

RESEARCH ARTICLE

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Cost of cultivation of sugarcane crop in Meerut district of Uttar Pradesh

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ABSTRACT : Sugarcane is an important agro industry crop in India plays a pivotal role in national economic by contributing 1.9 per cent to gross domestic product, form an important component in cropping pattern of the sugarcane growers, provide an essential commodity in the form of sugar and jiggery and solves the problem of green fodder for half of the year. The crop is cultivated in 5.03 million hectare producing more than 342 million tones with a productivity of about 70 tonnes per hectare. In India, Uttar Pradesh contributes about 47 per cent in area (1.98 million hectare) and production (117.14 million tonnes) with 47.36 per cent of total sugarcane production. The present study was attempt on, to work out the cost and returns of sugarcane production for different size group of farms in the study area. From the purposively selected district and block on the basis of highest area under the crop. Four villages were selected randomly from the selected block, a complete list of the farmers were prepared and than categorized into four categories *i.e.* marginal, small, medium and large. From the total sugarcane growers, 100 respondents were selected in probability proportion to their population, for the collection of data, suitable statistical tools were employed to meet the above objective. The cost of cultivation of sugarcane planted was Rs. 172679, in which share of operational cost, land rent and material costs was 38, 22 and 26 per cent, respectively. The cost of cultivation of sugarcane ratoon was to be Rs. 129752.65 with share of operational cost, land rent and material cost of 41, 29 and 14 per cent, respectively.

KEY WORDS : Cost, Cultivation, Sugarcane crop

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INTRODUCTION

Sugarcane and sugar beet are the main sources of sugar in Asia and Europe, respectively. While sugarcane is grown primarily in the tropical and sub tropical zones

of the southern hemisphere, sugar beet is grown in the temperate zones of the northern hemisphere. During 1970's, sugarcane and sugar beet accounted about 60 per cent and 40 per cent, respectively of the total sugar production in the world. However, during 1990's, the corresponding figures were 68 and 32 per cent. During 2005-06, sugarcane accounted for 75 per cent of the total sugar production in the world and only 25 per cent accounted by sugar beet. These figures amply demonstrate the growing importance of sugarcane in sugar production. Sugarcane provides the raw material

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mainly for the production of white sugar, jaggery (*gur*) and *khandsari*. It is also used for chewing and extraction of juice for beverage purpose. Sugarcane is one of the most important commercial crops of the country and the sugar industry occupies an important place in the economy of our country. Sugarcane crop provides raw material to sugar industry which is one of the largest agro-based processing industries, helpful for socio-economic development of rural masses and national economy. Nearly 5.0 million growers and their dependents are involved in the cultivation of sugarcane and the sugarcane based industry and this sector provides employment to more than one and half million skilled and unskilled workers in the manufacturing of sugar, *khandsari* and *gur*. The demand for sweeteners in the country is increasing mainly due to increase in population and partly due to improving standard of living. The estimated population of the country by 2020 A.D. will be 1360 million. The estimated requirement of this increased population for sweeteners will be 48.00 million tonnes (27.30 million tonnes of sugar and 20.70 million tonnes of *gur* and *Khandsari*). To meet the expected demand, there are needs to increase the production in general and productivity in particular with rational use of limited and costly inputs.

EXPERIMENTAL METHODS

The methodology used for conducting the present study is discussed, keeping in view the nature of the investigation and the objective of the problem. In this paper sampling design used to select the study area and the respondents, source and methods of data collection and analytical frame work used to fulfill the objectives of the study. The details of the methodology are described into following sub heads: District Meerut of western Uttar Pradesh was selected purposively of the present investigation because it the district occupies an important place in area, production and productivity of the sugarcane in the zone. There are 12 community development blocks in the selected district, one block namely Sardhana was selected purposively on the basis of highest area and production under sugarcane cultivation. A complete list of all the villages of the selected block was prepared with the help of block headquarter and were arranged in chronological order. From the selected block, four villages were selected randomly. After selection of the villages,

