J. Res. ANGRAU 47(4) 69-77, 2019

PRODUCTION AND MARKETING OF SUGARCANE IN VISAKHAPATNAM DISTRICT OF ANDHRA PRADESH

R. ASHA*, G. SUNIL KUMAR BABU and T. SURYA TEJA
Department of Agricultural Economics, Agricultural College,
Acharya N. G. Ranga Agricultural University, Bapatla- 522 101

Date of Receipt: 15.10.2019 Date of Acceptance:18.12.2019

ABSTRACT

The production and marketing of sugarcane cultivation have been studied in Visakhapatnam district of Andhra Pradesh during 2018-19. The results revealed that cost of cultivation was high for plant crop than the ratoon farming with the benefit-cost ratio of 1.10 for plant crop and 1.30 for ratoon crop. Net income for the plant crop was Rs.34735/- and Rs.41898/- for the ratoon. The coefficients human labour (0.73), manure (0.25) and seed rate (0.39) were showing positive significant effect on output and plant protection chemicals (-0.08) showing negative significant effect on output. The price spread analysis for the selected channel indicated that the producer received 70.83 per cent of consumer's price in channel 1 (sugar), 81.43% in channel 2 (jaggery). Total marketing cost was highest for channel 1 (34.30%) than the channel 2 (18.80%). The index of marketing efficiency was high for channel 2 *i.e.* 3.33 as compared to 1.06 for channel 1.

Key words: Sugarcane, cost concepts, input use efficiency, price spread

INTRODUCTION

India ranks second in the world in sugarcane production after Brazil. In India sugarcane was cultivated in an area of 4.73 million ha with production of 376.90 million tonnes and with the productivity of 79.65 tonnes ha^{-1} during 2017-18. Sugarcane is one of the important cash crops in Andhra Pradesh, constituting about 0.10 million ha of cultivated area with an overall production of 7.95 million tonnes and yield of 80.283 tonnes ha^{-1} during the year 2017-18 (GoI, 2018). The major districts growing sugarcane in Andhra Pradesh, are Visakhapatnam, West Godavari and Krishna. Visakhapatnam ranks first in terms of area (0.5 lakh ha.) and production (2.0 MT) of sugarcane in Andhra Pradesh during the year 2017-18. Two major sugarcane-based industries in Visakhapatnam are sugar and jaggery with, both the industries having their own peculiar characters. The study was conducted to know the production and marketing situation with objectives, to work out costs and returns in cultivation of sugarcane, analyse the input use efficiency of sugarcane, and to identify the marketing margins and price spread of sugarcane cultivation. Rao (2017) studied about price spread of sugarcane jaggery farmers and the producers share in consumer's rupee and marketing efficiency in Value chain I and II reported as 67.94, 73.10 and 2.72 and 2.12, respectively. Peerzado *et al.* (2016) studied economic assessment of sugarcane production and its marketing constraints in

*Corresponding author E-mail i.d: asha.rallapalli06@gmail.com

Sindh, Pakistan. Production cost of Rs. 171631/- per ha and net returns of Rs. 368369 per ha. Krishnakant *et al.* (2015) studied cost of cultivation of sugarcane crop and the results revealed that the cost of cultivation of plant and ratoon sugarcane crop were found to be Rs. 172679/- per ha and Rs. 129753/- per ha respectively in the Meerut district of Uttar Pradesh. Ogwang (2009) used Cobb-Douglas production function to determine factors affecting sugarcane productivity. The results indicated that sugarcane acreage (farm size), amount of labour used and the fertilizer usage were positive and statistically significant.

MATERIAL AND METHODS

The production and marketing of sugarcane cultivation was studied in Visakhapatnam district of Andhra Pradesh for the period of 2018-19 by collecting the data on costs and returns, marketing channels, etc. A multi-stage random sampling technique was adopted for selecting sampling units at various levels. In 1st stage, Andhra Pradesh is selected, in 2nd stage, Visakhapatnam district was selected as it is highest sugarcane producing district. In 3rd stage, three mandals were selected in Visakhapatnam district *viz.,* Madugula, Chodavaram and Anakapalle as sugarcane production was highest in these mandals. In 4th stage of sampling, 20 respondents were selected from each mandal and total 20 traders were also selected randomly from all the three mandals making total sample size 80 respondents.

