India's Production and Export Performance of Fresh Mango, Mangosteen & Guava: An Analysis (Since 1991 to 2011)

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Abstract

Recent developments in the international trade scenario and corresponding alterations in India's foreign trade policies have depicted for reaching implications for India's agricultural sector particular in exports. India produces different verities of fruits and vegetable crops and among them mango, mangosteen & guava is highly beneficial because of export into international market. Through the export of mango, mangosteen & guava, more foreign exchange use to generate by India. India's production of fresh mango, mangosteen & guava is tremendous; whereas export is adequate and the comparative advantage of fresh mango, mangosteen & guava in export has been found great improvement and advantageous during the period of the study. The present study is based on secondary data and data has been collected from various authentic sources such as research journals, books, magazines, news papers and government databases as well as authentic government websites. The study is taken in to consideration of production, export, and competitiveness of the fresh mango, mangosteen & guava. The study focused on basically two decades i.e. 1991 to 2011 and study also taking into account what changes has been made in the history of production and export of mango, mangosteen & guava since liberalization of India.

Keywords: *CAGR, Productivity, Production, Export, Revealed Comparative Advantage (RCA), Revealed symmetric comparative advantage (RSCA), forecasting, constraints.*

Introduction

Mango has originated from South Asia whereas Guava originated from Tropical America. Mangoes are grown mainly in tropical and subtropical regions. Indian mangoes are cultivated around February/early March, when the cold weather begins to subside and the danger of destruction through frost disappears. Mangoes are produced in over 90 countries worldwide. Asia accounts for approximately 77% of global mango production, and the Americas and Africa account for approximately 13% and 9%, respectively (FAOSTAT 2007).

There are nearly 1,000 cultivars or varieties in India. However only about 30 cultivars are grown commercially (Anon., 2003). These include Dashehari, Langra, Chausa, Bombay Green and Fazli in north India; Banganpalli, Totapuri, Neelum, Pairi, Suvarnarekha, Mulgoa, Kalapady and Rumani in south India; Alphonso, Kesar, Mankurad, Fernandin and Vanraj in western India; and Langra, Fazli, Chausa, Zardalu, Himsagar and Malda in eastern India (Negi, 2000). Other important mango varieties include Amrapalli, Bangalora, Bombay, Gulab Khas, Kishen Bhog, Mallika and Samar Bahist Chausa (Anon., 2003). Most of the Indian mango cultivars have specific ecogeographical requirements for optimum growth and fruiting/yield.

Indian mangoes are cultivated around February/early March, when the cold weather begins to subside and the danger of destruction through frost disappears. Mango fruits mature in 3–4 months from flowering and the fruit colour changes from dark green to light green on maturity. The fruits are harvested at the green mature stage in the morning hours. The Alphonso variety from South India is an early season variety and comes to the market by mid February. Its season is about two months until April/May. Mangoes grown in Uttar Pradesh (i.e. Chausa, Dashehari and Langra) enter the market in April and their season lasts until July/August. Harvesting is normally started after a few fruits drop. It comes into market early in May and remains in market until August/September. Guava produces in large quantity in India and the main varieties of guava are Allahabad Safeda, Lucknow-49, Chittidar, Nagpur Seedless, Banglore, Dharwar, Akra Mridula, Arka Amulya, Harijha, Hafshi, Allahabad Surkha CISH-G1, CISH-G2, CISH-G3 etc (NHB Database-2009).

Production of Mango, Mangosteen & Guava

Mango, mangosteen & guava are the most important fruit covering average 44.22 % of area and accounting of average 43.03% total production of total fruits in the country during 1991-2011, which is highest in the world. India has the richest collection of mango cultivars. Major mango growing States are Uttar Pradesh, Bihar, Andhra Pradesh, Orissa, West Bengal, Maharashtra, Gujarat, Karnataka, Kerala and Tamil Nadu (NHB Database-2009). Due to highly commercial fresh fruit, mangosteen produces in South Indian states and it also grows mainly in Southeast Asia, and also in tropical South American countries in the world. In India, guava become produces in Andhra Pradesh, Gujarat, Maharashtra, Uttar Pradesh Karnataka and Tamil Nadu and these are the major producing states (NHB Database-2009).

Even though India is the largest producer of the choicest varieties of mango, the country is not a major player in the export market for either fresh mango or processed mango products. Out of 10 million tonnes, around 40,000 tonnes of mango is exported as fresh fruit, accounting for about 0.4% of production. Other major producers of mango are China, Mexico, Thailand, Indonesia, Pakistan, Philippines, Nigeria, Brazil, Peru, Australia, South Africa, Malaysia and Venezuela (R.N. Hegde, 2006)

Export of Mango, Mangosteen & Guava

Alphonso, Kesar, Bangarpalli, Totapari, and Chausa are the verities in great demand abroad. The export of fresh mangoes has been showing an increasing trend, with earnings from export of fresh mangoes. Major export destinations for our mangoes are Gulf countries (51%), Bangladesh (33%), European Union (10%), Among the Indian varieties, Alphonso is most liked abroad (R.N. Hegde, 2006). Due to adequate demand of mango, mangosteens & guava, India exports to this fresh fruits in large quantity. India has exported the mango, mangosteens & guava to the foreign countries with average 13.37% during 1991-2011. India had 10.31% export share of mango, mangosteen & guava in 1991 whereas it increased to 16.03% in 2011. India had the highest export share of mango, mangosteen & guava during 2005 and it was 23.62% in the world.

