

Trends in Area, Production and Productivity of Kharif Paddy Crops in Jashpur District of Chhattisgarh

Homendra Siwana^{*1}, Pradeep Kumar Ganjeer² and Mukesh Kumar Seth³

¹ Assistant Professor, (Agricultural Economics), College of Agriculture and Research Station, Jashpur, Kunkuri - 496 225, Chhattisgarh, India

² Guest Faculty, (Agricultural Statistics), College of Agriculture and Research Station, Kanker - 494 334, Chhattisgarh, India

³ Assistant Professor, (Agricultural Economics), College of Agriculture and Research Station, Mahasamund - 493 445, Chhattisgarh, India

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Abstract

The present study was examined the trends and CGR of kharif paddy in Jashpur district and Chhattisgarh State. For the analysis, time series data from 2013-2014 to 2022-2023 were analyzed. The semi-log trend function was used to find out the trend and estimate the growth rate of area, production and Productivity of paddy in Jashpur district of Chhattisgarh. The trend value for CGR of area was found negatively significant (-0.05 percent), production and productivity were found positively significant (0.20 percent and 0.24 percent). Absolute change in area was found negative (-9.75 thousand ha). Relative change was found negative in area (-5.70 percent), production and productivity were found positive (3.47 and 8.33 percent) in Jashpur district. Relative change. CGR of area was found negative significance (-0.05 percent), production and productivity were found positive significance (0.20 percent and 0.24 percent). Agriculture is the mainstay of most of the population in Jashpur. The district's economy rests mainly on rainfed agriculture, horticulture and animal husbandry. The major agro farm produces are- several varieties of rice including scented rice, pulses, maize, Ramtil and wheat.

Key words: Kharif paddy, Trend values, Compound growth rate (CGR)

India's economy is highly dependent on agriculture. A represents 17.7% of the nation's gross value added (GVA) for the fiscal year 2023-24 (At current prices). Given the significance of the agriculture industry, the Indian government has adopted a number of measures to ensure its sustainable growth. Agriculture also works as a link to provide raw material to boost up other sectors. Production of food and non-food crops is a major role-playing growing Indian economy [1]. Production of food and non-food crops plays a crucial role in the growth and stability of the Indian economy, as agriculture continues to support livelihoods, ensure food security, and contribute significantly to national income. India has made remarkable progress in food grain production over the past decade, with total output increasing from 264.38 million tonnes in 2013-14 to 332.22 million tonnes in 2022-23, reflecting improvements in technology, input use, and policy support [2]. However, this growth has occurred alongside structural changes in agriculture, including a decline in the area under total cereal cultivation in recent years, driven by factors such as urbanization, diversification towards high-value crops, and pressure on land resources. By the end of the fiscal year 2024, India had about 130 million hectares under food grain cultivation, underscoring the need to enhance productivity to sustain production growth in the face of limited land expansion. The area of total cereals cultivation decreases in the previous few years. At the end of fiscal year 2024, India had over 130

million hectares of land area for cultivation of food grains [3]. Cereal crops including rice, wheat, maize are the backbone of India's agricultural economy, providing essential food and nutritional security to the country's large population.

Among cereal crops, rice (paddy) occupies a central position in India's agricultural economy. As a staple food for a large proportion of the population, rice contributes significantly to caloric intake, nutritional security, rural employment, and farm income. Paddy is predominantly cultivated during the kharif season, largely dependent on the southwest monsoon, making its performance highly sensitive to rainfall variability, soil conditions, and irrigation availability. Therefore, understanding trends in area, production, and productivity of kharif paddy is essential for assessing agricultural performance, identifying regional disparities, and formulating effective policy interventions aimed at sustainable crop production [4].

