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TEMPORAL PERFORMANCE OF FRUITS' PRODUCTION IN INDIA

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ABSTRACT

Considering the need of the hour, the present topic entitled as 'Temporal Performance of Fruits' Production in India' is taken to review the growth rate and instability indices in area, production and productivity as well as impact of the area and productivity on production.

The data is collected from the Indian Agricultural Statistic Research Institute on the Area, Productivity and Production of the Fruits from the year 1991-92 to 2014-15 on the Area, Productivity and Production of the Fruits in India.

The results show that the good fruits production achieved in India in last 25 years. The growth in area(4.30 %), productivity(0.33%) and production(4.65 %) of the Fruits in India is positive, while significant in area and production and non-significant in productivity. Instability Index shows that the Production of Fruits in India was more unstable as compared to Area and Productivity of Fruits during the period from 1995-96 to 2014-15. The previous years' area made positive effect on next years' production of Fruits in overall period.

1. Introduction

Almost all fruits are rich source of Vitamin C. In Schools, the students' diet plan is designed as per nutrition values. Fruits Production has been increased over the period of time in India. Fruits production contributed 11.60 percent in world production. Mangos, Grapes, Apple, Apricots, Orange, Banana Fresh, Avocados, Guava, Lichi, Papaya, Sapota and Water Melons are major fruits crops grown in India.

During the era of the drought and famine, getting sufficient fruits was also difficult to human life, With the growth in production of fruits, now the consumers are more consciousness and choosy about the size, colour, texture and nutrition content in the fruits. Consumer want sorted, graded, cleaned and variety of fruits. It is important to development the stable production of fruits in future to fulfill the need of the growing population.

China ranked first in fruit production with 154.364 million tonnes (MT) in 2013, followed by India (82.631 MT), Brazil (37.774 MT), USA (26.986 MT), Spain (17.699 MT), Mexico (17.553 MT), Italy (16.371 MT) and Indonesia (16.003 MT). with the weak productivity, India does better than China and Spain

Amongst the states of the India, the major fruit-producing states are Andhra Pradesh and Maharashtra, accounting for 19% and 18% of total production respectively, followed by Gujarat, Karnataka, Uttar Pradesh, Bihar, West Bengal, Madhya Pradesh, Kerala, Assam, J&K, Orissa and Punjab.

Considering the need of the hour, the present topic entitled as 'Trends and Stability status of Fruits' Production in India' is taken to review the growth rate and instability indices in area, production and productivity as well as impact of the area and productivity on production. The objectives of the study are designed as follows

Objectives

The objectives of the paper are given below

1. To study the production status of Fruits in India
2. To estimate the growth rates of the Area, Productivity and Production for Fruits in India;
3. To study the instability in the Area, Productivity and Production of Fruits in India;
4. To find the effect of Area and Productivity on Production of the Fruits in India;

2. Methodology

This section will focus on the source of data, period of the data, crop included, methods adopted to achieve the objectives.

2.1. Source of data

The data is collected from the Indian Agricultural Statistic Research Institute on the Area, Productivity and Production of the Fruits.

2.2. Period of the data

The annual data is collected from the year 1991-92 to 2014-15 on the Area, Productivity and Production of the Fruits.

2.3. Analytical Tools:

The tools are used to estimate the growth; instability and effect of area and productivity on production are as follows;

2.3.1. Estimation of Production status

The status of the Fruits production in last 25 years in simply presented in over decades. The triennial averages are estimated.

2.3.2. Estimation of Growth

In the present study, the Compound Growth Rates in Area, Productivity and Production of Fruits are estimated as follows

The exponential equation of the following type was used.

$Y=ab^t$

Where

Y = Area, Productivity and Production

(Area in "00" ha, Production in "00" bales, Productivity in lint kg /ha.)

t = time period in years

b = trend value (coefficient)

a = intercept.

Compound Growth Rate= (Antilog b-1) x 100. (Chand and et al. 2012)

The significance of the estimated compound growth rates was tested with the help of 't' test.

For getting normal base year, the triennial averages are taken as base year.

