Estimation of the Resource Use Efficiency and Constraints faced by the farmers in Sugarcane Cultivation in Balrampur District of Uttar Pradesh

ABSTRACT

To study the resource use efficiency and constraints faced by the farmers in Balrampur district of Uttar Pradesh was conducted in agriculture year 2020-21. Multistage sampling technique was used. The study pertains and data gathered was analyzed and it was found that the return to scale in marginal farm was 0.93, in small size farm it was about 0.92 and in medium size farm the return to scale was found to be 0.96. The major constraints faced by the farmers in production of Sugarcane are High cost of Input, High Interest on Loans, High Labor Cost, High Incidence of Disease, Lack of Irrigation water supply, Inadequate Credit, Delay in Sanction of crop loan, Uncertain Weather, Lack of knowledge and important Technology and Poor Soil Fertility and the constraint faced by the farmers in Marketing of Sugarcane are Delay in Cash Payment, High Commission Charges, Malpractices in weighing, Price Fluctuation, High cost of transportation, Lack of storage facility, Market is far from production, Lack of information about government schemes and subsidies, Illegal deduction and Lack of skilled labor.

Keywords: Constraint, Ranking, efficiency, return to scale.

INTRODUCTION

Sugarcane (Saccharum officinarum L.) belongs to the gramineae family and it is originated to tropical south Asia and south east-Asia. Sugarcane is a renewable, natural agriculture resource because it provides sugar besides biofuel, fiber, fertilizer and various of by products with ecological sustainability. Sugarcane juice is used for making white sugar, brown sugar (Khandsari), jaggery (Gur) and ethanol.

Sugarcane is an important cash crop grown in India. Sugarcane cultivation and its development of sugar industry run parallel to the growth of human civilization and it is as old as agriculture. The importance and use of sugarcane and sugar in the country's socio-economic environment is deep rooted and immense. In the current day rural economy set up sugarcane cultivation and sugar industry has been focal point for socio-economic development in rural areas by mobilizing rural resources generating employment and higher income, transport and communication facilities. About 7 million sugarcane farmers and large number of agricultural labourers are involved in sugarcane cultivation and ancillary activities. Apart from this the sugar industry provides employment to more than 4 Lakh skilled and semi-skilled workers in rural area.

RESEARCH METHODOLOGY

This chapter deals with methodology of the study which has been used at various stages. It has been applied particularly for selection of area, block, villages, sample size, collection of information farmers, traders and method of analysis the detailed methodological framework is presented below:

Sampling Technique

Multi stage sampling was followed for the selection of respondents for the present study.

Selection of District

Balrampur District was selected purposively for the research work since it is one of the major districts in the State where Sugarcane Production is very high.

Selection of Block

There are 9 blocks in Balrampur District out of which Balrampur block was selected purposively.

Selection of villages:

A list of all the villages falling in selected block will be prepared and five villages will be selected randomly.

Selection of farmers:

A separate list of farmers growing sugarcane of selected villages will be prepared along with their holding size. From this list 60 respondents will be selected randomly through proportionate allocation to the population.

1. Marginal size farm group- having area of cultivation less than 1 ha
2. Small size farm group- having area of cultivation between 1-2 ha
3. Medium size farm group- having area of cultivation between 2-10 ha
4. Large size farm group- having area of cultivation more than 10 ha

Mode of Data Collection

1. **Primary Data:** Primary data regarding Socio- economic conditions, factors influencing in adoption of Sugarcane cultivation, resources use efficiency, Cost return per hectare and per quintal, marketing costs, margins, efficiency, price spread, and constrains were collected from the sample respondents. Alternatively, the data on intermediaries were collected from various marketing intermediaries associated with marketing of Sugarcane through pre structured

schedules. Similarly, the constraints faced by Sugarcane growers in marketing of Sugarcane were collected through opinion survey.

2. **Secondary Data**: All the necessary secondary data related to the topic were collected from various published sources like journals, bulletins, books, magazines and particular websites etc. and other sources of secondary data includes various Government offices like Block office, Market office and District Agricultural office .

Method of Analysis

Descriptive Analysis: Tabulation method is used for the analysis of data along with the required statistical tool for the interpretation of the result.

Analytical tools used:

1. Production function:

To study the resource use efficiency in sugarcane production, Cobb-Douglas production function will be used. The mathematical form of Cobb Douglas production function is:

$$Y = aX_1^{b1}X_2^{b2}X_3^{b3}X_4^{b4} \dots\dots\dots\dots X_n^{bn}\, e^{\mu}$$

where,

Y = per hectare output (₹/ha)

X_1 = seed (₹/ha)

X_2 = Irrigation charge (₹/ha)

X_3 = Plant protection charges (₹/ha)

X_4 = Manure and fertilizers (₹/ha)

b_i = Elasticity coefficient of the respective input variables

e = Error term or disturbance term

μ = Random variables

2. Garret Ranking:

- It is used to rank the preference indicated by the respondents on different factors.

$$Percent\ position = \frac{100(R_{ij}-0.5)}{N_j}$$

- Where,

R_{ij} = Rank given for the i^{th} variable by j^{th} respondents.

