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A STUDY ON TRENDS IN AREA, PRODUCTION AND PRODUCTIVITY OF SUGAR CANE IN ORISSA

R.K. Rout* L.K.Das N. Ranasingh*** S.Behera******

*O.U.A.T, Bhubaneswar, Assistant Professor, Agricultural Economics, College of Agriculture, Bhawanipatna, Odisha.
** O.U.A.T, Bhubaneswar, Associate Professor, Agronomy, College of Agriculture, Bhawanipatna, Odisha.
***O.U.A.T, Bhubaneswar, Associate Professor, Plant Pathology, College of Agriculture, Bhawanipatna, Odisha.
****Govt. of Odisha, AAO, Department of Agriculture, Bhawanipatna, Odisha.

Abstract

Sugarcane is a major cash crop of India, particularly in UP, Maharashtra, Tamil Nadu, Karnataka, Andhra Pradesh, Bihar, Gujarat, and Foot hills of Uttarakhand. Sugarcane crop has an productivity of 70 tonnes/ha and an area of 4.2 mha. plays a pivotal role in the national economy. Sugarcane is considered as one of the best cash crops in Orissa. It is grown in all the 30 districts of Orissa. The selected district Dhenkanal occupied 10th position in area (1.19 thousand ha), 9th position in production (81.46 thousand MTs) and 14th position in yield (68510 kg/ha) in 2004-05. The establishment of a sugar factory in Dhenkanal district has increased the prospect of this crop in the surrounding area. In Orissa the productivity of sugarcane was only 53.2 tonnes/ha as compared to 68.4 tonnes/ha at all India level. There is ample scope for increasing area, production and productivity of the crop in the state. The area and production of sugarcane in the state has declined since last decade due to more emphasis given by the farmers to cereals and other crops. Koraput, Nayagarh, Ganjam, Cuttack, Nawarangpur, Bolangir and Dhenkanal are major cane growing districts of the state. The sample district Dhenkanal occupied seventh position in area, second in production and third position in productivity of sugarcane during 2005-06. The compound growth rate of area, production and productivity of sugar cane during the period 1995-96 to 2005-06 for the state were –1.43 (NS) per cent, 0.06 (NS) per cent, 1.86 (S) per cent. The productivity growth was found to be significant at 1 per cent level. However, for the district of Dhenkanal such magnitudes were non significant with –1.07 per cent, 5.09 per cent and 0.41 per cent respectively.

Key Words: Production, Productivity, Sugarcane, Trend.

Introduction

Sugarcane is a major cash crop of India, particularly in UP, Maharashtra, Tamil Nadu, Karnataka, Andhra Pradesh, Bihar, Gujarat, and Foot hills of Uttarakhand. Sugarcane crop has an productivity of 70 tonnes/ha and an area of 4.2 mha. plays a pivotal role in the national economy. However paltering yield level declining factor productivity, increasing production cost and slashing sugar prices in the industrial market in the recent years pose a real concern to crop diversification in sugar based production. Sugarcane is considered as one of the best cash crops in Orissa. It is grown in all the 30 districts of Orissa. Among these districts, Cuttack (5.45 thousand ha), Koraput (5.24 thousand ha), Nayagarh (4.45 thousand ha), Nawarangpur (3.85 thousand ha), Ganjam (2.48 thousand ha) are leading districts in sugarcane cultivated areas in the year 2004-05. The production of sugarcane in 2004-05 was to the extent of 496.03 thousand MTs in Koraput followed by 325.03 thousand MTs in Cuttack, 276.27 thousand MTs in Nayagarh, 191.94 thousand MTs in Ganjam. The productivity varied from 94589 kg/ha in Korapur, 85800 kg/ha in Kalahandi, 83200 kg/ha in Gajapati and 82288 kg/ha in Kendrapara.

In view of the above perspectives, a study on "A study on trends in area, production and productivity of sugar cane in Orissa" was undertaken with the following objective.

