Indian Journal of Ecology (2022) 49(2): 483-490
DOI: https://doi.org/10.55362/IJE/2022/3549

Manuscript Number: 3549
NAAS Rating: 5.79

Constraints in Mango Export from India

Kavita Baliyan, Sanjeev Kumar[1] and Moni Chandra[2]

Giri Institute of Development Studies, Lucknow-226 024, India
[1]Department of Economics, Lucknow University- 226 007, India
[2]Babasaheb Bhimrao Ambedkar University, Lucknow- 226 025, India
E-mail: kavitaujjwal.baliyan@gmail.com

Abstract: Indian Economy is facing various constraints in exporting horticulture goods relating to production practices, post-harvest technologies and issues relating to supply chain, market access, Non-Tariff Measures and government policies. The present paper aims to analyse the constraints in the export of Indian mango in terms of tariff and non-tariff barriers imposed by developed countries and the constraints faced by the exporters at domestic level. The findings depicts that countries like Russia, Japan, Turkey and EU countries imposed tariff on agricultural products more than or equal to bound rate while rate while USA rejects IMPORT OF Indian mango due to Sanitary reasons. Besides, the tariff rates of other countries are also beyond the bound rate as decided by the WTO. Also, out of the total refusals, around 58 per cent were on the grounds of adulteration and 42 per cent on account of inadequate labelling/misbranding & insanitary conditions. Although, the government has taken various efforts to remove these aforementioned hurdles, but a lot more is needed to boost mango export at national and international level.

Keywords: Pre & Post-harvest, Supply chain, Non-tariff measures, Market access

India is the second largest producer of fruits in the world just behind China. It's diverse climatic and geographical conditions support production of wide variety of fruits, vegetables, nuts and spices etc. Horticulture production has increased in the country by 30 per cent in the last 5 years and is estimated to be nearly 46 million tons (10 per cent of the world production) (APEDA 2014).In spite of being the largest producer of fruits and vegetables in the world, the export competitiveness of Indian producers remains low with only 1 percent share of export earnings from agricultural products. It is only after the Uruguay Round Agreement on Agriculture, the agricultural exports got increased and new opportunities have emerged. Its main reasons are rising income level of the people, focus on healthy diet pattern and improved transportation that has promoted the globalization of fruit trade (Chandra and Kar 2008). But despite these changes, Indian economy is still facing various constraints in export of horticulture goods that are related to production practices, post-harvest technologies, issues relating to supply chain, market access, NTB, and government policies. Among horticultural crops in India, 'Mango 'enjoys a place of pride. The Indian government has also taken various measures to boost mango production and exports in collaboration with APEDA, NHB, Export Promotion Board, Ministry of Commerce, and Government of India. In this context, the paper analyses the current global trade environment for horticultural exports and the restrictions that Indian mangoes are facing at domestic and international level, despite its competitiveness. Uttar Pradesh and Andhra Pradesh, combined together have a share of more than 50 per cent production of mango in the country. Dashehari, which is cultivated in the plains of Uttar Pradesh, is an important export variety of mango for its attractive appearance, excellent taste and pleasing flavour (Kishor et al 2019). Also, a large number of export varieties of mango are produced in these two states. For this reason, these two states have been selected to find out the major constraints in mango export from India.

The present paper aims to analyse the constraints in the export of Indian mango in terms of tariff and non-tariff barriers imposed by developed countries and the constraints faced by the exporters at domestic level. Further, the paper critically examines the Government policies for export promotion of horticultural products and its impact on export of mangoes with suggested measures to enhance its export from the country as well as from the selected states.

MATERIAL AND METHODS

The paper is mainly based on secondary and primary data. The secondary data on export was compiled from the publications of APEDA, Agricultural Marketing Board, Food and Agriculture Organization (FAO) and Monthly Statistics on Foreign Trade published by Directorate General of Commerce, Intelligence and Statistics, Ministry of Commerce, Government of India. Apart from secondary data,

20 traders/exporters were interviewed to collect detailed information regarding major constraints in mango export at National and International level. Besides, discussions were also held with the officials from *Mandi Samiti;* mango pack houses, agriculture marketing board of both the states and APEDA to know existing government policies to promote export of mango and constraints faced in this context.