N_j = Number of variables ranked by j^{th} respondents

RESULTS AND DISCUSSION

Production elasticity of Sugarcane crop on different size of group farms:-

Table 1 shows the production elasticity of Sugarcane crop in different household.

Table 1 Production elasticity of Sugarcane Crop on different size of group of farms

Size group of sample farms (ha)	Production elasticity						Return to scale	R^2
	X_1	X_2	X_3	X_4	X_5	X_6		
Marginal	0.55**	0.19	0.25	0.69	0.28	0.15	0.93	0.90
Small	0.88**	0.89	0.69	0.24	0.71	0.32*	0.92	0.91
Medium	0.66	0.32*	0.64	0.86**	0.87	0.61	0.96	0.97

**** Significant at 5% significance level**

***Significant at 1% significance level**

where,

X_1, X_2, X_3, X_4, X_5 and X_6 stands for Field Preparation, Irrigation, Seed and sowing, Labor, Fertilizer and Harvest and other expenses.

In marginal household the production elasticity of Field preparation, Irrigation, Seed and Sowing, Labor, Fertilizer and Harvest and other expenses were 0.55, 0.19, 0.25, 0.69, 0.28 and 0.15 respectively. The return to scale in marginal farm was 0.93 which shows decreasing return to scale i.e.

marginal farmers were gaining less than what they were spending. The R^2 value of marginal household was 0.90 i.e. the considered variable explains 90.00 percent of the variation in depending variable i.e. return from sugarcane. It can be concluded that cost of fertilizer at 5 percent level of significance had significant influence on the returns.

In small household the production elasticity's of seed, irrigation, plant protection chemicals, fertilizer and labour were 0.88, 0.89, 0.69, 0.24, 0.71 and 0.32 respectively. The return to scale in small farm was 0.92 which shows increasing return to scale i.e. small farmers were gaining more than what they were spending. The R^2 value of small household was 0.91 i.e. the considered variable explains 91.00 percent of the variation in depending variable i.e. return from sugarcane. The cost of seed at 5 percent level of significance and cost of irrigation at 1 percent level of significance had significant influence at the returns from sugarcane.

In medium household the production elasticity's of seed, irrigation, plant protection chemicals, fertilizer and labour were 0.66, 0.32, 0.64, 0.86, 0.87 and 0.61, respectively. The return to scale in medium farm was 0.96 which shows increasing return to scale i.e. medium farmers were gaining more than what they were spending. The R^2 value of medium household was 0.97 i.e. the considered variable explains 97.00 percent of the variation in depending variable i.e. return from sugarcane. It was found that the cost of seed at 5 percent level of significance and cost of irrigation at 1 percent level of significance had significant influence at the returns from sugarcane.

Table 2 Constraints faced by the farmers in the production of sugarcane

S.No.	List of Constraints	Garret score (in %)	Rank
1.	**High Incidence of disease**	54.88	4th
2.	**Inadequate credit**	51.55	6th
3.	**Delay in sanction of crop loan**	50.59	7th
4.	**High cost of Input**	61.33	1st
5.	**High Interest on Loans**	59.47	2nd
6.	**High Labour cost**	58.5	3rd
7.	**Uncertain weather**	42.85	8th
8.	**Lack of irrigation water supply**	53.2	5th
9.	**Poor soil fertility**	31.45	10th

10.	**Lack of knowledge and important Technology**	33.5	9th

Table 2 shows that the constraints faced by the Sugarcane farm families in Production of Sugarcane. Most of the respondents express that the major constraints in production of sugarcane was identified as High cost of input and ranked it (1st) followed by High Interest of Loan (2nd), High labour cost 3rd, High Incidence of disease (4th), Lack of irrigation supply (5th), Inadequate credit (6th), Delay in sanction of crop loan (7th), Lack of irrigation Supply(8th), Lack of knowledge and important technology(9th) and Poor soil fertility awarded as the last rank.

Table 3: Constraints faced by the farmers in the Marketing of sugarcane

S.No.	List of Constraints	Garret Score (in %)	Rank
1.	**Market is far from production**	48.35	7th
2.	**High cost of transportation**	51.88	5th
3.	**Lack of Storage facility**	48.5	6th
4.	**Price fluctuation**	51.88	4th
5.	**Lack of skilled labour**	42.3	10th
6.	**Delay in cash payment**	56.41	1st
7.	**Malpractices in weighing**	52.48	3rd
8.	**Illegal deduction**	42.75	9th
9.	**High commission charges**	53.96	2nd
10.	**Lack of information about Government schemes and subsidies**	43.2	8th

Table 3 shows that the constraints faced by the Sugarcane farm families in Marketing of Sugarcane. Most of the respondents express that the major constraints in production of sugarcane was identified as Delay in Cash Payment (1^{st}) followed by High commission of charges (2^{nd}), Malpractices in weighing (3^{rd}), Price fluctuation (4^{th}), High Cost of transportation (5^{th}), Lack of storage facility (6^{th}), Market is far from production (7^{th}), Lack of information and government schemes and subsidies (8^{th}), Illegal deduction (9^{th}) and Lack of skilled labour awarded as the last rank.

