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Trend in area production and productivity of paddy and wheat in Chhattisgarh state during 2002-03 to 2017-18

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Abstract

The analysis of compound annual growth rate of paddy and wheat cultivation in Chhattisgarh from 2002-03 to 2017-18 reveals positive trends in both crops. In paddy CAGR was 4.12 per cent for production, and 3.74 per cent productivity was found significant growth at a 1% level of probability, and wheat cultivation in Chhattisgarh exhibited favorable trends, with an increase in area 0.51 per cent, production 3.83 per cent, and productivity 3.3 per cent over the analyzed period and area was found significant at 5 per cent level of probability. These findings highlight the progress and improvement in agricultural practices, resulting in increased output and productivity for both paddy and wheat crops in Chhattisgarh.

Keywords: Paddy, wheat, Chhattisgarh, growth rate, area, production, productivity

Introduction

Agriculture in India is a crucial sector, employing a significant portion of the population and contributing to the country's GDP. Agriculture is counted as the chief economic occupation of the Chhattisgarh state. According to the government estimate the net sown area of the state is 4.828 million hectare and the grass on area is 5.788 million hectare. About 80% of the population of the state is rural and the main livelihood of the villagers is agriculture and agriculture-based small industries, horticulture animal husbandry, which also engage a major share of the total population of the state Chhattisgarh is also called the "rice bowl" of India. Both paddy and wheat play a crucial role in the agricultural economy of Chhattisgarh. These crops not only contribute to food grain production but also provide livelihoods to numerous farmers in the state.

Methodology

Selection of the study area and crop

Chhattisgarh state was selected purposely for the study and Rice (4052.58 thousand hectare) and wheat (120.11 thousand hectare) was selected on the basis of highest area under crops during kharif and rabi season as per the economics survey of Chhattisgarh 2017-18.

Period of study

The time-series secondary data for area, production and productivity were collected for the calculation of compound annual growth rates of paddy and wheat during 2002-03 to 2017-18 period of 16 years.

Collection of data

The crop-wise data concerned to the area, production and productivity of Chhattisgarh states from the time period of 2002-03 to 2016-17 was collected from various statistical yearbooks published by the Directorate of Economics and Statistics, Department of Agriculture, Government of India, and Co-operation and Farmers Welfare, farm input wholesale price index, GOI (<http://eands.dacnet.nic.in/>).

Analytical tools

Compound annual growth rate (CGAR) of area, production, productivity of paddy and wheat crops in Chhattisgarh

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

$$Y = a + bX$$

Where, Y= Trend value of dependent variable (area/ total production/yield)

a = constant

b =Trend coefficient (slope of line)

t = time variable (Years)

The function takes the form of a linear equation in logarithmic and becomenlog- linear as under:

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

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

CGR was estimated by applying OLS method. The t-test was performed to test the significance of β

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:

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

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

Where,

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 Discussions

Compound annual growth rates in area, production and productivity of paddy in Chhattisgarh

Trend in area production and productivity of paddy analyzed from the period of 2002-03 to 2017-18 the for the period of 16 years were 2002-03 was the base year and 2017-18 was end year for the analysis of paddy. Were In base year area production and productivity was 3778 (000 hectare), 2635 (000 metric ton) and 0.697 (ton/hectare) and average area, production and productivity was 3922, 5860 and 1.494 and growth was found 0.37 per cent for the area, 4.12 per cent for production and 3.7 per cent in productivity were the production and productivity was found in significant at 1% level of probability and absolute change in area production and productivity was 199, 114 and 0.748 respectively. Relative change in production was highest 118.2 per cent followed by 107.3 per cent in productivity and 5.27 per cent in area.

Table 1: Compound annual growth rates in area, production and productivity of paddy in Chhattisgarh

Particular	Area	Production	Productivity
Base year	3778	2635	0.697
End year	3977	5749	1.446
Mean	3922	5860	1.494
Absolute change	199	3114	0.748
Relative change (%)	5.27	118.2	107.3
Coefficients	14.6	219.2	0.05
CGR%	0.37	4.12*	3.74*

*** Significant at 10 per cent level of probability, ** Significant at 5 per cent level of probability, * Significant at 1 per cent level of probability

