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## Trends of area, production and productivity of groundnut in different districts of Chhattisgarh

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### Abstract

The time trend analysis of the area of groundnut is positively and significantly increasing in all districts due to increasing irrigation facilities and motivating the farmer for use of low cost input technology for groundnut crop under *Entisol* soil in Raipur, Durg, Rajnandgaon, Bilaspur districts and *Vertisol* soil in Surguja and Raigarh district. But it is important to note that groundnut area in the later period of the study is sharply increasing.

The production and productivity pattern of groundnut is positively and significantly increasing due to increased area in these districts including Raipur, Durg, Rajnandgaon, Bilaspur, Raigarh and Surguja due to increased fertilizer and pesticide consumption by the farmer and introduction of high yielding variety (HYP).

**Keywords:** trend, area, production and productivity

### Introduction

Indian oilseed economy is one of the largest vegetable oil producing country in the world next only to the USA and China. In the agricultural economy of India, oilseeds occupy an important place after food grains in terms of area, production and value.

Vegetable oil has become an indispensable part of present day civilized life, being next to food grains in importance. Oilseed farm the second largest agricultural commodity after cereals in India, sharing 14 percent (%) of the country's gross cropped area and counting for nearly 3 percent (%) of the gross national production and 10 percent of the value of all economical agricultural products. The edible oil industry is one of the most vibrant sectors of the Indian agricultural economy with an annual turnover of Rs. 60,000 crores (Hegde, 2005) [1].

Groundnut is the most important oilseed crop in India, accounting for up to 33% of total oilseed production and 28% of the area. India ranks first in groundnut area and production in the world. Groundnut can be cultivated in both *rabi* and *kharif* season in Chhattisgarh. Total area of groundnut in Chhattisgarh is 67.7 thousand ha<sup>-1</sup> with the production of 70.2 thousands tonnes and the productivity of 1036 kg ha<sup>-1</sup>, respectively.

### Materials and Methods

The present study is carried out in the state Chhattisgarh, which came in to existence on 1<sup>st</sup> Nov. 2000 as a result of bifurcation of M.P. state. It lies in eastern part of India and located between 17° 41' N and 24° 45' N latitude and 79° 30' E and 84° 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

The time trend pattern of the area of groundnut in Raipur district is shown in Fig. 1.1. It can be seen that area of groundnut crop suddenly increased from 1984-85 onwards in Raipur. The largest area under groundnut was observed in the year 2003-04 (15 thousand ha) whereas, the lowest area was observed in the year 1986-87 (6 thousand ha). The regression equation of the time trend is  $Y = 0.1701 X + 5.5841$ . The value of correlation coefficient (R) 0.70 and is statistically highly significant at 1 % probability level.

In Durg district, the area under groundnut in different year is shown in Fig. 1.1. The area of groundnut has increased over the time. The highest area under groundnut cultivation was found in the year 1989-90 (4.5 thousand ha) whereas, the lowest area was observed in the years 1974-75 to 1979-80 (0.1 thousand ha). The time trend equation was  $Y = 0.0868 X - 0.0625$  and the R-value was 0.62, which is significant at 1 percent probability level.

Similarly, in Rajnandgaon district the area under groundnut in different year is shown in Fig. 1.1 which, suggested increasing area in later period. The area of groundnut was observed highest in the year 2003-2004 (1.1 thousand ha), while most of year witnessed nominal cultivation area with value less than 100 ha. The regression equation is  $Y = 0.0133 X + 0.0338$  and the R value is 0.52, which significant at 1% level.

The area of groundnut in different years in Bilaspur district is shown in Fig. 1.1. The highest area under cultivation was found in the year 2002- 03 (12.0 thousand ha.) and the lowest area was observed during the period 1974-75 to 1979-80 (0.4 thousand ha.). It can be concluded from the figure that area under groundnut cultivation is rapidly increasing. Especially during the last decade area has increased many folds. The regression equation of time trend is  $Y = 0.3087 X - 1.0018$ . Whereas, the R value is 0.78, which is statistically highly significant at 1 % probability level.

The time trend pattern of the area of groundnut in Raigarh district is shown in Fig. 1.1. The area of groundnut gradually increased during the study period. The highest area under groundnut cultivation was found in the year 2003-04 (23.1 thousand ha) and lowest area was found in 1981-82 (6.1 thousand tonnes). The time trend equation is  $Y = 0.1607 X + 10.689$  and the R value is 0.42, which is significant at 5 % probability level.

