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RESEARCH PAPER

Export performance and trade directions of Indian floriculture

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Abstract : The present study was initiated with the objective of examining the production, export performance and trade directions of Indian floriculture. The data were divided into pre-NHM period (1994-95 to 2004-05) and post-NHM period (2005-06 to 2018-19) and was analyzed by estimating growth rates and using Markov chain approach. The results showed that area, production, productivity and export of floriculture in India showed positive and significant growth throughout the study periods. Floriculture exports of India represented the growth rate of 11.03 percent during the period 1994-95 to 2018-19. Netherlands, Germany and U. K. are the most stable importers of Indian flowers and having better potential as reflected by their higher probabilities of retention and showed increased probability retention in Post-NHM period than Pre-NHM period.

Key Words : Growth, Production, Export, Floriculture, Probability retention

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INTRODUCTION

Floriculture is becoming a flourishing industry in the world today. Flowers are normally offered for exchange to express one's feelings on occasions of joy or sorrow in the form of bouquets. Cut flowers and fully developed buds are generally used for such purposes. Many private companies are being taken up profit oriented floriculture projects to produce cut flowers for export purposes. Flowers are also used as raw material in industries to extract the oil fragrance. In the preparation of industrial products like perfumes, cosmetics, confectioneries, pharmaceuticals, toiletries, syrup and gulkand flowers are used as raw material. Because of this the term "floriculture industry" is being generally used. Floriculture has become one of the significant commercial trades among agriculture, an economical viable option in agri-business of the world due to increasing demand of flowers.

The total international trade of floriculture is of 63, 33,954.78 Mt which valued 20,233.52 Mill. US$.Germany, Netherland, USA, U K and France are the major players in the floriculture world market.India possesses a variety of agro climatic conditions blessed with plenty of sunshine, land, cheap and skilled manpower for the desirable development of floriculture industry. Government of India has identified floriculture as a sunrise industry.

Government of India has launched National Horticulture Mission (NHM) during the year 2005-06

(Tenth Plan) in which it provides 100 per cent assistance to the State Mission. The country has exported 15842.21 Mt of floriculture products to the world for the worth of Rs. 575.98 crore in 2020-21. Thus, considering the importance and scope of export, the present study has been taken with the specific objectives are as follows;

– To study the production and export performance of floriculture in India

– To examine the direction of export trade in floriculture from India.

MATERIAL AND METHODS

Data on area, production, productivity and export of flowers from India was collected for the period of 1994-95 to 2018-19. It was collected from annual published literature of APEDA and its website, WTO website, National Horticultural Board website and FAO year books. In order to assess the effect of National Horticulture Mission (NHM) programme (2005-06) the data were divided into two time periods as pre-NHM period (1994-95 to 2004-05) and post-NHM period (2005-06 to 2018-19).

Estimation of growth rates:

Trend analysis was done for year wise area, production and export values realized from exports. The exponential growth rates were worked out using the exponential growth function of the following form,

$$Y = ab^x e^u$$

where,

Y = Dépendent variable

a = Intercept

b = Regression co-efficient

x = Number of years

e^u = Error term

By using the semi-logarithmic form of the equationthe growth rate was estimated as below:

$$\text{Log } Y = \text{Log } a + t \text{ Log } b$$

Then, the compound growth rate (g) was computed using:

$$g = (\text{Antilog of Log } b - 1) \times 100$$

Market share and direction of trade

By using the first order Markov chain approachtrade directions of Indian cut flower exports were analyzed. It is the estimation of the transitional probability matrix P. The elements P^{ij} of the matrix P indicate the probability that exports will switch from country/zone (i) to country (j) with the passage of time. The diagonal elements of the matrix measure the probability.The diagonal elements givethe export share that will be retainedby a country which indicates the loyalty of an importing country to a particular country's exports.

Five major importing countries of cut flowers were considered for the present investigation.The rest of the countries were denoted as 'others'. The average exports to a particular country was considered to be a random variable is denoted algebraically as :

$$^{r}E_{jt} = \sum_{i=1} E_{it-1} P_{ij} + e_{jt}$$

where,

E_{jt} : Export of India to j^{th} country during the year t

E_{it-1}: Exports to i^{th} country during the year t-1

P_{ij}: The probability that export will shift from i^{th} country to j^{th} country

e_{jt}: The error term which is statistically independent of E_{it-1}

r: The number of importing countries.

