



## **An Economic Analysis of Sugarcane Cultivation in Nellore District, Andhra Pradesh**

**M Srikala and T V Neelakanta Sastry**

Department of Agricultural Economics, S V Agricultural College, Tirupati 517 502

### **ABSTRACT**

The per hectare cost of cultivation of sugarcane planted and ratoon worked out to Rs. 1,06,68, Rs. 76,827, and Rs. 1,13,117 on planted crop and Rs. 80,986, Rs. 1,09,895 and Rs. 78,907 for ratoon crop on small, large and combined farms respectively, thus exhibiting positive relationship with the size of the farm. The cost of producing a tonne of sugarcane planted and ratoon showed inverse relationship with the size of the holding, Rs. 1,016 and Rs. 778 on small farms and Rs. 1,005 and Rs. 762 on large farms. The net income from sugarcane planted and ratoon increased from Rs. 6,727 to Rs. 29,822 on small farms and from Rs. 8,383 to Rs. 33,764 on large farms respectively.

**Key words :** Cost of cultivation, Costs and returns, Sugarcane.

Sugarcane is one of the most important commercial crops of the country. In India, during 2011-12, the area under sugarcane crop was 5.09 million hectares with a total production of 347.87 million tonnes (Ministry of Agriculture, 2012). Among different states of the country, Uttar Pradesh occupied first place in area and production of sugarcane followed by Maharashtra, Karnataka, Tamil Nadu, Andhra Pradesh and Gujarat.

The profitability of sugarcane cultivation depends on the cost structure, prices and sugar recovery percentage. However, much attention has not been focussed on the economic aspects of sugarcane cultivation in Nellore district of Andhra Pradesh. In this context, it is felt necessary to probe into the economic aspects viz., costs and returns in the cultivation of sugarcane at micro level. The popular sugarcane varieties in the study area were Co7805, 83V15, 86V96 and 298.

### **MATERIAL AND METHODS**

Based on the largest area under sugarcane, two manadals viz; Kovur and Buchireddypalem of Nellore district were selected for the study. After arranging the villages in the descending order of magnitude based on the acreage under sugarcane cultivation, two villages from each mandal were selected. The selected villages were Kovur and Gangavaram from Kovur mandal and Rejala and Buchireddypalem from Buchireddypalem mandal. The list of sugarcane growers was prepared for each of the selected villages with the help of the

records of the Village Administrative Officers. 20 small farmers and 20 large farmers were selected randomly from each selected village (Those farmers with 2 hectares or less of dry land were considered as small farmers and the farmers with more than 2 hectares of dry land were considered as large. In this classification, 2 acres of dry land was considered equal to one acre of wet land in accordance with income generating capacity of dry and wet lands). Hence, the total sample size was 80 sugarcane growers consisting of 40 small farmers and 40 large farmers. Data were collected through survey method with the help of pre-tested schedules.

### **RESULTS AND DISCUSSION**

#### **Cost of cultivation of sugarcane main/planted crop**

The total cost of cultivation per hectare of sugarcane planted crop was Rs. 1,06,673 on small farms, Rs. 1,13,117 on large farms and Rs. 1,09,895 on combined farms. The break-up of the total costs into operational and fixed costs indicated that the operational costs were Rs. 87,117 (81.67 per cent), Rs. 94,551 (83.59 per cent) and Rs. 90,834 (82.66 per cent) while the fixed costs were Rs. 19,556 (18.33 per cent), Rs. 18,566 (16.41 per cent) and Rs. 19,061 (17.34 per cent) on small, large and combined farms respectively.

Fertilizer management was the most crucial for getting a good harvest of sugarcane. The balanced supply of the major nutrients would

help to maintain disease free condition to a greater extent. The small farmers had spent Rs. 10,632 (9.97 per cent), while large farmers spent larger amount touching Rs. 12,719 (11.23 per cent) on manure and fertilizers. The same on pooled farms was Rs. 11,675 (10.62 per cent) (Table 1).

Farmers in the study area resorted to both preventive and protective care in order to control pests and diseases. Normally, the crop is prone to early shoot borer. To control this pest, farmers were employing a cultural practice namely flooding. In the study area, farmers were using weedicides to keep the field weed free. Also, they use rodenticides to control rats. The expenditure towards rodenticides and weedicides was Rs. 1,120 (1.05 per cent) on small farms, Rs. 1,445 (1.28 per cent) on large farms and Rs. 1,283 (1.17 per cent) on combined farms.

Sugarcane is a labour intensive crop requiring regular operations like irrigation, weeding, twisting and plant protection. Sugarcane will be ready for harvest in 12 months after planting. Of the total costs, human labour cost was the highest costing factor of production. The expenditure incurred towards this input was Rs. 27,653 (25.92 per cent) on small farms, Rs. 29,640 (26.20 per cent) on large farms and Rs. 28,646 (26.07 per cent) on combined farms.

