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TRENDS, GROWTH AND VARIABILITY OF BENGAL GRAM IN ANDHRA PRADESH

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ABSTRACT

The main objectives of the study are to examine the trends in area, production and productivity of Bengal gram in Andhra Pradesh over a period of 1987-88 to 2006-2007. Compound growth rates of area, production and productivity were estimated by fitting semi log trend equation. Decomposition of output growth of groundnut was examined by fitting component analysis model. The compound growth rates of area production and productivity of Bengal gram over the period shows positively significant. The study also confirms the magnitude of variability in production of Bengal gram. The synchronized movements in area and productivity both was responsible for low instability / variability in Bengal gram of Andhra Pradesh. Further, the study conducted a decomposition analysis to determine the contribution of different components to the growth rate. The decomposition analysis revealed that in the total production of Bengal gram was completely due to the change in area under the crop as the yield and interaction effects were very small.

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INTRODUCTION

Bengal gram (*Cicer arietinum* L.) belongs to the family Leguminaceae. It is called chickpea or gram in south Asia and Garbanzo bean in most of the developed countries. Bengal gram is the highest consumed pulse crop of India. It is widely appreciated as healthy food. It is a protein rich supplement to cereal based diets, especially to the poor in developing countries, where people are vegetarians or cannot afford animal protein. India is the largest chickpea producing country with a share of 64 per cent in world production. Bengal gram is a cool season crop; it requires cooler and longer winter season and more suited to northern India. However, a major shift took place in gram area from northern India to central and southern India. Earlier Andhra Pradesh was not considered suitable for Bengal gram cultivation because of mild and short winter season. However, a yellow revolution has taken place in pulses *i.e.*, availability of short duration varieties and suitable for warmer short season environment production technology. In southern region of India, Maharashtra, Andhra Pradesh, and Karnataka are the major Bengal gram producing

states. Andhra Pradesh has secured the highest chickpea yield (1065 kg/ha) in the country and it is almost double than the national average (569 kg/ha). Thus, considering the importance and need, the present study has been taken with the specific objectives of the study are as follows

1. To study the trend and growth of area, production and productivity of Bengal gram in A.P.
2. To examine the contribution of area productivity towards increasing the production; the magnitude and instability for the Bengal gram crop.

MATERIALS AND METHODS

The present study utilizes the time series data (1995 - 1996 to 2006 - 2007) on area, production and productivity of Bengal gram was collected from various publications and websites of Directorate of Economics and Statistics Government of India, Agricultural Statistics at a glance and Bureau of Economics and Statistics of Andhra Pradesh state.

The exponential function $Y = A B^t$ was fitted to the data to compute the compound growth rates.

$$\text{Compound growth rate (r)} = (\text{antilog } b - 1) * 100 \quad (1)$$

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Table 1. Percentage change in area, production and productivity of Bengal gram in Andhra Pradesh (1987-88 to 2006-07)

Crop	Average area (hectares)		Percentage change in area	Average Production (tonnes)		Percentage change in production	Average Productivity (Kg/ha)		Percentage change in productivity
	I	II	Period II over I	Period I	Period II	Period II over I	Period I	Period II	Period II over I
Bengal gram	87.1	301.7	246.38	58.5	331.7	467.01	635	1001.4	57.70

The compound growth rates were tested for their significance by the student's t test. The measurement of instability in time series data requires an explicit assumption of what constitutes the acceptable and unacceptable components. A systematic component which can be predicted does not constitute instability and hence, it should be eliminated from the data. The remaining unpredictable component represents the variability. There are a number of techniques available to measure the index of instability. Such techniques are found in Coppock (1962), Mac-Bean (1966), Weber and Sievers (1985), Massel (1970), Singh and Byerlee (1990) and Cuddy-Della Valle (1978). In this study the instability in area, production and productivity of Ground nut crop is measured in relative terms by the Cuddy-Della Valle index which is used in recent years by a number of researchers as a measure of variability in time series data. The simple coefficient of variation over estimates the level of variability in time-series data characterized by long-term trends whereas the Cuddy-Della Valle index corrects the coefficient of variation. The instability index IX, is given by the expression:

$$IX = CV (1 - R^2)^{1/2} \quad (2)$$

Where

CV = coefficient of variation (in percent)

R^2 = Coefficient of determination from a time trend regression adjusted by the number of degrees of freedom.

To measure the contribution of area and productivity towards increasing production of Bengal gram decomposition analysis was used.

$$P = A_0 (Y_n - Y_0) + Y_0 (A_n - A_0) + \Delta A \Delta Y \quad (3)$$

Where

P = change in production

Y_0 = Area in base year

Y_0 = yield in the base year

Y_n = yield in the current year

A_n = area in the current year

ΔA = change in area ($A_n - A_0$)

ΔY = change in the yield ($Y_n - Y_0$)

Where, the first term is the productivity contribution, second term is the area contribution and the last term is the interaction effect.

RESULTS AND DISCUSSION

To study the trends and growth of area, production and productivity of Bengal gram in A.P considering in to two periods i.e. period -I (1987-88 to 1996-97) and period -II (1997-98 to 2006-07)

The average area, production and productivity of Bengal gram in two different periods of Bengal gram was presented in Table 1. It is seen from the table that, the average area, production and productivity of Bengal gram was 87.1 hectares, 58.5 tonnes and 635 kg/ha respectively during period I. In period II, the area, production and productivity of Bengal gram was increased by 246.38 percent, 467.01 percent and 57.70 percent respectively. Percentage change Period II over I of area, production and productivity was 246.38, 467.01 and 57.70 respectively.

Growth rates

Compound growth rates in area, production and productivity of Bengal gram in Andhra Pradesh are presented in Table 2. The growth rates in area, production and productivity of Bengal gram in Andhra Pradesh was observed to be positive and significant during first, second and overall period of study. The level of variability in Bengal gram crop production is very important for sustainable production. Therefore we have estimated the relative variability in Bengal gram crop in Table-3 using equation (2). Variability in area, production and productivity are estimated over the period i.e. 1987-88 to 2006-07. It may be observed that the production (39.02) of Bengal gram recorded the highest degree of instability. It concluded that the fluctuations in production are the compound result of fluctuation in productivity and acreage. In order to find out the contribution of area, production and productivity and the interaction of the two in increasing the production, decomposition analysis was carried out. The results are presented in Table 4. It is clearly observed from the table that, during the overall period, the total production of Bengal gram was completely due to the change in area under the crop as the yield and interaction effects were very small. Therefore, it is concluded that production growth in Bengal gram over the past 20 years has been slow & unstable with substantial temporal variation in the state.

Table 2. Annual compound growth rates of Bengal gram in area, production and productivity in Andhra Pradesh state (1987-88 to 2006-07)

	Period I (1987-88 to 1996-97)	Period II (1997-98 to 2006-07)	Over all (1987-88 to 2006-07)
Area	11.77*	16.17*	13.25*
Production	17.14*	28.11*	19.09*
Productivity	6.64*	9.69*	5.25*

Table 3. Instability in area, production and productivity of Bengal gram in Andhra Pradesh (1987-88 to 2006-07)

Statistical tools	Area	Production	Productivity
AM	17.56	15.03	0.836
SD	2.670	6.235	0.2651
Instability Index (IX)	11.06	39.02	31.33

Table 4. Decomposition analysis of Area Production and Productivity of Bengal gram of Andhra Pradesh Over the Period from 1987-88 to 2006-07

Area effect (ΔA)	Production effect (ΔP)	Yield effect (ΔY)	Interaction effect
7.693	0.60	-5.484	-1.606

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