International Journal of Chemical Studies

P-ISSN: 2349–8528
E-ISSN: 2321–4902
IJCS 2019; SP6: 383-387

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(Special Issue -6)
3rd National Conference
On
PROMOTING & REINVIGORATING AGRI-HORTI, TECHNOLOGICAL INNOVATIONS [PRAGATI-2019]
(14-15 December, 2019)

Trends of area, production and productivity of Total oilseeds in Different districts of Chhattisgarh

Dharmendra Agashe, Rajni Agashe, Dr. RL Raut and Jitendra Marskole

Abstract
The regression analysis indicates that the of area of total oilseeds significantly increasing in Rajnandgaon (R = 0.48**), Bastar (R = 0.38*), Raigarh (R = 0.54**) and Surguja (R=0.71**) districts under clay loam soil having better moisture content and retentions capacity and better productivity. The area under the total oilseeds witnessed significant decreasing trend during study period in Raipur (R = 0.71**) and Bilaspur (R = 0.42**), whereas, the increasing trend in total oilseed in Durg district has (R = 0.14) non-significant.
The production of total oilseed positively and significantly increased in Raipur (R = 0.63**), Durg (R = 0.65**), Rajnandgaon (R = 0.79**), Bastar (R=0.49**), Bilaspur (R = 0.58**), Raigarh (R = 0.74**) and Surguja (R=0.76**) due to increasing productivity of these districts, owing to Governmental intervention as well as efforts at farmer level to store or create irrigation facilities for taking second crop.
The total oilseeds shows, that productivity under total oilseeds increased significantly in Raipur (R = 0.92**), Durg (R = 0.74**), Rajnandgaon (R = 0.80**), Bilaspur (R = 0.91**), Raigarh (R = 0.77*) and Surguja (R = 0.67*) due to technology impact, intensive cultivation by progressive farmer in small area. Minor fluctuations may be due to some management variations from year to year but steady increase in productivity is due to exposure of farmer to new technology of crop production. The productivity of Bastar district (R = 0.32) also increased but statically, it is non-significant.

Keywords: Oilseed, Trend analysis, Regression equations

Introduction
In Chhattisgarh, total oilseeds area is 657.4 (Thousand ha.), in which 52% area is covered in *Rabi* and 47% in *Kharif* seasons. The productions, productivity of oilseed are 310.5 (Thousand tonnes.) and 472 kg/ha, respectively. The production of oilseed in the state is below that of the national average. Linseed (46.2 Thousand tonnes.), rapeseed-mustard (62.0 Thousand tonnes.) occupy major share with very low productivity due to cultivation under *utera* cultivation (Sowing of crop in standing paddy crop, 20-25 day before harvest) (Hegde, 2005) [1].
The climate of the state is dry sub-humid type. The average rainfall of the state is around 1400 mm, of which more than 90 percent is received during the southwest monsoon (June-September). The onset of monsoon is around 10 June in southern most part of Bastar plateau and extends over the entire area by 25 June. The monsoon starts withdrawing from mid September and by 25th September it withdraws from the entire state.

Materials and Methods
The present study is carried out in the state Chhattisgarh, which came in to existence on 1st Nov. 2000 as a result of bifurcation of M.P. state. It lies in eastern part of India and located

between 17^0 41$^{'}$ N and 24^0 45$^{'}$ N latitude and 79^0 30$^{'}$ E and 84^0 15$^{'}$ E longitude. Orrisa surrounds it in the east in the west by M.P. and Maharashtra, in the north by U.P. and Jarkhand and in the south by Andhra Pradesh.

Table 1. The study was carried out in 7 undivided districts of Chhattisgarh regions, which are:

S. No	Station	Latitude	Longitude
1	Raipur	21°14′N	81°39′E
2	Durg	21°13′N	81°17′E
3	Rajnandgaon	21°05′N	81°02′ E
4	Bastar	19°05′N	82°02′ E
5	Bilaspur	22°05′N	82°08′ E
6	Raigarh	21°55′N	83°24′ E
7	Surguja	23°07′N	83°12′ E

The long term crop data in regard to area, production and productivity for groundnut sesames, linseed, rapeseed-mustard, soybean and total oilseeds that are grown during *kharif*and *rabi* seasons of different districts of Chhattisgarh were collected from the published records of department of Agriculture, Government of Madhya Pradesh, Bhopal and Government of Chhattisgarh, Raipur. Data were obtained for the period 1974-75 to 2003-04 and were used in present study.

Trend analysis

For temporal analysis of area, production and productivity of oilseeds crop in undivided districts of Chhattisgarh 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.

