Original Research Article

Trends, Growth Rates, Correlation Analysis of Paddy in Balaghat District of Madhya Pradesh

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A B S T R A C T

Keywords

Area, Production, Productivity

The present study was carried out in Krishi Vigyan Kendra Badgaon Balaghat under Jawaharlal Nehru Krishi Vishwavidyalaya Jabalpur. The highest area of paddy was found in the year 2013-14 (274.52 thousand ha) and the lowest area found in the years 2007-2008 (244.34 thousand ha). The time trend regression equation is $Y = 0.0799\,X + 247.5$ and R^2 value is 0.262, which is significant at 1 % probability level. The highest production of 1084.9 thousand tones and lowest production of 303.88 thousand tones are observed in the year 2007-08, respectively. The regression equation of area with time is $Y = 38.87\,X + 122.1$ and R^2 value is 0.73, which is highly significant at 1 % probability level. The highest productivity was found in the year 2018-19 (4093 kg ha^{-1}) and lowest productivity 49 was found in the year 2001 (1145 kg ha^{-1}). The time trend regression equation is $Y = 145.5.\,X + 514.8$ and R^2 value is 0.77, which is highly significant at 1 % probability level. During the first decade (2001-2010), the growth rate of area , production was productivity was positive in Balaghat (0.3,3.2, and 4%/ year) and similarly in second decade (2011-2020) the the growth rate of area , production was productivity was positive in Balaghat 0.8,10.1, and 10%/ year respectively.

Introduction

Agriculture is the backbone of India's economy, providing direct employment to about 67 percent of the working people in the country. Agriculture contributes about 16.1 percent to GDP and one – fourth of India's exports are agricultural products. Rice one of the important staple foods which cover 65 percent of the population in India. It is the largest consumed calorie source among the food grains. With a per capita availability of 74.2 kg. It meets 31.4 percent of the total calorie requirement.

Rice has shaped the culture, diets and economic of thousands of millions of peoples. For more than half of the humanity " rice is life". Considering its importance position, the United Nation designated year 2004 as the "International Year of rice. Importance of rice is as follows: a. Rice is an important staple food crop for more than 60 per cent of the world people. In 2008, more than 430 million metric tons of rice was consumed worldwide, according to the USDA. b. Ready to eat products eg. popped and puffed rice, instant or rice flakes, canned rice and fermented products are produced c. Rice straw is used as cattle feed, used for

thatching roof and in cottage industry for preparation of hats, mats, ropes, sound absorbing , straw board and used as litter material. d. Rice husk is used as animal feed, for paper making and as fuel source. i e. Rice bran is used in cattle and poultry feed, defatted bran, which is rich in protein, can be used in the preparation of biscuits and as cattle feed. f. Rice bran oil is used in soap industry. Refined oil can be used as a cooling medium like cotton seed oil / corn oil. Rice bran wax, a byproduct of rice bran oil is used in industries.

India is the second largest producer of rice in the world next to china paddy being the major cereal crop of India, it is grown in almost all the provinces of the country but more than 86 percent of the total production accounts for the states of Andhra, Pradesh, West-Bengal, Tamilnadu, Uttar Pradesh, Bihar, Orissa, Madhya Pradesh, Chhattisgarh, Punjab and Assam.

Materials and Methods

The present study is carried out in Krishi Vigyan Kendra, Balaghat district of Madhya Pradesh, the long term crop data in regard to area, production and productivity for paddy that are grown during *kharif* and *rabi* seasons of different blocks of Balaghat were collected from the published records of department of Agriculture, Government of Madhya Pradesh, Bhopal. Data were obtained for the period 2001 to 2019-2020 and were used in present study.

Trend analysis

For temporal analysis of area, production and productivity of oilseeds crop in Balaghat district of Madhya Pradesh the time trend equations were constructed as:
Y = a + b X
Where,

Y = area, production, productivity
X = year
a = intercept
b = slope
The slope indicates the trend of area, production and productivity over the study period.