The area under groundnut in Sarguja district is shown in Fig. 1.1. The area of groundnut has increased sharply during the

study period. The highest area was found in the year 2003-2004 (12.7 thousand ha, while lowest area was found in the year 1980-81 (0.1 thousand ha). The regression equation is  $Y = 0.2107 X + 2.0901$  and R value is 0.72, which is significant at 1 % probability level.

The time trend analysis of the area of groundnut shows that the area under groundnut is positively and significantly increasing in Raipur (R=0.70\*\*), Durg (R=0.62\*\*), Rajnandgaon (R=0.52\*\*), Bilaspur (R=0.78\*\*), Raigarh (R=0.42\*) and Surguja (R=0.72\*\*) due to increasing irrigation facilities and motivating the farmer for use of low cost input technology for groundnut crop under *Entisol* soil in Raipur, Durg, Rajnandgaon, Bilaspur districts and *Vertisol* soil in Surguja and Raigarh district. But it is important to note that groundnut area in the later period of the study is sharply increasing.

#### Production

In Raipur district, the production of groundnut during different year is shown in Fig. 1.2. The production of groundnut is increasing continuously in Raipur district. The highest production of 17.3 thousand tonnes and lowest production of 2.7 thousand tonnes were observed in the years 2003-04 and 1982-83, respectively. The time trend equation is  $Y = 0.2601 X + 3.0113$  and corresponding R value is 0.73, which is highly significant at 1 % probability level.

In Durg district, the production of groundnut is continuously increasing as shown in Fig. 1.2. The highest production was observed in the year 1989- 90 and the lowest production was observed in 1974-75. The time trend equation for the production of groundnut is  $Y = 0.0948 X - 0.1995$  and R value was 0.68, which was highly significant at 1 % probability level.

The production pattern of groundnut during study period in Rajnandgaon district is shown in Fig1.2. The production of groundnut has increased sharply in last decades of the study period. The highest production was observed in the year 2003-04 (1.2 thousand tonnes) and lowest production was observed in the year 1974-75 (0.05 thousand tonnes). The regression equation is  $Y = 0.0173 X - 0.06$  and R value is 0.64, which is significant at 1 % probability level.

The production pattern of groundnut during study period in Bilaspur district is shown in Fig. 1.2. The production of groundnut fluctuated during the study period. The highest production under groundnut cultivation was observed in the year 2002-2003 (12.0 thousand tonnes) and the lowest production was observed in the year from 1974-76 (0.4 thousand tonnes). The regression equation of time trend is  $Y = 0.2912 X - 1.0871$  and the R value is 0.86, which is highly significant at 1 % probability level.

The production pattern of groundnut in Raigarh district is shown in Fig. 1.2. The production of groundnut shows fluctuations during the study period. An overall increasing trend of groundnut production was observed with highest production in the in the year 2003-04 (23.7 thousand tonnes) and lowest production in the year 1979-80 (3.7 thousand tonnes). The regression equation is  $Y = 0.3692 X + 5.7209$  and R value is 0.68, which is significant at 1 % probability level.

In Surguja district, the production of groundnut is increasing gradually. The highest production of 14.0 thousand tonnes and lowest production of 0.05 thousand tonnes were observed in the years 2003-2004 and 1979-80, respectively. The regression equation is  $Y = 0.2926 X + 0.1654$  and R value is 0.82, which is highly significant as shown in Fig. 1.2.

The production of groundnut is positively and significantly increasing in Raipur (R = 0.73\*\*), Durg (R = 0.68\*\*), Rajnandgaon (R = 0.64\*\*), Bilaspur (R = 0.64\*\*), Raigarh (R = 0.68\*\*) and Surguja (R = 0.82\*\*) all the districts of Chhattisgarh due to increased area in these district.

**Productivity**

In Raipur district, the productivity of groundnut during different years is shown in Fig. 1.3. The productivity of groundnut is increasing in Raipur district. The highest productivity of 1201 kg ha<sup>-1</sup> and lowest productivity of 420 kg ha<sup>-1</sup> were observed in the year 1992-93 and 1976-77, respectively. The time trend equation is Y = 14.4 X + 602.87 and corresponding R value is 0.68, which is significant at 1 % probability level.

