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Trends and growth rate analysis of area, production and productivity of rice crop of Chhattisgarh state

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Abstract

The Present study deals with trends and growth rate analysis of area, production and productivity of rice crop of Chhattisgarh state. The Chhattisgarh plain, Bastar plateau and Northern hills area of Chhattisgarh was purposely selected for this study because this area has different levels of the trends and growth rate of rice in the Chhattisgarh state. Rice is the principal food crop in India. Rice is grown in an area of 43.79 M ha with a production of 116.42 Mt and productivity of 2659 kg/ha in the country occupying 22 per cent of gross cropped area of the country. Rice contributes 41 per cent of total food grain production occupying 35 per cent of food grain area of the country (2018-19). The production was high significant and low growth rate of 2.44 percent in Northern hills followed by Chhattisgarh plains (2.04 percent) and Bastar plateau (0.63 percent) of Chhattisgarh state. The productivity of rice in different area that rice yield has marginally growth in Northern hills (2.26%) followed by Chhattisgarh plains (1.38%) and Bastar plateau (0.10 percent) of Chhattisgarh state. In this study the overall rice area, production and productivity was low significant and growth rate of 0.54 percent, 1.93 percent and 1.38 percent.

Keywords: production, relative change, significant, trend and growth rate

Introduction

Agriculture sector plays a vital role in Indian economy and it is the backbone of the country. Around 55 per cent of population is engaged in agriculture and allied activities and it contributes around 17 per cent to the country's Gross Value Added (Annual Report, 2016-17). Agriculture is the only means of employment for almost all two-thirds of rural people in India and provides food grains to all the rising population in the country. It also provides fodder to sustain livestock comprising of cattle, buffaloes, sheep and poultry etc. Under the conditions of low growth rates concerted efforts are required to increase the production in all major producing states to reach the projected demand of rice by 2050. Chhattisgarh is a state in central India; with a geographical area of 137.90 lakh hectares. It is known for rice cultivation and called "rice bowl of India" and is necessary to examine its absolute and relative changes and have an estimate of likely supply of this crop as well as other cereal crops such as maize and wheat in the state. In Chhattisgarh, rice occupies average of 3.6 million hectare with the productivity of the state ranging between 1.2 to 1.6 tonne per hectare depending upon the rainfall (Status Paper on Rice for Chhattisgarh).

Materials and Methods

Collection of Data

The study is based on secondary data. The secondary data was collected from Chhattisgarh agriculture statistics, land record office, annual districts statistics and other published and unpublished reports.

Methodology

Selection of area

Chhattisgarh state from India was considered purposely for study purpose and all the 3 agro-climatic zones viz Chhattisgarh plain, Bastar plateau and northern hills were considered for details investigation. After considering zone, from each zone, all the covered districts were selected for analysis purpose.

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Selection of Crop

In Chhattisgarh, Rice is the foremost crop grown in about 36 lakh ha area in kharif season which accounts for about 77% of net sown area. Only 27% of this area is irrigated and the rest is rainfed. The rice crop was selected for the Present study in the all three agro climate region and all 27 district of Chhattisgarh state.

Nature and sources of data

This Present study is based on secondary data which is obtained from the website of Government of Chhattisgarh Agriculture Development and Farmer Welfare and Bio – Technology Department (agriportal.cg.nic.in)

Period of Study

The time series data from 2009-10 to 2018-19 were used to analyse absolute change, relative change, C.V, trend, growth rate, area effect, yield effect and interaction effect and projection purpose.

Analytical tools

Trend

To analyse the growth rates of rice crop in the Chhattisgarh state trend analysis was carried out using linear trend method.

