

An Analysis of Growth Behaviour of the Production of Major Crops of Rajasthan

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ABSTRACT

The present study seeks to find out the growth behaviour of the production of major crops in Rajasthan. The study is pertained to the whole of the Rajasthan state and covers the period ranging from 2003-04 to 2022-23. The data have been collected from Handbook of Statistics on Indian Economy published by RBI. The data have been compiled and analysed for the study period from 2003-04 to 2022-23 and also, the entire study period has been divided into two decades to extract the results. Compound growth rates have been calculated to achieve the objectives.

Keywords: Agriculture, Growth Behaviour, Trends, Compound Growth Rates.

Introduction

The agriculture sector is a major driver of economic growth in India and supported a large portion of the nation's population. As such, it is crucial to recognise the sector's importance and that, in order to ensure the country's overall development, its growth and development are necessary conditions. The advanced agriculture sector is thought to be an engine of economic growth; but, during the post-independence era, numerous strategies and efforts were implemented in order to achieve the desired goals, including the use of modern inputs and technology to increase productivity and output in this sector of our nation.

The goal of achieving self-sufficiency in grain production was prioritized throughout the early stages of growth, and the green revolution in India was crucial in ensuring food security for the country's population. Given the significance of these crops to the Indian economy, additional inputs were used to boost the production of non-foodgrain crops in India when targets for the production of foodgrain crops were met. A significant portion of the economy of Rajasthan is agrarian. The state's arid state, thrives on agriculture carried out with irrigation systems and the laborious efforts of the state's impoverished farmers. The state has two main crop seasons, Rabi and Kharif. Estimating the production growth trends and behaviour of major crops in Rajasthan over the chosen research period is the goal of this study.

Methodology

This study pertains to the whole of the Rajasthan state and covers the period ranging from 2003-04 to 2022-23. The data have been collected from Handbook of Statistics on Indian Economy published by RBI. The data have been compiled and analysed for the study period from 2003-04 to 2022-23 and also, the entire study period has been divided into two decades to extract the results. Compound growth rates have been calculated to achieve the objectives. Major crops like Rice, Wheat, Coarse Cereals, Pulses, Total foodgrain, oilseeds, cotton, sugarcane crops have been selected for the present study. The data have been

compiled and analysed for the period from 2003-04 to 2022-23 and by dividing the entire study period into two periods with first period ranging from 2003-04 to 2012-13, second period ranging from 2013-14 to 2022-23. The related figures have also been computed for the entire study period.

Compound Growth rates (CGR) of the production of the selected crops have been worked out by fitting exponential function. Using the least square method, the following form of exponential function was used to calculate compound growth rates.

$$Y=AB^t$$

Where, Y= production of the crop

A= Constant

B= 1+r

r =Compound growth rate

t =time variable in years (1, 2 -----10/20)

The compound growth rate (r) is equal to (B-1) x 100. In log form B has been calculated by the following formula:

$$\text{Log B} = \frac{\sum T \log Y - \sum t \sum \log Y / N}{\sum t^2 - (\sum t)^2 / N}$$

The growth rates have been tested for significance by calculating ‘t’ value where t = r/s, ‘s’ is the standard error. The value of standard error has been calculated by following formula:

$$\text{S.E. (r)} = \frac{100B}{\text{Log}_{10}e} \sqrt{\frac{\sum (\log Y)^2 - (\sum \log Y)^2 / N - (\log 10^b)^2 \sum T^2}{(N-2) \sum T^2}}$$

Where; $T = t - \bar{t}$

Results and Discussion

The furnished results related to the growth behaviour of production of major crops in Rajasthan have been presented through the following heads:

Compound Growth Rates of Production of Rice in Rajasthan

Table 1 displays the results pertaining to the compound growth behaviour of Rajasthan's rice production. The final results demonstrate that rice production in Rajasthan had greatest growth during the entire study period, with a 7.6 per cent growth rate reported in this instance. This was followed by second period during which the rate of increase in rice production was 6.4 per cent. During first Period of the study, it was revealed that the output of rice was enhanced at the rate of 6.2 per cent when analyses was conducted in terms of C.A.G. R. All of the cases of compound growth rates continued to be very statistically significant.

