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## Growth rate of area, production and yield of maize in Kanker district of Chhattisgarh

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### Abstract

Maize is an important cereals crop provides significant sources of cash through the sales of seed, corn, fodder and wax. Maize plays an important role in the diets of rural populations. An attempt has been made in the study to estimate growth in area, production and yield of maize in Kanker district and Chhattisgarh state (2003 to 2013). The growth rate was worked out by using exponential analysis. The area of maize in Kanker district increased by 15.62 hectares from 15.20 hectares in 2003 to 30.82 hectares in 2012-13 similarly in case of the state area of maize cultivation is decrease by 10.9 hectares from 2003 to 2012-13. Actually the good growth by area of this crop may be observed only after 2002 in the district. In the Kanker district production of maize is increased from 20.40 metric tons to 38.28 metric tons during this period of 20 years. Similarly in the state production of maize is decreased by 7.2 metric tons during the period of 20 years. The yield of maize in Kanker district and Chhattisgarh state was estimated as 1019 kg and 910 kg during 2003 periods. The yield of this crop is increased about 400 and 550 kg/ha up to year 2012-2013. The compound growth rate of area over the period of 10 years is estimated as 4.837 per cent in the Kanker district which is significantly increased.

**Keywords:** Area, production, yield, maize

### Introduction

Maize is one of the most important cereal crops after rice. Maize has many assets for its wide distribution, its husk give protection from birds and rain can be harvested over a long period since it can be left dried in the field until harvesting is convenient, can be stored long, provide numerous useful food products and frequently preferred to sorghum and other millets. In fact it is a major source of starch. Corn starch (maize flour) is a major ingredient in home cooking and in many industrialized food products. Maize is also a major source of cooking (corn, wax and commercial fodder) and of maize gluten. Maize starch can be hydrolyzed and enzymatically treated to produce syrups, particularly high fructose corn syrup, a sweetener; and also fermented and distilled to produce grain alcohol. Grain alcohol from maize is traditionally the source of bourbon whiskey. Maize is sometimes used as the starch source for beer. It is also nutritive for adults of different ages. The green straw is suitable for making silage.

Maize is widely cultivated throughout the world, and a greater weight of maize is produced each year than any other grain. Worldwide production was 960 million tons 2013-14 more than rice (678 million tons) or wheat (691 million tons) (FICCI). In 2013, over 159 million hectares of maize were planted worldwide with a yield of over 5.5 t/ha. Maize is one of the most important cereals of the world. In terms of world area, India stands next to USA, Brazil, China and Mexico, whereas in production it ranks sixth (Wikipedia). Contributing to 2.4% of world production with almost 5% share in world harvested area. However, the country lags far behind in productivity – 24.7 quintal/ha against world average of 51.4 quintal/ha. and there is a huge scope for improvement in yield by improving the adoption of hybrids, particularly in traditional maize growing regions. With the growing demand from feed and starch sector, the overall demand for maize is likely to grow at a brisk pace. India has a huge potential to increase its market share and to make its presence felt in the global maize market (Wikipedia). In India, maize is grown in an area of 8.17 m. ha with a production around 19.33 m. tons and productivity 2414 kg/ha. It ranks next to rice, wheat, sorghum and pearl millet. It is the main staple food in hilly and sub mountain tracts of northern India and consumed all over the country as a fodder and grains. It is extensively grown in Uttar Pradesh, Rajasthan, Madhya Pradesh, Bihar and Karnataka. Largest area of maize is in Karnataka (1.3 m. ha.) followed by Rajasthan (1.1 m. ha.) while the production is highest in Karnataka (4.4 m. tons) followed by

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Andhra Pradesh (4 m. tons). Productivity is highest in Andhara Pradesh (5.3 t/ha) followed by Tamil Nadu (4.6 t/ha) and Karnataka (3.5 t/ha).

In Chhattisgarh it is the second important crop after rice because of favorable climatic condition of maize in Chhattisgarh. In Chhattisgarh area, production and productivity was continuously increasing. People of this state uses maize in many purposes many people grow maize for commercial purpose some use to grow it for animal feedings and for personal consumption too. Maize in Chhattisgarh is generally grown in baadies (area behind the house). It is generally grown in all season but kharif is highly suitable for its cultivation in this state.