Linear trend, $Y = a + b x$

Where,

Y= Dependent variables (Area, Production and productivity)

a = Intercept

b = Regression co-efficient

x = Period (years)

N=number of observation

Student t test

$$t = \frac{\bar{x} - \mu}{s/\sqrt{n}}$$

Where,

t= test statistics

\bar{x} =mean of sample

S=sample standard deviation

N=sample size

t calculated > t tabulated (significant)

t calculated < t tabulated (Non-significant)

Simple Growth Rate (SGR)

$$SGR (\%) = \frac{b}{\bar{y}} \times 100$$

Compound Growth Rate (CGR)

The compound growth rates (CGR) used to examine the growth rate in area, production and productivity of rice in Chhattisgarh state as a whole, using the exponential growth function of the form.

$$Y = ab^t$$

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

Results and Discussion

Trend for area, production and productivity of rice crop in different agro climatic zone of Chhattisgarh state

In the previous section, the time series data of important variables viz area, production and productivity with special highlights on rice crop have been synthesized by simple statistical tools like absolute change, relative change and coefficient of variation have been discussed accordingly. To continue the synthesis of data of rice crop a precise statistical tools viz trend and growth rate has been used in this section. Linear trend was used for estimating the trend and growth rate.

The value of regression coefficient of area, production and productivity of rice under different agro climatic zone of Chhattisgarh state have been provided in Table 1, 2 to 3.

Chhattisgarh plains

The value of regression coefficient of area in rice crop was found positive and significant at 5% and 1% level of significant in Balod, Balodabazar, Bemetara, Dhamtari, Durg, Gariyaband, Kabirdham, Kanker, Korba, Mahasamund, Mungeli and Rajnandgaon district, respectively while the regression coefficient of area in rice crop was found negative in case of Bilaspur, Janjgir-Champa, Raigarh and Raipur district in Chhattisgarh plain zone. In case of regression coefficient of production for rice crop out of 16 districts only 7 districts viz Balod, Balodabazar, Bemetara, Bilaspur, Kabirdham, Kanker and Raipur have negative trend value which shows that area of rice crop in this district where observed decreasing, while in remaining district viz Dhamtari, Durg, Gariyaband, Korba, Mahasamund, Mungeli, Raigarh and Rajnandgaon the value of regression coefficient were estimated positive and significant which indicate an increasing trend in area of rice crop.

The value of regression coefficient of rice crop for productivity was found positive and significant at 5% level in Balodabazar, Bilaspur, Dhamtari, Durg, Gariyaband, Janjgir-Champa, Korba, Raigarh, Raipur and Rajnandgaon districts. It was observed to be 0.01, 0.02, 0.04, 0.06, 0.04, 0.03, 0.01, 0.07, 0.12 and 0.001 percent, respectively. Also the regression coefficient of productivity of rice crop where found negative and significant in Balod, Bemetara, Kabirdham, Mahasamund and Mungeli district with 0.04, 0.06, 0.03, 0.02, 0.01 and 0.04 percent, respectively. Thus overall it could be concluded that rice crop gained significantly with respect to area in Balod, Balodabazar, Bemetara, Dhamtari, Durg, Gariyaband, Kabirdham, Kanker, Korba, Mahasamund, Mungeli and Rajnandgaon. The trend coefficient of production where positive and significant in Dhamtari, Durg, Gariyaband, Janjgir-Champa, Korba, Mahasamund, Mungeli, Raigarh and Rajnandgaon and in productivity the district covered where Balodabazar, Bilaspur, Dhamtari, Durg, Gariyaband, Janjgir-Champa, Korba, Raigarh, Raipur and Rajnandgaon gained its impact of the crop. The analysis also revealed that there was a significant reduction in area under Bilaspur, Janjgir-Champa, Raigarh and Raipur districts although decreasing its impact in area location but keep its productivity level in all the districts which is encouraging.

