



E-ISSN: 2278-4136  
P-ISSN: 2349-8234  
JPP 2017; SP1: 202-205

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## An economic analysis of production of sugarcane in Surajpur district of Chhattisgarh

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### Abstract

The present study deals with the cost and return of sugarcane in Surajpur district of Chhattisgarh. It was conducted in Pratappur and Surajpur blocks in Surajpur district of Chhattisgarh state. 150 farmers were selected randomly from two blocks out of which, marginal (40), small (65), medium (34) and large (11). The primary data were collected for the year 2014-2015. The study observed that the average size of farm was 2.12 hectares. The overall irrigated area of sampled household was noticed to be 1.11 ha/farm tubewell shared the maximum area (58.98 per cent). The overall cost of cultivation of sugarcane was found to be Rs 87491.30 per hectare and cost of production was Rs 105.70 per quintal of sugarcane. The yield of sugarcane was 831.23 q/ha in sample farms. The input output ratio over total cost was noticed to be 1:2.56. The study suggested that during peak period of agricultural operations the unavailability of sufficient labour and available at very high cost. To avoid the escalation of cost and better use of inputs mechanization may be encouraged.

**Keywords:** Sugarcane, Cost of cultivation, Gross return, Net return, Input output ratio.

### Introduction

Sugarcane is an important commercial crop of the world and the cultivation of sugarcane, in India dates back to Pre-Vedic period (2000 B.C.). India is one of the principal centers of the origin of the sugarcane. Sugarcane is grown in diversified climatic condition i.e. tropical and sub-tropical. India is the only country in which sugarcane is grown in both types of the climate, Sugarcane (*Saccharum* spp. hybrid complex) is an important commercial crop in India and plays a pivotal role in agricultural and industrial economy of our country. Sugarcane is an important commercial crop of the world and more than 100 Countries produce sugar, at present Brazil, Cuba, Mexico, India and Thailand are the leading producers of sugarcane. Currently 69 per cent of the world's sugar is consumed in the country of region. Globally, sugarcane is cultivated over an area of 20.10 million hectares with a production of 1,318.10 million tonnes and productivity of 65.5 tonnes per hectare. Sugarcane area and productivity differ widely from country to country. Brazil has the highest area (5.34 million hectares) while Australia has the highest productivity (85.1 tonnes per hectare) 1. India ranks second among the sugarcane growing countries of the world in the both area and production after Brazil with an area under sugarcane cultivation of 4.94 million hectares with an average yield is 68.6 tons per hectare.

Chhattisgarh, the state, which has been known as "rice bowl" of the country in the country's agriculture map, is now set to create a niche for itself in the sugar production. The sugar production in all the three factories (Kawardha, Surajpur and Balod) in the state had reached 63916 (2014-15) metric tonnes. Chhattisgarh State is comprised of Chhattisgarh plains, Bastar plateau and Northern hills agro climatic regions. The scope of sugarcane is bright in the Northern hills and production was 11.04 lacs metric tonnes with average productivity of 49.96 t/ha and Chhattisgarh plains was cultivated in 26.921 thousand hectares in 20014-15. Surajpur district has second largest area 3.14(000 ha.), production 7.57 million tonnes and productivity 71.13 tonnes in Chhattisgarh State. Followed by Kawardha district has highest area, production and productivity 20.93 (000 ha.), 1046 million tonnes, 78.42 tonnes. The study also aims at evaluating the level of influence imparted by area and productivity towards production of sugarcane for Chhattisgarh state.

### Objective

To find out the cost and return of sugarcane in Surajpur district of Chhattisgarh.

### Materials and Methods

Present study deals with the cost and return of sugarcane in Surajpur district of Chhattisgarh.

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150 sugarcane growers were selected randomly 2 Blocks (Pratappur and Surajpur) and were categorized into marginal (40), small (65), medium (34) and large (11) farmers based on their holding size. The primary data from the farmers was collected through personal interview method with the help of well prepared pretested schedule and questionnaire for the year 2014-15.

