International Journal of Commerce and Business Management
Volume 7 | Issue 1 | April, 2014 | 6-10
RESEARCH PAPER

Export of fresh Indian grapes

D.K. KUSUMA AND H. BASAVARAJA

Received : *23.08.2013;* **Revised :** *17.01.2014;* **Accepted :** *18.02.2014*

ABSTRACT

Grape (*Vitis venifera*) is one of the most delicious refreshing and nourishing fruits. It is universally consumed as table fruit and ripen grapes are easily digestible.The present paper attempts to quantify the changing structure of Indian fresh grape exports. Data for analysis were obtained from the various published issues for a period of 10 years from 2001-02 to 2010-11. Compound growth rate (C.G.R.) was computed for grape production, area, yield, export quantity and export value over the years. The Markov chain analysis was attempted to assess the transition probabilities for the major grape markets. The major export markets for Indian grapes are Bangladesh (35.42 %), Netherlands (21.5%), U.K. (13.85 %), U.A.E. (10.87%) and Germany (3.01 %). The major Indian grape export markets were categorized as stable markets (Bangladesh, U.A.E, Netherlands) and unstable markets (Germany, U.K.) based on the magnitude of transition probabilities.

KEY WORDS : Compound growth rate, Structural change, Direction of trade, Markov chain

How to cite this paper : Kusuma, D.K. and Basavaraja, H. (2014). Export of fresh Indian grapes. *Internat. J. Com. & Bus. Manage*, **7**(1) : 6-10.

India has been a predominantly agrarian economy since time immemorial. The development efforts over the last few decades have doubtlessly strengthened our industrial base. However, agriculture continues to be the mainstay of our economy and even today as more than 67 per cent of population depends on it. The production of fruits and vegetables has vital importance as it provides three to four times more cash income than cereals per unit of land. Fruits and vegetables are the prime source of vitamins and minerals without which human body cannot maintain proper health to resist diseases. Indian Council of Medical Research has recommended the consumption of atleast 92 grams of fruits per head per day. On the contrary, the per capita consumption of fruits in India is only 46 grams per day. India is the second largest producer of fruits after China and ranks first in production of mango, banana, guava, limes and lemon. India has made a fairly good progress in production of fruits and vegetables.

Grape is a fruiting berry of the deciduous woody vines of the botanical genus *Vitis*. Grapes can be eaten raw or they can be used for making wine, jam, juice, jelly, grape seed extract, raisins, vinegar, and grape seed oil. Grapes are a non-climacteric type of fruit, generally occurring in clusters. Grape (*Vitis venifera*) is one of the most delicious refreshing and nourishing fruits. It is universally consumed as table fruit and ripen grapes are easily digestible. They are rich in energy giving sugars and some useful minerals like phosphorus, iron and vitamins like B_1 and B_2. Majority of grape produced in the world is pressed for wine making (80%), nearly 10 per cent for raisin making, hardly 5 per cent is used as table grapes and remaining 5 per cent is used as unfermented beverage. Grapes are also processed into products like raisins, juice and jellies. Grape juice is a refreshing drink, a stimulant to kidneys and also as a laxative.

The major producers of grapes are China, Italy, USA, Spain, France, Turkey, Chile, Argentina, Iran and India.

The major exporters are Chile, USA, Turkey, South Africa, Italy, Mexico Spain, Peru, Brazil and Greece. The major export markets for Indian grapes are Bangladesh

MEMBERS OF THE RESEARCH FORUM

Correspondence to:
D.K. KUSUMA, Department of Agricultural Economics, University of Agricultural Sciences, DHARWAD (KARNATAKA) INDIA
Email: kusuma3836dk@gmail.com

Authors' affiliations:
H. BASAVARAJA, Department of Agricultural Economics, University of Agricultural Sciences, DHARWAD (KARNATAKA) INDIA
Email: hbraja12@rediffmail.com

(35.42%), Netherlands (21.5%), U.K. (13.85%), U.A.E. (10.87%), Germany (3.01%) and others (15.35%). These five countries accounted for 84.65 per cent of the India's fresh grapes export. India stood at 15th place and contributes 1.46 per cent in world's fresh grapes export. An attempt has been made to quantify the changing structure of Indian grapes exports.

The objectives of the paper are to estimate the growth in area, production, productivity and exports of grapes from India and to study the direction of export and structural change in grapes exports.

METHODOLOGY

The study is based on time series data on area, production, productivity and exports of grapes from India obtained from various published issues of APEDA for a period from 2001-02 to 2010-11.