a list of all the farmers in the four selected villages was obtained from gram pradhan of the respective villages, and the information on their land holding taken from the record of Lekhpal and tehsil head quarter. The farmers were then categorized into four size groups *i.e.* marginal (less than one hectare), small (1 to 2 hectare), medium (2-4 hectares) and large (above 4 hectares). From the list of the farmers 25 respondents from each village and a total of 100 were selected in probability proportion to their population. The convenience of the farmers was given due consideration. Every possible care was taken to ensure the accuracy and reliability of the data. The primary data on production and marketing of sugarcane were collected by personal interview method with the help of pre-tested and well structured survey schedules. For this purpose respondents were personally interviewed by the researcher and their responses were recorded in the survey schedule. During the course of investigation, several visits were made for collection of information. The primary data on quantity and prices of the inputs like land acreage under different crops, number of irrigation, quantity of fertilizer and manure, number of labour used, quantity of seed, expenditure on tractor and machinery and plant protection materials used in the crop grown by the sample farmers were collected. Output data includes the yield of main product and by product. Secondary data were collected from published sources *i.e.*, journals, books, reports and from the records of the blocks and district offices; District statistical Offices; D.C.O. office, D.A.O office, lekhpals record and other sources.

Analytical tools :

Cost of cultivation and returns from sugarcane cultivation were also estimated using standardized C.A.C.P cost concepts as listed below.

C.A.C.P cost concept :

Returns over various cost concepts :

Gross returns were calculated at the price to which the sugarcane crop was sold to the sugar factory and/or to the khadsari unit. Returns were calculated by subtracting costs as $A_1, A_2, B_1, B_2, C_1, C_2, C_2^*$ and cost C_3 from gross returns.

EXPERIMENTAL RESULTS AND ANALYSIS

The component wise various costs incurred in the

cultivation of sugarcane planted crop are given in Table 1 that, the overall cost of production of sugarcane planted was Rs. 172679.00. Of the total cost of cultivation, 64 per cent (Rs. 65297.00/ha) expenditure was incurred as operational cost, human labour constituted the most important component of operational cost with its share of more than 38 per cent. The material cost accounted 26 per cent (Rs. 44842.00/ha), among the material cost items 11 per cent expenses incurred on manure and fertilizer and seed, irrigation and plant protection accounted 8.77, 4.57 and 2.07 per cent, respectively. The share of rental value of land accounted 21.72 per cent (Rs. 37500.00/ha) and the remaining was accounted by land revenue, depreciation on implements, interest on working capital and interest on fixed capital of the total cost of cultivation.

On the marginal farms, the share of operational cost accounted for 24.80 per cent (Rs. 42188.00/ha) of the total cost, and again human labour constituted the most important component of operational cost with share of more than 28 per cent of the total cost, the material cost accounted for 25.87 per cent (Rs. 43963.00/ha), rental

value of land accounted for a share of 22.07 per cent (Rs. 37500.00/ha) of total cost sugarcane planted cultivation and the balance was accounted for land revenue, depreciation on implements, interest on working capital and interest on fixed capital etc.

For the small size farms, the operational and material cost accounted for 37.45 per cent (Rs. 64055.00/ha) and 26.00 per cent (Rs. 44469.00). The share of rental value of land was 21.92 per cent (Rs. 37500.00/ha) of total cost of sugarcane planted cultivation and the balance was accounted by land revenue, interest on fixed capital, depreciation on implements, interest on working capital and interest on fixed capital etc.

In case of medium size farms, the operational cost, material cost, rental value of land accounted for 37.68 per cent (Rs. 68075.00/ha), 26.92 per cent (Rs. 48640.00/ha) and 20.75 per cent (Rs. 37500.00/ha), respectively of the total cost sugarcane planted. The balance was accounted for land revenue, depreciation on implements, interest on working capital and interest on fixed capital.

