

Trends in Growth Rates in Area, Production, Productivity of Sugarcane and Reasons for Crop Shift in North Coastal Districts of Andhra Pradesh

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ABSTRACT

This study was conducted to know the trends in area, production and productivity of sugarcane at north coastal districts of Andhra Pradesh and also to know the constraints for cultivation of sugarcane crop in North Coastal Zone of Andhra Pradesh. To analyze the trends in production and productivity, 10 years secondary data were analyzed and 180 respondents from command areas of sugar factories were selected to know the reasons/constraints which led to crop shifting. The results revealed that except in Srikakulam, negative growth rates were found in Vizianagaram (-1.97 and -0.50), Visakhapatnam (-2.67 and -0.93) and entire North Coastal Zone (-2.03 and -0.18) for both area and production. However, positive growth rate was noticed in yield for all the three districts. The constraints faced by sugarcane farmers were classified into four broad categories, namely, socio-economic constraints, technical constraints, administrative constraints and psychological constraints. The results revealed that major socio-economic constraints faced by the sample growers were high labour cost (97.2%), unavailability of farm machinery (90.0%), etc. Important technological constraints faced by the sugarcane growers were non-availability of high promising varieties (91.7%), high cost of seed and no subsidy on seed (85.5%). Moreover, existing varieties were highly prone to viral diseases (73.2%). While coming to the administrative constraints, lack of intimate payments (88.8%), delayed cutting orders (85.0%), less input support from factories (77.7%), etc. were the major psychological constraints which drove them to shift to other crops. From the present study, one can conclude that farmers are facing several problems in cultivation of sugarcane. It is recommended that there is a necessity of intensification of extension services to address their constraints and to increase their level of adoption of recommended practices. The study also suggested the need to enhance the efforts in transfer of technology and credit availability to the small and marginal farmers.

Key words : Sugarcane growers, constraints, marketing, crop shift

INTRODUCTION

Sugarcane is cultivated in both tropical and sub-tropical regions of India. In Andhra Pradesh, about 4.0 lakh farmers are engaged in sugarcane production and 0.20 lakhs workers get direct employment in its processing for sugar. Maximum cane area is in coastal region followed by Rayalaseema and Telangana. In recent years, area under sugarcane has drastically reduced due to high production cost, scarcity of labour and stiff competition from other crops like maize, sunflower, soybean, groundnut and paddy (Srilatha and Srilatha, 2020). In north coastal districts of Andhra Pradesh, cane area (56143 to 49119 ha), cane production (2747984 to 3185471 tonnes) and cane productivity (168.40 to 203.25 t/ha) decreased from 2009 to 2019. Lack of irrigation water, non-

availability of improved varieties of sugarcane, land preparation, high cost of inputs, diseases and insect-pests, weeds and market problem were reported as the major constraints faced by the farmers regarding sugarcane production (Abdul *et al.*, 2016; Ritesh *et al.*, 2016; Upreti and Singh, 2017; Yadav and Yadav, 2017; Chavhan *et al.*, 2018). The cane yields have to be increased from present level to higher levels in order to sustain sugarcane farmers and sugar factories (Bee and Rahman, 2020). Scientists should concentrate on development of clones with high yield potential, rich in quality and tolerance to biotic and abiotic stresses to step up cane yields by adopting medium and long term approaches. The sugar factory management and Department of Agriculture should intensify their efforts to reach the technologies to the farmers.

METHODOLOGY

Trend analysis and constraint analysis were the two components of a present study. The first objective was based entirely on time series secondary data on sugarcane crop area, production and productivity in Andhra Pradesh's North Coastal Zone. The study period for the objectives was confined to a minimum of 10 years, from 2009 to 2018-19. For this study, figures were acquired from the Directorate of Economics and Statistics of the Government of Andhra Pradesh. The following formulas were used to calculate the techniques for assessing growth and the extent of instability :

Compound growth rates of area, production and yield for periods mentioned earlier were measured by fitting an exponential function in the following formulae (Rama Rao *et al.*, 2018; Singh *et al.*, 2021) :

$$Y = Ab_t$$

$$\text{Log } Y = \text{Log } A + t \cdot \text{log } b$$

Where, Y = Area/production/yield

A = Constant

b = (1+r)

r = Compound growth rate

t = Time variable in years (1, 2, 3...n)

To estimate the instability, coefficient of variation (CV) was calculated. Coefficient of variation explained the fluctuations over the period as.

$$CV = \frac{\left[\frac{1}{N-1} (\sum_t - \bar{X})^2 \right]^{1/2}}{\bar{X}}$$

Where N = Number of years

X_t = Area/production/yield in the year 't'

\bar{X} = Mean of area/production/yield

In the present study, area and yield variables were taken as proxy for policy and technology factors, respectively. This was represented as :

$$DP = Ao.DY + Yo.DA + DA.DY$$

Where, DP = Production difference

Yo.DA = Policy effect

Ao.DY = Technology effect

DA. DY = Interaction effect of policy and technology

The second goal was carried out by conducting a survey. Six villages from sugar factory

command areas were deliberately chosen for this study in the Visakhapatnam, Vizianagaram and Srikakulam districts of Andhra Pradesh's North Coastal Zone. A total of 180 farmers were selected at random from each village with sample size of 30 farmers. A schedule for such interviews was developed and tested ahead of schedule. Interview schedules were used to obtain data. The study was undertaken in the academic year 2019-20. Sugarcane growers' restrictions were divided into four groups : socio-economic constraints, technical constraints, administrative constraints and psychological constraints. The constraints were ranked employing simple statistics such as frequency and percentages.