Objective

1. To analyze the growth rates in area, production and productivity of sugarcane in the sample district and state.

Materials and Methods

Sample Design

The multi-stage stratified random sampling technique was adopted in the study. In the first stage two blocks namely Dhenkanal Sadar and Kankadahada were selected randomly, in the second stage, 16 villages were randomly selected at the rate of 8 villages per block. This constituted 5 per cent of the total number of villages of two selected blocks. In the final stage, list of sugarcane farmers was prepared separately for both types of sample villages and 10 farm households from each of the 16 sample villages were selected randomly.

Analytical Tools

The collection of secondary data on in area, production and productivity of sugarcane were collected and analyzed systematically keeping in view the objectives of the study. The details of the tools are presented below.

Compound Growth Rate

Using the least square, the following form of exponential function was fitted to estimate compound growth rates of area, production and productivity of sugarcane.

$Y_t = e^{bt} U_t$

$LnY_t = a + bt + ut$

Compound Growth rate = (Antilog b-1) x 100

Where LnY_t = Area/ production/ productivity

a = constant term

t = time (1, 2, 3 … n)

u = error term

b if positive and significant → positive growth

b if negative and significant → Negative growth

b if insignificant (irrespective of sign) → Stagnant growth

Results and Discussion

World Sugarcane Production

Worldwide sugarcane occupies an area of 22.42 million hectares with a total production of 1333 million metric tonnes (FAO, 2003). Sugarcane area and productivity differ widely from country to country (Table-1). Brazil has the highest area (5343 million ha), while Australia has the highest productivity (85.1 tonnes/ha).

Table 1: Area, Production and Yield of Sugarcane in the World (2003)

Country	Area (million ha)	Production (million tons)	Productivity (Tons/ha)
Brazil	**5.343**	**386.2**	**78.3**
India	4.608	289.6	62.8
China	1.328	92.3	65.5
Thailand	0.970	64.4	66.4
Pakistan	1.086	52.0	47.9
Mexico	0.639	45.1	70.6
Columbia	0.435	36.6	84.1
Australia	0.423	36.0	**85.1**
USA	0.404	31.3	77.5
Philippines	0.385	25.8	67.1
Indonesia	0.350	25.6	73.1
Cuba	0.654	22.9	35.0
South Africa	0.325	20.6	63.4
Argentina	0.295	19.2	65.2
Myanmar	0.165	7.5	45.4
Bangladesh	0.166	6.8	41.2
World	**22.42**	**1333.2**	**65.2**

Source: Directorate of Economics & Statistics, Ministry of Agriculture, Agril. Statistical Division

(i) Sugarcane Production in India

As described earlier sugarcane is cultivated under diverse situation on 4.139 million hectares encompassing areas in Tamil Nadu in the sough extreme, Punjab in the north, Gujarat in the west and Assam in the east. Table-2 explains that the Uttar Pradesh could devote 1974 thousand hectares under sugarcane production followed by Maharashtra (580 thousand hectares), Tamil Nadu (314 thousand hectares) and Karnataka (313 thousand hectares), but Kerala had only 6 thousand hectares under this crop. The production of sugarcane was as high as 1, 19,830 thousand tones in Uttar Pradesh followed by Maharashtra (46,656 thousand tones), Tamil Nadu (34,576 thousand tones) and Karnatak (24,918 thousand tones) and Kerala had the lowest production of 464 thousand tones of sugarcane.