### Cost of cultivation

To find out the cost of cultivation simple arithmetic and statistical techniques of analysis viz. average, percentage and standard method of cost of cultivation were adopted.

The study find out the cost of production of sugarcane as per the definition given by Commission on Agricultural Costs and Prices (CACP) that are as follows;

Cost  $A_1$  = Value of purchased material inputs (seed, insecticides and pesticides, manure, fertilizer), hired human labour, animal labour (hired and owned), hired farm machinery, depreciation on farm implements and farm buildings, irrigation charges, land revenue cases and other taxes, and interest on working capital.

Cost  $A_2$  = Cost  $A_1$  + rent paid for leased-in land.

Cost  $B_1$  = Cost  $A_1$  + interest on value of owned capital assets (excluding land).

Cost  $B_2$  = Cost  $B_1$  + rental value of owned land (net of land revenue) and rent paid for leased-in 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  $C_2$  + 10% of Cost  $C_2$  on account of managerial functions performed by farmer.

### Income over different cost

Income over cost  $A_1$  = Output – Cost  $A_1$

Income over cost  $A_2$  = Output – Cost  $A_2$

Income over cost  $B_1$  = Output – Cost  $B_1$

Income over cost  $B_2$  = Output – Cost  $B_2$

Income over cost  $C_1$  = Output – Cost  $C_1$

Income over cost  $C_2$  = Output – Cost  $C_2$

Income over cost  $C_3$  = Output – Cost  $C_3$

## Results and Discussion

### Cost of cultivation of Sugarcane

Table 1 shows cost of cultivation of sugarcane per hectare, it reveals that irrespective to the farm size of holdings, the total cost of cultivation of sugarcane of sample farms was Rs 87491.30 per hectare in which the share of total variable cost was 85.11 per cent followed by total fixed cost which was found to be 14.82 per cent. In total variable cost the shares was found to be maximum in human labour cost 40.20 per cent followed by total material cost 33.01 per cent, cost of total power used was observed to be 7.59 per cent and interest on working capital was 4.31 per cent, respectively. In materials cost, the share of seed was 17.11 per cent and fertilizer 11.36 per cent was noticed to be the major cost. While in human labour cost, the share of hired labour cost being 21.02 per cent was comparatively more than that of family labour cost 19.18 per cent. The share of machine power 5.60 per cent was more than that of bullock power 1.99 per cent. In total fixed cost, the rental value of land in Surajpur district was Rs 12000 per hectare and Rs 25.00 was paid as land revenue. The total fixed cost was comparatively more than the interest on working capital. The total cost of cultivation of sugarcane was increasing with respect to farm size of holdings and was found to be maximum under large farms Rs 92899.07 per hectare and minimum in marginal farm Rs 73661.04 per hectare. It is important to note that total variable cost was increasing with respect to the farm size. Thus, it could be concluded that total cost of cultivation was increasing with respect to farm size holding due to bigger farmers could incurred more expenditure on the material inputs.