Ten exporters were purposively selected from Uttar Pradesh and Andhra Pradesh, 5 from each State as they are the leading producer of mango in the country (appendix table 1).This represent different agro-climatic and geographical conditions. Moreover, Uttar Pradesh is a land locked state, while Andhra Pradesh has a long coastal belt. Dashehari mango of Lucknow in UP has been granted Geographical Indication. Another ten exporters were randomly selected from national level who exports from different states and particularly via Delhi and Mumbai (list of exporters were collected from the APEDA).

Compound annual growth rate (CAGR): The study used time series analysis to analyze the production and export performance of Indian mangoes and mango pulps. The exponential compound annual growth rates are estimated by using time series data on area, production, yield and export of mango.

Growth estimation: The following exponential model has been fitted to the time series data for estimating the compound annual growth rates (CAGR) of area, production, yield and export of mango from 1985-86 to 2015-16 in India;

$$y = ab^t e^u$$

The logarithmic form of this function is given by

$$\ln(y) = \ln(a) + t \ln(b) + u$$

Where y is a dependent variable whose growth rate is to be estimated, t is an Independent variable (time) and u is a disturbance or error term. The coefficients 'a' and 'b' are the parameters to be estimated from the time series observations. The regression co-efficient b is estimated by ordinary least squares (OLS) technique. The Compound Average Growth Rate (CAGR) in per cent is estimated as:

$$CAGR = \{Antilog (b) - 1\}*100$$

RESULTS AND DISCUSSION

Trends in mango production and exports: The area and output of mango has shown growth over the years but its share in total fruit area and production has declined sharply in the last two decades. The share of mango in total area under fruit crops declined from 43.5 per cent in 1987-88 to 34.4 percent in 2019-20 and over the same period its share in fruit production dropped from 37.4 per cent to 20.7 per cent. However, its production in absolute term increased from 8.7 MT in 1991-92 to 20.4MT in 2019-20, registering an annual compound growth rate of around 3 per cent. Although, the productivity has increased in the recent years (2014-19) but still CAGR is only 0.26 per cent. Thus, when area is expanding, productivity per hectare is likely to decline initially as new plantations start bearing fruits only after four-five years.

The mango export has increased at a CAGR of 9.4 per cent but the share of exports in mango production is still nominal (Table 2). In 1985, mango export was only 0.18 per

Table 1. Trends in area, production and productivity of mango in India

Year	Area under mango (M ha^{-1})	Per cent of total fruit area	Production of mango (Million MT)	Per cent of total fruit production	Productivity (t ha^{-1})
1987-88	1.24	43.5	10.35	37.4	8.4
1991-92	1.08	37.5	8.72	30.4	8.1
1994-95	1.23	28.5	10.99	28.5	9.0
1999-00	1.49	37.3	10.50	23.0	7.1
2004-05	1.97	39.7	11.83	24.0	6.0
2009-10	2.31	36.5	15.03	21.0	6.5
2013-14	2.55	35.7	18.68	22.1	7.3
2014-15	2.16	35.40	18.53	21.39	8.6
2015-16	2.20	35.50	19.52	21.92	8.9
2016-17	2.21	34.71	19.51	20.99	8.82
2017-18	2.26	34.71	21.82	22.41	9.66
2018-19	2.30	34.80	21.38	21.82	9.31
2019-20*	2.29	34.38	20.44	20.64	8.92
CAGR (%)	3.00		3.27		0.26

Source: Indian Horticulture Database, various years, sources www.nhb.gov.in, http://nhb.gov.in/Statistics.aspx?enc=WkegdyuHokljEtehnJoq0KWLU79sOQCy+W4MfOk01GFOWQSEvtp9tNHHoiv3p49g#; *= Second estimates

cent of the total production and improved to 1.55 in 2001-03 followed by 1.92 percent in 2006-08 after 10 years of WTO. This improvement may be because after 1986, US lifted the ban from Indian mango export in 2006. This trend declined in 2012-14 by 1.31 followed by 0.57 percent in 2018-20. The major reasons of this decline are strict non-tariff measure imposed by the developed countries and massive decline of Indian export to Bangladesh (Table 3). Further, the neighboring country, Pakistan, produces around one million tons of mango, but exports 40,000 tons annually (4 per cent of its total production) (Hegde, 2006) which indicates that there is a huge possibility for promoting mango exports from India.