In Durg district, the productivity of groundnut is increasing as shown in Fig. 1.3. However, there is considerable year-to-year fluctuation in the productivity of the groundnut and the productivity showed decreasing trend in last two years. The producing highest productivity was found in the year 1992-93 (1442 kg ha<sup>-1</sup>). The lowest productivity was found in the year 1982-83 (516 kg ha<sup>-1</sup>). The time trend equation for the productivity of groundnut is Y = 18.679 X + 598.42 and R value is 0.72, which is significant at 1 % probability level.

The productivity pattern of groundnut during the study period in Rajnandgaon district is shown in Fig. 1.3. The overall trend in productivity shows increasing yield with stagnation in the later period. The highest productivity was observed in the year 1992-93 (1448 kg ha<sup>-1</sup>) and lowest productivity was found in the year 1976-77 (571 kg ha<sup>-1</sup>). The time trend equation is Y = 16.332 X + 658.52 and The R value is 0.71, which is highly significant at 1 % probability level.

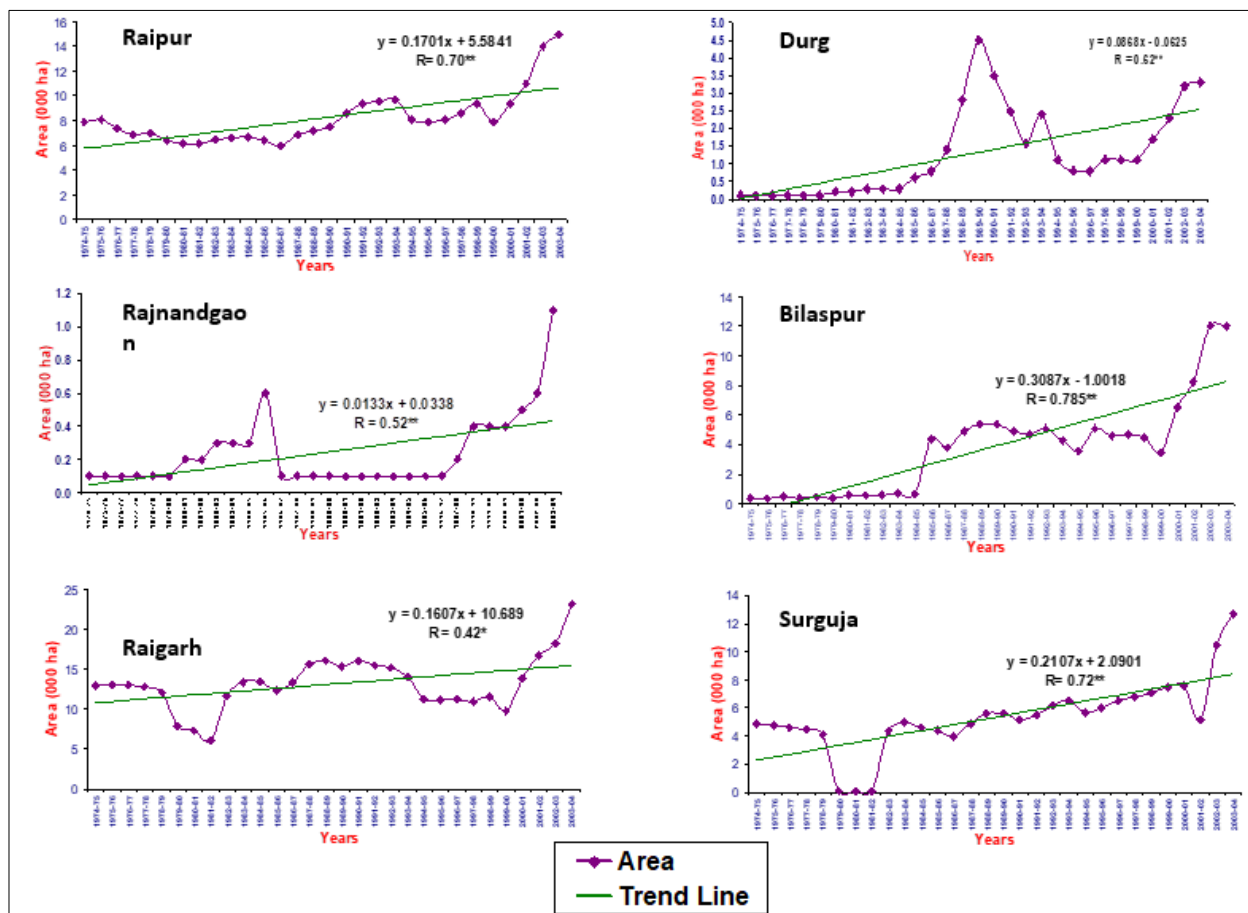
In Bilaspur district, there is considerable year-to-year fluctuation in the productivity of groundnut with stagnation in later phase of study period. The highest productivity was observed in the year 1993-94 (1083 kg ha<sup>-1</sup>) and lowest productivity was found in the year 1979-80 (508 kg ha<sup>-1</sup>). The time trend equation is Y = 13.285 X + 617.15 and R value is 0.73, which is highly significant at 1 % probability level.