Data base

Crop data

The long term crop data in regard to area, production and productivity for paddy that are grown during *kharif* seasons of different blocks of Balaghat district were collected from the published records of department of Agriculture, Government of Madhya Pradesh, Bhopal Data were obtained for the period 2001 to 2020 and were used in present study.

Rainfall

The monthly rainfall data for long-term period (2001 to 2020) were obtained from the department Land Revenue Balaghat, which maintain data bank as part of its activity.

Decadal growth rate

Linear growth rate

Decadal linear growth rate of the area, production and productivity of paddy were calculated by using following formula: -

$$\text{Growth rate} = \frac{B}{Y} \times 100$$

Where,

B = Slope in decadal yield
Y = Mean decadal yield

To calculate the production performance of paddy in Balaghat districts of Madhya Pradesh, secondary data of area, production

and productivity were collected from published records of department of Agriculture, government of Madhya Pradesh, Bhopal. Decadal linear growth rate was estimated for the period from 2001 to 2020. The whole period was divided into two-sub periods i.e.

> Period I – (2001 to 2010)
> Period II – (20011 to 2020)

Correlation

In order to find out the relationship of yield paddy with total rainfall in cropping period (June-October), correlation coefficients were calculated by formula A.

Formula A

$$r(x, y) = \frac{Cov(x, y)}{\sqrt{var(x).var(y)}}$$

Where,

r (x, y) = Correlation coefficient between combination x and y
var (x) = Variance of combination x
var (y) = Variance of combination y

Results and Discussion

Area

In Balaghat district, time trend pattern of area for different years is shown in Fig .1 The area of paddy constant during the study period. The highest area was found in the year 2013-14 (274.52 thousand ha) and the lowest area found in the years 2007-2008 (244.34 thousand ha). The time trend regression equation is Y= 0.0799 X +247.5 and R^2 value is 0.26, which is significant at 1 % probability level.

Production

In Balaghat district the production pattern of different years is shown in Fig. 2. The production of paddy highly fluctuated during study period. The highest production of 1084.9 thousand tonnes and lowest production of 303.88 thousand tonnes are observed in the year 2007-08, respectively. The regression equation of area with time is Y = 38.87 X +122.1 and R^2 value is 0.73, which is highly significant at 1 % probability level.

Productivity

The trend in productivity of paddy inBalaghat district during different years is shown in Fig. 3. The productivity has fluctuated during the study period, but is gradually increasing. The highest productivity was found in the year 2018-19 (4093 kg ha^{-1}) and lowest productivity 49 was found in the year 2001 (1145 kg ha^{-1}). The time trend regression equation is Y = 145.5. X +514.8 and R^2 value is 0.77, which is highly significant at 1 % probability level.

The time trend analysis area, production, and productivity of paddy showed that the area under paddy is positively and significantly increasing in black soil of Balaghat (R = 0.26**), production (R = 73**) and productivity (R = 0.77**) respectively in district having better moisture content.

Decadal linear growth rates:

During the first decade (2001-2010), the growth rate of area, production was productivity was positive in Balaghat (0.3, 3.2, and 4%/ year) and similarly in second decade (2011-2020) the growth rate of area, production was productivity was positive in Balaghat 0.8,10.1, and 10% / year respectively.

Relationship between rainfall and crop yield

Correlation is significant at the 0.05 level (2-tailed).

Table 2 indicated that there is significant negative correlation between grain yield and rainfall. It's mean that high amount of rainfall adversely affect the grain yield.