For the large size group of farms, the operational

Table 1 : Cost of cultivation of sugarcane planted					(Rs./ha)
Variable cost	Farm size group				Overall
	Marginal	Small	Medium	Large	
Operational cost					
Family labour	42188.00 (24.80)	35345.00 (20.66)	29324.00 (16.23)	18837.00 (10.68)	35580.00 (20.60)
Hired labour	6738.00 (3.96)	13446.00 (7.80)	22858.00 (12.65)	31069.00 (17.61)	13929.00 (8.07)
Machinery	10567.00 (6.22)	10321.00 (6.03)	10826.00 (5.99)	12170.00 (6.90)	10755.00 (6.23)
Transportation expenditure	4882.00 (2.87)	4943.00 (2.89)	5067.00 (2.80)	5490.00 (3.11)	5003.00 (2.90)
Sub total (A)	64376.00 (37.87)	64055.00 (37.45)	68075.00 (37.68)	67566.00 (38.30)	65297.00 (37.81)
Material cost					
Seed	14547.00 (8.56)	14805.00 (8.65)	16517.00 (9.14)	16328.00 (9.25)	15136.00 (8.77)
Manure and fertilizer	18392.00 (10.82)	19420.00 (11.35)	19703.00 (10.90)	13860.00 (7.86)	18246.00 (10.57)
Irrigation	8057.00 (4.74)	7096.00 (4.15)	8407.00 (4.65)	8119.00 (4.60)	7886.00 (4.57)
Plant protection chemical	2966.00 (1.75)	3148.00 (1.84)	4013.00 (2.22)	6099.00 (3.46)	3574.00 (2.07)
Sub total (B)	43963.00 (25.87)	44469.00 (26.00)	48640.00 (26.92)	44406.00 (25.17)	44842.00 (25.97)
Total of variable cost (A+B)	108343.00 (63.76)	108524.00 (63.44)	116715.00 (64.59)	111972.00 (63.46)	110139.00 (63.78)
Other cost					
Interest on working capital @ 7%	2602.00 (1.53)	2821.00 (1.65)	3257.00 (1.80)	3592.00 (2.04)	2881.00 (1.67)
Depreciation	2540.00 (1.49)	2687.00 (1.57)	2722.00 (1.51)	2940.00 (1.67)	2654.00 (1.54)
Land revenue	0.00 (0.00)	15.00 (0.01)	25.00 (0.01)	55.00 (0.03)	14.50 (0.01)
Interest on own fixed capital	3492.00 (2.06)	3963.00 (2.32)	4014.00 (2.22)	4336.00 (2.46)	3793.00 (2.20)
Rental value of own land	37500.00 (22.07)	37500.00 (21.92)	37500.00 (20.75)	37500.00 (21.25)	37500.00 (21.72)
Sub total (C)	46134.00 (27.15)	46986.00 (27.47)	47518.00 (26.30)	48423.00 (27.45)	46842.00 (27.13)
Cost C ₂ * total (A+B+C)	154470.00 (90.90)	155510.00 (90.90)	164260.00 (90.90)	160390.00 (90.90)	156980.00 (90.90)
10% of C ₂ * for managerial work	15447.00 (10.10)	15551.00 (10.10)	16426.00 (10.10)	16039.00 (10.10)	15698.00 (10.10)
Cost C ₃ -(C ₂ *+ C ₂ *10%)	169917.00 (100.00)	171061.00 (100.00)	180686.00 (100.00)	176434.00 (100.00)	172679.00 (100.00)

cost, material cost and rental value of land were 38.30 per cent (Rs. 67566.00/ha), 25.17 per cent (Rs. 44406.00/ha) and 21.25 per cent (Rs. 37500.00/ha), respectively of the total cost of cultivation of sugarcane planted and the balance was accounted by land revenue, depreciation on implements, interest on working capital and interest on fixed capital. The expenditure on hired labour was about 39.14 per cent across all the farms size groups.