Similarly, in Raigarh district productivity is increasing during the study period as shown in Fig. 1.3. The highest productivity was observed in the year 1992- 93 (1341 kg ha<sup>-1</sup>) and lowest productivity was found in the year 1976-77 (392 kg ha<sup>-1</sup>). The time trend equation is Y = 18.234 X +568.04 and R value is 0.76, which is highly significant at 1 % probability level.

The productivity of groundnut in Surguja district is shown in Fig. 1.3. The highest productivity was observed in the year 2003-04 (1103 kg ha<sup>-1</sup>) and lowest productivity was found in the year 1984-85 (516 kg ha<sup>-1</sup>). The regression equation is Y = 18.591 X +516.51 and R value is 0.84, which is statistically highly significant at 1 % probability level.

The productivity pattern of groundnut is positively and significantly increasing in all the districts including Raipur (R = 0.68\*\*), Durg (R = 0.72\*\*), Rajnandgaon (R = 0.71\*\*), Bilaspur (R = 0.73\*\*), Raigarh (R = 0.76\*\*) and Surguja (R = 84\*\*) due to increased fertilizer and pesticide consumption by the farmer and introduction of high yielding variety (HYP).

Gauraha *et al.* (2003) [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 1.1:** Trends of area of groundnut in different districts of Chhattisgarh

