Problem confrontation of sugarcane farmers in Natore district of Bangladesh

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A B S T R A C T

The present study was conducted to explore the problems of sugarcane farmers in the selected areas of Natore district in Bangladesh. A total of 100 farmers were selected from Lalpur upazila of Natore district by using a simple random sampling technique. Data were collected through individual interviews during October to November, 2019 by using a structured interview schedule. Both descriptive and inferential statistics were used to analyze data. The majority of the sugarcane farmers (80%) had medium problems in sugarcane cultivation. Among twenty problems, difficulty in getting sugarcane setts was identified as the most critical one, followed by low market price of sugarcane. The least important problem faced by the farmers was lack of labour for sugarcane cultivation. Correlation analysis revealed that credit received, input availability, and extension media contact were significantly associated with the problems of sugarcane farmers. The study indicated some opportunities for the policymakers to address the dominant factors i.e. credit received, input availability, and extension media contact for increasing sugarcane production. Moreover, credit facilities, supply of inputs, proper training and access to extension services could play a vital role in lessening problems in sugarcane cultivation.

Keywords: Sugarcane, Farmers, Problems, Bangladesh.

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Introduction

Sugarcane (*Saccharum officinarum*) is one of the important agricultural crops in the world (Tukaew *et al.*, 2016). It is an annual commercial field crop grown in tropical and subtropical areas (Khaiyam *et al.,* 2018; Tabriz *et al.,* 2021). Sugarcane is used as a raw material for making sugar, biofuels, bioproducts, and plays a vital role in daily life of any nation including nutritional and economic sustenance (Ambetsa *et al.,* 2020). It contributes 86% to sugar production as a vital source of white sugar globally (Rumankova and Smutka, 2013; OECD-FAO, 2019).

Sugarcane is the important cash-cum industrial crop and mainly used for producing white sugar in Bangladesh (Rahman *et al.,* 2016; Tabriz *et al.,* 2021). It ranks second among the cash crops and it ranks third among major field crops in the country (Rahman *et al.,* 2016). Sugarcane cultivation covers about 1.2% of the total agricultural land in Bangladesh (BSRI, 2016). Presently, sugarcane is grown in 0.17 million ha of land of which about 0.086 million ha is located in the sugar mills zones and remaining 0.084 million ha is situated in the non-mill zones (BSRI, 2020). About 5 million people depend on sugarcane cultivation for their livelihood and it contributes 0.81% to the national economy of Bangladesh (BSRI, 2020).

The sugar production in Bangladesh is quite low but demand of sugar is getting higher day by day due to high growth rate of population (Rahman *et al.,* 2016). The average yield of sugarcane is 45.81 ton ha^{-1} in Bangladesh which is very much low compared to other cane producing countries (Rahman *et al.,* 2016). The current production of sugar can meet only 25% of the national demand, while imported sugar satisfies the remaining 75% of the same (Rahman *et al.,* 2016). Therefore, the yield of sugarcane in Bangladesh needs to be increased to ensure timely supply for the growing population (Tabriz *et al.,* 2021).

The production of sugarcane is fluctuated from year to year due to various reasons in Bangladesh (Reza *et al.*, 2016). Yield and production could not be increased to the desired level without identifying those problems in production of sugarcane (Hossain and Abdulla, 2015). The main constraints of low production might be traditional farming practices adopted by sugarcane growers (Raza *et al.*, 2020). There may be several problems in producing sugarcane like increased rates of inputs, low return of output, little knowledge of farmers about scientific methods etc. (Nazir *et al.*, 2013). According to Karim *et al.* (2016), the sugarcane farmers of Bangladesh have been facing a lot of problems like shortage and high wages of labour, high price of inputs, low price of sugarcane/sugar, high insect and pest infestation etc. Investigating those problems and identifying how to overcome them may increase the production of sugarcane in Bangladesh.

Therefore, the present study was conducted to explore the extent of problems faced by the sugarcane farmers in producing sugarcane. The specific objectives were to describe the socioeconomic characteristics of the sugarcane farmers; explore the extent of problems of sugarcane farmers; and determine the relationships between socioeconomic characteristics of sugarcane farmers and their problem confrontation.

