

## **Analysing the Growth in Area, Production and Productivity of Cotton Crop in Haryana and India**

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### **Abstract**

*The present study was conducted on cotton cultivation on the data area, production and productivity trend analysis in Haryana and India. The study was based on secondary data were collected from 2002-03 to 2021-22 various published and unpublished source Haryana and India. The present study was undertaken to know the growth rate in area, production and productivity of cotton in Haryana and India which were found positive during 2002-03 to 2021-22. The area, production and productivity was increase due to use of high yielding varieties, balanced use of fertilizers and adoption of modern cultivation techniques. There is need to promote resource conservation technologies, awareness campaign among the farmers related to scientific package of practices, modern technologies, improved seed, integrated nutrients management etc to reduce the yield gap between actual yield and potential yield of cotton in the country.*

**Keywords:** Cotton, Production, Productivity, Compound Annual Growth Rate, Linear Growth Rate

### **Introduction**

Cotton is a soft, fluffy staple fibre that develops around the seeds of cotton plants of the genus *Gossypium* in the mallow family Malvaceae in a boll, or protective casing. The fibre is almost entirely made of cellulose, with traces of wax, fat, pectin, and water. In India, area under cotton was 120.67 lakh hectares giving out a production of 362 lakh bales with a yield of 510 kgs/ha in 2021-22 (Indiastat.com). So Since the launch of “Technology Mission on Cotton” by Government of India in February 2000 significant achievements have been made in increasing yield and production through development of high yielding varieties, appropriate transfer of technology, better farm management practices, increased area under cultivation of Bt cotton hybrids, etc. All these developments have resulted into a turnaround in cotton production in the country since the last decade. India has the distinction of having the largest area under

cotton cultivation which is about 37% of the world area. Also, India is the largest producer of cotton in the world accounting for about 22% of the world cotton production. The yield per hectare which is 510 kgs/ha but is still lower against the world average yield of about 789 kgs/ha. In Haryana total area under cotton was 6.95 lakh hectares in 2021-22 leading to the production of 20.5 lakh bales with the yield of 500 kgs/ha. In 2020-21 area under cotton in Haryana was 7.40 lakh hectares and on other hand production was 18.23 lakh bales resulting in yield per ha to 418.8 kgs/ha (Indiastat.com). So as we can see that area under cotton has decreased from previous year, but production and yield per ha has gone up indicating towards better farm practices been undertaken by the farmers. Agricultural activities in Haryana contribute around 18 percent of GDP of the state. Cotton industry in Haryana has become an integral part of socio-economic development of rural masses in some districts. Haryana is one of the major producers of the fibre in north India.

### **Materials and Methods**

For the present study secondary data of cotton for India and Haryana was taken. The study aims to

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calculate the growth of cotton, and hence secondary data pertaining to area, production and productivity of cotton for the time period of 20 years (2002-2022) was taken from the Cotton Corporation of India.

*Statistics tools and models employed*

The linear and compound growth rates for area, production and productivity were calculated from the time series data for the period 2002-03 to 2021-22 collected from the cotton corporation of India. The following analytical tools were used to estimate the growth rates by using method of ordinary least squares. The obtained data was compiled and analysed for area, production and productivity of cotton in India and Haryana.

*Linear Growth function*

The Linear growth function is specified in the following form.

$$Y_t = a + b_t + e_t$$

Where, t is the time in years, Y<sub>t</sub> is the trend value, a and b are constants and e<sub>t</sub> is error term.

The linear growth rate is estimated by the formula,

$$\text{Linear Growth Rate (LGR \%)} = b/y \times 100$$

*Compound Growth Function*

The compound growth function is specified in the following form.

$$Y = ab^t$$

Taking log on both sides, we have,

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

Where, t is the time in years, Y<sub>t</sub> is the characteristic and a and b are parameters.

The compound growth rate (CGR%) is calculated by using the formula.

$$\text{CGR (\%)} = (\text{antilog } b - 1) \times 100$$

The significance of the growth rates can be tested by applying student's t-test as

$$t = r / \text{SE (r)} \sim t_{(n-2)} \text{ df}$$

Where, r is the growth rate, n is the total number of years under study and SE (r) is the standard error of growth rate.

