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GROWTH PERSPECTIVE OF SUGARCANE – A STUDY

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Abstract: This paper attempts to analyse Sugarcane Production in India, Tamil Nadu and Theni district level. Sugarcane occupies an important position in India's agrarian economy and more than six million farmers are engaged in its cultivation. It is a major crop of social, economic and environmental importance in the country. The main objectives of the present study are to analysis the area, production and productivity of sugarcane at national, Tamil Nadu and Theni district level. The researcher collected secondary data from Government websites and reputed journals. Trend values, Co –efficient variations and CGR (Compound Growth Rate) were used to analyse the data based on which conclusions were drawn and suggestions were offered.

Key words: Sugarcane, Area, Production, Productivity, Trend, CGR, CV.

INTRODUCTION

Agriculture is the most important sector of **Indian Economy**. Indian agriculture sector occupies 18 per cent of India's Gross Domestic Product (GDP) and provides **employment** to 50 per cent of the country's **workforce.** Sugarcane is the popularly grown commercial crop all over the world including India. However, growing sugarcane is not an easy job. It requires greater amount of care and management. It also requires care and attention during harvesting. Basically sugarcane crop is a seasonal crop that grows the most in tropics ad subtropics region which produces multiples of stems having a diameter about 3 to 5 cm and height about 5m. However, this crop belongs to the bamboo family. Stems of this crops grow into cane stalk formed, and contributes about more than 70 per cent of the total plant when matured. A mature sugarcane stem contains about 11 to 18 per cent water soluble sugar, 10 to 16 per cent of fibers, about 3 to 4 per cent of non – sugars content along with more than 70 per cent of water content in it.[1]

STATEMENT OF THE PROBLEM

The major challenge for sugarcane farmers have alone the vagaries of nature, is to balance with input usage and productivity, which ultimately affects the economics of their crop. Other noted challenges faced by cane growing farmers are weeds & insects. The weed problems by monocots, dicot and sedges are growing. Termites, white grubs, early shoot borer, internode borer, top borer, mealy bug and wooly aphids are pests that are known to cause economic loss. The soil pest (white grub and termites) infestation is seen throughout the year wherein they feed on the roots of cane and adversely impact the final production of cane. The early shoot borer infestation starts from 30 days and may extend up to 60 days of the crop. Top borer and intermodal borer infestation occurs between 150-240 days. The black bug damage is observed from 80-120 days. Other pests are seasonal which infest the crop occasionally.

Lack of availability of skilled labours is yet another problem of sugarcane farmers. Of late, the wages are very expensive. The income received from sugarcane cultivation is not sufficient to meet the input cost. So

most of the sugarcane farmers are interested to change their cultivation to short term period crops. Because of increased cost of cultivation and maintaining the long term process of land on, most of the sugarcane farmers are not economically comfortable. They can't afford to buy/ rent any modern machinery required for sugarcane cultivation. Drop it essential to under this back drop it is essential to explore the growth pattern of this vital crops both at macro and micro level.

1. https://en.wikipedia.org/wiki/agriculture

OBJECTIVES OF THE STUDY

1. To study the extent of production, growth and productivity of sugarcane in general and Theni District in particular.
2. To suggest policy measures for achieving higher production and productivity and increasing the area of sugarcane cultivation.

METHODOLOGY OF THE STUDY

The study is based on secondary data. Data regarding sugarcane, of area, production, and productivity will be collected from various journals, books, reports, articles and records of the department of Agriculture, Government of Tamil Nadu.

TOOLS OF ANALYSIS

Following statistical tools have been used for analysing the data namely Percentage analysis, Trend Analysis, Compound Growth Rate and Co –efficient variation.

SUGARCANE PRODUCTION IN INDIA

Sugarcane is a long duration, high water (750-1200mm range rainfall required) and high nutrient demanding crop. India is second largest sugar producer in the world after Brazil. Sugarcane production has been more or less static (around 350 million tonnes) in India during the past 10 years. During the year 2014-15, the total production was a record 362.33 million tonnes.

