

Investment Pattern and Returns Capability of Sugarcane Farms U. P., India

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

The study was confined to a sample of 150 sugarcane farmer households selected of two blocks of Lakhimpur Kheri District. Findings reveal that per farm investment on farm structure was highest on large size group of farms i.e., Rs. 906411.71. The overall average of costs of cultivation in sugarcane (planted) was found to be Rs.120101.42 on sample farms. The benefit cost ratio was found to be highest on large size of farm (1:0.88) as compared to small farms (1:0.78) and medium farms (1:0.78). It was revealed that the total cultivation cost per hectare on overall farms was Rs. 87037.53 in Ratoon crop. And on an overall average gross income was recorded Rs. 166173.80 and net income came to Rs.79136.27. Study finally results on to the conclusion that sugarcane farming is a profitable venture. In future farmers can invest in it for smart returns.

Keywords: Sugarcane; investment; cost and returns; profit.

1. INTRODUCTION

Sugarcane plays an important role for the general socio-economic development of farming

community (Rehman and Bee, 2019). In an era, which demands sustainable as well as inclusive economic growth, the sugar industry has successfully contributed to the employment and

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economic development of rural economies. Sugarcane production and its processing is a major source of employment and livelihood in India. About 50 million farmers and three to five lakhs skilled and unskilled workers are engaged in cultivation of sugarcane and sugar industries and its allied industries [1]. Production of sugar is the second largest agro-processing industry in the country after cotton and textiles. India is the only country that produces plantation while sugar unlike other countries that produce raw or refined sugar or both. India is one among the most important sugarcane producers within the world, producing around 300 million tonnes of sugarcane per a year. Uttar Pradesh, the country's leading producer, having total sugarcane area is around 2224 thousand hectares, 179714.77 thousand tonnes production and with productivity about 80807 kg/hectare in 2018-19. [2]. Thus, keeping in view the importance of production, marketing and processing of sugarcane in agriculture economy of the country, the present study under taken with the objective to analyze the investment pattern and returns capability of sugarcane farms in the Lakhimpur district.

2. METHODOLOGY ADOPTED

Multistage stratified purposive cum random sampling technique was used for the study. The study was confined to a sample of 150 sugarcane farmer households selected from ten villages randomly, of two blocks of Lakhimpur Kheri District out of 15 blocks. The selection of the district and the blocks was made purposively keeping in view of very rich population engaged in sugarcane practices. A simple percentage analysis and mathematical operations was employed to identify the investment pattern and cost & returns of sugarcane cultivation for the selected sample farmers. The primary data was collected from the respondent by using pretested interview schedule by personal contact [3-10].

3. RESEARCH FINDINGS AND DISCUSSION

3.1 Farm Asset/Farm Investment Structure on Sample Farms

Farm investment is the most crucial factor of production affecting farm structure farm planning and budgeting, efficiency of management, nature and scale of business, benefit and loss of existing enterprises and utilization of available

resources on the farm. It was observed that sugarcane crop is labour intensive and require more human labour for different field operations in comparison to use of farm implements in its cultivation.

Farm structure mainly includes the availability of building, livestock, irrigation facilities and machinery and implement at the sample farms. Per farm and per hectare investment on farm structure at marginal, small and large sample farms were studied and presented in Table 1 & 2.

A. Per farm investment on sample farms:

Table 1 reveals about the per farm asset structure on selected sample farms. It is evident from this table that major components of farm asset structure are Buildings, Live-stocks and Machinery and implements which constituted 83.35 per cent, 9.85 per cent and 6.82 per cent of total asset value respectively on the basis of overall average.

Per farm buildings, major implements and livestock came to Rs.601629.06, Rs. 49259.96 and Rs. 71121.99 respectively. It is revealed from the table that per farm investment on farm structure was highest on large size group of farms i.e., Rs. 906411.71 followed by small and marginal size group of farms which faced the money value of Rs.725533.40 and Rs. 644476.14 respectively.