Constraints in Mango, Mangosteen & Guava Production and Export

India's continues to be absent or at best a marginal player in most of the leading markets for its export of fresh fruits. Indian players have not succeeded in establishing direct linkages with buyers/ consumers in importing countries, as a result of which a large proportion of exports are being further processed & re-exported by other countries. Some of the major concerns for promoting the export related to:

Common Problems

The following common problems are- Poor market inadequate availability of disease free, high quality planting material, Non-tariff barriers, Lack of diseases and pests outbreak forecast service, Lack of quality standards, Lack of technologies in value addition, Lack of post harvest management technology and infrastructure, Weak database and intelligence, Poor marketing practices and infrastructure, Inadequate technical manpower/ human resource in farming system, Poor credit supply, high rate of interest coupled with inadequate crop insurance scheme, Ineffective transfer of technology and poor adoption of improved techniques (transfer of technology system need through reorientation with active participation of public, NGO's and private sectors, Poor linkage between Research and Development sectors, industries and farming communities, Absence of horticultural crop suitability Late implementation of government policies and schemes

Review of Literature

For this research paper, the various research journals, papers and articles has been reviewed which supports for finding the concrete results and these are as follows:

Negi, (2000), states that in India, mangoes are grown in tropical and subtropical regions from sea level to an altitude of 1500 m (i.e. from Cape Comorin to Himalayas). However, they are grown commercially in

areas up to 600 m altitude where the temperature rarely goes below 0ºC and grows best in temperatures around 27ºC.

Anitha Gomathi Krishnan, Tapan Kumar Nailwal, Alok Shukla, Ramesh Chandra Pant (2009), state that Mango (Mangifera indica L.) universally considered to be one of the finest fruits, and is an important crop in tropical and subtropical areas of the world.

G.P. Gandhi (2006), said that the infrastructure and technology today is competent to the extent that Indian mangoes not only reach all parts of the globe without any quality loss but also provide the importer an opportunity to market it over a longer period of time.

PFID-FV Report (2001), India is by far the largest producer of mangoes in the world. Mexico and Brazil are the largest producers in the Americas. Thailand, Pakistan and the Philippines are the largest Asian producers (after India). Nigeria is Africa's largest mango producer. In the US mangoes are grown in Florida, Hawaii and California.

G.M. Naidu, G.R. Naidu (2010), states that India is the leading producer of mangoes accounting for more than 50 percent of mango production worldwide. For the majority of farmers in India, mangoes are an important cash crop besides being a popular fruit. India's mangoes are unique in taste and aroma as they represent more than one thousand varieties, a diversity unmatched by any other national production. It is estimated that nearly 15 percent of India's mango production is wasted due to lack of adequate infrastructure facilities.

Edward A. Evans (2008), found that Worldwide mango production occurs in over 90 countries. While only a small proportion of total mango production enters international trade (less than 4%), the volume traded has risen substantially over the last decade. Among the factors responsible for increased mango production, trade, and consumption are lower prices, year-round availability, fewer trade barriers, longer shelf life, and consumer interest. Although not a major mango producer, the United States has developed most of the popular cultivars traded on the international market, and is the largest single-country mango importer.

R. N. Hegde (2006), studied that Quality parameters of fresh fruit are decided on the basis of appearance factor (i.e. size, shape, pattern, gloss, colour and physical defects), Kinesthetic factor (feel and sense) and sensory measurements (subjective methods). Adequate infrastructure, efficient logistic management, human resources development and multidisciplinary research are essential to enhance quality of export of fresh horticulture produce. Only integrated and concerted efforts of growers, suppliers, shippers, transporters and exporters can bring about satisfactory results.

World Bank (2006), Indian mangoes account for 40% of the world mango production although they are mainly meant for the domestic market. To this extent the Tamil Nadu region in India has got good opportunities for raising its income by focusing on the marketing of processed mangoes.

Tharanathan et al. (2006), states that being the major economic fruit crop within India, production of mangoes comprises cultivation of a large number of varieties and at present over a thousand are known Andhra Pradesh is the main production area while Uttar Pradesh, Bihar, Karnataka, Himachal Pradesh, Maharastra, Orissa, Tamil Nadu, and West Bengal also produce mangoes in large quantities

Pitam Chandra & Abhijit Kar (2006), said that trade in fruits has become steadily more important over the last decades. The composition, volume, and direction of this trade have changed as incomes and insistence on quality have grown on the demand side, while technology and trade agreements have influenced the supply side.

Bhaskar N. Patil1 & A. J. Nirban (2010), states that with respect to export value, mango is the main fruit crop, and among vegetables, onion occupies the first position. Bangladesh is one of the major trading partners for India for export of fresh fruits and onion and potatoes. However, fruits from India such as grape, mango and vegetables, such as eggplant are increasingly gaining market share in the U.K., The Netherlands, France and Germany.

Mattoo et al. (2007), said that India's mango exports have been about only one percent of the total production (Table 1). This is primarily due to huge domestic demand; however, it is also due to lack of export supply chain, high transport costs, and non-exportable quality of Indian mangoes

Methodology

Research methods refer to the behavior and instruments used in selecting and constructing research technique.

Importance of the Study

The importance of this study is for academicians and government policy makers. This study is based on fresh Mango, Mangosteens & Guava which plays significant role in consumer life as well as in national economy. The growth rate of Mango, Mangosteens & Guava production and export has been rising and it creates positive atmosphere on the farmers and exporters. The export plays important role for any country and India has good potential to export more fruits. This study deals with problems and their possible solution in production & export of Mango, Mangosteens & Guava.

Objectives of the Study

1. To examine the production, productivity, & export share of fresh mango, mangosteen & guava.
2. To evaluate the export performance and future forecast of fresh mango, mangosteen & guava.
3. To identify the major factors affecting the production and export of mango, mangosteen & guava.
4. To provide the possible solutions for addressing production and export issues across the fresh mango, mangosteen & guava.

Research Design

The exploratory and descriptive research methods have been used for the study. The present research is aimed at exploring the production and export issue of fresh mango, mangosteen & guava. The research is designed to be descriptive as well as, the research finds the facts & draws conclusions based on explored export and production issues not addressed earlier. The study is purely based on secondary data. The data has been collected from various sources such as reputed research journals magazines, newspapers, government annual reports, databases and government websites etc.