The compound growth rate analysis was carried out to ascertain the growth in area, production, productivity and exports of grapes from India. The structural change and direction of change in the export of grapes was analyzed using Markov chain analysis:

$$Y_t = ab^t u_t$$

where,

Y_t = area, yield, production or export of grapes in year t

t = year which takes values 1, 2 …….n

u_t = disturbance term.

'a' and 'b' are regression parameters to be estimated. Logarithmic transformation of provided estimating equation was:

$$\ln Y_t = \ln a + t \ln b + \ln u_t$$

The equation was estimated by ordinary least square technique (OLS). Compound growth rate (g) was then estimated by the identity given in equation:

g = (anti log of b-1) 100 where,

g = estimated compound growth rate in per cent per year and

b = anti log of b.

Annual export data for the period from 2001-02 to 2010-11 were used to analyze the direction of trade and changing pattern of Indian grapes export. The major Indian grapes importing countries considered were Bangladesh, Netherlands, U.K., U.A.E and Germany. Markov chain analysis was employed to analyze the structural change in any system whose progress through time can be measured in terms of single outcome variable (Dent, 1967). In the present study, the dynamic nature of trade patterns, that is, the gains and losses in export of Indian grapes in major importing countries was examined using the Markov chain model. Markov chain analysis involves developing a transitional probability matrix 'P', whose elements, P_{ij} indicate the probability of exports switching from country 'i' to country 'j' over time. The diagonal element P_{ij} where i=j, measures the probability of a country retaining its market share or in other words, the loyalty of an importing country to a particular country's exports.

In the context of current application, structural change was treated as a random process with seven importing countries for grapes. The assumption was that the average export of grapes from India amongst importing countries in any period depends only on the export in the previous period and this dependence was same among all the periods. This was algebraically expressed as:

$$E_{jt} = \sum_{i=1}^{n} [Ei_{t-1}] P_{ij} + e_{jt}$$

where,

E_{jt} = exports from India to the j^{th} country in the year t

E_{it-1} = exports to i^{th} country during the year t-1

P_{ij} = the probability that exports will shift from i^{th} country to j^{th} country

e_{jt} = the error term which is statistically independent of E_{it-1}

n = the number of importing countries

The transitional probabilities P_{ij}, which can be arranged in a (c x n) matrix, have the following properties :

$$\sum_{i=1}^{n} P_{ij} = 1 \text{ and } 0 \le P_{ij} \le 1$$

Thus, the expected export share of each country during period't' was obtained by multiplying the exports to these countries in the previous period (t-1) with the transitional probability matrix. The probability matrix was estimated for the period 2000-01 to 2010-11. The transitional probability matrix (T) was estimated using linear programming (LP) framework by a method referred to as minimization of Mean Absolute Deviation (MAD):

$$\text{Min, } OP^* + I e$$

Subject to

$$X P^* + V = Y$$

$$GP^* = 1$$

$$P^* \ge 0$$

where,

P* is a vector of the probabilities P_{ij}

O is the vector of zeros

i is an appropriately dimensional vectors of areas

e is the vector of absolute errors

Y is the proportion of exports to each country.

X is a block diagonal matrix of lagged values of Y

V is the vector of errors

G is a grouping matrix to add the row elements of P arranged in P* to unity.

Prediction of quantity of fresh grapes export was made by using the Transitional Probability Matrix:

$$B_t = B_0 * T$$

$$B_{t+i} = B_{t+i-1} * T$$

where,

B_0 = Quantity exported in base years

B_t = Quantity exported in next year (prediction)

T = Transitional probability matrix.

ANALYSIS AND DISCUSSION

The estimated growth rates of area, production and productivity of grapes in India and export quantity and export value for the period 2001-02 to 2010-11 are depicted in Table 1. The results revealed that area (9.25 %) was growing at a positive rate, while production (-0.31 %) and productivity (-8.75 %) of grapes were found to be decelerating. This negative growth in production and productivity of grapes may be due to poor management practices by the producers. The study also depicted the growth in the value of export that was increasing at 23.82 per cent per annum and quantity of export was increasing at 25.95 per cent per annum. Compared to production, export of grapes was growing at a positive and significant growth. Growth in value of export was found to be very high indicating good potential and higher profit for Indian grapes. These results are in line with findings of Ramachandra (2006).