Result and Discussion

Area

The time trend pattern of the area of total oilseeds in Raipur is shown in Fig. 1. Trend of total oilseed show decreasing area at rate of 1405 ha/year during the study period. The largest area under total oilseed was observed in the year 1975-76 (88.7 thousand ha), whereas, lowest area was observed in the year 1998-99 (33.0 thousand ha). The regression equation is Y = -1.405 X + 73.924 and R value is 0.71, which highly significant at 1 % probability level.

In Durg district, area of total oilseeds showed stagnation over the study period as shown in Fig. 1. The largest area was found in the year 2003-04 (104.0 thousand ha) and the lowest

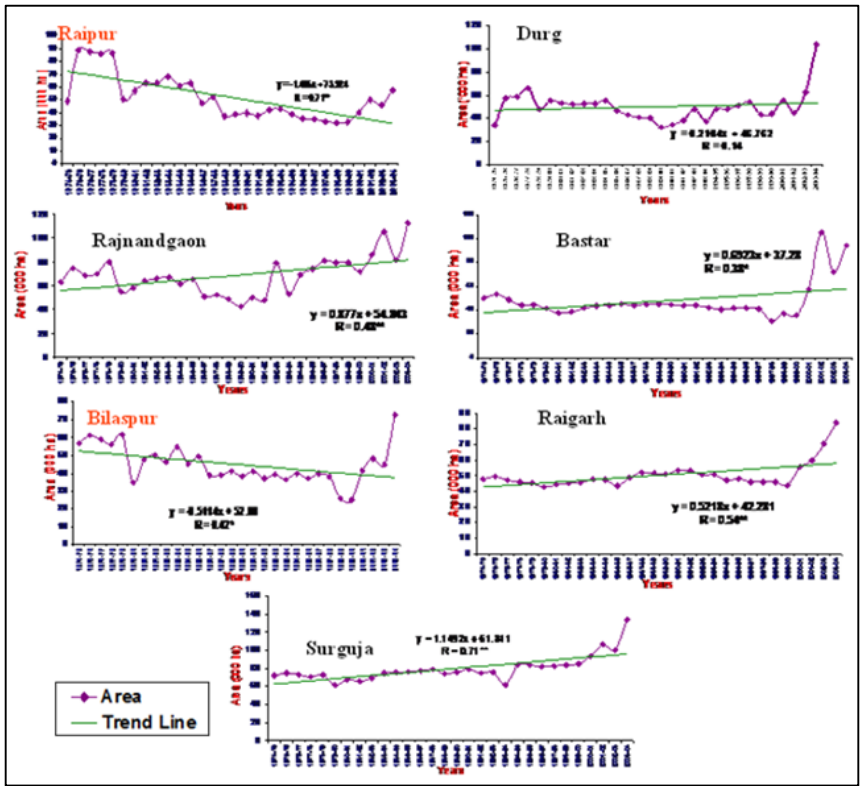

Fig 1: trends of area of total oil seeds in different districts of Chhattisgarh area was found in the year 1989-90 (32.1 thousand ha). The time trend equation is Y = 0.2104 X + 46.762 and R value is 0.14, which is non-significant.

In Rajnandgaon district, the area under total oilseeds during study period has been shown in Fig. 1. The area showed an overall increasing trend at the rate of 877 ha/year with large interannual fluctuations. The largest area under total oilseeds was found in the year 2003-04 (112.3 thousand ha) and the lowest area was found in the year 1989-90 (42.3 thousand ha). The regression equation is Y = 0.877 X + 54.843 and R value is 0.48, which is statistically significant at 1% probability level.

In Bastar district, trend of area under total oilseeds showed stagnation during last century, but it showed sharp increase in the present century as shown in Fig. 1. The highest area of 105.6 thousand ha and the lowest area of 8.8 thousand ha were found in the years 1997-1998 respectively. The time

trend equation was Y = 0.6923 X + 37.28 and R value is 0.38, which is significant at 5 % probability level.

In Bilaspur district, the area under total oilseeds showed decreasing trend at the rate of 511 ha/year as shown in Fig. 1. The highest area was found in the year 2003-04 (69.2 thousand ha), whereas, lowest area was found in the year 1999-2000 (24.9 thousand ha). The regression equation is Y = -0.5114 X + 52.88 and R value is 0.42, which is significant at 5 % probability level.

The time trend pattern of area under total oilseeds for Raigarh district for different years is shown in Fig. 1. The area showed stagnation until 1999-2000, after that sharp increase was observed. The highest area was found in the year 2003-04 (84.1 thousand ha) and the lowest area was found in the year 1979-80 (43.0 thousand ha). The regression equation is Y = 0.5218 X + 42.281 and R value is 0.54, which is significant at 1 % probability level.

