Resource Use in Sugarcane Cultivation under Tenant and Owner Farms of Assam: A Comparative Economic Analysis

Brota S. Bey*, Ram Singh[†], Jeemoni Gogoi*, Rizwan Ahmed*, Raplang Lapasam*, R. Buragohain** and Nivedita Deka[‡]

ABSTRACT

The present paper estimates the cost and returns of sugarcane cultivation, input use efficiency using primary data collected from 37 tenant farms and 47 owner sugarcane growers giving the total of 84 farms on various aspects of costs and returns spread over three blocks in Karbi Anglong district of Assam. It was observed that the tenant farm had lower profit compared to the owner farm in the sugarcane production as the rent paid for the leased in land was observed in tenant farm but not in owner farm as owner farm mostly cultivates in their own land so the cost of cultivation was seen more in tenant farm compared to the owner farm. The cost of resource use was observed to have a positive influence on the sugarcane production but showed no significant difference between them. The resource use by tenant farms were found under-utilising the seed/setts, human labour, fertiliser and machines whereas owner farms were found to use a greater number of seed/setts. The resource use efficiency was found to be better in the owner farmers than the tenant farmers in sugarcane cultivation.

Keywords: Tenant, Owners, Sugarcane, Resource and Assam.

JEL.: O13, Q11, Q12, Q15, Q16

I

INTRODUCTION

Sugarcane is an important widely grown commercial crop in the world and is cultivated in more than 100 countries, the leading countries being Brazil, India, China, Thailand, Pakistan, Mexico and Colombia. The botanical name of sugarcane is *Saccharum officinarum* and for sugar beet, it is *Beat Vulgare*. Sugarcane is produced in tropical and temperate zones and contributes 7 per cent of the total value of the agricultural crop in the country. Moreover, the area under sugarcane cultivation in the country has gone up from 1.18 million ha (1930- 1931) to 5 million hectares (2010-2011); while cane production has increased from 37 million tonnes to 340 million tonnes with an average productivity of 628.10 quintals per hectare in the corresponding period. Sugarcane is one of the important cash crops of Assam occupying an area of about 29 thousand ha with an average productivity of 37 t/ha. The sugarcane cultivation plays a vital role in rural economy by mobilising rural resources and generating greater

income and employment opportunities. Large work force is involved in sugarcane cultivation and other ancillary activities. The major sugarcane growing districts in the state of Assam are Karbi-Anglong, Nagaon, Dima Hasao, Sonitpur and Golaghat where sugarcane is grown on a large extent of area under upland condition. A number of varieties of sugarcane are grown in Assam depending on the suitability of the soil. In recent times sugarcane area is found to be declining in some districts as a consequence of replacement of sugarcane area by tea crop owing to greater influence of large tea industries. A switch over from sugarcane to tea cultivation is caused due to high labour requirement in sugarcane cultivation, shortage of agricultural labour due to rapid urbanisation and migration of labour to urban areas. However, rising demand for gur in village as well as city areas have prompted many sugarcane growers to revert back to sugarcane from tea cultivation resulting in marginal increase in sugarcane area (Begum *et al*., 2016). Karbi Anglong district in the hills zone of Assam cultivates sugarcane as the important crop both in the hills and plain areas. The land owners do not cultivate in all of their cultivable land because of lack of family labour and due to other causes and lease out part of their land to the tenants. There are numerous types of tenancy system found in Karbi Anglong district of Assam such as the *Pykas, Adhi, Shukti, Leased* system. In *Pykas* system of tenancy, the land owners get paid only for the value of the land and the tenant farmers can cultivate on the land where as in *Adhi* system of tenancy, a deal is made between the land owner and the tenant farmers to have an equal share of the production of the crops between the tenant farmers and land owners. In *Shukti* system of tenancy, a deal between the landowners and the tenant farmers are held, based on the result of the deal or contract, the tenant farmers will be allowed to use the owner land for cultivation and some number of benefits have to be given to the land owners. Out of these, *Pykas* system of tenancy was found to be most frequent in Karbi Anglong district of Assam (Bey *et al*., 2021). The crop efficiency in the tenants and owned farms appear to be different from place to place which is a controversial issue. The emphasis on the consequence of tenancy on production is stressed. It has involved a projecting place mainly because of their suggestions for the impact of land tenancy reforms on the effectiveness of the production. The traditional theoretical notion is that *share* tenancy is an incompetent form of tenurial preparation as compared to their owned farming or fixed rent tenancy, because the terms of *share cropping* deliver disincentives to resource use (Johnson, 1950). Some others at the theoretical level have argued that resource allocation and productivity appear to be invariant of tenurial arrangement (Cheung, 1969). At empirical level also, many studies have been conducted regarding tenancy productivity relationship. These studies are also conflicting leading to different policy issues. Some are of the opinion that owner operated farms are more productive than the tenant farms (Jabbar, 1977) while others (Talukdar, 1980) found no significant difference in productivity between the owner and tenant farms. Considering the above, the present paper attempts to examine the resource use efficiency of sugarcane production under tenant and owner farmers in Karbi Anglong district of Assam.

