Research Article

Growth and instability analysis of Indian grapes export

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SUMMARY : The study was conducted to assess the growth and instability in export of grapes. Compound growth rate and instability index were employed to analyse the time series data for 26 years collected from APEDA and FAO. The result showed that the grapes exports during pre-WTO period, registered a significantly positive growth with less instability index in terms of export quantity, value and unit price realized as against comparatively less growth rate with the higher instability index during post-WTO period. Quantum of fresh grapes exported to Bangladesh, Germany, Netherlands and Saudi Arabia were increasing positively in association with high instability indices. As revealed by high compound growth rates of export of grapes to European countries and Bangladesh, the crop needs to be identified as an important commodity for export promotion not only to these countries but also to other potential importing countries.

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BACKGROUND AND OBJECTIVES

The growing importance of horticulture in strengthening the Indian economy has been realized of late. The contribution of agriculture towards national income was about 14.2 per cent as on 2009-10. Horticulture from an area of just 8.5 per cent of the gross cropped area of the country is estimated to have contributed over 24.5 per cent to the agriculture GDP of India. It is potential source of employment especially for the youth and women in the rural area where 72.2 per cent of the Indian population resides. The income generation through effective horticulture farming is higher as compared to agriculture farming. Horticultural farming has also increased the sustainability of the small land holding, helping the small and medium farmers who form the majority of farmers in India, to increase their per capita income. This in turn has increased the disposal income of the rural population and helped the overall economic development of the country. The process of

globalization initiated in the early nineties has resulted in free flow of goods including agriculture goods across international borders. The Indian farmer is being exposed to numerous challenges because of the growing phenomenon. However, if the challenges are overcome which opens up a great opportunity for horticulture exports from India since the country grows a variety of fruits of excellent quality. The Indian peasants need support from all the concerned stake holders to harness the growing opportunities for horticulture exports to different global markets.

Grape occupies the 9th position among all fruits production in the country accounting only 1.6 per cent of total fruit production. It is next only to apple, pineapple and sapota in terms of production. The current area and production under grapes in India is estimated at 1.11 lakh ha with an annual production of 12.35 lakh tonnes. While 78 per cent of grapes produced is used for table purpose, nearly 20 per cent is dried for raisin production and 2 per cent is used for

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manufacturing of juice and wine. Grapes exports from India started during 1970 with an export of only 3 tonnes to Asian countries. Remunerative prices offered by these countries led to an increase in grapes export, while import market for Indian grapes widened to European countries during 1990-91.

Total export of grapes during 2010-11 was 99,270 tonnes worth 411.98 crores, which amounts for 80 per cent of the total production of grapes as against 24 per cent of all fruits grown in India. The major importers of Indian grapes are Netherlands, Bangladesh, UK, UAE, Russia, Saudi Arabia, Belgium, Thailand, Sweden, Norway, Oman, Bahrain, Sri Lanka, Mauritius, USA, Singapore and Hong Kong etc. Indian fresh grapes are highly competitive in the international market because of cultivation of Thompson Seedless a highly preferred variety with higher productivity and also lower cost of production (being a very labour intensive crop and the labour input being comparatively cheaper than other major grape producing countries). Also, grapes cultivation being largely in the hands of progressive and well-to-do farmers with better managerial abilities has made Indian grapes highly competitive. Hence, the present study was undertaken with the objectives of assessing growth and instability analysis of grapes export from India.

RESOURCES AND METHODS

Secondary data for the study were collected from various published sources. Time series secondary data on export quantity and value of grapes for a period of 26 years from 1985-86 to 2010-11 were obtained from the publications of FAO and APEDA.

Growth rate on quantity, value and unit value of grapes export were computed for a period of 26 years from 1985-86 to 2010-11. This period was separated by phased manner such as pre-WTO (1985-86 to 1995-96) and post- WTO (1996-97 to 2010-11) and overall (1985-86 to 2010-11) and destination -wise growth rates and instability in export of fresh grapes from India during 1992-03 to 2010-11 were computed. Different functional forms were tried in the past for working out growth rates in quantity, value and unit value of grapes export. Some of the important forms tried were the linear growth model (Y = a+ bt), exponential function (Y = ab^t) and quadratic function (Y = a+bt+ct2). However, it was found that the exponential form of the function Yt = ab^t was the better and most frequently used one.

Growth rates were computed using the exponential growth function of the form:

Y= a b^t e

where,

Y= Dependent variable for which the growth rate is estimated *i.e.*, quantity, value and unit value of grapes export.

a= Intercept

b= Regression coefficient

t= Time variable

e= Error term.