Uttar Pradesh is the largest producer of sugarcane as it produced an around 145.39 million tonnes of sugarcane, which is 41.28 per cent of the all-India production. Sugarcane crop is sown in an area of 2.17 million hectares in the state, which amounts to 43.79 per cent share of all India sugarcane farming. Maharashtra comes at the second place with the production of 72.26 million tonnes in the year 2015-16, which is 20.52 per cent of the all-India sugarcane production. Total area of the state agricultural land where sugarcane is grown is 0.99 million hectares of land, largely consisting of black soil belt.

Karnataka comes at the third position with the production of 34.48 million tonnes in the year 2015-16, which is approximately 11 per cent of the country's sugarcane production. Sugarcane is grown on a total area of 0.45 million hectares of state's agricultural land.

TREND IN AREA PRODUCTION AND PRODUCTIVITY IN SUGARCANE OF INDIA

The area production and productivity under sugarcane cultivation in India is presented in Table 1 along with their trend values.

Table 1Trend in Sugarcane Area, Production and Productivity in India form 2008-09 to 2017-18

Year	Area (Ha) (000)	Trend in Area (Ha) (000)	Production (MTs) (000)	Trend in Production (MTs) (000)	Productivity (MTs/Ha)	Trend in Productivity (MTs/Ha)
2008-09	4415.00	4629.29	285029	313487.27	64.559	67.638
2009-10	4175.00	4659.72	292302	318194.21	70.012	68.198
2010-11	4885.00	4690.14	342382	322901.15	70.088	68.759
2011-12	5038.00	4720.56	361037	327608.09	71.663	69.319
2012-13	4999.00	4750.99	341200	332315.03	68.254	69.880
2013-14	4993.00	4781.41	352142	337021.97	70.527	70.440
2014-15	5067.00	4811.84	362333	341728.91	71.508	71.000
2015-16	4927.00	4842.26	348450	346435.85	70.723	71.561
2016-17	4389.00	4872.68	306720	351142.79	69.884	72.121
2017-18	4774.00	4903.11	355090	355849.73	74.380	72.682

Source: Indiastat.com

Table1 shows that there was a steady increase of area under sugarcane cultivation for the period from 2008 -09 to 2011 -12and the year from 2013 -14 to 2016 -17 there was continuous decrease of area under in Sugarcane cultivation. Except the year 2014-15 the trend values were also increasing positively during the period under review Production of sugarcane has gone up from 2,85,029 tonnes (2008-09) to 3,61,037 tonnes in 2011- 12. But it shows from the year 2014 -15 to 2016 -17 decrease the production. In the year of 2017 -18 there was an increase the land usage and production. The trend values of production were also increasing and positive during the study period The productivity level also increased from the year 2008 -09 to 2011 -12 but fell down for the year from 2013 – 14 to 2016 -17.Year 2017 -18 interested the maximum levels of value of productivity. The Trend values of productivity are range from 67.638 (2008-2009) to 72.682(2017-18).

COMPOUND GROWTH RATE AND MAGNITUDE OF VARIABILITY

The annual compound growth rate and magnitude of variability of area, production and productivity of sugarcane in India are presented in Table 2.

Table 2 Compound Growth Rate and Magnitude of Variability of Sugarcane Area Production and Productivity in India from 2008 -09 to 2017 -18.

Factors	Log-linear		R^2	CGR (Per -cent/ Annum)	CV (%)
	Semi – log Constant 'a'	Regression Co –efficient 'b'			
Area	8.430 (0.048)	0.007** (0.008)	0.087	1.625	6.73
Production	12.636 (0.056)	0.015* (0.009)	0.251	3.514	8.6
Productivity	4.206 (.020)	0.008* (0.003)	0.448	1.859	3.0

Source: Computed Data from Table1

Figures in parentheses are standard errors.

*Significant at five per cent level,

CGR = Compound Growth Rate,

CV = Co – efficient of variation.

Table 2 indicates that during the study period, the growth rate of area under cultivation of sugarcane was at the rate 1.625 per cent per annum, whereas the production grew at the rate of 3.514 per cent per annum. However, the productivity had increased only at the rate of 1.859 per cent per annum. The co – efficient of variation indicates that the growth of production under sugarcane cultivation was more consistent than that growth of area and productivity. It is inferred from the above analysis that the Indian scenario of sugarcane cultivation appears to be prosperous in the coming years.

