



## Growth Trends of Major Crops in Coastal Districts of Andhra Pradesh

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### ABSTRACT

The present study is an attempt to estimate the patterns of growth in area, production and productivity of different crops grown in Coastal Region of Andhra Pradesh for a period of 28 years i.e. from 1981-82 to 2008-09. The results showed that in Vizianagaram district, jowar, bajra, ragi, small millets and bengalgram recorded significant negative area growth. On the other hand, crops like maize, redgram, blackgram, greengram, sugarcane and sesamum were found associated with positive significant growth of area. Area under paddy declined at an annual rate of 0.20 per cent but it was non-significant. Among the foodgrains, bengalgram recorded the highest growth rate of productivity (3.80 per cent). In Prakasam district, area growth rate was the highest for bengalgram followed by maize and sunflower. Productivity growth rate was the highest in bengalgram (3.10 per cent) followed by chillies (2.04 per cent).

**Key words :** Compound growth rates, Food grains, Production, Productivities.

Agriculture is the bedrock of Andhra Pradesh State's economy and the agricultural production depends upon the seasonal distribution of rainfall. Its vast dryland tracts could not keep pace with the better-endowed regions resulting in wide inter-regional disparities. In order to address the problems of agriculture, the state has been implementing various schemes from time to time. Despite this, agriculture in the state has been exhibiting stagnation in growth and is seeking innovative policy and technology interventions. Diversification has been identified as one of the potential ways of enhancing growth and ensuring stability in agriculture.

Therefore the present study is made with an objective of estimating the compound growth rates of area, production and productivity of different crops grown in the study area.

### MATERIAL AND METHODS

For the purpose of the present study, two districts in the coastal Andhra region namely Vizianagaram from north coastal and Prakasam from south coastal districts were selected as primary units, based on the extent of diversification. Time series secondary data on area, production and productivity of different crops was collected from various published and unpublished sources for a period of 28 years i.e. from 1981-82 to 2008-09.

### Growth Model

The growth in area, production and productivity of the crops selected in the two districts of coastal Andhra region were analyzed using the exponential growth function of the form,

$$Y = ab^t e$$

where,

Y = Dependent variable [Area ('000 ha.) / Production ('000 tonnes) / Productivity (kg ha<sup>-1</sup>)]

a = Intercept

b = Regression coefficient

t = Time variable

e = Error term

The compound growth rates were obtained from the logarithmic form of the equation as below:

$$\ln Y = \ln a + t \ln b + e$$

The per cent compound growth rate (CGR) was derived using the relationship.

$$CGR = (\text{Anti log } b - 1) \times 100$$

### RESULTS AND DISCUSSION

The results of compound growth rates of different crops with respect to their area, production and productivity for Vizianagaram and Prakasam districts are furnished in Table 1 and Table 2 respectively.

### **Vizianagaram district**

For the purpose of present study the crops were divided into foodgrain crops and non-foodgrain crops. The foodgrain crops include paddy, jowar, bajra, ragi, maize, small millets, redgram bengalgram, blackgram, greengram and horsegram, while non-foodgrain crops are groundnut, sugarcane, mesta, sesamum, chillies and tobacco.

### **Foodgrain Crops**

#### **Paddy:**

This is the major foodgrain crop in the district and is mainly cultivated during *kharif* season with 80 per cent of the area under tanks, which in turn depends on rainfall. The results of compound growth rate of area under paddy was found to be negative and non-significant i.e. -0.20 per cent per annum, whereas, that of production and productivity were positively significant at 0.66 per cent and 0.88 per cent per annum respectively. The increase in productivity can be ascribed to the production management coupled with measures taken upto control rice blast and brown plant hopper (BPH). The results of Rajendra Prasad *et al.*, (2009) revealed a negative growth trend in area and production but showed a positive trend in yield (0.44) for paddy.

#### **Jowar:**

The compound growth rates of area and production in jowar were found to be negative at 3.45 per cent and 2.63 per cent per annum respectively which were statistically significant, while the productivity indicated a non-significant compound growth rate of 0.85 per cent per annum. The decline in the area and production of jowar was due to less profitability.

#### **Bajra:**

In the case of bajra two components namely area and production showed declining growth rates of 3.95 per cent and 4.07 per cent. The significant contraction of area resulted in the significant reduction of production. The annual compound growth rate of productivity was negative and non-significant with 0.13 per cent per annum.