**Table 1:** Costs of cultivation of sugarcane under different farm size

Particular	Marginal	Small	Medium	Large	Overall
<b>a. Material cost</b>					
I. Seed	14520.42 (19.71)	14880.30 (18.46)	14950.30 (17.09)	15125.20 (16.28)	14977.57 (17.11)
II. Fertilizer	6545.32 (8.81)	8270.77 (10.20)	9617.50 (10.96)	11450.30 (12.33)	9943.35 (11.36)
III. Plant protection	1575.39 (2.12)	1752.31 (2.26)	2065.72 (2.35)	2362.70 (2.54)	2103.46 (2.39)
IV. Irrigation charges	1236.45 (1.66)	1552.05 (1.91)	1898.85 (2.16)	2145.35 (2.30)	1890.90 (2.15)
<b>Total material cost</b>	<b>23877.58</b> (32.30)	<b>26455.43</b> (32.83)	<b>28532.37</b> (32.56)	<b>31083.55</b> (33.45)	<b>28915.28</b> (33.01)
<b>b. Human labour cost</b>					
I. Family labour	21750.34 (29.28)	22650.80 (27.95)	15750.20 (17.94)	14250.40 (15.37)	16783.23 (19.18)
II. Hired labour	7500.21 (10.10)	9750.11 (12.03)	19800.30 (22.56)	22950.10 (24.67)	18392.92 (21.02)
<b>Total human labour cost</b>	<b>29250.55</b> (39.38)	<b>32400.91</b> (39.98)	<b>35550.50</b> (40.50)	<b>37200.50</b> (40.04)	<b>35176.15</b> (40.20)
<b>c. Power use cost</b>					
I. Bullock labour	1176.85 (1.59)	1494.89 (1.85)	1698.15 (1.95)	1984.35 (2.13)	1746.09 (1.99)
II. Machine power	4165.58 (5.60)	4486.75 (5.57)	4897.10 (5.60)	5213.70 (5.61)	4904.29 (5.60)
<b>Total power use cost</b>	<b>5342.43</b> (7.19)	<b>5981.64</b> (7.42)	<b>6595.25</b> (7.55)	<b>7198.05</b> (7.78)	<b>6650.38</b> (7.59)
<b>d. Interest on working capital</b>	<b>2570.33</b> (3.48)	<b>2953.10</b> (3.70)	<b>3844.95</b> (4.60)	<b>4286.21</b> (4.59)	<b>3777.06</b> (4.31)
<b>A. Total variable cost</b>	<b>61040.89</b>	<b>67791.08</b>	<b>74523.07</b>	<b>79768.31</b>	<b>74518.87</b>

	(82.86)	(84.14)	(85.22)	(85.86)	(85.11)
<b>D. Fixed cost</b>					
I. Land revenue	25.00 (0.03)	25.00 (0.03)	25.00 (0.02)	25.00 (0.02)	25.00 (0.03)
II. Rental value of land	12000.00 (16.29)	12000.00 (14.89)	12000.00 (13.72)	12000.00 (12.91)	12000.00 (13.78)
III. Interest on fixed capital	595.15 (0.80)	765.50 (0.94)	915.25 (1.04)	1105.76 (1.21)	947.43 (1.08)
<b>Total fixed cost (B)</b>	12620.15 (17.13)	12790.50 (15.86)	12940.25 (14.78)	13130.76 (14.14)	12972.43 (14.89)
<b>Total cost(A+B)</b>	73661.04	80581.58	87463.32	92899.07	87491.30

**Note** –Interest on working capital is computed at 7% interest rate per annum for the crop period.  
Figure in parentheses indicate percentage of total cost of cultivation

### Measures of farm profit in sugarcane

Table 2 shows the measures of farm profit in sugarcane has been understood by considering the economic parameters viz; yield of sugarcane, cost of cultivation, gross return, net return, cost of production, and input-output ratio, which is presented in Table 4.6. It has been observed from empirical findings that net return over total cost of cultivation of sugarcane was Rs 136941.07 per hectare,

irrespective to the farm size holding and it varying from Rs 109007.50 to Rs 147873.43 per hectare for marginal to large farms size. The per quintal cost of production was found to be Rs 108.87, Rs 106.73, Rs 105.34 and Rs 104.17 for marginal, small, medium, and large farms size, respectively. While input-output ratio were showing increasing trend with respect to farm size. Overall, input-output ratio was found to be 1:2.56 respectively.

**Table 2:** Measures of farm profit in sugarcane

S. No	Particulars	Farm Size				
		Marginal	Small	Medium	Large	Overall
1	Yield (q/ha)	676.55	754.95	830.25	891.75	831.23
2	Cost of cultivation (Rs/ha)	73661.04	80581.58	87463.32	92899.07	87491.30
3	Gross return (Rs/ha)	182668.50	203836.50	224167.50	240772.50	224432.37
4	Net return (Rs/ha)	109007.50	123254.92	136704.18	147873.43	136941.07
5	Cost of production (Rs/q)	108.87	106.73	105.34	104.17	105.38
6	Input -Output ratio	1:2.47	1:2.52	1:2.56	1:2.59	1:2.56