II

METHODOLOGY

For the purpose of study Karbi Anglong district was selected purposively where tenant and owner farming prevailed. Three blocks namely, Lumbajong, Howraghat and Langsomepi were randomly selected from the district. Further, one village each from the selected blocks as selected based on the existence of the tenancy system. A sample of 37 tenant farmers and 47 owners' farmers are drawn and selected for the study to make a total sample size of 84 farmers. Primary data were collected from the selected farmers of sugarcane through personal interview method with the help of the schedule on area under sugarcane crops, various inputs used, output produced, cost of inputs and price of outputs.

Analytical Technique

A simple percentage analysis was employed to identify the socio-economic characteristics and cost and returns and the problems faced by tenant and owner farms in sugarcane cultivation. In order to estimate the technical efficiency, Cobb-Douglas production function was used to analyse the impact of production variables such as seed/ setts, human labour, fertiliser and machine hour on the sugarcane production under tenant and owner farms.

Production function in general form can be written as:

$$Y = f(Xi)$$
$$Y = \beta_\circ X_1^{\beta 1} X_2^{\beta 2} X_3^{\beta 3} X_4^{\beta 4} e_u$$

where, where Y is the gross return per hectare and Xi s are the various inputs used (in monetary terms) per hectare. We included seed/setts, human labour, fertiliser and machine hour as an explanatory variable for the study viz;

$X_{1=}$ Seed/setts

$X_{2=}$ Human labour

$X_{3=}$ Fertiliser and

$X_{4=}$ Machine hour.

Eq. (1) of the production function in log form is:

$$\ln Y = \beta_\circ + \beta_1 \ln X_1 + \beta_2 \ln X_2 + \beta_3 \ln X_3 + ... + \beta_n \ln X_n$$

The output of sugarcane was converted to value terms for the functional analysis which is represented in the following equation as:

$$\ln (GR) = \beta_\circ + \beta_1 \ln (SD) + \beta_2 \ln (HL) + \beta_3 \ln (FER) + \beta_4 \ln (ML)$$

where, GR is the gross return obtained from sugarcane cultivation calculated by multiplying the sugarcane output by price of the output

SD is seed/setts cost per hectare in rupee terms
HL is human labour cost in rupee terms
FER is fertiliser cost per hectare in rupee terms and
ML is the machine cost per hectare in rupee terms

The coefficients β_i (i=1,2,3,4) are the elasticities of the respective variables with respect to the gross return obtained from sugarcane production, with the assumption that $\beta_i > 0$.

Allocative Efficiency

The resource use efficiency of sugarcane was analysed as stated below,

r = MVP/MFC

where, *r* is the efficiency ratio
    MVP is the marginal value product of the concerned input
    MFC is the marginal factor cost or price per unit of input and assumed as ₹1 for all the inputs
    MVP was calculated as $MVP_i = \beta_i \frac{\bar{Y}}{\bar{X}i}$, where $\bar{Y}$ is the geometric mean of the value of output and $\bar{X}i$ is the geometric mean of i-th input.
    If r = 1, then the level of resource use is at optimum implying efficient resource utilisation.
    If r <1, then the resource is over-utilised; hence, a decrease in quantity is suggested to maximise profits till *r* becomes equal to 1.
    If r > 1, the resource is under-utilised, and an increase in inputs will raise the profit to the level when r falls to 1.
    To explore the difference, if any between the tenant and owner farmers in respect of resource use cost and returns, a two-sample 't' test assuming unequal variance was used. The formula for 't' test is

$$t = \frac{\overline{x_1} - \overline{x_2}}{\sqrt{\frac{s^2}{n_1} + \frac{s^2}{n_2}}}$$

where, $\overline{x}_1$ and $\overline{x}_2$ are the means of various input used per hectare, yield per hectare and income per hectare of tenant and owner farms, respectively, n_1 and n_2 are the number of observations in the two samples and s^2 is the pooled variance of the two samples.

