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Growth Rate and Trend of Area, Production and Productivity of Tomato, Potato and Onion (TOP) Commodities for Madhya Pradesh in comparison to other major states of India: An Economic Analysis

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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Original Research Article

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ABSTRACT

Aim: To estimate the trend and growth rate of area, production and productivity of tomato, potato and onion (TOP) commodities for MP in comparison to other major states of India.
Study and Design: Retrospective observational study to estimate the trend and compound growth rate for the period of 10 years (2010-11 to 2019-20).
Methodology: Place of study- Out of 29 states of India 3 states were selected for the study under TOP commodities which cover around 70% of total production. For tomato - KR , AP & MP, For onion -MH ,KR & MP For Potato – UP, WB , & MP.
Method of analysis- The exponential trend equation was used to estimate the compound growth rate (CGR in %).
Results: CGR of area, production & productivity for Tomato in MP are 7.85%, 12.72%, 4.51% respectively, in Karnataka are 1.68%,1.35%,-0.32%,& in AP are -19.23%, -9.22%,12.4%. CGR of area, production & productivity for Onion in MP are 9.74%, 12.73%, 2.73%, in MH are 5.18%, 8.77%,3.42%, in KR are 0.01%, 2.04%,2.03%. CGR of area, production & productivity for Potato in MP are 4.82%, 13.47%, 8.24%, in UP are 0.92%, 0.51%,-0.41%.

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Conclusion: On the basis of study it can be concluded that the trend and annual growth rate of area, production and productivity for TOP commodities in Madhya Pradesh was increasing and positive in comparison to other major states.

Keywords: TOP-tomato onion & potato; CGR-compound growth rate; MP-Madhya Pradesh; KR-Karnataka; AP-Andhra Pradesh; UP-Uttar Pradesh; WB-West Bengal; regression coefficient.

1. 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. Acc 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 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 [1,2]. Hence, the present study was under taken 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 [3,4].

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.

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

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-

$$Y = a+bx$$

where,

a = intercept,
b = regression coefficient of Y on X

Compound annual growth rate (CAGR) was calculated using the following equation:

$$CGR\ (\%) = [\text{antilog } b - 1] * 100$$

3. RESULTS AND DISCUSSION

3.1 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.

3.2 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 per cent 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 1per cent level. In case of Karnataka, the production showed a positive trend with positive value of regression coefficient significant at 5 per cent level. The productivity in MP was 4.51 per cent, 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.

3.3 Onion

It revealed from the table 2 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, Neemuch, 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 per cent growth rate in MP and 5.18 per cent, 0.74 per cent in MH and Karnataka respectively.

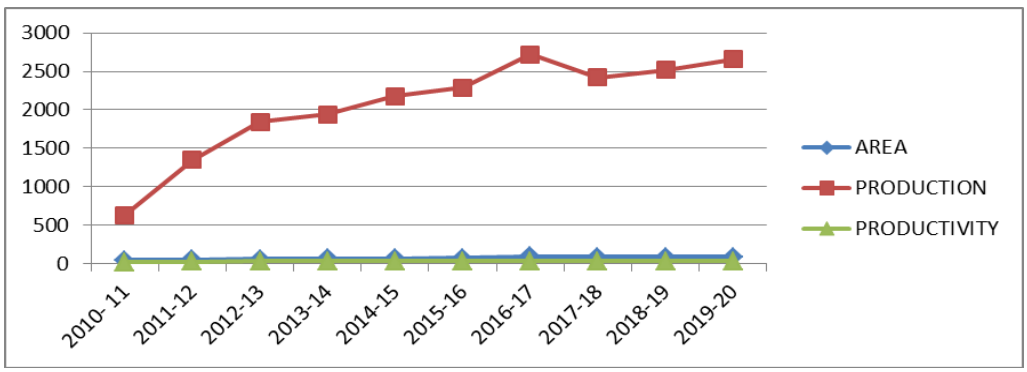

Fig. 1. Trend in area and production of tomato in MP (2010-2011 to 2019-20)