In Surguja district, the area under total oilseeds has shown considerable year-to-year increase at the rate 1149 ha/year as shown in Fig. 1. The largest area was found in the year 2003-04 (133.6 thousand ha), whereas, lowest area was found in the year 1993-94 (61.2 thousand ha). The regression equation is Y=1.149 X + 61.811 and R value is 0.71, which is highly significant at 1 % probability level.

The regression analysis indicates that the of area of total oilseeds significantly increasing in Rajnandgaon (R = 0.48**), Bastar (R = 0.38*), Raigarh (R = 0.54**) and Surguja (R=0.71**) districts under clay loam soil having better moisture content and retentions capacity and better productivity. The area under the total oilseeds witnessed significant decreasing trend during study period in Raipur (R = 0.71**) and Bilaspur (R = 0.42**), whereas, the increasing trend in total oilseed in Durg district has (R = 0.14) non-significant.

Production

In Raipur district, the production of total oilseeds continuously increased at the rate of 482 t/ year as shown in Fig. 2. The highest production was observed in the year 2001-02 (33.8 thousand tonnes) and the lowest production was found in the year 1979-80 (4.8 thousand tonnes). The regression equation is Y = 0.4824 X + 7.0657 and R value is 0.63, which is significant at 1 % probability level.

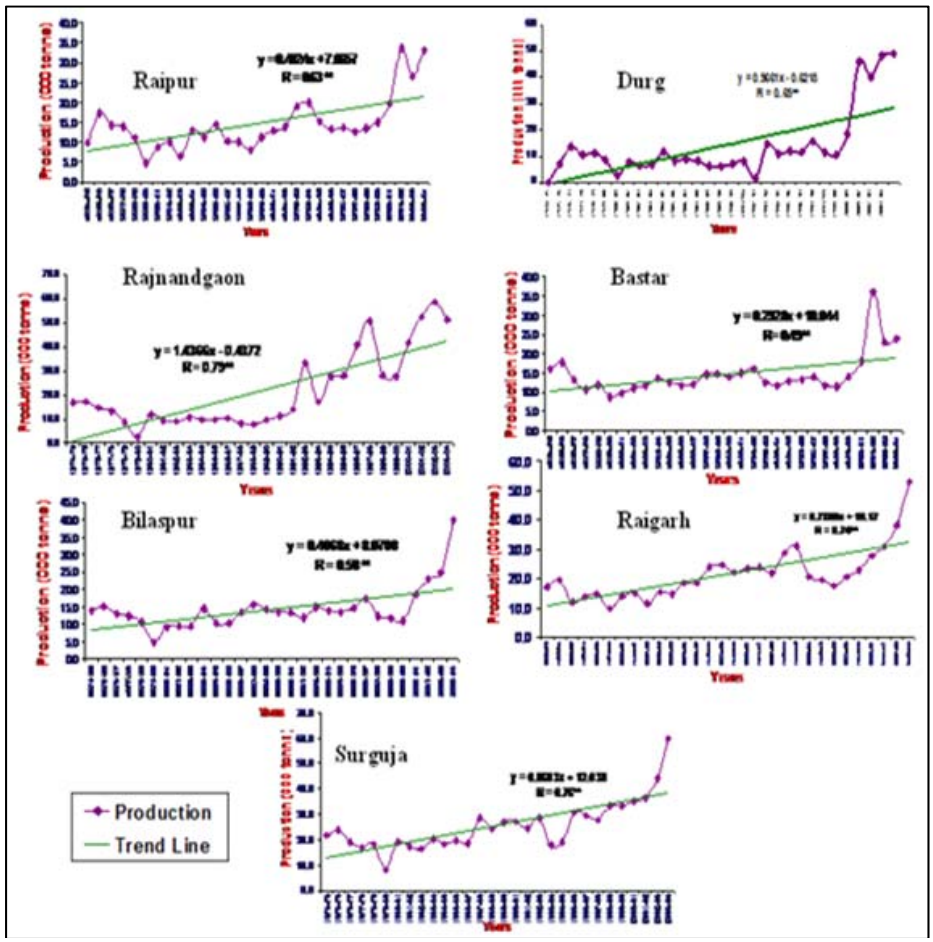

Fig 2: trends of production of total oil seeds in different districts of Chhattisgarh

The production of total oilseeds also showed increasing trend in Durg district as shown in Fig. 2. The production is increasing at the rate of 966-t/year and the highest productions of 48.9 thousand tonnes and the lowest production of 7.3 thousand tonnes were found in the years 2003-04 and 1974-75, respectively. The time trend equation is Y = 0.92661 X - 0.6218 and R value is 0.65, which is significant at 1 % probability level.