RESULTS AND DISCUSSION

The growth trends were observed for the period 2009-10 to 2018-19 in the three districts of north coastal zone. Except in Srikakulam, negative growth rates were found in Vizianagaram (-1.97 and -0.50), Visakhapatnam (-2.67 and -0.93) and entire North Coastal Zone (-2.03 and -0.18) for both area and production. However, positive growth rate was noticed in yield for all the three districts (Table 1).

In Srikakulam and Vizianagaram districts, area (0.24 and 0.13) had higher effect on production fluctuations than yield (0.10 and 0.07). In Visakhapatnam, both area and yield had similar effect on production fluctuation. In entire north coastal zone area (0.08) had higher effect on production fluctuation than area (0.07).

The technology effect (370.03%) was more on production than policy effect (-223.73%) and interaction effect (-46.29%) in north coastal zone as a whole. Similar results were found in Vizianagaram and Visakhapatnam districts also. Except in Srikakulam, there was higher policy effect (85.28%) on production than technology effect (9.87%) and interaction effects (4.85%). The magnitude of technology effect ranged between 529.27% (Visakhapatnam) to 9.87% (Srikakulam). Similarly, policy effect ranged between 85.28% (Srikakulam) to 315.31% (Visakhapatnam). Major socio-economic constraints faced by the sample farmers were high labour cost (97.2%), non-availability of farm machinery (90.0%),

Table 1. Extent of growth rates and instability in area, production and yield of sugarcane in NC Zone districts of A. P.

A. Compound growth rates of area, production and yield of NCZ districts			
	Area	Production	Yield
Srikakulam	3.25	5.85	2.51
Visakhapatnam	-2.67	-0.93	1.79
Vizianagaram	-1.97	-0.50	1.50
NCZ	-2.04	-0.18	1.92
B. Coefficient of variation in area, production and yield of NCZ districts			
	Area	Production	Yield
Srikakulam	0.24	0.26	0.10
Visakhapatnam	0.09	0.07	0.09
Vizianagaram	0.13	0.16	0.07
NCZ	0.08	0.09	0.07
C. Policy and technology effect on change in production of sugarcane in NCZ districts			
	Technology effect	Policy effect	Interaction effect
Srikakulam	9.87	85.28	4.85
Visakhapatnam	529.27	-315.31	-113.96
Vizianagaram	117.04	-13.34	-3.07
NCZ	370.03	-223.73	-46.29

labour shortage (67.2%), low profits (61.7%), no machinery used for sugar-cane was covered under subsidy (58.3%), high transport cost (49.4%), expensive farm machinery (33.3%), no capital flow due to late payments by the sugar factories (31.1%), less loaning ability (22.2%), etc. (Table 2). Farmers were of opinion that these factors greatly affected their production and submitted their recommendations to address the issue with urgent attention. The results were at par with the findings of Ahmed *et al.* (2016).

Table 2. Distribution of sugarcane growers according to their socio-economic constraints

S. No.	Reasons/constraints	Frequency	%	Rank
1.	Small and marginal holding	38	21.1	XI
2.	No capital flow due to late payments by the sugar factories	56	31.1	VIII
3.	Low profits	111	61.7	IV
4.	High labour cost	178	97.2	I
5.	Unavailability of labour at peak time	121	67.2	III
6.	Unavailability of machinery	162	90.0	II
7.	Expensive farm machinery	60	33.3	VII
8.	No machinery used for sugarcane was covered with subsidy	105	58.3	V
9.	High transport cost	89	49.4	VI
10.	Poor transportation facilities	50	27.8	IX
11.	Less loaning ability	40	22.2	X
12.	Fluctuations in price	37	20.5	XII

Unavailability of high yielding/promising varieties (91.7%), high cost of seed and no seed subsidy (85.5%) and existing sugarcane clones were highly prone to viral diseases (73.2%), continuous cultivation of old varieties with red rot susceptibility (66.7%), neglected ratoon management (60.5%), and not exercising improvised ratoon management (60.5%) were the 12 major technological constraints faced by sugarcane growers (Table 3). The results are consistent to those of Illuru and Kondeti (2016).