Cost of Cultivation: The different cost concepts used are A_1, A_2, B_1, B_2 and C_1, C_2 & C_3 based on these cost concepts the production cost of sugarcane was calculated.

Cost A_1 = All actual expenses incurred in production by owner operator

Cost A_2 = Cost A_1 + rent paid for leased in land

Cost B_1 = Cost A_2 + interest on fixed capital (excluding land)

Cost B_2 = Cost B_1 + imputed rental value of owned land

Cost C_1 = Cost B_1 + imputed value of family labour

Cost C_2 = Cost B_2 + imputed value of family labour

Cost C_3 = Cost C_2 + 10per cent of Cost C_2 (As managerial cost)

Cobb-Douglas production function: This was fitted for the estimation of elasticities of important variables contributing to the yield of sugarcane.

$$Y = a\, X_1^{b1} X_2^{b2} X_3^{b3} X_4^{b4} X_5^{b5}$$

Where, Y - Yield (kg.)

X_1 - Human labour (human-days)

X_2 - Manure (kg.)

X_3 - Fertilizers (kg.)

X_4 - Plant protection chemicals (L)

X_5 - Seed rate (kg.)

Producer's share in Consumer's Rupee: It is the price received by the farmers expressed as a percentage to the retail price (*i.e.* price paid by consumer). If P_r is the retail price and P_f is the producer price then the producer's share in consumer rupee P_s may be expressed as: $P_S = \frac{P_f}{P_r} * 100$

Marketing Margin of Middlemen: This is the difference between the total payment (cost + purchase price) and receipts (sale price) of middlemen (i^{th} agency).

Percentage margin of i^{th} middleman = $\frac{P_{R_i} - (P_{P_i} + C_{m_i})}{P_{R_i}} * 100$

Wherein, P_{Ri} = Total Value of receipts per unit (sale price)

P_{Pi} = Purchase value of goods per unit (purchase price)

C_{mi} = Cost incurred on marketing per unit.

Total Cost of Marketing: The total cost incurred on marketing of sugarcane by the farmers and intermediaries involved in the process of marketing was computed as:

$C = C_F + C_{M1} + C_{M2} + C_{M3} + \ldots\ldots\ldots\ldots + C_{Mn}$

Wherein, C = Total cost of marketing

C_F = Cost incurred by producer in the marketing of sugarcane

C_{M1} = Cost incurred by the middlemen in the market of sugarcane

Marketing margin for the adopted marketing channel was worked out by comparing the prices prevailing at successive stages of marketing. The used prices were related to a particular point of time and the channels involved in the study are: Producer- Sugar factory- Wholesaler- Retailer- Consumer and Producer- Processor (Gur)- Wholesaler- Retailer- Consumer.

Marketing Efficiency: Shephard (1970) has suggested the ratio for calculating marketing efficiency. The decision rule was higher the ratio, higher the efficiency and vice-versa.

M.E. = $\frac{V}{I} - 1$

Wherein, V= value of goods sold (consumer's price)

I = Total marketing cost

M.E. = Index of marketing efficiency

RESULTS AND DISCUSSION

Costs and returns in cultivation of sugarcane

The operational cost has been presented for plant and for ratoon. The operational cost for ratoon crop (Rs. 83,302/-) found less when compared to plant crop (Rs. 1,42,945/-) because preparatory cultivation and planting charges are very less in the ratoon crop as compared to plant crop (Chinnappa, 1998).

Harvesting costs are higher for the sugarcane crop up to 18% to 20 per cent of the total operational cost are from harvesting operation only. The operational cost on the cultivation of sugarcane was increased over years due to increased labour wages and seed cost similar result for operational costs was recorded by Pusappa (2013). The total cost of cultivation was found to be Rs. 1,71,205/- for plant and Rs. 1,03,501/- for ratoon crop. Human labour contributes 28 per cent to total costs for planted, and for ratoon 26 per cent, seed cost contributes 16 per cent to total cost for planted 2.06 per cent for ratoon. Total fixed capital Rs.40669/- for plant and Rs.40,565/- for ratoon crop (Table 1).