RESULTS AND DISCUSSION

Area, production and productivity of floriculture in India:

In order to identify floriculture performance of India, period wise analysis of growth in area, production and productivity during the study period was done. The Table 1 revealed that, average flowers area during the overall period was 1,67,830 ha while it was 89,840 ha and 2,29,110 ha, respectively during the pre-NHM period and post-NHM period. The average production of flowers were 10,36,880 Mt with average productivity of 6.20 Mt/ha in the overall study period. The average production of flowers in pre-NHM period was 485,050 Mt and it was increased to 15,95,460 Mt in post-NHM period. The average productivity of flowers in pre-NHM period was 5.52 Mt/ha and it was increased to 6.74 Mt/ha in post – NHM period.

The growth rate in area of flowers was7.42 per cent for the overall study period in India and. it was higher with the rate of 7.35 per cent in post-NHM period than the growth rate of 6.09 per cent inpre-NHM period. Production of floriculture in India showed 10.67 per cent growth rate in post-NHM period. The growth rate in production during post-NHM period (10.67%) was higher than pre-NHM period (9.54%) and overall study period (9.79%). During overall study period,the productivity of flowers has increased at the rate of 2.08 per cent per annum. Compound growth rate in productivity of flowers

was higher in pre-NHM period (3.87%) than post-NHM period (3.10%).

It is observed that, there was decisive and substantial growth in all area, production and productivity of flowers throughout all the periods of study. Different agro-climatical zones in the country, superior soil conditions, favourable warm temperature, good Government efforts and availability of cheap labours have helped the growth in area and production of flowers in India during post-NHM period.

Export of floriculture in agricultural export of India:

The Table 2 depicts the percentage share of floriculture exports in agricultural exports for the period

Table 1 : Trends in area, production and productivity of floriculture in India

Sr. No.	Particulars		Pre-NHM period		Post-NHM period		Overall period	
1.	Area	Average (ha)	89,840		229,110		167,830	
		CAGR (%)	6.09	***	7.35	***	7.42	***
2.	Production	Average (Mt)	485,050		15,95,460		10,36,880	
		CAGR (%)	9.54	***	10.67	***	9.79	***
3.	Productivity	Average (Mt/ha)	5.52		6.74		6.20	
		CAGR (%)	3.87	**	3.10	***	2.08	***

Note: ** and *** indicate significance of values at P=0.05 and 0.01, respectively

Table 2 : Export performance of floriculture products in agricultural export of India

Sr. No.	Years	Agricultural exports (Rs. Lakhs)	Floriculture exports (Rs. Lakhs)	Share of floriculture exports in agricultural exports (%)
1.	1994-95	13,22,276.00	3,083.80	0.23
2.	1995-96	20,39,774.00	6,014.15	0.29
3.	1996-97	24,16,129.00	6,339.86	0.26
4.	1997-98	24,83,745.00	8,120.68	0.33
5.	1998-99	25,51,064.00	9,660.98	0.42
6.	1999-00	25,31,366.00	10,515.65	0.46
7.	2000-01	28,65,737.00	12,310.04	0.41
8.	2001-02	29,72,861.00	11,532.52	0.43
9.	2002-03	34,65,394.00	16,575.10	0.52
10.	2003-04	37,26,652.00	24,954.80	0.67
11.	2004-05	41,60,265.00	22,110.99	0.54
12.	2005-06	49,21,696.00	30,144.65	0.61
13.	2006-07	62,41,142.00	65,269.72	1.05
14.	2007-08	79,03,972.00	34,014.41	0.43
15.	2008-09	85,95,170.00	36,881.40	0.43
16.	2009-10	89,34,130.00	29,446.96	0.33
17.	2010-11	1,20,18,548.00	29,604.04	0.25
18.	2011-12	1,87,47,589.00	36,532.15	0.19
19.	2012-13	2,27,19,261.00	42,344.61	0.19
20.	2013-14	2,62,77,896.00	45,549.17	0.17
21.	2014-15	2,39,68,104.00	46,077.22	0.19
22.	2015-16	2,15,39,655.00	48,341.34	0.22
23.	2016-17	2,26,65,194.00	54,670.73	0.24
24.	2017-18	2,50,27,301.00	50,731.23	0.20
25.	2018-19	2,69,22,634.00	57,141.27	0.21
	CAGR (%)	14.06 ***	11.03 ***	

Note: ** and *** indicate significance of values at P=0.05 and 0.01, respectively