Summary and Conclusion

Summary

In small household the production elasticity's of seed, irrigation, plant protection chemicals, fertilizer and labour were 0.88, 0.89, 0.69, 0.24, 0.71 and 0.32 respectively. The return to scale in small farm was 0.92 which shows increasing return to scale i.e. small farmers were gaining more than what they were spending. The R^2 value of small household was 0.91 i.e. the considered variable explains 91.00 percent of the variation in depending variable i.e. return from sugarcane. The cost of seed at 5 percent level of significance and cost of irrigation at 1 percent level of significance had significant influence at the returns from sugarcane.

In medium household the production elasticity's of seed, irrigation, plant protection chemicals, fertilizer and labour were 0.66, 0.32, 0.64, 0.86, 0.87 and 0.61, respectively. The return to scale in medium farm was 0.96 which shows increasing return to scale i.e. medium farmers were gaining more than what they were spending. The R^2 value of medium household was 0.97 i.e. the considered variable explains 97.00 percent of the variation in depending variable i.e. return from sugarcane. It was found that the cost of seed at 5 percent level of significance and cost of irrigation at 1 percent level of significance had significant influence at the returns from sugarcane.

The production constraint analysis concluded that High Cost of Input was the biggest problem faced by 60 farmers in the study sample followed by High Interest of Loan (2^{nd}), High labour cost 3^{rd}, High Incidence of disease (4^{th}), Lack of irrigation supply (5^{th}), Inadequate credit (6^{th}), Delay in sanction of crop loan (7^{th}), Lack of irrigation Supply (8^{th}), Lack of knowledge and important technology (9^{th}) and Poor soil fertility awarded as the last rank.

The marketing constraint analysis conclude that the Delay in Cash Payment was the biggest problem in the study sample followed by High commission of charges (2^{nd}), Malpractices in weighing (3^{rd}), Price fluctuation (4^{th}), High Cost of transportation (5^{th}), Lack of storage facility (6^{th}), Market is far from production (7^{th}), Lack of information and government schemes and subsidies (8^{th}), Illegal deduction (9^{th}) and Lack of skilled labour awarded as the last rank.

Conclusion

The study shows that in resource use efficiency the coefficient of determination (R^2) in marginal household was 0.90, in small household farm it was 0.91 and in medium size household farm it was 0.96. The major constraints faced by the farmers in production of sugarcane were High Cost if Input (61.33%), High Interest of loan (59.47%), High labor cost (58.5%), High Incidence of disease (54.88%) and in marketing constraint of sugarcane were Delay in cash payment (56.41%), High commission charges (53.96%), Malpractices in weighing (52.48%), Price fluctuation (51.88%) and this can be resolved by different Government departments like Department of Agriculture, plant protection and irrigation should assure the timely and adequate supply of the inputs and irrigation water and government should also ensure that the quality inputs are supplied to the farmer by different private agencies. Through the Kisan Credit Cards and other financial schemes of the institutional credit have been proved helpful for the farmers. But to make it more efficient these facilities should be easier and liberal. Problem of human labour can be solved with adoption of co-operation among farming community.

References

Karpgam, C.; Selvaraj, T.; Mooventhan, P. and Venkatasubramanian, V. (2019). Social and technological dimensions and constraint analysis in sugarcane cultivation of Theni district of Tamil Nadu, India. *Journal of Applied and Natural Science*, 11(2): 581-586.

Lahoti, S.R.; Chole, R.R. and Rathi, N.R. (2010). Constraints in Adoption of Sugarcane Production Technology. *Agricultural Research Communication Centre*,30(4): 270-272.

Patil, A. R. and Patel, M. R. (1980). Exploiting sugarcane production potential, *Eastern Economist*, Vol. 75(26): 4125-4130.

Samantaray, S.K., Nayak, M.P. and Panda, P.K. (2017). Constraints under Contract Farming in Sugarcane Cultivation: A case of Odisha, *Asian Journal of Agricultural Extension, Economics& Sociology*, 20(2): 1-8.

Gangwar, L. S. (2002) Economic analysis and resource utilization pattern under irrigated and rainfed conditions in central U.P. CAB *AbstractsAgricultural Economics Research Review; 2002. (Conference Issue)*:1-7. 7 ref. [Journal article. Conference paper] AN: 20043193928

Kale, P.V. and Sale, D.L.(2000). Response efficiency on sugarcane farms in western Maharashtra. Indian Sugar: Vol. **XLIX.** pp909.

Jawanjal, B.G.; Naik, V.G.; Talathi, J.M.; Malave, D.B. and Wagale, S.A. (2014). Resources use efficiency in sugarcane production in Konkan region (M.S.). *Agricultural Update*, 9(4): 556-570.