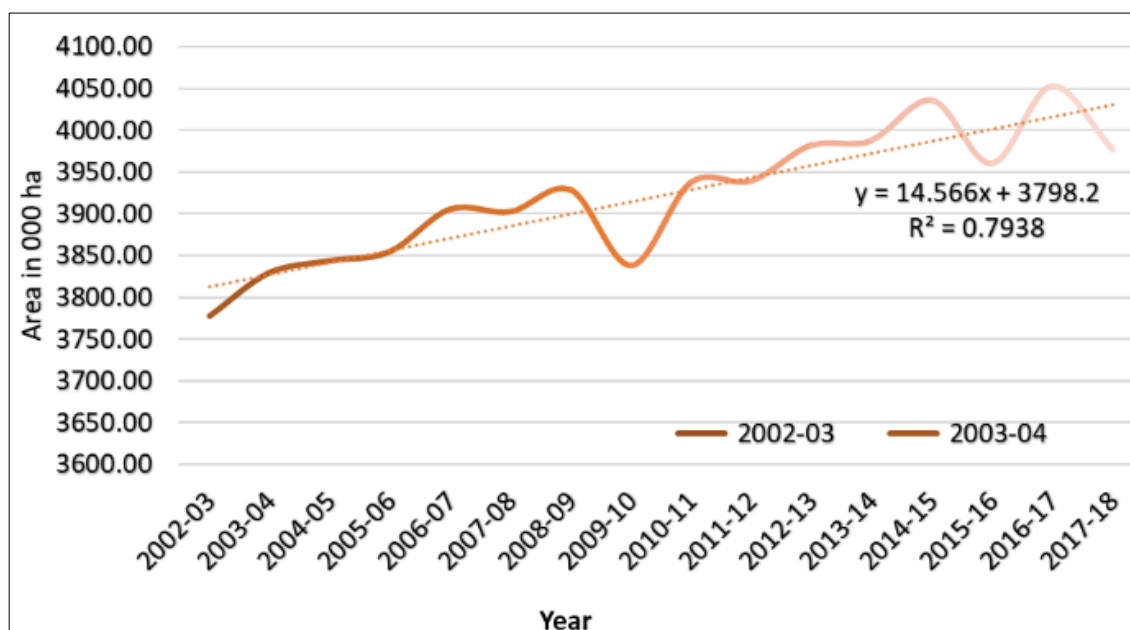


Fig 1: Compound annual growth rates in area of paddy in Chhattisgarh

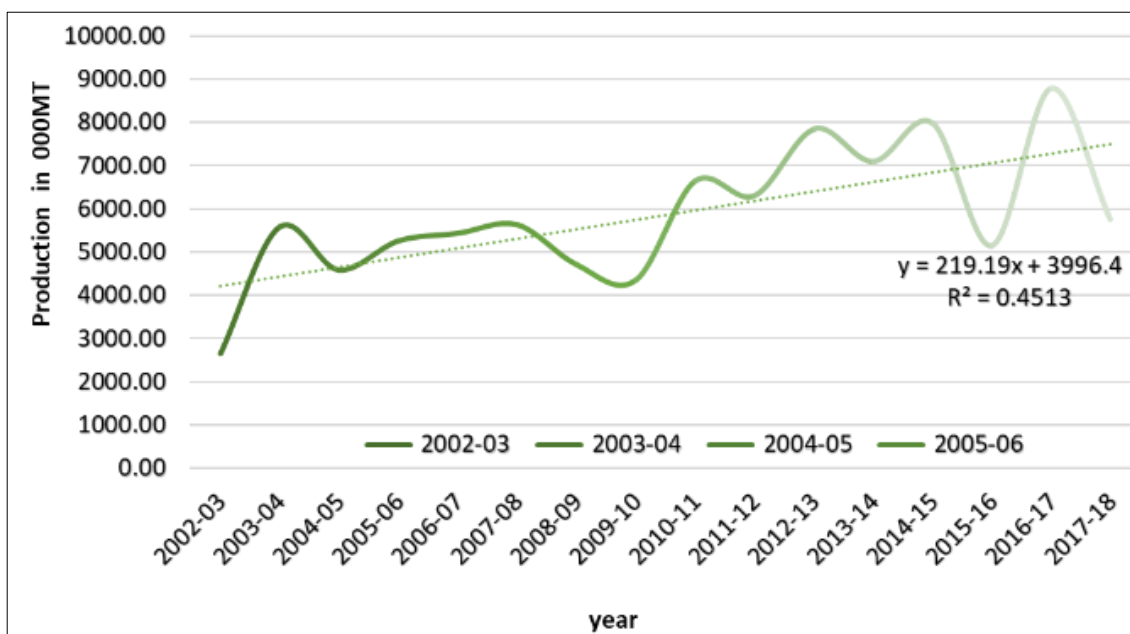


Fig 2: Compound annual growth rates in production of paddy in Chhattisgarh

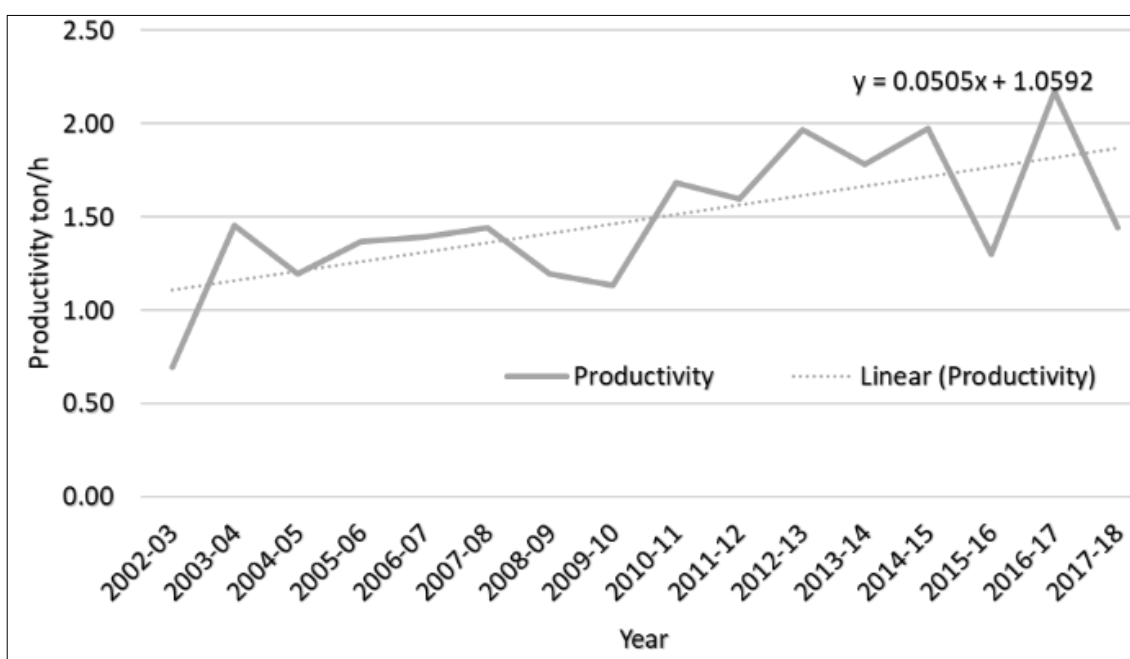


Fig 3: Compound annual growth rates in productivity of paddy in Chhattisgarh

Compound annual growth rates in area, production and productivity of wheat in Chhattisgarh

From 2002-03 to 2017-18, wheat cultivation in Chhattisgarh exhibited positive trends in terms of area, production, and productivity. The area dedicated to wheat cultivation increased from 93.846 thousand hectares to 102.195 thousand hectares, representing a relative change of 8.896%. Similarly, wheat production rose from 98.592 thousand metric tonnes to 141.642 thousand metric tonnes, indicating a relative change of 43.665%. Notably, wheat productivity also saw a significant increase, with the base year productivity of 1.051 metric tonnes per hectare rising to 1.386 metric tonnes per

hectare in the end year, reflecting a relative change of 31.928%. The coefficients and compound growth rates (CGR%) suggest positive annual growth rates in all three parameters, with the highest growth observed in production. These findings highlight the favorable growth and improvement in wheat cultivation in Chhattisgarh during the given time period compound growth rates (CGR%) suggest a steady annual growth rate in wheat cultivation, with a CGR% of 0.51% for area, 3.83% for production, and 3.3% for productivity. These figures highlight the positive trajectory of wheat cultivation in Chhattisgarh over the specified period

Table 2: Compound annual growth rates in area, production and productivity of wheat in Chhattisgarh

Particular	Area	Production	Productivity
Base year	93.846	98.592	1.051
End year	102.195	141.642	1.386
Mean	101.099	120.388	1.191
Absolute change	8.349	43.05	0.335
Relative change (%)	8.896	43.665	31.928
Coefficients	0.505	4.437	0.038
CGR%	0.51**	3.83	3.3

