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Trends in Growth Rates of Major Agricultural Crops in Karnataka

Basavaraj, B.[1*] and Annapoorna, M. S.[2]

[*1] Ph.D. Research Scholar, Department of Economics and Commerce, CMR University Bengaluru

[2] Professors, Department of Economics and Commerce, CMR University Bengaluru

*Corresponding Author E-mail: mbbasavaraj@gmail.com

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ABSTRACT

Indian population is mostly dependent on agriculture. However with time, the proportion of population dependent on agriculture, the land under agriculture has steadily declined. Agriculture plays an important role in the holistic growth of Karnataka's economy despite a fall in its share in the state domestic product. The present study initiates and analyzes the trends in growth rates in area, production and productivity of cotton, redgram, sugarcane, paddy and groundnut in the districts of Yadgir, Kalaburagi, Belagavi, Raichur and Chitradurga respectively. Negative growth rate was seen in area for groundnut, jowar and rice, whereas for Red gram, the growth rate in area was positive and significant (3.57%). With regard to production, the growth rate was positive for cotton (5.99%), whereas it was negative for the other crops. Yield was positive and significant for tur (3.52%) and cotton (6.35%). Negative growth rates are a result of shift in the trend from farming to non farming activities. Bringing all the farmers under the ambit of crop insurance, training the farmers on abilities to bear risk at the times of unseen events can further encourage them to continue with agriculture.

Key words: *Growth rate, Area, Production, Yield*

INTRODUCTION

The Indian economy has undergone structural changes over time with the anticipated decline in the share of agriculture in the GDP[4]. The agriculture sector continues to remain more important than industry in the states in a way to provide employment (about 70 percent of the population is engaged in agriculture directly or indirectly to earn their livelihood), generating income, providing raw materials to the industrial sector and ensuring food security to the poor. Assuring food and nutrition security of 1.3 billion people is a great battle for India today. It requires incremented output of food grains, oilseeds, gram and pulses, vegetables, fruits, dairy products, poultry, fish and meat, making the produce available to the population at economical prices. Indeed, India required reinforcement of both research and intervention of agricultural technology in order to improve the crop productivity, profitability, stability and sustainability of the farming community. Since 1960s, much transformation has taken place in Indian agriculture.

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Post the introduction of technology-oriented agricultural production approach, shift was noticed from the integrated rural development and land reforms as the policy of institutional reforms of agriculture. The introduction of various programmes by the Government like NFSM etc, have aided the farmers in enhancing their yield levels.

Agriculture plays an important role in the holistic growth of Karnataka's economy despite a fall in its share in the state domestic product. In Karnataka, horticulture crops occupy about 15.21 lakh hectares with an annual production of about 96.60 lakh tonnes. Agriculture remains the primary activity and main source of livelihood for the rural population in the state. It is characterized by wide crop diversification and remains highly dependent on the vagaries of the southwest monsoon. Food grain production in the state decreased from 13.31 to 12.81 million tons in 2014-15 over the previous year and this decrease was mainly due to continuous droughts in the state. Agriculture contributed 4.5 per cent (at constant prices) to the state's GSDP in 2014-15 over previous year. The present study initiates and analyzes the trends in growth rates in area, production and productivity of cotton, redgram, sugarcane, paddy and groundnut in the districts of Yadgir, Kalaburagi, Belagavi, Raichur and Chitradurga respectively.

MATERIAL AND METHODS

The growth rate was calculated for the period of 1997 to 2016. The data was obtained from Directorate of Economics and Statistics website. In the first case growth rate was calculated for the entire period, whereas in the second case, growth rate was calculated by splitting the period into two decades of 1997-2006 and 2007 to 2016. The growth rate was calculated for cotton, redgram, sugarcane, paddy and groundnut in the districts of Yadgir, Kalaburagi, Belagavi, Raichur and Chitradurga respectively. Compounded growth rate analysis was employed to study the growth rates.

The exponential model is of the following form.