III

RESULTS AND DISCUSSION

From the survey it was found that most of the members of the sample respondents' family of both the tenant and owners farmers belonged to the age group of 15 to 60

years. The education level of the family members was found to be comparatively higher in case of tenant farmers than the owners farmers which indicated that the knowledge level of the tenant farmers were seen better than the owner farmers which might have contributed to use the resources in an effective way as compared to the owner farmers. Since all the respondent of the tenant farmers (100 per cent) were found to have agriculture as their main occupation and the only source of income it could have led them to invest more of their knowledge towards agriculture only whereas nearly 81 (per cent) of the owner farmers were only found to have agriculture as their main occupation and 19 per cent were found to have some other occupation as main source of income (Table 1). The average cropping intensity in the study area was found to be 176.64 per cent. The average cropping intensity for the Karbi Anglong district was recorded to be 172.40 per cent during the year 2016-17 which was found to be slightly higher in the study area. (Source: NER data bank). The cropping intensity of the tenant farmers was found to be comparatively higher (175.40 per cent) than that of owner farmers (172.64 per cent) owing to the reason that intensive cropping requires more labour, inputs and capital which were found reasonable by the tenant farmers than in comparison to the owner farmers.

TABLE 1. SOCIO-ECONOMIC CHARACTERISTICS FOR TENANT AND OWNER FARMS

Socio Economics characteristics	Tenant	Owner
(1)	(2)	(3)
Below 15 years	24	32
	(12.57)	(13.68)
Between 15-60 years	152	192
	(79.58)	(82.05)
Above 60 years	15	10
	(7.85)	(4.27)
Primary	45	29
	(22.48)	(19.59)
Literate	136	104
	(67.66)	(70.27)
Illiterate	20	15
	(9.95)	(10.14)
High School	10	39
	(4.08)	(26.35)
Under Graduate	4	4
	(1.09)	(2.70)
Graduate and above	7	2
	(3.58)	(1.35)
Agriculture	37	38
	(100.00)	(80.85)
Others	5	9
	(13.51)	(19.15)

Source: Field Survey data, 2019-20. Figures in parentheses indicate percentage.

Estimated Cost and Return of Sugarcane Cultivation between Tenant and Owner Farms

Sugarcane production was found to be determined by various factors of which area under sugarcane, seed/setts costs, human labour cost, fertiliser cost and machine hour
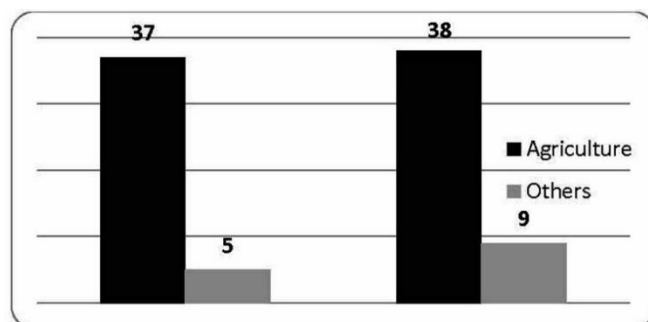
Figure 1. Occupational Pattern.

cost accounted to be major factors affecting the gross income from sugarcane. Hence, estimates of these tactical variables were done and presented for both group of farmers in Table 2 and 3. It was found that the total cost of cultivation per hectare was more on farm of tenants (₹87,697.18) than the farm of owners (₹ 73,491.47) which was due to higher rental value of leased in land for the tenants while the gross return was more in the farm of owner (₹ 62,8011.63) than the tenants farm (₹ 58,3128.16) and so the return over variable cost was higher (₹10.09) in owner farmers compared to tenant farm

TABLE 2. COST OF CULTIVATION OF SUGARCANE

(₹/ha)