Table 2 depicts the production and export of grapes from India. Production has increased from 11.84 lakh mt in 2001-02 to 18.78 lakh mt in 2008-09 with a growth rate of 6.32 per cent per annum but it has declined to 12.35 lakh mt in 2010-11. The export of fresh grapes of about 14606 mt out of 11.84 lakh mt of fresh grapes produced was seen in 2001-02 in India. Thus, it was only 1.23 per cent of total grapes produced in 2001-02. Thereafter the export of fresh grapes from India grew at the compound growth rate of 25.95 per cent and the extent of fresh grapes export in India also has been increasing continuously. At present (2010-11) 93,685 mt of fresh grapes are exported from the production of 12.35 lakh mt, which accounts 7.59 per cent of fresh grapes produced. In 2009-10, the share was the all time highest in, which was of about 13.50 per cent.

The quantum of export, value of export and unit value have been represented in Table 3. There was not a uniform change in quantum of export, value of export and unit value. In export quantity declined in 2010-11 (-21.20%), in 2009-10 it was almost zero (0.17%) and in remaining years and it

Table 1: Compound growth rates of export of fresh grapes from India during 2001-02 to 2010-11

Sr. No	Particulars	2001-02	2010-11	CGR (%)
1.	Area (000 ha)	47.50	111.00	9.25
2.	Production (000 mt)	1184.20	1235.00	-0.31
3.	Productivity (mt/ha)	24.90	11.10	-8.75
4.	Quantity of export (mt)	14606.00	93685.27	25.95
5.	Value of export (Lakhs)	6020.60	37144.16	23.82

Table 2: Production and export of grapes in India during 2001-02 to 2010-11

Year	Production (000MT)	Export (MT)	Share of export to production (%)
2001-02	1184.20	14606.00	1.23
2002-03	1247.80	25666.52	2.06
2003-04	1474.80	26783.83	1.82
2004-05	1564.70	39338.95	2.51
2005-06	1649.60	54049.86	3.28
2006-07	1685.00	85897.78	5.10
2007-08	1735.00	96963.57	5.59
2008-09	1878.00	118692.96	6.32
2009-10	880.70	118894.85	13.50
2010-11	1235.00	93685.27	7.59

Table 3: Export quantity, value and unit value of grapes from India during 2001-02 to 2010-11

Year	Export quantity		Export value		Unit value	
	Mt	Per cent change	Lakhs	Per cent change	Rs./kg.	Per cent change
2001-02	14606.00	-	6020.60	-	41.22	-
2002-03	25666.52	75.73	11010.16	82.87	42.90	4.07
2003-04	26783.83	4.35	10588.81	-3.83	39.53	-7.84
2004-05	39338.95	46.88	12844.57	21.30	32.65	-17.41
2005-06	54049.86	37.40	21460.85	67.08	39.71	21.61
2006-07	85897.78	58.92	30192.45	40.69	35.15	-11.48
2007-08	96963.57	12.88	31782.51	5.27	32.78	-6.75
2008-09	118692.96	22.41	36582.99	15.10	30.82	-5.97
2009-10	118894.85	0.17	43516.35	18.95	36.60	18.75
2010-11	93685.27	-21.20	37144.16	-14.64	39.65	8.33

Table 4: Destination -wise growth rates in export of fresh grapes from India during 2001-02 to 2010-11

Destinations	Export share	CGR (% Pa)		
	(%)	Quantity	Value	Unit
Netherlands	21.5	35.56	39.78	3.12
Bangladesh	35.42	78.96	82.56	2.02
Germany	3.01	10.58	9.34	-1.12
UK	13.85	7.8	9.98	2.01
UAE	10.87	9.54	11.06	1.39
Others	15.35	23	26.33	2.7
Total		25.95	23.82	-47.39

Table 5: Transitional probability matrix for fresh grapes export from India (2001-02 to 2010-11)

Countries	Netherland	Bangladesh	Germany	U.K	U.A.E	Others
Netherlands	0.7437	0.2563	0.0000	0.0000	0.0000	0.0000
Bangladesh	0.1746	0.8018	0.0000	0.0000	0.0000	0.0236
Germany	0.0000	0.0000	0.2726	0.6901	0.0373	0.0000
U.K	0.1103	0.0000	0.8154	0.0000	0.0000	0.0743
U.A.E	0.0447	0.0000	0.0427	0.0568	0.8559	0.0000
Others	0.0000	0.0000	1.0000	0.0000	0.0000	0.0000

Table 6: Actual and predicted quantity of fresh grapes export from India to selected countries **(Qty in tonnes)**

