline.com/agriculture-events ○ https://www.2exhibitions.com/agriculture-and-forestry/ ● Online trade websites such as www.indiamart.com and www.exportersindia.com ● Buyer-Seller meets organized under the MAGNET project
Through an importer at the importing country	<ul style="list-style-type: none"> ● Trade fairs (physical and virtual) conduct by APEDA. Details are published on https://apeda.gov.in/apedawebsite/trade_promotion/International_trade_event ● Other National Trade Fairs conducted by various Organizations / Association. These events are published on various platforms such as: <ul style="list-style-type: none"> ○ https://krishijagran.com/events ○ https://www.kisaanhelpline.com/agriculture-events ○ https://www.2exhibitions.com/agriculture-and-forestry/ ● International Trade Fairs such as: <ul style="list-style-type: none"> ○ Fruit Logistica: yearly event at Berlin, Germany is one of the most important events for fruit trade across the world ○ Asia Fruit Logistica: yearly event conducted in Asia – at Hong Kong / Bangkok ○ Fruit Attraction: yearly event at Madrid, Spain

Export Route	How to establish connects?
	<ul style="list-style-type: none"> • International events on horticulture trade are regularly published on the website of CBI – a centre for promotion of imports from developing countries to Europe. www.cbi.eu/events • www.freshplaza.com, and https://www.hcisingapore.gov.in/events also provides an event calendar on important global fairs for horticulture crops

1.2.7 Advantages and Risks Associated

Each export route mentioned in the above sub-section comes with its risks. Not all export route is suitable for all FPOs, and it is necessary for FPOs to understand the risks before pursuing exports through any of the routes.

Export Route	Risks / Disadvantages	Advantages
Through an exporter from India	<ul style="list-style-type: none"> • Significant margin from the final export price is taken by the exporter • FPO cannot make heavy export-oriented investments as export orders may not be assured • Exporter can procure equivalent quality from any other seller at lower prices, if available 	<ul style="list-style-type: none"> • Exporting through this route is suitable for all FPOs, especially for FPOs that handle small quantities of produce • Payment terms from exporters to FPOs can be for shorter credit time • Export compliance is handled by the exporter – only quality adherence is taken care by FPOs
Through an importer at the importing country	<ul style="list-style-type: none"> • FPO should be able to send the minimum required quantity per consignment consistently. This is possible only through strong procurement (from its member farmers, and other growing regions) • Payment default by importers in case the FPO does not take precautionary measures like Letter of Credit • Credit timelines for payment from the importer can be as high 30 to 60 days 	<ul style="list-style-type: none"> • Higher margins • Long-term business opportunity- FPO can become an exporter for other FPOs / market players • Increase exports through volume and by adding other crops in which the FPO is dealing

Export Route	Risks / Disadvantages	Advantages
	<ul style="list-style-type: none"> ● FPO requires proper and complete knowledge on export compliance requirements of the importing country ● Rejection of consignment by importing country – shortfall in compliances. Especially for European and North American markets ● Importers in Bangladesh are recently facing difficulties in procuring Letter of Credit. This can significantly increase payment risk or last-minute cancellation of orders 	

2.2 Domestic market

2.2.1 Characteristics of the segment

Domestic trade of mangoes in India is generally driven by the decentralized *mandi* system. Depending on the grade of fruit, different prices are decided, and trade is facilitated between the trader and the farmer.

Domestic markets consume all grades of mangoes. In India, the peak season for ripe mangoes lasts from May to July. Trade is dominated by various varieties depending on the regional preferences. The purchasing power is growing in India, and the local market is demanding higher quality material.

2.2.2 Competitors¹⁰

Mangoes grown in different parts of the country are transported to the big cities for marketing. The fruits produced in Andhra Pradesh, Telangana and Tamil Nadu find markets in Nagpur, Mumbai, and Kolkata. The important wholesale mango markets in India are Delhi, Nagpur, Mumbai, Adilabad, Karimnagar, and Hyderabad (Telangana), Kollar (Karnataka), Chennai, Ajmer (Rajasthan) and Bulandshahar and Kanpur in Uttar Pradesh.

