



Universal Impact  
Factor 0.9285:2012;  
1.2210:2013

Index Copernicus  
ICV 2011: 5.09  
ICV 2012: 6.42  
ICV 2013: 15.8

NAAS Rating  
2012 : 1.3;  
2013-2014:2.69

Received on:  
30<sup>th</sup> July 2015

Revised on:  
28<sup>th</sup> October 2015

Accepted on:  
28<sup>th</sup> October 2015

Published on:  
1<sup>st</sup> December 2015

Volume No.  
Online & Print  
70 (2015)

Page No.  
67 to 74

*Life Sciences Leaflets*  
is an international  
open access print & e  
journal, peer reviewed,  
worldwide abstract  
listed, published every  
month with ISSN, RNI  
Free- membership,  
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## GROWTH, INSTABILITY AND STRUCTURAL CHANGES IN BANANA EXPORTS FROM INDIA

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### ABSTRACT:

Banana is one of the important fruit crops in India contributing 27.82 per cent of the total world production. The export of fresh banana from India has increased from Rs.89.56 lakhs in 1994-95 to Rs.156.93 lakhs in 2013-14. In this paper an attempt was made to quantify the growth, instability and the changing structure of Indian banana exports. Data for a period of 20 years from 1994-95 to 2013-14 was collected to estimate Compound Growth Rate and Coppock's Instability Index. The results showed that banana exports registered positive growth and instability has declined in recent years. The growth of exports to major importing countries recorded a double digit positive growth rate in terms of quantity. The Markov chain analysis was attempted through linear programming method to assess the transition probabilities for the major banana markets. The major Indian banana export markets were categorized as stable market (Oman, U.A.E. and Saudi Arabia) and unstable markets (Kuwait and Bahrain) based on the magnitude of transition probabilities. It was found that Oman and U.A.E are the loyal markets for Indian banana in future. The share of importing countries clearly shows that the Indian banana markets are confined to neighbouring countries and hence efforts are needed to devise suitable strategies to increase the export to these countries.

**KEY WORDS:** Export Performance, Compound growth rate, Coppock's instability index, Markov Chain Analysis.

## **INTRODUCTION:**

India is the fruit and vegetable basket of the world. It is the home of wide variety of fruit and vegetables and holds a unique position in production. India is the second largest producer of fruits in the world after China (137.07 million tonnes) with production of 88.98 million tonnes from an area of 7.22 million hectares and contributes 13.59 per cent to the world fruit production during 2013-14. India is the largest producer of banana with 29.72 million tonnes from an area of 0.80 million hectares contributing 15.94 per cent and 27.82 per cent to world's total fruit area and production, respectively. It accounts for 11.12 per cent to India's total fruit area and 33.41 per cent of total production (Indian Horticulture Data Base, 2014). The major varieties are Grand Cavendish and Robusta. The leading banana producing states in India are Tamil Nadu (19.0 per cent), Maharashtra (16.3 per cent) and Gujarat (14.2 per cent). Ecuador is the largest exporter of banana with a quantity share of 47.25 per cent followed by Costa Rica (17.56 per cent) while India stood at 46<sup>th</sup> position during 2013-14. Banana is one of the major export earning commodities in India. Thus India has immense potential to assert a strong presence in the global banana market, which is still under-developed. The export value of banana has increased from Rs.1342.76 crores in 2004-05 to Rs.15683 crores in 2013-14. The major export markets for Indian banana are U.A.E (38.77 per cent per cent), Nepal (16.43 per cent), Saudi Arabia (13.32 per cent), Oman (9.75 per cent), Kuwait (5.95 per cent) and Bahrain (5.74 per cent). Of the total banana production in India 36255.89 tonnes was exported. The share of export to total banana production in India was only 0.12 per cent. The banana production is likely to increase further due to technological improvements. Hence it is important to identify potential export markets and make necessary arrangements to export of banana which is a perishable commodity. Therefore, an attempt was made to quantify the growth and changing structure of Indian banana exports. The main objective of the paper was to study the growth, instability and direction of trade in banana.

## **METHODOLOGY:**

The study is based on the time series data on total (1994-95 to 2013-14) and country wise exports (2004-05 to 2013-14) of banana from India obtained from various published issues of APEDA. The compound growth rate analysis was carried out to ascertain the growth in exports of banana from India for 20 years period. The instability in exports was estimated using Coppock's instability index. The structural and direction of change in the export of banana was analysed using markov chain analysis.