Major destination of Indian fresh mango export: The major importing countries of Indian mango are Gulf countries like Bahrain, Qatar, UAE, Saudi Arabia; United Kingdom, USA, and Bangladesh. In 2000-01, India exported 39.9 million tons of mango that increased to around 50 tonnes in 2019-20. In terms of value, during 2004-05, the total export of fresh mango on constant price was Rs.9545 lakh that increased to Rs. 11977 lakhs in 2019-20 (Table 3). In value terms, the Gulf countries accounted for around 51 per cent of total mango export followed by the Bangladesh (26 percent) in 2001-03(the other major country was United Kingdom). On the other hand, during 2019-20, the share of Bangladesh reduced to 2.4 per cent. Out of the total mango exports from India to Bangladesh, around 70 per cent of export used to be from West Bengal. But due to the rising import duty on the fruit by the neighbouring country coupled with increase in the area of the mango cultivation there, the export of mango from West Bengal to Bangladesh declined. However, over the period, the share of UAE in total mango export has increased due to decreased share of Bangladesh (though in absolute terms, it has declined). Nvertheless, the export of Indian mango was impressive in case of UK, USA, and other

Table 2. Trends in mango export from India

Year	Production ('000 tons)	Export ('000 tons)	Export as per cent of production
1985-87	9774	18	0.18
1988-90	8359	20	0.24
1991-93	9362	24	0.26
1994-96	10976	26	0.24
1997-99	10337	43	0.42
2000-02	10194	42	0.42
2003-05	12018	186	1.55
2006-08	13465	258	1.92
2009-11	14322	259	1.83
2012-14	17543	230	1.31
2015-17	20167	179.9	0.89
2018-20	25115	142.8	0.57
CAGR	2.95	9.35	

Source: FAOSTAT (1961-2016)

Table 3. Mango fresh export from India (2004-05 constant price)

Country/year	Quantity (000 Tones)			Value in Rs Lakhs		
	2001-03	2011-2013	2017-20	2001-03	2011-2013	2017-20
Baharain IS	636 (1.6)	701 (1.2)	918 (1.9)	236 (2.5)	142 (1.4)	240 (2.0)
Bangladesh PR	18618 (46.7)	18433 (31.1)	2983 (6.1)	2491 (26.1)	1012 (10.3)	290 (2.4)
Kuwait	911 (2.3)	712 (1.2)	1176 (2.4)	401 (4.2)	271 (2.8)	484 (4.0)
Qatar	204 (0.5)	905 (1.5)	2648 (5.4)	78 (0.8)	216 (2.2)	755 (6.3)
Saudi Arab	2380 (6.0)	1879 (3.2)	1942 (4.0)	744 (7.8)	454 (4.6)	502 (4.2)
U Arab EMTS	11234 (28.2)	28362 (47.8)	18836 (38.5)	3445 (36.1)	5776 (58.7)	4878 (40.7)
U K	1148 (2.9)	2853 (4.8)	4033 (8.2)	543 (5.7)	977 (9.9)	1773 (14.8)
U S A	638 (1.6)	232 (0.4)	949 (1.9)	188 (2.0)	147 (1.5)	722 (6.0)
Other countries	4079 (10.2)	5219 (8.8)	12272 (25.1)	1418 (14.9)	838 (8.5)	1603 (13.4)
Total	39847 (100.0)	59297 (100.0)	48919 (100.0)	9545 (100.0)	9834 (100.0)	11977 (100.0)

Source: Compiled from Monthly Statistics on Foreign Trade published by Directorate General of Commerce, Intelligence and Statistics, Ministry of Commerce, Government of India; Figures in parentheses are percentage share.

countries. Namrata et al (2019) also reported that after WTO period, UAE again became the largest importer followed by Bangladesh due to the shrunken export to Bangladesh.