#### **Ragi:**

The area and production of ragi in the district witnessed a significant fall as revealed by the negative significant growth rates of 2.59 per cent and 2.23 per cent per annum. But the productivity recorded an annual growth rate of 0.38 per cent. Finger millet is losing importance on commercial

front and its place in food basket has also gone down. The decline in area of ragi was due to acreage shift to maize, cotton etc. in north coastal districts.

#### **Maize:**

The area and production under maize had registered a positive growth of 10.64 per cent and 12.37 per cent respectively and were statistically significant. Productivity too indicated a significantly increasing compound growth rate of 1.57 per cent per annum. The increase in area was due to the shift of area under other crops like ragi etc. to maize. The accessibility to maize hybrids has led to the increase in productivity as well as production. Thangaraja *et al.*, (2006) pointed out a decline in growth rate of productivity of maize at 0.82 per cent per annum in Tamil Nadu and stated that fluctuations in the climate, deficit rainfall, lack of drought resistant varieties etc. might be some of the reasons for negative yield growth rate.

#### **Small millets:**

There was a significant decline in area of small millets at 1.86 per cent. Productivity had shown a positive non-significant growth rate of 1.63 per cent annually. The decline in area was due to shift from low valued coarse cereals to high valued commercial crops.

#### **Redgram:**

The area and productivity under redgram increased significantly at 2.64 per cent and 1.52 per cent per annum respectively, which resulted in significant increase of production at an annual growth rate of 4.24 per cent. The increase in area was driven by the inherent ability of redgram to withstand drought coupled with knowledge gained by the farming community regarding varietal use. Lakshmanan *et al.*, (2005) observed the increasing growth rates only with regard to area and production.

#### **Bengalgram:**

The area declined significantly at 2.45 per cent per annum but there was a significant increase in the productivity at 3.80 per cent. Because of this increase in productivity, the production registered a positively significant growth (1.23 per cent) even at declining area growth.

#### **Blackgram:**

Positive significant growth rates were observed in area (5.47 per cent) and production (4.20 per cent) of blackgram at 1 per cent and 10 per cent

Table I. Compound growth rates of area, production and productivity of different crops in Vizianagaram district (1981-82 to 2008-09)

(Per cent)				
S. No.	Crop	Area	Production	Productivity
<b>I. Foodgrain Crops</b>				
1.	Paddy	-0.20	0.66	0.88
2.	Jowar	-3.45**	-2.63**	0.85
3.	Bajra	-3.95**	-4.07**	-0.13
4.	Ragi	-2.59**	-2.23**	0.38
5.	Maize	10.64**	12.37**	1.57**
6.	Small millets	-1.86**	-0.26	1.63
7.	Redgram	2.64**	4.24**	1.52**
8.	Bengalgram	-2.45**	1.23**	3.80**
9.	Blackgram	5.47**	4.20***	-1.20**
10.	Greengram	3.56**	3.93**	0.37
11.	Horsegram	-0.01	0.54	0.56
<b>II. Non-Foodgrain Crops</b>				
1.	Groundnut	-1.09	-0.92	0.15
2.	Sugarcane	1.91**	2.20**	0.20
3.	Mesta	-0.75	0.06	0.84
4.	Sesamum	1.37**	0.40	-0.86
5.	Chillies	1.17	1.09	-0.30
6.	Tobacco	0.27	1.37	0.65

Note: \*\* denotes significance at 1% level.  
 \* denotes significance at 5 % level,  
 \*\*\* denotes significance at 10 % level.

levels respectively, whereas the productivity declined at 1.20 per cent annually which was statistically significant at 1 per cent level. Eventhough a negative growth in productivity was observed, because of increase in area over the period had led to increase in production.

#### **Greengram:**

Area and production registered significantly positive annual growth rates of 3.56 per cent and 3.93 per cent respectively. The annual compound growth rate of productivity was positive but low at 0.37 per cent. Similar positive trends in area, production and productivity of greengram were observed by Lakshmanan *et al.*, (2005).

#### **Horsegram:**

The area declined marginally by 0.01 per cent, while there was a non-significant growth in production and productivity with 0.54 and 0.56 per

cent respectively. Thangaraja *et al.*, (2006) observed similar positive growth trend in the case of productivity (1.11 per cent) of horsegram which might be due to drought tolerance nature of the crop and low incidence of pest and disease attack in this crop.

#### **Non-Foodgrain Crops**

##### **Groundnut:**

Groundnut crop recorded a non-significant decline in area by 1.09 per cent. The growth rates of production and productivity were non-significant with production bearing a negative sign and productivity with positive sign. Similar results of declining growth in area of groundnut was observed by Aravind and Basawaraya (2010).