Cost concept wise cost of sugarcane planted crop on various sized farms groups :

The results related to various categories of cost as per C.A.C.P. cost concepts for the sugarcane plant of different sized farms are presented in Table 2. The table indicates that per hectare cost A_1 was Rs. 71290.00 on

marginal farm, Rs. 78702.00 on small farm, Rs. 93395.00 on medium farms and Rs. 99722.00, on large farm, the share of cost A_1 was 41.96 per cent, 46.00 per cent, 51.68 per cent and 56.52 per cent of "Cost C_3 " on the respective categories.

It has been observed that as land holding size increases, the cost A_1 also increases. Regarding cost A_2 , B_1 , B_2 was increased with the increase in size of farm. But cost C_1 and cost C_2 was more in case of medium size of farm than that of marginal, small, and large size groups. It was found that actual wages rate (Rs. 200/man day) was higher than minimum statutory wage rate (Rs. 150/man day) thus, the cost C_2 and cost C_2^* were same for all the farm size groups in the study area. Per hectare cost C_3 is the total cost of cultivation of sugarcane

Particulars	Farm size group				
	Marginal	Small	Medium	Large	Overall
Cost A_1	71290.00 (41.96)	78702.00 (46.00)	93395.00 (51.68)	99722.00 (56.52)	80108.00 (46.39)
Cost A_2	71290.00 (41.96)	78702.00 (46.00)	93395.00 (51.68)	99722.00 (56.52)	80108.00 (46.39)
Cost B_1	74782.00 (44.01)	82665.00 (48.32)	97436.00 (53.92)	104058.00 (58.97)	83901.00 (48.58)
Cost B_2	112282.00 (66.08)	120165.00 (70.24)	134936.00 (74.67)	141558.00 (80.23)	121401.00 (70.30)
Cost C_1	116970.00 (68.84)	118010.00 (68.98)	126760.00 (70.15)	122895.00 (69.65)	119481.00 (69.19)
Cost C_2	154470.00 (90.90)	155510.00 (90.90)	164260.00 (90.90)	160395.00 (90.90)	156981.00 (90.90)
Cost C_2^*	154470.00 (90.90)	155510.00 (90.90)	164260.00 (90.90)	160395.00 (90.90)	156981.00 (90.90)
Cost C_3	169917.00 (100.00)	171061.00 (100.00)	180686.00 (100.00)	176434.00 (100.00)	172679.00 (100.00)

Particulars	Farm size ratoon				
	Marginal	Small	Medium	Large	Overall
Yields of main product (q/ha)	587.50	601.50	622.50	611.50	603.50
Yields by product (q/ha)	72.00	72.50	73.00	72.00	72.00
Prices of main product (Rs./q)	251.00	251.00	253.00	254.00	252.00
Prices by product (Rs./q)	58.00	58.00	58.00	58.00	58.00
Return of main product (Rs./ha)	147462.50	150976.50	157492.50	155321.00	152082.00
Return of by product (Rs./ha)	4176.00	4205.00	4234.00	4205.00	4205.00
Gross return (Rs./ha)	151638.50	155181.50	161726.50	159526.00	158706.00
Return over various costs (Rs./hector)					
Cost A_1	80348.00	76479.50	68331.50	59804.00	78598.00
Cost A_2	80348.00	76479.50	68331.50	59804.00	78598.00
Cost B_1	76856.00	72516.50	64290.50	55468.00	74805.00
Cost B_2	39356.00	35016.50	26790.50	17968.00	37305.00
Cost C_1	34668.00	37171.50	34966.50	36631.00	39225.00
Cost C_2	-2832.00	-328.50	-2533.50	-869.00	-1725.00
Cost C_2^*	-2832.00	-328.50	-2533.50	-869.00	-1725.00
Cost C_3	-18279.00	-15879.50	-18959.50	-16908.00	-13973.00
Cost of sugarcane production (Rs./q)	289.00	284.00	290.00	288.00	286.00
Profit margin (Rs./q)	-38.00	-33.00	-37.00	-34.00	-34.00

planted crop, includes the managerial cost of farmers also. Medium size group of farmers were spends more amount on sugarcane cultivation Rs. 180686.00/ha than that of other category and the overall average cost of cultivation per hectare of planted sugarcane was Rs. 172679.00/ha.