The compound growth rate was obtained from the logarithmic form of the equation as below:

ln y=ln a + t ln b

The per cent compound growth rate (g) was derived using the relationship:

g= (Anti log of b – 1) x 100

The co-efficient of variation was used as measure to study the variability in export of grapes from India. The coefficient of variation or index of instability were computed by using the following formula:

$$CV = \frac{Standard\ deviation(\ )}{Mean(X)} x100$$

Linear trend were fitted to the original data of export trade of grapes, for the period for the time series data of 26 years from 1985-86 to 2010-11. This period was separated by phased manner such as pre-WTO (1985-86 to 1995-96) and post- WTO (1996-97 to 2010-11) and overall (1985-86 to 2010-11). The trend co-efficients were tested for their significance. Whenever the trend of series found to significant; the variation around the trend rather than the variation around mean was used as an index of instability. The formula suggested by Cuddy and Della Valle (1978) was used to compute the degree of variation around the trend. That is co-efficient of variation was multiplied by the square root of the difference between the unity and co-efficient of multiple determinations (r^2) in the cases where r^2 was significant to obtain the instability index.

$$Instability\ index = \frac{Standard\ deviation(\ )}{Mean(X)} x100\ x\ \sqrt{1 - r^2}$$

r^2 = RSS/TSS = Goodness of fit

RSS= Regression sum of square

TSS= Regression sum of square

TSS= Total sum of square.

OBSERVATIONS AND ANALYSIS

During pre-WTO period, export value of fresh grapes registered a higher growth of 37.83 per cent which increased from Rs 3.06 crores during 1985-86 to 55.55 crores during 1995-96 and export quantity increased from 3462 tonnes to 22,151 tonnes at the rate of 23.98 per cent over the years. A modest growth of 11.16 per cent was observed in unit value realised, with instability indices of 17.77, 15.39 and 6.81

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per cent in export quantity, value and unit value realized, respectively during the study period. The average of quantity export, value and unit value realized for this period were 9.38 thousand MT, Rs.19.00 crores and Rs.16.92 per kg (Table 1). The statistics clearly indicated the reason for a large scale expansion of area under grapes in India. Patil and Patil (2000) had observed that export of Indian grapes to Middle East Asian countries began during 1980's and the first few consignments were offered a premium price of Rs. 40 per kg and such an attractive price promoted more and more farmers to produce quality grapes for exports.

During the post-WTO period, quantity of fresh grapes exported over the period witnessed a growth of 18.74 per cent. The value and unit value of grapes increased at the rate of 20.65 and 1.60 per cent over the years. Similarly 34.93, 24.75 and 14.26 per cent of instability was observed in the case of export quantity, value and unit value, respectively realized from export of grapes. The average of quantity export, value and unit value realized for this period were 52.81 thousand MT, Rs.192.75 crores and Rs.36.48 per kg. This indicating that the liberalization and WTO agreements have actually given a greater fillip to export of Indian grapes. However, the credit for such impressive growth in quantity

and value during the study period may go to various promotional activities of Central and State Government as well as the institutes established by various Government and farmer's agencies as indicated by the study of Kumar and Subarthi (1998) which says that the entry of Mahagrapes and NAFED to develop considerable infrastructure had helped to increase exports of high quality grapes from India.

Looking at the results for the overall study period, the growth rate to the tune of 15.13 per cent was observed in the case of export quantity of grapes. On the other hand export value and unit value were seen to be growing, at the rate of 21.85 and 5.84 per cent, respectively. Instability indices were 36.52, 28.41 and 17.78 per cent of for export quantity, value and unit value, respectively during the study period. The average of quantity export, value and unit value realized for this period were 36.35 thousand MT, Rs. 127.17 crores and Rs.29.54 per kg.

