

Original Research Article

Growth Rate and Trend in Area, Production and Productivity of Tomato, Potato and Onion (TOP) Commodities from Selected States of India:-An Economic Analysis

Abstract

An attempt has been made in this study to estimate the trend and growth rate in area, production and productivity of tomato, potato and onion (TOP) commodities from major states of India including Madhya Pradesh. The study pertains to the period from 2010-11 to 2019-20. The study area includes following states, for tomato- MP, Karnataka and AP, for Onion- MP, Maharashtra and Karnataka, for Potato – MP, UP and WB. The study revealed that overall compound growth rate in area, production and productivity of tomato, potato and onion (TOP) commodities in the selected states was of increasing trend except the area, production and productivity of tomato in AP. The growth rate in production of tomato in MP, Karnataka and AP was 12.72 percent, 1.35 percent, -9.22 percent respectively. The productivity of Karnataka also showed the negative growth rate with -0.31 percent. While the growth in production of potato in MP, UP, WB was 13.47 percent, 0.51 percent, and 0.64 percent respectively. The productivity of potato in UP and WB observed the negative growth of -0.41 percent, and -0.01 percent respectively. The overall growth rate in production of onion across the selected states MP, MH, Karnataka was of increasing trend, which was recorded 8.77 percent, 12.41 percent, 0.74 percent per annum respectively. The productivity was also observed in increasing trend in the three states. Lastly it was inferred that these three TOP staples found across the country symbolized the government of India's initiative called 'Operation Greens' to improve the living condition of farmers and build up the Indian economy by raising the export potential of TOP crops and their by-products.

Key words: TOP, Commodities, regression coefficient, trend, growth.

INTRODUCTION

India is the second largest producer of vegetables in the world after China. Tomatoes, onions and potatoes, popularly known as the TOP vegetables, are the three largest cultivated, produced and consumed vegetables in India. Potato, tomato, & onion contribute 53 percent of the total vegetable production. According to (3rd adv. estimates) 2019-20 the total vegetable production in India is 196.27 MT. The tomato production is 21.00 MT, onion 26.92 MT and potato production is 53.69 MT in

Comment [L1]: In the abstract section describes the identification of the problem, the purpose of the method of results and discussion and suggestions for the future for researchers and partners

India (2019-20 (2nd adv. estimate)), where Tomato is 11 %, potato is 28% & onion is 14% of the total vegetable production. India exported 105 thousand tons of fresh tomatoes & paste, 2.42 million tons of fresh onions in 2018-19.

India ranks second as the producer of onion in the world, the major onion producing states in India are MH, Karnataka, Gujarat, Bihar, MP, AP, Rajasthan, Haryana, UP and TN. These states together contribute 87.93 % of the total area and 89.91% of the total production of onion in India. Hence, the present study was undertaken with the objective to analyse the trend and growth rate in area, production and productivity of onion in the major states of India.

India has become the planet's second largest producer of potato. The major potato producing states are UP, WB, Bihar, Gujarat, MP. Nonetheless, this spectacular increase masks a series of less readily apparent tendencies in the growth rates for potato production, area and yield. While area harvested has expanded, the growth for area harvested experienced a series of peaks and valleys; as yields per hectare continuously rose.

If we talk about tomatoes, a well known Indian saying is "No tomato, no cooking" but 99% of the tomatoes are currently consumed fresh as it is currently estimated that only about 150,000 tonnes of tomatoes are processed annually.

Comment [L2]: Write down the purpose of the research

2. Methodology:-

Selection of study area: Out of 29 states of India 3 states under each commodity have been selected for the study under tomato, potato and onion (TOP) commodities on the basis of maximum production while MP has been selected purposively for the study.

- For tomato- MP, Karnataka and AP
- For onion – MP, MH and Karnataka
- For potato – MP, UP and WB

Comment [L3]: The methodology describes the stages of the research, from problems, solutions and methods of improvement.

Study period: The study period was taken from 2010-11 to 2019 20. (Ten years) The data with respect to area, production and productivity for selected commodities was taken from Directorate of Economics and statistics, Ministry of Agriculture, Govt. of India and Horticulture Statistics Division, Department of Agriculture, Cooperation and Farmers Welfare.