Mangoes for these big markets are usually collected at the central places in all the mango growing areas such as Ratnagiri and Vengurla in Maharashtra. Delhi and Mumbai are the most important markets for dispatch of mangoes.

¹⁰ Source: Agricultural and Processed Food Products Export Development Authority

2.2.3 Maintaining quality standards and supply

For domestic market, mangoes are mostly packed in Corrugated Fiberboard (CFB) boxes with paper cuttings and proper ventilation. Semi ripe mangoes are sent mostly at ambient temperature, reefer trucks are generally not required. Ethylene treatment is done few times depending on maturity of mangoes.

2.2.4 Pricing

Pricing in domestic markets depends on the day-to-day supply-demand dynamics. Hence, FPOs can command remunerative price only by supplying good quality produce to the market. FPOs should also take into consideration the freight charges to various regions while deciding on interstate trade.

Logistics cost for an 8 MT truck load from Maharashtra would range between Rs. 8-9 per kg for National Capital Region (NCR) and Rs. 4-5 per Kg for Hyderabad. Packaging is normally done in corrugated boxes with paper cuttings. Such boxes cost Rs. 40-50 each. In few cases, disposable crates are also used costing Rs. 120 per crate. Loading of fruits in the vehicle may cost Rs. 1-2 per Kg.

www.agmarket.gov.in is the Government portal that provides information on the maximum price, minimum price, and modal price of mango at all key markets in a particular day / week / month where mango is being traded. FPOs can use the portal to understand the pricing trend before sending their produce to distant *mandis*.

1.2.8 Establishing Connects

FPOs can supply to domestic markets either by taking their produce for auction at *Mandis* or by directly supplying to traders in different markets. Connects can be established through visits to *Mandis* in different cities to meet Commission Agents. It can also be done by seeking help from other FPOs or traders dealing in mango in surrounding geography.

Agriculture / horticulture commodities focused marketplace platforms are effective tool for FPOs to find buyers across the country. Trading option for mango is available on **Bijak** mobile application. Online B2B platforms / trade websites such as www.enam.gov.in, www.farmerconnect.apeda.gov.in, www.kisanmandi.com, www.farmersmandi.in, www.indiamart.com and www.tradeindia.com can also be used for listing of mango.

1.2.9 Advantages and Risks Associated

Selling to major domestic markets decreases the price risk significantly. When prices are low in nearby markets, FPOs can sell their produce to other domestic markets wherever feasible. Consistent supply to

major domestic markets is necessary for FPOs to build long-term relationship with buyers. This acts as a significant hedge against price variations in the nearby markets.

Risk of delayed payments or payment defaults is higher when selling to distant domestic markets in comparison to selling in nearby markets. FPOs should also be able to send a complete truck load for optimal logistics cost, thereby should have strong procurement and consistent supply.

2.3 Organized retail and e-commerce

2.3.1 Characteristics of the segment

The organized retail and eCommerce market targets the mid-premium to premium consumer categories. Hence, there is significant focus on quality of the produce.

The companies in this market usually procure from *Mandis* and from traders / village-level aggregators. Over the recent years, there is significant focus from these companies to procure directly from farmers / FPOs to reduce costs and have more control over quality. With this aim, many retail outlets have setup own facilities and collection centers in fruits & vegetables catchment areas in Maharashtra.

Some retail chains buy directly from farmers while most of them prefer designated vendors who buy fruits and vegetables on their behalf. The major collection centers of retail chains for mangoes are in Ratnagiri and Raigad districts of Maharashtra.

The organized retail market for mangoes in India has been growing steadily, with supermarkets, hypermarkets, fruit specialty stores and e-commerce companies playing a significant role. This shift is driven by consumer demand for quality assurance and convenience. Additionally, organized retail allows for better storage and handling practices, ensuring fresher produce reaches consumers, however, traditional markets still dominate mango sales due to factors like price flexibility and cultural preferences.