The export of fresh grapes is mainly concentrated to European countries (40 % of total export from India). Major markets for India's fresh grapes considered for the present study were Bangladesh, Germany, Netherlands, UK, UAE and Saudi Arabia. These countries together accounted for 87 per cent of India's total fresh grapes export and remaining

Table 1: Compound growth rates and instability of export of fresh grapes from India during 1985-86 to 2010-11

Description		Pre-WTO(1985-1995)	Post-WTO(1996-2011)	Overall period (1985-2011)
Compound growth rate (%)	Quantity (000 MT)	23.98*(0.019)	18.74*(0.022)	15.13*(0.010)
	Value (Rs. Crores)	37.83*(0.018)	20.65*(0.016)	21.85*(0.009)
	Unit value (Rs./kg.)	11.16*(0.007)	1.60(0.009)	5.84*(0.007)
Instability index (%)	Quantity (000 MT)	17.77	34.93	36.52
	Value (Rs. Crores)	15.39	24.75	28.41
	Unit value (Rs./kg.)	6.81	14.26	17.78
Average	Quantity (000 MT)	9.38	52.81	36.35
	Value (Rs. Crores)	19.00	192.75	127.17
	Unit value (Rs./kg.)	16.92	36.48	29.54

Note: Figures in the parentheses indicate 'Standard error'
*and ** indicate significance of values at P=0.05 and 0.01, respectively

Table 2: Destination -wise growth rates and instability in export of fresh grapes from India during (1992-03 to 2010-11)

Description	Export quantity		Export value		Unit value	
	Compound growth rate (%)	Instability index (%)	Compound growth rate (%)	Instability index (%)	Compound growth rate (%)	Instability index (%)
Bangladesh	02.84	100.80	22.02	98.93	0.97	62.49
Germany	27.79	67.71	30.34	53.32	1.99	26.30
Netherland	33.54	53.29	39.24	44.92	4.27	19.81
UK	7.90	33.12	14.03	46.60	5.68	31.85
UAE	6.22	35.76	11.13	30.90	4.63	12.24
Saudi Arabia	5.33	102.31	12.04	118.30	6.37	19.29
Others	18.28	43.17	23.93	44.85	4.78	20.45
Total	14.09	42.74	18.00	28.11	3.43	14.78

Note: Unit value – Rs./kg realized

countries were categorized in others. And the results are presented in Table 2. Export trends analysis of fresh grapes during 1992-93 to 2010-11 showed that quantity of fresh grapes export grew at the rate of 14.09 per cent, whereas value increased at much higher rate of 18.00 per cent and unit value realized (Rs./kg) increased at the rate of 3.43 per cent. The stable markets for India's fresh grapes during the study period were UK and UAE as evidenced from lower instability index. UK is the major export destination for India's fresh grapes, quantity exported to UK increased at the rate of 7.90 per cent over the years, whereas the value realized increased at the rate of 14.03 per cent with instability indices of 33.12, 46.60 and 31.85 per cent in quantity, value and unit value, respectively.

Quantity exported to Saudi Arabia registered a lower compound growth rate of 5.33 per cent compared to all other countries, but export value increased at the rate of 12.04 per cent, and 6.37 per cent growth was observed in the value received per kg of grapes. Instability indices of 102.31, 118.30, and 19.29 per cent were observed for quantity exported, value and unit value, respectively. This shows that Saudi Arabia is the highly instable market for the Indian grapes. Germany emerged as another important market during the study period. Export to this country was impressive, as export quantity augmented at the rate of 27.79 per cent. Export value also grew impressively at almost same rate of 30.34 per cent but these are associated with high instability 67.71 and 53.32 per cent, respectively. On the other hand meagre growth of 1.99 per cent was observed in unit value realized with instability of 26.30 per cent. High degree of instability was observed in quantity of fresh grapes exported to Bangladesh (100.80%), value received (98.93%) and (62.49%) in unit value received, which were increasing at the rate of 20.84 and 22.02 and 0.97 per cent for export quantity and value and unit value realized, respectively.

Quantity exported to Netherlands grew at the rate of 33.54 per cent and 39.24, 4.27 per cent, respectively growth

were observed in the case of value and unit value realized from this country during the same period with instability of 53.29 and 44.92, 19.81 per cent, respectively. Export to UAE showed growth rate of 6.22 and 11.13 per cent in export quantity and value, respectively, but unit value realized was growing steadily at the rate of 4.63 per cent with instability of 35.76, 30.90 and 12.24 per cent, respectively in quantity exported, value and unit price realized during the study period. There seems to be an increased preference because of the premium quality of Indian grapes by these countries. Mamale Desai (2002) had argued that, eradicating the maggots in the mangoes by employing vapor heat treatment had led to increase in the export of Indian mangoes, as quality of fruits has a very important bearing on its acceptability by the international consumers. India's grapes export to other countries grew at the rate of 18.28 per cent in terms of quantity and 23.93 and 4.78 per cent in value and unit value realized with moderate instability of 43.17, 44.85 and 20.45 per cent in export quantity, value and unit value realized, respectively during the study period.

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