

RESEARCH PAPER

Apple scenario of India: An economic analysis

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ABSTRACT

The present work was taken up to investigate the policies which will help in increasing the production and satisfying local and global demand of apple. Preliminary compound annual growth rate analysis was taken up for the period 2006-07 to 2015-16 and it was found that the area, production and productivity increased at the rate of 2.69, 4.13 and 1.36 per cent per annum, respectively. The instability was very less with respect to area, production and productivity of apples in the country. It was found that the import of apple by India in terms of quantity as well as value increased at the rate of 1.18 and 4.81 per cent per annum. With respect to imports, the instability was very less in terms of quantity as compared to that of its value. While in case of the Indian apple exports in terms of quantity and value registered negative growth rates (-8.54% and -15.01% per annum). Export of apples showed higher level of instability in terms of both quantity and value. It is estimated that the imports of apples will be increasing year by year and by 2019-20, the expected import of apples would be around 2,11,305 metric tons. The estimated export of apples using compound growth rates would be around 17,560 metric tons during 2016-17 and would gradually decrease and would reach around 13,433 metric tons by 2019-20. It was concluded that although there is positive and significant growth in area, production and productivity of apples in India, there is need to take a concerted efforts in terms of improving the quality of the product.

KEY WORDS : Apple, Production, Instability indices, Export, Import

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India has diverse weather condition which offers a luxury for the production of different types of fruits and vegetables. In India, fruits and vegetables constitute a major account (90%) of the total horticulture

production. India produced 91.443 million metric tons (MT) of fruits from 6.405 million hectares during 2015-16 (<http://www.indiastat.com/default.aspx>). India is the second largest producer of fruits and vegetables in the world after China and is recognized as fruit basket of the world (Lone and Sen, 2014; Choudhary and Kundal, 2015; Saxena *et al.*, 2015 and Thowseaf and Millath, 2016). The major fruits grown in India are mango, grapes, apple, apricots, orange, banana, avocados, guava, litchi, papaya, sapota and water melons. India is also a leading exporter of fruits to the world. The country has exported 3,08,261.23 MT of fresh fruits to the world, worth of Rs. 1,538.16 crores during the year 2015-16 (<http://>

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apeda.gov.in/apedawebsite/index.html). Apples are gaining more importance in world's fruit economy as the commodity has entered the international trade. Out of world's total apple production (76.409 million MT), India is the fifth largest producer of apples with (1.900 million MT), behind China (42.600 million MT), European Union (12.659 million MT), Unites States (4.502 million MT), Turkey (2.740 million MT) and Iran (1.693 million MT) (<http://www.fao.org/faostat/en/>). The apples are mainly grown in the North-Western states of India (Ghosh, 1998). Five hilly states, viz., Jammu and Kashmir (1368.63 MT), Himachal Pradesh (625.2 MT), Uttarakhand (106.1 MT), Arunachal Pradesh (32.00 MT) and Nagaland (1.89 MT) contributes majorly towards its production viz., 64.14, 29.30, 4.97, 1.50, and 0.09 per cent to the total apple production in India, respectively (<http://www.indiastat.com/default.aspx>). Two lakh family members of farmers depend up on the production of apple for their livelihood as apple contributes about 16 per cent of these states' GDP.

In case of Indian apple, studies with respect to economic aspects of production and export are either very less or outdated. This kind of study has been carried out for other economically important fruits (Kassa, 2000; Patil and Nirban, 2010; Vinayaka *et al.*, 2014; Wasim, 2011; Yosini, 2011; Krishan and Chanchal, 2014; Kusuma and Basavaraja, 2014; Kusuma *et al.*, 2014; Mokashi and Hosamani, 2014 and Ushunde *et al.*, 2016) and crops (Gajbhiye *et al.*, 2010 and Uddin *et al.*, 2015 and Patil and Yeledhalli, 2016) in different countries. However, now-a-day's apple is gaining much importance for getting foreign exchange from export. Study on these aspects would throw sufficient light on drawing proper policy guidelines in these aspects. Hence the study was initiated with the following objectives.

- To study the growth in area, production and productivity of apple in India.
- To study the import and export performance of apple from India.

METHODOLOGY

Time series secondary data were collected on area, production, productivity, import and exports of apple from various sources like NHB, APEDA, Indiastat, FAOSTAT, DGCIS (Directorate General of Commercial Intelligence and Statistics), etc. The data on area, production and productivity of apple in India were

considered for a period of ten years (2006-07 to 2015-16), and for import and export study, six year data (2010-11 to 2015-16) were considered. Further, other necessary information were gathered from internet websites, journals and News paper articles. Compound annual growth rate and instability index were computed for better interpretation of the results.