2.3.3. Estimation of Instability

To estimate the instability of Area, Productivity and Production of Fruits, the Coefficient of variation and Cuddy Della Index is used. The formula is as fallows

a) Coefficient of Variation(CV) : Standard Deviation/Mean

To avoid the over estimation of CV, the following Cuddy Della Index (Ix) is used in comparison with CV.

b) Cuddy Della Index (Ix) was calculated as follows:

$$I_x = CV\sqrt{(1-\overline{R}^2)}$$

Where, CV = Coefficient of Variation ($\sigma/\overline{X}$)

$\overline{R}^2$ = Adjusted coefficient of multiple determination

2.3.4. Method for effect of Area and Productivity on Production

To estimate the effect of Area and Productivity on Production of Fruits in India, the Crop Acreage Response Model is used. In this model, the effect of lagged years' area and productivity on the present production of the Fruits is estimated.

$Y = a + b_1A_{t-1} + b_2P_{t-1} + u$

Y = Production of selected crop (000 tons)

a = Intercept

A_{t-1} = Area under selected crop (000 ha)

P_{t-1} = Productivity of selected crop (ton/ha)

b_i (1 to 2)= Coefficients of respective variables

3. Results and Discussion

Results regarding the trend and stability of the Fruits in India are presented and discussed in this section on the line of objectives mentioned.

3.1 Production status of Fruits in India

The table no 1 represents the area, production and productivity status of the fruits in India. The table shows the area, production and productivity of fruits in India over the decade since 1991-92 and the current year 2014-15.

The area of the fruits in the country has increased from 3101 thousand hectares to 6852 thousand hectares i.e. net increased by 121 per cent. The production also increased from 34830 thousand tons to 86360 thousand tons i.e. net increased by 148 per cent. The productivity of fruits in India is increased from 11.18 tons per hectare to 12.65 tons per hectare. i.e. net increased by 13 per cent. The more increase in area and production in seen between year 2001-02 to 2011-12 which is increased by 91 and 97 per cent

Overall, the good fruits production achieved in India in last 25 years

Table no. 1 . Production Status of Fruits in India

Area: Area 000 ha, Production 000 tons, Productivity tons / ha

S.N.	Particulars/Year	1991-92	2001-02	2011-12	2014-15
1	**Area**	3101	3889	6690	6852
	%	100	125	216	221
2	**Production**	34830	43781	77529	86360
	%	100	126	223	248
3	**Productivity**	11.18	11.27	11.59	12.65
	%	100	101	104	113

Note : The figures area triennial averages. The horticulture production is estimated as 283 million tonnes in year 2015- 16

3.2 Growth in Fruits in India

The table no 2 represents the compound growth rates of area, production and productivity of Fruits in India. The table shows the compound growth rates of area, production and

productivity of Fruits in India for the decades 1995-96 to 2004-05 and for the decade 2005-06 to 2014-15 as well as for whole period of said two decades.

The growth rate of the fruits' area was 3.33 per cent significantly for first decade. While, it was 2.57 per cent significantly for second decade. For whole period it was 4.30 percent significantly. Which shows the growth in area of fruits was smother and positive for whole period.

The fruits' productivity was declined by 1.62 percent in first decade and increased by 2.20 percent per annum in second decade, significantly. For whole period, growth rate of productivity in fruits was positive but non-significant and it was 0.33 percent per annum.

The production growth in Fruits of India was 1.66 percent, 4.82 percent and 4.65 percent for first decade, second decade and for whole period respectively. It was positive and significant at 1 per cent.

Overall, the growth in area(4.30 %), productivity(0.33%) and production(4.65 %) of the Fruits in India is positive, while significant in area and production and non-significant in productivity.