Methodology

Study area

The study was carried out in Arbab union of Lalpur upazila (sub-district) under Natore district in Bangladesh (Fig. 1). The upazila is located in between 24°07' and 24°18' north latitudes and in between 88°52' and 89°08' east longitudes. In the study area, a huge number of farmers were engaged in sugarcane cultivation (Reza *et al.*, 2016).
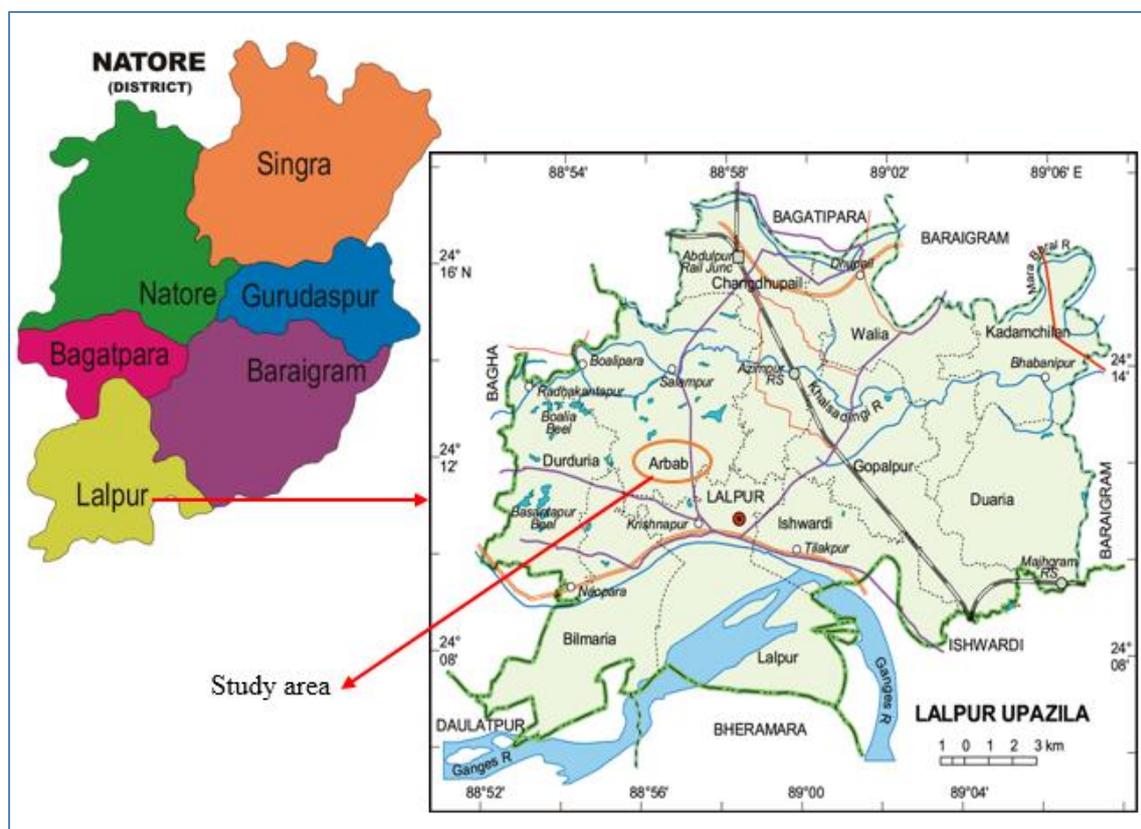
Fig. 1. Map showing the study area.

Population, sampling, data collection and analysis

The farm households involved in sugarcane cultivation were the target population of the study. The farmers were selected by using a simple random sampling technique from Arbab union of Lalpur upazila. The union was selected purposively through the discussion with upazila

agriculture officer of Lalpur upazila. A list of farmers growing sugarcane was collected from upazila agriculture office and around 500 farmers were found in the list. A total of 100 farmers (20% of total population) were selected randomly as sample for the survey. Data were collected through individual interviews during October to November, 2019 by using a structured interview schedule.

Extent of problems of sugarcane farmers was the focus variable and fourteen socioeconomic characteristics of them were selected as explanatory variables namely age, education, household size, farming experience, farm size, sugarcane cultivation area, sources to sell sugarcane, annual family income, credit received, input availability, organizational participation, extension media contact, training exposure, and knowledge on sugarcane cultivation.

The socioeconomic characteristics of the sugarcane farmers for the study were measured with descriptive statistics viz. mean, standard deviation, and percent. According to Fraenkel *et al.* (2012), descriptive statistics help to explain the characteristics and basic features of the respondents in a study.