It is concluded the amount of investment on fixed capital was found to be positively correlated with increasing the size of holding. Per farm investment on fixed capital influences the production, cost of cultivation per farm, cost of production per quintal and consequently, gross and net return from the farm enterprises. Per farm investment on sample farm were showed the direct relationship with size of holding. Whereas component wise investment on marginal small and large farm showed definite trend.

B. Per hectare investment on sample farms:

Per hectare investment on borrow sample farms is presented in Table 2. It is revealed from the table that the overall total per hectare investment on sample farms was Rs. 551153.44 which included the 83.35 per cent of expenditure on building 9.86 per cent on livestock and 6.79 per cent on farm machinery, which corresponding the amount of Rs. 459258.82, Rs. 54291.59 and Rs. 37603.03 respectively.

Table 1. Per farm investment on various assets on different size group of farms (Rs./farm)

S. N.	Particular	Size group of farms						Overall average	%
		Marginal	%	Small	%	Large	%		
1	Buildings	552469.94	85.72	585923.07	80.76	752500.37	83.02	601629.06	83.327
A	Residential	510787.10	79.26	540461.53	74.49	705445.73	77.83	557608.34	77.230
B	Cattle shed	41682.84	6.47	45461.54	6.27	47054.64	5.19	44020.72	6.097
2	Implement and machinery	25370.14	3.94	67132.60	9.25	74300.97	8.20	49259.96	6.823
a	Minor implement	717.95	0.11	791.35	0.11	1085.33	0.12	812.46	0.113
b	Major implement	24652.19	3.83	66341.25	9.14	73215.64	8.08	48447.50	6.710
3	Live stock	66636.06	10.34	72477.73	9.99	79610.37	8.78	71121.99	9.851
a	Cow	27923.50	4.33	32862.35	4.53	38622.39	4.26	31665.69	4.386
b	Buffalo	38712.56	6.01	39615.38	5.46	40987.98	4.52	39456.30	5.465
Grand Total		644476.14	100.00	725533.40	100.00	906411.71	100.00	722011.01	100.000

(Note: - Figures in parentheses indicate percentage to the grand total.)

(Major implement: tractor, cultivator, harrow, thresher, tube well, diesel engine etc)

(Minor implement: sprayer, duster, desi plough, spade, kudal, sickle, khurpi)

Table 2. Per hectare investment on various assets on different size group of farms. (Rs./ha)

S. N.	Particular	Size group of farms						Overall average	%
		Marginal	%	Small	%	Large	%		
1	Buildings	708294.79	85.72	434017.09	80.76	292801.70	83.02	459258.82	83.35
A	Residential	654855.26	79.26	400341.87	74.49	274492.50	77.83	425655.22	77.25
B	Cattle shade	53439.54	6.47	33675.21	6.27	18309.20	5.19	33603.60	6.10
2	Implement and machinery	32525.82	3.94	49727.85	9.25	28910.88	8.20	37603.03	6.79
a	Minor implement	920.45	0.11	586.19	0.11	422.31	0.12	620.20	0.11
b	Major implement	31605.37	3.83	49141.67	9.14	28488.58	8.08	36982.83	6.68
3	Live stock	85430.85	10.34	53687.21	9.99	30976.80	8.78	54291.59	9.86
a	Cow	35799.36	4.33	24342.48	4.53	15028.17	4.26	24172.28	4.39
b	Buffalo	49631.49	6.01	29344.73	5.46	15948.63	4.52	30119.31	5.47
Grand Total		826251.46	100.00	537432.15	100.00	352689.38	100.00	551153.44	100.00

Note: - Figures in parentheses indicate percentage to the grand total

Table 3. Cost of Cultivation of Sugarcane (planted)(Rs./ha.)