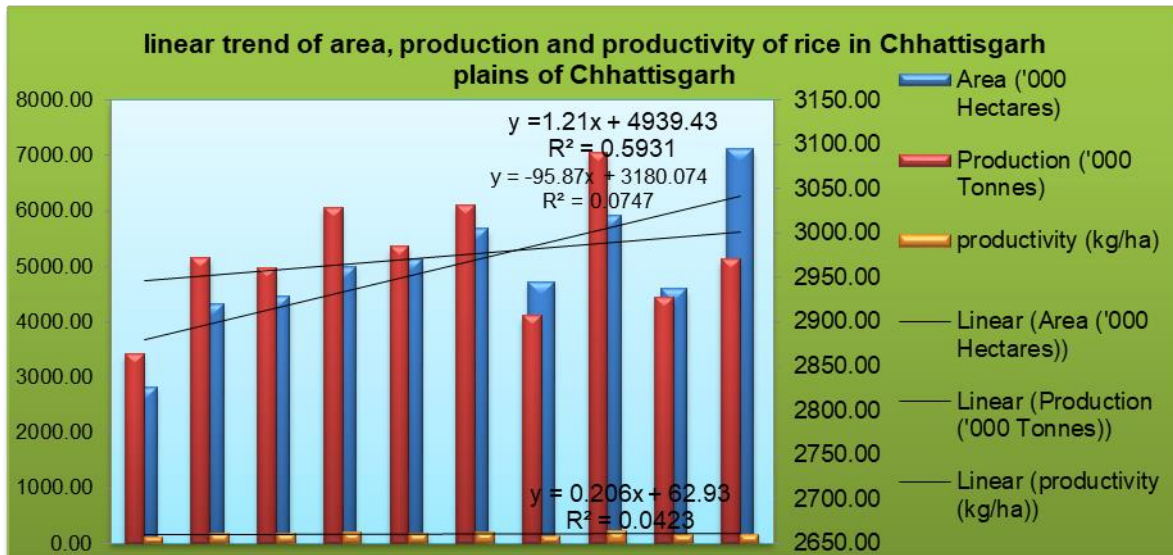


Fig 1: Linear trend of area, production and productivity of rice in Chhattisgarh plains

Table 1: Linear trend in area, production and productivity of rice crop in Chhattisgarh plains zone of Chhattisgarh State

District	Area		Production		Productivity	
	Regression co-efficient (b)	intercept (a)	Regression co-efficient (b)	intercept (a)	Regression co-efficient (b)	intercept (a)
1. Balod	0.80* (1.57)	176.18	-5.54* (14.68)	350.22	-0.04* (0.11)	1.99
2. Balodabazar	0.95* (2.03)	222.84	-5.54* (14.68)	351.12	0.01* (0.07)	1.51
3. Bemetara	3.58* (3.52)	140.70	-4.05* (11.10)	246.74	-0.06* (0.08)	1.93
4. Bilaspur	-9.14* (1.25)	291.80	-7.11* (28.63)	446.18	0.02* (0.13)	1.58
5. Dhamtari	1.33* (5.92)	166.04	9.80* (37.69)	166.04	0.04* (0.16)	2.21
6. Durg	2.20* (2.75)	115.11	10.66* (24.85)	11.00	0.06* (0.17)	1.54
7. Gariyaband	1.98* (2.02)	125.50	8.22* (19.19)	154.76	0.04* (0.13)	1.25
8. Janjgir-Champa	-0.91* (3.41)	265.51	4.07* (30.42)	695.02	0.03* (0.11)	2.60
9. Kabirdham	1.94* (2.04)	90.78	-0.52** (7.29)	129.80	-0.03* (0.08)	1.41
10. Kanker	1.64* (1.65)	169.23	-1.55* (34.03)	344.18	-0.02* (0.19)	2.01
11. Korba	0.02* (0.10)	109.18	1.23* (9.51)	134.27	0.01* (0.09)	1.24
12. Mahasamund	2.86* (3.02)	258.31	2.55* (24.22)	419.72	-0.01* (0.09)	1.61
13. Mungeli	1.68** (1.67)	101.13	0.60** (9.62)	229.30	-0.04* (0.09)	2.24
14. Raigarh	-72.65* (1.95)	240.80	14.80* (27.22)	278.71	0.07* (0.11)	1.16
15. Raipur	-35.59* (2.81)	442.56	-29.77* (32.93)	600.47	0.12* (0.18)	1.22
16. Rajnandgaon	3.40** (4.10)	264.40	3.36* (3.97)	381.90	0.001* (0.13)	1.43
Total	-95.87	3180.0	-2.66	132.73	-57.86	1.69