2.3.2 Competitors

FPOs looking to supply to companies in this segment are competing with *mandis* and traders across the country. These companies procure across the country, where required quality at the right price is available. Retail organizations buy mangoes in Maharashtra for supplying to their stores in the state as well as country. Maharashtra has the highest number of retail outlets, shops, supermarkets, and hypermarkets in India on account of a thriving population with relatively high-income households. So, the retail organizations prefer procurement of mangoes from Maharashtra to reduce costs by minimizing distance between procurement center and points of sale.

2.3.3 Maintaining quality standards and supply

Retail quality specifications for mangoes typically include factors like size, color, ripeness, and appearance. The taste and aroma should be characteristic of the concerned variety. Mangoes are often categorized based on their weight, with specific size ranges specified. Retail players would mostly have their own ripening chamber and thus would procure raw / semi ripe fruits to be ripened in the chambers. In some cases, ripening substance packets are added in the fruit boxes. From source of fruits to collection centers to the distribution centers and ultimately to the consumers, fruits are packed in crates and transported in covered vehicle with proper ventilation. Fruits are stored in cool and dry place away from sunlight.

Normally, more than 200 g weight mangoes are preferred in the organized retail segment. A grade mango is 220-250 g, B grade is 180 g-220 g and C grade is below 180 g weight.

The mangoes should be clean and shiny without blemishes / latex on skin / black fungus / stem rot or other pest or disease infestation, free from any foreign material, chemical or mud or any other contaminants. Mangoes may be laboratory tested for heavy metals, contaminants, pesticides & microbiological parameters periodically as per FSSAI requirements.

FPOs should ensure that it delivers on the quality requirements of these market players consistently to build long-term business relationship. The produce would need to be delivered at the collection centers of the retail players. To obtain good quality produce, FPO can invest into packhouse with facilities such as bubble washer to remove field dirt and latex marks, drying, grading, and sorting and ripening chamber. As discussed above, some retail players also have their own ripening facility and thus, an FPO should only invest into ripening chamber as per the market demand. Mangoes are packed in CFB boxes for transportation to collection centers. Boxes can be lined with shredded paper / straw to protect from bruises. Key operational costs involved in supplying to retail market players include- Washing, cleaning, and grading @ Rs. 2-3 per Kg and Ripening @ Rs. 5-6 per Kg.

2.3.4 Pricing

The pricing for this category is dependent on the prevalent domestic market prices. Since these companies procure from different States to meet their demand, they can easily offset price increase in one market by procuring from another market. Different varieties of mangoes are available in the retail and e-commerce platforms. The price of mangoes varies depending upon the variety, quality, and size. For instance, a plus grade Alphonso from Ratnagiri and Devgad can fetch price in the range of Rs. 2000-5000 per dozen. However, average price of Alphonso can be in the range of Rs. 800-1200 per dozen.

Entering into seasonal contracts with these companies in this segment is a win-win situation for both the parties. FPOs can supply at a reasonable and assured price, while the companies are guaranteed of

required quality and quantity through the season. Pricing is decided on mutual agreement based on last season(s) markets' price trends. Prices obtained by supplying to these companies may not necessarily be higher than the market prices but FPOs can safeguard themselves against subdued low market prices during peak season.

1.2.10 Establishing Connects

Many market players in the Organized retail and eCommerce segment are actively working towards procuring from farmers and FPOs. They procure from major production regions for each crop, and hence procure mangoes from Konkan region from Maharashtra.