$Y = a\ bt^{e}$ …… (1)

Where,

Y= Dependent variable for which the growth rate is estimated (area, production and productivity of major crops such Cotton, Rice, Groundnut, Jowar, Sugarcane and Red gram)

a= Intercept

b= Regression coefficient

t= Time variable from 1997-98 to 2016-17

e= Error term

The exponential growth rate was achieved from the logarithmic form of the equation as mentioned below

$\ln y = \ln a + t \ln b$

The per cent exponential growth rate (g) was derived using the relationship

g = (Anti ln of b – 1) X 100.

RESULTS AND DISCUSSION

The growth rate trends in area, production and productivity depend on many factors. For instance, the agricultural productivity in most cases depends on area sown under the crops and total production of that crop. The production of a crop not only depends on area sown under the crop but also affected by technology adopted therein, entrepreneurship and economics of production. The growth rate in area, production and yield for the period of 1997-2016 is presented from **Table 1 to Table 6.**

3.1 Growth rate for the period 1997 to 2016

Calculation of growth rate revealed positive and significant growth in area for tur in Raichur (8.8%), whereas it was non-significant in Gulbarga (0.82%) **(Table 1).** However, the production was positive and significant for tur in Gulbarga (5%), Raichur (14%) and Chitradurga (4.52%) **(Table 2).** Yield shows significant and positive growth rate in Gulbarga (4%), Raichur (7%) and Belagavi (4%) **(Table 3).** This might be due to the improvement in verities in tur, and high price for the produce that encouraged the farmers. The over growth rate in area for tur between 1997 to 2016 was positive and significant with 3.57%, yield was positive and significant with 3.52%. Similar results was presented by Avinash and Patil[3] in their study on Trends in

area, production and productivity of major pulses in Karnataka and India: An economic analysis.

Cotton shows significant positive growth rate in area in Yadgir (19%), whereas production was non-significant and yield was negative though non-significant. Cotton is very susceptible to pests. Unless proper care is taken, the crop yields are reduced. Groundnut exhibited negative and significant growth rate in area (-2.4%), production (-5.7%) and yield (3.46%) in Chitradurga districts. The area for jowar showed a negative growth rate in Gulbarga (-3.46%). Rice despite being major crop in Raichur, did not exhibit significant positive growth rates. Same was the trend in sugarcane for Belagavi. The overall growth rate for the state in the case of paddy was negative in the case of area (-0.61, however non significant. The production and productivity was positive but non significant. Paddy dominant state of Andhra Pradesh, exhibited positive growth rate in area (0.035%), production (0.043%) and yield (0.011%)[1] during 2001-2011. The negative growth rates may be due to the shift in cropping pattern and non-remunerative crops.

Table 1: Growth rate in area (1997-98- 2016-17)

Districts / Crops	1997-98 to 2016-17					
	Gulbarga	**Raichur**	**Yadgir**	**Chitradurga**	**Belagavi**	**Total**
Tur	0.82	6.6***	2.42	2.23	-3.25	3.57***
Cotton	8.8***	4.6	19.31***	0.95	0.68	2.35
Ground nut	-18.42***	-2.17***	7.69**	-2.39***	-5.05***	-3.18***
Jowar	-3.46***	-5.24***	-8***	-8.3***	-2.59***	-3.62***
Rice	-10.07**	0.98	-2.07	12.52	-0.09	-0.61
Sugarcane	7.04***	4.73	30.99	-17.83	1.12	1.12

*significant at 10%; **significant at 5%; *** significant at 1%

Table 2: Growth rate in production (1997-98- 2016-17)

	1997-98 to 2016-17					
	Gulbarga	**Raichur**	**Yadgir**	**Chitradurga**	**Belagavi**	**Total**
Tur	5.04***	13.96***	2.66	4.52***	0.42	-7.21***
Cotton	10***	10.93***	8.91	2.27	2.64	5.99***
Ground nut	-18.1	0.5	8.23	-5.7***	-4.7***	-3.6***
Jowar	0.02	-1.9	-5.59	-9.34***	-1.17	-1.96**
Rice	-9.78	1.48	6	-13.72	1.44	0.46
Sugarcane	5.2**	4.75	26.07	-18.28**	1.25	0.74

