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The Trends and Growth Analysis in the Area, Production and Productivity of Turmeric in Surguja District of Chhattisgarh, India

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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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ABSTRACT

Turmeric is an important spice crop grown in Chhattisgarh. The present study is mainly based on time series data. The secondary data on area, production and productivity of Turmeric in Chhattisgarh, were collected for the period 2001-02 to 2020-21from various publications. To analyze the trends and growth rate in the area, production and productivity of turmeric in Surguja district of Chhattisgarh state. The performance of turmeric was examined by estimating the growth

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rates and instability index of area, production and productivity of turmeric. Growth analysis for area, production and productivity. Focus on the Surguja district. It was positive and non-significant in the area of compound and linear growth rate, but it was positive and significant in the case of production. In terms of productivity, both compound and linear growth rate showed negatively significance. In the case of Chhattisgarh, the linear and compound growth rates in the area and production of turmeric were observed as positive and non-significant. While the growth rate in productivity in Chhattisgarh was found negatively and significant over the period. The major of constraints faced by the selected area, unavailability of improved and high yielding varieties, package and practices and Weather fluctuation. Ensure to availability of Improved and high yielding varieties for good production, productivity and good quality and Weather based information should provide for turmeric grower region.

Keywords: CGR (compound growth rates); LGR (linear growth rate); area; production; productivity.

1. INTRODUCTION

One of the first crops to be domesticated, turmeric (*Curcuma longa* L.), has been farmed in India and China for thousands of years. Many claim that turmeric, the primary spice in the Indian cuisine curry is the most potent herb on earth for preventing and maybe curing disease [1]. People all around India often and liberally utilize the spice turmeric. It is one among India's oldest and most enduring export products. It is referred regarded as the "King of Spices" and is also referred to as "Indian saffron" because it is an Indian spice. It is one of the most important components for cooking in the entire world [2]. It is a thick underground rhizome-based herbaceous perennial that produces primary and secondary rhizomes known as fingers. The dried rhizome of the herbaceous plant Curcuma longa is what makes up turmeric. Curcumin, a pigment, makes about 1.8 to 5.4 percent of the rhizome while essential oil makes up 2.5 to 7.2 percent. About 80% of the world's production of turmeric and 60% of its exports come from India [3-7]. India is the world's biggest producer, consumer, and exporter of turmeric. There are around 11 lakh tonnes of turmeric produced worldwide each year. China comes in second with 8% of the global production market, followed by India with 80%, Myanmar with 4%, Nigeria with 3%, and Bangladesh with 3%. Compared to the 1.37 lakh tonnes shipped the year before, India exported 1.71 lakh tonnes of turmeric in 2020–21. Bangladesh imports the most turmeric from India (49,522 tonnes), followed by the UAE (12,182 tonnes), Iran (10,964 tonnes), the USA (9,712 tonnes), and Morocco (8,522 tonnes). Turmeric export demand increased as a result of a surge in orders from the Middle East, the United States, Europe, and Southeast Asia. Bangladesh, from whence the turmeric was shipped by rail rakes, was the country with the highest demand for the stock. Turmeric sales have been steadily rising in 2020–21 after the Covid-19 epidemic (Outlook report of turmeric 2021). Telangana, Maharashtra, Karnataka, Tamil Nadu, Andhra Pradesh, Madhya Pradesh, West Bengal, and Chhattisgarh are the principal turmeric-producing states in India. Turmeric is grown on 12,072 thousand hectares in Chhattisgarh, with production expected to reach 106.403 metric tons in 2020–21. Balrampur is in the top spot for the region, followed by Surguja District, and Balrampur and Raigarh are at the top for production. In addition to Surguja, where turmeric is grown, it is also extensively produced in places like Balrampur, Mahasamund, Bilaspur, Koriya, Raigarh, Korba, and Baster District, among others. (Directorate Horticulture and Farm Forestry, Chhattisgarh, Department of Agriculture, Government of Chhattisgarh). In the Surguja district, total spice production in 2020–21 will be 19.571 metric tons on an area of roughly 2.916 thousand hectares.In the 1.340 (thousand hectare) total area used for spices, only the turmeric crop contributed. 2020–2021: Area and 1.347 (metric tonne) productions in the Surguja district [8,9].

2. METHODOLOGY

2.1 Detail of Study Area

The present study conducted in surguja district of chhattisgarh based on secondary sources; the study's data was compiled. For the years 2001-02 to 2020-21, data on turmeric's production, area, and productivity were gathered from the *Directorate of Horticulture and Farm Forestry, Chhattisgarh, Department of Agriculture, Government of Chhattisgarh*. Due to its status as the second-largest turmeric-growing region in

Chhattisgarh, Surguja district will be purposefully chosen for the study [10-12].