Table no. 2: Compound Growth Rate of Area, Productivity and Production of Fruits in India

S.N.	Particulars	1995-96 to 2004-05 (first decade)	2005-06 to 2014-15 (second decade)	1995-96 to 2014-15 (whole period)
1	**Area**	3.33***	2.57***	4.30***
2	**Productivity**	-1.62**	2.20***	0.33
3	**Production**	1.66***	4.82***	4.65***

Note: * = Significant at 10 percent (table T value is 1.833 for decades and 1.729 for whole period)

** = Significant at 5 percent (table T value is 2.262 for decades and 2.093 for whole period)

*** = Significant at 1 percent (table T value is 3.250 for decades and 2.861 for whole period)

3.3 Instability in Fruits of India.

The table no.3 displayed the Instability in Area, Productivity and Production of Fruits in India for the decades 1995-96 to 2004-05, for the decade 2005-06 to 2014-15 and for whole period of said two decades. Coefficient of Variation and Cuddy- Della Index are showing instability in Area, Productivity and Production.

The instability indicates the variation in the selected indicator over the period of the study. The Cuddy Della Index indicates instability at controlled level.

The Coefficient of Variation in area of fruits was 12.44, 8.83 and 25.32 per cent in first decade, second decade and for whole period respectively, while the CD index for area in fruits was 6.81, 4.49 and 6.64 per cent in first decade, second decade and for whole period respectively.

In case of Productivity of fruits in India, the Coefficient of Variation was 7.07, 8.13 and 7.83 per cent in first decade, second decade and for whole period respectively, while the CD index for productivity in fruits was 5.25, 4.43 and 7.54 per cent in first decade, second decade and for whole period respectively.

The fruits production was also varying over the selected period. The Coefficient of Variation was 6.42, 14.39 and 28.67 per cent in first decade, second decade and for whole period respectively, while the CD index for productivity in fruits was 3.92, 2.33 and 8.43 per cent in first decade, second decade and for whole period respectively.

The Coefficient of Variation shows that variation of the almost all parameters is higher than the variation showed by Cuddy Della Index.

Overall, Instability Index shows that the Production of Fruits in India was more unstable as compared to Area and Productivity of Fruits during the said period.

Table no. 3: Instability in Area, Productivity and Production of Fruits in India

S.N.	Indices	Area			Productivity			Production		
		1995-2004	2005-14	1995-2014	1995-2004	2005-14	1995-2014	1995-2004	2005-14	1995-2014
		I	II	Whole	I	II	Whole	I	II	Whole

1	CV	12.44	8.83	25.32	7.07	8.13	7.83	6.42	14.39	28.67
2	Cuddy-Della index	6.81	4.49	6.64	5.25	4.43	7.54	3.92	2.33	8.43

3.4 Effect of Area and Productivity on Production of Fruits in India

The table.4 depicts the effect of previous years' Area and Productivity of Fruits on next years' Fruits Production in India for the decades 1995-96 to 2004-05 and for the decade 2005-06 to 2014-15 as well as for whole period of the two decades.

The results show that the lagged value of the area has given positive effect on next years' production significantly. The regression coefficient of area was 1.93 percent, 1.25 per cent and 1.15 percent significantly for first decade, second decade and whole period. While the lagged productivity of Fruits has contributed negatively on production non-significantly in second decade and as whole, while positively and significantly in first decade.

The effect of past productivity was negative for whole period. The previous years' area made positive effect on next years' production of Fruits in overall period..

Table no. 4 : Crop Acreage Response Model of Fruits in India

S.N.	**Year**	**1995-2004**	**2004-14**	**1995-2014**
	Particulars	**Coefficient**	**Coefficient**	**Coefficient**
1	Productivity	410.02	-733.60	-589.05
2	Area	1.93**	1.25**	1.15**
3	Intercept	-8085.49	6827.23	5835.49

Note: * = Significant at 10 percent (table T value is 1.833 for decades and 1.729 for whole period)

** = Significant at 5 percent (table T value is 2.262 for decades and 2.093 for whole period)

*** = Significant at 1 percent (table T value is 3.250 for decades and 2.861 for whole period)

4. Conclusion

It is concluded from the results that the good fruits production achieved in India in last 25 years. The growth in area(4.30 %), productivity(0.33%) and production(4.65 %) of the Fruits in India is positive, while significant in area and production and non-significant in productivity. Instability Index shows that the Production of Fruits in India was more unstable as compared to Area and Productivity of Fruits during the period from 1995-96 to 2014-15. The previous years' area made positive effect on next years' production of Fruits in overall period.

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