*significant at 10%; ** significant at 5%;***significant at 1%;

Table 3: Growth rate in yield (1997-98- 2016-17)

	1997-98 to 2016-17					
	Gulbarga	**Raichur**	**Yadgir**	**Chitradurga**	**Belagavi**	**Total**
Tur	4.19***	6.90***	0.24	2.24	3.79***	3.52***
Cotton	1.1	6.05***	-76.4		1.95	6.35***
Ground nut	0.39	2.73***	0.5	-3.46***	0.33	-0.51
Jowar	3.6***	3.48***	2.62	-1.1	1.45	1.71
Rice	0.68	-0.28	-3.9***	0.66	1.2	8.24
Sugarcane	-1.72	-0.03	-3.35	-0.54	0.13	-0.37

*significant at 10%; ** significant at 5%;***significant at 1%;

3.2 Decadal Growth Rates

Decadal growth rate was calculated, with periods from 1997-98 to 2006-07; 2007-08 to 2016-17. With regard to the tur crop, area was positive and significant in the first decade (4.35%) **(Table 4),** whereas in the second decade the area showed a positive growth but non significant in Gulbarga. Similarly, in the case of production, significant positive growth rate was seen in the first decade but in the second decade it was positive but non-significant in Gulbarga district. In the case of yield though the positive growth rate was seen in Gulbarga in both the decades, it was non significant. However in the case of Raichur the growth rate was significant and positive during both the decades.

Growth rate of area for cotton in Yadgir was positive and significant (19.3%), yield was was negative non significant (-8.71%) **(Table 6).**

Ground nut being prominent in Chitradurga exhibited negative growth rates in area, production and productivity in both the decades. Area for jowar in Gulbarga was negative during the first (-3.88%) and second (-3.55%) decades as well. Production was negative and non significant in the second decade, in the first it was positive and non significant. With regard to the area, it was positive and non significant.

Rice shows negative growth rate in area in Raichur in both the decades. However in Gulbarga, it exhibited positive growth rate in the first decade (27%) whereas in the second decade it was negative (29%). Same was in the case of production. Yield was negative in both the decades. With regard to sugarcane significant positive growth was not observed in any of the period for area, production and yield in Karnataka. However, in the state of Uttar Pradesh, sugarcane exhibited positive growth rate in area, production and yield during 1950 to 2015 as per the study by Arti[2].

The overall view of the growth rates reveal decline in area, production and productivity for the crops across periods.

Though the crops exhibited positive growth rates in certain cases, it could be seen that the same crops would have had negative growth rates in their native districts. It is to note that the yield has tremendously declined in most of the cases, despite the increase in area. Karnataka experiences varying climatic conditions of arid, semi-arid and humid. Rainfall plays an important role in maintaining the crop productivity in Karnataka. High variation in rainfall affects agricultural production. Discussion with the farmers revealed varied rainfall pattern one of the major reasons for the decline in yield. In many a cases, the farmer s were found to use low yielding varieties of crops. The farmers opined on moving from agriculture to other jobs as agriculture was non remunerative which is a reason for decline of area under the crops with negative growth rates. In certain cases, non-use of scientific methods of cultivation, not being able to afford high cost inputs, issues with human labour, low price for the output are appearing as major challenges for crop cultivation.