In Kanker district of Chhattisgarh, maize is preferred by the farmers after rice. There are many reasons that farmers of the Kanker district growing maize, firstly favorable climatic conditions for its cultivation and can be grown in all the seasons but the farmers mainly grow during rabi season. Some of the farmers also growing maize during kharif as well as summer. The area of maize in Kanker district is 10.20 thousand hectares and productivity is nearly 21 q/ha. The production of maize was 31.75 thousand tons during 2011-2012. Although area of maize and its production is continuously increasing in the past of the Kanker district. Therefore, the present study is being undertaken in the district of Kanker.

Maize is highly demandable by people of Chhattisgarh in all the season. Maize captured a very good market in Kanker district which shows that it has a vast scope in future in agriculture field as well as in marketing. Most of the produce are exported to other state from Kanker. It shows that there is good demand of maize from Chhattisgarh to other states.

**Methodology**

**1. Area, Sampling and Data Collection**

Kanker districts of Bastar plateau have also noticed the higher production of maize than other districts of Baster plateau. Out of seven blocks of Kanker district of Chhattisgarh, Durgkondal and Koailibeda were selected purposively as it represents the similar agro-economic condition of Baster plateau. From Durgkondal block, three villages namely Surangdoh, Kodogaon and Karaki and from koailibeda block three villages namely Donde, Ravindranagar and Satyanandpur were selected randomly. Out of 679 farm families of the sample villages among then 498 were maize growers. Nearly 10 percent maize growers respondents (i.e. 120 farmers) were randomly selected subject to condition that at least 20 respondents should be included in sample from each of the four categories of farms i.e. Marginal, Small and Large. The well design questionnaire or schedule was

prepared to covers all the relev out aspects to work out the costs and return of maize cultivation disposal pattern of maize and their marketable surplus; and constraints prevailed in the production of marketing of maize.

**2. Analytical Procedure**

To estimate the compound growth rates of area, production and yield of maize crop is worked out in the Chhattisgarh state and Kanker district by fitting an exponential function. The following formula is used for this purpose.