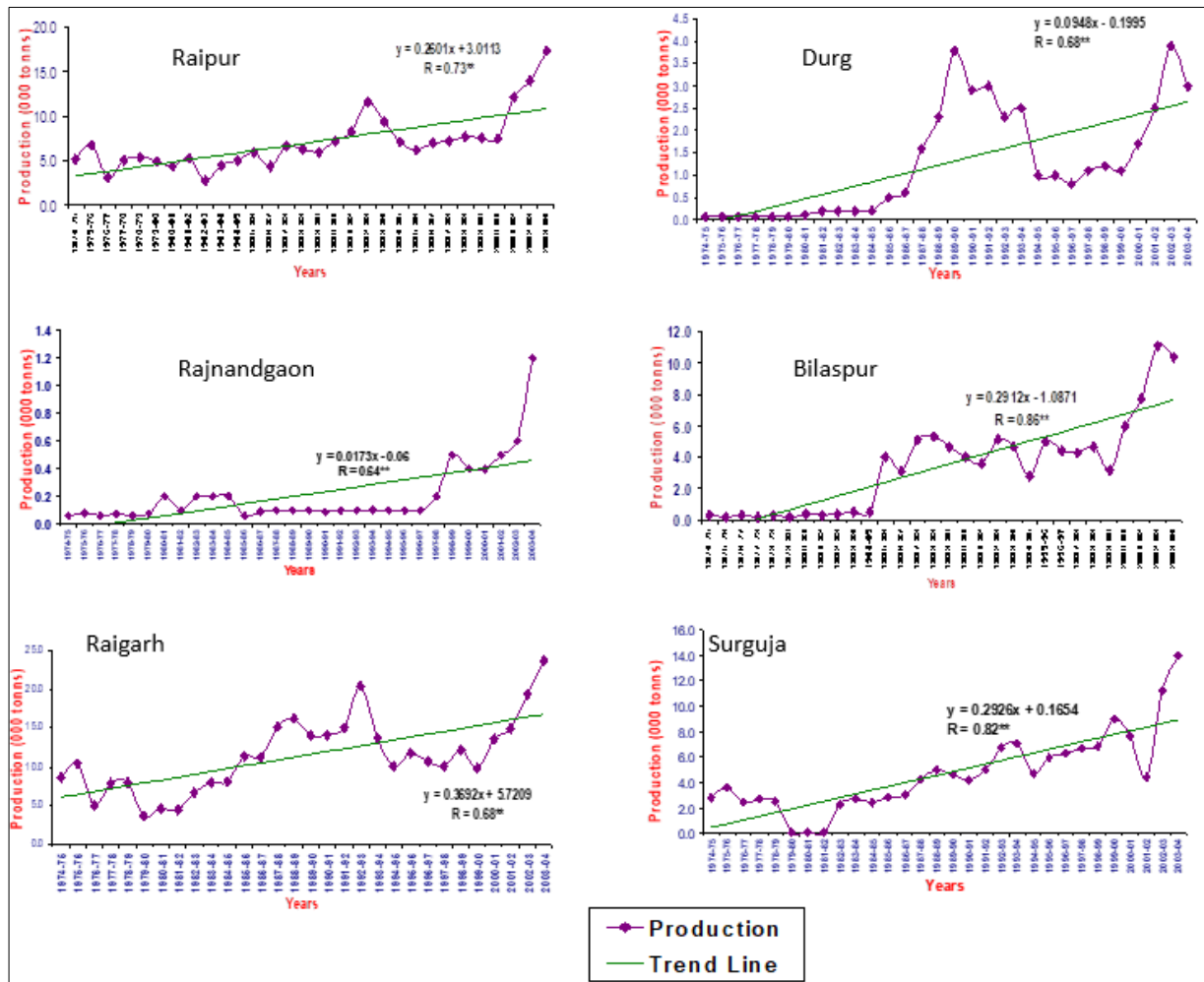


Fig 1.2: Trends of production of groundnut in different districts of Chhattisgarh