*, ** shows 5 and 1 percent level of significance, respectively

Fig in brackets shows the SE of concerned regression co-efficient

Bastar Plateau

The trend coefficient for rice crop area where observed negative and significant in Bastar, Bijapur, Dantewada, and Narayanpur while in Kondagaon and Sukma districts the coefficient was positive and significant at 5% level. As far as the trend coefficient of production of rice crop was concerned

the value of coefficient was negative and significant in Bastar, Dantewada, Kondagaon and Narayanpur district but only in two districts viz Bijapur and Sukma where found positive and significant at 5% level. The trend coefficient for rice productivity where negative and significant in all the districts of Bastar plateau zone. Overall it could be concluded that the

area of rice where increased in Kondagaon and Sukma district and in production point of view Bijapur and Sukma district maintain its importance. But in case of productivity trend, all

the districts found negative and significant trend which indicates that there is no impact of improved technology in that area.

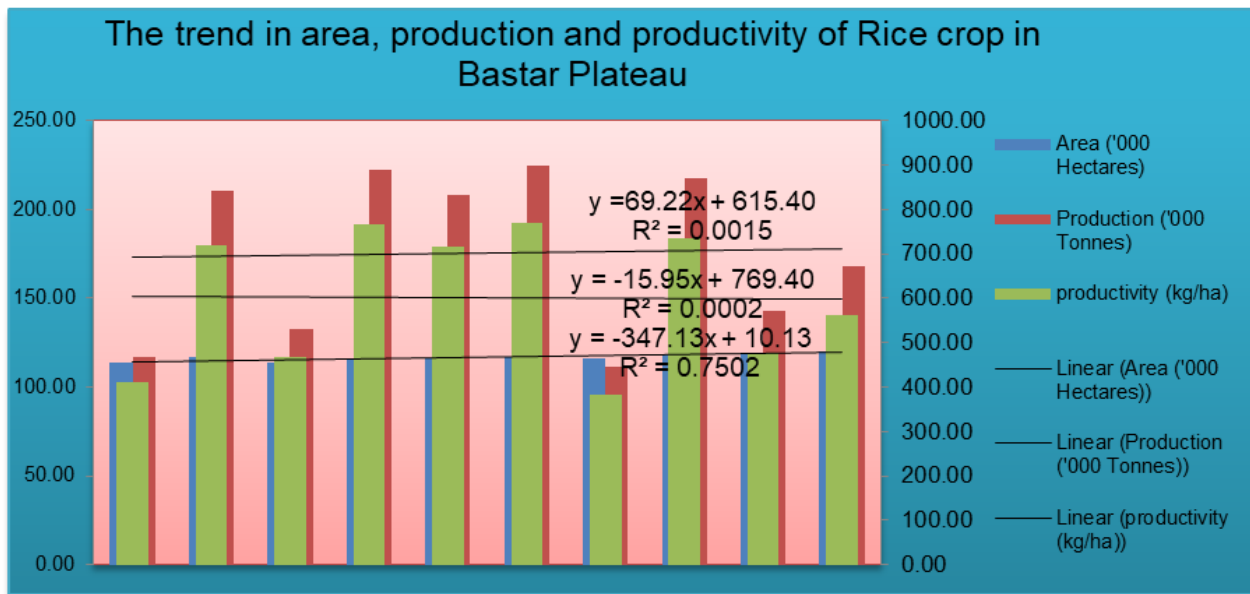


Fig 2: The linear trend in area, production and productivity of Rice crop in Bastar Plateau

Table 2: Linear trend in area, production and productivity of rice crop in Bastar Plateau zone of Chhattisgarh State

District	Area		Production		Productivity	
	Regression co-efficient (b)	intercept (a)	Regression co-efficient (b)	intercept (a)	Regression co-efficient (b)	intercept (a)
1. Bastar	-10.80* (0.5)	214.37	-6.82* (16.18)	257.65	-0.04* (0.12)	1.99
2. Bijapur	-0.98* (0.69)	98.89	0.53* (7.40)	57.47	-0.03* (0.12)	1.70
3. Dantewada	-60.26* (0.83)	115.68	-10.03* (11.15)	171.54	-0.04* (0.16)	1.62
4. Kondagaon	1.10* (1.14)	94.79	-0.87* (10.07)	157.28	-0.02* (0.10)	1.65
5. Narayanpur	-0.21* (0.57)	26.03	-1.23* (3.49)	39.30	-347.00** (0.12)	1.48
6. Sukma	1.93* (1.91)	65.64	2.47* (10.11)	113.16	-0.0004* (0.13)	1.69
Total	-69.22	615.4	-15.95	796.4	-347.13	10.13