1994-95 to 2018-19. It is seen that, agricultural exports increased from 13,22,276 lakhs in 1994-95 to 2,69,22,634 lakhs in 2018-19. Per cent share of floriculture exports in agricultural exports was highest in the year 2006-07 which was 1.05 per cent of total agricultural export.Year 2006-07 definitely saw a boost in the floriculture sector justifying the Government's decision to give it a sunrise industry status with the introduction of National Horticulture Mission. In the overall study period (1994-95 to 2018-19) agricultural exports of India have shown a compound growth rate of 14.06 per cent, while floriculture exports of India increased with the rate of 11.03 per cent. Although, there was degradation from 2007-08, it should not be scare considering the depression that had influenced the markets worldwide. Again from 2007-08 there was increased demand for flowers in the domestic market. India's exports of floricultural products in the year 2007-08 decreased to 34,014.41 lakhs, from 65,269.72 lakhs in 2006-07, which further decreased in the year 2008-09 and 2009-10. However, in 2008-09, in rupee terms, export of floriculture from India increased marginally than the export of 2007-08. From 2009-10 in rupee terms India's exports of floricultural products has increased. Percentage share of floriculture exports in agricultural exports has observed less due to increased share of other agricultural products in total agricultural export. Currently, the states of Karnataka, Maharashtra and Andhra Pradesh report for better of the cut flowers exported. However, they are facing hard competition from African countries. These countries are exporting the cut flowers to the Middle East. High freight rates add to the exigency. Freight rate in India is also higher.

Market share and direction of trade :

The Markova chain approach was used to analyze the market shares and direction of trade of Indian flowers. This was done through the probability transitional matrix. The considered countries were USA, Netherlands, Germany, Japan and UK.The analysis was done for two periods *i.e.* pre-NHM (National Horticulture Mission) 1994-95 to 2004-05 and post-NHM from 2004-05 to 2018-19.

Country wise market share and direction of trade:

Transitional probability matrix for top countries in pre-NHM period and post-NHM period obtained from the analysis are presented in the Table 3 and 4, respectively. It is seen that, Netherlands, Germany and UK has shown higher probabilities of retention and these were the most balanced flowers importers of India. In pre-NHM period, 0.42 probability retention had reflected by Netherlands which increased to 0.53 in post-NHM period. UK had probability retention of 0.32 in pre-NHM period, this increased to 0.51 in post-NHM period.The USA had probability retention of 0.58 in pre-NHM period which reduced to 0.17 in post-NHM period. The other countries category had probability retention of 0.78 in pre-NHM period this reduced to 0.71 in post-NHM

Table 3 : Transitional probability matrix for country wise export of floriculture products during pre-NHM period

Importing countries	USA	Netherlands	Germany	Japan	UK	Others
USA	0.58	0.00	0.17	0.19	0.06	0.00
Netherlands	0.10	0.42	0.15	0.22	0.00	0.11
Germany	0.05	0.78	0.15	0.02	0.00	0.00
Japan	0.00	0.13	0.00	0.14	0.20	0.53
UK	0.45	0.05	0.18	0.00	0.32	0.00
Others	0.14	0.00	0.00	0.00	0.08	0.78

Table 4 : Transitional probability matrix for country wise export of floriculture products during post-NHM period

Importing countries	USA	Netherlands	Germany	Japan	UK	Others
USA	0.17	0.30	0.00	0.16	0.11	0.26
Netherlands	0.16	0.53	0.13	0.00	0.18	0.00
Germany	0.17	0.00	0.79	0.00	0.00	0.04
Japan	0.19	0.20	0.13	0.16	0.16	0.16
UK	0.05	0.00	0.00	0.00	0.51	0.44
Others	0.29	0.00	0.00	0.00	0.00	0.71

period. Germany on the other hand shows a lot of potential as it had moved from 0.15 in pre-NHM period to very stable in post-NHM period with probability retention of 0.79. The Japan had probability retention of 0.14 in pre-NHM period this slightly increased to 0.16 in post-NHM period.

Transitional probability matrix for top countries in pre-NHM period obtained from the analysis is presented in the Table 4. Other countries group which has reflected high probability retention of 0.78 were the most stable market of Indian floriculture *i.e.* the probability that other countries retain their export share in the performance period over the last 11 years of pre-NHM period has the highest probability of retention followed by USA (0.58), Netherlands (0.42), UK (0.32), Germany (0.15) and Japan (0.14).