### **Compound Growth Rate**

$$Y = a b^t e_t$$

where,

Y = banana export quantity, value and unit value

t = time variable

$e_t$  = Error term

'a' and 'b' are unknown constants to be estimated. Logarithmic transformation of provided the 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  $g = (\text{anti log of } b) - 1) \times 100$

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

b = anti log of b

### Export Instability for top five countries

Export Instability was estimated for 10 years data (2004-05 to 2013-14) using Coppock's instability index (Coppock, 1962). The estimable form is given below

$$V = \frac{1}{N} \left[ \log \frac{X_{t+1}}{X_t} - m \right]^2$$

The instability index is  $= (\text{Antilog of } (\sqrt{V} - 1) \times 100)$

where,

$X_t$  = Value or volume of exports in year t

n = Number of years

N = n - 1

n - 1

$$m = \frac{1}{N} \sum (\log X_{t+1} - \log X_t)$$

t = 1

### Direction of Trade - Markov Chain Model

The structural change in export of Indian banana was examined by estimating the transition probability using Markov chain model. According to Dent (1967), Markov chain analyzes the structural change in any system whose progress through time can be measured in terms of single outcome variable. The data on quantity of banana exported to various countries from 2004-05 to 2013-14 was taken for the analysis.

The year wise export quantity of top five countries viz., U.A.E, Saudi Arabia, Bahrain, Kuwait and Oman and pooling all other countries export as 'other countries' were formulated into a Linear Programming (LP) problem under the method of Minimization of Mean Absolute Deviations (Yeledhalli *et al* 2012). To get the transition probability matrix, LP was solved using LINGO (version 10) software Package. Diagonal elements of transition probability matrix indicate the loyalty of the importing country to exporting country (Atkin and Blandford, 1982).

## **RESULTS AND DISCUSSION:**

### **Export of Banana from India**

The export quantity, value and unit value of banana from India are furnished in Table 1. It could be seen from the table that the export quantity of banana was 966.08 tonnes during 1994-95 has increased to 8622.43 tonnes in 2000-01 and 57539.29 tonnes in 2010-11. It has reduced to 36255.89 tonnes during 2013-14 but the unit value of banana exports was high. Similarly the export value for banana has increased from Rs.89.56 lakhs to Rs.15693.39 lakhs during 1994-95 and 2013-14 respectively.

### **Export Performance of Banana**

The growth of export quantity, value and price of Indian banana was estimated to assess the export performance and the results are presented in Table 2.

It could be seen from table 1 that the growth of export quantity of banana has decreased from 34.79 per cent in Period I to 19.4 per cent in Period II which led to less growth in export value in Period II. Whereas the unit value of banana export was non-significant during Period I but positive (11.89) and significant during Period II. For overall period from 1994-95 to 2013-14 the growth of banana export in terms of quantity, value and unit value was positive. The results imply that the export performance of Indian banana is good.

### **Export Instability of Banana in India**

The export performance of a country for any commodity during any given period is measured not only from the point of view of increase in quantity exported, value and unit value but also on the extent of fluctuations taking place in the above aspects. Hence Coppock's instability index was constructed to understand the behaviour of banana export during two periods (1994-95 to 2003-04) and (2004-05 to 2013-14) and overall period. The instability indices were constructed for export quantity, value and unit value for banana and the results are presented in Table 3.

Table 3 revealed that the instability of export quantity was high (36.36 per cent) during Period I when compared to Period II (26.45 per cent). In case of export value, the index was high during Period I with 61.23 per cent and decreased to 24.56 per cent during Period II. For unit value of banana export, the

instability index was 42.24 per cent and 25.45 per cent during Period I and II, respectively. The instability index for export quantity, value and unit value of banana exports were 29.83 per cent, 32.34 per cent and 30.23 per cent for the overall period. This shows that the export quantity of banana exports was comparatively stable than value and unit value for the period of twenty years. The results imply that in recent years the instability in export of banana had declined and it is stable.

### **Growth and Instability of Banana Export to Top Five Countries from India**

The growth and instability of banana exports to top five importing countries were computed and results are presented in Table 4. It is evident from the table 3 that export of banana from India to all five countries registered a double digit growth rate and it was high with 31.62 per cent and 40.31 per cent for Oman with respect to quantity and value. Except the unit value of banana exports to Bahrain growth in terms of export quantity, value and unit values was positive and significant for all selected countries. It was also found that the instability index of export quantity was low for Oman (46.92 per cent) and U.A.E (55.31 per cent). Among the importing countries, the index was found to be high for Bahrain. In sum, India's banana export to all the major importing countries is not stable.