Particulars (1)	Tenants (2)	Owner (3)	Difference over owner (4)
Seed/setts cost	14131.88	15011.50	-879.62
	(16.11)	(20.43)	(-4.32)
Human Labour cost	41781.40	40518.40	1263
	(47.64)	(55.13)	(-7.49)
Fertiliser cost	3731.25	3670.05	61.2
	(4.25)	(4.99)	(-0.74)
Machine hour cost	3900.00	4125.00	-225
	(4.45)	(5.61)	(-1.16)
Interest on working capital@10 per cent	3177.23	3166.25	10.98
	(3.62)	(4.31)	(-0.69)
Total variable cost	66721.76	66491.19	230.57
	(76.08)	(90.47)	(-14.39)
Depreciation @ 10 per cent	388.79	657.48	-268.69
	(0.44)	(0.89)	(-0.45)
Land revenue	39.74	39.74	0
	(0.05)	(0.05)	(0.00)
Rental Value of owned land	17000.00	5666.67	11333.33
	(19.38)	(7.71)	(11.67)
Interest on fixed capital@10 per cent	1742.85	636.39	1106.46
	(1.99)	(0.87)	(1.12)
Total fixed cost	19171.38	7000.28	12171.1
	(21.86)	(9.53)	(12.33)
10 per cent managerial cost	8443.92	7317.08	1126.84
	(9.63)	(9.96)	(0.33)
TOTAL COST	87697.18	73491.47	14205.71
	(100.00)	(100.00)	(0.00)

Source: Field survey data, 2019-20.
Note: Figures in parentheses indicate the percentage to total cost.

TABLE 3. ECONOMIC RETURNS OF SUGARCANE

(₹/ha)

Particulars	Tenants	Owner	Difference over owner
(1)	(2)	(3)	(4)
Gross return (₹/ha)	583128.16	628011.63	-44883.47
Net return (₹/ha)	498689.00	554840.81	-56151.81
Return over total cost	8.55	8.02	0.53
Returns over variable cost	9.45	10.09	-0.64

Source: Field survey, 2019-20.

(₹9.45) as the yield of sugarcane was more in owners farm than the tenants' farm resulting in higher profitability for the owner farmers compare to tenant farmers. It is observed that among all the explanatory variables, human labour cost was found to be the highest as compared to other variables such as seed/setts cost, fertiliser cost and machine hour cost. A similar study (Saravanan, 2016) revealed that the total cost incurred for sugarcane production was ₹ 39796.89 per acre and total return was found to be ₹ 74867.80 per acre with hired labour accounting for the highest among the variable cost of ₹ 15889.98 per acre clearly indicating that sugarcane cultivation is a highly labour-intensive occupation. Contrary to this study, in the study carried out by Bansal and Grover, 2019 it was observed that tenant farmers were more efficient as compared to owner farmers in order to increase the returns, profit maximization and cost minimization for growing sugarcane crop in the study area. It might be due to less investment made by tenant farmers on purchasing expensive farm machinery for cultivation of land.

Estimation of Production Variables of Tenant Farm

Based on the data furnished in Table 4, the regression coefficient for area was estimated as 0.695 which implies that 1 per cent increase in area would enhance gross return by 0.695 per cent. The regression coefficient for seeds/setts (0.135), human labour was (0.494), fertiliser (0.036) and machine hour (0.021) were worked out. The coefficient of multiple determinations (R^2) was found to be 0.87 of which reflecting 87 per cent of the variation in sugarcane production was explained by the variables considered. Hence, there is still scope for the tenant farms to improve sugarcane production by increasing the level of input. The return to scale $\sum b_i > 1.381$, indicates an increasing return to scale in model on tenant farms. A similar study conducted by Pokharel *et al.* (2019) reported that the value of R^2 was 0.79 variations in the explanatory variable explained 79.80 per cent of the variation in the dependent variable in the sugarcane production. Pandey *et al.* (2020) concluded that the farmers were under-utilising the sett, irrigation and fertiliser thereby suggesting to increase the expenditure on the inputs like sett, irrigation and fertiliser to increase the profit of the farmers. The study conducted by Girei and Giroh (2013) revealed that resources are insufficiently utilised in the production process of sugarcane by contact out growers and therefore if his system is to be improved, re-allocation of resources for better use

is encouraged and the (R_2) was 0.797 this means that about 79.70per cent of variation in the dependent variable was explained by variations in the explanatory variables.