**Results and Discussion**

*Area, production and productivity of cotton in India and Haryana*

Table 1: Compound Growth Rate in Area, Production and Productivity of Cotton in Haryana and India

Period	Haryana			India		
	Area	Production	Productivity	Area	Production	Productivity
2002-03 to 2011-12	-0.24	6.43	6.69	4.89	14.20	10.70
2012-13 to 2021-22	2.76	-0.71	-3.37	0.68	12.75	-0.92
2002-03 to 2021-22	1.80	1.56	-0.24	2.82	9.95	3.57

The compound annual growth rate trends in area, production and productivity of cotton in India and Haryana from 2002-03 to 2011-12 and 2012-13 to 2021-22 are shown in Table 1. The data concluded that annual compound growth rate for cotton area, production and productivity in India were found positive growth rate 4.89 percent, 14.20 percent, and 10.70 in India whereas Haryana growth rates for cotton area, production and productivity were -0.24 percent, 6.43 percent and 6.69 percent respectively for the time period 2002-03 to 2011-12. For the time period 2012-13 to 2021-22 growth rates for cotton area, production and productivity in India were found 0.68 percent, 12.75 percent, -0.92 percent respectively. In case of Haryana annual growth rates for cotton area, production and productivity for the time period 2012-13 to 2021-22 were found 2.76 percent, -0.71 percent and -3.37 percent respectively. In India area, production and productivity were found positive 2.82, 9.95 and 3.57 per cent, respectively whereas in case of Haryana were area and production found positive 1.80 and 1.56 percent and productivity was negative -0.24 during the period 2002-03 to 2021-22 and the graphically presented in Fig. 1. The productivity was negative due to infestation of sucking pest and pink bollworm and other some environment issues. The results obtained are in conformity with the earlier study conducted by Sanjay and Kundu(2018).

The data presented that in table 2 linear growth rate for cotton area, production and productivity in India were found positive 4.84, 2.12 and 9.01 per cent in India whereas in Haryana linear growth rate for cotton were -0.15, 5.87 and 5.92%, respectively during the period 2002-03 to 2011-12. In case of area, production and productivity in India were found 0.69, 26.32 and -0.86% respectively whereas Haryana growth rate were found 2.70, -1.17 and -4.07 percent, respectively during the period 2012-13 to 2021-22. In case of area, production and productivity were found positive 2.65, 13.84 and 2.87%, respectively whereas in Haryana were also found 1.82, 1.41 and 2.65 per cent,

Table 2: Linear Growth Rate in Area, Production and Productivity of cotton in Haryana and India

Period	Haryana			India		
	Area	Production	Productivity	Area	Production	Productivity
2002-03 to 2011-12	-0.15	5.87	5.92	4.84	12.12	9.01
2012-13 to 2021-22	2.70	-1.17	-4.07	0.69	26.32	-0.86
2002-03 to 2021-22	1.82	1.41	2.65	2.65	13.84	2.87

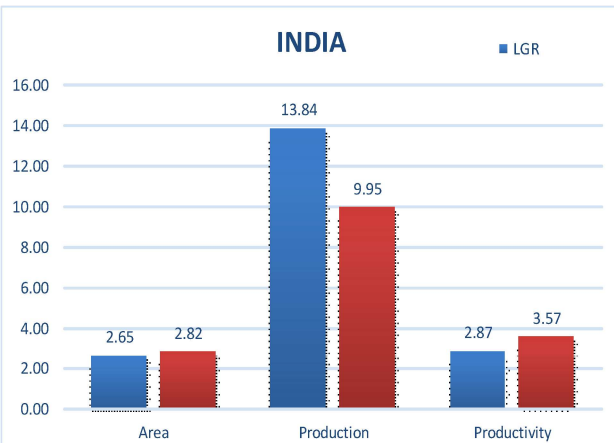


Fig. 1: Growth rate showing LGR and CAGR for INDIA from 2002-03 to 2021-22

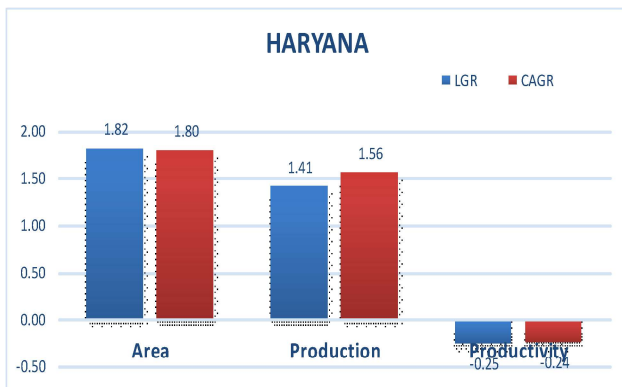


Fig. 2: Growth rate showing LGR and CAGR for HARYANA from 2002-03 to 2021-22

respectively during the period 2002-03 to 2021-22 and the graphically showed in Fig. 2. Similar results were obtained by Ardesna *et al.* (2017) in their study.

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