SUGARCANE PRODUCTION IN TAMIL NADU

Tamil Nadu is the fourth largest state in India in producing sugarcane with the production of 26.50 million tonnes of sugarcane, which roughly amounts to 7.5 per cent of country's sugarcane production. Bihar comes next with 14.68 million tonnes of sugarcane a 4.17 per cent of country's sugarcane production.

TREND IN AREA, PRODUCTION AND PRODUCTIVITY IN SUGARCANE OF TAMIL NADU

The area production and productivity under sugarcane cultivation in Tamil Nadu is presented in Table.3 along with their trend values.

Table.3

Trend in Sugarcane Area, Production and Productivity in Tamil Nadu from 2008-09 to 2017-18

YEAR	AREA '000"ha	Trend in Area (Ha) (000)	Production (MTs) (000)	Trend in Production (MTs) (000)	Productivity (MTs/Ha)	Trend in Productivity (MTs/Ha)
2008-09	309	345.96	32804	36911.38	106.20	107.77
2009-10	293	332.13	29746	35248.76	101.50	106.74
2010-11	316	318.29	34252	33586.15	108.40	105.71
2011-12	346	304.45	38576	31923.53	111.50	104.68
2012-13	347	290.62	33919	30260.91	97.70	103.65
2013-14	313	276.78	32454	28598.29	103.70	102.61
2014-15	263	262.95	28093	26935.67	106.80	101.58
2015-16	252	249.11	25494	25273.05	101.20	100.55
2016-17	215	235.27	22396	23610.44	104.20	99.52
2017-18	183	221.44	16562	21947.82	90.10	98.49

Source: Indiastat.com

It could be observed from Table.3 that there was a steady increase of area under sugarcane cultivation in Tamil Nadu for the period from 2008 -09 to 2012 -13. After that the year from 2013 -14 to 2017 -18 there was continuous decrease of land usage in sugarcane cultivation. Production of sugarcane has increased from 32804 tonnes to 38,576 tonnes in 2011- 12. But it shows from the year 2013 -14 to 2017 -18, there was a decrease in the production. The productivity level also increase

from the year 2008 -09 to 2011 -12 but it fell down for the year from 2012 – 13to 2017 -18. The trend values of area, production and productivity were also decreasing and negative during the study period.

COMPOUND GROWTH RATE AND MAGNITUDE OF VARIABILITY

The annual compound growth rate of area, production and the productivity of sugarcane in Tamil Nadu and their magnitude of variability are presented in Table 4.

Table.4

Compound Growth Rate and Magnitude of Variability of Sugarcane Area, Production and Productivity in Tamil Nadu from 2008 -09 to 2017 -18.

Factors	Log-Linear		R^2	CGR (Per cent/ Annum)	CV (%)
	Semi – log Constant 'a'	Regression Co –efficient 'b'			
Area	12.835 (0.094)	-0.054* (0.015)	0.613	-213.24	19.24
Production	17.526 (0.113)	0.064* (0.018)	0.610	-215.87	22.08
Productivity	4.206 (0.036)	0.010* (0.006)	0.270	-202.33	5.74

Source: Computed Data from Table.3

Figures in parentheses are standard errors.

*Significant at five per cent level,

CGR = Compound Growth Rate,

CV = Co – efficient of variation.

It could be observed form Table.4 that during the study period, the growth rate of area under cultivation of sugarcane was negative value namely -213.24. The co –efficient variation indicate that the growth of area was more consistent. It is inferred from the above analysis that Tamil Nadu scenario of sugarcane cultivation appears to be prosperous in the coming years. The growth rate of production of sugarcane was at the negative rate – 215.87 per cent. It is revealed that the trend co –efficient is positive. The sugarcane productivity in Tamil Nadu co – efficient of variation is 5.74 percent during the study period.