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*

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*

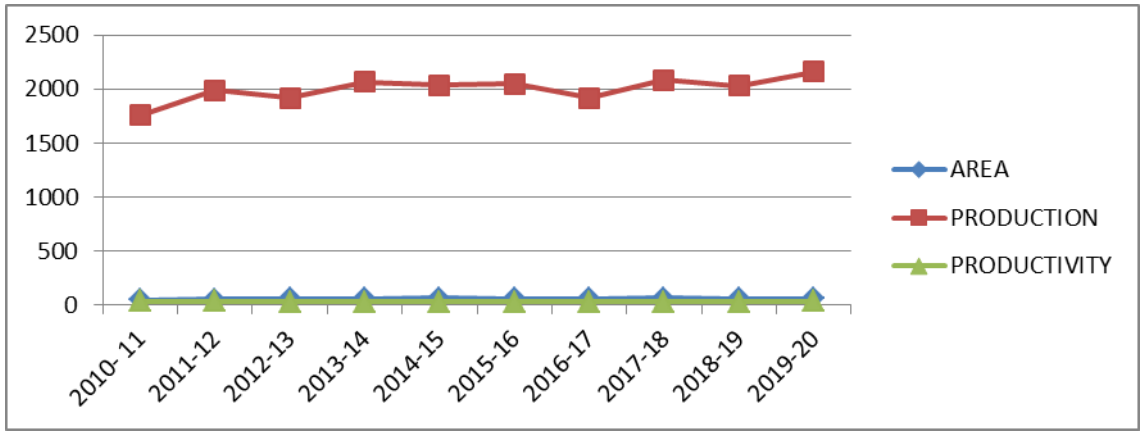

Fig. 2. Trend in area and production of tomato in Karnataka (2010-2011 to 2019-20)

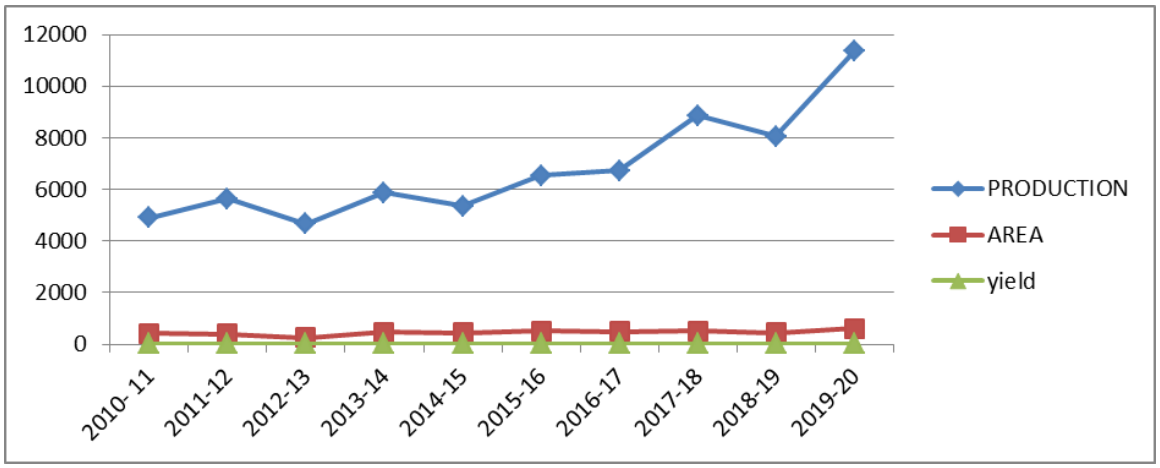

Fig. 3. Trend in area and production of onion in Maharashtra (2010-2011 to 2019-20)