*, ** shows 5 and 1 percent level of significance, respectively
Fig in brackets shows the SE of concerned regression co-efficient

Northern hills

The value of regression coefficient of area in rice crop was found positive and significant at 5% level of significant in Balrampur, Jaspur, Surajpur and Sarguja district respectively while the regression coefficient of area in rice crop was found negative in Korea district in Northern hills zone.

In case of regression coefficient of production for rice crop out of 5 districts only 2 districts viz Jashpur and Sarguja have negative trend value which shows that area of rice crop in this district where observed decreasing while in remaining districts viz Balrampur, Korea and Surajpur the value of regression coefficient were estimated positive and significant which indicate an increasing trend in area of rice crop.

Also the regression coefficient of productivity of rice crop where found negative and significant in Balrampur and Jashpur district with 0.02 and 0.04.

Overall it could be concluded that the area of rice where increased in Balrampur Jashpur Surajpur and Sarguja district. In production point of view Balrampur, Korea and Sarguja maintained its importance. But in case of productivity trend in Korea, Surajpur and Sarguja were positive and significant. The analysis also revealed that there was significant reduction in area under Korea district although decreasing its importance in area allocation but keeping its productivity level in all the districts which is encouraging.

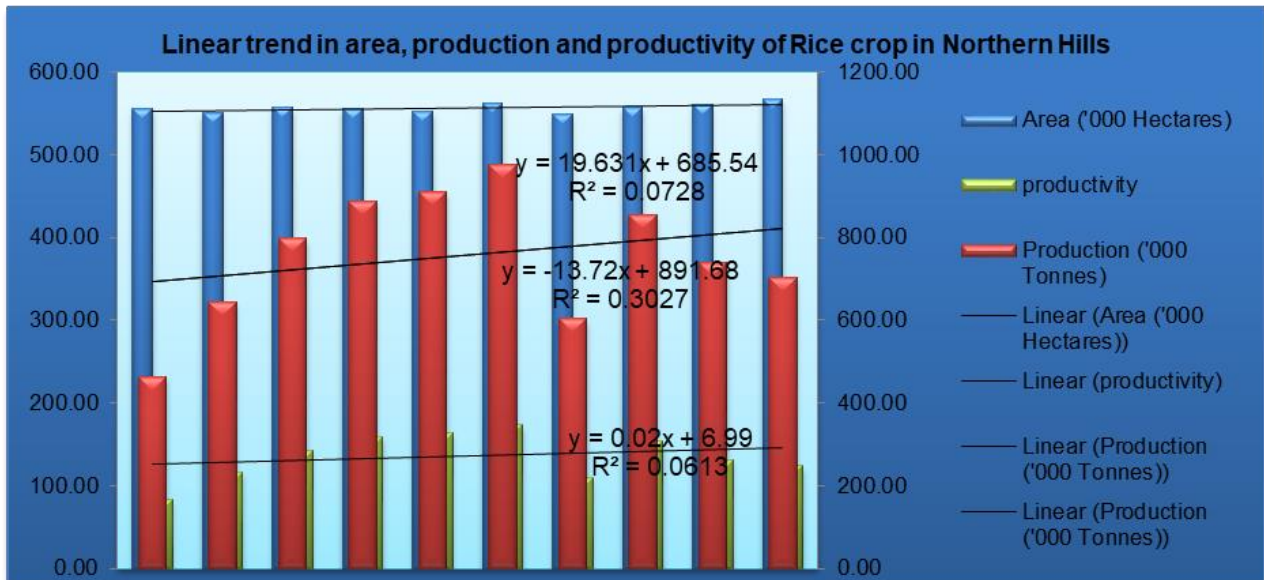


Fig 3: Linear trend in area, production and productivity of Rice crop in Northern Hills