Objective: The objective of the study is to estimate the growth rate in area, production and productivity of Tomato, Onion and Potato (TOP) commodities. To attain the following objective, the linear equation was used-

$$Y = a + bx \quad \text{where, } a = \text{intercept, } b = \text{regression coefficient of } Y \text{ on } X$$

Compound annual growth rate (CAGR) was calculated using the following equation:
$$\text{CGR}(\%) = [\text{antilog } b - 1] * 100$$

3. Results and Discussion

Trend and growth rate in area, production and productivity of TOP crops in selected states of India

Indian farmers grow an amazing no. of 175 different vegetables but potato, tomato, onion contribute 53% of the total vegetable production. Table 1 inferred that the production of TOP crops in Madhya Pradesh has seen a lot of variations during the recent past due to improved seeds, irrigation and good storage facilities. Although the area under cultivation has also increased, it has not been as substantial as the increase in total production, indicating productivity gains during the period.

Tomato

During the study it was observed that, although AP is the largest producer and having largest area under cultivation of tomato but the area and production has been decreased over the decade. The value of regression coefficient of area and production for AP was found negative and significant at 1 per cent and 5 percent level respectively (Table 2). While in case of MP and Karnataka, there was a positive trend in both area and production.

The overall annual growth rate of production was negative in AP which was analysed as -9.22 percent while the growth rate of production in MP was 12.73 percent. The regression coefficient of production of MP was found positive and significant at 1 percent level. In case of Karnataka, the production showed a positive trend with positive value of regression coefficient significant at 5 percent level. The productivity in MP was 4.51 percent, while that of AP and Karnataka was 12.40 percent and -0.32 respectively. The value of regression coefficient of productivity was positive and non-significant in case of Madhya Pradesh, Karnataka and Andhra Pradesh.

Table:1 State wise Trend, Simple growth rate and Compound growth rate of area, production and productivity of tomato crop-

Particulars	MP			Karnataka			AP		
	Area	Production	Productivity	Area	Production	Productivity	Area	Production	Productivity
Regression coefficient	5.124 (0.70)	192.35** (33.82)	0.964 (0.45)	0.961* (0.30)	26.323* (9.38)	-0.1075 (0.14)	-30.79** (6.36)	-400.73* (143.8)	3.960 (2.04)

SGR	7.051	9.368	3.498	1.6023	1.316	-0.322	-22.3	-10.709	10.93
CGR	7.85%	12.72%	4.51%	101.68%	1.35%	-0.32%	-19.23%	-9.22%	12.40%

Fig in bracket shows the SE of concern regression coefficient
 , *, * shows the 1,5,10 percent level of significance

Fig 1: CGR of tomato in major growing states of India

Onion

It revealed from the table2 that the value of regression coefficient of area of onion for MP was found positive and significant at 5 percent level which shows increase in area during the study. In case of Maharashtra and Karnataka, the trend value for area of onion was observed positive and significant at 5percent level for Maharashtra and non-significant for Karnataka.The trend value for production was positive and significant at 10 percent level for Maharashtra and non-significant for MP and Karnataka. While in productivity of onion, it was observed positive trend in all the selected states but was found significant at 1percent in MP, and non-significant in MH and Karnataka.

It was revealed during the study that the production of onion in MP has almost been quadrupled from 1021.5 thousand tons in 2010-11 to 4028.9 thousand tons in 2019 - 20, while the production in MH has been doubled from 4905 thousand tons to 11363 thousand tons in 10 years. In spite of the fluctuation in the area and production of onion, an increasing trend has been observed during the last decade in production of onion(Table 2).It was observed from the table 2 that,the growth rate of production in MP was 12.73 per cent while the growth rate in Maharashtra and Karnataka was 8.77 per cent and .01 percent which was very low as compared to MP. Although the area under cultivation has increased so far but the growth rate in area is not quite substantial as the production. It showed that, the rise in productivity is due to improved cultivation practices, irrigation methods like drip irrigation in onion crops in Maharashtra, Karnataka, MP (Khandwa, Nemuch, Ratlam, Indore). The growth rate

of productivity in MP, MH and Karnataka was 2.73 per cent, 3.42 per cent and 0.73 per cent respectively.

The area registered 9.74 percent growth rate in MP and 5.18 per cent, 0.74 per cent in MH and Karnataka respectively.