##### **Sugarcane:**

Sugarcane had registered significant positive growth rate in area and production with 1.91

per cent and 2.20 per cent of compound growth rates respectively. Though the productivity growth rate was positive it was non-significant. These results were supported by Kshirsagar *et al.*, (2007) who reported significant and positive growth rates of area and production.

#### **Mesta:**

One of the important major non-foodgrain crops in this district had registered a decline in area (-0.75 per cent) annually. The production was almost static as indicated by non-significant negligible growth rate. The compound growth rate of productivity was also non-significant.

#### **Sesamum:**

For sesamum positive and significant growth rate of 1.37 per cent in area was only recorded. The productivity growth rate was negative, while the compound growth rate of production was 0.40 per cent. The results of Singh and Grover (2009) on sesamum indicated positive and significant growth in area (0.51 per cent) but positive and non-significant growth in production (0.37 per cent) and negatively non-significant growth in yield.

#### **Chillies:**

Area and production under this crop grew annually at respective growth rates of 1.17 per cent and 1.09 per cent, whereas the productivity declined by 0.30 per cent. However the annual compound growth rates were non-significant for the three parameters.

#### **Tobacco:**

Tobacco crop too registered a non-significant increase in area (0.27 per cent), production (1.37 per cent) and productivity (0.65 per cent).

#### **Prakasam district**

The foodgrain crops in Prakasam district include paddy, jowar, bajra, ragi, maize, small millets, redgram, bengalgram, blackgram, greengram, and the non-foodgrain crops are groundnut, cotton, sunflower, sesamum, chillies and tobacco.

#### **Foodgrain Crops**

##### **Paddy:**

As the estimated annual compound growth rates indicated, there was no significant growth with respect to any of the parameters. The growth of area was negative with 0.07 per cent, while the same for production and productivity were positive.

Productivity grew at an annual rate of 0.91 per cent with the popular variety of BPT 5204.

##### **Jowar:**

Jowar area declined significantly by 7.25 per cent per annum, while productivity grew at an annual significant growth rate of 1.75 per cent. Significant decline in area even in the wake of significant productivity growth caused the production to decline by 5.61 per cent. The area under other crops gained from jowar and hence the decline in area.

##### **Bajra:**

The area decreased significantly at the rate of 3.07 per cent per annum, whereas per hectare yield registered a positively significant growth rate of 1.20 per cent per annum. Even the productivity gains could not prevent the decline of area under bajra. Of the two, area reduction was greater than the yield increase, which meant that the production of bajra registered a negative significant growth of 1.90 per cent per annum.

##### **Ragi:**

Ragi too followed the trend of jowar regarding growth rates of area and production. Both area and production declined significantly at the rate of 4.88 and 4.45 per cent, while productivity had registered a non-significant growth of 0.43 per cent per annum. In view of the significant reduction in the area, which was larger than the productivity increase, the production growth obviously decreased by 4.45 per cent.

##### **Maize:**

All the three parameters viz., area, production and productivity registered positive significant growth rates of 8.17 per cent, 9.51 per cent, 1.22 per cent per annum respectively. The area increase coupled with significant increase in yield increased the output to a significant rate of 9.51 per cent.

##### **Small millets:**

There was a tremendous significant decline in the area and production as their respective growth rates were -10.06 per cent and -8.83 per cent per annum. Productivity growth was positive with 1.37 per cent per annum and non-significant. Steep fall in the area, resulted in the decrease of production. This major decline in its area was due to its shifts to other crops like, sunflower and also because of the factors like market inadequacies and consequent poor returns.

**Redgram:**

Production of redgram in the district registered positive significant growth rate of 4.27 per cent per annum. This was possible by the positive significant annual growth rate of area by 3.23 per cent though the productivity growth was non-significant. Redgram is grown as an inter-crop but at the same time the area under redgram as a sole crop has also increased.

**Bengalgram:**

Bengalgram production grew at an annual rate of 13.90 per cent which was statistically significant. The production growth was helped by a significant increase of area at the rate of 10.43 per cent duly accompanied by a positive and significant growth of productivity at the rate of 3.10 per cent annually. It has substantially gained from the area under jowar, ragi and millets. Encouraging varieties viz., JJ-11, ICCV-2, KAK-2 are accessible to the

farmers to make best out of them, a major factor that is influencing this important pulse crop performance. Chaudhari and Pawar (2010) found similar results of significant growth in area, production and productivity of bengalgram and stated that area increase was due to the shift in area from cereals to pulses and significant increase in productivity was due to the use of improved technology and introduction of irrigation facilities.