Table 3: Linear trend in area, production and productivity of rice crop in Northern Hills zone of Chhattisgarh state

District	Area		Production		Productivity	
	Regression co-efficient (b)	intercept (a)	Regression co-efficient (b)	intercept (a)	Regression co-efficient (b)	intercept (a)
1. Balrampur	0.98* (1.16)	75.48	0.27* (6.09)	129.14	-0.02* (0.01)	1.71
2. Jashpur	0.39* (0.52)	179.23	-7.16* (7.29)	268.93	-0.04* (0.09)	1.49
3. Korea	-0.14* (0.76)	69.39	1.43* (9.62)	84.39	0.02* (0.13)	1.20
4. Surajpur	0.04* (0.49)	105.70	1.67* (6.89)	154.60	0.01* (0.06)	1.46
5. Sarguja	18.36* (1.63)	255.74	-9.93* (9.86)	254.62	0.05* (0.07)	1.13
Total	19.63	685.54	-13.72	891.68	0.02	6.99

*, ** shows 5 and 1 percent level of significance, respectively
Fig in brackets shows the SE of concerned regression co-efficient

Reference

- Acharya SP, Basavaraja H, Kunnal LB, Mahajanashetti SB, Bhat ARS. Growth in area, production and productivity of major crops in Karnataka. Karnataka J of Agril. Sci. 2012;25(4):431-436.
- Dhar S. "Trend and Performance of Major Food grain Production." The Echo. 2013;1(4):103-111.
- Ganjeer Pradeep. A Review on Trend in Area, Production and Productivity of Wheat Crop in different Districts of Northern Hills of Chhattisgarh State, Bull. Env. Pharmacol. Life Sci. 2017;6[1]:302-304.
- Gautam Ajay, Sisodia BVS. Analysis of trends and growth rate of wheat crop and forecast of its production in Uttar Pradesh, Journal of Pharmacognosy and Phytochemistry. 2018;7(5):3306-3310.
- Nain Mohit. Instability and Trend in Area, Production and Productivity of Rice Crop in Haryana and India, Current Journal of Applied Science and Technology. 2019;37(5):1-9. Article no.CJAST.51517.
- Mahesh P, Deepa NR. Trend Analysis of Area, Production and Productivity of Rice in Kerala in the Context of Food Security, International Journal of Agricultural Research and Review, ISSN: 2360-7971, 2016 November;4(8):539-546.
- Prasher RS, Bahl SK. Growth and instability in Himachal Pradesh agriculture: A decomposition analysis, Bihar J Agric. Marketing. 1998;6(1):43-49.
- Rajendraprasad, Supriya, Bhavne Mhv. Growth trends of Maize crop in Telangana region of Andhra Pradesh. The journal Research A.N.G.R.A.U. 2012;40(4):104-107.
- Shanker G, Shrivastava A, Saxena RR. "Growth and Instability: An Inter-Zonal Analysis of Kharif and Rabi Crops in Chhattisgarh." Research J Engineering and Tech. 2010;1(1):18-23.
- Sharma A, Kalita DC. Trends of area, production and productivity of food grain crops in north eastern states. Nagaland University Res. J. 2004;2:31-37.
- Sharma, Hemant, Parihar TB, Kapadia K. "Growth Rates and Decomposition Analysis of Onion Production in Rajasthan State of India", Economic Affairs, 2017 March, 62(1),
- Shibu SK, Thomas J, Thomas EK. Area, production and productivity of cashew in Kerala – A Trend Analysis The Cashew. 2004;18(3):22-26.
- Sunandini. Analysis of Trends, Growth and Instability in Rice Production in Andhra Pradesh CJAST. 2020;39(42):40-46. Article no.CJAST.63517.
- Yoginder Alagh K, Sharma PS. Growth of crop production: 1960-61 to 1978-79 is it decelerating. Indian Journal of Agricultural Economics. 1980;35(2):104.