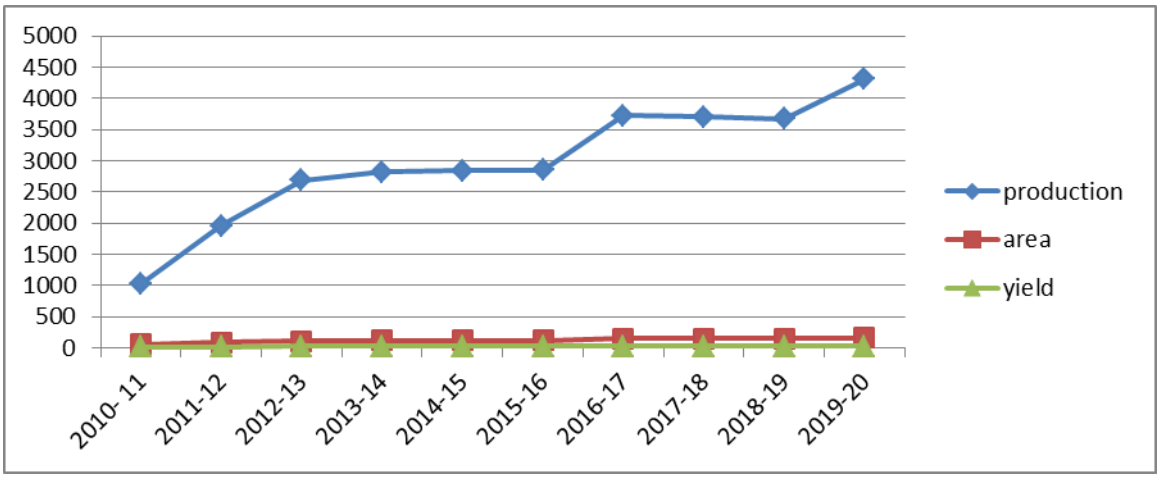

Fig. 4. Trend in area and production of onion in MP (2010-2011 to 2019-20)

3.4 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 per cent 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).

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 Table 3 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.

Table 3. State wise trend, simple growth rate and compound growth rate of area, production and productivity of potato crop

Particulars	MP			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*

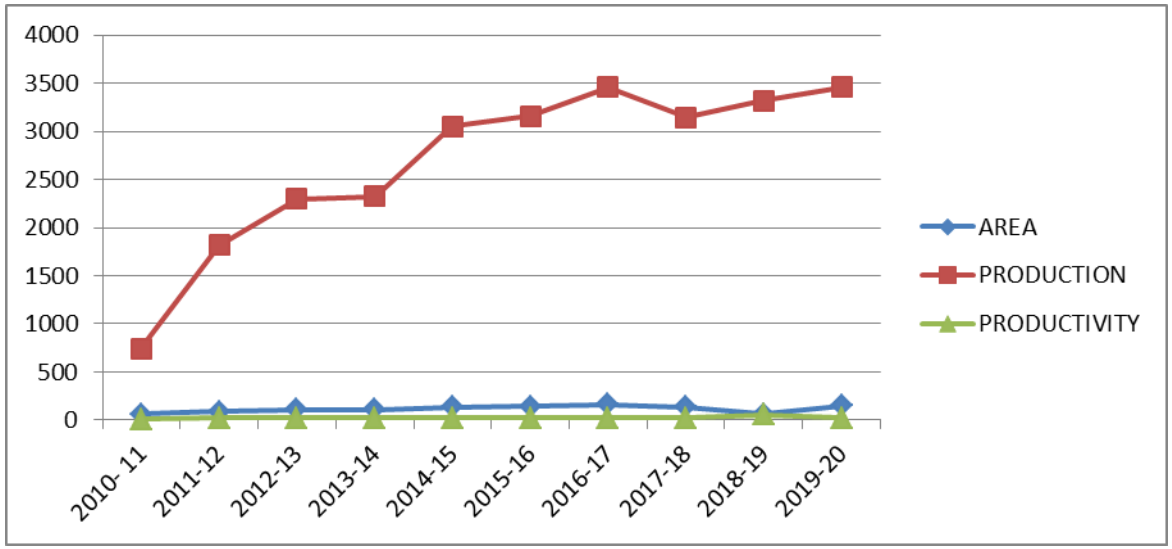

Fig. 5. Trend in area and production of Potato in MP (2010-2011 to 2019-20)