2.2 Analytical Tools

Suitable statistical analysis will be used at the time of analysis looking to the availability of data.

2.3 Linear Growth Rate

To fulfill the objective 1- a simple linear growth rate will be computed the formula in the same as given as follows-

$$Y = a + b X$$

Where,

Y = Area, production, producer
X = year
a = intercept,
b = slope

2.4 Compound Growth Rate

The compound growth rates in area, production and productivity of crops are worked out by fitting an exponential function

$$Y = A B^{t}$$

Taking the log on both sides

$$\text{Log } Y = \log A + \text{to log } B$$

Assuming,

Log Y = y
Log A = a
Log B = b

We get

$$y = a + bt$$

Where,

t = 1, 2, 3…… n
y = Area/production/productivity of crops.

After regression between y and t

We have the value of a and b

Where,

a = Constant,
b = regression coefficient
As b = 1 + r

Hence,

$$r = b - 1$$

Therefore,

r = (Anti-log of b-1)*100

Where,

r = Compound growth rate

3. RESULTS AND DISCUSSION

3.1 Growth Rates in Area, Production and Productivity of Turmeric Crop in Surguja District Covering Time Period 2001-02 to 2020-21

Growth analysis for area, production and productivity shown in Table 1, and Fig. 1, Fig. 2 and Fig 3, with a focus on the Surguja district. It was positive and non-significant in the area of compound and linear growth rate, but it was positive and significant in the case of production. In terms of productivity, both compound and linear growth rate showed negative significance [13].

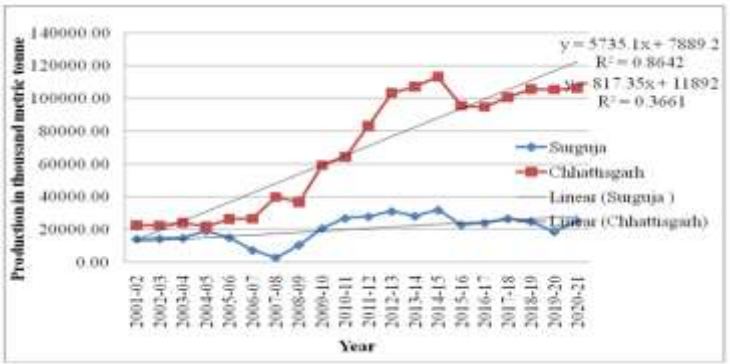

Fig. 1. Area of Surguja district and Chhattisgarh state

Table 1. Area production and productivity of turmeric in Surguja district

S. No.	Year	Area (In thousand hectare)	Production (in thousand MT)	Productivity (in MT/hectare)
1	2001-02	906.00	14317.00	15.80
2	2002-03	925.00	14610.00	15.79
3	2003-04	944.00	14908.00	15.79
4	2004-05	963.00	19212.00	19.95
5	2005-06	757.00	15212.00	20.10
6	2006-07	797.00	7571.00	9.50
7	2007-08	1497.00	3008.00	2.01
8	2008-09	1497.00	10629.00	7.10
9	2009-10	1902.00	20775.00	10.92
10	2010-11	2474.00	27027.00	10.92
11	2011-12	2569.00	27990.00	10.90
12	2012-13	2824.00	31208.00	11.05
13	2013-14	2566.00	28212.00	10.99
14	2014-15	2905.00	32004.00	11.02
15	2015-16	2956.00	22967.00	7.77
16	2016-17	3140.00	24045.00	7.66
17	2017-18	3433.00	26779.00	7.80
18	2018-19	3467.00	24991.00	7.21
19	2019-20	3478.00	18776.00	5.40
20	2020-21	3508.00	25252.00	7.20
CGR		9.47	4.99**	-4.87**
LGR		7.83	3.99*	-4.08*

Note: Figures in parenthesis indicates standard error of area, production and productivity of turmeric in Surguja district.