TABLE 4. PRODUCTION FUNCTION ESTIMATION FOR SUGARCANE CULTIVATION

Variables (1)	Tenant (2)	Owner (3)
Area in hectare (X_1)	0.695	0.474*
	(0.645)	(0.249)
Value of seed/setts in ₹/ha (X_2)	0.135	0.0001
	(1.713)	(0.357)
Value of human labour in ₹/ha (X_3)	0.494	0.373*
	(0.348)	(0.199)
Value of fertiliser in ₹/ha (X_4)	0.036	0.726
	(0.647)	(0.846)
Value of machine hour in ₹/ha (x_5)	0.021	0.243
	(0.125)	(0.250)
R^2	(0.87)	(0.96)
Returns to scale	1.381	1.816

Source: Field Survey, 2019-20. *Significant at 10 per cent probability level. Figures within parenthesis indicate standard errors

Estimation of Production Variables of Sugarcane Production under Owner Farms

The estimated regression co-efficient of the variables pertaining to the data are furnished in Table 4 which shows that the area under cultivation and seed/setts was found to be positive and significant at 10 per cent level of probability. The regression coefficient for area was estimated to be 0.474 which implies that 1 per cent increase in area would enhance the gross return by 0.474 per cent. The regression coefficient for seeds/setts (0.0001), human labour was (0.373), fertiliser (0.726) and machine hour (0.243) were worked out. The coefficient of multiple determinations (R^2) was found to be 0.96 which reflected 96 per cent of the variation in sugarcane production was explained by the variables considered. Hence, there is still scope for the owner farms to improve sugarcane production by increasing the level of input. The return to scale $\sum b_i > 1.816$, indicates an increasing return to scale in model on owner farms. Ranjan *et al.* (2020) found a decreasing return to scale and R^2 for marginal, small and medium farms was estimated to be 0.923, 0.928 and 0.930 respectively. Jaiswal *et al.* (2018). observed that, the estimated regression co-efficient of variables (inputs) pertaining to the data for production of sugarcane was highly significant under all the three methods of irrigation, which was found to 0.5495, 0.5980 and 0.4181 for flood, sprinkler and drip irrigation method, respectively. It indicates that variable inputs have functional relationship contributed as 54.95, 59.80 and 41.81 percent for respective method of sugarcane cultivation. Jawanjal *et al*. (2014) observed that, in suru sugarcane co-efficient of determination (R^2) was 0.9113 indicating 91 per cent of variation and in ratoon sugarcane co-efficient of determination (R^2) was 0.9344 indicating that, 93 per cent of the variation in the yield was explained by the identified input variables included in the function, e.g., expenditure on manures, plant protection, potassium and nitrogen in suru sugarcane cultivation, and plant protection and manures to be

curtailed considering their excess utilization in ratoon sugarcane cultivation. Kumari, V. (2018) shows that planting materials (seeds), tractor cost and plant protection chemical uses have a positive and significant influence on sugarcane yield, indicating that these resources are being used at sub-optimal levels and there exists the possibility of enhancing the yield of sugarcane by increasing their use.

Comparative Resource Use Efficiency for Tenant and Owner Farm of Sugarcane

The *r* values for seed/setts, human labour, machine hour and fertiliser for sugarcane cultivation were computed for the tenant, based on the estimated parameters in the sugarcane production Table 5. The *r* values were found to be more than unity for seed/setts (5.57), human labour (6.89), fertiliser (5.63) and machine hour (3.14) which indicates under-utilization of these resources in sugarcane cultivation which underlines scope of increasing the use of these inputs. Jawanjal, *et al.* (2014). found the MVP to FC ratios was more than unity for phosphorus and nitrogen, human labour, irrigation indicated under-utilisation of these resources in sugarcane cultivation which underlines scope of expanding the use of these inputs.

TABLE 5. ESTIMATED RESOURCE USE EFFICIENCY FOR TENANT AND OWNER FARMS

Farm inputs	Production elasticities		MVP		MVP/MFC (*r*)	
	Tenant	Owner	Tenant	Owner	Tenant	Owner
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Seed/setts cost	0.135	0.0001	5.57	0.004	5.57	0.004
Human labour cost	0.494	0.373	6.89	5.78	6.89	5.78
Fertiliser cost	0.036	0.726	5.63	124.23	5.63	124.23
Machine hour cost	0.021	0.243	3.14	3.77	3.14	3.77

Source: Field survey, 2019-20.

