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A study on trend analysis of area, production and productivity of brinjal in Uttar Pradesh

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Abstract

Uttar Pradesh became the largest share of horticultural crop cultivation. The analysis was conducted to estimate the trends of area, production and productivity under brinjal cultivation. This study was based on secondary data taken from the period 2001-2002 to 2021-2022. The study period was divided into three sub period i.e., period-I (2001-2010), period-II (2011-2022) overall period (2001-2022). The compound growth rate of area, production and productivity was calculated at the Indian level as well in Uttar Pradesh and found that In India the growth rate was 1.94 percent, 2.14 percent and 0.19 percent in area, production and productivity respectively. The compound annual growth rate in Uttar Pradesh was estimated under area, production and productivity are 8.53 percent, 9.62 percent and 1.00 percent respectively. This study showed that percentage share of Uttar Pradesh under brinjal cultivation was more than in the whole India.

Keywords: Compound annual growth rate, brinjal, area, production and productivity

Introduction

The diverse climate of India provides the availability of a wide range of fresh fruits and vegetables. For diversification of agriculture and increasing farm income, protected cultivation can be used (Vikash and Meena, 2022) [8]. The nature of vegetables being a higher productivity nature in a short duration with a valuable source of income generation for the upliftment of livelihood. (Vanitha *et al.*, 2021) [7]. According, to the National Horticulture Board's National Horticulture Database (Second Advance Estimates), India is the world's second-largest producer of fruits and vegetables after China. The area under cultivation of vegetables and fruits is estimated at 10.86 million hectares and 9.6 million hectares respectively (APEDA, 2023) [2]. Uttar Pradesh became the largest share of horticultural crop cultivation among all the states of India in the fiscal year 2021 accounting for 13 percent. 200 million metric tons of total vegetable production was estimated and included vegetables are tomato, potato, onion, brinjal and cabbage (Statista, 2023). The tremendous production base provides India with enormous export prospects. During 2021-22, India exported fresh fruits and vegetables worth Rs. 11,412.50 crores/ 1,527.60 USD Millions, of Rs. 5593 crores/ 750.7 USD Millions were fruits and Rs. 5745.54 crores/ 767.01 USD Millions were vegetables. In 2021-22, processed fruits and vegetables including pulses are expected to be worth Rs. 12,858.66 crores/ USD 1,724.88 million, with processed vegetables including pulses at Rs.8308.04 crores/ USD 1114.19 million and processed fruits and juices worth Rs.4550.62 crores/ USD 610.69 million (APEDA, 2023) [2]. Bangladesh, the UAE, Nepal, the Netherlands, Malaysia, Sri Lanka, the United Kingdom, Oman, and Qatar are importing countries for Indian fresh fruits and vegetables. Despite India's small part of the world market (almost 1%), the country's horticultural products are becoming more popular (APEDA, 2023) [2]. This is owing to concurrent advances in the fields, such as cutting-edge cold chain infrastructure and quality assurance measures. Aside from major private-sector investments, the government has also taken the lead alongside APEDA in establishing many Centers for Perishable Cargoes and integrated post-harvest processing facilities throughout the country. Capacity-building programs at the farmer, processor, and exporter levels have also helped this effort.

Method and Material

The basis of the present study was to calculate the compound annual growth rate of area, production and productivity under brinjal cultivation. India and Uttar Pradesh were selected purposively as Uttar Pradesh became the largest share of horticultural crops, earlier it was on second position after West Bengal.

The collected data was entirely based on secondary data collected from horticulture at Glance reports and the national horticulture Board. The study period was taken between 2001 and 2002 to 2021-2022. The period was further divided into period-I, period II and the overall period from 2001 to 2010, 2011-2022 and 2001 to 2022 respectively three sub-periods. The growth rates were estimated using exponential growth functional form as under:

The exponential form of the function is given below:

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

and,

$$\text{Compound growth rate (percent)} = [(\text{Antilog "b"}) - 1] \times 100$$

(Dastagiri *et al.*, 2013) ^[3]

(Antilog of b-1) * 100 was used to calculate the growth rates in area, production and productivity for a period of 21 years.