1. **** are denoted for the 1% level of significance*
2. *** are denoted for the 5% level of significance and*
3. **are denoted for the 10% level of significance*

Table 2. Area production and productivity of turmeric in Chhattisgarh

S. No.	Year (In hectare)	Area (In Thousand hectare)	Production (In Thousand MT)	Productivity (In MT
1	2001-02	1985.00	22834.00	11.50
2	2002-03	1838.61	22612.64	12.30
3	2003-04	2104.48	24308.61	11.55
4	2004-05	2210.20	21998.25	9.95
5	2005-06	2312.30	26680.12	11.54
6	2006-07	2534.15	26785.95	10.57
7	2007-08	4420.00	40017.90	9.05
8	2008-09	4420.00	36928.70	8.35
9	2009-10	5373.08	59294.68	11.04
10	2010-11	7425.33	64444.92	8.68
11	2011-12	9747.25	83470.26	8.56
12	2012-13	10791.00	103402.00	9.58
13	2013-14	10938.00	107106.00	9.79
14	2014-15	11021.00	113347.00	10.28
15	2015-16	10575.00	95653.00	9.05
16	2016-17	10542.00	94935.00	9.01
17	2017-18	11356.00	100696.00	8.87
18	2018-19	11849.00	105703.00	8.92
19	2019-20	11925.00	105509.00	8.85
20	2020-21	12072.00	106430.00	8.82
CGR		12.46	10.87	-1.41*
LGR		9.19	8.42	-1.48*

Note: Figures in parenthesis indicates standard error of area, production and productivity turmeric in Chhattisgarh state

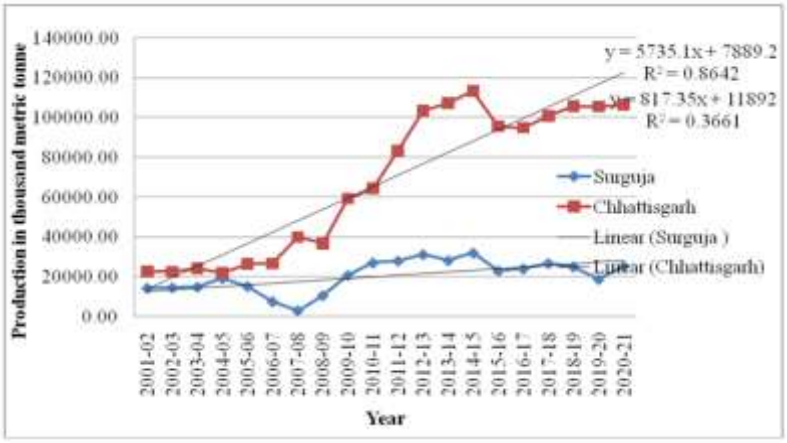

Fig. 2. Production of Surguja district and Chhattisgarh state

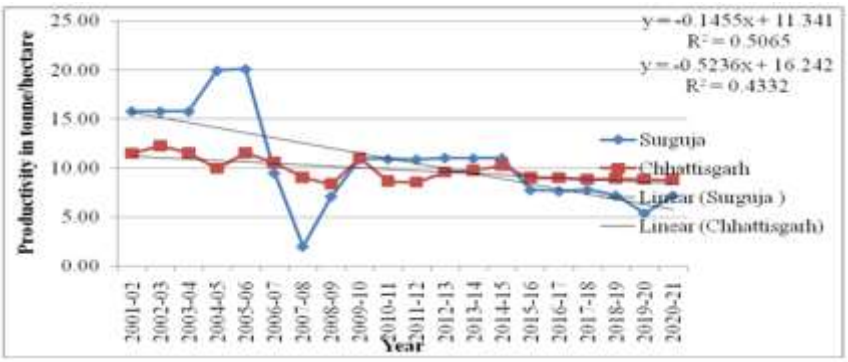

Fig. 3. Productivity of Surguja district and Chhattisgarh state

3.2 Growth Rates in Area, Production and Productivity of Turmeric Crop in Chhattisgarh State Covering Time Period 2001-02 to 2020-21

In the case of Chhattisgarh, the linear and compound growth rates present in Table 1 and Fig. 1, Fig. 2 and Fig. 3. In area and production of turmeric were observed as positive and non-significant. While the growth rate in productivity in Chhattisgarh was found negatively and significant over the period.

4. CONCLUSION

Turmeric is one of the most important spices crop in India. India is the world's biggest producer, consumer, and exporter of turmeric. About 80% of the world's production of turmeric and 60% of its exports come from India. Mainly in Chhattisgarh, the maximum area and production of turmeric is in Surguja district, hence this district was deliberately chosen. In turmeric cultivation from Surguja district, area was positive in increasing order, production was normal and productivity was in decreasing order, whereas in Chhattisgarh, area and production were positive but productivity was decreasing and negatively significant. The major of constraints faced by the selected area, lack of improved and high yielding varieties, lack of recommended package and practices for the crop. Weather fluctuation most common thing in the study area so Weather based information should provide for turmeric grower. Ensure to availability of Improved and high yielding varieties for good production, productivity and good quality of output make possible for turmeric grower.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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