USA held its original import share of 58.00 per cent during pre-NHM period. It gained 45.00 per cent from UK, 14.00 per cent from others, 10.00 per cent from Netherlands and 5.00 per cent from Germany while it lost 19.00 per cent to Japan, 17.00 per cent to Germany and 6.00 per cent to UK.

Netherlands retained its original share of 42.00 per cent and gained 78.00 per cent from Germany, 13.00 per cent from Japan and 5.00 per cent from UK whereas it lost 22.00 per cent to Japan, 15.00 per cent to Germany, 11.00 per cent to others and 10.00 per cent to USA.

Germany grasped its original share of 15.00 per cent and gained 18.00 per cent from UK, 17.00 per cent from USA and 15.00 per cent from Netherlands whereas it lost 78.00 per cent to Netherlands, 5.00 per cent to USA, 2.00 per cent to Japan.

Japan retained its original share of 14.00 per cent and gained 22.00 per cent from Netherlands, 19.00 per cent from USA and 2.00 per cent from Germany whereas it lost 53.00 per cent to others, 21.00 per cent to UK and 13.00 per cent to Netherlands.

UK withstood its original import share of 32.00 per cent during pre-NHM period. It gained 20.00 per cent from Japan, 8.00 per cent from others and 6.00 per cent from USA while it lost 45.00 per cent to USA, 18.00 per cent to Germany and 5.00 per cent to Netherlands.

The other countries together have lost floriculture imports share to the tune of 14.00 per cent to USA and 8.00 per cent to UK However, it gained 53.00 per cent from Japan and 11.00 per cent from Netherlands.

Transitional probability matrix for top countries in post-NHM period obtained from the analysis is presented in the Table 5. Germany was the most stable market of Indian floriculture as reflected by the highest probability retention of 0.79 followed by others (0.71), Netherlands (0.53), UK (0.51), USA (0.17) and Japan (0.16).

USA affirmed its original import share of 17.00 per cent during post-NHM period. It gained 29.00 per cent from others, 19.00 per cent from Japan, 17.00 per cent from Germany 16.00 per cent from Netherlands and 5.00 per cent from U.K while it lost 30.00 per cent to Netherlands, 26.00 per cent to others, 16.00 per cent to Japan and 11.00 per cent to UK.

Netherlands retained its original share of 53.00 per cent and gained 30.00 per cent from U.S.A and 20.00 per cent from Japan whereas it lost 18.00 per cent to UK, 16.00 per cent to USA and 13.00 per cent to Germany.

'Germany sustained its original share of 79.00 per cent and gained 13.00 per cent from Japan and 13.00 per cent from Netherlands whereas it lost 17.00 per cent to USA and 4.00 per cent to others.

Japan upheld its original share of 16.00 per cent and it lost 19.00 per cent to USA, 20.00 per cent to Netherlands, 16.00 per cent to others, 16.00 per cent to UK and 13.00 per cent to Germany.

UK retained its original import share of 51.00 per cent during post-NHM period. It gained 18.00 per cent from Netherlands, 16.00 per cent from Japan and 11.00 per cent from USA while it lost 44.00 per cent to others and 5.00 per cent to USA.

The other countries together have sustained its original import share of 71.00 per cent and gained 44.00 per cent from UK, 26.00 per cent from USA, 16.00 per cent from Japan and 4.00 per cent from Germany whereas it lost 29.00 per cent to USA.

Conclusion:

There was an increasing trend in the growth rate of area, production and productivity of Indian floriculture. During overall study period, CAGR inarea, production and productivity of floriculture in India was 7.42, 9.79 and 2.08 per cent, respectively. Area, production and productivity of floriculture showed strong growth in Post-NHM period than Pre-NHM period indicating positive effect of NHM scheme.Area, production and productivity of floriculture in India showed positive and significant growth rate throughout all the periods of study. Agricultural exports of India exhibited a compound growth rate of 14.06 per cent, while floriculture exports

of India represented the growth rate of 11.03 per cent during the period 1994-95 to 2018-19.

Netherlands, Germany and U. K. are the most unchanging importers of Indian flowers having betterpotentialas reflected by their higher probabilities of retention and showed increased probability retention in Post-NHM periodthan Pre-NHM period. Therefore, efforts are needed to promote exports to these countries by supplying quality floriculture products and make its price competitive in the international market.

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