Results and Discussion

The area under brinjal cultivation was recorded in 2001-02 was 502.4 thousand hectares with the increasing compound annual growth rate reached to 752.8 thousand hectares in 2021-22 in India. Uttar Pradesh shows the total area under brinjal cultivation during 2001-2002 was 1.58 thousand hectares showing a positive trend reached to 8.82 thousand Hectares (Table 1). In India, the growth trend of the area

under brinjal cultivation during period-I, period II and the overall period was 3.07, 0.78 and 1.94 percent respectively. During period-I, period II and the overall period in Uttar Pradesh compound annual growth of 8.76, 10.64 and 8.53 percent respectively were found which show a positively increasing trend (Table 2).

In India, the total production of brinjal during 2001-02 was 8347.7 thousand MT recorded and it was reached 13023.2 thousand MT in 2021-22 with positive growth trend and compound annual growth rate during this period was 2.14 percent record. Similarly in Uttar Pradesh, the growth rate was 9.62 percent showing an increase in production from 45.40 thousand MT in 2001-02 to 312.98 thousand MT in 2021-22. The highest growth trend was recorded during period-I was 3.60 percent and the lowest was 0.27 percent during Period II in India and in Uttar Pradesh, the highest and lowest growth trend was 11.90 and 7.50 percent shown in Period II and Period-I respectively which are just opposite to each other.

The compound annual growth rate of yield under brinjal cultivation was 0.19 percent and increased by 16.6 MT in 2001-02 to 17.3 MT in 2021-22 in India. Uttar Pradesh shows the total yield under brinjal cultivation during 2001-2002 was 28.73 MT showing a positive trend reached to 35.47 MT (Table 1). In India only period II was recorded in declining trend i.e., -0.51 percent, another sub-period was showed an increasing trend whereas in Uttar Pradesh period-I showed in negative trend, and during period II and overall period was in positive trend (Table 2).

Table 1: Trends in area, production and productivity of vegetables in India and Uttar Pradesh

Year	India			Uttar Pradesh		
	Area (000' Ha)	Production (000'MT)	Productivity (MT/ Ha)	Area (000' Ha)	Production (000'MT)	Productivity (MT/ Ha)
2001-02	502.4	8347.7	16.6	1.58	45.40	28.73
2002-03	507.3	8001.2	15.8	1.69	53.20	31.48
2003-04	516.4	8477.3	16.4	1.85	55.85	30.19
2004-05	526.5	8600.8	16.3	2.23	55.85	34.69
2005-06	559.7	9136.4	16.3	2.33	78.32	33.61
2006-07	568	9300.8	16.4	2.56	79.03	30.87
2007-08	561	9678	17.3	2.81	88.30	31.42
2008-09	600	10378	17.3	3.09	91.20	29.51
2009-10	612	10563	17.3	3.41	92.10	27.01
2010-11	680	11896	17.5	3.66	93.60	25.57
2011-12	691.5	12634.1	18.3	2.90	90.80	31.30
2012-13	722.1	13443.6	18.6	3.10	106.40	34.00
2013-14	711.3	13557.8	19.1	3.40	111.70	32.60
2014-15	673	12589	18.7	4.50	154.70	34.30
2015-16	663	12515	18.9	7.78	267.19	34.34
2016-17	733	12510	17.1	7.91	272.01	34.38
2017-18	730	12801	17.5	8.01	275.40	34.40
2018-19	727	12680	17.4	8.24	289.30	35.11
2019-20	744	12682	17	8.49	299.13	35.25
2020-21	749	12874	17.2	8.61	303.41	35.25
2021-22	752.8	13023.2	17.3	8.82	312.98	35.47