Table 2: Area, Production and Yield of Sugarcane during 2006-07 in Respect of Major Sugarcane Producing States

S. No	State	Area Under Sugarcane (Million Ha)	Production Sugarcane (Million Tonnes)	Yield/Ha (Million Tonnes)
1.	Uttar Pradesh	2.25	133.95	59.53
2.	Maharashtra	1.05	78.57	74.83
3.	Tamil Nadu	0.39	41.12	105.44
4.	Karnataka	0.33	28.67	86.88
5.	Andhra Pradesh	0.26	21.69	83.42
6.	Gujarat	0.21	15.63	74.43
7.	Haryana	0.14	9.58	68.43
8.	Uttarakhand	0.12	6.1	50.83
9.	Punjab	0.1	6.02	60.20
10.	Bihar	0.13	5.96	45.85
11.	Madhya Pradesh	0.06	2.81	46.83
12.	West Bengal	0.02	1.27	63.50
13.	Orissa	0.02	1.27	63.50
14.	Assam	0.03	1.06	35.33
15.	Others	0.04	1.82	45.50
16.	All India	5.15	355.52	69.03

Source: Directorate of Economics & Statistics, Ministry of Agriculture, Agril. Statistical Division

But, yield per hectare was the highest in Tamil Nadu (110.0 tonnes/hectare) followed by the Maharashtra (80.4 tonnes/hectare) and Kerala (80.0 tones/hectare). The table further highlights that Assam, Bihar, Haryana, Madhya Pradesh, Orissa, Punjab, Rajasthan, Uttar Pradesh and Other States register below the all India average of 68.4 tonnes/hectare.

The Orissa state could cultivate sugarcane in 30,000 hectares of land with total production of 1574 thousand tonnes of sugarcane. The productivity was only 53.2 tonnes/hectare. This suggests that there is ample scope in increasing sugarcane area, production and productivity in the Orissa state.

(ii) Sugarcane Production in Orissa

Table 3 explains the area, production and productivity of sugarcane in Orissa from 1980-81 to 2005-2006. During this period sugarcane area increased from 48.6 thousand hectares to a maximum 57.0 thousand hectares in the year 1983-84. In later years, the area has shown a declining trend. There after the production of sugarcane recorded an increase of 11.67 percent during 1980-81 to 1996-97 and declined significantly. The production of sugarcane varied from 3060 thousand tones to 2543 thousand tonnes from 1980-81 to 2005-06. This decline may be due to more emphasis given by farmers to cereals and other cash crops than sugarcane.

Table 3: Area, Production and Yield Rate of Sugarcane in Orissa

Year	Area in'000 hectare	Production in'000 tonnes	Yield/hectare in tones
1980-81	48.6	3060.0	62.96
1981-82	50.0	3220.0	64.40
1982-83	51.2	3169.4	61.90
1983-84	57.0	3560.0	62.45
1984-85	45.7	2708.8	59.27
1985-86	48.0	3101.2	64.60
1986-87	42.6	2721.9	64.00
1987-88	42.3	2785.6	65.90
1988-89	47.0	3200.2	68.00
1989-90	47.5	3325.0	70.00
1990-91	49.0	3549.0	72.43
1991-92	51.0	3602.8	71.64
1992-93	40.6	2657.3	65.45
1993-94	38.9	2618.9	67.32

1994-95	42.0	2900.0	69.00
1995-96	48.9	3348.5	68.47
1996-97	51.0	3417.0	67.00
1997-98	44.26	3214	72.62
1998-99	47.13	3059	64.92
1999-2000	30.97	1826	52.99
2000-01	31.41	2102	66.95
2001-02	29.66	1890	63.73
2002-03	25.21	1516	60.15
2003-04	28.78	1810	62.91
2004-05	33.83	2320	68.60
2005-05	36.71	2543	69.29

Source: Directorate of Agriculture and Food Production, Govt. of Orissa, Bhubaneswar. Statistical Abstract of Orissa, 2008.

(iii) District-wise Production of Sugarcane

Table 4 illustrates that sugarcane is produced in all the districts of Orissa with varying degrees. The area under sugarcane was recorded the highest in Cuttack district (6308 hectares) followed by Bolangir (5354 hectares), Nayagarh (4573 hectares) and Nawrangpur (4351 hectares). The lowest area under sugarcane was recorded in Phulbani district (13 hectares).

