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## Export performance of orange from Indian

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### Abstract

The study explores the export performance of oranges from India to different countries during the period 2008-09 to 2017-18 (10 years). The objective of the study was to estimate the growth rates, instability and index number (trend) of export quantity and export value of major importing countries of oranges from India. The secondary time series data for last 10 years was collected from Agri-stat India and analysed by using the statistical tools like CGR, CV, CDVI and Index number in order to complete the objectives of the study. The study shows that, the compound growth rate was highest 77.205 per cent per annum and 105.656 per cent per annum in case of United Arab Emirates for export quantity and export value respectively with one per cent significant level. Whereas Nepal and Qatar were also found to be positive (20.893 per cent per annum and 64.909 per cent per annum respectively) and significant at five per cent significant level for export quantity while Nepal (32.526 per cent per annum) at one per cent significant level and Qatar (73.927 per cent per annum) at five per cent significant level. The instability analysis indicate that for export quantity the highest variability was observed in Baharain IS with coefficient of variation 215.505 per cent and CDVI 192.874 per cent while the lowest variability was observed in Oman with coefficient of variation 56.812 per cent and CDVI 56.783 per cent. Whereas, for export value the highest variability was found in Baharain IS (241.329 per cent) in case of coefficient of variation but in case of CDVI the highest variability was found in UK (211.899 per cent) and the lowest variability was found in Nepal with 83.175 per cent coefficient of variation and CDVI 45.176 per cent. The trend analysis done by using the index number of export quantity and export value of major 10 countries importing orange from India found fluctuations during the study period.

Therefore, the study concludes that orange have better export potential in future. Hence, it is suggested so as to attain proper international market for orange, there is need to initiate a systematic and long term export planning at the national level.

**Keywords:** orange, export, instability, cuddly della index, index number

### 1. Introduction

Export is one of the fastest growing segments of the agricultural sector in India today. Production of this fruit crop in central and western part of India is increasing every year. Mrig crop (monsoon blossom) which matures in February-March has great potential for export since arrivals fruit in international market are very less during this period. Selection of desired quality fruit as per specific market demand and careful post-harvest handling to retain most of natural qualities and freshness plays a key role in expanding exports of orange. At present fruit consignments are being exported to neighboring countries by road without cooling and any other treatments. For distant markets of Europe, Gulf and South East Asia export by refrigerated container ships is imperative considering viability and sustainability for times to come.

During 2017-18, around 15,840.47 MT of fresh oranges were exported to Bangladesh, U.K, Saudi Arabia, U.A.E, Qatar, Nepal, Baharain IS, Sinapore, Kuwait and Oman. Fruits exported to neighboring countries viz. Bangladesh and Nepal are sent by trucks following traditional way of handling and packing without pre-harvest treatments or cooling.

Bangladesh is India's largest export market for oranges and Maharashtra alone exports about 35% of the total volume to the country. In the 2016 season, 52 tonnes of oranges, after many years, were exported to Sri Lanka through the sea route. The state of Maharashtra is the largest producer of oranges, accounting for as much as 50% of the country's total production, with Rajasthan in second place producing 20% of the country's crop. The fruit is also grown in the states of Punjab, Himachal Pradesh and the North East Out of the about 2 lakh hectares under orange cultivation, near about 1.21 lakh hectares is in Maharashtra and the state records a production of about 10 lakh tonnes annually.

The fruit is mainly cultivated in the districts of Amravati, Nagpur, Akola, Wardha and Yavatmal.

Nagpur oranges reputed for their flavour and sweetness are the best ones produced in the country, but efforts to export them has been a constant struggle. Unlike oranges from other countries which have a tight skin and shine on it, Nagpur oranges have loose skin and the fruit has a lesser shelf life that does not make it suitable for exports.

Oranges have a great economic importance. It is a rich source of vitamin-A, B and phosphorus. Oranges are an important food source in many parts of the world for several reasons. They are a commonly available source of vitamin C. They last longer than many other fruits when they are stored. They are easy to transport because each orange comes in its own tough skin which acts as a container. They can be piled into heaps or carried in bags, lunchboxes and shipping containers without being easily damaged. The objectives of the are: 1) To estimate the growth and instability in export of orange. 2) To study the trend of orange export.

## 2. Methodology

Whole India was taken into consideration at aggregate level so as to facilitate data compilation. Major 10 countries were selected for analysis. The nature of data used for the study is entirely based on secondary source of data. Data on export of orange from India was collected from Agri-stat Indian website. The data which was collected from secondary sources subjected to appropriate techniques in order to obtain a valid conclusion. The different techniques used for the study were- Growth rate analysis, Instability analysis and Trend analysis.