The state of Chhattisgarh, often referred to as the "Rice Bowl of Central India," plays a vital role in national rice production due to its favorable agro-climatic conditions, extensive paddy-growing area, and traditional dependence on rice-based farming systems. Within the state, Jashpur district, located in the north-eastern corner of Chhattisgarh, represents a unique agro-ecological region characterized by undulating terrain, tribal-dominated population, and rainfed agriculture. Geographically, the district lies between 22°17' to 23°15' north latitudes and 83°30' to 84°24' east longitudes, and agriculture

***Correspondence to:** Homendra Siwana, E-mail: hsiwana@gmail.com; Tel: +91 7999757023

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forms the backbone of the local economy, with kharif paddy being the principal crop.

Despite its importance, paddy cultivation in Jashpur district faces several challenges, including fluctuating rainfall, limited irrigation infrastructure, small and fragmented landholdings, and varying levels of adoption of improved technologies. At the same time, recent years have witnessed efforts to enhance productivity through improved varieties, better agronomic practices, and government-supported schemes [5]. In this context, an analysis of the trends in area, production, and productivity of kharif paddy in Jashpur district becomes imperative to understand the nature of growth, identify whether production changes are area-led or productivity-driven, and assess the district's performance in comparison with broader state-level trends. The major agro farm produces are- several varieties of rice including scented rice, pulses, maize, Ramtil and wheat. Therefore, the present study aims to examine and analyze the temporal changes in area, production, and productivity of kharif paddy in Jashpur district of Chhattisgarh over time, providing insights that can aid policymakers, planners, and researchers in designing strategies for sustainable rice production and improving the livelihoods of farming communities in the region.

MATERIALS AND METHODS

The data used for the analysis are accumulated from various issues of Economics and statistics department of Chhattisgarh and Directorate of Economics & Statistics, DAC&FW. A time series data from 2013-14 to 2022-2023 (10 years) regarding the area, production and productivity paddy were collected from the above-mentioned source. The following semi-log trend function was used to find out the trend and estimate the growth rate of area, production and Productivity of paddy in Jashpur district of Chhattisgarh.

Compound growth rates (CGR) were estimated with the following exponential model using least square techniques which are given below:

$$Y = \alpha \beta^t$$

$$\text{Log } Y = \log \alpha + t \log \beta$$

Table 1 Compound annual growth rate (CGR) of area, production and productivity of Paddy in Jashpur district and Chhattisgarh, 2013-14 to 2022-23

Particular	Jashpur district			Chhattisgarh state		
	Area (‘000 ha)	Production (‘000 tonne)	Productivity (tonne/ha)	Area (‘000 ha)	Production (‘000 tonne)	Productivity (tonne /ha)
Base year	180.506	277.510	1.54	3987.721	7102.729	1.78
End year	170.756	287.493	1.68	4335.202	11224.482	2.59
Mean	175.631	282.502	1.61	4144.247	4121.753	1.90
Absolute change	-9.75	9.983	0.14	347.481	7915.575	0.81
Relative change (%)	-5.70	3.47	8.33	8.01	58.03	45.50
Coefficients	-0.00026	0.0009	0.0011	0.01928	0.02052	0.01545
CGR%	-0.059**	0.20**	0.24**	1.17	4.84*	3.62*

*5% level of significance

**1% level of significance

The data depicted in (Table 1) revealed that in case of Chhattisgarh state mean of area, production and productivity were 4144.247 thousand ha, 4121.753 thousand tonne and 1.90 tonne /ha, respectively. Absolute change of paddy was found maximum in production (715.575 thousand tonne). Relative change was found maximum in production (58.03 percent). Production and productivity were found positive significant compound annual growth rate (4.84 percent and 3.62 percent). In Jashpur district, the paddy area declined from 180.51 to 170.76 thousand ha, registering an absolute reduction of 9.75

Where;

Y = Area/production/productivity of major crops

α = Constant

β = Regression coefficient

t = time in year

$$\text{Compound growth rate (\%)} = (\text{Antilog } \beta - 1)100$$

Where;

b = regression coefficient

$$\text{Coefficient of variation} = \text{standard variation} \div \text{mean} \times 100$$