FPOs can try to establish connects with this market segment by:

- Through procurement centers of companies in surrounding region
- Through mutual connects who supply to such companies
- Listing on online trade websites such as www.indiamart.com and www.tradeindia.com
- Listing on agriculture / horticulture specific eCommerce platforms such as Bijak
- Various Government Departments / schemes conduct Buyer-Seller meets. FPOs can meet representatives from companies in this segment
- MAGNET project's Buyer-Seller meets. These Buyer-Seller meets offer platform for FPOs to interact with various market players including Organized retailers and eCommerce players
- Following websites give details on different events including Buyer-Seller meets that happen across the country:
 - <https://krishijagran.com/events>
 - <https://www.kisaanhelpline.com/agriculture-events>
 - <https://ficci-web.com/events>
 - <https://www.2exhibitions.com/agriculture-and-forestry/>

1.2.11 Advantages and Risks Associated

FPOs that have / can invest in building good harvest infrastructure can get good value for their Grade A and B mangoes. This segment is growing rapidly, hence making good business relationship with customers of this segment can lead to long term benefits for FPOs. Some companies in these segments also invest in capacity building and post-harvest infrastructure, which the FPOs can leverage. FPOs can enter into formal contracts with these customers and sell at profitable prices at reduced risk. Payment default risk is lower with these customers.

These customers function on credit terms, though credit terms can be as short as 7 days to 30 days. Some retail players have payments terms of 2-3 days only. Rejections and price cuts due to quality issues can be

common occurrence as they can have strict quality norms. Since these customers procure from different production regions and numerous buyers, the pricing power with FPOs is low during negotiations.

2.4 Processors

Processors are manufacturing units of secondary or tertiary processed products of mangoes. They can be big processing units, MSMEs or cottage industries. The first level of mango processing segment mainly involves manufacturing of pulp or puree from the completely ripened mangoes. The pulp is further used for making juice, nectar, jams, jellies, etc.

2.4.1 Characteristics of the segment

Processors are highly price sensitive customers, and usually procure low grade fruits for processing. The two main clusters of mango processing are Chittoor in Andhra Pradesh and Krishnagiri in Tamil Nadu. Few mango puree processing facilities are also located in Gujarat and Maharashtra. Alphonso, Totapuri, and Kesar are the most popular varieties for mango processing. Processors majorly procure from traders. Few FPOs also supply small quantities to processors.

2.4.2 Competitors

For an FPO looking to supply to processors, its competitors are the local *Mandis* and wholesalers. The processors also tend to have long-standing relationship with select suppliers, as the suppliers understand their requirements. Large processors usually procure from multiple states to have consistent supply throughout the year.

2.4.3 Maintaining quality standards and supply

Mango processing units are mostly concentrated in the mango growing clusters. The processors may buy mangoes from traders or directly from farmers. Quality requirements for processing are not very stringent, all sizes and medium to lower grades can be used. The fruits should not be rotten or infested. The focus lies on ensuring that the processed mango products meet certain standards for required taste, color, texture, and hygiene. The pulp is normally packed in aseptic drums. In small scale, cottage industry, pulp is packed in 850 g tins.

2.4.4 Pricing

Industrial processors tend to maintain a procurement price of 15-20% lower than the market price. This is because of the large quantities and lower quality specifications at which they usually procure, thus giving an assured market for the suppliers.

Small scale processors and cottage industries operate at the day-to-day market prices. FPOs supplying to them have to match the prices that is prevailing the market for the required grade of mangoes.

1.2.12 Establishing Connects

FPOs can supply mangoes to processors in its region (district and surrounding districts). FPOs can try to establish connects with this market segment by:

- Approaching processors in their region directly
- Through mutual connects who supply to such companies
- Listing on online trade websites such as www.indiamart.com and www.tradeindia.com
- Various Government Departments / schemes conduct Buyer-Seller meets. FPOs can meet representatives from companies in this segment
- MAGNET project's Buyer-Seller meets. These Buyer-Seller meets offer platform for FPOs to interact with various market players including Processors

1.2.13 Advantages and Risks Associated

Long-term business association with processors ensures a steady market for the lower grade produce. Supply to processors can be done in batches as and when sufficient quantity of required quality mango is available with the FPO. Logistics cost can be minimized by doing batch transportation.

Processors usually function on long credit cycles from 15 to 60 days, leading to payment default risk. Industrial processing units may procure in large quantities. Though this might provide FPOs with a large business opportunity, this increases the risk of over dependence on single / handful of companies.