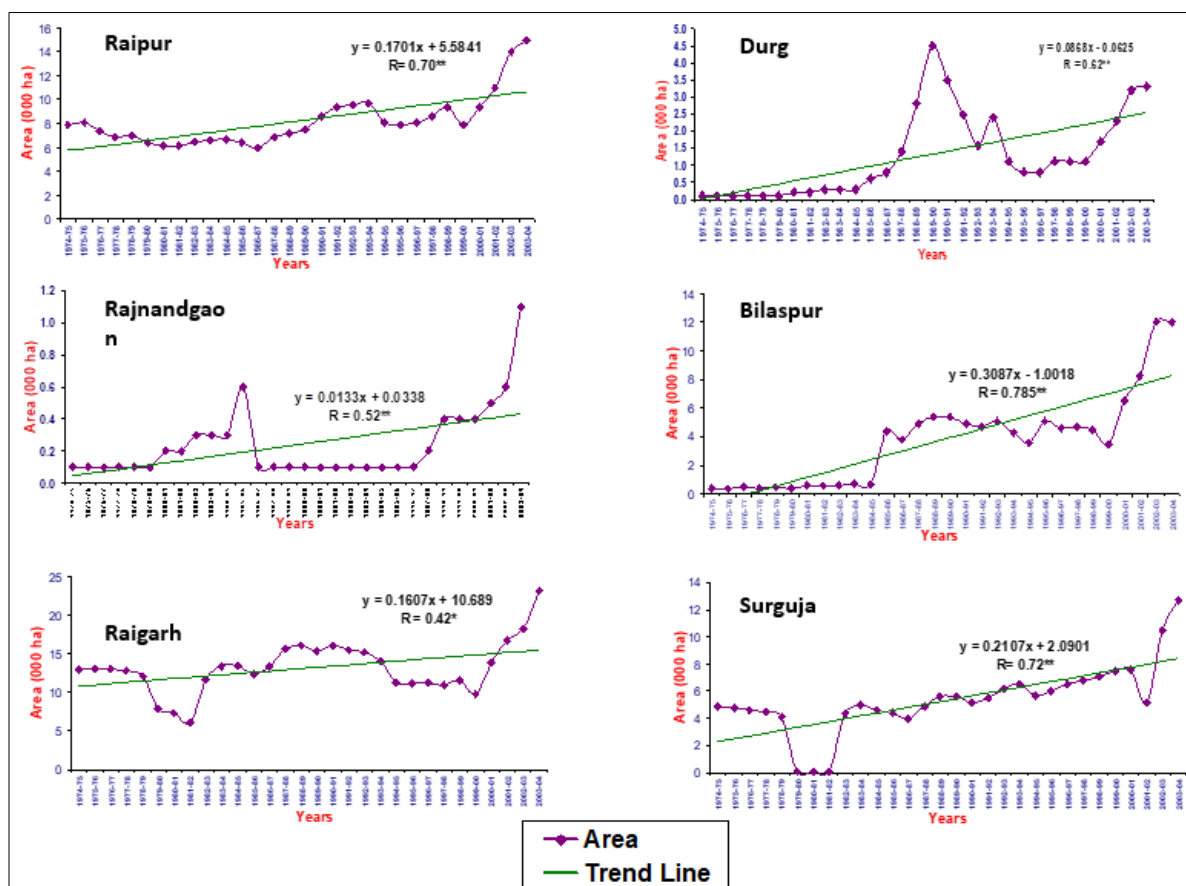


Fig 4.1: Trends of area of groundnut in different districts of Chhattisgarh

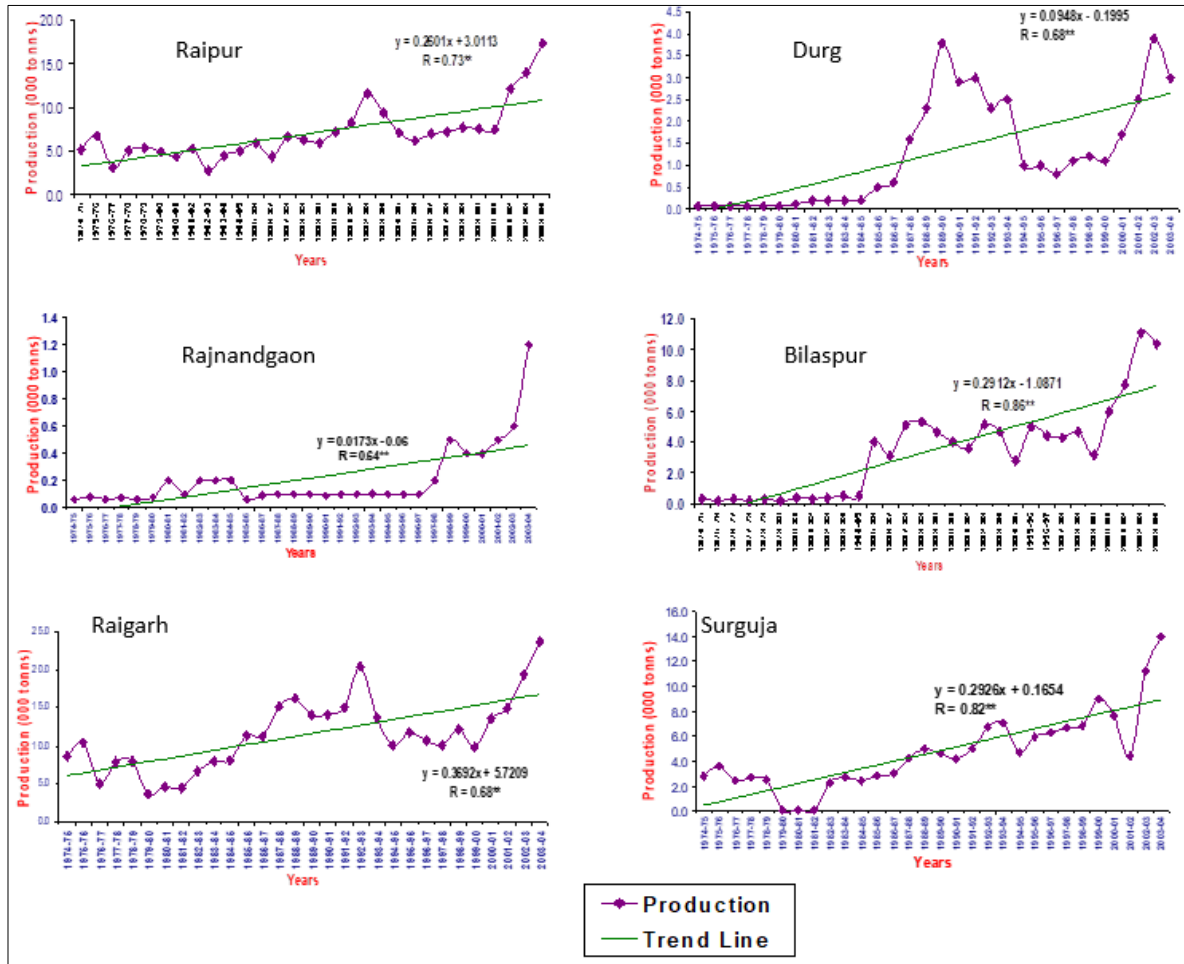


Fig 4.2: Trends of production of groundnut in