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Trends of area, Production and Productivity of Soybean in undivided districts of Chhattisgarh

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ABSTRACT
The analysis of area under soybean shows that the area under soybean is significantly increasing in Raipur (R = 0.41) Durg (R = 0.90**), Rajnandgaon (R = 0.91**) and Bilaspur district (R = 0.60**) under Entisol soil. Because soybean is a newly introduced crop in these districts and farmers are very enthusiastic in adopting the new crop, which is economically viable. The regression analysis indicates that production of soybean is positively and significantly increasing in all districts because of increasing area and productivity of these districts and productivity of soybean is positively increasing in Raipur (R=0.59**) and Durg (R = 0.68**) districts due to the adoption of recommended agro-techniques by the farmer while, productivity in Bilaspur district is decreasing marginally, which is not significant statistically.*
Keywords: Trends of area, production and productivity, Soybean, Vertisol soil

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INTRODUCTION

The oilseed scenario in the country has undergone a sea change in the last couple of years. Currently, India accounts for about 13 percent of world oilseed area and 8 percent of the world oilseed production, 6 to 7 percent of the world oil meal production, 5 to 6 percent of the world oil meal export, 15 to 17 percent of world vegetable oil import and 10 percent of the world edible oil consumption. However, the production productivity in India is only 935 kg/ha as compared to the world level of 1632 kg/ha [1].
It is newly introduced crop in Chhattisgarh, which is called as 'Wonder Crop'. In Chhattisgarh total area is 83.1 thousand ha with productivity 74.7 thousand tonnes and productivity 899 kg ha^{-1}. It is grow mostly under rainfed condition in *kharif* season in *Vertisol* soil.

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.
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

In Raipur district, time trend pattern of area for different years is shown in Fig .1 The area of soybean highly fluctuated during the study period. The highest area was found in the year 2002-03 (2.0 thousand ha) and the lowest area found in the years 1987-1988 (0.2 thousand ha). The time trend regression equation is Y= 0.0358 X +0.4819 and R value is 0.41, which is significant at 5 % probability level.

The time trend pattern of the area of soybean in Durg district is shown in Fig. 1 The area is sharply increasing during the study period. The highest area was found in the year 2003-04 (25.7 thousand ha) whereas, the lowest area was found in the year 1986-90 (0.2 thousand ha). The regression equation is Y = 0.9115 X -4.4158 and R value is 0.90, which is highly significant at 1 % probability level.

In Rajnandgaon district, the area of soybean is increasing more sharply as shown in Fig. 1 The largest area was found in the year 2003-04 (49.0 thousand ha), whereas lowest area was found in the year 1986-87 (0.3 thousand ha). The time trend equation is Y = 2.7551 X -11.264 and R value is 0.91, which is statistically highly significant at 1 % probability level.

The area of soybean is in Bilaspur district is shown in Fig. 1 The highest area is found in the year 1997-98 (7.2 thousand ha), while the lowest area from the year 1986-87 to 1991-92 (0.3 thousand ha). The regression equation is Y = 0.2005 X -0.6011 and R value is 0.60, which is significant at 1% probability level.

The analysis of area under soybean shows that the area under soybean is significantly increasing in Raipur (R = 0.41*) Durg (R = 0.90**), Rajnandgaon (R = 0.91**) and Bilaspur district (R = 0.60**) under *Entisol* soil. Because soybean is a newly introduced crop in these districts and farmers are very enthusiastic in adopting the new crop, which is economically viable.