### 2.1 Compound growth rate

The growth rates was used to measure the past performance of the economic variables. The growth in production, quantity exported, exported value and unit value of export were analysed by using exponential growth function as given below.

$$Y = a \cdot b^t \quad \dots(1)$$

Where,

Y = Depended variable for which growth rate is to be estimated (Quantity exported/export value/unit value).

a = Intercept

b = Regression Coefficient

t = Time Variable

This equation will be estimated after transforming (1) as follows,

$$\text{Log } y = \text{log } a + t \text{ Log } b \quad \dots(2)$$

Then the percent annual compound growth rate (g) will be computed by using the relationship.

$$\text{CGR} = [\text{Antilog}(\text{log } b) - 1] \times 100 \quad \dots(3)$$

The significance of the regression coefficient will be tested using the student's t test.

### 2.2 Instability analysis

In order to study the instability in the export of orange, Coefficient of variation and Cuddy Della Valle instability index will be used.

#### 2.2.1 Coefficient of variation (CV)

$$\text{Coefficient of variation (CV)} = \frac{\sigma}{\bar{x}} \times 100$$

Where,

$\sigma$  = Standard deviation

$\bar{x}$  = Arithmetic mean

#### 2.2.2 Cuddy Della Valle instability index (C & D)

$$\text{Instability Index} = \text{CV} \sqrt{(1 - R^2)}$$

Where,

CV = Simple Estimates of coefficient of variation in per cent and

$R^2$  = Coefficient of determination from a time trend regression adjusted by the number of degree of freedom.

#### 2.2.3 Index number: were estimated for identifying trend of export in quantity and value of fish with following formula

$$\text{Index No} = \frac{\text{Current year}}{\text{Base year}} \times 100$$

## 3. Result and Discussion

Considering the objectives of the study, the required data collected from Agri-stat was analysed and interpreted. The results obtained are presented and discussed below.

### 3.1 Growth rates of export of oranges

The results obtained by using the exponential growth function used for the estimation of export of oranges are presented in the following table. The compound growth rates with respect to export quantity and export value was evaluated for 10 years i.e. 2008-09 to 2017-18 and accordingly the results are presented in the table 1 and 2 respectively.

**Table 1:** Compound growth rate of export quantity of oranges (2009-2018)

Sr. No.	Country name	CGR	t-value	R <sup>2</sup>
1	Bangladesh	-0.727	-0.031	0.001
2	Nepal	20.893*	2.634	0.464
3	U Arab Emts	77.205**	3.816	0.645
4	Qatar	64.909*	2.467	0.432
5	Oman	0.398	0.04	0.001
6	Kuwait	42.802	1.529	0.226
7	Saudi Arab	24.437	0.785	0.071
8	UK	-19.277	-1.032	0.117
9	Baharain IS	44.386	1.413	0.199
10	Singapore	-9.158	-0.333	0.014

**Note:** \*\* denote significant at 1% level and \* denote significant at 5% level

Table 1 reveals that among the 10 countries, growth rate of export quantity of only United Arab Emirates was found to be 77.205 per cent per annum significant at one per cent level while that of Nepal and Qatar was found to be 20.893 and 64.909 per cent per annum respectively at five per cent level of significance. The growth rates of Bangladesh, Oman, Kuwait, Saudi Arab, UK, Baharain IS and Singapore were -0.727, 0.398, 42.802, 24.437, -19.277, 44.386 and -9.158 per cent per annum respectively.

The export quantity of oranges has shown positive growth trend for almost all countries except Bangladesh, UK and Singapore which showed negative growth trend.

Table 2 reveals that growth rates among all the 10 countries of export value only Qatar was found to be significant at five percent level with CGR 73.927 per cent per annum and even the other two countries Nepal and United Arab Emirates were found to significant at one per cent with 32.526 and 105.656 per cent per annum compound growth rates respectively. The growth rates of Bangladesh, Oman, Kuwait, Saudi Arab, IK, Baharain IS and Singapore were 8.894, 15.138, 45.193, 38.676, 4.923, 60.810, -13.469 per cent per annum respectively.

The export value of oranges shown positive trend for all countries except Singapore, which showed negative growth rate.