Countries	Netherlands		Bangladesh		Germany		U.K		U.A.E		Others	
Year	A	P	A	P	A	P	A	P	A	P	A	P
2001-02	1362.09	1828.12	248.21	548.18	280.26	7237.47	5042.39	467.51	4829.70	4143.97	2843.35	380.76
	(9.33)	(12.52)	(1.70)	(3.75)	(1.92)	(49.55)	(34.52)	(3.20)	(33.07)	(28.37)	(19.47)	(2.61)
2002-03	3661.31	4098.28	526.66	1360.83	724.86	12934.95	8945.82	877.55	6648.71	5717.36	5159.16	677.54
	(14.26)	(15.97)	(2.05)	(5.30)	(2.82)	(50.40)	(34.85)	(3.42)	(25.90)	(22.280	(20.10)	(2.64)
2003-04	4260.12	4478.45)	2125.55	2796.28	2381.01	12959.14	6618.62	1908.97	4685.28	4098.76	6713.25	542.24
	(15.91)	(16.72)	(7.94)	(10.44)	(8.89)	(48.38)	(24.71)	(7.13)	(17.49)	(15.30)	(25.06)	(2.02)
2004-05	7529.23	9064.63	14724.37	13735.65	1151.39	9918.68	5888.76	1105.32	5475.83	4729.47	4569.37	785.21
	(19.14)	(23.04)	(37.43)	(34.92)	(2.93)	(25.21)	(14.97)	(2.81)	(13.92)	(12.02)	(11.62)	(2.00)
2005-06	12132.62	13018.63	13933.09	14281.30	2992.48	16973.14	11318.51	2464.88	7045.60	6141.66	6627.56	1170.24
	(22.45)	(24.09)	(25.78)	(26.42)	(5.54)	(31.40)	(20.94)	(4.56)	(13.04)	(11.36)	(12.26)	(2.17)
2006-07	19020.63	20513.41	25761.19	25530.43	6137.32	26337.67	13657.67	4697.15	8140.28	7195.91	13180.69	1623.21
	(22.14)	(23.88)	(29.99)	(29.72)	(7.14)	(30.66)	(15.90)	(5.47)	(9.48)	(8.38)	(15.34)	(1.89)
2007-08	24379.36	26481.53	37994.97	36712.79	2162.15	21594.68	11639.68	2041.79	9686.60	8370.9	11100.81	1761.80
	(25.14)	(27.31)	(39.18)	(37.86)	(2.23)	(22.27)	(12.00)	(2.11)	(9.99)	8(8.63)	(11.45)	(1.82)
2008-09	24340.70	29475.22	54376.80	49837.32	1303.86	26393.95	12672.50	1510.03	10752.70	9251.37	15246.40	2225.07
	(20.51)	(24.83)	(45.81)	(41.99)	(1.10)	(22.24)	(10.68)	(1.27)	(9.06)	(7.79)	(12.85)	(1.87)
2009-10	28821.90(	31217.83	44419.20	43002.38	2356.45	31673.82	14308.50	2196.70	10053.60	8692.33	18935.20	2111.78
	24.24)	(26.26)	(37.36)	(36.17)	(1.98)	(26.64)	(12.03)	(1.85)	(8.46)	(7.31)	(15.93)	(1.78)
2010-11	17681.50	21053.42	38052.00	35041.53	741.17	26880.44	7550.40	1053.24	9545.90	8197.53	20114.30	1459.10
	(18.87)	(22.47)	(40.62)	(37.40)	(0.79)	(28.69)	(8.06)	(1.12)	(10.19)	(8.75)	(21.47)	(1.56)
2011-12		22258.53		33492.2		9996.03		19014.47		8019.01		905.02
		(23.76)		2(35.75)		(10.67)		(20.30)		(8.56)		(0.97)
2012-13		24856.67		32558.95		19476.62		7353.02		7236.12		2203.88
		(26.53)		(34.75)		(20.79)		(7.85)		(7.72)		(2.35)
2013-14		25304.95		32476.73		13818.07		13850.80		6919.89		1314.84
		(27.01)		(34.67)		(14.75)		(14.78)		(7.39)		(1.40)

Note: A-Actual exports in tonnes. P- Predicted exports in tonnes. Figures in parenthesis indicate exports share in per cent

was positive over the respective previous years. In value of export of grapes, there was decline over previous years seen in 2003-04 (-3.83 %) and 2010-11 (-14.64 %). But in unit value of export, the decline over previous years was noticed in 2003-04 (-7.84 %), 2004-05 (-17.41 %), 2006-07 (-11.48 %), 2007-08 (-6.75 %) and 2008-09 (-5.97%). The trend in both quantity of export of grapes and value of export was found to be very uneven.