Table:2 State wise Trend, Simple growth rate and Compound growth rate of area, production and productivity of onion crop

Particulars	MP			MH			KARNATAKA		
	Area	Production	Productivity	Area	Production	Productivity	Area	Production	Productivity
Regression coefficient	10.22 [*] (1.23)	298.85 (38.15)	0.59 ^{**} (0.17)	22.19 [*] (7.71)	604.45 ^{***} (116.75)	0.50 (0.26)	19.80 (3.6)	0.64 (36.36)	0.188 (0.27)
SGR	8.33	10.10	2.5	4.88	8.89	3.38	0.75	0.36	1.24%
CGR	9.74 %	12.73 %	2.73%	5.18%	8.77%	3.42%	0.74%	0.01%	0.73%

Fig in bracket shows the SE of concern regression coefficient

^{**}, ^{*}, ^{***} shows the 1,5,10 percent level of significance

Fig 2: CGR of Onion in major growing states of India

POTATO

During the study it was revealed that there were major fluctuations in the production of potato crop in MP, UP and WB, while the area under cultivation showed a slow rise. MP is fourth largest potato producing state after UP it accounts for about 6 percent of total national potato production (Saxena and Gandhi, 2014). The value of regression coefficient of area, production and productivity for MP was found positive. For production it was significant at 1 per cent level and non significant for area and productivity showing an increasing trend (Table 3).

Table:3 State wise Trend, Simple growth rate and Compound growth rate of area, production and productivity of potato crop-

Particulars				UP			WB		
	Area	Production	Productivity	Area	Prod.	Productivity	Area	production	Productivity
Regression coefficient	5.5355 (3.72)	258.61** 46.90	2.09 (1.07)	4.841 (10.65)	78.815 (99.82)	-0.119 (0.90)	3.373 (5.00)	61.313 (192.2)	-0.056 (0.57)
SGR	4.7859	9.6614	8.6644	0.866	0.547	-0.4438	0.8080	0.54961	-0.2071
CGR	4.82%	13.47%	8.24%	0.92%	0.51%	-0.41%	0.79%	0.64%	-0.01%

Fig in bracket shows the SE of concern regression coefficient

** , * , *** shows the 1,5,10 percent level of significance

Fig 3: CGR of Potato in major growing states of India

It was observed during the study that the overall annual growth rate of area for MP was positive with 4.82 percent which was highest among the three selected states i.e. UP and WB. While the annual growth rate in production was analysed as 13.47 percent, which was very high as compared to WB and UP. The hike in production was observed due to favourable climatic conditions of Madhya Pradesh with high dry matter yield.

UP has been the largest producer of potato in India. It was observed during the study that the potato production in UP was 13576.6 thousand tons which was very high as compared to MP in 2010-11. It revealed from the table3 that the value of regression coefficient of area and production was positive and non significant, while that of productivity was found negative showing a negative trend. Although the increment in area was observed, but not substantial as that of production. The annual growth rate of area was positive at 0.92 percent and productivity was negative at -0.41 percent.

WB is the second largest producer of potato in India It revealed from the table3 that the value of regression coefficient of area and production was positive and non significant, while that of productivity was found negative showing a negative trend The annual growth rate in production was positive and was analysed at 0.64 percent. While the annual growth rate in area was positive at 0.79 percent which was lower than MP and UP. The growth rate of productivity was negative at .01 per cent

The area under cultivation also showed negative annual growth rate of-19.23 percent, while the other selected states i.e. MP and Karnataka showed a positive growth of 7.85 percent and 101.68 percent respectively.

Conclusion

Overall it can be concluded from the study that, the area, production and productivity of onion in MP,MH and Karnataka show an increasing trend for all the three variables.The result of trend value of the productivity shows the positive trend but non-significant in MH and Karnataka. So efforts are needed to improve the productivity of onion all the selected states as onion is very important crop and occupy the good position in vegetable and also the demand of onion in all over India is increasing. It was also observed that, the annual growth rate of area, production and productivity of onion crop was positive for all the three states with highest growth rate in Madhya Pradesh.

The study also revealed that the trend and annual growth rate of area,production and productivity of tomato, potato and onion (TOP) commodities for Madhya Pradesh was increasing and positive. The comparison of all the three variablesrevealed that (tomato,potato and onion)TOP crops show better performance in Madhya Pradesh than Maharashtra, UP, WB,Karnataka,AP. For potato crop the annual growth rate of area, production and productivity is more in MP. The comparison between the states for tomato crop revealed that the annual growth rate of area, production and productivity is quite higher in Madhya Pradesh than Karnataka and AP. Though AP is leading producer inspite of that negative trend and growth rate in area and production both has been observed. Thus, MP has become an emerging and leading producer of the three staple horticultural crops over the years. Due to favourable climatic conditions, irrigation, good storage facilities, processing industries, has motivated the farmers of MP to look towards the horticultural crops which help them to generate year round additional income.

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Comment [L4]: suggestions for the future for researchers and partners

Comment [L5]: for reference it is better to use a reference program such as mendeley or endnote

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