Table 4: Area, Production and Productivity of Sugarcane in Different Districts of Orissa (2005-06)

Name of the Districts	Area in '000 hectare	Production in '000 tonnes	Yield/hectare (in qtls/hect)
Angul	0.18	9.65	535.90
Balasore	0.29	14.38	490.89
Baragarh	0.50	33.83	676.63
Bhadrak	0.32	21.05	668.19
Bolangir	0.94	59.41	633.40
Boudha	0.01	0.56	509.22
Cuttack	1.31	60.19	460.16
Deogarh	0.03	1.68	507.28
Dhenkanal	0.79	46.04	585.00
Gajapati	0.20	12.42	608.89
Ganjam	1.92	151.10	785.32
Jagatsinghpur	0.43	32.87	759.13
Jajpur	0.23	12.97	554.48
Jharsuguda	0.04	2.52	629.43
Kalahandi	0.58	33.18	574.96
Kandhamal	0.01	0.33	478.00
Kendrapara	0.08	5.04	600.00
Keonjhar	0.09	5.40	607.25
Khurda	0.48	28.92	600.00
Koraput	3.62	306.96	849.13
Malkanagiri	-	-	-
Mayurbhanj	0.03	1.54	453.14
Nawaranpur	1.16	50.30	435.14
Nayagarh	2.52	150.43	596.47
Nuapara	0.02	0.78	410.00
Puri	0.26	16.03	623.69
Rayagada	0.14	6.67	486.77
Sambalpur	0.05	3.04	552.00
Sonepur	0.08	4.75	609.23
Sundargarh	0.02	0.97	486.18
Orissa	**16.33**	**1073.01**	**657.00**

Source: Directorate of Economics and Statistics Orissa, Bhubaneswar, 2008.

As regards production of sugarcane, the Koraput district had a production of 650150 tonnes, followed by Dhenkanal district (331430 tonnes) and Ganjam (277090 tonnes). The lowest yield was recorded in Phulbani district. Productivity of sugarcane varies from 41 tonnes/hectare in Nuapada and Phulbani districts to 89.36 tonnes/hectare in Koraput district in 2005-06.

The Dhenkanal district occupied the seven position in area, second position in production and third position in productivity of sugarcane during 2005-06.

Growth Rate of Area, Production and Productivity

The growth rates of area, production and productivity of sugarcane in Dhenkanal district were studied with 1995-96 as the base year (Table 5.5). The percent change over previous year was studied as a measure of annual fluctuations. The area under sugarcane fluctuated almost all the years. During 1995-96 to 2005-06, area under sugarcane varied from 1.77 thousand to 1.49 thousand hectares in 2005-06. The index varied from 24.85 to 120.34 during this period, which means that area under sugarcane varied by factors like prices of gur, prices of inputs like fertilizer or cost of labour and availability of labours in the study area. Perhaps this year's market prices induces the farmers to take up sugarcane cultivation and next year's price forces them to reduce the area under sugarcane if he bears losses or market problems. The wide fluctuations in area under sugarcane in Dhenkanal district was perhaps not caused by agronomic problems but by economic problems.

The production of sugarcane varied from 10.22 thousand tones in 8.46 thousand tones during the period 1995-96 to 2005-06. The index varied from 8098 to789.72 during the same period. The percent change over previous year indicated wide fluctuations. The reason for wide fluctuations in sugarcane production was mainly caused by wide fluctuations in area under sugarcane.

The productivity of sugarcane in Dhenkanal district varied from 59.50 tones / hectare to 48.87 tonnes / hectare. This variation was mainly attributed by time of planting, doses of fertilizers and irrigation as reported by the cane growers of the locality.