Sl. No.	Particulars	Size group of farms						Overall average	%
		Marginal	%	Small	%	Large	%		
1	Value of seed/sets	13124.3	11.18	13980.19	11.52	14002.54	11.26	13590.65	11.32
2	Tractor Charges	9116.21	7.77	9301.66	7.66	9358.45	7.53	9226.95	7.68
3	Total Human Labour	19843.42	16.91	21290.56	17.54	22592.29	18.17	20867.87	17.38
a.	Family Labour	13051.29	11.12	6612.41	5.45	4687.12	3.77	9214.91	7.67
b.	Hired Labour	6792.13	5.79	14678.15	12.09	17905.17	14.40	11652.96	9.70
4	Manure and fertilizer	12987.11	11.06	13097.46	10.79	13894.21	11.17	13195.43	10.99
5	Irrigation	6248.34	5.32	6298.7	5.19	6308.47	5.07	6277.36	5.23
6	Plant Protection	1067.2	0.91	1167.18	0.96	1177.14	0.95	1123.05	0.94
7	Total working capital	62386.58	53.15	65135.75	53.65	67333.1	54.14	64281.30	53.52
8	Interest on working capital	4367.06	3.72	4559.50	3.76	4713.32	3.79	4499.69	3.75
A.	Variable Cost/Operational Cost	66753.64	56.87	69695.25	57.41	72046.42	57.94	61751.09	51.42
9	Rental value of land	36000.00	30.67	36000.00	29.65	36000.00	28.95	36000.00	29.97
10	Interest on fixed capital	1342.19	1.14	1501.37	1.24	1688.74	1.36	1463.12	1.22
11	Depriciation	2610.34	2.22	3167.19	2.61	3316.94	2.67	2938.99	2.45
B.	Fixes cost/Overhead cost	39952.53	34.04	40668.56	33.50	41005.68	32.97	40402.11	33.64
12	Subtotal (A+B)	106706.17	90.91	110363.81	90.91	113052.10	90.91	109183.11	90.91
13	Managerial Cost@10% of sub-total	10670.62	9.09	11036.3813	9.09	11305.2097	9.09	10918.31	9.09
Grand total		117376.79	100.00	121400.19	100.00	124357.31	100.00	120101.42	100.00

Note: - Figures in parentheses indicate percentage to the grand total respectively of the total costs of cultivation. The cost of sugarcane cultivation reflects a positive relationship with the size group of farms as it has been increased with an increase in the holding size of sample farm

Per hectare investment was highest on marginal farm followed by small and large farm which accounted Rs.826251.46, Rs. 537432.15 and Rs. 352689.38 respectively. It is also revealed from the data that per hectare investment on different categories of sample farmers had the indirect relation with size of holding. As holding size decrease the investment on per hectare of area increase.

3.2 Cost of Cultivation of Sugarcane, Gur, Sugar and Processing of Ethanol

Economics of sugarcane (planted) production: The economics of sugarcane cultivation was studied and presented in Table 3. Per hectare costs incurred on the specific input factor in sugarcane production were worked out and are given in Table 3. The highest cost of cultivation was reported on large size of farms Rs.124357.31 followed by Rs.121400.19 on small farms and Rs.117376.79 on marginal farms. The overall average of costs of cultivation was found to be Rs.120101.42 on sample farms.

As far as the costs of different input component is concern on an overall average it was maximum on rental value of land (29.97 per cent) followed by human labour (17.38 per cent), seed cost (11.32 per cent), manure and fertilizer (10.99 per cent), tractor charge (7.68 per cent), irrigation charge (5.23 per cent) and plant protection (0.94 per cent).

3.3 Computation of Costs and of Returns Based on CACP for Sugarcane Production

Per hectare costs and income measures of sugarcane cultivation on sample farms are presented in Table 4. Table 4 reveals that the cost of cultivation of sugarcane based on different cost concepts on overall average came to Rs.120101.42 per hectare as cost A1/A2, and the other costs like cost B₁, cost B₂, cost C₁, cost C₂, and Cost C₃, worked out to be Rs 62505.08, Rs. 63968.20, Rs. 99968.20, Rs. 73183.11, and Rs. 109183.11 per ha, respectively. The cost of cultivation of Sugarcane on per hectare basis under the cost concepts was found positively associated with size of farms.