**Table 2:** Compound growth rate of export value of oranges (2009-2018)

Sr. No.	Country name	CGR	t-value	R <sup>2</sup>
1	Bangladesh	8.894	1.055	0.122
2	Nepal	32.526**	4.37	0.705
3	U Arab Emts	105.656**	7.092	0.863
4	Qatar	73.927*	2.987	0.527
5	Oman	15.138	1.305	0.175
6	Kuwait	45.193	1.474	0.214
7	Saudi Arab	38.676	1.213	0.155
8	UK	4.923	0.355	0.015
9	Baharain IS	60.810	2.043	0.343
10	Singapore	-13.469	-1.208	0.154

Note: \*\* denote significant at 1% level and \* denote significant at 5% level

### 3.2 Instability in export of oranges

As growth rates will only explain the growth rate over period, while instability will judge the stability of growth performance for period for the pertinent variable. Therefore for better understanding of magnitude and pattern of changes in export quantity and export value of oranges of different countries from India instability analysis is done. The simple coefficient of variation (CV) often contains the trend component and hence overtimes the level of instability in the time series data characterised by long term trend. So as to overcome this problem, the study of instability index given by Cuddy Della Valle (1978), which corrects the coefficient of variation was used.

Table 3 depicted that Baharain IS exhibited highest variability with coefficient of variation at 215.505 per cent followed by Qatar and Kuwait with 210.987 and 185.817 per cent variability respectively while Oman was found to have lowest variability with coefficient of variation at 56.812 per cent. The coefficient of variation of Bangladesh, Nepal, United Arab Emirates, Saudi Arab, UK and Singapore were 59.245, 81.920, 169.444, 118.064, 122.698, 147.457 per cent respectively.

**Table 3:** Instability of export quantity of oranges (2009-18)

Sr. No.	Country	CV	CDVI
1	Bangladesh	59.245	59.216
2	Nepal	81.920	59.976
3	U Arab Emts	169.444	100.958
4	Qatar	210.987	159.012
5	Oman	56.812	56.783
6	Kuwait	185.817	163.477
7	Saudi Arab	118.064	113.796
8	UK	122.698	115.297
9	Baharain IS	215.505	192.874
10	Singapore	147.487	146.451

In Cuddy-Della instability index also Baharain IS exhibited highest variability with CDVI 192.874 per cent followed by Kuwait and Qatar with CDVI 163.477 and 159.012 per cent respectively. Even the lowest variability was found to be Oman with CDVI 56.783 per cent. Bangladesh and Nepal found nearly same variability with CDVI 59.216 and 59.976 per cent respectively. The other countries variability in respect to high to low CDVI were found to be Singapore, UK, Saudi Arab, United Arab Emirates with CDVI 146.451, 115.297, 113.796 and 100.958 per cent respectively.

Table 4 depicted that Baharain IS exhibited highest variability with coefficient of variation 241.329 per cent followed by UK and Qatar with coefficient of variation 213.506 and 195.391 per cent respectively while Bangladesh and Nepal exhibited lowest variability with nearly same coefficient of variation 83.371 and 83.175 per cent respectively. The variability found in United Arab Emirates, Oman, Kuwait, Saudi Arab and Singapore with coefficient of variation 167.309, 105.727, 173.477, 145.444, 124.189 per cent respectively.

**Table 4:** Instability of export value of oranges (2009-18)

Sr. No.	Country	CV	CDVI
1	Bangladesh	83.371	78.120
2	Nepal	83.175	45.176
3	U Arab Emts	167.309	61.927
4	Qatar	195.391	134.380
5	Oman	105.727	96.031
6	Kuwait	173.477	153.799
7	Saudi Arab	145.444	133.698
8	UK	213.506	211.899
9	Baharain IS	241.329	195.611
10	Singapore	124.189	114.227

In case of Cuddy-Della instability index UK was found to have highest variability with CDVI 211.899 per cent while Nepal was found to be with the lowest variability with CDVI 45.176 per cent. The variability with respect to high to low CDVI 195.611, 153.799, 134.380, 133.698, 144.227, 96.031, 78.120 and 61.927 per cent of remaining countries as Baharain IS, Kuwait, Qatar, Saudi Arab, Singapore, Oman, Bangladesh and United Arab Emirates respectively.

### 3.3 Index number of export of oranges

The index numbers were worked out for different country's export quantity and export value of oranges from India. The basic object of estimating index numbers was to make the trends of export of oranges from India. For this analysis data pertaining to the year 2008-09 to 2017-18 i.e. last 10 years of major ten importing countries were used. The results of index numbers of export quantity and index number of export value are presented in the following table 5 and 6 respectively.

Table 5 depicted that index number of export quantity have been found fluctuating over the study period for almost all countries. While the index number 8535.75, 3629.748 and

21215.330 of Qatar, Oman and UK respectively have shown highest value in export quantity for the year 2017-18. It can be seen that during 2012-13 Qatar, Kuwait, Saudi Arab, UK.

