Int.J.Curr.Microbiol.App.Sci (2021) *10*(03): 2030-2035

International Journal of Current Microbiology and Applied Sciences
***ISSN: 2319-7706* Volume 10 Number 03 (2021)**
Journal homepage: http://www.ijcmas.com

Original Research Article https://doi.org/10.20546/ijcmas.2021.1003.259

Trends and Decadal Linear Growth Rate of Area, Production and Productivity of Gram in Balaghat District of Madhya Pradesh

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Keywords

Area, Production, Productivity

Article Info

Accepted:
18 February 2021
Available Online:
10 March 2021

A B S T R A C T

The present study was carried out in Krishi Vigyan Kendra Badgaon Balaghat under Jawaharlal Nehru Krishi Vishwavidyalaya Jabalpur. The time trend analysis area, production, and productivity of gram showed that the area under gram was positively and significantly increasing in black soil of Balaghat, (R = 0.73**), production (R = 73**) and productivity (R = 0. 81***) respectively in district having better moisture content. The growth rate of area, production, and productivity in the first decade (1997-98) and second decade (2007-08 to 2016-17) was positive in districts. Significant negative correlation between gram yield and rainfall.

Introduction

Pulses are a cost effective source of protein in human diets. Additionally, they maintain soil fertility through biological nitrogen fixation in soil and thus play a vital role in furthering sustainable agriculture. In 2005-07, globally 60 million tons of pulses are produced annually from 72 million hectares (FAOSTAT). Chickpea, also known as garbanzo bean, Indian pea, *ceci*bean, Bengal gram, and hummus, kadalekaalu (Kannada), *Chana or Channa*is an edible legume of the family fabaceae, subfamily Faboideae. Chickpea (*Cicer arietinum* L.) is the fourth largest grain-legume crop in the world following soybean, dry pea and dry bean (FAO, 2005). Developing countries like India, China, Brazil, Turkey and Mexico account for nearly two thirds of global chickpea production. However, the average productivity of chickpea in India is very low at about 600 Kg/ha against the average global productivity of 857 Kg/ha and 1,900 Kg/ha in Canada and USA in 2006-08.However, the per capita production in India of pulses has declined from 60g/day in 1970-71 to36g/day in 2007-08.

The two commercial types of chickpeas produced are *desi* and *kabuli*. *Kabuli* chickpeas, also known as garbanzo beans, have a larger, cream colored seed with a thin seed coat. The *desi* type has a smaller, darker colored seed with a thick seed coat. Chickpeas thrive under good moisture

conditions with daytime temperatures between 21 to 29 degrees Celsius and nighttime temperatures near 20 degrees Celsius. Length of maturity depends on available heat and moisture, but is in the range of 95-105 days for *desi* type and 100-110 days for *kabuli* type.

The *desi* form is also known as Bengal gram or *Kala Chana*. *Kabuli* chickpea is the kind widely grown throughout the Mediterranean. Chickpea is a *Rabi* (post-rainy) crop and is sown from November to December and harvested from February to March and has an average shelf life of over a year.

In most of the regions in India chickpea crop is grown by smallholder farmers with no irrigation and minimal inputs other than land and labor. In contrast, in the Australia, Canada and USA. Chickpea produced on a commercial scale using improved varieties and modern crop management practices, irrigation and purchased inputs. Yields are therefore considerably higher and more stable than in India.

These regions have the highest Chickpea productivity ranging from 1.32- 1.47 t/ha. In contrast Asia has the lowest productivity of 0.80 t/ha.

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 gram that are grown *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 1997-98 to 2019-2020 and were used in present study.

Trend analysis

For temporal analysis of area, production and productivity of gram 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.

Decadal growth rate

Linear growth rate

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

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

Where,

B = Slope in decadal yield
Y = Mean decadal yield

To calculate the production performance of gram in 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 1997-98 to 2019-2020. The whole period was divided into two -sub periods i.e.

Period I – (1997-98 to 2006-07)
Period II – (2007-08 to 2016-17)

Results and Discussion

Area

In Balaghat district, time trend pattern of area for different years is shown in Fig. 1. The area of gram were increasing pattern during the study period of 1997-98 to 2016-17.

The highest area was found in the year 2019-20 (57.25 thousand ha) and the lowest area found in the years 1997-98 (4.7 thousand ha). The time trend regression equation is Y= -1.8214 X +61.265 and R^2 value is 0.73**, which is significant at 1 % probability level.

Production

In Balaghat district the production pattern of gram in different years is shown in Fig. 2. The productions of gram were increasing pattern during the study period of 1997-98 to 2016-17 The highest production of 70.87 thousand tonnes found in year 2019-20 and lowest production of 2.0 thousand tonnes are observed in the year 1997-98, respectively. The regression equation of area with time is Y = 1.7253 X -7.1223 and R^2 value is 0.63, which is highly significant at 1 % probability level.

Productivity

The trend in productivity of gram in Balaghat 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 (1530kg ha^{-1}) and lowest productivity was found in the year 1997-98 (420 kg ha^{-1}). The time trend regression equation is Y = 7.358X +43.685 and R^2 value is 0.81***, which is highly significant at 1 % probability level. The time trend analysis area, production, and productivity of gram showed that the area under gram was positively and significantly increasing in black soil, sandy loam soil of Balaghat, (R = 0.73**), production (R = 63**) and productivity (R = 0. 81***) respectively in district having better moisture content.