Cost of production and returns from sugarcane planted crop :

Table 3 shows the yield of main product, by-product and their prices, the yield of sugarcane planted was observed 587.50, 601.50, 622.50 and 611.50 quintal per hectare under marginal, small, medium and large category of farms and the yields of by-products 72.00, 72.50, 73.00, and 72.00 quintals per hectare in the respective categories. The prices received by the farmers in the respective category was Rs. 251.00, 251.00, 253.00 and 254.00/ql received by the large farmers were higher than that of other categories farmers. The gross returns per hectare were estimated Rs. 151638.50, 155181.50, 161726.50 and Rs. 159526.00/ha for marginal, small, medium and large

farm size, respectively. Per hectare cost of cultivation was found to be more than the gross return. Therefore, net returns per hectare were found negative *i.e.* Rs. -18279.00, Rs. -15879.50, Rs. -18959.50/ and Rs. -16908.00 on marginal, small, medium, large size of farms, respectively.

The loss per hectare obtained by the marginal farmers were more than the other categories of farmers in the study area which were due to increase in the cost of production Cost C_3 as the farm size increases when we examine the per quintal cost of production of planted sugarcane crop then we found that the medium and large farmers were spending relatively large amount of money on field preparation, planting, seeds, fertilizers and on harvesting for producing one quintal of sugarcane than other categories of farmers.

The profit margin on marginal, small, medium, large and overall was Rs.-38.00/ql, Rs.-33.00/ql, Rs.-37.00/ql and Rs.-34.00/ql, respectively. It is clear from the study that as the size of farm increase the cost of crop production also increased. The farm size and cost of

Table 4 : Cost of cultivation of sugarcane ratoon					(Rs./ha)
Variable cost	Farm size group				
	Marginal	Small	Medium	Large	Overall
Operational cost					
Family labour	32872.00 (26.11)	28158.00 (21.76)	20030.00 (14.87)	10070.00 (7.28)	26850.00 (20.69)
Hired labour	6973.00 (5.54)	12707.00 (9.82)	23020.00 (17.09)	33652.00 (24.31)	14224.00 (10.96)
Machinery	5662.00 (4.50)	5804.00 (4.49)	6262.00 (4.65)	6296.00 (4.55)	5868.00 (4.52)
Total transportation expenditure	6058.00 (4.81)	6481.00 (5.01)	6830.00 (5.07)	7243.00 (5.23)	6429.00 (4.95)
Sub total	51565.00 (40.96)	53150.00 (41.07)	56142.00 (41.69)	57261.00 (41.37)	53371.00 (41.13)
Material cost					
Seed	-	-	-	-	-
Manure and fertilizer	5738.00 (4.56)	6141.00 (4.75)	6348.00 (4.71)	6435.00 (4.65)	6016.00 (4.64)
Irrigation	8056.00 (6.40)	8210.00 (6.34)	8407.00 (6.24)	8119.00 (5.87)	8153.00 (6.28)
Plant protection chemical	2966.00 (2.36)	3148.00 (2.43)	4013.00 (2.98)	6099.00 (4.41)	3574.00 (2.75)
Sub total	16760.00 (13.31)	17499.00 (13.52)	18768.00 (13.94)	20653.00 (14.92)	17743.00 (13.67)
Total of variable cost(A+B)	68325.00 (54.26)	70649.00 (54.59)	74910.00 (55.62)	77514.00 (55.99)	71114.00 (54.80)
Other cost					
7% interest on working capital	2602.00 (2.07)	2821.00 (2.18)	3257.00 (2.42)	3592.00 (2.60)	2881.00 (2.22)
Depreciation	2540.00 (2.02)	2687.00 (2.08)	2722.00 (2.02)	2940.00 (2.12)	2654.00 (2.05)
Land revenue	0.00 (0.00)	15.00 (0.01)	25.00 (0.02)	55.00 (0.04)	14.50 (0.01)
Interest on oven fixed capital	3492.00 (2.77)	3963.00 (3.06)	4014.00 (2.98)	4336.00 (3.13)	3793.00 (2.92)
Rental value of oven land	37500.00 (29.78)	37500.00 (28.98)	37500.00 (27.85)	37500.00 (27.09)	37500.00 (28.90)
Sub total	46134.00 (36.64)	46986.00 (36.31)	47518.00 (35.85)	48423.00 (36.98)	46842.00 (36.10)
Cost C_2 * total (A+B+C)	114459.00 (90.90)	117635.00 (90.90)	122428.00 (90.90)	125836.00 (90.90)	117956.50 (90.90)
10% C_2 * for managerial work	11445.90 (10.10)	11763.50 (10.10)	12242.80 (10.10)	12583.60 (10.10)	11795.65 (10.10)
Cost C_3 (C_2 *+ C_2 *10%) cost	125905.90 (100.00)	129398.50 (100.00)	134670.80 (100.00)	138419.60 (100.00)	129752.65 (100.00)