**Blackgram:**

The results of growth rate analysis showed that over the period of 28 years, the area and production of blackgram increased significantly by 3.75 per cent and 3.10 per cent per annum respectively. But productivity registered a declining trend of -0.59 per cent. Lakshmanan *et al.*, (2005) observed increased production of blackgram which was due to increased growth rate of area and productivity.

Table 2. Compound growth rates of area, production and productivity of different crops in Prakasam district (1981-82 to 2008-09)

(Per cent)				
S. No.	Crop	Area	Production	Productivity
<b>I. Foodgrain Crops</b>				
1.	Paddy	-0.07	0.84	0.91
2.	Jowar	-7.25**	-5.61**	1.75**
3.	Bajra	-3.07**	-1.90**	1.20**
4.	Ragi	-4.88**	-4.45**	0.43
5.	Maize	8.17**	9.51**	1.22**
6.	Small millets	-10.06**	-8.83**	1.37
7.	Redgram	3.23**	4.27**	1.00
8.	Bengalgram	10.43**	13.90**	3.10**
9.	Blackgram	3.75**	3.10**	-0.59
10.	Greengram	4.19**	4.26**	0.04
<b>II. Non-Foodgrain Crops</b>				
1.	Groundnut	-3.65**	-2.31**	1.38
2.	Cotton	-1.57**	-2.00*	-0.42
3.	Sunflower	7.64**	8.45**	0.69
4.	Sesamum	2.29**	2.24*	-0.10
5.	Chillies	0.45	2.52**	2.04**
6.	Tobacco	0.16	0.96	0.82

Note: \*\* denotes significance at 1% level.  
 \* denotes significance at 5 % level,  
 \*\*\* denotes significance at 10 % level.

**Greengram:**

The area under this crop recorded a significant increase at the rate of 4.19 per cent. The production growth was 4.26 per cent per annum even at low growth of productivity (0.04 per cent) because of positive and significant acreage growth.

**Non-Foodgrain Crops****Groundnut:**

Groundnut recorded a significant declining growth of area and production, while the productivity growth was positively non-significant. The estimated growth rates were -3.65 per cent, -2.31 per cent and 1.38 per cent per year respectively.

**Cotton:**

The negative growth rate in respect of area (-1.57 per cent) and productivity (-0.42 per cent) resulted in the decline of production growth rate at -2.00 per cent per annum. The significant decline in area under cotton was because of its shift to redgram and to some extent to bengalgram. Findings of Chahal *et al.*, (2003) differed from the above because it was revealed by them that area, production and productivity under cotton grew at 0.25 per cent, 2.43 per cent and 2.18 per cent per annum respectively and were statistically significant.

**Sunflower:**

Sunflower production increased at an annual rate of 8.45 per cent, which was statistically significant at 1 per cent level. The area under the crop registered a significant increase at the rate of 7.64 per cent, whereas per hectare yield of the crop registered a positive and non-significant growth rate of 0.69 per cent. As a major area under small millets was shifted to sunflower its area has increased during the study period.

**Sesamum:**

Area and production under this crop registered a positive significant growth rate of 2.29 per cent and 2.24 per cent respectively, whereas productivity declined at 0.10 per cent per annum. But significant increase in area resulted in increase in production even at negative growth rate of productivity. Area under sesamum revealed a declining trend according to the findings of Swain (2007).

**Chillies:**

Chilly output in the district showed a significant positive growth rate of 2.52 per cent per year. Productivity increased significantly at the rate

of 2.04 per cent. The growth rate of area was positive but non-significant. Aparna *et al.*, (2008) found positive non-significant growth trends in area, production and productivity of chillies at 2.97 per cent, 3.42 per cent and 0.43 per cent per annum respectively.

**Tobacco:**

The annual compound growth rates of area, production and productivity were all positive but non-significant.

**Conclusions**

From the above analysis it can be concluded that in Vizianagaram district, paddy one of the major cereal crops exhibited a non-significant declining growth rate in area, whereas its production and productivity were positively non-significant. Among the millets highest significant declining growth rate with respect to area and production was observed in the case of bajra followed by jowar and ragi, whereas small millets declined significantly in area. With regard to the commercial crops only sugarcane crop exhibited positively significant growth with respect to area and production, whereas mesta area declined but its production and productivity increased non-significantly.

In Prakasam district, there was a negligible decrease in paddy area with a meager non-significant increase in production and productivity. Among the millets highest significant declining growths in area and production were observed in small millets, followed by jowar, ragi and bajra. In maize area, production and productivity growth were found to be positive and significant. With regard to pulses bengalgram exhibited significant increase in all the three parameters i.e. area, production and productivity.

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