Table 4: Decadal growth rates in area sample crops across sample districts

	1997-98 to2006-07					2007-08 to 2016-17					
	Gulbarga	Raichur	Chitradurga	Belagavi	Total	Gulbarga	Raichur	Yadgir	Chitradurga	Belagavi	Total
Tur	4.35***	-3.51	-1.71	-8.64	3.1***	2.4	15.92**	2.42	5.68	1.25	3.97*
Cotton	8.11	-11.23***	-9.29	-10.3**	-5.99**	14.9**	21.82***	19.31***	7.92	14.61	9.65***
Ground nut	-9.24***	-6.53***	-1.91	-2.65	-3.26**	-26.93***	-1.63	7.69**	-3.25	-5.76	-4.51***
Jowar	-3.88***	-6.19***	-2.96	0.59	-3.05***	-3.55**	-4.14**	-8***	-14.75***	-2.33	-3.84***
Rice	26.83***	-1.64	15.62**	1.04***	-0.68	-29.43**	-2.93	-2.07	-24.59***	-1.81**	-3.62***
Sugarcane	-3.82	-34.68**	-26.14	-4.01	-3.84	13.12**	15.21	30.99	-1.48	3.87	3.52

*significant at 10%; ** significant at 5%;***significant at 1%;

Table 5: Decadal growth rates in production for sample crops across sample districts

	1997-98 to2006-07					2007-08 to 2016-17					
	Gulbarga	**Raichur**	**Chitradurga**	**Belagavi**	**Total**	**Gulbarga**	**Raichur**	**Yadgir**	**Chitradurga**	**Belagavi**	**Total**
Tur	9.19*	11.37**	0.83	-10.4	8.05	2.66	28.03***	2.66	5.57	5.58	6.95
Cotton	18.37***	-7.64**	-5.84	-10.99	-6.8	6.72	18.14***	8.91	2.19	9.12*	8.2*
Ground nut	0.002***	0.003***	-9.8	-8.4**	-8.7**	-24.56**	1.93	8.23	-4.38	-2.56	-2.62
Jowar	0.51	-5.24***	-8.4***		-3.11	-2.2	-7.49	-5.59	-17.95***	-6.09***	-6.31***
Rice	32.49***	-3.16	-17.64**	-0.25	0.13	-28.99	-1.18	6	-25.02	-0.67	-2.9**
Sugarcane	-8.1	-35.73**	-27.5**	-5.73	-5.3	10.8	15.29	26.07	-2.7	1.57	2.13

*significant at 10%; ** significant at 5%;***significant at 1%;

Table 6: Decadal growth rates in yield for sample crops across sample districts

	1997-98 to2006-07					2007-08 to 2016-17					
	Gulbarga	**Raichur**	**Chitradurga**	**Belagavi**	**Total**	**Gulbarga**	**Raichur**	**Yadgir**	**Chitradurga**	**Belagavi**	**Total**
Tur	4.63	15.42***	2.58	-1.9	4.81	5.18	10.45**	0.24	-0.09	4.28	2.8
Cotton	9.49***	4.03		-1.08	-0.89	-7.11	-3.02	-8.71		-4.78	-1.31
Ground nut	-0.67	4.91***	-8.12	-5.90***	-5.70**	3.24	3.62	0.5	-1.17	3.39	1.97
Jowar	4.58	1	-5.6	-2.7	-0.06	1.4	-3.5	2.6	-3.7	-3.85	-2.57
Rice	-1.15	0.04	-0.15	-2.04	0.81	-9.8	-1.12	-3.96***	-0.11	-3.02	0.64
Sugarcane	-4.48	-1.57	-1.83	-1.79	-1.51	-1.94	-0.06	-3.55	-1.32	-2.24	-1.36

*significant at 10%; ** significant at 5%;***significant at 1%;

CONCLUSION

The growth rates for the crops across districts show varying trend. Negative growth rate in area can be observed in many a case. This is a result of shift in the trend from farming to non farming activities. Discussion with the farmers at the time of survey revealed that the farmers were ready to give up agriculture if found a job. Introduction of new programmes by the government, monitoring their implementation can further encourage the farmers. Bringing all the farmers under the ambit of crop insurance, training the farmers on abilities to bear risk at the times of unseen events can further encourage them to continue with agriculture.

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