Figures in the parentheses indicates the per centage to the total

production of planted crop has direct relation with each other and thus due to the lowest cost of production among all farm size groups the marginal farmer having highest loss of Rs. 16118.50/ha in case of sugarcane planted crop and thus the loss was also found to be highest in case of marginal farmers. On an average, farmers having the loss of about Rs. 13973.00/ha from the sugarcane planted cultivation.

Cost of cultivation of sugarcane ratoon crop :

The results related to cost of cultivation of sugarcane ratoon crop and return from it discussed under this section.

Component wise cost of cultivation of sugarcane ratoon crop :

The component wise costs incurred in the cultivation of sugarcane ratoon crop are given in the Table 4 that the overall cost of production of sugarcane ratoon was Rs. 129753.00 which consists of 41 per cent of the operational cost and 14 per cent of the material cost. In the operational cost, more than 31 per cent expenses incurred on human labour alone and on machinery and transportation it was about 5 per cent of the total cost. Within the material cost expenditure irrigation, manure and fertilizer and plant protection chemicals was 6.28, 4.64 and 2.75 per cent, respectively. 28.90 per cent (Rs. 37500.00/ha) was the rental value of land of total cost of cultivation and the remaining was accounted by land revenue, depreciation on implements, interest on working capital and interest on fixed capital.

Table also reveals that on the marginal farm size, the operational cost accounted for 40.96 per cent (Rs. 51565.00/ha), material cost 13.31 per cent (Rs. 16760.00/ha), rental value of land accounted for a share of 29.78 per cent (Rs. 37500.00/ha) of total cost sugarcane ratoon

cultivation and the balance was accounted for land revenue, depreciation on implements and interest on working capital etc.

For the small size farms, the operational, material cost and rental value of land accounted for 41.07 per cent (Rs. 53150/ha), 13.52 per cent (Rs. 17499.00/ha) and 28.98 per cent (Rs.37500.00 /ha) of total cost. The expenses on other items accounted by land revenue, interest on fixed capital, depreciation on implements and interest on working capital etc. By and large, the similar trend was observed in case of medium farm size groups.

For the large size group of farms, the operational cost, material cost and rental value of land were 41.37 per cent (Rs.57261.00/ha), 14.92 per cent (Rs.20653.00/ha) and 27.09 per cent (Rs.37500.00/ha), respectively of total cost sugarcane ratoon cultivation and the balance was accounted by land revenue, depreciation on implements, interest on working capital and interest on fixed capital etc.