The expenditure that was incurred for transporting the cane to the sugar factory was Rs. 17,850 (16.73 per cent), Rs. 19,125 (16.91 per cent) and Rs. 18,487 (16.82 per cent) on the on small, large and combined farms respectively. This was the next highest costing item after human labour.

Among the fixed costs, rental value of land was the major item. The rental value was arrived at based on the rent prevailing in the study area. Hence, the rental value of owned land was the same (Rs. 15,000 per hectare) on all the size groups. The other items of fixed costs were interest on fixed capital, depreciation and land revenue accounting for 2.28, 1.36 and 0.05 per cent of the total costs respectively on combined farms.

#### **Cost of cultivation of ratoon crop**

The per hectare cost of cultivation of sugarcane ratoon crop was estimated at Rs. 76,827 on small farms, Rs. 80,986 on large farms and Rs. 78,907 on combined farms. The break up of total costs showed that 75.84 per cent was accounted

by operational costs and 24.16 per cent by fixed costs on combined farms. More or less, the same trend was observed on small and large farms.

It was found that human labour was the major item of expenditure among operational costs amounting to Rs. 20,706, Rs. 22,184 and Rs. 21,445 per hectare and accounted for 26.95, 27.39 and 27.18 per cent of the total costs on small, large and combined farms respectively. Expenditure on transportation of sugarcane from the farm to the sugar factory which included loading and unloading charges was the next important item of cost accounting for 21.85, 22.30 and 22.08 per cent of the total costs on the small, large and combined farms respectively. The interest of farmers to earn more income from the farm business through better management practices was quite evident as the small, large and combined farms incurred Rs. 8028 (10.46 per cent), Rs. 9,090 (11.24 per cent) and Rs. 8,559 (10.85 per cent) towards manures and fertilizers respectively. The other items of operational costs in the order of their importance were, interest on working capital (5.83 per cent), bullock labour (3.95 per cent) and tractor power (3.49 per cent) on combined farms. The same trend was observed on small and large farms (Table 1).

The fixed costs worked out to Rs. 19,556 (25.45 per cent) Rs. 18,566 (22.92 per cent) and Rs. 19,061 (24.16 per cent) on small, large and combined farms respectively. Among the fixed costs, the rental value of owned land was the major item and accounted for 19.52, 18.52 and 19.01 per cent of the total costs on the above said categories of farms. Interest on fixed capital and depreciation were other components of fixed costs accounting for 3.18 and 1.90 per cent of the total costs respectively on the combined farms.

The overall analysis of cost structure of sugarcane planted and ratoon cultivation revealed that the large farmers had incurred higher costs than small farmers (5.70 per cent and 8.25 per cent in case of planted crop and ratoon crop respectively). The difference in the per hectare cost of cultivation between the size groups was due to the differences in the magnitude of inputs and input services utilisation such as human labour, tractor services, manures and fertilizers etc. The cost of human labour, transportation, manures and fertilizers, rental value of owned land, cattle labour and tractor services accounted for 79.09 per cent

Table 1. Cost of cultivation of sugarcane (Rupees per hectare).