Data Collection

For the study, the data has been personally collected from various authentic agencies in India and some data has been collected from authentic websites of the various nations. Such as- Data for production of fresh fruits & vegetables has been collected from- National Horticulture Board, Ministry of Agriculture of India (NHB), data collected for export of fresh fruits and vegetables- Food and Agriculture Organization of United States (website source), Some other sources used for collecting of secondary data are- Central Food Technological Research Institute (CFTRI), Indian Institute of Foreign Trade (IIFT) New Delhi, Ministry of Commerce and Industry, Government of India, Indian Institute of Horticulture Research (IIHR) Bangalore, Indian Institute of Vegetables Research, Varanasi (U.P.) Directorate of Economics and Statistics, Ministry of Agriculture, DGCI & S Kolkata etc. And some data related to trade, has been collected from Reserve Bank of India, Annual Reports (2007 to 2011) etc.

Scope of the Study

The horticulture sector encompasses a wide range of commodities, including fruits, vegetables, potatoes, tuber crops, and ornamentals, medicinal and aromatic crops. However, this study considers only fresh mango, mangosteens & guava and the time period has taken for study is from 1991 to 2011. Basically, the study considers production (state wise, crop wise), export and import of fresh mango, mangosteens & guava and production and export. The study has been conducted only in context of India and world.

Limitations of the Study

i. For the study, only 21 years have been taken i.e. from 1991 to 2011.

ii. For the study, data has been taken related to production, export and import of mango, mangosteens & guava.

Tools and Techniques for Study

For analyzing the research data, simple tools and technique have been used. For calculating the productivity; researcher divided the total production of mangosteens & guava in respective year by total production area of the mangosteens & guava. Further researcher calculated the per cent share of respective mangosteens & guava area, production, export, and import and it is done by using simple formula of percentage. Other tools and techniques which have been taken for completing and finding the result of research are as follows.

Compound Annual Growth Rate (CAGR)

The Compound Annual Growth Rate (CAGR) is used to calculate growth rate of production and export of mangosteens & guava, and this technique helps to calculate growth rate of particular product with respect to production and export.

Formula-

$$CAGR = ((End\ Value/Start\ Value)\ ^\wedge\ (1/\ (Periods\ -\ 1))\ -1$$

$$CAGR\ (t_0\text{-}t_n) = (V(t_n)/V(t_0)\text{^}1/(t_n\text{-}t_0)\ -1$$

Implication-

CAGR= ((Value of mango, mangosteens & guava Production/export in 2011/ Value of mangosteens & guava Production/export in 1991)^(1/21-1))-1

Revealed Comparative Advantage Ratio (RCA)

Commodity that a nation should produce and export is determined by the principle of comparative advantage. The comparative advantage tells about the capability of the country to export a commodity, while the competitiveness of the commodity in the world market is determined by the measures of export competitiveness.

The formula of RCA has been given by Balassa's in 1965. Revealed comparative advantage ratio has been used to study the export comparative advantage of the products. The ratio is defined as:

Formula:

$$R_{ih} = ((X_{ih}/X_{it})/(X_{wh}/X_{wt})$$

Where

R_{ih} = Revealed Comparative Advantage Ratio for India in product h

X_{ih} = India's exports of product h

X_{it} = Total exports of India

X_{wh} = World exports of product h

X_{wt} = Total world export

Implication:

RCA= (India's exports of mangosteens & guava / Total exports of India in particular period) / (World Exports of mangosteens & guava /Total world export in particular period)

The RCA ratio is the share of a given product in a country's export to its share in world exports. A country is said to have the Revealed Comparative Advantage in the product if the ratio is greater than one (RCA>1).

The RCA ratio of less than one (RCA<1) implies a disadvantage i.e. country does not have comparative advantage in that product. If a commodity has a comparative advantage then it means that the share of this country exports is more competitive in world.

However, RCA suffers from the problem of asymmetry as pure RCA is basically not comparable on both sides of unity. It the index ranged from zero to one, a country is said not to be specialized in a given sector and if the value of the index ranged from one to infinity, the country is said to be specialized. The index is made symmetric, following the methodology suggested by Dalum *et al* (1998) and the resultant index is called Revealed Symmetric Comparative Advantage (RSCA). Mathematically, it can be expressed by the equation (2)

$$RSCA = (RCA-1) / (RCA+1) \quad . \quad . \quad . \quad (2)$$

This measure ranges between -1 and +1 and is free from the problem of skewness. A commodity is said to have comparative advantage in its exports if the corresponding RSCA value is positive and vice versa. In the present study, the RSCA is used to measure the revealed symmetric comparative advantage of the mango, mangosteens & guava.

Forecasting

When estimates of future conditions are made on a systematic basis, the process is referred to as "forecasting" and the figure or statement obtained is known as a 'forecast'. There are different methods of forecasting such as regression, econometric, business barometer, Exponential Smoothing, and time series analysis etc. The first step in making estimates for the future consists of gathering information from the past data. In this connection, one usually deals with statistical data which are collected, observed or recorded at successive intervals of time. Such data are generally referred to as 'time series'. Thus when we observe numerical data at different points of time, the set of observations is known as time series.

Least Square Method

This method is most widely used in practice. When this method is applied, a trend line is fitted to the data such a manner that the following two conditions are satisfied:

(1) $\Sigma(Y - Yc) = 0$

i.e., the sum of deviations of the actual value of Y and the computed of Y is zero.

(2) $\Sigma(Y - Yc)^2$ is least,

i.e., the sum of the squares of the deviations of the actual and computed values is least from this line. That is why this method is called the method of least squares. The line obtained by this method is known as the line of 'best fit'.

The method of least squares can be used either to fit a straight line trend or a parabolic trend.