Sodhiya (1990) estimated the linear trend in area, production and productivity of 10 major crops in Sagar division, Madhya Pradesh, for the period 1956-57 to 1982-83. He covered various crops such as wheat, rice, sorghum, millet, barley (in the cereal group), chickpea, lentil (pulse group) and linseed, sesamum, and soybean (in the oilseed crop). He found that crop such as sorghum and millet is decreasing, while, the production was increasing of some inferior crop like sesamum.

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

Duration (Years)		Growth Rate (%)
1997-2006	**A**	4.6
	P	7
	Y	3
2007-2016	**A**	17.1
	P	2
	Y	2

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

Sr.No.	Yield kg/ha	Rainfall mm
Yield kg/ha	1	-0.103*
Rainfall mm	-0.103*	1

Fig.1 Trend of area of Gram in Balaghat District

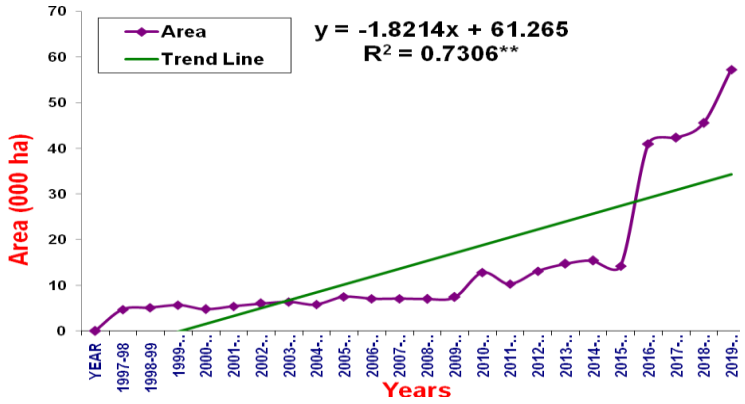


Fig.2 Trend of production of Gram in Balaghat District

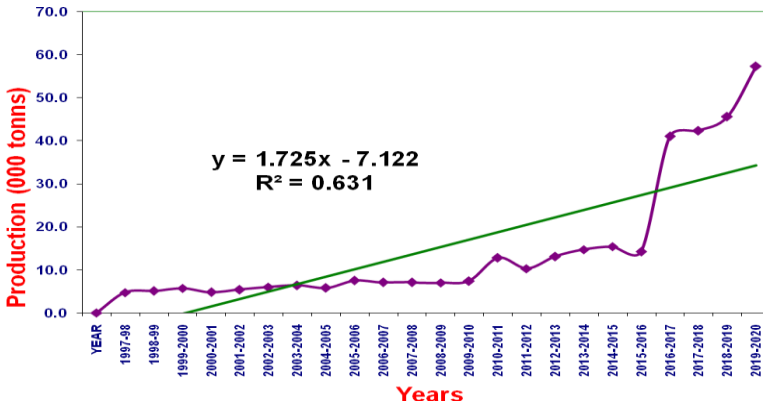
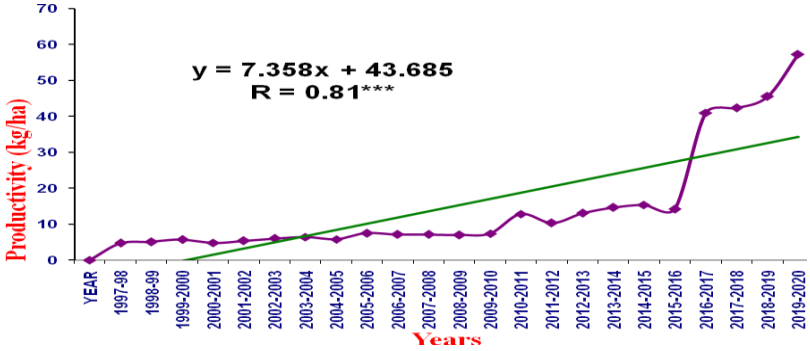


Fig.3 Trend of production of Gram in Balaghat District



Decadal growth rate

Linear growth rate

The decadal linear growth rate of area, production and productivity of groundnut for three decades 1997-2006, 2007-2016are shown in Table 1.

Area

In the first decade (2097-2006) and second decade (2007-2016) the linear growth rate of area of gram was positive in the districts i.e. 4.6% and 17.1% respectively.

Production

The linear growth rate of production of gram was also positive in both the decade i.e. 7 % and 2%.

Productivity

The linear growth rate of Productivity of gram was also positive in both the decade i.e.3 % and 2 % respectively shown in table 1.

The result revealed that the growth rate of area, production, and productivity in the first decade (2097-2006) and second decade (2007-2016) was positive in districts.

Nagraj and Gowda (1997) showed the trend of area, production and productivity along with the pattern of instability in area, production and productivity of safflower in Karnataka for period of 31 years from 1964-65 to 1994-95. The period was divided into sub-periods, period I (1964-65 to 1976-77) and period (1976-77 to 1994-95). They found significant increase in area during the study period was mainly due to emphasis given by the state and central government. The change in mean yield was found responsible for increased production of the state.

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.

References

Nagraj, C.V. and Gowda, M.V.S. 1997. Growth and instability of safflower production in Karnataka. *Agricultural Situation in India*. pp. 257-259.

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, PandurangBobade and Rajni Agashe 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.

How to cite this article:

Hemant Rahangdale, R. L. Raut and Agashe, D. R. 2021. Trends and Decadal Linear Growth Rate of Area, Production and Productivity of Gram in Balaghat District of Madhya Pradesh. *Int.J.Curr.Microbiol.App.Sci.* 10(03): 2030-2035.
doi: https://doi.org/10.20546/ijcmas.2021.1003.259