Sl. No.	Particulars	Main Crop			Ratoon Crop		
		Small	Large	Combined	Small	Large	Combined
<b>I</b>	<b>Operational Costs</b>						
1.	Human Labour	27,652 (25.92)	29,640 (26.20)	28,646 (26.07)	20,706 (26.95)	22,184 (27.39)	21,445 (27.18)
a	Owned Labour	9,620 (9.02)	-	4,810 (4.38)	7,220 (9.40)	-	3,610 (4.58)
b	Hired Labour	18,033 (16.90)	29,640 (26.20)	23,836 (21.69)	13,486 (17.55)	22,184 (27.39)	17,835 (22.60)
2.	Cattle labour	3,832 (3.59)	3,636 (3.21)	3,734 (3.40)	3,000 (3.90)	3,240 (4.00)	3,120 (3.95)
a	Owned	2,432 (1.31)	-	1,216 (1.11)	1,950 (2.54)	-	975 (1.23)
b	Hired	1,400 (2.28)	3,636 (3.21)	2,518 (2.29)	1,050 (1.36)	3,240 (4.00)	2,145 (2.72)
3.	Tractor Power	8,840 (8.28)	9,687 (8.56)	9,264 (8.43)	2,500 (3.25)	3,000 (3.70)	2,750 (3.49)
a	Owned	-	4,625 (4.08)	2,312 (2.10)	-	1,437 (1.77)	719 (0.91)
b	Hired	8,840 (8.28)	5,062 (4.48)	6,951 (6.33)	2,500 (3.25)	1,562 (1.93)	2,031 (2.57)
4.	Planting sett materials	9,640 (9.04)	9,910.00 (8.76)	9,775.00 (8.89)	-	-	-
5.	FYM	4,312 (4.04)	5,040 (4.46)	4,676 (4.26)	3,200 (4.17)	3,280 (4.05)	3,240 (4.11)
6.	Fertilizers	6,320 (5.93)	7,679 (6.79)	6,999 (6.37)	4,828 (6.29)	5,810 (7.19)	5,319 (6.74)
	N	3,172 (2.98)	3,795 (3.35)	3,484 (3.17)	2,424 (3.16)	2,750 (3.40)	2,587 (3.28)
	P	2,247 (2.11)	2,684 (2.37)	2,466 (2.24)	1,680 (2.19)	2,100 (2.60)	1,890 (2.39)
	K	900 (0.84)	1,200 (1.06)	1,050 (0.96)	724 (0.94)	960 (1.19)	842 (1.07)
7.	Plant Protection Chemicals	1,120 (1.05)	1,445 (1.28)	1,282 (1.17)	860 (1.12)	1,050 (1.30)	955 (1.21)
8.	Repairs	1,250 (1.17)	729 (0.64)	989 (0.90)	1,25 (1.63)	729 (0.90)	989 (1.25)
9.	Interest on working capital	6,300 (5.91)	7,660 (6.77)	6,980 (6.35)	4,140 (5.39)	5,065 (6.25)	4,602 (5.83)
10.	Transporting the cane to sugar factory	17,850 (16.73)	19,125 (16.91)	18,487 (16.82)	16,787 (21.85)	18,062 (22.30)	17,425 (22.08)
11	Total Operational Costs	87,117 (81.67)	94,551 (83.59)	90,834 (82.66)	57,271 (74.55)	62,420 (77.08)	59,846 (75.84)
<b>II</b>	<b>Fixed costs</b>						
12	Land revenue	50 (0.05)	50 (0.04)	50 (0.05)	50 (0.07)	50 (0.06)	50 (0.06)
13	Rental value of owned land	15,000 (14.06)	15,000 (13.26)	15,000 (13.65)	15,000 (19.52)	15,000 (18.52)	15,000 (19.01)
14	Depreciation	1,586 (1.48)	1,416 (1.25)	1,501 (1.36)	1,586 (2.06)	1,416 (1.74)	1,501 (1.90)
15	Interest on fixed capital	2,920 (2.74)	2,100 (1.86)	2,510 (2.28)	2,920 (3.80)	2,100 (2.60)	2,510 (3.18)
16	Total fixed Costs	19,556 (18.33)	18,566 (16.41)	19,061 (17.34)	19,556 (25.45)	18,566 (22.92)	19,061 (24.16)
<b>III</b>	<b>Total Costs</b>	1,06,673 (100.0)	1,13,117 (100.0)	1,09,895 (100.0)	76,827 (100.0)	80,986 (100.0)	78,907 (100.0)

Note: Figures in parentheses indicate percentages to the total.

of the total cost. Cost of cultivation of planted and ratoon crop was positively related with the size of farm. Cost of cultivation of planted crop was higher than that of ratoon crop (38.84 per cent, 39.64 percent and 39.27 per cent in case of large, small and combined farms respectively). These results are in agreement with the findings of Patel (1997) and Singh and Singh (2007).

### **Costs and returns per tonne of sugarcane production**

#### **Costs and returns per tonne of sugarcane – planted crop**

The total cost per tonne of sugarcane planted was estimated at Rs. 1,016, Rs. 1005 and Rs. 1,011 on small, large and combined farms respectively. A tonne of sugarcane yielded a net income of Rs. 64 on small farms and Rs. 74 on large farms and the same was Rs. 69 on the combined farms (Table 2).

#### **Costs and returns per tonne of sugarcane – ratoon crop**

The cost of production had inverse relationship with the size of the farm as it was Rs. 778 on small farms, Rs. 762 on large farms. The same was Rs. 770 on combined farms. The net returns per tonne were higher by Rs. 16 on large farms compared to small farms exhibiting positive relationship with the size of the farm.

From the above analysis, it can be concluded that the cost of producing a tonne of sugarcane planted and ratoon was higher on small farms and thus exhibited inverse relationship with the size of the holding. On the other hand, the net returns per tonne showed positive relationship with the size of the holding indicating that large farmers realized higher net income compared to small farmers. The cost of production was lesser in ratoon than in the case of planted crop. These findings are in confirmity with the findings of Chougale and Patil (1983).