The straight line trend is represented by the equation

$$Yc = a + bX$$

There Yc denotes the trend (computed) values to distinguish them from the actual Y values, a is the Y intercept or the value of the Y variable when X= 0, b represents slope of the line or the amount of change in Y variable that is associated with a change of one unit in X variable. The X variable in time series represents time.

Analysis and Interpretation

India and World Compound Annual Growth Rate (CAGR) of Mango, Mangosteen & Guava

Table 1 presents the CAGR of mango, mangosteen & guava for the period 1991-2011. For the period of 1991-97, the CAGR of India's mango, mangosteen & guava production is 3.88% and it decreased to 1.95% in the period 1998-2004. Further, it is observed that the CAGR has increased to 4.25% in the period 2005-

11 which signifies that there is a consistent fluctuation for the mango, mangosteen & guava production. The CAGR of mango, mangosteen & guava for the overall period i.e. 1991-2011 is 2.79%. India had highest CAGR of mango, mangosteen & guava production in the period 2005-2011.

Table 1: Compound Annual Growth Rate of Mango, Mangosteen & Guava during 1991-2011

Periods		India		World	
		Production (%)	Export (%)	Production (%)	Export (%)
1st	1991-1997	3.88	11.69	4.80	13.69
2nd	1998-2004	1.95	22.09	4.61	9.16
3rd	2005-2011	4.25	0.48	3.54	7.19
4th	1991-2011	2.79	12.15	3.97	9.70

For the period of 1991-97, the CAGR of World's mango, mangosteen & guava production is 4.80%. Further, it is observed that for the period 2005-11 the CAGR of mango, mangosteen & guava is 3.54% which declined from 4.61% of the previous period 1998-2004. There is gradual increase in the world's mango, mangosteen & guava production since 1998-2004 and the CAGR for the overall period i.e. 1991-2011 is 3.97%. During 1991-97, world had highest CAGR and it implies the high production growth rate of mango, mangosteen & guava production in the particular period.

For the period of 1991-97, the CAGR of India's mango, mangosteen & guava export is 11.69% and it increased to 22.09% in the period 1998-2004. Further it is observed that the CAGR of mango, mangosteen & guava is 0.48% during 2005-11 which has declined from second period. The CAGR for the overall period of mango, mangosteen & guava export i.e. 1991-2011 is 12.15%. In the second period, India had highest CAGR and it explains the high export growth rate of mango, mangosteen & guava in the particular period.

For the period of 1991-97, the CAGR of World's mango, mangosteen & guava export is 13.69%. Further, it is observed that the CAGR of mango, mangosteen & guava for the periods 1998-2004 and 2005-11 is 9.16% and 7.19%, respectively whereas the overall period i.e. 1991-2011 had to 9.70% CAGR. In the first period, world had highest CAGR and it implies the high export growth rate of mango, mangosteen & guava in the particular period.

Productivity of Mango, Mangosteen & Guava in India & World

Table 2 & figure 1 presents India & World productivity of mango, mangosteen & guava during 1991-2011. India's productivity of mango, mangosteen & guava had been fluctuating and it was 8.12% in 1991 which decreased to 8.11% in 1992 and further it is observed that India registered highest productivity in 1997 for mango, mangosteen & guava. For few periods, India's productivity of mango, mangosteen & guava had more than 8% but in maximum period the productivity of mango, mangosteen & guava

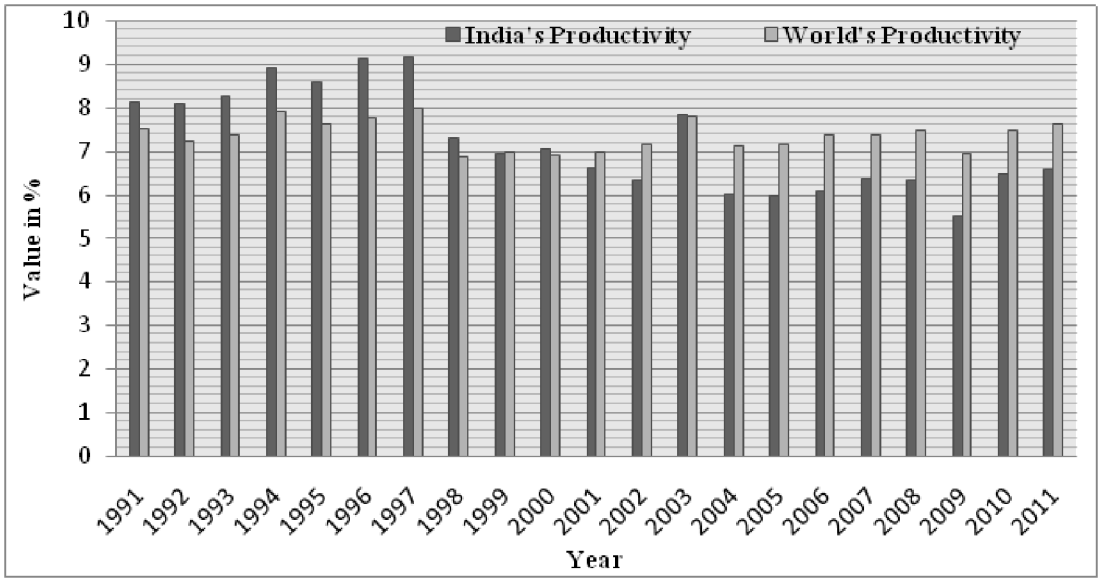
Table 2: India & World Productivity of Mango, Mangosteen & Guava during 1991-2011

Year	*India's Productivity(%)*	*World's Productivity (%)*
1991	8.12	7.51
1992	8.11	7.25
1993	8.28	7.40
1994	8.93	7.93
1995	8.59	7.64
1996	9.15	7.79
1997	9.16	7.99
1998	7.30	6.89
1999	6.97	7.00

2000	7.06	6.92
2001	6.62	6.98
2002	6.35	7.16
2003	7.84	7.83
2004	6.02	7.13
2005	6.00	7.18
2006	6.08	7.38
2007	6.37	7.39
2008	6.35	7.48
2009	5.52	6.97
2010	6.49	7.49
2011	6.61	7.65

had less than 8%. So there has been seen the mixed trend in India's productivity of mango, mangosteen & guava whereas the world's productivity of mango, mangosteen & guava had been almost constant but having some fluctuation since 1991-2011. World registered the highest productivity for mango, mangosteen & guava in 1997. Further it is observed that there has been slight fluctuation in world productivity of mango, mangosteen & guava in comparison to India during the period of study. Therefore, India's productivity of mango, mangosteen & guava had been more in few periods in comparison to world and later world turned for more productivity in comparison to India during 1991-2011.