Table 4 depicts the growth of Mango fresh exports from India from 2000-01 to 2019-20 in terms of quantity and value. During the overall period of study, the growth rate of Mango fresh export, in value terms stood at 1.5 percent but was significant only at 10 percent while the growth rate of quantity for the same period was insignificant. During 2000-2010, the total mango export registered a positive growth rate of 8.6 and 4.6 percent for quantity and value respectively .However, during the last decade, it got slumped to -1.9 & 3.0 per cent for quantity and value respectively (Table 4).

During the recent period, the growth rate of Bangladesh and UAE slumped but that of Qatar, USA and Kuwait surged up. This is due to the lifting of ban on mango export by USA in 2006. Moreover, UK and Saudi Arabia showed positive growth rates. UAE registered a modest growth rate of 3.3 per cent during the overall period while UK and Quarter registered significantly higher growth rate. Besides, higher growth rates were also posted by relatively smaller importers (Baliyan et al 2015). Though the rate of growth of total quantity of mango exported from India for the overall period was negative (-1.9), but in value terms, exports increased at the rate of 1.5 per annum and was not significant.

Constraints in mango export: This section shows the major constraints in mango export that India faced at international level due to trade policies of different countries and which adversely affected Indian agricultural exports. The major constraints at the international level include market access and non- tariff barriers (NTM).

Tariff Barriers: After the formation of WTO and implementation of Agreement on Agriculture, low growth rate of agriculture exports, especially mango exports, is not only due to high rate of tariff barriers but also due to many non-tariff barriers imposed by the developed countries. The WTO has defined the specific bound rate of tariff for all member countries and the member countries are directed not to charge the tariff more than the bound rate. However, Russia, Japan, Turkey and EU countries imposed tariff on agricultural products more than or equal to bound rate while the tariff rate of other countries are far away from bound rate as decided by the WTO (Table 5). Similarly, non-tariff measures also very strict in developed countries as compared to other countries.

Non-Tariff Barriers (NTB): Non-tariff barriers are extensively applied by the developed countries to restrict imports from developing countries. They have the potential to cause/create an economic effect on international trade in goods, causing change in quantities traded, or prices or both (UNCTAD 2015). The basic aim of the TBT Agreement was to ensure that technical regulations and procedures used for assessing conformity with such regulations are not formulated and applied which disrupts the smooth functioning of trade. Both the agreements have a provision that depicts disparity for developing countries (WTO, 2007). There exist 8 different types of NTMs (1) packaging and labeling guidelines, (2) pesticide residue limit guidelines, (3) chemical content restrictions, (4) fruit fly related rules, (5) uniformity requirements, (6) labour standards, (7) documentation procedures and (8) company and product registration. Developed countries like USA, EU and Japan impose sophisticated regulations like registration, packaging and labelling, pesticide residue and aflatoxin content, fruit fly regulations and labour standards. The problems faced by

Table 4. Growth of export of mango fresh from India (2004-05 constant price)

Country/year	Quantity (000 Tones)			Value in Rs Lakhs		
	2001-03	2011-2013	2017-20	2001-03	2011-2013	2017-20
Baharain IS	6.1***	3.0***	1.9**	-0.1 NS	6.8***	0.4 NS
Bangladesh PR	7.8***	-26.5***	-19.1***	-0.9 NS	-21.7***	-20.8***
Kuwait	-5.5***	8.1***	4.6***	-2.6**	9.6***	4.6***
Qatar	2.1**	21.4***	20.1***	3.8***	24.1***	18.0***
Saudi Arab	-2.3**	-0.1 NS	-1.4*	-2.6**	1.4*	-1.4*
U Arab EMTS	12.8***	-4.7***	3.3***	10.4***	-2.3**	3.3***
U K	12.5***	5.8***	5.7***	12.6***	10.2***	5.9***
U S A	-28.4***	25.3***	9.2***	-14.9***	28.2***	16.3***
Other countries	8.8***	15.0***	4.3***	-1.5*	10.4***	0.2 NS
Total	8.6***	-1.9**	-0.4 NS	4.6***	3.0***	1.5*

Source: Compiled and calculated from Monthly Statistics on Foreign Trade published by Directorate General of Commerce, Intelligence and Statistics, Ministry of Commerce, Government of India.
***, ** and * Significant at 1, 5 and 10 per cent levels: Non-significant.

firms in Gulf countries are mostly caused by uniformity in size and documentation procedures (WTO 2015). The compliance costs were not uniform across NTMs but seemed to be more severe on smaller firms than large ones[1]. Some of the major NTMs that are maintained against Indian exports are given Table 6.