Absolute and relative change

The relative change explains comparative change between current and base year in terms of percentage and the absolute change expressed in physical terms of comparative change between current and base year. The area, production and productivity of major rice-producing states were estimated using the following formula:

$$\text{Absolute change} = Y_n - Y_o$$

$$\text{Relative change (\%)} = \frac{Y_n - Y_o}{Y_o} \times 100$$

Y_n = average of the current year for area, production and productivity

Y_o = average of the base year for area, production and productivity

RESULTS AND DISCUSSION

The data in (Table 1) revealed that the absolute change in area, production and productivity of paddy crop of Jashpur District and Chhattisgarh state was analyzed, the table revealed that the mean of area, production productivity in Jashpur District were 175.63 thousand ha, 282.502 thousand tonne and 1.61 tonne/ha. While Absolute change of paddy was high in Production (9.983 thousand tonne), absolute change in area was found negative (-9.75 thousand ha). Relative change was found negative in area (-5.70 percent), production and productivity were found positive (3.47 and 8.33 percent) in Jashpur district. Relative change. CGR of area was found negatively significant (-0.05 percent), production and productivity were found positively significant (0.20 percent and 0.24 percent).

thousand ha and a relative decline of 5.70 per cent. This contraction is further supported by a negative and significant CGR of -0.059 per cent per annum (1% level), indicating a consistent reduction in area over the study period. The decline in area may be attributed to factors such as diversification towards other crops, changes in land use, labour constraints, or climatic variability [6-7].

Despite the reduction in area, paddy production in Jashpur increased marginally from 277.51 to 287.49 thousand tonnes, with a relative increase of 3.47 per cent. The CGR of

production was positive and significant (0.20% per annum at 1% level), suggesting that gains in output were achieved primarily through improvements in productivity rather than expansion of area. This is corroborated by the rise in productivity from 1.54 to 1.68 t ha⁻¹, recording an 8.33 per cent relative increase and a significant CGR of 0.24 per cent per annum (1% level). The productivity-led growth reflects the likely impact of improved varieties, better crop management practices, and enhanced input use [8].

At the state level (Chhattisgarh), a contrasting trend is evident. Paddy area expanded from 3987.72 to 4335.20 thousand ha, showing an absolute increase of 347.48 thousand ha and a relative growth of 8.01 per cent. Although the CGR of area (1.17% per annum) was positive, it was statistically non-significant, indicating moderate and less consistent area expansion. However, production exhibited a sharp increase, rising from 7102.73 to 11224.48 thousand tonnes, with a substantial relative growth of 58.03 per cent [9]. This growth is supported by a significant CGR of 4.84 per cent per annum (5% level). The most striking improvement at the state level was observed in productivity, which increased from 1.78 to 2.59 t ha⁻¹, registering a 45.50 per cent relative gain and a significant CGR of 3.62 per cent per annum (5% level). This indicates that productivity enhancement was the dominant driver of production growth in Chhattisgarh, supplemented by moderate area expansion. The results reflect the cumulative effects of

state-level interventions such as improved irrigation coverage, dissemination of high-yielding and stress-tolerant varieties, mechanization, and better extension services [10].

Overall, the analysis highlights that paddy growth in Jashpur district is predominantly productivity-driven under shrinking area, whereas Chhattisgarh state exhibits robust growth in both productivity and production, with some support from area expansion. The declining area but improving productivity in Jashpur underscores the need for location-specific strategies focusing on sustaining yield gains, stabilizing area through suitable incentives, and addressing local constraints, while the state-level trends reflect the success of broader agricultural development policies.

CONCLUSION

Analysing the annual growth rate trends in the area, production and productivity over a period of time at Jashpur district and Chhattisgarh has remained issues of significant concern for researchers as well as policymakers. The growth rate in the production and Productivity of kharif paddy were found positive and significant in Chhattisgarh state. In case of Jashpur district area was shown negative and significant. In case of Chhattisgarh state absolute change was found high in production and relative change was also found highest in production.

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