Compound annual growth rate analysis :

For computing compound annual growth rate for area, production, productivity, import and export of apple in India over a period of time, the exponential function of the following form was used.

$$Y = ab^t U_t \quad (1)$$

where,

Y = Area / Yield / Production / Import / Export

U_t = Disturbance term in year 't'

The eq. (1) was transformed into log linear form and written as;

$$\log Y = \log a + t \log b + U_t \quad (2)$$

Eq. (2) was estimated by using Ordinary Least Squares (OLS) technique.

Compound annual growth rate (g) was then computed

$$g = (B - 1) 100 \quad (3)$$

where,

g : Compound annual growth rate in per cent per annum

B : Antilog of b

The standard error of the growth rate was estimated and tested for its significance with 't' statistic.

Instability analysis :

Index of instability was given by Cuddy and Della Valle, in 1978, which is named as Cuddy-Della Valle Instability Index (%). It was computed by using the following formula with an objective to know that, upto what extent risk is occurred in the selected variables (area, production, productivity, import and export).

$$\text{Instability index} = \frac{\text{Standard deviation}}{\text{Mean}} \times 100 \times \sqrt{1 - R^2}$$

ANALYSIS AND DISCUSSION

The compound annual growth rate in area, production and productivity of apple in India were worked out for the period of 2006-07 to 2015-16 and the results are presented in the Table 1. India showed positive growth

rates in area, production and productivity of apple over the study period.

It is observed from the table that, the area under apple in India was growing at the rate of 2.69 per cent per annum. Production and productivity increased at the rate of 4.13 and 1.36 per cent per annum, and were significant at 1 per cent. The results indicated that there is significant growth in area production and productivity of apple in India over the study period. Major apple producing states of India come under rain shadow belt, which provides the ideal condition for apple production, such as longer sunshine period and restriction from heavy rain and wind due to large range of hills. Further to promote apple cultivation, Himachal Pradesh has introduced a programme for improved varieties which require less chilling and can continue to sustain in low altitude areas. Government has allocated financial support for importing good quality rootstocks and pollinates. In

recent years, apple producing states of India had research collaboration with New Zealand under World Bank funded project to increase the productivity of the crop by importing rootstock from the island countries.

The instability indices for area, production and productivity of apple in India indicated that the instability were very less with respect to area, production and productivity of apples in the country. This indicates the concentrated efforts taken by the respective state governments to improve the production of apples in the country in recent years.

Import scenario of apple in India :

India is a major producer and consumer of the apples. Because of medicinal values and health benefits of apples, there is an old popular saying “An Apple a day may do more than just keep the doctor away”, people are being more health conscious day by day. Generally Indians consume fresh apples but with passing era they have started preferring processed products of apple like jams, jellies, juice, etc.

Compound annual growth rate of imports by quantity and by value for apple fruit in India was worked out for the period of 2010-11 to 2015-16. India showed positive growth in imports of apples both terms of quantity and value over the study period.

It is depicted in Table 2 that, the import of apple in India in terms of quantity as well as value are growing at the rate of 1.18 and 4.81 per cent per annum, respectively and were found to be significant at 1 per cent level. The result indicated that there was significant growth in import of apple in India over the study period. The positive growth in value over the years was mainly attributable to separation in geographical area from the countries which were producing apples and expenses like (transportation cost, refrigeration and chilling cost), which put together were responsible for the relatively high prices of imported apples in the Indian market. Increased health consciousness, coupled with increased demand for apples in the Indian markets has led to

Table 1 : Compound annual growth rates and instability indices of area, production and productivity of apple fruit in India (Period: 2006-07 to 2015-16)

Particulars	Area	Production	Productivity
CAGR	2.69**	4.13**	1.36**
R ²	0.84	0.41	0.06
Cuddy-Della Valle	3.39	15.3	16.71

Instability Index (%)

** indicates significance of value at P=0.01

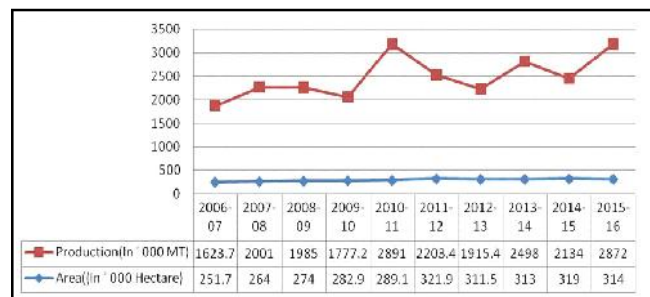


Fig. 1 : Area and production of apple fruit in India

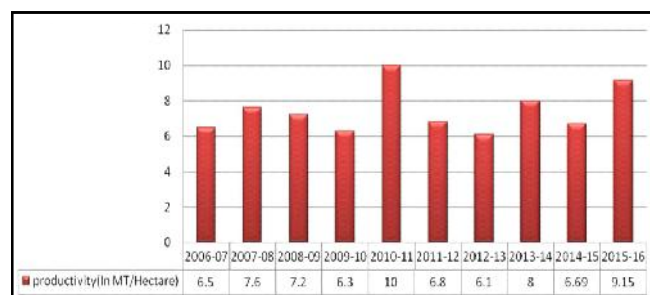


Fig. 2 : Productivity of apple fruit in India

Table 2 : Compound annual growth rates and instability indices of import of apple fruit in India. (Period: 2010-11 to 2015-16)