Table.1 Decadal linear growth rates (%) of paddy in Balaghat districts of Madhya Pradesh

Duration	Growth Rate %
2001-2010 A	0.3
P	3.2
Y	4
2011-2020 A	0.8
P	10.1
Y	10

Table.2 Relationship between total rainfall and yield of paddy in Balaghat districts

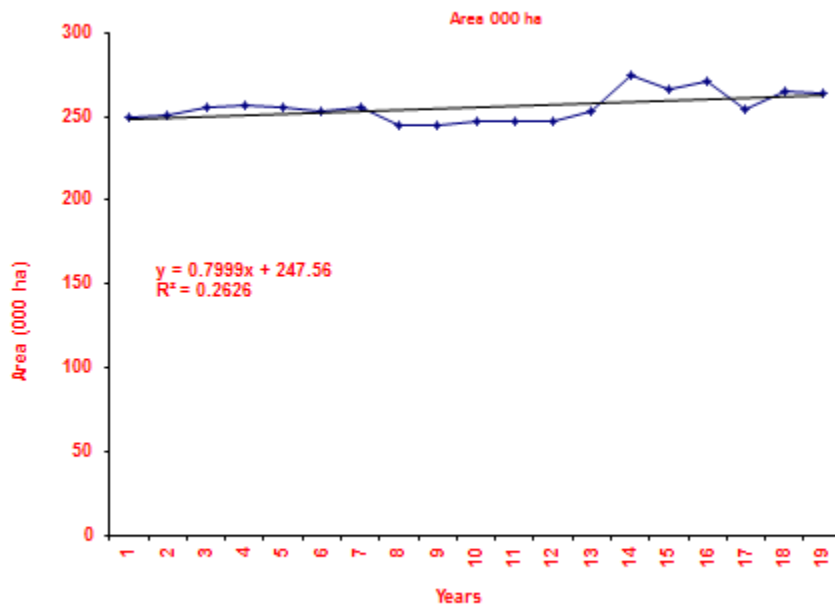| Sr.No.	Yield kg/ha	Rainfall mm
Yield kg/ha	1	-0.463*
Rainfall mm	-0.463*	1

Fig.1 Trend of Area of Paddy Balaghat district
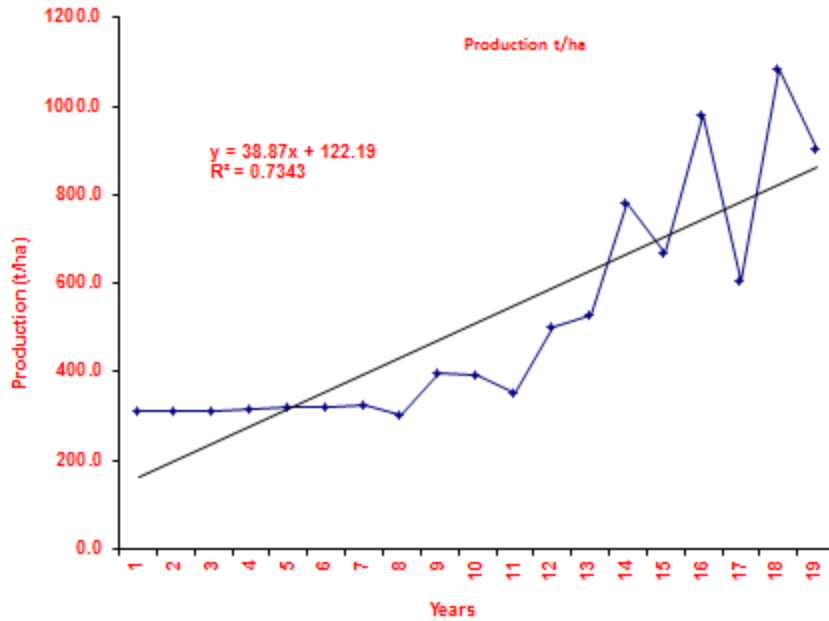
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Fig.2 Trend of Production (t/ha) of Paddy Balaghat district
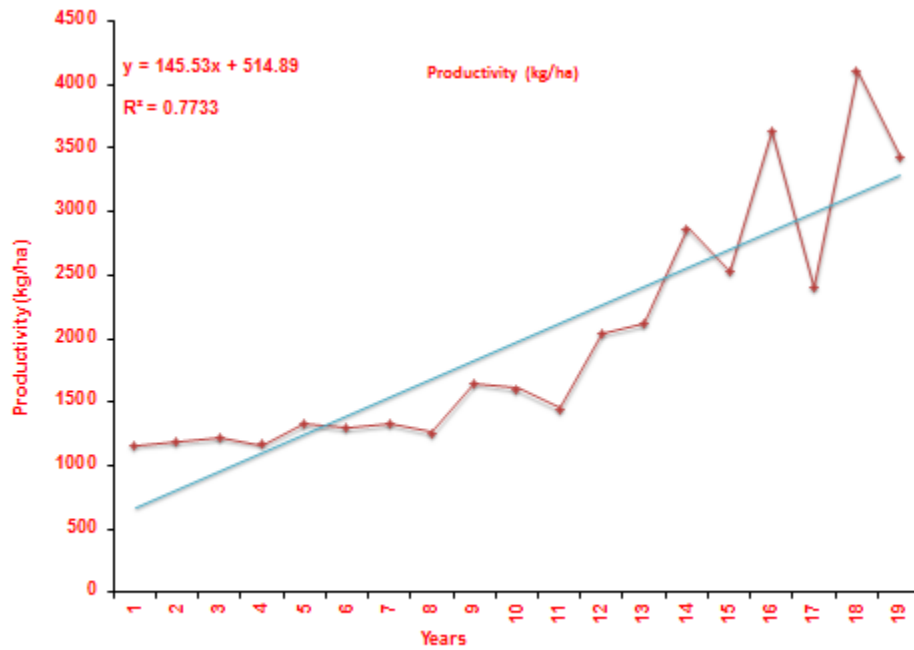