Table 1. Comparison of costs of cultivation of plant and ratoon sugarcane in 2018-19 (Rs. ha^{-1})

	Particulars	Plant crop contribution	per cent crop	Ratoon contribution	per cent
1.	Hired human labour	37182	22	16844	16
2.	Imputed value of family labour	11320	7	9800	9
3.	Seed cost	27000	16	2140	2
4.	Animal power	1800	1	4000	4
5.	Machine power	7200	4	0	0
6.	Manures and fertilizers	14381	8	9940	10
7.	Plant protection	2715	2	2715	3
8.	Irrigation	9750	6	6520	6
9.	Interest on working capital	2922.89	2	1212	1
10.	Total operational cost	114271	67	53171	51
11.	Rental value of owned land	36000	21	36000	35
12.	Depreciation	297	0.2	244	0.2
13.	Interest on fixed capital	3697	2	3688	4
14.	Total fixed capital	40669	24	40565	39
15.	Grand Total (Rs.)	154940	90	93735	91
16.	Cost A_1	142648	83	83058	80
17.	Cost A_2	142648	83	83058	80
18.	Cost B_1	142945	83	83302	80
19.	Cost B_2	143620	84	83935	81
20.	Cost C_1	154265	90	93102	90
21.	Cost C_2	154940	90	93735	91
22.	Cost C_3	171205	100	103501	100
	Yield (tonnes per ha.)	70		50	
	Gross income (Rs.)	189000		135000	
	Net income (Rs.)	34735		41898	
	Benefit- cost ratio on operational cost	1.32:1		1.62:1	
	Benefit- cost ratio on total cost	1.10:1		1.30:1	

The yields of sugarcane were stagnant for past two decades (hovering around 70-80 t ha^{-1}) (Rao, 2012). This has been mainly because a large area is under rainfed sugarcane wherein, the average yield is 50 t ha^{-1}. In the study area, the average yield of plant crop was 70 t ha^{-1} and 50 t ha^{-1} for ratoon. Total gross returns for sugarcane farmers was Rs. 1,89,000/-in plant crop and Rs. 1,35,000/- in ratoon crop per ha. The cost of production per tonne was Rs.2,446/- for plant and Rs.2,070/- for ratoon crop. Benefit cost ratio on operational cost for plant is 1.32 and for ratoon crop is 1.62. Benefit cost ratio on total cost for plant is 1.10 and for ratoon was 1.30. Total net income against total cost was Rs. 34,735/- and for ratoon crop was Rs. 41,898/- per ha.

Input use efficiency of sugarcane

The Cobb-Douglas production function was fitted For the estimation of elasticities of important variables contributing to the yield of sugarcane. (Table 2). The value of coefficient of multiple determinations (R^2) was found to be 0.78. Regression co-efficient associated with human labour, fertilizers, manures, seed rate and irrigation were positive and significant indicating that these resources contributed significantly to the output of this crop. However, plant protection chemicals did not enter as one of the significant variables in sugarcane cultivation. The negative and significant co-efficient of plant protection chemicals indicated that these farms are using this input in excess quantity.

Table 2. The input use efficiency of sugarcane

Sl.No.	Particulars	Parameter	Coefficients
1.	Intercept	A	2.22
2.	human labour (human-days)	X_1	0.73** (0.13)
3.	Manure (kg.)	X_2	0.25* (0.05)
4.	Fertilizers (kg.)	X_3	0.269 (0.09)
5.	plant protection chemicals (L)	X_4	-0.08** (0.10)
6.	Seed rate (kg.)	X_5	0.39* (0.05)
7.	Irrigation (no.)	X_6	0.43 (0.29)
8.	R Square		0.78

Note: * and ** indicate significance at 1per cent and 5per cent, respectively; Figures within the parentheses are standard errors for the respective regression coefficients.

The results showed that for every unit increase in human labour, manure, fertilizers, seed rate and irrigation, the yield per ha increases by 0.73%, 0.25%, 0.269%, 0.39%, 0.43%, respectively and for a unit increase in plant protection chemicals the yield decreased by 0.08 %.

Marketing margins and Price spread of Sugarcane cultivation

In marketing of sugarcane two main products *viz.,* sugar and jaggery are involved. The marketing margins of producers and other marketing intermediaries are quantified along

with the existing two marketing channels for sugarcane (Rao and Kumar, 2005). In the first channel (channel 1) the main players are producers, sugar factory, wholesalers, retailers and consumers. In the second channel (channel 2) the players are producers cum processor (gur), jaggery wholesalers, retailers and consumers.