Figure 1 : India & World Productivity Trend of Mango, Mangosteen & Guava for the period 1991-2011



Share of India's Mango, Mangosteen & Guava in Area, Production, Export and Import

Table 3 presents the share of mango, mangosteen & guava in world's area, production, export & import during 1991-2011. During the period of study, India had tremendous share in area for producing mango, mangosteen & guava and area had been about to consistent. During 1991, India had 45.29% share of area which declined to 41.61% in 2000 and further it revised to 45.13% in 2011 for producing mango, mangosteen & guava. In 1991, India produced alone 46.77% mango, mangosteen & guava in world which has declined to 42.49% in 2000 and further it declined to 38.99% in 2011 and the share of mango, mangosteen & guava had been fluctuating during the period of study. Though, the production share had been satisfactory of mango, mangosteen & guava during 1991-2011. Whereas the export of mango, mangosteen & guava had been considerable and it was 10.31% in 1991 which declined to 6.31% in 2000 and further it revised to

16.03% in 2011 and India had highest share of export in 2005 i.e. 23.63%. However, India imported mango, mangosteen & guava during the period of study but it was very less while India had 0.05% share in 2011 which is the highest import share of mango, mangosteen & guava.

Table 3: Share of India's Mango, Mangosteen & Guava in World's Area, Production, Export & Import during 1991-2011

Value in Percent

Year	*Area*	*Production*	*Export*	*Import*
1991	45.29	47.66	10.31	00
1992	45.20	50.53	11.17	00
1993	45.93	50.37	8.00	00
1994	45.06	50.73	9.08	00
1995	43.41	48.78	6.93	00
1996	43.11	50.62	6.58	00
1997	40.50	46.43	9.26	00
1998	42.56	45.12	8.74	00
1999	41.69	41.50	6.66	00
2000	41.64	42.49	6.31	00
2001	42.61	40.36	7.07	00
2002	43.06	38.22	6.25	00
2003	42.82	42.84	19.30	00
2004	45.78	38.66	17.11	00
2005	44.82	37.43	23.62	0.01
2006	45.38	37.41	22.77	0.01
2007	45.70	39.38	20.71	0.01
2008	46.24	39.29	22.91	0.01
2009	46.11	36.51	22.76	0.03
2010	46.64	40.44	19.28	0.01
2011	45.13	38.99	16.03	0.05

India's Foreign Trade (Export & Import) of Mango, Mangosteen & Guava

Table 4 presents the export & import of mango, mangosteen & guava during 1991-2011. During 1991-2011, India's export of mango, mangosteen & guava increased continuous and there had been consistency in export. The export of mango, mangosteen & guava had been fluctuating during the period of study. The total export of mango, mangosteen & guava had 2513711 tons during 1991-2011 and it was 23105 tons in 1991 which increased to 39274 tons in 2000 and further it has increased to 229192 tons in 2011. Since 2003-09, the export of mango, mangosteen & guava had been more than other periods and mango, mangosteen & guava had highest export in 2009. Whereas, the total import of mango, mangosteen & guava by India had 1748 tons during 1991-2011. If we see the difference between export & import of mango, mangosteen & guava has turned to positive export for all the period of study. That means India's export of mango, mangosteen & guava had been more than import during the 1991-2011.

Table 4: Difference between Export & Import of Mango, Mangosteen & Guava during 1991-2011

Year	*Export(Tons)*	*Import(Tons)*	*Export – Import (Tons)*
1991	23105	0	23105
1992	25850	0	25850
1993	23405	0	23405
1994	27320	4	27316
1995	23275	0	23275
1996	26780	18	26762

1997	44862	13	44849
1998	47149	0	47149
1999	37822	7	37815
2000	39274	29	39245
2001	46232	19	46213
2002	41577	59	41518
2003	179179	49	179130
2004	156222	6	156216
2005	222622	100	222522
2006	256874	109	256765
2007	240858	104	240754
2008	274854	171	274683
2009	286775	297	286478
2010	260484	132	260352
2011	229192	631	228561
Total	2513711	1748	2511963

Revealed Comparative Advantage (RCA) & Revealed Symmetric Comparative Advantage (RSCA) Ratio of Mango, Mangosteen & Guava

Table 5 & figure 2 represents the RCA and RSCA ratio of India's mango, mangosteen & guava during 1991-2011. During 1991-2011, the RCA ratio of mango, mangosteen & guava is more than one (RCA>1) and RSCA ratio has been implying the positive sign for export. That means, India has great comparative advantage for mango, mangosteen & guava because the export share of this commodity is considerable/ remarkable into the global market.