Adherence to safe export norms is very important to have credible sustainable export. SPS Codex brings nations together to evaluate agricultural, processing and handling methods and bring out commonly accepted guidelines for the international food safety. It becomes essential to generate knowledge by scientific research for structuring food safety norms and policy alignment according to the changing global regulations (Baliyan et al.2015). During the period 2002 to 2019, there were 303 cases of refusals of Indian mango and mango products by USA accounting for 30.1 per cent of total world mango export refusals by USA (Table 7).

The refusal of mango products was highest in 2006 i.e.

Table 5. Average rate of tariff imposed by the selected countries on mango & agricultural products (in percent)

Country	Fresh or dried guavas, mangoes and mangosteens		Tariff on agricultural products	
	1996-2020		1996-2015	2006-2020
	Bound	MFN applied	Bound	MFN applied
Bahrain	35.0	0.25	31.1	5.7
Bangladesh	200.0	25.05	134.1	10.3
Canada	0.0	0.00	14.6	13.5
EU Countries	0.0	0.55*	12.6	12.5
Japan	3.0	3.01	20.0	18.1
Kuwait	100.0	0.00	80.0	4.0
Nepal	30.0	10.00	37.3	12.8
Oman	46.7	0.00	22.3	6.0
Qatar	15.0	0.00	20.7	5.5
Russia	4.0	4.20	3.4	12.0
Saudi Arab	7.3	1.42	14.4	5.1
Singapore	10.0	0.00	24.7	0.5
Sri Lanka	50.0	28.65	40.0	19.9
Turkey	58.5	45.00	42.4	30.1
U Arab Emirates	15.0	0.00	20.3	5.1
USA		0.00	4.4	4.6
Yemen Republic	100.0	25.00	2.5	5.2

Source: WTO, World Tariff Profile, different years, accessed from http://tariffdata.wto.org/TariffList.aspx dated 28.2.2022,

Table 6. Non-tariff measures imposed by selected countries on Indian mango export

Name of country	Details of NTM
Australia	Australia continues ban on the alleged reason of the presence of fruit flies and stone weevils.
United States	Detailed labelling requirements with extensive product and content description. Presently, USA imports Mangoes from India after irradiation treatment. The inspectors from USDA, APHIS supervise the all preclearance activity.
European Union	European Commission (EC) has placed a ban w.e.f. 1st May, 2014 on the ground of interception of high no. of harmful pests and organisms in the exported consignments but now, it has lifted the ban.
New Zealand	Ban on import of Indian mangoes and other fruits due to presence of fruit flies and weevil and high food safety standards and bio security[2] Issue. Without Approval of Vapor Heat Treatment (VHT) facility, New Zealand is not ready to import mango from India.
South Africa	Market access for mangoes is denied due to approval of pests risk analysis (PRA) management system.
South Korea	Indian mangoes cannot be exported to South Korea because of pests management system from farm to treatment is yet to be approved by Animal and Plant Quarantine Agency of South Korea.

[1]http://www.tradeportalofindia.com/usrdata/webadmin/Section3.9/Mult_NonTariffMeasures_1201.html) 23.04.2014
[2]Biosecurity, as defined by FAO, offers a strategic and integrated approach to analyses and manage risks in food safety, animal and ... to biosecurity, and discusses the characteristics, requirements and benefits of a more harmonized approach

around 38 consignment and lowest in 2018 (only 8 consignment). Out of the total refusals, about 58 per cent were on the grounds of adulteration and 42 per cent on account of inadequate labelling/misbranding & insanitary conditions (Table 7). Indian mangoes must undergo several treatments and inspections before they enter United States, including an irradiation treatment with a minimum absorbed dose of 400 grays to treat insect pests, inspection and fungicidal treatments for fungal pests and preclearance inspection within India for bacterial pests (Ferrier et al 2012).