As regards to the income measures from sugarcane cultivation at different size of farms

were concerned, it is observed from the table that on an overall farm yield was 650.71 quintal per hectare, which was found to be 705.00, 649.00 and 630.00 quintal per hectare on large, small and marginal size of farm group respectively.

The gross income, net income, farm business income, family labour income, and benefit cost ratio in case of overall farms were found to Rs. 211480.75, Rs. 95962.93 and Rs. 153559.27, Rs. 116096.15 and 1:0.80 respectively from the cultivation of sugarcane. The gross income from sugarcane cultivation was found to be maximum on large farms i.e., Rs. 234118.80 per hectare as compared to small farms Rs.2154940.60 and marginal farms Rs.209178.20 per hectare. It is also observed from the data that net income from cultivation of sugarcane was found to be highest on large farms as compared to other farm unlike farm business income and family labour income were found to be highest on large farms followed by marginal and small farms, it shows the indefinite trend to gross income. The benefit cost ratio was found to be highest on large size of farm (1:0.88) as compared to small farms (1:0.78) and medium farms (1:0.78).

3.4 Economics of Sugarcane (Ratoon) Cultivation

Economics of sugarcane (ratoon) cultivation on sample farms were analyzed and presented in table 5. From the table it is revealed that the total cultivation cost per hectare on overall farms was Rs. 87037.53, which was the highest on large farms i.e., Rs. 89508.78, followed by a small and marginal farm i.e., Rs. 88130.79 and Rs. 85194.96 respectively. A maximum cost of cultivation on large farm was occurred due to more expenditure done on labour and seed cost. Per hectare costs of cultivation was found of positive relation with size of holding. As farm size increases cost of cultivation increased. As far as the per cent share of different constituents of total costs is concerned, rental value of land was found of maximum share i.e., 41.36 per cent followed by human labour 16.27 per cent, manure & fertilizer 8.90 per cent, irrigation charge 7.63 per cent, tractor charge 6.82 per cent and plant protection 1.34 per cent respectively. In general, it was observed that sugarcane crops were not affected any pest and disease which helped to reduce the cost of cultivation per hectare.

Table 4. Cost and return of sugarcane cultivation (Planted) (Rs./ha.)

Particulars	Size group of farms			Overall average
	Marginal	Small	Large	
Cost A1/A2	56312.69	66250.03	70676.24	62505.08
Cost B1	57654.88	67751.40	72364.98	63968.20
Cost B2	93654.88	103751.40	108364.98	99968.20
Cost C1	70706.17	74363.81	77052.10	73183.11
Cost C2	106706.17	110363.81	113052.10	109183.11
Cost C3	117376.79	121400.19	124357.31	120101.42
Yield (qtl. per ha)				
Main-product	630.00	649.00	705.00	650.71
By-product	63.26	65.28	71.34	65.48
Sale price of main product (Rs./qtl)	325.00	325.00	325.00	325.00
Sale price of by-product (Rs./qtl)	65.00	65.00	65.00	65.00
Income				
Main-product	204750.00	210925.00	229125.00	211480.75
By-product	4428.20	4569.60	4993.80	4583.60
Gross Income	209178.20	215494.60	234118.80	216064.35
Net Return	91801.41	94094.41	109761.49	95962.93
Family Income	115523.32	111743.20	125753.82	116096.15
Farm Business Income	152865.51	149244.57	163442.56	153559.27
Farm Investment Income	129143.60	131595.78	147450.23	133426.05
Input-Output ratio	1.78	1.78	1.88	1.80
B:C ratio	0.78	0.78	0.88	0.80