different districts of Chhattisgarh

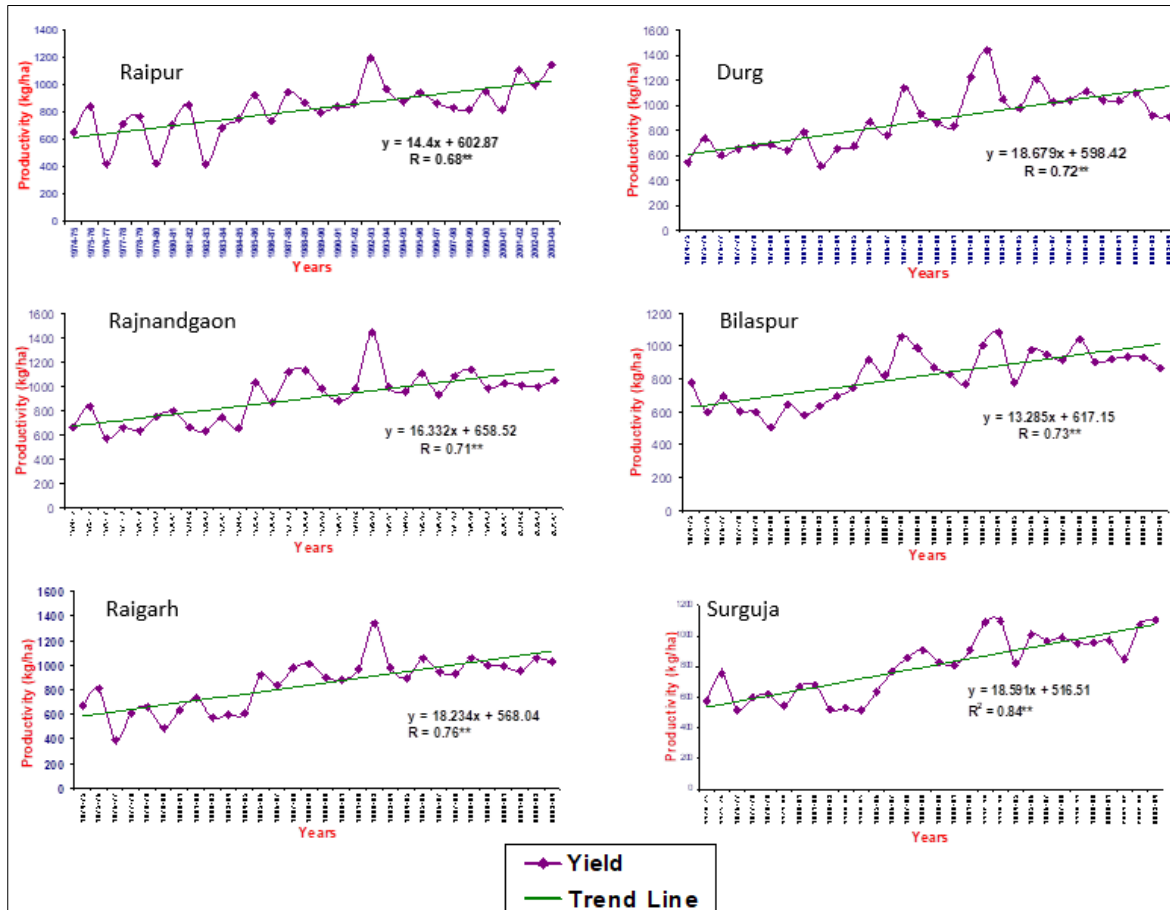


Fig 4.3: Trend of productivity of groundnut in different districts of Chhattisgarh

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