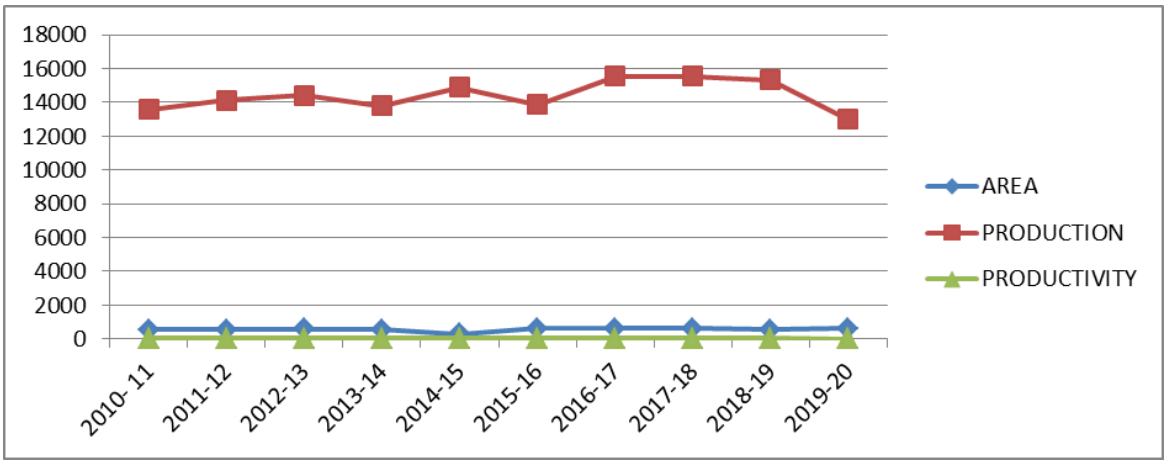

Fig. 6. Trend in area and production of Potato in UP (2010-2011 to 2019-20)

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.

4. 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 variables revealed 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 [5,6]. 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.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. DES. Directorate of Economics and Statistics, Department of Agriculture, Cooperation and Farmers Welfare, Ministry of Agriculture and Farmers Welfare, Government of India. Data retrieved from Monthly Report on Onion; 2020.
Available: https://eands.dacnet.nic.in/

2. Parimalarangan R. Trends in Area, Production and Productivity in Onion in Tamil Nadu, Parimalarangan: IJECC. 2020;10(11):95-99,2020;
Article no.IJECC.61788
3. Nalegaonkar AR, More SS. Growth and Instability in Area, Production and Yield of Onion in India, Research Article published in International Journal of Current Microbiology and Applied Sciences. 2020;9(11).
4. DES. Directorate of Economics and Statistics, Department of Agriculture, Cooperation and Farmers Welfare, Ministry of Agriculture and Farmers Welfare, Government of India; 2021.
Available: https://eands.dacnet.nic.in/
5. DES. Directorate of Economics and Statistics, Department of Agriculture, Cooperation and Farmers Welfare, Ministry of Agriculture and Farmers Welfare, Government of India. Data retrieved from Monthly Report on Potato; 2020.
Available: https://eands.dacnet.nic.in/
6. DES. Directorate of Economics and Statistics, Department of Agriculture, Cooperation and Farmers Welfare, Ministry of Agriculture and Farmers Welfare, Government of India. Data retrieved from Monthly Report on Tomato; 2020.
Available: https://eands.dacnet.nic.in/

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