Table 5. Cost of cultivation of sugarcane (Ratoon crop) Rs./ha

Sl. No.	Particulars	Size group of farms						Overall average	%
		Marginal	%	Small	%	Large	%		
1	Total Human Labour	13221.57	15.52	14768.56	16.76	15330.31	17.13	14161.80	16.27
a.	Family Labour	9098.46	10.68	4612.37	5.23	4321.14	4.83	6621.61	7.61
b.	Hired Labour	4123.11	4.84	10156.19	11.52	11009.17	12.30	7540.20	8.66
2	Tractor power charges	5619.21	6.60	6137.82	6.96	6349.18	7.09	5938.71	6.82
3	Manure and fertilizer	7642.29	8.97	7781.26	8.83	7954.19	8.89	7749.61	8.90
4	Irrigation	6589.18	7.73	6673.18	7.57	6691.44	7.48	6637.95	7.63
5	Plant Protection	1134.15	1.33	1189.43	1.35	1209.51	1.35	1167.75	1.34
6	Total working capital	34206.40	40.15	36550.25	41.47	37534.63	41.93	35655.83	40.97
7	Interest on working capital	2394.45	2.81	2558.52	2.90	2627.42	2.94	2495.91	2.87
A.	Variable Cost/Operational Cost	36600.85	42.96	39108.77	44.38	40162.05	44.87	38151.74	43.83
8	Rental value of land	36000.00	42.26	36000.00	40.85	36000.00	40.22	36000.00	41.36
9	Interest on fixed capital	1894.27	2.22	1948.81	2.21	1994.81	2.23	1932.31	2.22
10	Depreciation	2954.85	3.47	3061.32	3.47	3214.75	3.59	3040.98	3.49
B.	Fixes cost/Overhead cost	40849.12	47.95	41010.13	46.53	41209.56	46.04	40973.29	47.08
C.	Subtotal (A+B)	77449.97	90.91	80118.90	90.91	81371.61	90.91	79125.03	90.91
D.	Managerial Cost@10% of sub-total	7745.00	9.09	8011.89	9.09	8137.16	9.09	7912.50	9.09
Grand Total		85194.96	100.00	88130.79	100.00	89508.78	100.00	87037.53	100.00

Note: - Figures in parentheses indicate percentage to the grand total

Table 6. Cost and return of sugarcane (ratoon crop) cultivation (Rs./ha.)

Particulars	Size group of farms			Overall average
	Marginal	Small	Large	
Cost A1/A2	30457.24	37557.72	39055.66	34571.11
Cost B1	32351.51	39506.53	41050.47	36503.42
Cost B2	68351.51	75506.53	77050.47	72503.42
Cost C1	41449.97	44118.90	45371.61	43125.03
Cost C2	77449.97	80118.90	81371.61	79125.03
Cost C3	85194.96	88130.79	89508.78	87037.53
Yield (qtl. per ha)				
Main-product	495.85	502.75	508.12	500.58
By-product	52.36	53.61	56.75	53.62
Sale price of main product (Rs./qtl)	325.00	325.00	325.00	325.00
Sale price of by-product (Rs./qtl)	65.00	65.00	65.00	65.00
Income				
Main-product	161151.25	163393.75	165139.00	162688.50
By-product	3403.40	3484.65	3688.75	3485.30
Gross Income	164554.65	166878.40	168827.75	166173.80
Net Return	79359.69	78747.61	79318.97	79136.27
Family Income	96203.14	91371.87	91777.28	93670.38
Farm Business Income	134097.41	129320.68	129772.09	131602.69
Farm Investment Income	117253.96	116696.42	117313.78	117068.57
Input-Output ratio	1.93	1.89	1.89	1.91
B:C ratio	0.93	0.89	0.89	0.91