*** Significant at 10 per cent level of probability, ** Significant at 5 per cent level of probability, * Significant at 1 per cent level of probability,

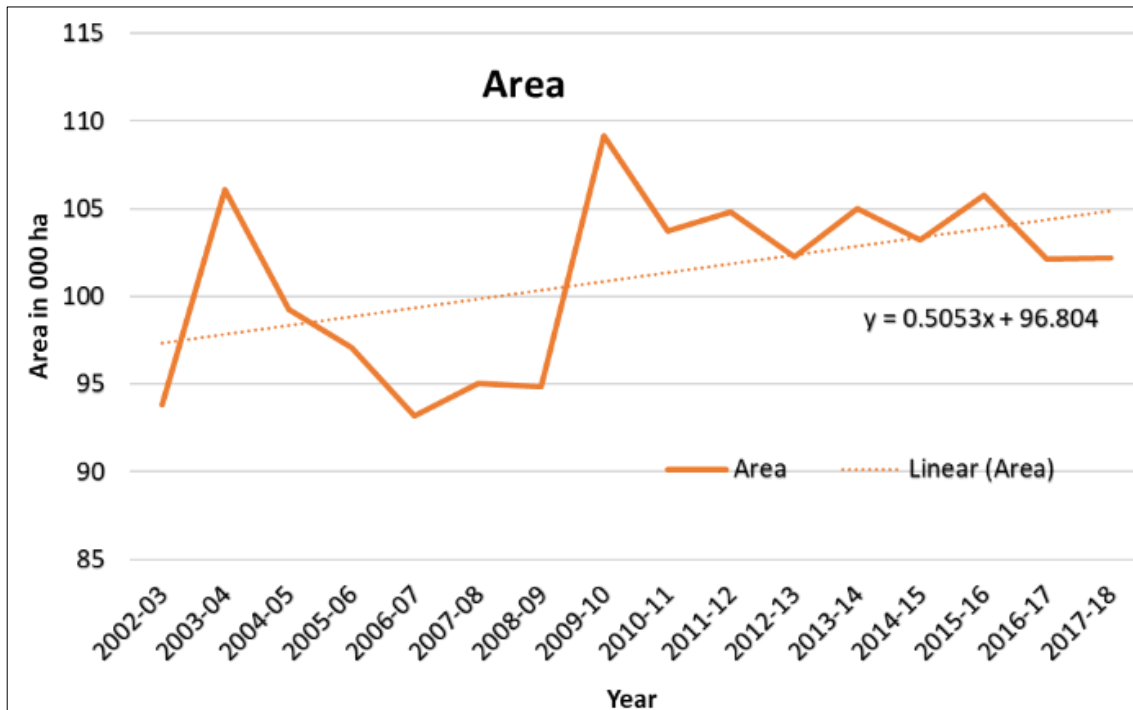


Fig 4: Compound annual growth rates in area of wheat in Chhattisgarh

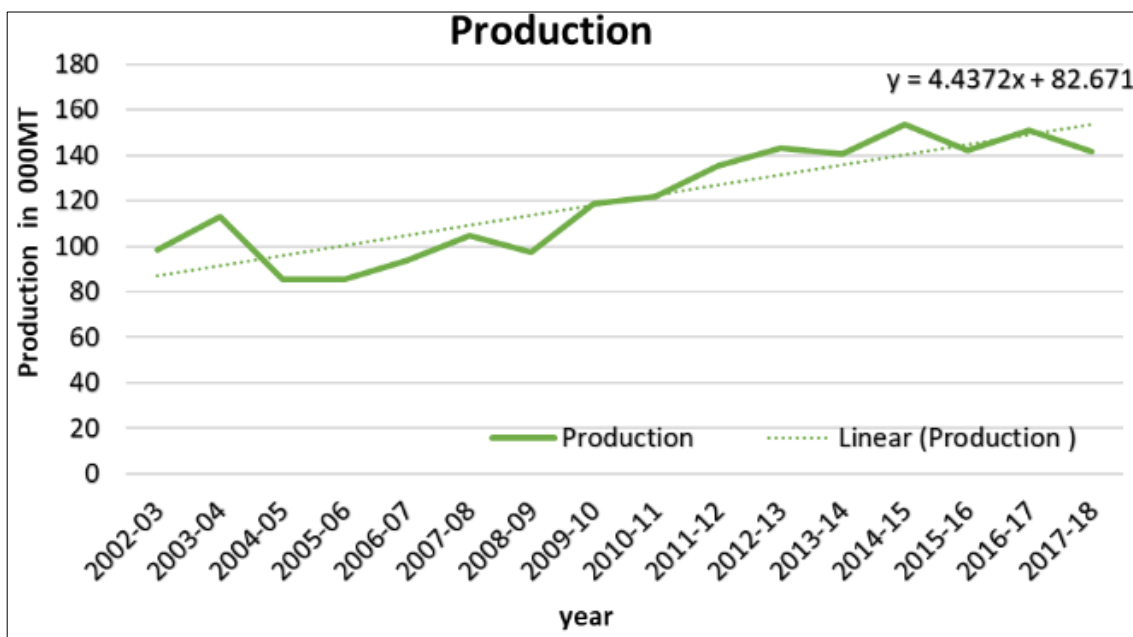


Fig 5: Compound annual growth rates in production of wheat in Chhattisgarh

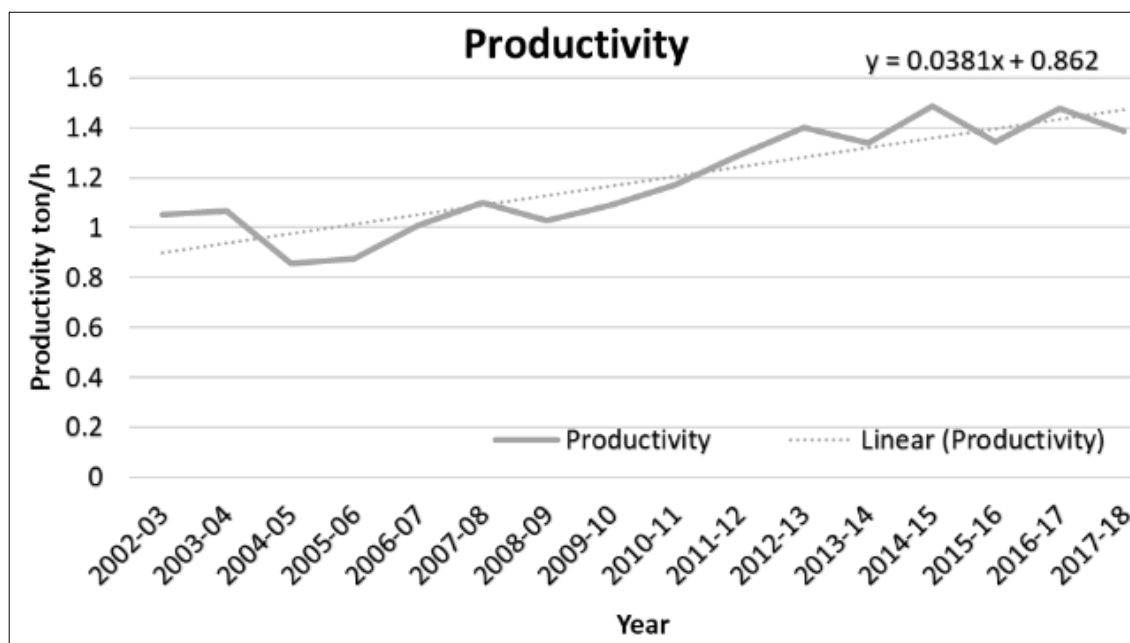


Fig 6: Compound annual growth rates in productivity of maize in Chhattisgarh

Summary and Conclusion

From 2002-03 to 2017-18, the analysis of paddy cultivation shows significant trends. The average area increased from 3778 to 3922 (000 hectares), production rose from 2635 to 5860 (000 metric tons), and productivity improved from 0.697 to 1.494 (tons per hectare). Growth rates were 0.37% for area, 4.12% for production, and 3.7% for productivity, all statistically significant at a 1% level. Absolute changes were 1993 in area, 114 in production, and 0.748 in productivity. Relative changes saw production rise by 118.2%, productivity increase by 107.3%, and area expand by 5.27%. These findings indicate positive progress in paddy cultivation over the analysed period.

wheat cultivation in Chhattisgarh experienced positive trends in area, production, and productivity. The area dedicated to wheat increased by 8.896%, production grew by 43.665%, and productivity improved by 31.928%. Compound growth rates (CGR%) indicate steady annual growth rates of 0.51% for area, 3.83% for production, and 3.3% for productivity. These findings underscore the favourable growth and progress in wheat cultivation in Chhattisgarh over the specified period, with production showing the highest growth.

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