Table 5: Indices of Area, Production and Productivity of Sugarcane in Dhenkanal District during 1995-96 to 2005-06

Year	Area			Production			Productivity		
	Area in '000 ha.	Index	% Change Over Previous Year	Production in '000 tonnes	Index	% Change Over Previous Year	Productivity in tones/ ha	Index	% Change Over Previous Year
1995-96	1.77	100.0	-	12.62	100	-	71.30	100	-
1996-97	2.13	120.3	20.34	16.17	128.21	28.12	75.90	106.45	6.45
1997-98	1.46	82.49	-31.45	10.22	80.98	-36.80	70.00	98.17	-7.77
1998-99	1.46	82.49	0	10.22	80.98	-0.19	70.00	98.17	0
1999-00	0.44	24.85	-69.8	37.34	295.82	265.30	84.87	119.03	21.24
2000-01	0.55	32.77	31.87	43.64	345.73	16.87	75.24	105.52	-11.35
2001-02	0.65	36.72	12.05	38.68	306.43	-0.001	59.50	83.45	-20.91
2002-03	1.05	59.32	61.54	62.48	494.97	61.52	59.50	83.45	0
2003-04	1.12	63.28	6.67	71.09	563.17	13.77	63.47	89.01	6.66
2004-05	1.19	67.23	6.24	81.46	645.32	14.58	68.51	96.08	7.94
2005-06	1.49	84.18	25.21	99.60	789.02	22.26	66.85	93.75	-2.42

Source: Directorate of Economics and Statistics Orissa, Bhubaneswar, 2008.

In order to examine the growth behaviour of sugarcane in the district and State, compound growth rates with respect to area, production and productivity were calculated in Table 6.

Table 6: Compound Growth Rate of Area, Production and Productivity for Sugarcane Crop in Orissa and Dhenkanal District during 1995-96 to 2005-06

Items	Area	Production	Productivity
Compound growth rate of Orissa	-1.43	0.06	1.86**
Compound growth rate of Dhenkanal District	-1.07 NS	5.09 NS	0.41 NS

** Significant at 1% level. NS: Not significant

The compound growth rates of area and production of sugarcane during the period 1995-96 to 2005-06 for the State as a whole were –1.43 per cent and 0.06 per cent, respectively and were found to be not significant. However, the compound

growth rate for productivity was found to be significant at 1 per cent level for the State as a whole. But the compound growth rate of area, production and productivity of Dhenkanal district during 1995-96 to 2005-06 were –1.07 per cent, 5.09 per cent and 0.41 per cent, respectively and were found to be not significant.

It is therefore, evident that there was negative growth rate in area, of sugarcane both in the district as well as in the State during 1995-96 to 2005-06. This finding contradicts the hypothesis that growth of area under sugarcane in the district is positive. So the postulated hypothesis is, therefore rejected.

The reasons for decreasing trend in sugarcane area and production over time may be attributed due to lack of high quality varieties of sugarcane and improper managerial abilities of sugar industry in the state. It also reflects that there was a greater degree of diversification to vegetables and pulse crops because of inadequate irrigation facilities.

Conclusion

In Orissa, the productivity of sugarcane was only 53.2 tonees/ha and there is ample scope for increasing area, production and productivity of the crop. The area and production of sugarcane have declined since last decade. This decline was due to more emphasis given by farmers to cereals and other crops. Koraput, Nayagarh, Ganjam, Cuttack, Nawarangpur, Bolangir and Dhenkanal are major cane growing districts of the state. The sample district Dhenkanal occupied the seventh position in area, second in production and third position in productivity of sugarcane in the State during 2005-06. The compound growth rate of area, and production of sugarcane during the period 1995-96 to 2005-06 for the State as a whole were –1.43 per cent and 0.06 per cent respectively and were found to be non-significant. However the compound growth rate for productivity was found to be significant at 1 per cent level for the state as a whole. But the compound growth rate of area, production and productivity of Dhenkanal district during the same period were –1.07 per cent, 5.09 per cent and 0.41 per cent respectively and were found to be non-significant.

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