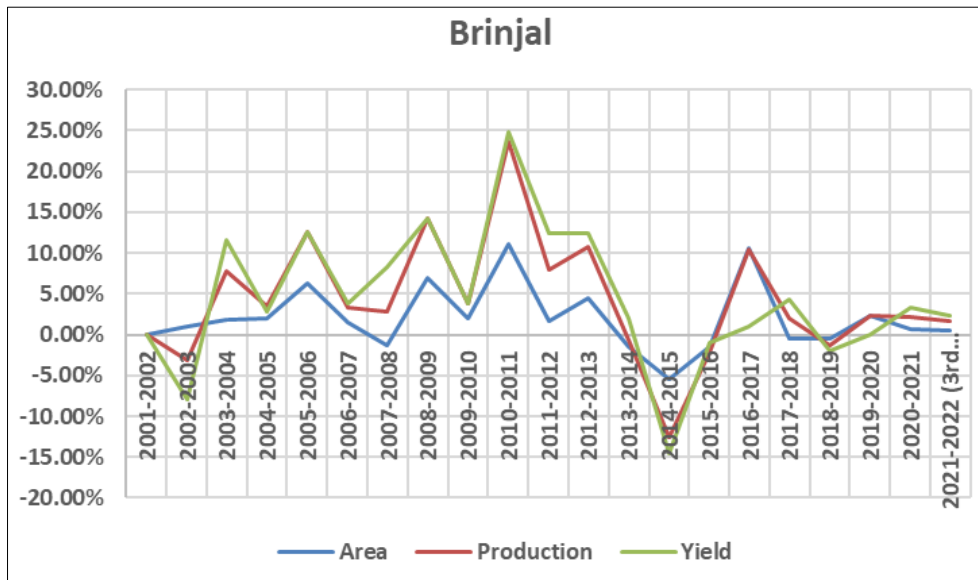
Source: Indiatat, 2022 ^[1]

Table 2: Overall CAGR of Area, Production and Productivity of Brinjal in India

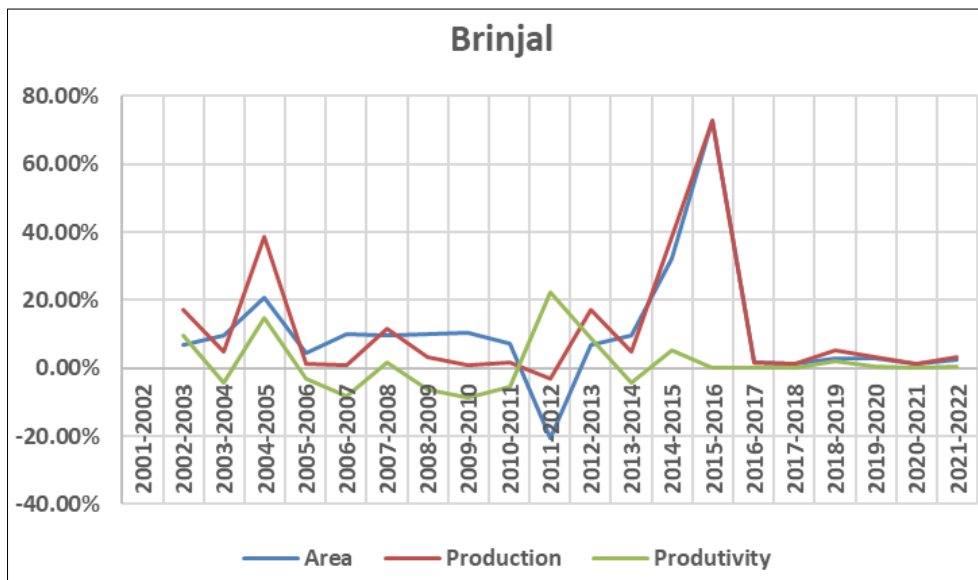
		Period-I (2001-2010)		Period II (2011-2022)		Overall Period (2001-2022)	
		All India	Uttar Pradesh	All India	Uttar Pradesh	All India	Uttar Pradesh
Area	CAGR (%)	3.07*	8.76	0.78**	10.64*	1.94	8.53
	R ² (%)	89.30	98.89	47.11	83.18	90.37	85.82
Production	CAGR (%)	3.60*	7.50*	0.27	11.90*	2.14	9.62
	R ² (%)	90.20	90.02	4.39	85.33	80.65	84.88
Yield	CAGR (%)	0.52**	-1.15	-0.51*	1.14*	0.19**	1.00*
	R ² (%)	68.51	24.96	61.69	72.63	25.79	35.53