### **Direction of Trade**

Direction of trade of banana from India was assessed using the export quantity to the top 5 importing countries during 2004-05 to 2013-14. Markov chain analysis was used to obtain transition probability matrix and the forecasted quantity were obtained for the period of five years from 2014-15 to 2018-19. The matrix gives a broad indication of direction of trade of Indian banana export. The row elements in the transitional probability matrix provide the information of the extent of loss in trade, on account of competing countries. The column 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. The transition probability matrix for banana export from India to major importing countries is shown in Table 5.

It is clear from the table that Oman was the stable market with the retention of 83.42 per cent of the export quantity. Though the quantity of banana exports to Oman was far less when compared to U.A.E., it has retained the imports over the years. U.A.E was also found to be the loyal market for Indian banana exports retaining 59.52 per cent of the exports. It has gained 64.15 per cent of Bahrain's export and 29.15 per cent of Saudi Arabia's exports.

The table also indicated that Bahrain and Kuwait could not retain the banana exports from India with zero retention. It is concluded from the results of direction of trade that Oman, U.A.E, Saudi Arabia and countries included under others category are the loyal markets for Indian fresh banana.

## CONCLUSION:

The study revealed that the banana export in terms of quantity, value and unit value registered a positive significant growth. Further the export of banana from India to major importing countries registered a double digit growth rate. The instability index showed that export quantity of banana was more stable than export value and unit value. The transition probability matrix indicated that Oman, U.A.E and Saudi Arabia were the stable and loyal market for Indian banana exports in the future. Though India is the largest producer of banana in the world, its export was less than one per cent of production. Banana production is likely to increase further due to technological improvement which indicates that India has a good potential for export of banana and it needs to strive hard to improve its export by suitable strategies targeting the high demanded markets.

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**Table 1. Export quantity, value and unit value of Indian Banana**

S.No	Year	Quantity (tonnes)	Value (Rs.lakh)	Unit Value (Rs/kg)
1	1994-95	966.08	89.56	9.27
2	2000-01	8622.43	1799.65	20.87
3	2010-11	57539.29	10232.22	17.78
4	2013-14	36255.89	15693.39	43.29

**Table 2. Compound growth rate of export quantity, value and unit value of banana (%)**

S.No	Category	Period I (1994-95 to 2003-04)	Period II (2004-05 to 2013-2014)	Overall Period (1994-95 to 2013-14)
1	Total Quantity	34.79**	19.4**	22.68*
2	Total Value	38.92**	33.6*	26.78*
3	Unit value	3.07 <sup>NS</sup>	11.89*	3.34**

Note: \*Significant at 1 per cent level, \*\*Significant at 5 per cent level, NS-Non significant

**Table 3. Coppock's Instability Index for banana export from India (%)**

Export	Period I (1994-95 to 2003-04)	Period II (2004-05 to 2013-2014)	Overall Period (1994-95 to 2013-14)
Quantity	36.36	26.45	29.83
Value	61.23	24.56	32.34
Unit Value	42.24	27.45	30.23

**Table 4. Growth and Instability of Banana Export to Top Five Countries from India (2004-05 to 2013-14) (%)**

S.No	Country	C.G.R			Coppock's Instability Index		
		Quantity	Value	Unit value	Quantity	Value	Unit value
1	U.A.E	26.07*	33.47*	5.87**	55.31	52.76	28.95
2	S. Arabia	28.27*	37.84*	7.46**	73.44	69.04	50.52
3	Bahrain	26.06**	30.89*	3.83 <sup>NS</sup>	118.34	61.19	188.25
4	Kuwait	25.32**	33.55*	6.57**	70.02	83.86	58.48
5	Oman	31.62*	40.32*	6.59**	46.92	61.53	22.20

Note: \*Significant at 1 per cent level, \*\*Significant at 5 per cent level, NS - Non significant



Table 5. Transition Probability Matrix of Banana Exports from India (2004-05 to 2013-14)

S.No	Countries	U.A.E.	S. Arabia	Bahrain	Kuwait	Oman	Others
1	U.A.E.	<b>0.5952</b>	0.3352	0	0.0695	0	0
2	S. Arabia	0.2915	<b>0.2698</b>	0.1328	0.3017	0.0042	0
3	Bahrain	0.6415	0	<b>0</b>	0	0.1133	0.2452
4	Kuwait	0	0	0.1138	<b>0</b>	0	0.8862
5	Oman	0	0	0.1658	0	<b>0.8342</b>	0
	Others	0.1325	0	0.0535	0.0275	0.0133	<b>0.7732</b>