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GROWTH OF AREA, PRODUCTION AND PRODUCTIVITY OF SUGARCANE CULTIVATION IN INDIA

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Abstract:

This study examined the growth rate of area, production and productivity of sugarcane cultivation in the selected Indian states during the post-reform period. The compound interest rate formula was used (adopted by the World Bank) with the least square method. The study used the Centre for Monitoring Indian Economic (CMIE) database and the report of aps.dac.gov.in for 1991-92 to 2017-18 for select Indian states. The study found that the production was registered the maximum positive growth rate of 1.63 per cent, followed by 1.31 per cent in the area and 1.30 per cent in productivity. All are significant at 1 per cent level. The positive sign of area and production revealed positive productivity in the Indian states.

Introduction:

Indian agriculture has been witnessing wide variations in growth performance during six decades after independence. The variability was particularly pronounced due to the subsistence nature of farming in India and the sector's heavy dependence on monsoon and other climatic parameters. In the initial years after planned development, the green revolution technologies fired up growth in the sector for nearly three decades[1]. The impact of the green revolution tapered off gradually towards the later years of the last century. Economic reforms initiated in the early nineties had a significant impact on the agricultural sector, primarily due to the opening up of the economy to external competition, liberalization of trade and deregulation of input and other sub-sectors[2].

The share of agriculture in Gross Domestic Product (GDP) increased to 19.9 per cent in 2020-21 from 17.8 per cent in 2019-2020. This was also when the sector clocked 9.5 per cent GDP growth. After the severe drought of 2002, the growth rate was negative. Following 2003-04, the share has remained between 17 and 19 per cent. There has been a steady growth in the area under sugarcane cultivation in India[3]. The area was only 17.07 lakh hectares in 1950-51; it increased to 51.11 lakh hectares in 2018-19. Karnataka, Tamil Nadu, Gujarat and Andhra Pradesh are other central cane-growing states in the tropical region.

Review of Earlier Studies:

Baliyan (1955)[4] studied the economics of sugarcane production in the Muzaffarnagar district of Utter Pradesh. They found that the profitability of both planted and ratoon sugarcane has increased and concluded that sugarcane cultivation is more profitable than other crops. They suggested that the farmer should involve this cultivation intensively.

Subbarao (1970)[5] found that changes in relative acreage under sugarcane were positively associated with a change in its relative price to rise. No measurable yield response to price was observed.

Bathla and Jain (2002)[6] analyzed that the sugarcane was a remunerative crop and its returns were higher than any competing crop and the crop rotation. However, this was true when the Sugar mills accepted almost ninety per cent of the produce at the state-sponsored prices; thus, the increase in sugarcane area must also

1 Agriculture Background: Green Revolution .... http://www.mospi.nic.in/sites/default/files/Statistical_year_book_india_chapters/Agriculture_writeup.pdf
2 http://mospi.nic.in/sites/default/files/Statistical_year_book_india_chapters/Agriculture_writeup.pdf
3 Agriculture Background: Green Revolution .... http://www.mospi.nic.in/sites/default/files/Statistical_year_book_india_chapters/Agriculture_writeup.pdf
4 Baliyan (1955). Economics of sugarcane production in Muzaffarnagar District of Western Uttar Pradesh, Agricultural situation in India, LII(6).
5 Subbarao, K. (1969). Farm Supply Response-A Case Study of Sugarcane in Andhra Pradesh. Indian Journal of Agricultural Economics, 24(1), 84.
6 Bathla .B and Jain . K.K (2002). An Economic Analysis of Sugarcane production in Punjab, Journal of Agricultural Development and Policy, 14(1).

entail. The farmers should be encouraged to plant more sugarcane rather than rationing it for more than one year.

Raj (2005)[7] indicated that the inter-crop is one of the most important commercial crops cultivated in Tamil Nadu and elsewhere for supplying to sugar factories and making Jaggery. Hence, cultivating soybeans as intercrop in sugarcane is a viable option for farmers to earn an additional income within a short period.

Anbazhagan (2010)[8] studied the economic analysis of sugar production in Tamil Nadu. Found that the sugarcane in India is the third-largest crop, next to rice and wheat. The sugar-yield capacity is related to the industries' producing capacity and the availability of sugarcane. The erratic monsoon and fluctuating price levels are also vital factors.

Vikas (2019)[9] observed decomposition analysis results revealed that area expansion's contribution is relatively more important than productivity expansion to increase sugarcane production. Instability analysis indicates that the level of instability in the area, production and productivity of sugarcane is almost stagnant in India. In contrast, the level of instability in the area, production and productivity of sugarcane has been drastically increased in Maharashtra.

Data and Methodology:

Data:

The perspective of agriculture and its role in mounting India's economic development is examined from data extracted from published and unpublished sources like books, journals, the Centre for Monitoring Indian Economy (CMIE) database and the report aps.dac.gov.in. The secondary data of the study covers the period from 1991-92 to 2017-18[10].

Methodology:

Growth Model:

Growth is studied regarding annual growth rates computed based on the compound interest rate formula adopted by the World Bank using the least square methods.

The least-squares growth rate 'r' is estimated by fitting a least-squares linear regression trend line to the logarithmic annual values of the variable in the relevant period. More specifically, the regression equation takes the form

$$\text{Log } X_t = a + bt + e_t$$

where this is equivalent to the logarithmic transformation of the compound growth rate equation

$$X_t = X_0 (1+r)^t$$

In these equations, 'X' is the variable,'t' is period, and a=log X_0 and b= log (1+r) are the parameters to be estimated, 'e' is the error term. If b^* is the least-squares estimate of 'b' then the average annual percentage growth rate 'r' is obtained as (antilog b^*) –1 and multiplied by 100 to express it as a percentage.