The *r* values for seed/setts, human labour, fertiliser and machine hour for sugarcane under the owner farmers were computed and the *r* values was found to be more than unity for human labour (5.78), fertiliser (124.23) and machine hour (3.77) but less than unity for seed/setts (0.004). The results indicated that the owner farmers have the opportunity to increase the output per hectare by increasing their use of human labour, fertiliser and machine hour. However, farmers need to reduce their use of seeds/setts for present level of sugarcane production. A similar finding was reported by Sulaiman *et al.* (2015) where the resource inputs used in the study area were not efficiently being utilised. Thus, there is need for training sugarcane farmers on farm inputs optimum utilisation by the extension agents in the study area. A study by Ahmad *et al.* (2018) reported that the resource input such as human labour, machine labour, seed(setts) and fertilisers in sugarcane production were not utilised efficiently which resulted in low productivity of sugarcane. A study conducted by Girei and Giroh (2013) revealed that insufficient utilisation of resources in the production of sugarcane by contract out growers and therefore if their systems are to be improved, re-allocation of resources for better use needs to be encouraged.

Difference in Resource Use and Returns of Tenant and Owner Farms

A paired sample t test was used to find out the difference between the tenant and owner farms on their resource use and returns in their farming. The t-estimate values show a positive influence on sugarcane production but no significant difference in the resource use of seed/setts cost, human labour cost, fertiliser cost, machine hour cost and gross return and net return as well between the two groups of tenant and owner farms (Table 6).

TABLE 6. T ESTIMATES FOR DIFFERENCE BETWEEN TENANT AND OWNER FARMS

Returns and resources	t values
(1)	(2)
Seed/setts costs	2.07
Human labour costs	2.08
Fertiliser costs	2.02
Machine costs	2.03
Gross return	2.06
Net return	2.05

Source: Field survey, 2019-20.

Problems Faced by Tenant Farmers in the Study Area

The problems stated by the farmers during personal interview were ranked by using frequency and percentage analysis, and ranks were given against each problem and the observations were presented in the Table 7. Lack of irrigation facilities (94.59 per cent) was one of the major problems identified and ranked I, followed by non-availability of crop insurance for tenant farmers (83.78 per cent) which was ranked II.

TABLE 7. PROBLEMS FACED BY TENANT FARMERS IN THE STUDY AREA

				n=37
Sl.no	Problems	F	Per cent	Rank
(1)	(2)	(3)	(4)	(5)
1.	Lack of irrigation facility	35	94.59	I
2.	Non-availability of crop insurance for tenant farmers	31	83.78	II
3.	Lack of timely distribution of quality seeds/setts	29	78.38	III
4.	Inadequate financial assistance from bank	28	75.68	IV
5.	Non-availability of the loan waiver scheme for tenant farmers	25	67.57	V
6.	Non-availability of credit in time	23	62.16	VI
7.	Farmers unaware of Minimum Support Price (MSP)	22	59.46	VII
8.	Increase in the wage rate of hired labour	21	56.76	VIII
9.	High rent for the leased lands	19	51.35	IX
10.	In sharecropping, of tenancy system the tenant farmers do not get much profit since they had to divide their production in 50:50 ratio with the land owner and the farmer had to pay most of the input expenses for cultivation	16	43.24	X
11.	Fluctuation in market prices	14	37.84	XI
12.	Lack of proper knowledge regarding various disease, insect and pest management.	13	35.14	XII

Source: Field survey data, 2019-20.
Note: * Responses are Inclusive, F= Frequency, Per cent= Percentage.

Lack of timely quality seed/setts distribution (78.38 per cent) was considered as ranked III among the problems faced by tenant farmers. Inadequate financial assistance from bank (75.68 per cent) was ranked IV. Non-availability of the loan waiver scheme for tenant farmers (67.57 per cent) was ranked V. Non- availability of credit in time (62.16 per cent) was ranked VI. Farmers unaware of Minimum Support Price (MSP) (59.46 per cent) and was ranked VII, increase in the wage rate of hired labour (56.76 per cent) was ranked VIII. High rent for the leased lands (51.35 per cent) and was ranked IX. The X ranked problem of tenant farmers in the study area was that in sharecropping of tenancy system the tenant farmers do not get much profit since they had to divide their production into 50:50 ratio with the land owner and the farmers had to pay most of the input expenses for cultivation (43.24 per cent). Fluctuation in market prices (37.84 per cent) and lack of proper knowledge regarding various diseases, insects and pest management (35.14 per cent) were considered as the XI and XII ranked problems respectively.