Findings Based on Field Survey

Constraints at domestic level: The exporters reported that several domestic factors have constrained the export of mango from the country as well as from the states. At domestic level, the major constraints can be divided into two parts i.e. Supply chain and technological constraints.

Supply chain constraints: Most of the exporters in both the states reported that despite high mango production, they did not get the sufficient good quality mangoes for exports. The major problems in the supply chain constraints related with pre & post-harvest management of crops and marketing and constraints like lack of gradation and quality control, transport problems; inadequate storage facility, poor packaging, marketing problems, fluctuations in output due to weather conditions were also reported. These findings are also supported by the findings of earlier workers (Adhiguru and Ramasamy 2003, Mittal 2007, Kishore et al 2019). These factors restrict mango export from India and also affect mango growers, who do not get a fair value of their crops. Another major issue in the supply chain is the inefficient post-harvest management which include proper cooling and packaging facility, quick and efficient transportation, careful handling and proper management of the environment like temperature, humidity and cleanliness. Besides, inadequate knowledge of pest control, inadequate sea freight facilities and high air freight costs are other major constraints in exports. The similar findings are also mentioned by earlier workers (Badatya 2007, Mittal 2007, Banerjee 2011, Menaka et al 2016).

Technological constraints: The exporters as well as the government officials reported that major technological constraints in mango export from India are unavailability quality mango grafts, lack of knowledge regarding improved technology, poor rates offered by middlemen to the farmers

Table 7. Share of Indian mango and mango products in world mango export consignment refusals by USA

Year	Total world mango refusals	Mango and mango products related refusals	Percent share of Indian mango refusals in world mango refusals	Reason for refusals (Multiple reasons for rejection of one consignment)	
				Adulteration	Inadequate labelling/ misbranding and insanitary conditions
2002	59	7	11.86	25.0	75.0
2003	52	13	25.00	50.0	50.0
2004	57	9	15.79	76.2	23.8
2005	63	31	49.21	62.9	37.1
2006	58	38	65.52	63.0	37.0
2007	77	21	27.27	54.5	45.5
2008	75	32	42.67	39.1	60.9
2009	48	12	25.00	44.0	56.0
2010	55	16	29.09	63.0	37.0
2011	44	12	27.27	76.5	23.5
2012	110	26	23.64	40.4	59.6
2013	48	9	18.75	71.4	28.6
2014	42	17	40.48	53.1	46.9
2015	33	12	36.36	93.8	6.3
2016	55	15	27.27	73.3	26.7
2017	46	15	32.61	93.3	6.7
2018	49	8	16.33	100.0	0.0
2019	35	10	28.57	70.0	30.0
Total	1006	303	30.12	57.9	42.1

Source: http://www.accessdata.fda.gov/scripts/importrefusals/.

and lack of knowledge in exporting of fruits as size & variety of mango. The inferior quality of genetic stocks, high incidence of diseases and excess use of pesticides increases the cost of farmers and also increases the chance of rejection of export consignment. The present findings of the study are supported by the findings of Hegde, (2006) and Reddy and Kumar (2010). Besides, the export of mango requires proper post-harvest management techniques such as hot water treatment, vapor heat treatment and irradiation technique. Japan, UK and other EU countries do not allow import of mango without vapor heat treatment (APEDA 2007). There are only six VHT centers operating in India and out of these, two are not working properly i.e. one in Uttar Pradesh and one in Andhra Pradesh. However, both-pack houses and VHT centers were on lease by the big exporters which acts as a hurdle for small exporters for exporting their product. Exporters further reported that they cannot export mango to USA without irradiation treatment, and the country's only irradiation center is at Lasalgaon, about 70 km from Nasik in Maharashtra which started working from 16 March, 2007. Another two centers located in Karnataka and Vashi (Mumbai) have starting working only recently (2016 onwards).The major hurdles that are restricting exports from India are availability of fewer varieties for exports, high shipping charges, limited cargo space, poor labelling and costly packaging (specific packaging for each produce made of bio-degradable materials only).Main constraints faced by mango exporters in Andhra Pradesh and Uttar Pradesh is lack of sufficient VHT canters. Besides, Uttar Pradesh lacks processing units, as such it's unable to export processing mango products .As far as Andhra Pradesh is concerned, and it lacks exportable variety of fresh mango.