**Table 5:** Index number of export quantity (Base year = Triannum ending average of 2009)

Year Country	Bangladesh	Nepal	UAE	Qatar	Oman	Kuwait	Saudi Arab	UK	Baharain IS	Singapore
2008-09	120.969	93.951	92.308	0	110.732	3.701	232.394	64.342	242.923	247.214
2009-10	112.184	152.368	148.951	21.446	117.200	294.898	17.606	120.669	1.392	52.753
2010-11	66.857	1213.128	2.123	278.553	36.114	1.100	0	114.988	55.684	0.004
2011-12	25526.030	4487.218	32.912	1.009	50.139	0.600	536.680	0	69.606	11.140
2012-13	28709.990	87.416	1440.188	0	158.802	0	0.423	0	0	494428.200
2013-14	23043.810	190.048	62.637	1.077	144.071	44.271	0.234	0	0	55375.950
2014-15	49.497	3254.959	2.225	1.730	3.526	128.529	7.592	0.087	3.879	0.001
2015-16	219.221	12732.650	6.549	1.059	18.986	62.122	0	5.218	0.043	0.001
2016-17	123.406	321.763	24126.41	2966.42	2624.762	9.974	4.793	0	29.021	3531630
2017-18	3300.828	234.893	21074.830	8535.75	3629.748	46.472	11.530	21215.330	86.401	2737013

**Table 6:** Index number of export value (Base year = Triannum ending average of 2009)

Year Country	Bangladesh	Nepal	UAE	Qatar	Oman	Kuwait	Saudi Arab	UK	Baharain IS	Singapore
2008-09	98.256	83.834	43.933	0	90.256	1.336	263.813	187.5	58.824	262.053
2009-10	100.426	159.463	163.179	13.761	146.474	298.129	36.187	58.125	5.882	37.947
2010-11	2205.242	130.1621	1.684	286.238	6.858	4.489	0	54.375	235.294	0
2011-12	7497.783	1129.757	5.531	0.218	16.519	2.993	3.935	0	2.04	116.889
2012-13	143.384	202.747	1558.436	0	189.989	0	1.167	0	0	104.065
2013-14	221.289	500.169	137.736	13.661	195.238	9.133	30.350	0	0	0.488
2014-15	1712.892	326.204	1.029	365.138	0.911	8.554	4023.735	51.75	811.765	0.431
2015-16	9855.644	840.628	3.387	1013.761	5.600	5.346	0	68.625	5.882	13.349
2016-17	512.926	634.526	25149.700	3804.587	5405.341	818.555	1345.914	0	2282.353	43.833
2017-18	94.342	433.434	19884.630	521.618	7447.994	414.913	2966.148	854.625	11882.35	3.555

Baharain have 0 index number while in the same year Bangladesh have highest index number among the study period. In case of Nepal highest index number seem to be in 2015-16 i.e. 12732.650, UAE in 2016-17 i.e. 24126.41, Kuwait in 2009-10 i.e. 294.898, Saudi Arab in 2011-12 i.e. 536.680, Baharain IS in 2008-09 i.e. 242.923 and Singapore in 2016-17 i.e. 3531630.

While the lowest index number for Bangladesh in 2014-15 i.e. 49.497, Nepal in 2012-13 i.e. 87.416, UAE in 2010-11 i.e. 2.123 and Oman in 2014-15 i.e. 3.526. In case of UK, the index number for continuous three years i.e. from 2011-12 to 2013-14 has been seen as 0 even Baharain IS and Singapore seems to have continuous two years 0 index number from year 2012-13 to 2013-14 and 2014-15 to 2015-16 respectively.

Table 6 depicts that as like index number of export quantity, index number of export value too are fluctuating over study period. The highest index number of Bangladesh seems to be in 2015-16 i.e. 9855.644, Nepal in 2011-12 i.e. 1129.757, UAE in 2016-17 i.e. 25149.700, Qatar in 2016-17 i.e. 3804.587, Oman in 2017-18 i.e. 7447.994, Kuwait in 2016-17 i.e. 818.555, Saudi Arab in 2014-15 i.e. 4023.735, UK in 2017-18 i.e. 854.625, Baharain IS in 2016-17 i.e. 2282.353 and Singapore in 2008-09 i.e. 262.053. While lowest index numbers seem to be as Bangladesh in 2017-18 i.e. 94.342, Nepal in 2008-09 i.e. 83.834, UAE in 2014-15 i.e. 1.029, Oman in 2014-15 i.e. 0.911. In case of Qatar, Kuwait, Saudi Arab, UK and Baharain IS has 0 index number for more than a year.

#### 4. Conclusion

The present study was undertaken to analyse the compound growth rates, during the study period the export quantity and

export value have shown positive value for almost all countries indicating vast potential for the export of oranges from India. Hence there is need to evolve policies directing higher production of oranges and formulate alternative management strategies and policies to boost orange export in India. While the trend analysis with the help of index number showed fluctuations in export quantity and export value throughout the study period which may be due to changing policies and its execution at different periods of time.

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