Problems Faced by Owner Farmers in the Study Area

Table 8 revealed that among the owner farmers, lack of irrigation facility (91.49 per cent) was considered one of the major problems of the owners' farmers which was similar to the tenant farmers and was ranked I. The second problem was lack of capital to invest in the cost of cultivation (87.23 per cent) followed by lack of timely distribution of quality seeds/setts (78.72 per cent). Farmers not aware of Minimum Support Price (MSP) (68.09 per cent) was ranked IV. Increase in the wage rate of hired labour (61.70 per cent) was ranked V. Lack of knowledge about crop insurance scheme (53.19 per cent) was ranked VI. Lack of proper knowledge regarding disease, insects and pest management (51.06 per cent) and last but not the least fluctuation in market prices (44.68 per cent) were ranked VII and VIII, respectively.

TABLE 8. PROBLEMS FACED BY OWNER FARMERS IN THE STUDY AREA

n=47

Sl.No.	Problems	F	Per cent	Rank
(1)	(2)	(3)	(4)	(5)
1.	Lack of irrigation facility	43	91.49	I
2.	Lack of capital to invest in the cost of cultivation of the crops	41	87.23	II
3.	Lack of timely distribution of quality seed/setts	37	78.72	III
4.	Farmers unaware of Minimum Support Price (MSP)	32	68.09	IV
5.	Increase in the wage rate of hired labour	29	61.70	V
6.	Lack of knowledge about crop insurance scheme	25	53.19	VI
7.	Lack of proper knowledge regarding disease, insect and pest management	24	51.06	VII
8.	Fluctuation in market prices	21	44.68	VIII

Source: Field survey data, 2019-20.
Note: * Responses are Inclusive, F= Frequency, Per cent= Percentage.

Suggestion and Recommendations to Overcome the Constraints of Sugarcane Cultivation for Both Tenant and Owner Farmers

1. It is recommended to provide irrigation facilities for both tenant and farmers which would certainly increase production and productivity of the crops.
2. Provide sufficient financial assistance at the lowest possible interest rate for the tenant farmers.
3. Simplify the procedure for procuring loans from the banks for both the tenant and owner farmers.
4. Providing knowledge about the Minimum Support price (MSP) of various crops to both the tenant and owner farmers in the Karbi Anglong district of Assam so that they can procure the crops at not less than the minimum support price (MSP).
5. It is recommended for timely distribution of seeds/setts to both the tenant and owner farmers by the agriculture department of Assam at Karbi Anglong district.
6. To overcome higher labour charge, use of small implements is recommended.
7. Farmers should be aware and trained on the adoption of the recommended package of practices for the crops for better yield performance.
8. Proper advisory services and training regarding the insect, pest and disease management should be imparted to the farmers to make them more efficient in insect, pest and disease management.

Thus, it is the responsibility of the government, extension agency and research institutions to deliver the above suggested facilities to both tenant and owner sugarcane growers' farmers for their enhancement.

IV

CONCLUSION

From this study, it was observed that there were differences in resource use between tenant and owner farms. The tenant farms were found under-utilising the seed/setts, human labour, fertiliser and machine hour whereas owner farms were found to use a greater number of seed/setts. The resource use efficiency was found to be better in owner farms in comparison to the tenant farms in sugarcane production despite the tenant farmers being better educated than the owner farmers which might be due to the reason that most of the tenant farmers are not indigenous to the area which might have played a vital role in restricting them to access the resources at an optimum level of prices which ultimately has resulted in the lower resource use efficiency among the tenant farmers in comparison to the owner farmers. The seed/setts, human labour, fertiliser and machine hour were found under-utilised by tenant farms hence, they still have scope to increase their input use to increase their production. Similarly, the owner farms could still increase the use of resources to further increase the sugarcane production. Gross return was found more in owners' farms as compared to the tenant

as the yield of sugarcane was more in owners farm than the tenants' farm resulting in higher profitability for the owner farmers compared to tenant farms. However, due to higher rental value of land for tenant farms, the net return was found to be lower as compared to the owner farm. To improve the resource use efficiency and optimise input use for sugarcane production for both tenant and owner farms, appropriate policy measures like alertness and training on adoption of the recommended package of practices for better yield performance, advisory services and proper training regarding the insect, pest and disease management of sugarcane in the hill district of Assam are recommended.

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