As we move from the marginal to large farm size, the total cost, operational cost, material cost increases with increases the farm size. The share of rental value of own land in the total cost of sugarcane ratoon cultivation was found decreasing from marginal to large farm size. Interest on working and fixed capital was observed positively related with size of farm. The share of land revenue was the least in the total cost.

Cost concept wise cost of sugarcane ratoon crop :

The results related to various categories of cost as per C.A.C.P. cost concepts for the sugarcane ratoon on different farm sizes are presented in Table 5, indicates that per hectare overall cost A_1 was Rs. 49813.00 and on marginal, small, medium and large farm size groups it was Rs. 40595.00, 48014.00, 60884.00 and 73930.00, respectively, which was 32.24, 37.10, 45.20 and 53.41

Particulars	Farm size group				
	Marginal	Small	Medium	Large	Overall
Cost of cultivation					
Cost A ₁	40595.00 (32.24)	48014.00 (37.10)	60884.00 (45.20)	73930.00 (53.41)	49813.50 (38.39)
Cost A ₂	40595.00 (32.24)	48014.00 (37.10)	60884.00 (45.20)	73930.00 (53.41)	49813.50 (38.39)
Cost B ₁	44087.00 (35.02)	51977.00 (40.16)	64898.00 (48.19)	78266.00 (56.54)	53606.50 (41.31)
Cost B ₂	81587.00 (64.80)	89477.00 (69.14)	102398.00 (76.03)	115766.00 (83.63)	91106.50 (70.21)
Cost C ₁	76959.00 (61.12)	80135.00 (61.92)	84928.00 (63.06)	88336.00 (63.81)	80456.50 (62.00)
Cost C ₂	114459.00 (90.90)	117635.00 (90.90)	122428.00 (90.90)	125836.00 (90.90)	117956.50 (90.90)
Cost C ₂ *	114459.00 (90.90)	117635.00 (90.90)	122428.00 (90.90)	125836.00 (90.90)	117956.50 (90.90)
Cost C ₃	125905.90 (100.00)	129398.50 (100.00)	134670.80 (100.00)	138419.60 (100.00)	129752.65 (100.00)

per cent of cost C_3 in the respective category.

It has also been observed from the table that as increase the holding size cost A_1 also increases. It was also found that cost A_2 , cost B_1 , cost B_2 , cost C_1 and cost C_2 and cost C_2^* on per hectare basis also showed the increasing trends with the increases in farm sized groups. Per hectare cost C_3 is the total cost of cultivation of sugarcane ratoon crop which includes the managerial cost of farmers also. Large farmers were found to spend more amount on sugarcane cultivation *i.e.* Rs. 138419.60/ha, which is 1.09 times more than that of marginal farmers Rs. 125905.90/ha, the average cost of cultivation on per hectare of sugarcane ratoon was Rs. 129752.65/ha for all the farms in the study area.

Cost of production and returns from sugarcane ratoon crop :

Table 6 shows the yield of sugarcane ratoon per hectare on marginal, small, medium and large farms were found to be 803.00, 842.00, 869.00 and 897.00 and the yields of by-product was 94.00, 95.50, 96.00 and 97.00 quintal per hectare in the respective categories. The prices of sugarcane received by the farmers of the

respective size groups were Rs. 251.00, 251.00, 253.00, and 254.00/ql. From the table price received by the large farmers were higher than that of marginal, small and medium farmers. The price of sugarcane top was Rs. 58 per quintal in the market as taken for all the categories. Gross return was calculated by the addition of value of main product and value of by-product. The gross return per hectare was Rs. 206995.00, 216881.00, 225485.00 and Rs. 233464.00 in the respective categories of farms. The net return was worked out by deducting the total cost from the gross return per hectare. Per hectare net return was found Rs. 81090.00, 87483.00, 90815.00 and 95045.00 with the overall average net return of Rs. 91024.00.