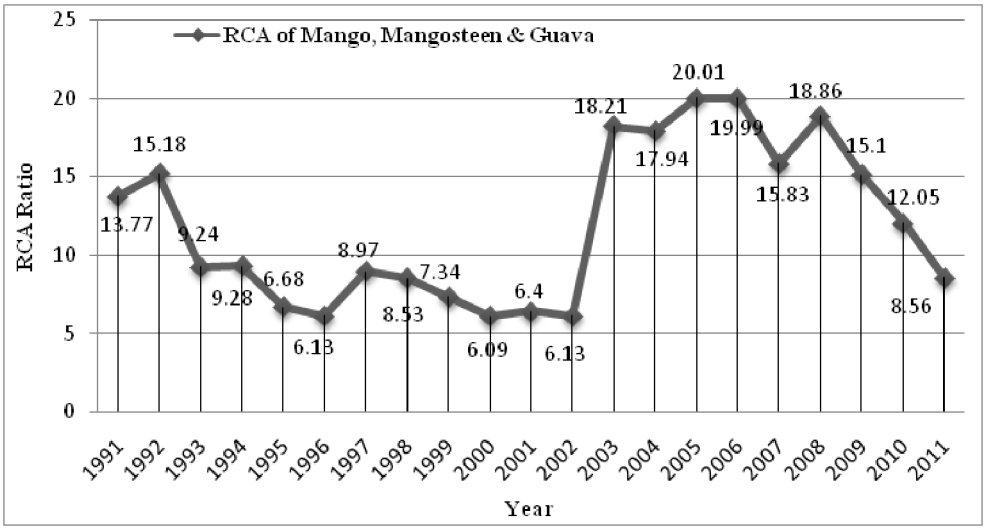
India's mango, mangosteen & guava has been enjoying into foreign market since over the years and these are creating the significant competition among international competitor at international level. Due to high export, India's mango, mangosteen & guava has tremendous opportunity to exist into the international market as a key player because India is the top most producing nation since over the years of this fresh fruit in world.

Table 5 : India's RCA & RSCA Ratio of Mango, Mangosteen & Guava during 1991-2011

Year	*RCA Ratio*	*RSCA Ratio*
1991	13.77	0.86
1992	15.18	0.87
1993	9.24	0.80
1994	9.28	0.80
1995	6.68	0.73
1996	6.13	0.71
1997	8.97	0.79
1998	8.53	0.79
1999	7.34	0.76
2000	6.09	0.71
2001	6.40	0.72
2002	6.13	0.71
2003	18.21	0.89
2004	17.94	0.89
2005	20.01	0.90

2006	19.99	0.90
2007	15.83	0.88
2008	18.86	0.89
2009	15.10	0.87
2010	12.05	0.84
2011	8.56	0.79

Figure 2 : Revealed Comparative Advantage (RCA) Trend of Mango, Mangosteen & Guava for the period 1991-2011



Mango, Mangosteen & Guava Production and Export Forecast for the Period 2012-25

Table 6 presents the production and export of mango, mangosteen & guava during 2012-2025. For the forecasting period i.e. 2012 to 2025, the production and export of mango, mangosteen & guava is expected to increase and figure shows an increasing trend.

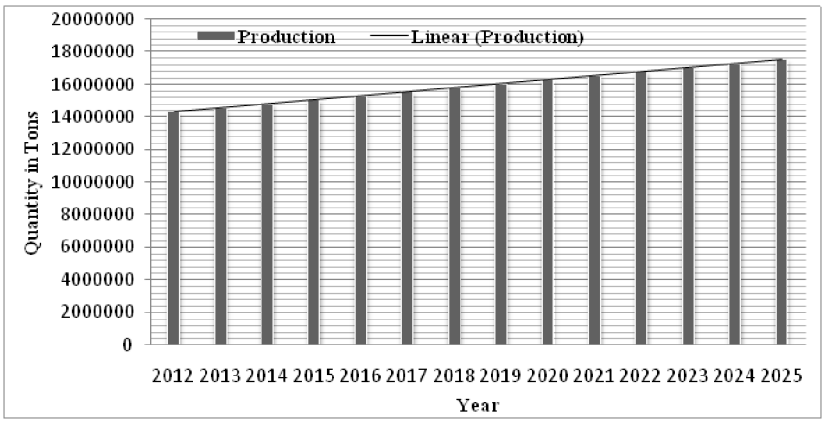
Table 6 : Forecasting of India's Mango, Mangosteen & Guava Production and Export for the period 2012-2025

Year	*Production (Tons)*	*Export (Tons)*
2012	14306137	288150
2013	14554842	303464
2014	14803547	318778
2015	15052251	334091
2016	15300956	349405
2017	15549661	364719
2018	15798366	380032
2019	16047070	395346
2020	16295775	410660
2021	16544480	425973
2022	16793185	441287
2023	17041889	456601
2024	17290594	471914
2025	17539299	487228

The production of mango, mangosteen & guava is expected to 2485840 tons whereas the export likely to be 82080 tons up to 2025. In future, the production and export of mango, mangosteen & guava is expected to

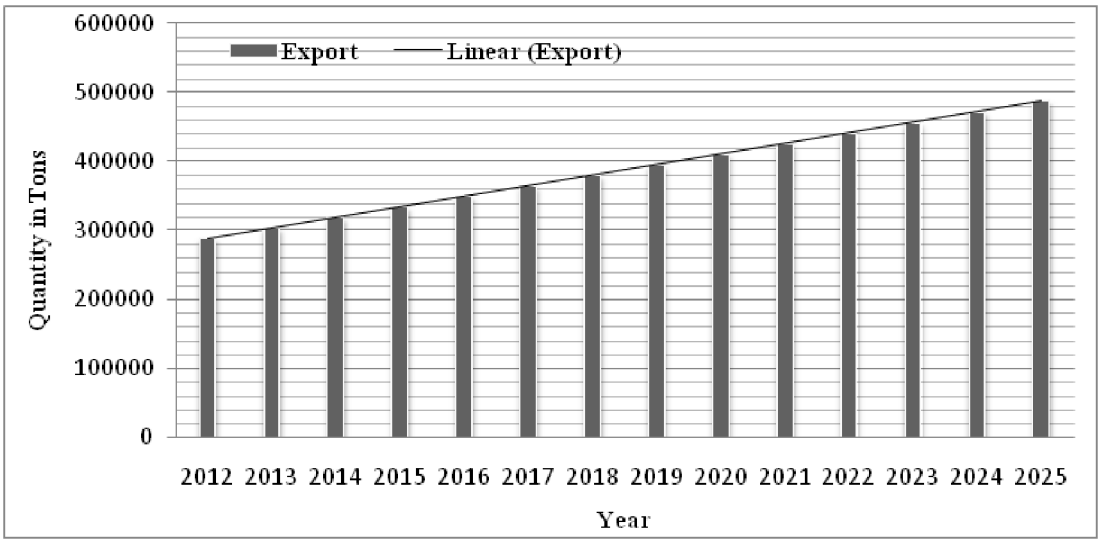
increase with positive growth. Figure 4 & 5 are showing the increasing trend of mango, mangosteen & guava production and export for the period 2012-2025.