TAMIL NADU'S SHARE IN SUGARCANE CULTIVATION IN INDIA

The Area and production of sugarcane in India and Tamil Nadu's share are given in Table.5

Table.5

Area and Production of Sugarcane in India and Tamil Nadu's share From 2008-09 to 2017-18

Year	Area			Production		
	India (ha) (000)	Tamil Nadu (ha) (000)	Share in Tamil Nadu %	India (mts) (000)	Tamil nadu (mts) (000)	Share in Tamil Nadu %
2008-09	4415.00	309	6.999	285029	32804	11.509
2009-10	4175.00	293	7.018	292302	29746	10.176
2010-11	4885.00	316	6.469	342382	34252	10.004
2011-12	5038.00	346	6.868	361037	38576	10.685
2012-13	4999.00	347	6.941	341200	33919	9.941
2013-14	4993.00	313	6.269	352142	32454	9.216
2014-15	5067.00	263	5.190	362333	28093	7.753
2015-16	4927.00	252	5.115	348450	25494	7.316
2016-17	4389.00	215	4.899	306720	22396	7.302
2017-18	4774.00	183	3.833	355090	16562	4.664
Average	4766.20	283.70	5.96	334668.50	29429.60	8.86

Source: Computed Data

It could be observed from Table.5 that there was land usage of sugarcane in Tamil Nadu share increased between 2008 -09 to 2009 -10. In 2010 -11 to 2013 -14 showed more or less same percentage. It fell down from 2014 -15 to 2017 -18. The production level of Tamil Nadu was continuously decreased during study period. Tamil Nadu contributed 5.96 per cent of area and 8.86

per cent of production of the total Indian area and production.

SUGARCANE PRODUCTION IN THENI DISTRICT

Theni district is basically an agriculture oriented district where in most of the people engaged in agriculture oriented occupation. The Mullaiperiyar river, Manjallar river and Kottagudi river which are following across the district facilitate the growth of various commercial crops including sugarcane. The fertile soil, entrepreneurial culture of the native people and encouragement by the sugar mills located in this area provide ample scope for sugarcane cultivation throughout the district.

TREND IN AREA, PRODUCTION AND PRODUCTIVITY IN SUGARCANE OF THENI

The area production and productivity under sugarcane cultivation in Theni is presented in Table 6 along with the trend values

Table.6

Trend in Sugarcane Area, Production and Productivity in Theni district from 2008-09 to 2017-18.

Year	Area (Ha)	Trend in area (Ha)	Production (MTs)	Trend in Production (MTs)	Productivity (MTs/Ha)	Trend in Productivity (MTs/Ha)
2008-09	7658	7578.55	769797	808100.51	100.522	108.025
2009-10	6790	7290.30	780850	770548.22	115.000	106.554
2010-11	6645	7002.05	697725	732995.93	105.000	105.083
2011-12	6895	6713.80	710185	695443.64	103.000	103.612
2012-13	7118	6425.55	692578	657891.35	97.300	102.142
2013-14	6409	6137.30	641026	620339.05	100.020	100.671
2014-15	6424	5849.06	647388	582786.76	100.780	99.200
2015-16	4767	5560.81	514806	545234.47	108.000	97.729
2016-17	5287	5272.56	539320	507682.18	102.000	96.258
2017-18	4821	4984.31	397477	470129.89	82.440	94.788

Source: Handbook reports available in the office of statistics and Agriculture

DEPARTMENT, THENI

Table 6 indicates that there was a decrease of land under sugarcane cultivation for the period from 2008 -09 to 2010 -11. It was compared to year from 2011 -12 and 2012 -13 minimum level of increase the land usage of sugarcane cultivation. But the year from 2012 -13 to 2014 -15 there was continuous decrease of land usage in Sugarcane cultivation. In the year 2015 -16 increase the previous year. In 2016 -17 it fell down the land usage of sugarcane. Production of sugarcane increased to 780850 tonnes compare to the year 2009-10. The productivity level also is not steady from the year 2008 -09 to 2017 -18. The trend values of area, production and productivity were also decreasing and negative during the study period.

COMPOUND GROWTH RATE AND MAGNITUDE OF VARIABILITY

The annual compound growth rate of area, production and the productivity of sugarcane in Theni district and their magnitude of variability are presented in Table.7

Table. 7

Compound Growth Rate and Magnitude of Variability of Sugarcane Area, Production and Productivity in Theni District from 2008 -09 to 2017 -18.