Particulars	Import (Quantity)	Imports (Value)
CAGR	1.18**	4.81**
R ²	0.09	0.22
Cuddy-Della Valle	5.61	14.95

Instability Index (%)

** indicates significance of value at P=0.01

positive growth in imports over the years. Seasonality of production, but enlarged demand throughout the year might also trigger for increased growth in imports.

The instability indices for import of apples in India were calculated by using co-efficient of variation and the result showed that the instability was very less in terms of quality as compared to the value terms, owing to the reasons already discussed.

In India consumption is more than domestic production because India is second most populous country of the world (Deodhar *et al.*, 2006). Hence, there is a boosting trend for demand of apples. Subsequently, many people are becoming more health conscious in recent years, growing number of middleclass families, improving standard of living, more disposable income and spending capacity towards changing life style are also contributing factors for increased import of apples.

India is importing apples from the countries like USA, Chile, China, Belgium and Italy. To know the import scenario of apples in India, the imports were estimated using the growth rates and are presented in Table 3. It is estimated that the imports of apples will be increasing year by year and by 2019-20 the expected import of apples would be around 2,11,305 metric tons.

Year	Estimated imports (in MT)
2016-2017	203,998.29
2017-2018	206,405.46
2018-2019	208,841.04
2019-2020	211,305.36

Export scenario of apple from India :

Major export destinations of Indian apples are Bangladesh, Maldives, Nepal, Saudi Arabia and Sri Lanka.

Compound annual growth rates for exports of apples by quantity and value were worked out for the period of 2010-11 to 2015-16 and the results are presented in Table 4. India witnessed negative growth in exports in terms of both quantity and value over the study period.

It could be seen from the table that the, export of apple from India in terms of quantity as well as value is showing negative growth at the rate of -8.54 and -15.01 per cent per annum, respectively, and both were significant at 1 per cent level of significance. Indian apples in recent years are being regularly attacked by epidemics like European red mite and apple scab diseases. The

Table 4 : Compound annual growth rates and instability indices of export of apple fruit from India

Particulars	Export (Quantity)	Export (Value)
CAGR	-8.54**	-15.01**
R ²	0.36	0.58
Cuddy-Della Valle	26.93	25.11
Instability Index (%)		

** indicates significance of value at P=0.01

orchard owners are taking up chemical control measures to protect the crop. Excessive use of pesticides resulted in rejection of the consignments exported to many countries. Further, Strict SPS stipulations adhered after WTO regime has drastically reduced the Indian apple exports and it shows negative growth rate of apple exports in value terms.

The instability indices for export of apple from India were calculated by using co-efficient of variation and the results showed that higher level of instability was noticed in exports both in terms of quantity (26.93%), and values (25.11 %) during the study period.

As depicted in Table 5, the estimated export of apples, using compound growth rates would be around 17,560 metric tons during 2016-17 and would gradually decrease and would reach around 13,433 metric tons by 2019-20. Thus it is evident that the export of Indian apples is going to decrease in the near future. Due to SPS stipulation laid out after WTO agreements, many of the Indian exporters could not maintain the quality parameters laid down by the traders of importing countries. At the same time, increased production due to increased productivity and area expansion could not be translated into increased export. The improper storage facilities which could not stretch the shelf-life of Indian apples to get themselves qualified for export in extended seasons. Hence, exports are expected to come down in near future.

Table 5 : Estimated export of apple fruit from India

Year	Estimated export (in MT)
2016-2017	17,558.56
2017-2018	16,059.06
2018-2019	14,687.62
2019-2020	13,433.30

Conclusion :

The study revealed that there is positive and significant growth in area, production and productivity of apples in India due to concerned efforts of the local governments, research efforts and International

collaborations with respect to crop improvement. But to qualify for exports and to operate in international markets, Indian growers need to concentrate on IPM (integrated pest management), forecasting of pest and diseases attacks, organic farming practices, replacing old orchards with internationally demanded varieties viz., Braeburn, Fuji, Premier Star, TCL3 and Kings beer Red, Gala, Royal delicious. There is also a need for adopting modern techniques for production, storage, packing and transportation to avoid quality and quantity losses. There is an urgent need to find proper export destinations for exporting increased production so that the prices of apple in both domestic and national markets get stabilized and farmers will get better returns for their efforts.

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