Table 3. Price spread per quintal of sugar in Visakhapatnam district for Channel-I

S. No.	Particulars	Cost (Rs.)	Per cent to Consumer's rupee
1	Cost incurred by producer		
i.	Weighing, loading and unloading	50	1.38
ii.	Transportation	100	2.77
iii.	Miscellaneous charges	30	0.83
	Total	180	4.98
	Net sale price to producers	**2550**	**70.83**
2.	Cost incurred by sugar factory		
i.	Weighing, loading and unloading	50	1.38
ii.	Transportation	150	4.00
iii.	Production cost of sugar preparation	400	22.20
	Total	600	16.66
	Net sale price to Sugar factory	**2700**	**75.00**
3.	Costs incurred by wholesaler:		
i.	Weighing, loading and unloading	50	1.38
ii.	Transportation	100	2.77
iii.	Storage	50	1.38
iv.	Miscellaneous (packing material, GST and labour cost)	25	0.69
	Total	225	6.25
	Wholesaler's market margin	275	7.64
	Wholesaler's sale price/retailer's purchase price	**3200**	**88.88**
4.	Costs incurred by retailer:		
i.	Cost of packing	50	1.38
ii.	Transportation	80	2.22
iii.	Miscellaneous charges	100	2.77
	Total	230	6.38
	Retailer's margin	170	4.72
	Retailer's sale price /Consumer's purchase price	**3600**	**100**
	Total marketing cost	1235	34.30

Producers share in consumer's rupee was found about 70.83 per cent in the channel-1 (Table 3). Producer incurred marketing cost of Rs. 180 for weighing, unloading and transportation. The total net sale price for producer was Rs. 2,550 per quintal of sugar. One tonne of sugarcane produces average one quintal of sugar. The cost incurred by sugar factory was Rs. 200 for transportation, loading and weighing and Rs. 400 for production cost of sugar which formed 16.66 per cent in consumer's rupee. The sugar factory sells sugar to wholesalers or brokers at Rs. 2700 per quintal sugar which formed 75 per cent in consumer's rupee. Wholesaler incurred marketing cost Rs.225 for weighing, loading and unloading, transportation, storage, taxes and packing which formed 6.25 per cent in consumer's rupee. Wholesaler sells produce to retailer at a cost of Rs.3200 including his margin Rs.275. Retailer incurred marketing cost Rs.230 which formed 6.38 per cent in consumer's rupee and his margin was Rs.170. The price paid by the consumer was Rs.3600 per quintal. In channel-1 total marketing cost for one quintal of sugar was Rs. 1235 which is 34.30 per cent in consumer's rupee.

Producer's share in consumer's rupee was 81.43 per cent in the channel-2 (Table 4). Producer incurred marketing cost of Rs. 424.5 per quintal for weighing, unloading, hamalies, commission to commission agents and transportation. The total net sale price for producer was Rs.3,420 per quintal of jaggery. One tonne of sugarcane produces on an average 100 kg to 130 kg of jaggery (Rao and Babu, 2012). The producer (farmer) sells jaggery to wholesalers in jaggery market yard in Anakapalle at price Rs. 3,420 per quintal. Wholesaler incurred marketing cost Rs.210 for weighing, loading and unloading, transportation, storage, which formed 5 per cent in consumer's rupee. Wholesaler sells jaggery to retailer at a cost Rs. 3,850 including his margin Rs.220. Retailer incurred marketing cost Rs.155 which formed 3.69 per cent in consumer's rupee and his margin was Rs. 195. The ultimate price received by the consumer was Rs. 4200. In case of channel-2 total marketing cost for per quintal of jaggery was Rs.789 which is 18.80 per cent in consumer's rupee.

Table 4. Price spread per quintal of jaggery in Visakhapatnam district for Channel-2

S. No.	Particulars	Cost (Rs.)	Per cent to Consumer's rupee
1.	Costs incurred by Producer		
i.	i. Cost of gunny bags	50	1.19
ii.	ii. Weighing	2.80	0.07
iii.	iii. Hamalies	9.30	0.22
iv.	iv. Taxes if any	73.6	1.75
v.	v. Commission to commission agent	138.8	3.30
vi.	vi. Transportation	150	3.57
	Total	424.5	10.11
	Producer's sale price	**3420**	81.43

Table 4 contd..