### **Output and returns from sugarcane cultivation**

#### **Output and returns from sugarcane planted crop**

On an average, the yield per hectare was 105.00, 112.50 and 108.75 tonnes on small, large and combined farms respectively. The small and large farms realized a gross income of Rs. 1,13,400

and Rs. 1,21,500 per hectare respectively. The net income increased from Rs. 6,727 on small farms to Rs. 8,382 per hectare on large farms. The same was Rs. 7,555 on the combined farms (Table 3).

### **Output and returns from sugarcane ratoon crop**

In the case of ratoon, the productivity exhibited positive relationship with the farm size. The per hectare yield increased from 98.75 tonnes on small farms to 106.25 tonnes on large farms. On an average, the sample cultivators produced 102.50 tonnes. Gross and net returns per hectare were higher on large farms (Rs. 1,14,750 and Rs. 33,763) compared to small farms (Rs. 1,06,650 and Rs. 29,822).

From the above analysis, it is clear that the productivity both in the main and ratoon crop was higher on large farms compared to small farms. Large farmers realized higher net income in the cultivation of main as well as ratoon. It may be noted that the profit was higher in ratoon than in the case of main crop. This might be due to the lower cost of cultivation of ratoon, resulting from the elimination of expenditure on preparatory cultivation and seed material. These findings are similar to the findings of Rama Kumar (1985) and Suresh Kumar (1994).

### **CONCLUSIONS**

The overall analysis of cost structure of sugarcane planted and ratoon cultivation revealed that the large farmers had incurred higher costs than small farmers (5.70 per cent and 8.25 per cent in case of planted crop and ratoon crop respectively). The difference in the per hectare cost of cultivation between the size groups was due to the differences in the magnitude of inputs and input services utilisation such as human labour, tractor services, manures and fertilizers etc. The cost of human labour, transportation, manures and fertilizers, rental value of owned land, cattle labour and tractor services accounted for 79.09 per cent of the total cost. Cost of cultivation of planted and ratoon was positively related with the size of farm. Cost of cultivation of planted crop was higher than that of ratoon crop (38.84 per cent, 39.64 percent and 39.27 per cent in case of large, small and combined farms respectively).

It can be concluded that the cost of producing a tonne of sugarcane planted and ratoon

Table 2. Costs and Returns per tonne of Sugarcane (In Rupees).

Sl. No.	Particulars	Main Crop			Ratoon Crop		
		Small	Large	Combined	Small	Large	Combined
<b>I. Costs</b>							
1.	Variable costs	830	840	835	580	587	584
2.	Fixed costs	186	165	175	198	175	186
3.	Total costs	1,016	1,005	1,011	778	762	770
<b>II. Returns</b>							
1.	Gross returns	1,080	1,080	1,080	1,080	1,080	1,080
2.	Net returns	64	75	69	302	318	310

Note: Figures in parentheses indicate percentages to the total.

Table 3. Output and returns per hectare of sugarcane.

Sl. No.	Particulars	Main Crop			Ratoon Crop		
		Small	Large	Combined	Small	Large	Combined
1.	Yield (in tonnes)	105.00	112.50	108.75	98.75	106.25	102.50
2.	Gross Returns Rs)	1,13,400	1,21,500	1,17,450	1,06,650	1,14,750	1,10,700
3.	Total Costs (Rs)	1,06,673	1,13,117	1,09,895	76,828	80,986	78,907
4.	Net Returns (Rs)	6,727	8,383	7,555	29,823	33,764	31,793

was higher on small farms and thus exhibited inverse relationship with the size of the holding. On the other hand, the net returns per tonne showed positive relationship with the size of the holding indicating that large farmers realized higher net income compared to small farmers. The cost of production was lesser in ratoon than in the case of planted crop.

It is also clear that the productivity both in the main and ratoon crop was higher on large farms compared to small farms. Large farmers realized higher net income in the cultivation of main as well as ratoon. It may be noted that the profit was higher in ratoon than in the case of main crop. This might be due to the lower cost of cultivation of ratoon, resulting from the elimination of expenditure on preparatory cultivation and seed material.

#### LITERATURE CITED

- Chougale J D and Patil 1983** Resource productivity in sugarcane in selected cultivator farms in Kolhapur district of Maharashtra, Co-operative sugar Vol.19(2):p:625.
- Rama Kumar 1985** Profitability of sugarcane farming in Anantapur District of Andhra Pradesh an empirical analysis M.Sc.(Ag.) (Unpublished) thesis submitted to Andhra Pradesh Agricultural University, Hyderabad.
- Suresh Kumar K 1994** Yield gap and constraint analysis in sugarcane in Chittoor district of Andhra Pradesh M.Sc.(Ag.) (Unpublished) thesis submitted to Andhra Pradesh Agricultural University, Hyderabad.
- Singh and Singh 2007** Impact of sugar factories on costs and returns of sugarcane in district Faizabad of Uttar Pradesh, Indian Sugar, 56(12): 19-32.