Table1 Compound Growth Rates of Production of Rice in Rajasthan

Time-Period/Calculated Values	B-value	C.G. R	P-value
First Period (2003-04 to 2012-13)	1.062	6.2	0.00
Second Period (2013-14 to 2022-23)	1.064	6.4	0.00

Overall Study Period (2003-04 to 2022-23)	1.076	7.6	0.00
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Compound Growth Rates of Production of Wheat in Rajasthan

Table 2 presents information that illustrates the growth behaviour of wheat output in Rajasthan. It was discovered that the output of wheat in Rajasthan increased by 5.5 per cent during the study's first phase, but it only increased by 1.8 per cent during the study's second phase. With respect to the study's overall period, Rajasthan's wheat production showed a growth pattern of 3.4 per cent. At the one percent probability level, it was determined that the C.G.A.R. values for each of the periods under investigation were statistically significant.

Table 2 Compound Growth Rates of Production of Wheat in Rajasthan

Time-Period/Calculated Values	B-value	C.G. R	P-value
First Period (2003-04 to 2012-13)	1.055	5.5	0.00
Second Period (2013-14 to 2022-23)	1.018	1.8	0.00
Overall Study Period (2003-04 to 2022-23)	1.034	3.4	0.00

Compound Growth Rates of Production of Coarse Cereals in Rajasthan

The development patterns of Rajasthan's coarse cereal crops during the two sub-study periods and the entire research period are depicted through figures presented in Table 3. The analysis revealed that the second period was the most advantageous for the growth of coarse cereal crops in Rajasthan. During that era, the state's coarse cereal crop production increased at a rate of 2.7 per cent, resulting in the highest growth observed. Throughout the entire study period, a 1.4 per cent gain in cereal crop production was observed. It is also important to note that during the study's first period, the production of coarse cereals increased at a rate of 1.1 per cent. The values for C.G.A.R in cases of the all the periods under consideration were found to be statistically significant at 1 per cent level of probability.

Table 3 Compound Growth Rates of production of Coarse Cereals in Rajasthan

Time-Period/Calculated Values	B-value	C.G. R	P-value
First Period (2003-04 to 2012-13)	1.011	1.1	0.00
Second Period (2013-14 to 2022-23)	1.027	2.7	0.00
Overall Study Period (2003-04 to 2022-23)	1.014	1.4	0.00

Compound Growth Rates of Production of Pulses in Rajasthan

The furnished results presented in Table 4 reflect the compound growth rates in the case of the pulses. When it came to the output of pulses, the second phase of the study proved to be more advantageous than the previous periods because it saw the highest growth rate, which was 8.8 per cent during that time. In reference to the second place, the study's overall period was determined by observing a growth rate of 7.0 per cent. It was found to be 4.5 per cent during the study's initial phase. At the one percent probability level, it was determined that the C.G.A.R. values for each of the periods under investigation were statistically significant.

Table 4 Compound Growth Rates of Production of Pulses in Rajasthan

Time-Period/Calculated Values	B-value	C.G. R	P-value
First Period (2003-04 to 2012-13)	1.045	4.5	0.00
Second Period (2013-14 to 2022-23)	1.088	8.8	0.00
Overall Study Period (2003-04 to 2022-23)	1.070	7.0	0.00

Compound Growth Rates of Production of Total Foodgrain in Rajasthan

Table 5 provides the furnished information regarding compound growth rates of all food grains in Rajasthan. It has been determined that the production of all food grains in Rajasthan increased by 3.4 per cent during the first period of the study. This was followed by 3.2 per cent growth rate during the third period and the entire study period showed a growth rate of 3.1 per cent. At the one percent probability level, the C.G.A.R. values for each of the periods under investigation were shown to be statistically significant.