Figure 3 : Forecasting Production Trend of Mango, Mangosteen & Guava for the period 2012-2025



For the period 2012-2025, the compound annual growth rate of India's mango, mangosteen & guava production and export is projected to 1.57% & 4.12%, respectively.

Figure 4 : Forecasting Trend of Mango, Mangosteens & Guava Export for the period 2012-2025



Hence, the compound annual growth rate of mango, mangosteen & guava production is less than export. That means the projected export growth rate of mango, mangosteen & guava is to be more than production for the period 2012-2025. During the period 2012-2025, mango, mangosteen & guava production is expected to increase with very slow growth rate in future while export is likely to be faster than production.

Findings

It is found that, the CAGR of India's mango, mangosteen & guava production had been less than world whereas export CAGR of mango, mangosteen & guava had been more than world during 1991-2011. India had 2.79% CAGR for mango, mangosteen & guava production whereas world had 3.97% CAGR. While India had 12.15% CAGR for mango, mangosteen & guava export whereas world had 9.70% CAGR. India's productivity of mango, mangosteen & guava stood from 6% to 9% whereas world had 6% to 8% during 1991-2011. So, therefore a mixed trend has been found in India's & world's mango, mangosteen & guava productivity during the period of study. India occupied tremendous area for producing the mango, mangosteen

& guava which signify for adequate production and the share of area fluctuated during 1991-2011. India occupied 44.22% average share of area for producing mango, mangosteen & guava with 43.03% average production share during 1991-2011. The share of mango, mangosteen & guava production has been decreased from 47.66% to 38.99% in 1991 & 2011, respectively whereas the export of mango, mangosteen & guava had been satisfactory and increased from 10.31% to 16.99% in 1991 & 2011, respectively while India had very less share of mango, mangosteen & guava during 1991-2011. India's trade of mango, mangosteen & guava had been positive because the export of this fruit had more than import during 1991-2011. India exports the mango, mangosteen & guava in large quantity to Mexico, Brazil, Peru, and Pakistan and these are the major importer. The RCA ratio of mango, mangosteen & guava had been more than one for all the period of study. Thus, India had immense comparative advantage for mango, mangosteen & guava during 1991-2011. India has been major producing nation since over the few decades so that its export is very high. For the estimating period 2012-2025, in future the production and export of mango, mangosteen & guava is expected to increase and the production and export forecast indicates towards favorable increasing trend in the coming years. For the forecasting period 2012-25, the projected compound annual growth rate of mango, mangosteen & guava production and export shall have 1.57% & 4.12%, respectively.

Conclusion and Suggestions

In the globalized era, every sector of a nation has been touching new height for expanding their importance to the wellbeing of human. After liberalization of India, the new age started and various sectors arose and opened their hands for shaping the elderly India. Among these sectors, the Agriculture sector has been playing an incredible role in India which contributed more than 50% share in GDP before 1970. But now this sector contributes approximately 16% share in Indian GDP. Agriculture sector contains various sub-sectors such as horticulture, floriculture etc. In agriculture, the horticulture sector has been contributing important share in Indian economy over the years while horticulture sector contains most momentous sector which is fruit and vegetable. For many years, India is the world's second leading producer of fruits and vegetables after China.

India produces different verities of fruits and vegetable crops and among them mango, mangosteen & guava is highly beneficial because of export into international market. Through the export of mango, mangosteen & guava, more foreign exchange use to generate by India. India's production of fresh mango, mangosteen & guava is tremendous; whereas export is adequate and the comparative advantage of fresh mango, mangosteen & guava in export has been found great improvement and advantageous during the period of the study. The demand of mango, mangosteen guava is adequate in India, as well the consumption of this fruits is very high; so there is highly need to produce more mango, mangosteen & guava for fluffing the future expected demand.

China has been occupying the first rank for producing the fruits and vegetables while USA is on third position in production of fruits whereas Brazil is also on third position in production of vegetables. But India's share of fruit and vegetable is negligible for the global market i.e. the export share of fruit and vegetable is as low as less than two percent. The export market for fresh fruits is highly competitive among the top exporters. Gaining access to foreign markets is critical to countries that are large exporters. Free trade agreements are one means to provide increased market access and encourage increased exports. A large volume of exports of fruits and vegetables goes to SAARC and ASEAN Nations and countries in Gulf. In spite of being low cost producer of crops; Indian fruits and vegetables produce is not finally competitive in global markets, primarily due to non-availability of critical volumes of good quality product from a compact area resulting into higher delivery costs.