Table 4 shows that the sugarcane growers faced six major administrative difficulties, major one was a lack of intimate payments (88.8%). The major administrative constraints faced by sugarcane growers were delayed cutting orders (85%), less input support from factories (77.7%), less attention from factories to sustain the area under sugarcane (66.6%), less technical support from factories (56.1%), and less strive to keep farmers under sugarcane crop cultivation (22.2%).

In the study area, 18.8% respondents had less interest in sustainable resource use, whereas 12.2% respondents had lower risk taking ability, 11.1% respondents had fear of indebtedness and 8.8% respondents had lost interest in sustainable resource use (Table 5). Due to these issues, the cultivated area under the sugarcane crop is shrinking, which has an influence on the farmers' socio-economic status as well as the country's overall production.

The supply of high yielding, pest and disease-free seed material was a major requirement expressed by 100% of the respondents (Table 6). Growers faced a number of challenges, including a lack of awareness of improved production practises. As a result, 84.4% of

Table 3. Distribution of sugarcane growers according to their technical constraints

S. No.	Reasons/constraints	Frequency	%	Rank
1.	Unavailability of high yielding/promising varieties	165	91.7	I
2.	High cost of seed and no subsidy on seed	154	85.5	II
3.	No subsidy on inputs	60	33.3	IX
4.	Improper irrigation facilities with power interruption	64	35.5	VIII
5.	Frequent droughts/floods	51	28.3	X
6.	Existing varieties are highly prone to viral diseases	132	73.2	III
7.	Continuous cultivation of old varieties with redroot susceptibility	120	66.7	IV
8.	Not practicing improved agronomic practices	100	55.6	VI
9.	Neglected ratoon management	109	60.5	V
10.	Low yields	88	48.8	VII

Table 4. Distribution of sugarcane growers according to their administrative constraints

S. No.	Reasons/constraints	Frequency	%	Rank
1.	Delayed cutting orders	153	85.0	II
2.	Lack of intimate payments	160	88.8	I
3.	Less attention of factories to sustain the area under sugarcane	120	66.6	IV
4.	Less input support from factories	140	77.7	III
5.	Less technical support from factories	101	56.1	V
6.	Less efforts to sustain farmers under cultivation of sugarcane crop	40	22.2	VI

Table 5. Distribution of sugarcane growers according to their psychological constraints an influence on the farmers' socio-economic status as well as the country's overall production

S. No.	Reasons/constraints	Frequency	%	Rank
1.	Less risk taking ability	22	12.2	II
2.	Lost interest on agriculture	16	8.8	IV
3.	Less interest of sustainable use of resources	34	18.8	I
4.	Fear of indebtedness	20	11.1	III

Table 6. Distribution of sugarcane growers according to their suggestions to prevent crop shift

S. No.	Suggestions	Frequency	%	Rank
1.	Timely cutting orders and timely payments	91	50.5	V
2.	Supply of high yielding, pest and disease-free seed material	180	100.0	I
3.	Subsidy on mechanized harvesting should be provided by government in conjunction with private millers in crushing seasons	150	83.3	III
4.	Subsidy on sugarcane seed and other inputs	148	82.2	IV
5.	Continuous technical support	152	84.4	II
6.	More credit facilities should be made available to farmers at nominal interest rate	89	49.4	VI
7.	Government to assess crop damage by stray animals and make appropriate compensation for losses	85	47.2	VII

growers suggested that the government should improve extension activities to raise awareness of production technologies and, as a result, promote adoption of the recommended technologies. Eighty-three per cent of growers urged that the government and private millers collaborate, and that the government give a subsidy for mechanical harvesting in conjunction with private millers during

crushing season. The input cost such as seed and fertilizer had significant impact on overall cost of production. 82.2% of growers suggested that subsidy on sugarcane seed and other inputs should be made available. 50.5% of the respondents revealed that timely cutting orders and timely payments will be the best strategy to hold the sugarcane farmers from crop shift. Non-availability of easy credit facility

(bank loan) at nominal interest rate was also hindering sugarcane production; therefore, 49.4% of the growers suggested more credit facilities should be provided to farmers at nominal interest rate. The problem of stray animals was suggested to be addressed by the government. 42.7% of the growers suggested that crop damage by stray animals should be assessed by Agricultural Officers and accordingly desirable compensations should be made to the growers. In summary, all sampled growers strongly suggested that above recommendations should be taken on board with top priority if sugarcane farming is to be improved to a better standard in Visakhapatnam district.

CONCLUSION

According to the study, majority of sugarcane growers encountered a range of issues due to which they decided to take sugarcane crop hiatus and switch to more lucrative crops. As a result, it was suggested that all constraints be addressed using the recommended suggestions and solutions. It was also suggested that technology transfer be strengthened in order to alleviate technological obstacles. The study found that there was a massive disparity between technological advancement and farmer uptake. Increased awareness, training, and demonstrations will have a key role in the adoption of technology and, as a result, in increasing sugarcane productivity. The government should take the initiative to offer financial support through financial institutions, as well as a subsidy for producers.

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