The profit margin per hectare obtained by the large farmers was more than the other categories of farmers in the study area which was due to economy of scale in the large farm. The table also explain that the overall per quintal cost of production of sugarcane ratoon crop was Rs. 153.56 and the profit margin of Rs. 98.44 per quintal. The cost of production per quintal on marginal, small, medium and large sized farmers were Rs. 156.00, 153.00, 154.00 and 154.00 and profit margins Rs.95.00, 98.00, 99.00 and 100.00 per quintal, respectively. Similar results

Particulars	Farm size groups				(Rs./ha)
	Marginal	Small	Medium	Large	Overall
Yields of main product (qtl/ha)	803.00	842.00	869.00	897.00	845.00
Yields by product (qtl/ha)	94.00	95.50	96.00	97.00	96.00
Prices of main product (Rs./qtl)	251.00	251.00	253.00	254.00	252.00
Prices by product (Rs./qtl)	58.00	58.00	58.00	58.00	58.00
Return of main product (Rs./ ha)	201553.00	211342.00	219857.00	227838.00	212940.00
Return of by product (Rs./ha)	5442.00	5539.00	5568.00	5626.00	5568.00
Gross return	206995.00	216881.00	225485.00	233464.00	218508.00
Returns over various costs					
Cost A_1	166400.00	168867.00	164601.00	159534.00	168694.50
Cost A_2	166400.00	168867.00	164601.00	159534.00	168694.50
Cost B_1	162908.00	164904.00	160587.00	155198.00	164901.50
Cost B_2	125408.00	127404.00	123087.00	117698.00	127401.50
Cost C_1	130036.00	136746.00	140557.00	145128.00	138051.50
Cost C_2	92536.00	99246.00	103057.00	107628.00	100551.50
Cost C_2^*	92536.00	99246.00	103057.00	107628.00	100551.50
Cost C_3	81090.00	87483.00	90815.00	95045.00	887560.00
Cost of sugarcane production (Rs./qtl)	156.00	153.00	154.00	154.00	153.56
Profit margin (Rs./qtl)	95.00	98.00	99.00	100.00	98.44

were also reported by Saini *et al.* (2012).

Conclusion :

The overall average per hectare cost of sugarcane planted was Rs. 172679.00 and among different categories, it was Rs. 169917.00, 171061.00, 180686 and 176434.00 on marginal, small, medium and large size of farms, respectively, indicating there by its direct relationship with the size of farms.

The net returns per hectare amounted to be Rs. -18279.00, -15879.50, -18959.50 and -16908.00 rupees on marginal, small, medium and large farms, respectively. Per quintal cost of production of sugarcane (planted) was 289.00, 284.00, 290.00 and 288.00 rupees in the respective categories and the profit margin per quintal of cane produced was Rs.-38.00, -33.00, -37.00 and -34.00. The highest loss (Rs. 16118.50/ha) was in marginal category because they were doing cultivation on hired basis. The overall average of cost of cultivation, net return, cost of production and profit margins were 172679.00, -13973, 286.00 and -34.00 rupees, respectively.

Sugarcane ratoon :

The overall average per hectare cost of sugarcane ratoon was Rs. 129752.65 and among different categories it was Rs. 125905.90, 129398.50, 134570.80 and 138419.60 on marginal, small, medium and large size of farms, respectively, indicating there by its direct relationship with the size of farms.

The net returns per hectare amounted to be Rs. 206995.00, 216881.00, 225485.00 and 233464.00 rupees on marginal, small, medium and large farms, respectively. Per quintal cost of production of sugarcane (ratoon) was 156.00, 153.00, 154.00 and 154.00 rupees in the respective categories and the profit margin per quintal of cane produced was Rs. 95.00, 98.00, 99.00 and -100.00. The highest profit (Rs. 16118.50/ha) was in large category. The overall average of cost of cultivation, net return, cost

of production and profit margins were 129752.65, 887560, 153.56 and 98.44 rupees, respectively.

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