Destination-wise, Indian grapes are shown in Table 4. The major importers of Indian grapes are Bangladesh (35.42%), Netherlands (21.5%), U.K. (13.85%), U.A.E. (10.87%), Germany (3.01%) and others (15.35%). The top five countries accounted for 84.65 per cent of the India's fresh grapes export. The quantity and value export to Bangladesh was growing at the annual compound growth rate of 78.96 and 82.56 per cent, respectively. For Netherlands the growth was 35.56 per cent in export quantity and 39.78 per cent in value. Even though the share of Germany in export was only 3.01 per cent, it is growing at a faster rate (10.58%). The analysis showed that, there is a greater potentiality to export and earn foreign exchange by exporting grapes to Bangladesh, Netherlands and Germany. Moreover, there is a good scope and potentiality of Indian grapes to earn maximum foreign exchange from European countries.

The transitional probability matrix presented in Table 5 provides a broad indication of changes in the direction of export of fresh grapes from India for the study period (2001-02 to 2010-11). The major Indian fresh grapes importing countries were Netherlands, Bangladesh, Germany, UK, UAE and all other importing countries were grouped under the category of the other countries. The row elements in the transitional probability matrix provide the information on the extent of loss in trade, on account of competing countries. The columns element indicates the probability of gains in volume of trade from other competing countries and the diagonal element indicates probability of retention of the previous year's trade volume by the respective country.

It is evident from Table 5, that Bangladesh and UAE were the most stable market among the major importers of Indian grapes as reflected by the probability of retention of 80 and 85 per cent, respectively. The unstable markets among the importing countries were U.K., Germany and other countries with the least retention of percentage. Netherlands retained 74 per cent of total export from India. These results are in line with findings of Kumar *et al.*, (2007) and Mokashi (2012).

The market share projections of Indian fresh grapes exports to the major importing countries were computed up to 2013-14 using the transitional probability matrix. Table 6 presents the actual and predicted values of Indian grapes exports to major importers from 2001-02 to 2010-11 and also projections up to 2013-14. The actual share of Bangladesh in fresh grapes export had shown fluctuation over the study period (2001-02 to 2010-11) on the whole it had increased from 1.70 per cent to 40.62 per cent. Similar picture was in prediction of export share too, where the increase was from 3.75 per cent to 34.67 per cent.

Regarding Netherlands, the actual and predicted export share showed fluctuations from 9.33 per cent to 18.87 per cent and 12.52 per cent to 27.01 per cent respectively from 2001-02 to 2010-11. The actual proportion of U.A.E. market share of imports from India showed a decreasing trend from 33.07 per cent to 10.19 per cent. The predicted export share also decreased from 28.37 per cent to 7.39 per cent over the study. Regarding Germany, the actual and predicted proportion of exports showed increasing trend upto 2006-07 and later a decreasing trend. With regard to U.K., the actual market share of India's fresh grapes exports showed a decrease from 34.52 per cent to 8.06 per cent but there was increase in predicted export from 3.20 per cent to 14.78 per cent. The actual and predicted proportion of exports share of India's grapes exports to other countries maintained a range between 19.47 per cent to 21.47 per cent and 2.61 per cent to 1.40 per cent. It appears that India needs to strive to improve its export shares to these three major importers by improving upon the quality of grapes exports and also by improving the yield levels.

REFERENCES

Dent, W.T. (1967). Application of Markov analysis to International Wool Flows. *Rev. Eco.& Statis.*, **49** (2): 613-616.

Kumar, Pramod, Badal, P.S. and Lalith, Achoth (2007). Changing direction of Indian mango exports. *Indian J. Agric. Mktg.*, **21**(1) : 130-137.

Mokashi, P. (2012). An economic analysis of export potential of grapes from Northern Karnataka. M.Sc. (Ag.) Thesis, University of Agricultural Sciences, Dharwad, KARNATAKA (INDIA).

Ramachandra, V.A. (2006). Production and marketing of Sapota in Northern Karnataka - An economic analysis. M. Sc. (Ag.) Thesis, University of Agricultural Sciences, Dharwad KARNATAKA (INDIA).

WEBLIOGRAPHY

www.apeda.com