3.5 Computation of Costs and Returns based on CACP for Sugarcane (Ratoon) Production on Sample Farm

The cost and return have been summarized for non- sample farms in Table 6. It is revealed from the table that, on an average cost $A_1/A_2, B_1, B_2, C_1, C_2$ and cost C_3 came to Rs. 34571.11, Rs. 36503.42, Rs. 72503.42, Rs. 43125.03, Rs.79125.03 and Rs. 87037.53 respectively. On an overall average gross income was recorded Rs. 166173.80 and net income came to Rs.79136.27. On large farms, gross income was highest, which was recorded Rs.168827.75 followed by small farms Rs. 166878.40 and lowest on marginal farms i.e., Rs.164554.65 respectively. The net income was highest on marginal farms Rs. 79318.97 followed by large farms Rs. 79359.69 and small farms Rs. 789747.61. It shows that the indefinite trends of net income over cost C_3 to gross income. On an overall average family labour income and farm business income were observed to Rs. 93670.38 and Rs. 131602.69, respectively. Family labour income was highest on marginal farms followed by large and small farms. Which shows indefinite trend association with farm size, whereas farm business income did not show any definite relation with size of farms. On an average, cost of production per quintal and yield per hectare were estimated to Rs. 173.87 per quintal and 500.58 quintal respectively. On an overall average benefit cost ratio was found 1:0.91 and highest on marginal size of farm (1:0.93) as compared to small farms (1:0.89) and large farms (1:0.89). It shows the similar trend to gross income of different size of sample farms.

3.6 Comparative Economics of sugaRcane Cultivation for Planted and Ratoon Crop on Sample Farms

The comparison of economics of sugarcane cultivation for planted and ratoon cultivation was also studied to see the impact on sugarcane production. It is revealed from the that planted crop cultivation helped to sample farmers to spent 86.49 per cent more on total cost, which offered the higher gross income and net income accounted for 84.89 and 85.53 per cent respectively as compared to ratoon cultivation.

4. CONCLUSION

As per the following results we can conclude that:

- Per farm investment on sample farm were showed the direct relationship with size of holding. Whereas component wise investment on marginal small and large farm showed definite trend.
- It is also revealed from the data that per hectare investment on different categories of sample farmers had the indirect relation with size of holding. As holding size decrease the investment on per hectare of area increase.
- The cost of sugarcane cultivation reflects a positive relationship with the size group of farms as it has been increased with an increase in the holding size of sample farm.

It can be seen from the results from the study that sugarcane can be a better option among the farming of different crops. Farmers can enhance their condition as well as capital gradually by engaging themselves to the crop. It can further bring smart returns and prosperity in their socio-economic conditions.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Kant K, Tripathi SP, Meena M. Cost of cultivation of sugarcane crop in Meerut district of Uttar Pradesh. *International Journal of Forestry and Crop Improvement*. 2015;6(1):35-42.
2. Directorate of Economics and Statistics; 2016. Available:<http://des.kar.nic.in/>. Date accessed: 07/05/2016.
3. Teshu K. Determination of Resource Productivity and Resource Use Efficiency in Sugarcane (Planted and Ratoon) Production in Meerut District of Uttar Pradesh. *International Journal of Agriculture Sciences*, ISSN. 2016:0975-3710.
4. Verma LK, Solanki A. Cost and returns analysis of sugarcane production in Baghpat district of western Uttar Pradesh, India. *Int J Curr Microbiol App Sci*. 2020;9(1):733-9.
5. Rout RK, Mishra RK, Bar N. Economics of Production of Sugarcane in Orissa.

- International Journal of Social Science. 2015;4(1):61.
6. Singh G. An empirical study of economics of sugarcane cultivation and processing based farming in Uttar Pradesh. Sky Journal of Agricultural Research. 2013;2(1):7-19.
 7. Nataraja DR, Gowda NK. Sugarcane Scenario in India – A View. International Journal of Social Science and Economic Research. 2019;04(4):2512-2522.
 8. Upreti P, Singh A. An economic analysis of sugarcane cultivation and its productivity in major sugar producing states of Uttar Pradesh and Maharashtra. Economic Affairs. 2017;62(4):711-8.
 9. Mohanasundari P. Cost and Returns from the Cultivation of Sugarcane. International Journal of Economics. 2013;1(3).
 10. Veeresh S, Wali Kiran, Kadam L, Upasana M, Mishra RK. Economics of sugarcane cultivation in Bagalkot district of Karnataka. 2019;8(2):261-265. Available:www.thepharmajournal.com,

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