**Note:** - Procurement price of sugarcane was Rs 220/q plus bonus provided by Govt. of Chhattisgarh is Rs 50/q.

### Cost and returns on the basis of different cost concept.

Table 3 shows generally, 7 cost concepts used for estimation of costs and return by Commission of Agricultural Price and Cost, Government of India. Cost of cultivation of sugarcane of sample farms in the study area has been worked out and presented in Table 4.9. It is envisaged that Cost A1 is designated as the variable cost including land revenue and interest on working capital and excluding family labour was found to be Rs 57760.67 per hectare on overall basis, which was added with rent paid for lease in land and dignified with Cost A2 which was found to be Rs 57760.67 per hectare which is same as cost A1 because we have not taken land in lease. Cost B1 is cost A1 added with interest on value of owned capital assets (excluding land) which was found to be Rs 58708.10 per hectare. Cost B2 is cost B1 added with rental value of owned land which was

found to be Rs 70708.10 per hectare. Cost C1 is cost B1 added with imputed value of family labour which was Rs 75491.30 per hectare. Cost C2 is cost B2 added with imputed value of family labour which is Rs 87491.30 per hectare. Cost C3 is cost C2 included with value of management input at 10% of cost C2 which is Rs 96240.43 per hectare.

Under return obtained over different costs, the return over cost A1,

A2, B1, B2, C1, C2 and C3 is obtained by subtracting them from Gross return of sugarcane respectively. So, the return over cost A1, A2, B1, B2, C1, C2 and C3 is Rs 166671.70, 166671.70, 165724.27, 153724.27, 148941.06, 136941.06, and 128191.93 per hectare was found respectively.

**Table 3:** Break-up of total cost, and income obtained over different cost of sugarcane cultivation

S. No	Particulars	Farm size				Overall
		Marginal	Small	Medium	Large	
<b>A.</b>	<b>Break-up of cost</b>					
	Cost A <sub>1</sub>	39315.54	45165.28	58797.87	65542.91	57760.67
	Cost A <sub>2</sub>	39315.54	45165.28	58797.87	65542.91	57760.67
	Cost B <sub>1</sub>	39910.69	45930.78	59713.12	66648.67	58708.10
	Cost B <sub>2</sub>	51910.69	57930.78	71713.12	78648.67	70708.10
	Cost C <sub>1</sub>	61661.03	68581.58	75463.32	80899.07	75491.30
	Cost C <sub>2</sub>	73661.03	80581.58	87463.32	92899.07	87491.30
	Cost C <sub>3</sub>	81027.14	88639.73	96209.65	102188.97	96240.43
<b>B.</b>	<b>Income over different cost</b>					
	Cost A <sub>1</sub>	143352.96	158671.22	165369.62	175229.58	166671.70
	Cost A <sub>2</sub>	143352.96	158671.22	165369.62	175229.58	166671.70
	Cost B <sub>1</sub>	142757.80	157905.72	164454.40	174123.83	165724.27
	Cost B <sub>2</sub>	130757.80	145905.72	152454.38	162123.83	153724.27
	Cost C <sub>1</sub>	121007.46	135254.92	148704.18	159873.43	148941.06
	Cost C <sub>2</sub>	109007.46	123254.92	136704.18	147873.43	136941.06
	Cost C <sub>3</sub>	101641.35	115196.76	127957.85	138583.52	128191.93

### Conclusion and Suggestions

The major findings are found as on basis of overall, the cost of cultivation of sugarcane was amounted as 87491.30 Rs/ha. The major share of cost of cultivation gone to human labour cost being 40.20 per cent. The net return against the cost of cultivation observed Rs 136941.07 ha. The input-output ratio of sugarcane came to 1:2.56. The study suggested that during peak period of agricultural operation the unavailability of sufficient labours and available at very high cost. To avoid the escalation of cost and better use of inputs mechanization may be encouraged.

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