The production of total oilseeds in Rajnandgaon district increases gradually at the rate 1437 t/ha as shown in Fig. 2. The highest production of 58.8 thousand tonnes and the lowest production of 2.6 thousand tonnes were found in year 2002-03 and 1979-80. The time trend regression equation is Y

= 1.4366 X- 0.4372 and R value is 0.79, which is statistically highly significant at 1% probability level.

The production of total oilseed stagnated in Bastar district as shown in Fig. 2. The highest production was found in the year 2001-02 (36.1 thousand tonnes) and the lowest production was found in the year 1979-80 (8.8 thousand tonnes). The regression equation is Y = 0.2928 X + 10.044 and R value is 0.49, which is significant at 1 % probability level.

The trend of production, under total oilseeds in Bilaspur district fluctuated as shown in Fig. 2. However, increasing pattern has been observed in later phase of study period. The highest production of 37.8 thousand tonnes and lowest production of 4.2 thousand tonnes were observed in the years 2003-04 and 1979-80, respectively. The time trend equation is Y = 0.4068 X + 8.0708 and R value is 0.58, which is significant 1 % probability level.

The production of total oilseed in Raigarh district has been increasing continuously as shown in Fig. 2. The highest production was found in the year 2003-04 (53.4 thousand tonnes), whereas, lowest production was found in the year 1979-80 (9.8 thousand tonnes). The time trend equation is Y = 0.7366 X + 10.17 and R value is 0.74, which is statistically highly significant at 1% probability level.

In Surguja district production under total oilseed in different years showed increasing trend at the rate of 868 t/ year as shown in Fig. 2. The highest production was found in the year 2003-04 (61.7 thousand tonnes), whereas, lowest production was found in the year 1979-80 (8.2 thousand tonnes). The regression equation is Y = 0.8683 X + 12.038 and R value is 0.76, which is highly significant at 1 % probability level.

The production of total oilseed positively and significantly increased in Raipur (R = 0.63**), Durg (R = 0.65**), Rajnandgaon (R = 0.79**), Bastar (R=0.49**), Bilaspur (R = 0.58**), Raigarh (R = 0.74**) and Surguja (R=0.76**) due to increasing productivity of these districts, owing to Governmental intervention as well as efforts at farmer level to store or create irrigation facilities for taking second crop.

Productivity

In Raipur district, the productivity of total oilseed increased at the rate of 16 kg/ha/ year as shown in Fig. 3. The highest productivity of 674.7 kg ha^{-1} and the lowest productivity of 126 kg ha^{-1} were found in the years 2001-02 and 1978-79, respectively. The time trend regression equation is Y = 15.801 X + 58.636 and R value is 0.92, which is highly significant at 1% probability level.