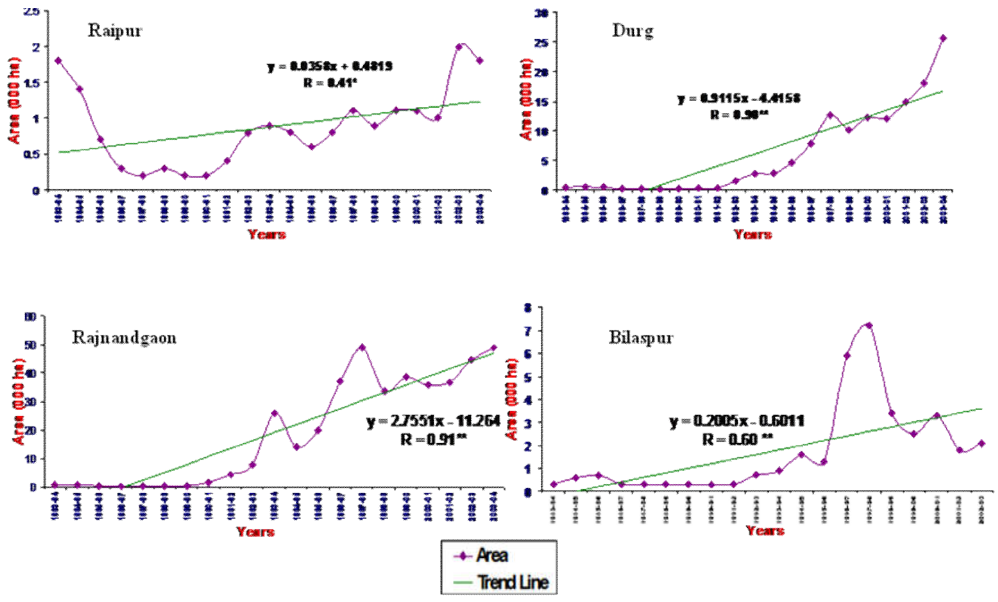

Fig. 1 : Trends of area of soybean in different districts of Chhattisgarh

Production

In Raipur district the production pattern of different years is shown in Fig. 2. The production of soybean increased during study period. The highest production of 1.9 thousand tonnes and lowest production of 0.1 thousand tonnes are observed in the year 2002-03 and 1989-90, respectively. The regression equation of area with time is Y = 0.0427 X +0.3395 and R value is 0.53, which is highly significant at 1 % probability level.

The production of soybean in Durg district in different years is shown in Fig. 2.The production of soybean has increased considerably in the last decade. The highest production was observed in the year 2002-2003 (25.8 thousand tonnes), whereas, the lowest production was found in the year 1986-87 (0.01 thousand tonnes). The regression equation for Durg district is Y = 0.9792 X -5.67 and R value is 0.81, which is highly significant at 1 % probability level.

In Rajnandgaon district, the production of soybean is increasing continuously since 1986-87 as shown in Fig. 2. The highest production of 2.0 thousand tonnes and lowest production of 0.2 thousand tonnes were found in the years 2002-03 and 1989-90, respectively. The regression equation for Rajnandgaon district is Y = 2.1244 X -9.0067 and the R value is 0.84, which is significant at 1% probability level.

Production pattern of different years of soybean crop in Bilaspur district is shown in Fig. 2. The production has highly fluctuated during the study period. The highest production (5.7 thousand tonnes) and lowest production (0.3 thousand tonnes) where found in the year 2003-04 and in the late 1983-84, respectively. The regression equation is Y= 2.1244 X -9.0067 and R value is 0.65, which is highly significant at 1 % probability level.

The regression analysis indicates that production of soybean is positively and significantly increasing in Raipur (R = 0.53**) Durg (R = 0.81**), Rajnandgaon (R = 0.84*) and Bilaspur (R = 0.65**) because of increasing area and productivity of these districts.

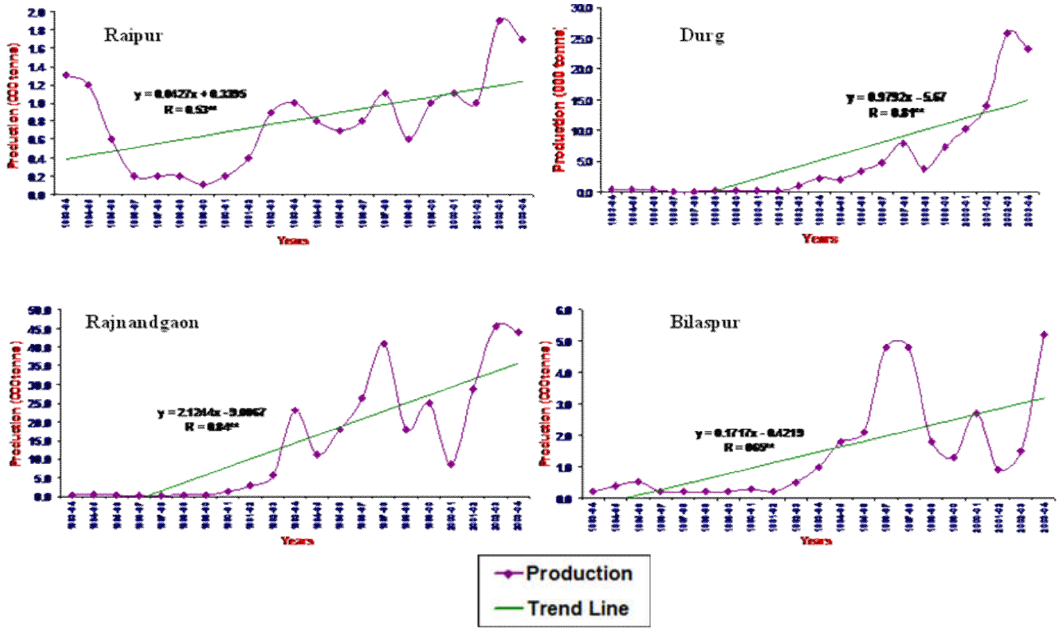

Fig. 2 : Trends of production of soybean in different districts of Chhattisgarh

Productivity

The trend in productivity of soybean in Raipur 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 2002-03 (1159 kg ha^{-1}) and lowest productivity was found in the year 1998-99 (450 kg ha^{-1}). The time trend regression equation is Y = 13.206 X +584.49 and R value is 0.59, which is highly significant at 1 % probability level.