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Useful Website Source

1. Food & Agriculture Organization of the United States (FAO)
2. http://www.faostate.org
3. World Trade Organization (WTO)
4. http://www.wto.org
5. Department of Agricultural Research and Education
6. http://dare.nic.in
7. Indian Council of Agricultural Research
8. http://www.icar.org.in
9. Department of Agriculture and Cooperation
10. http://www.agri.coop.nic.in
11. Ministry of Commerce and Industry
12. http://www.commin.nic.in
13. Department of Commerce
14. http://commin.nic.in/doc
15. Agriculture and Processed Food Products Export Development Authority (APEDA)
16. http://www.apeda.com
17. Directorate General of Foreign Trade
18. http://dgft.delhi.nic.in

APPENDIX

Table A5 : Production of Mango, Mangosteen & Guava in India and World during 1991-2011

Area in Hectare & Production in Tons

	India			*World*	
Year	*Area*	*Production*	*India's Production Rank*	*Area*	*Production*
1991	1077621	8752134	1	2379119	17877775
1992	1136668	9223256	1	2514525	18251065
1993	1220000	10110000	1	2655675	19677946
1994	1230000	10990000	1	2729303	21660231
1995	1280000	11000000	1	2948581	22550078
1996	1300000	11898801	1	3015541	23502526
1997	1200000	11000000	1	2962504	23691102
1998	1400000	10230000	1	3289022	22668317
1999	1401600	9781700	1	3361933	23566703
2000	1486900	10503500	1	3570129	24714477
2001	1519000	10056800	1	3564681	24916060
2002	1575800	10020200	1	3659109	26214536
2003	1623400	12733200	1	3791107	29720353
2004	1906700	11490000	1	4164157	29715860
2005	1970400	11829700	1	4395505	31600157
2006	2080700	12663100	1	4584732	33840467
2007	2154000	13734000	1	4713042	34875446
2008	2201000	13997000	1	4759419	35619384
2009	2309000	12750000	1	5006865	34917913
2010	2312300	15026700	1	4956754	37149496
2011	2297000	15188000	1	5088805	38953166
Total	34682089	242978091	1	78110508	575683058

Source: National Horticulture Board, Database - 2001, To 2011, Ministry of Agriculture, India and Database from Food & Agriculture Organization, USA
Researchers' Compilation & Calculation

Table A4 : India's Export and Import (Trade) of Mango, Mangosteen & Guava during 1991-2011

Year	*Export (Tons)*	*Export (Million Rs*)*	*Import (Tons)*	*Import (Million Rs*)*
1991	23105	330.65	0	0
1992	25850	452.94	0	0
1993	23405	448.40	0	0
1994	27320	475.02	4	0.28
1995	23275	400.57	0	0
1996	26780	474.87	18	1.16
1997	44862	747.61	13	0.25
1998	47149	825.35	0	0
1999	37822	775.98	7	0.34
2000	39274	742.57	29	1.52
2001	46232	899.98	19	0.94
2002	41577	936.86	59	2.04
2003	179179	3973.88	49	2.42

2004	156222	4218.96	6	0.27
2005	222622	5411.51	100	4.14
2006	256874	7122.16	109	4.53
2007	240858	6765.52	104	3.30
2008	274854	9787.75	171	5.65
2009	286775	10192.02	297	7.69
2010	260484	10455.38	132	4.25
2011	229192	9397.38	631	26.27
Total	2513711	74835.36	1748	65.05

*Value converted from Thousand Dollar to Million Rupees through exchange rate in the respective year
Source: Database from Food Agriculture Organization, USA
Researchers' Compilation & Calculation

Table A3 : World Export and Import (Trade) of Mango, Mangosteen & Guava during 1991-2011

Year	**Export** *(Tons)*	**Export** *(Million Rs*)*	**Import** *(Tons)*	**Import** *(Million Rs*)*
1991	224043	4359.85	211559	5315.21
1992	231322	5466.30	218515	6798.62
1993	292373	8052.03	255956	8495.79
1994	300675	8388.85	299384	10233.44
1995	335740	9450.97	350407	13124.03
1996	406802	12495.41	397395	13904.31
1997	484003	13019.69	448550	15328.03
1998	539451	15723.00	497573	18352.10
1999	567425	16307.44	565134	20597.66
2000	621814	17331.90	621810	23056.48
2001	653824	19636.14	637031	25624.53
2002	664594	18913.68	685188	25278.91
2003	928044	26284.62	804074	32291.08
2004	912712	26182.96	799651	30300.06
2005	942190	27423.05	754520	34590.01
2006	1128043	34214.98	850604	40776.89
2007	1162820	37770.90	898759	43772.14
2008	1199676	43341.09	908834	48632.29
2009	1259584	48507.04	867389	49233.27
2010	1350430	53034.38	1017347	53607.42
2011	1429679	64026.23	1098007	62396.50
Total	15635244	509930.51	13187687	581708.77

*Value converted from Thousand Dollar to Million Rupees through exchange rate in the respective year
Source: Database from Food & Agriculture Organization, USA
Researchers' Compilation & Calculation

Table A4 : Top Five Countries of Mango, Mangosteen & Guava Producing in the World

1991	*1995*	*2000*	*2005*	*2010*	*2011*
India	India	India	India	India	India
Mexico	China	China	China	China	China
Thailand	Mexico	Thailand	Thailand	Thailand	Thailand

China	Thailand	Mexico	Mexico	Pakistan	Indonesia
Pakistan	Indonesia	Pakistan	Pakistan	Mexico	Pakistan

Source: FAOSTAT-2013

Table A5 : Top Five Countries of Mango, Mangosteens & Guava Exporting in the World

1991	1995	2000	2005	2010	2011
Mexico	Mexico	Mexico	India	India	Mexico
Philippines	Philippines	Philippines	Mexico	Mexico	India
India	Netherlands	Netherlands	Netherlands	Netherlands	Netherlands
Netherlands	Brazil	Brazil	Brazil	Brazil	Brazil
Venezuela	China	Peru	Peru	Peru	Peru

Source: FAOSTAT-2013

Table A6 : Top Five Countries of Mango, Mangosteens & Guava Importing in the World

1991	1995	2000	2005	2010	2011
USA	USA	USA	USA	USA	USA
UK	Netherlands	Netherlands	Netherlands	Netherlands	Netherlands
France	China	China	France	Germany	Germany
Japan	France	France	UK	UK	UK
Netherlands	Japan	Japan	Germany	France	France

Source: FAOSTAT-2013