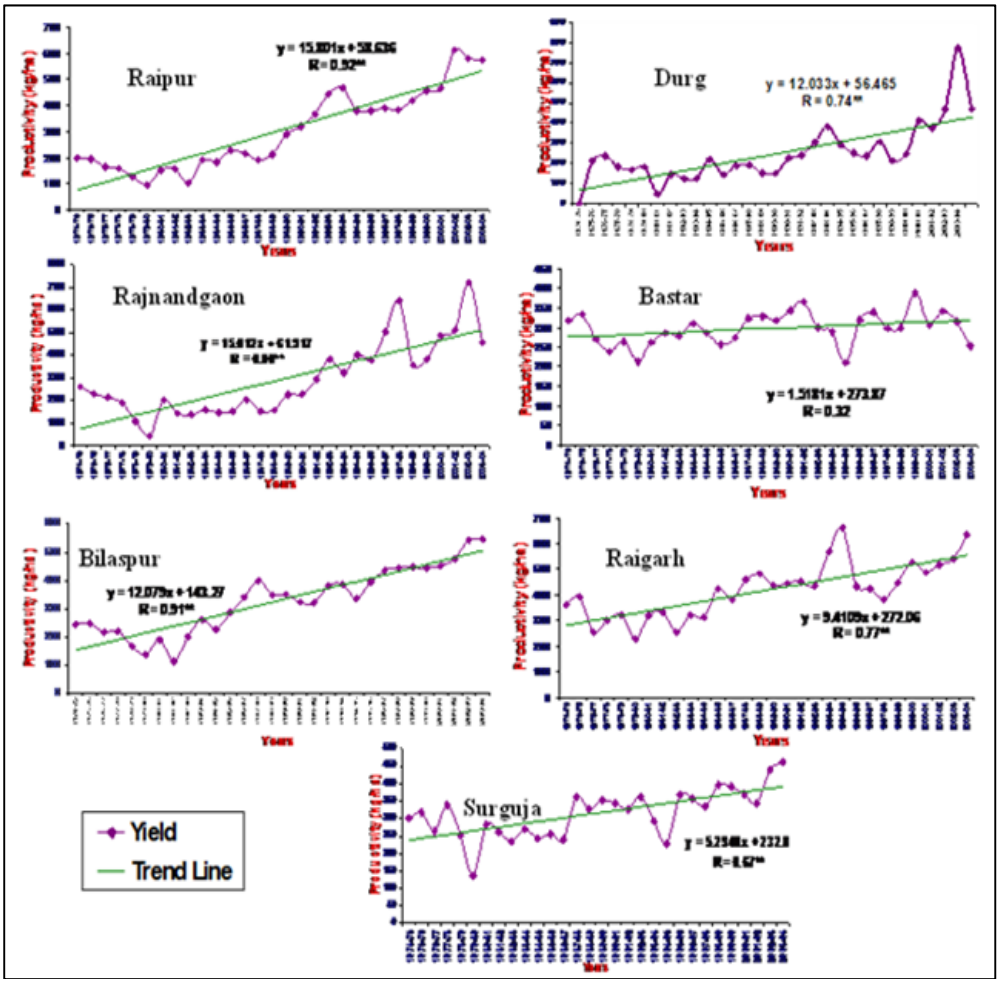

Fig 3: trend of productivity of total oil seed in different districts of Chhattisgarh

In Durg district, the productivity also increased at the rate of 12 kg/ ha/ year as shown in Fig. 3. The highest productivity was observed in the year 2002-03 (777 kg ha^{-1}) and the lowest productivity was observed in the year 1974-75 (50 kg ha^{-1}). The time trend regression equation is Y = 12.033 X + 56.465 and R value is 0.74, which is highly significant at 1 % probability level.

The productivity of total oilseeds in Rajnandgaon district showed high increasing trend, at the rate of 15 kg/ ha/year as shown in Fig. 3. The highest productivity of total oilseeds was

found in the years 2002-03 (722 kg ha^{-1}) whereas, lowest productivity was found in the year 1979-80 (47 kg ha^{-1}). The regression equation is Y = 15.012 X + 61.917 and R value is 0.80, which is highly significant at 1% probability level.

In Bastar district, productivity of total oilseeds in different years is shown in Fig. 3. The productivity showed large fluctuations during the study period. The higher productivity was found in the year 1999-2000 (388 kg ha^{-1}) and the lowest productivity was found in the year 1979-80 (213 kg ha^{-1}). The time trend regression equation is Y = 1.5181 X+ 273.87 and R value is 0.32, which is statistically non-significant.

In Bilaspur district, productivity of total oilseeds increased consistently and sharply (12 kg/ha/year) as shown in Fig. 3. The highest productivity was found in the year 2003-04 (547 kg ha^{-1}) and the lowest production was observed in the year 1981-82 (116 kg ha^{-1}). The regression equation is Y = 12.079 X + 143.27 and R value was 0.91, which was statistically highly significant at 1 % probability level.

In Raigarh district, the productivity of total oilseeds increased at the rate of 9.4 kg/ha/ year as shown in Fig. 3. The highest productivity of 661.7 kg ha^{-1} and the lowest productivity of 228 kg ha^{-1} were observed in the years 1994-95 and 1979-80, respectively. The regression equation is Y = 9.4109 X + 272.06 and R value is 0.77, which is statistically highly significant at 1 % probability level.

The productivity pattern of total oilseeds in Surguja district is shown in Fig. 3. The productivity has gradually increased at the rate of 5.3 kg/ha/year during the study period. The highest productivity of 462 kg ha^{-1} and the lowest productivity of 134 kg ha^{-1} were found in the years 2003-04 and 1979-80, respectively. The time trend regression equation is Y = 5.2948 X + 232.8 and R value of 0.67, which is significant at 1 % probability level.

The regression analysis of total oilseeds shows, that productivity under total oilseeds increased significantly in Raipur (R = 0.92**), Durg (R = 0.74**), Rajnandgaon (R = 0.80**), Bilaspur (R = 0.91**), Raigarh (R = 0.77*) and Surguja (R = 0.67*) due to technology impact, intensive cultivation by progressive farmer in small area. Minor fluctuations may be due to some management variations from year to year but steady increase in productivity is due to exposure of farmer to new technology of crop production. The productivity of Bastar district (R = 0.32) also increased but statically, it is non-significant.

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.

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