Fig.3 Trend of Productivity (Kg/ha) of Paddy Balaghat district

References

Hegde, D.M. 2005. Oilseed Scenario – Past, Present and Future with special reference to rapeseed-mustard. *In*: Winter school held at National center for Rapeseed-Mustard, Sewar, Bhartpur, Rajasthan. pp. 1.

Gauraha, A.K., Shrivastava, R.S.L., Banafar, K.N.S. and Mathur, P. 2003.

Production performance resource use efficiency, technology adoption and constraints in chickpea production in Durg district of Chhattisgarh International Chickpea Conference, Raipur, C.G., India, pp. 104-109.

Agashe, D.R, ASRAS Sastri, Pandurang Bobade and Rajni Agashe. (2018). Trends of area, production and productivity of groundnut in different districts of Chhattisgarh, *Journal of Pharmacognosy and Phytochemistry*, Vol. 7 ,No.(4) pp. 1254-1259.

Agashe, D.R, A.S.R.A.S. Sastri, Pandurang Bobade and Rajni Agashe. (2018). Trends of Area, Production and Productivity of Linseed in Different Districts of Chhattisgarh, *Int.J.Curr.Microbiol. App.Sci*, Vpl. *7 No.* (7) pp. 711-718.

Agashe, D.R, A.S.R.A.S. Sastri, PandurangBobade and Rajni Agashe (2018). Trends of area, production and productivity of rapeseed and mustard in different districts of Chhattisgarh, India. *Int.J.Curr.Microbiol.App.Sci, Vol.7, No.*(7) pp. 711-718.

Agashe, D.R, PandurangBobde, Vinayak Pandey and Rajni Agashe (2018). Trends of area, production and productivity of Sesamum in Different districts of Chhattisgarh. *Bulletin of Environment, Pharmacology and Life Sciences Bull. Env. Pharmacol. Life Sci.*, Vol8 No.[5] pp. 53-57.

Agashe, D.R, Pandurang Bobde, Vinayak Pandey and Rajni Agashe (2018).Trends of area, Production and Productivity of Soybean in undivided districts of Chhattisgarh. *Bulletin of Environment, Pharmacology and Life Sciences Bull. Env.Pharmacol.Life Sci.*, Vol8

No. [5]pp.57-59.