$$Y = A B^t$$

Taking log on both sides

$$\log Y = \log A + t \log B$$

Assuming  $\log Y = y$

$$\log A = a$$

$$\log B = b$$

We get

$$y = a + bt$$

Where  $t = 1, 2, 3, \dots, n$

After regression between  $y$  and  $t$

We have value of  $a$  and  $b$

Where

$a = \text{Constant}$

$b = \text{Regression coefficient}$

As  $b = 1 + r$

Hence  $r = b - 1$

Where,

$r = \text{Compound growth rate (Anti-log of } B-1) \times 100$

$t = \text{Time variable (} t = 1, 2, \dots, n)$

$y = \text{Area/production/yield of groundnut.}$

**Results and Discussion**

**1. Growth rate in Area, Production and Productivity of Maize**

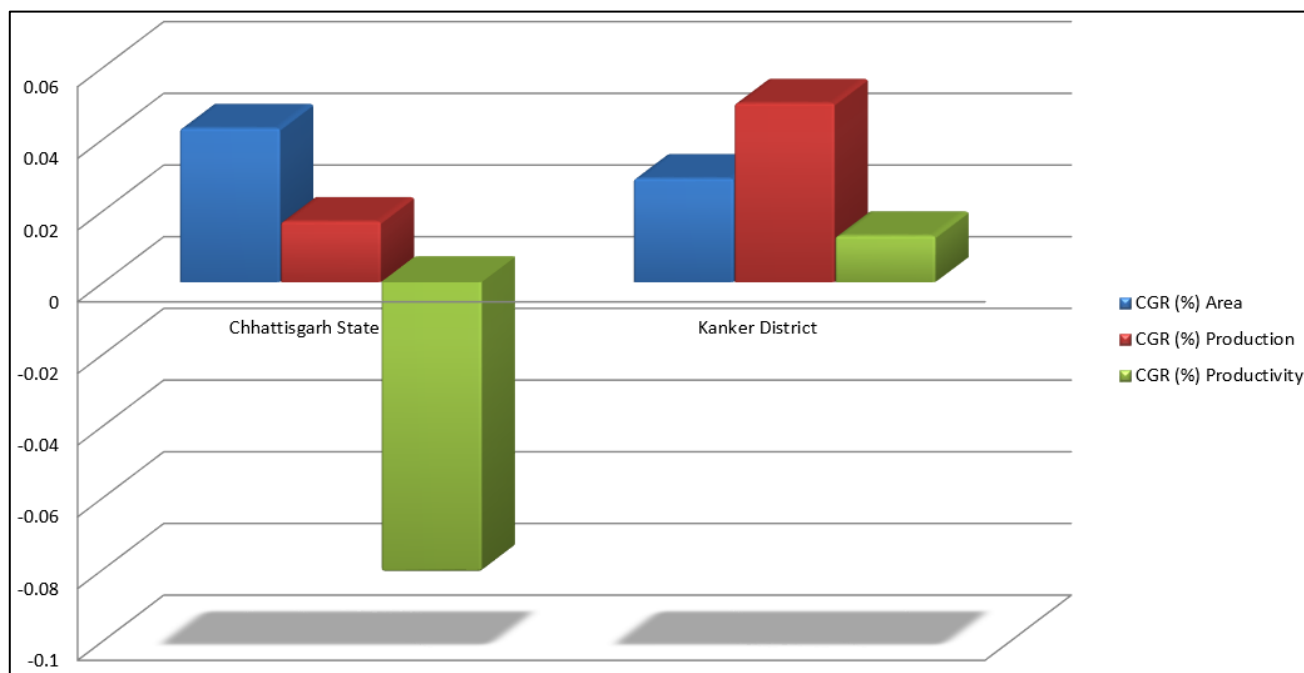
The detail insight picture of maize was understand through estimation of compound growth rate of area, production and productivity of maize over the period of 2003-04 and 2012-13, which is presented in Table 1. The significant growth of area, production and productivity of maize was observed in Chhattisgarh state as well as in sample district Kanker during the period of study. It was found to be 0.029 and 0.004 per cent growth in area of mize in the State and Kanker district in year 2002-03 to year 2012-13, which was significant 1 percent and significant 5 per cent probability level. However, significant growth in production was 0.05 and 0.017 per cent for the state and Kanker district, respectively. While productivity was found 00.081 and 0.013 percent of the state and Kanker district respectively.

**Table 1:** Compound growth rate of area, production and productivity of maize in Kanker district and Chhattisgarh state.

Particular	CGR (%)		
	Area	Production	Productivity
Chhattisgarh State	0.043*	0.017**	-0.081
Kanker District	0.029*	0.05*	0.013**

**Note:** \* Denotes the significant level at 1% of probability level at t distribution

\*\* Denotes the significant level at 5% of probability level at t distribution



**Fig 1:** Growth rate of maize in Kanker district and Chhattisgarh State

### Conclusions and Recommendations

Chhattisgarh state consists 27 districts, Out of these Kanker district contributes 13 percent in area and 16 percent production of maize. The total area of groundnut crop in Kanker district is 6979 hectare and Production is 8820 metric ton in the district. Farmers of maize and other cereals of the district need to be regulated in the market so that they can sell at the rate of minimum support price. This action will control the diversification of the maize growers from other less beneficial crops. On the other hand, maize is an important agricultural commodity next only to cereals in the country. There is a huge demand for maize in the country due to an increase in per capita popcorn consumption. To meet this demand and to reduce the huge foreign exchange in importing cereals, there is an urgent need to increase the domestic maize production of the country. An assessment of exploitable yield reservoir available in corn implies that there is a scope for doubling the maize production of the country. However, this can be possible by the complete adoption of improved maize production technologies by the growers. A thorough review on the adoption behavior of maize growers reveals that there is a scope for improving the adoption behavior of maize growers. This effort needs intensive transfer of technology efforts. However, there are certain lacunae existing in the public sector in the transfer of technology efforts. The strategies to improve the transfer of technology efforts are suggested below.

- The farmers should be motivated to participate more in the extension activities like training, demonstrations, exhibition, agriculture quiz programs and farmers fair etc., so that they may have an opportunity to learn new technology related to production technology.
- The farmers should be motivated to adopt HYVs that are stable, hardy to adverse climate conditions and resistant to insect-pest and disease.
- The credit facility should be made available to the farmers on a lower interest rate so that they can easily adopt the new technologies.
- The initiating of co-operative marketing is the answer to improve the bargaining power of maize producers in order to realize a good price of their produce.

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