Results and Discussion:

Growth of Area, Production and Productivity of Sugarcane Cultivation in India during the Post-Reform Period:

Table 1 reveals the analysis of growth in the area, production and productivity of Sugarcane cultivation in Indian states during the post-reform period (1991-92 to 2017-18).

Among the different indicators in the post-reform period, production has registered the highest growth rate of 1.63 per cent, followed by 1.31 per cent in the area and 1.30 per cent in productivity. All are significant at 1 per cent level. The negative trend was observed in area and production growth rate in the eleven states whereas seven in productivity. There are different reasons for the negative growth of production and productivity in different states. However, the decline in public investment in irrigation and water management and scientific research has adversely affected farmers' profitability in all parts of India. On the other hand, the growth rate was positive in nine states of both area and production while thirteen states were in productivity.

Table 1: Growth of Area, Production and Productivity of Sugarcane Cultivation in India During the Post-Reform Period (1991-92 to 2017-18)

States	Compound Growth Rate		
	Area	Production	Productivity
Andhra Pradesh	-2.25*	-1.36**	0.91*
	(-4.72)	(-2.38)	(3.10)

[7] Xavier P.R.M (2005). Soy bean as intercrop in Sugarcane, Kissan world 32(3).

[8] Anbazhagan, K. (2010), An Economic Analysis of Sugar Production in Tamil Nadu, Kisan World, 37(7),15-17.

[9] Abnave B. V (2019). Sustainability Concerns on Sugarcane Production in Maharashtra, India: A Decomposition and Instability Analysis, Working Paper 441, The Institute for Social and Economic Change, Bangalore.

[10] All the estimations are based on the data available and many states are newly introduced by the Government of India. The secondary data available up to in the year 2017-18.

Arunachal Pradesh	6.53*	7.48*	0.90*
	(10.95)	(13.03)	(3.31)
Assam	-0.96*	-1.35*	-0.39*
	(-3.03)	(-3.81)	(-4.01)
Bihar	2.94*	3.61*	0.65**
	(3.77)	(3.60)	(1.99)
Chhattisgarh	11.96*	13.14*	1.05
	(8.19)	(8.58)	(0.68)
Goa	-2.15*	-2.48*	-0.33
	(-5.29)	(-6.26)	(-0.91)
Gujarat	1.40*	-0.38	-1.75
	(3.66)	(-0.33)	(-1.62)
Haryana	-1.88*	-2.20	-0.33
	(-4.29)	(-1.33)	(-0.23)
Himachal Pradesh	-2.81**	5.39	8.43**
	-2.05	(1.33)	(2.01)
Karnataka	1.56*	1.54**	-0.02
	(2.90)	(2.27)	(-0.07)
Kerala	-6.95*	-13.68*	-7.23*
	(-7.64)	(-7.82)	(-4.58)
Madhya Pradesh	2.60*	4.51*	1.86*
	(4.25)	(7.14)	(4.40)
Maharashtra	3.58*	3.66*	0.07
	(6.17)	(5.17)	(0.32)
Orissa	-4.55*	-4.15*	0.41***
	(-5.97)	(-4.71)	(1.80)
Punjab	-1.38**	-0.50	0.90*
	(-2.36)	(-0.76)	(4.22)
Rajasthan	-6.96*	-4.91*	2.20*
	(-9.98)	(-5.96)	(8.06)
Tamil Nadu	0.08	-0.25	-0.33***
	(0.16)	(-0.42)	(-1.95)
Uttar Pradesh	1.00*	-1.20*	0.51*
	(8.72)	(-3.80)	(2.98)
Uttarakhand	-1.45*	53.74*	0.25
	(-6.37)	(6.91)	(1.05)
West Bengal	-0.26	1.72***	1.98*
	(-0.47)	(1.92)	(2.62)
Mean	**1.31***	**1.63***	**1.30***

Note : Figures in parentheses are t values.
*= Statistically Significant at 1 % level. ** = Statistically Significant at 5 % level.
*** = Statistically Significant at 10 % level;
Source: CMIE and https://aps.dac.gov.in/APY/Public_Report1.aspx

Policymakers in India have been stressing the need for crop diversification to higher-value crops as a primary agricultural development strategy. The planners feel that such diversification offers opportunities for raising farm incomes significantly and is likely to put less pressure on natural resources—the diversification of a crop rise in per capita income of the country. At the same time, the demand for food grain is likely to grow slowly; oilseeds, fibres, sugarcane, livestock and horticulture products are projected to grow at a much faster rate.

Compared with the all India (state-wise) level, the Tamil Nadu districts revealed inconsistent production and productivity reports. The negative growth of production and productivity was found in the post-reform period. In contrast, the positive growth of the area was observed in Tamil Nadu districts during the post-reform period.

Conclusion:

The analysis of growth rate of area, production and productivity of sugarcane cultivation in the Indian states during the post-reform period of 1991-92 to 2017-18. The production has registered the maximum positive growth rate of 1.63 per cent, followed by 1.31 per cent in the area and 1.30 per cent in productivity, and all are significant at 1 per cent level. Thus, it is evident that the positive sign of area and production has revealed

positive productivity in the Indian states. The positive sign of area, production and productivity was found in the Indian sugarcane cultivation during the post-reform period. Further, it could be observed that in seven out of twenty states, productivity growth has a positive sign, whereas nine states in both area and production. The reasons for the positive productivity of these states were the Indian farmers well known the cultivation method and adopted the new technology.

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6. Bathla . B and Jain . K.K (2002). An Economic Analysis of Sugarcane production in Punjab, Journal of Agricultural Development and Policy, 14(1).
7. http://mospi.nic.in/sites/default/files/Statistical_year_book_india_chapters/Agriculture_writeup.pdf
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