* Significant at percent 1

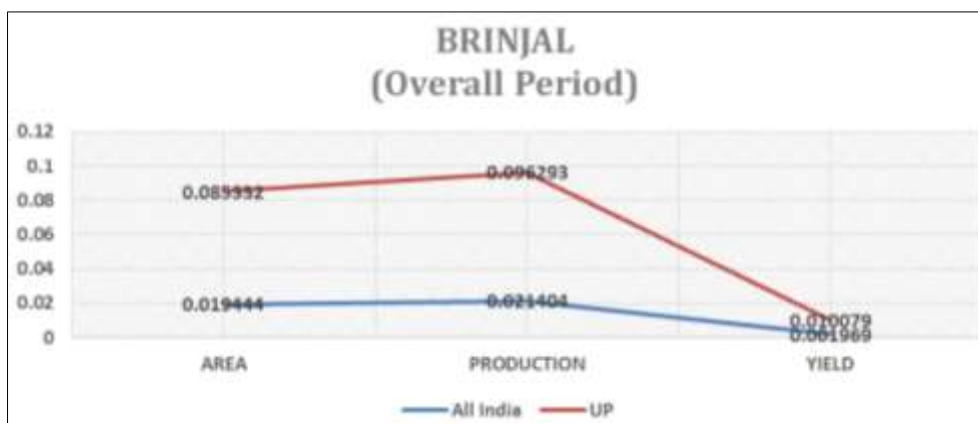
** Significant at percent 5



Graph 1: All India Compound Annual Growth Rate of Area, production and Productivity



Graph 2: Uttar Pradesh Compound Annual Growth Rate of Area, production and Productivity



Graph 3: Overall CAGR of area, production and yield of brinjal

Conclusion

The outlook for horticulture crops in India has improved significantly as India is the world's second-largest producer of fruits and vegetables after China (Negi and Anand, 2014) [5]. The area under cultivation of vegetables and fruits is

estimated at 10.86 million hectares and 9.6 million hectares respectively (APEDA, 2023) [2]. The agricultural sector's gross domestic product in the northern Indian state of Uttar Pradesh reached approximately three trillion Indian rupees. Although there is much variation in area, Production and productivity

found under brinjal cultivation in Uttar Pradesh (Graphs 2&3) but area, production and yield under brinjal cultivation in the whole of India during the overall period was showing less percent share as compared to Uttar Pradesh (Graph 3). The agriculture sector in India is predicted to gain speed in the next years due to increased investment in agricultural infrastructure such as irrigation, warehousing, and cold storage. The cost of production for one quintal was estimated by Sharma and Singh 2020^[6]; and stated that the holding capacity of land reducing the cost; it was Rs. 551.35, Rs.478.33 and Rs.440.71 per quintal for marginal, small and medium farmers, respectively. Therefore, there are chances to increase the productivity of brinjal by technology and innovation. Indian vegetable cultivation reflected a glorious past and a bright future (Dastagiri *et al.* 2013)^[3]. Government should focus on the Agriculture sector as Agriculture and allied activities recorded a growth rate of 3.9% in 2021-22 (until 31 January, 2022) (IBEF, 2023)^[4] and expected to increase to US\$ 24 billion by 2025.

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