In Durg district, the productivity of soybean is increasing slowly but consistently as shown in Fig. 3. The highest productivity of soybean is observed in the year 2002-03 (1432 kg ha^{-1}) and lowest productivity is found in the year 1998-99 (361 kg ha^{-1}). The time trend regression equation is Y = 21.778 X +434.82 and R value is 0.68, which is statistically significant at 1 % probability level.

In Rajnandgaon district, the increasing trend in productivity is shown in Fig. 3. The highest productivity was found in the year 1993-94 (1200 kg ha^{-1}), whereas, the lowest productivity was observed in the year

1987-88 (506 kg ha^{-1}). The time trend regression equation is Y = 9.557 X +797.82 and R value is 0.37, which is non-significant.

The productivity of soybean in Bilaspur district is shown in Fig. 3. The highest productivity was found in the year 1993-94 (1174 kg ha^{-1}) and the lowest productivity was found in the year 2001-02 (527 kg ha^{-1}) in Bilaspur district. The productivity in Bilaspur district has shown very high fluctuations during study period with marginally negative trend. The time trend regression equation is Y = -0.5649 X +754.45 and R value is 0.02, which is statistically non significant.

The productivity of soybean is positively increasing in Raipur (R=0.59**) and Durg (R = 0.68**) districts due to the adoption of recommended agro-techniques by the farmer while, productivity in Bilaspur district is decreasing marginally, which is not significant statistically.

Gauraha *et al.* [2] reported, that the time trend analysis from 1970-71 to 1999-2000, showed increase in area, production and productivity of chickpea in almost all the districts in the state. The production of chickpea has increased because of both intensive and extensive utilization of land, the contribution of later to the rise in production has been relatively higher in almost all the sub-regions of Chhattisgarh.

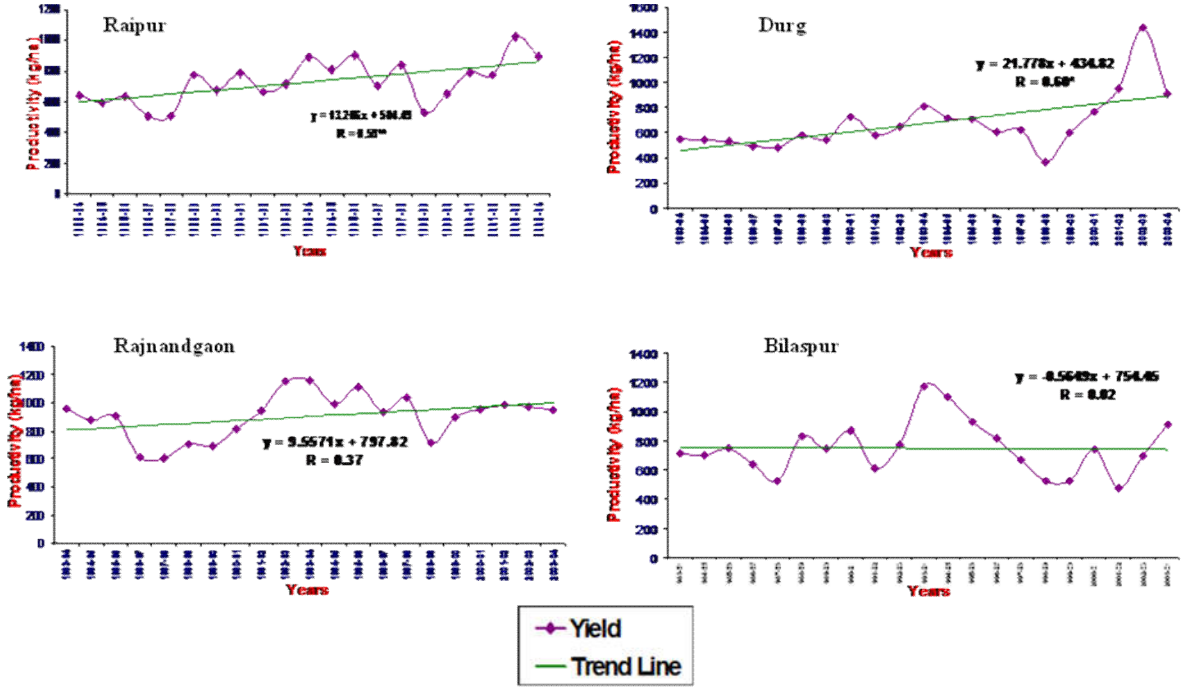

Fig. 3 : Trends of productivity of soybean in different districts of Chhattisgarh

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