S. No.	Particulars	Cost (Rs.)	Per cent to Consumer's rupee
2.	Costs incurred by wholesaler		
i.	Weighing, loading and unloading	40	0.95
ii.	Transportation	70	1.67
iii.	Storage	50	1.19
iv.	Miscellaneous (packing material and labour cost)	50	1.19
	Total	210	5.00
	Wholesaler's margin	220	5.24
	Wholesaler's sale price/retailer's purchase price	**3850**	91.67
3.	Costs incurred by retailer		
i.	Cost of gunny bags	80	1.90
ii.	Transportation	50	1.19
iii.	Miscellaneous charges	25	0.60
	Total	155	3.69
	Retailer's margin	195	4.64
	Retailer's sale price /Consumer's purchase price	**4200**	100
	Total marketing cost	789.50	18.80

Table 5. Indices of marketing efficiency in the selected channels

Particulars	Channel-1	Channel-2
1. Value of goods sold (V)/ Net price received by farmer	2550	3420
2. Consumers purchase price	3600	4200
3. Marketing cost (I)	1235	789.5
4. Index of marketing efficiency	1.06	3.33

From the Table 5 it can be observed that channel-2 was efficient than channel-1. The low producers net price, higher marketing cost and margins in channel-1 to leads to inefficiency in marketing process. Similar results were recorded by Kavitha (2014) in her study on supply chain management of jaggery in Anakapalle region and observed that jaggery marketing channel had marketing efficiency of 3.33.

CONCLUSION

The total cost of cultivation was found to be more for plant crop of sugarcane than ratoon crop. The reason might be due to high cost incurred on inputs such as seed material and fertilizers in the planted crop. Net income was more for ratoon crop. Plant protection chemicals had negative impact on the production. Channel-1 for sugar was less efficient with a value of marketing efficiency of 1.06 were as for channel-2 for jaggery it was 3.33. Producer's

share in consumer's rupee for sugar producing farmer was 70.83 per cent and for jaggery farmer it was 81.43 per cent.

REFERENCES

GoI. 2018. Agricultural Statistics at a Glance 2017-18. Directorate of Economics and Statistics. Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India.

Chinnappa, B. 1998. Resource use, cost structure and marketing of Sugarcane: a case study of Karnataka. The Bihar Journal of Agricultural Marketing. 6 (1):74-79.

Kavitha, M. 2014. Supply chain management of jaggery in Anakapalle region of Andhra Pradesh. M.Sc. Thesis submitted to Professor Jaya Shankar Telangana State Agricultural University, Rajendranagar, Hyderabad.

Krishnakant, Siddharth, Prakash, Tripathi and Meena, A. 2015. Cost of cultivation of sugarcane crop in Meerut district of Uttar Pradesh. International Journal of Forestry and Crop Improvement. 6 (1):41-48.

Ogwang, H.J. 2009. Production and profitability of sugarcane among Kinyaracane Out-growers, Masindi District. M.Sc. Thesis submitted to Faculty of Agriculture, Makerere University Research Repository, Kampala, Uganda.

Peerzado, M.B., Jalbani, A.A., Mangan, T., Joyo, M.A.A., Jingdong, L., Qurat, U., Memon, A and Wagan, S.A. 2016. Economic assessment of sugarcane production and its marketing constraints in Sindh, Pakistan. Journal of Marketing and Consumer Research.29 (1):11-17.

Pusappa, K.N. 2013. Economics of sugarcane cultivation in Andhra Pradesh. Ph.D. Thesis submitted to Andhra University, Visakhapatnam.

Rao, I.V.Y. R. 2017. Estimating the economic efficiency in production and value chains of jaggery in Andhra Pradesh, India. Indian Journal of Agricultural Marketing. 31 (2):31-41.

Rao, I.V.Y.R and Babu, G.S.K. 2012. An economic analysis of production and marketing of Jaggery in Andhra Pradesh. Indian Journal of Agricultural Marketing. 26 (2):54-63.

Rao, I.R. 2012. Efficiency, yield gap and constraints analysis in irrigated *vis-a-vis* rainfed Sugarcane in North Coastal Zone of Andhra Pradesh. Plant Protection. 2328-2375.

Rao, K.P.C and Kumar, R. 2005. Production and marketing scenarios of jaggery in India with special reference to Andhra Pradesh. Indian Journal of Agricultural Marketing. 46 (4):39-43.

Shephard, R.W. 1970. Theory of cost and production functions. Princeton University Press, Princeton. 31 (3):721-723.