Problems faced by the exporters at international level: The exporters reported that they have to bear 100 percent risk in case of rejection of consignment, due to any reason, as the help from the government side is negligible. High freight charges increases the price of mango, thereby decreasing its competitiveness in the international market. Baliyan (2017) has found that India has a very high comparative advantage in mango export but is unable to enjoy competitiveness at international level .the reason being the high domestic prices of mango as compared to prices at international level. The exporters reported that they are facing the refusals of exports consignments, particularly from the developed countries, as there is a lack of international standard in branding and packaging, not only in fresh mango but in processed products also.

Suggestions given by the exporters to improve mango export: It was suggested that to tackle sophisticated regulations like registration, packaging &labeling, pesticide residue & aflatoxin content, fruit fly regulations and labour standards involved in exporting products, adequate number of pack houses and VHT centers are required to be established near the production area. The costly freight charges, restricted cargo space and high packaging cost needs to be removed. Since the importing countries demand specific packaging for each produce, the use of bio-degradable materials should be taken care off.

To bridge these gaps and improve competitiveness of mango in the world markets, India has taken several significant steps such as setting-up of National Horticulture Mission (NHM), mango pack houses and Codex Committee and broadening of export basket by APEDA. These reforms have enhanced the access of Indian exports to international markets. APEDA has also been organizing mango promotion programs in different countries. The Government of India is also taking steps to encourage exports of agro products, including mangoes through measures and incentives under planned schemes through Export Promotion Councils & APEDA. Besides ,various schemes namely Market Development Assistance (MDA), Market Assistance Initiative (MAI), Assistance to States for Developing Export Infrastructure and Allied Activities (ASIDE), Vishesh Krishi and Gram UpajYojana, Focus Product Scheme, Focus Market Scheme, Town of Export Excellence, etc. are there to provide assistance to encourage exports. The Government also established mango pack houses, VHT centers, Hot Water treatment and Irradiation technique plant during 2005-06 to meet the International Standards and to increase the mango export from India. This had a positive impact on the value of exports especially to developed countries like USA, Japan, UK, etc. these efforts led to the increase of exports at 5.8 per cent annum in value terms of 5.8 per annum (Table 4).

CONCLUSION

India's export of mango is going up but not proportionately to total production. At domestic level, a number of factors have affected export of mango from the country like, fluctuations in output due to weather conditions, costly transportation, lack of gradation and quality control, excessive use of pesticides & insecticides, marketing problems. Besides, other issues like inefficient post-harvest management i.e., proper cooling and packing facility, careful handling, and proper management of environment like temperature, humidity, proper ventilation and sanitation apart from storage facilities. Further, constraints like suitability of few varieties for exports, high freight charges, limited cargo space, high packaging cost and poor labeling also restricts the expansion of mango exports from India. At international level, incidences of NTMs in mangoes are also hindering

mango exports. Though, to remove these aforementioned hurdles, the government has taken many efforts. But a lot more is needed to be done to boost export of mango at national as well as international level.

ACKNOWLEDGEMENT

This paper is based on the project "Impact of WTO Provisions on Horticultural Exports: The Case of Indian Mango" Sponsored by Indian Council of Social Science Research (ICSSR), New Delhi. Author is Thankful to the ICSSR for providing the Financial Support for the project.

REFERENCES

Adhiguru P and Ramasamy C 2003. *Agricultural-based interventions for sustainable nutritional security,* National Centre for Agricultural Economics and Policy Research. New Delhi, India, and Tamil Nadu Agricultural University Coimbatore India. http://www.ncap.res.in/upload_files/policy_paper/pp17.pdf

APEDA 2007. *Mango* APEDA Agri Exchange, Agricultural & Processed Food Products Export Development Authority, Ministry of Commerce, Govt. of India, http://apeda.in/agriexchange/prodgallery/PrdProfile_moa.aspx?hscode=08045020

APEDA 2014. *India export of agro food products*. The Agricultural and Processed Food Products Export Development Authority (APEDA), Ministry of Agriculture, Government of India, New Delhi, Retrieved from http://agriexchange.apeda.gov.in/indexp/Product_description_32head.aspx?gcode=0204

Badatya KC 2007. *Mango in Andhra Pradesh-A commodity specific study*. Evaluation/Commodity Study Series, Andhra Pradesh, No.16. Department of Economic Analysis and Research and National Bank for Agriculture and Rural Development, Mumbai.