Table 5 Compound Growth Rates of Production of Total Foodgrain in Rajasthan

Time-Period/Calculated Values	B-value	C.G. R	P-value
First Period (2003-04 to 2012-13)	1.034	3.4	0.00
Second Period (2013-14 to 2022-23)	1.032	3.2	0.00
Overall Study Period (2003-04 to 2022-23)	1.031	3.1	0.00

Compound Growth Rates of Production of Oilseeds in Rajasthan

Table 6 presents final results regarding the oilseeds' compound growth rates in Rajasthan. From the table, it can be observed that the total oilseeds in Rajasthan experienced an increase of 5.9 per cent during the study's second period. This was followed by a 3.0 per cent growth for the entire study period. It is also important to highlight that, during the study's initial phase, oilseed production increased by 2.9 per cent, a figure that appeared encouraging at the time. At the one percent probability level, the C.G.A.R. for every period taken into consideration was determined to be statistically significant.

Table 6 Compound Growth Rates of Production of Oilseeds in Rajasthan

Time-Period/Calculated Values	B-value	C.G. R	P-value
First Period (2003-04 to 2012-13)	1.029	2.9	0.00
Second Period (2013-14 to 2022-23)	1.059	5.9	0.00
Overall Study Period (2003-04 to 2022-23)	1.030	3.0	0.00

Compound Growth Rates of Production of Cotton in Rajasthan

The results shown in Table 7 illustrates that during the initial study period, 6.6 per cent growth in cotton was noted in the Indian state of Rajasthan. When considering the output of cotton during the second phase of the study, it was shown to expand at a pace of 11.1 per cent. The rate of increase in cotton production during the third term of the study was 8.2 per cent. At the one percent probability level, the C.G.A.R. for every period under investigation was determined to be statistically significant.

Table 7 Compound Growth Rates of Production of Cotton in Rajasthan

Time-Period/Calculated Values	B-value	C.G. R	P-value
First Period (2003-04 to 2012-13)	1.066	6.6	0.00
Second Period (2013-14 to 2022-23)	1.111	11.1	0.00
Overall Study Period (2003-04 to 2022-23)	1.082	8.2	0.00

Compound Growth Rates of Production of Sugarcane in Rajasthan

The furnished results related to the growth behaviour of Sugarcane in Rajasthan show that maximum growth in case of the production of Sugarcane in Rajasthan was recorded during first period of the study that was observed as 3.0 per cent. However, it exhibited negative results during second and overall periods of the study. The growth rates were registered as -5.2 per cent and -1.1 per cent respectively. The C.G.A.R for all the periods under consideration were found to be statistically significant at 1 per cent level of probability.

Table 8 Compound Growth Rates of Production of Sugarcane in Rajasthan

Time-Period/Calculated Values	B-value	C.G. R	P-value
First Period (2003-04 to 2012-13)	1.03	3.0	0.00
Second Period (2013-14 to 2022-23)	0.948	-5.2	0.00
Overall Study Period (2003-04 to 2022-23)	0.989	=1.1	0.00

Conclusion

It was concluded on the basis of the above discussion that a comparative analysis of the growth behaviour of the production of major crops in Rajasthan showed that highest growth took place in case of the production of cotton during second period of the study which increased at the rate of 11.1 per cent that was followed by the growth rate of 8.8 that was the case observed in case of the production of pulses during second period of the study. The production of cotton found third position with the growth rate of 8.2 per cent and it was observed for entire study period. It is also worthwhile to mention here that the growth rates were remained positive for all the crops during all the periods of the study barring only sugarcane in which case negative trends emerged for second and overall study periods. The values obtained for C.G.A.R for all the periods for all crops under consideration were found to be statistically significant at 1 per cent level of probability.

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