Factors	Log - linear		R^2	CGR (Per cent/Annum)	CV (%)
	Semi – log Constant 'a'	Regression Co –efficient 'b'			
Area	8.997 (0.059)	-0.48* (0.009)	0.761	-211.69	15.75
Production	13.696 (0.064)	0.063* (0.010)	0.826	-215.61	18.98
Productivity	4.700 (0.052)	0.015* (0.008)	0.292	-203.51	8.21

Source: Computed Data from Table. 6

Figures in parentheses are standard errors.

*Significant at five per cent level,

CGR = Compound Growth Rate,

CV = Co – efficient of variation.

Table 7 indicates that during the study period, the compound growth rate for the sugarcane area in Theni district negatively increased at the rate of -211.69 per cent. The sugarcane area and production showed a variation of 15.75 per cent and 18.98 per cent respectively, which indicates wide fluctuations in the level of area and production of sugarcane in Theni district during the period under study. The sugarcane productivity in Theni district achieved an annual growth rate -203.51 per cent during the study period. The variation in sugarcane output was found to be at8.21 per cent showing wide information in the output.

THENI DISTRICT'S SHARE IN SUGARCANE CULTIVATION IN TAMIL NADU

The area and Production of Sugarcane in Tamil Nadu and Theni district's share are given table.8

TABLE.8

Area and Production of Sugarcane in Tamil Nadu's and Theni share From 2008-09 to 2017-18

YEAR	AREA			PRODUCTION		
	TAMILNADU (ha)	THENI (ha)	SHARE IN THENI %	TAMILNADU (MTs)	THENI (MTs) (000)	SHARE IN THENI %
2008-09	309000.00	7658	2.478	32804000	769797	2.347
2009-10	293000.00	6790	2.317	29746000	780850	2.625
2010-11	316000.00	6645	2.103	34252000	697725	2.037
2011-12	346000.00	6895	1.993	38576000	710185	1.841
2012-13	347000.00	7118	2.051	33919000	692578	2.042
2013-14	313000.00	6409	2.048	32454000	641026	1.975
2014-15	263000.00	6424	2.442	28093000	647388	2.304
2015-16	252000.00	4767	1.892	25494000	514806	2.019
2016-17	215000.00	5287	2.459	22396000	539320	2.408
2017-18	183000.00	4821	2.635	16562000	397477	2.400
AVERAGE	283700.00	6281.43	2.24	29429600.00	639115.20	2.20

Source: Computed data from Tables 3 and 6

It could be observed form Table 8 that the land usage of sugarcane in share of Theni that there was same percentage was showed in the year 2008 -09 to 2010-11. It was very low to compare the year was 2011 -12 and 2015 -16. The above balance year viewed that maximum same level of percentage. The production was compared to the Tamil Nadu 2008 -09 to 2010-11showed the little point percentage was changed. Very low production percentage are showed in the year 2011-12 and 2013 -14 was compared to the other year. The rest of the year showed the same percentage level of production of sugarcane.

FINDINGS &SUGGESTIONS

- While compared to the Tamil Nadu and Theni District production of sugarcane at all India level was more lower
- Government schemes support the farmers to produce more sugarcane Incentives, and subsidy are given products also.
- Central/ State government may arrange for training programme to the farmers for adopts new methods of cultivation in sugarcane
- To protect farmers for natural calamities, crop insurance scheme may be strictly introduced.
- Central Government offering more insurance scheme to protect the farmers and providing the Bank loans with lowest rate of interest at the time of cultivation.
- The guaranteed price by Government for the sugarcane should be moderate and ensure profit to the cultivation.

CONCLUSION

Production of sugarcane at cheapest cost will ensure economic wellbeing of cultivators as well as the nation. Continuous government support and enhanced farmers awareness will improve the present scenario to a greater extent usage of modern technology right from the selection of seeds/ seedlings to the harvesting of sugarcane will go a long way in increasing the overall production and productivity. Brazil and Cuba have already shown the path.

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