Baliyan K 2017. Export performance and competitiveness of Indian mango. *Agricultural Situation in India* **LXXIV**(6): 19-26.

Baliyan K, Kumar S, Chahal VP and Kumar S 2015. Dynamics of Indian fresh mango export. *Indian Journal of Agricultural Sciences* **85**(11): 1466-1471.

Banerjee GD 2011. *Economics of mango cultivation*, Occasional Paper–58, Department of Economic Analysis and Research, National Bank for Agriculture and Rural Development, Mumbai, 2011.

Chandra P and Kar A 2006. *Issues and solutions of fresh fruit export in India,* pp. 17-23, Division of Post-harvest Technology. Indian Council of Agricultural Research (ICAR), Government of India, http://www.unapcaem.org/Activities%20Files/A22/p31_IssuesIndia.pdf.

Ferrier P, Petersen E and Landes M 2012. *Specialty Crop Access to U.S. Markets: A Case Study of Indian Mangoes*, ERR-142, U.S. Department of Agriculture, Economic Research Service, November 2012, P.6, https://www.ers.usda.gov/webdocs/publications/45026/33787_err142.pdf?v=0.

Hegde RN 2006. Prospects for export of Indian fresh alphonso mangoes, *CAB Calling*, pp. 40-42.

Kishor S, Dwivedi DH, Maji S, Singh N and Gond M 2019. Clonal variability in mango (*Mangifera indica* L.) orchards cv. dashehari. *Indian Journal of Ecology* **46**(2): 311-315.

Menaka S, Mani K and Sangeetha R 2016. Domestic and export potential of organic coconut in Coimbatore, Tamil Nadu, India. *Indian Journal of Ecology* **43**(Special Issue-1): 278-280.

Ministry of Agriculture, Government of India, Indian Horticulture Database. 2008-2015. *Ebola: Information for the public*. Retrieved from data sources www.nhb.gov.in, http://nhb.gov.in/Statistics.aspx?enc=WkegdyuHokljEtehnJoq0KWLU79sOQCy+W4MfOk01GFOWQSEvtp9tNHHoiv3p49g#.

Mittal S 2007. *Can horticulture be a success story for India?* Indian Council for Research on International Economic Relations, New Delhi, Working Papers 197. Retrieved from https://icrier.org/pdf/Working%20Paper%20197.pdf.

Reddy KV and Kumar P 2010. An economic appraisal of mango processing plants of Chittoor district in Andhra Pradesh**,** *Indian Journal of Agricultural Economics* **65**(2): 1-21.

UNCTAD 2015. *Classification of non-tariff measures*, NCTAD/DITC/TAB/2012/2/Rev.1, United Nations Publication 2015, Retrieved from http://unctad.org/en/Publications Library/ditctab20122_en.pdf

Vinay A, Kumar R, Rahangdale S, Kumar BTN, Azeez PA and Kumar DK 2016. Indian seafood export: trends forecast and market stability analysis. *Indian Journal of Ecology* **43**(Special Issue-2): 793-796.

WTO 2007. *Sanitary and phytosanitary measures: Text of the agreement: The WTO agreement on the application of sanitary and phytosanitary measures (SPS Agreement)*, Retrieved from http://www.wto.org/english/tratop_e/sps_e/spsagr_e.htm (September 25, 2007).

WTO 2015. *Understanding the WTO*, World Trade Organization Information and External Relations Division, WTO 2015, Fifth Edition, ISBN 978-92-870-3748-0, Geneva, Switzerland, Retrieved from https://www.wto.org/english/thewto_e/whatis_e/tif_e/understanding_e.pdf

Received 25 October, 2021; Accepted 21 January, 2022