A four-point rating scale was used to explore the extent of problems of sugarcane farmers in the study area (Mithun *et al.*, 2020). A total of twenty (20) problems in sugarcane cultivation were identified from the focus group discussions (FGD) and available literature. Each problem was scored with four possible responses: high, medium, low and not at all, with corresponding scores of 3, 2, 1 and 0, respectively. Hence, the scale score ranged from 0 to 60, where 60 indicates severe problem, and 0 indicates no problem. A problem facing index (PFI) was calculated to measure the extent of severity of the problems faced by the sugarcane farmers in the study area (Equation 1) (Amin *et al.*, 2016; Pandit and Basak, 2013; Uddin *et al.*, 2020).

$$PFI = \frac{P_h \times 3 + P_m \times 2 + P_l \times 1 + P_n \times 0}{N} \quad\text{............................ (1)}$$

Where,

PFI = problem facing index, P_h = number of responses with high problems, P_m = number of responses with medium problems, P_l = number of responses with low problems, P_n = number of responses with no problem, and N = total number of responses

The factors associated with problems of sugarcane farmers were measured employing Pearson's product-moment correlation coefficient. For the analysis, the data were cleaned, coded, and analyzed with the statistical package for social sciences (SPSS) var. 20. Microsoft excel 13 was used for preparing different charts and graphs. To explore the relationship between the explanatory variables and focus variable, Pearson's product-moment correlation coefficient (r) (Pearson, 1895) was computed (Equation 2).

$$r_{xy} = \frac{\sum(x_i - \tilde{x})(y_i - \bar{y})}{\sqrt{\sum(x_i - \tilde{x})^2 \sum(y_i - \bar{y})^2}} \quad\text{............................. (2)}$$

Where,

r_{xy} = Pearson's product-moment correlation coefficient
$\bar{x}$ and $\bar{y}$ = Means of the variables x and y, respectively

Results and Discussion

Socioeconomic characteristics of the sugarcane farmers

The socioeconomic characteristics of the sugarcane farmers are presented in Table 1. Findings reveal that the majorities (80%) of the farmers were middle to old aged and more than half of them (56%) could sign their names only. Educated farmers possess more knowledge, more ability to understand and respond to critical situations (Mulinya, 2017; Pandit and Basak, 2013) and therefore, are more likely to face lower problems. Four-fifth of the respondents (80%) was from small to medium sized household categories. An overwhelming majority of them (85%) had medium to high farming experience and the highest proportions (88%) of them had small sized farm (Table 1). Almost all of the respondents (95%) mainly used their small sized farm area for sugarcane cultivation. Laosutsan *et al.* (2019) reported that the cultivation area contributed significantly to minimize farm problems. More than four-fifth of the respondent farmers (85%) were accustomed to sell their harvested sugarcane in the local market and most of them (90%) had low to medium income.

Results also show that the highest proportions of the respondents (90%) received no credit facilities and three-fourth of them (75%) had high level of available inputs for sugarcane cultivation in the study area. Table 1 indicate that more than four-fifth of them (90%) had no organizational participation and the highest proportions (62%) of the respondent sugarcane farmers had medium contact with extension personnel. Tey *et al.* (2014) explained that organizational participation greatly influences the management of agricultural activities. Majority of the respondent sugarcane farmers (92%) received no training. Ituma and Ukah (2017) asserted that training enhances farmers' ability to manage farms and contribute maximum productivity of the farms effectively. Most of the respondents (70%) had medium knowledge on sugarcane cultivation in the investigation area. Knowledge plays a significant role on farmers' capability to overcome their problems (Pandit and Basak, 2013).

Table 1. Socioeconomic characteristics of the farmers (n=100)

Socioeconomic characteristics	Respondents (%)	Mean	SD*
Age (year)			
Young age (up to 35)	20		
Middle age (36-50)	32	49.61	12.32
Old age (above 50)	48		
Education (year)			
Illiterate (0)	10		
Sign only (0.5)	56		
Primary (1-5)	17	2.21	2.92
Secondary(6-10)	15		
Above secondary (above 10)	2		
Household size (number)			
Small (up to 4)	34		
Medium (5-7)	46	5.31	1.32
Large (above 7)	20		
Farming experience (year)			
Low (up to 18)	15		
Medium (19-36)	57	25.85	12.3
High (above 36)	28		
Farm size (ha)			
Small (up to 1 ha)	88		
Medium (1.01-3 ha)	12	0.47	0.36
Large (above 3 ha)	0		
Sugarcane cultivation area (ha)			
Small (up to 0.5 ha)	95		
Medium (0.6-2 ha)	5	0.28	0.23
Large (above 2 ha)	0		
Sources to sell sugarcane (place)			
Mill (0)	15		
Local Market (1)	85	1.15	0.36
Annual family income ('000' BDT)			
Low (up to 80)	54		
Medium (81-150)	36	89.43	46.47
High (above 150)	10		
Credit received ('000' BDT)			
No credit (0)	90		
Credit received (1)	10	1.79	8.25
Input availability (score)			
Low (up to 5)	5		
Medium (6-11)	20	12.93	1.89
High (above 11)	75		
Organizational participation (score)			
No participation (0)	90		
Participation (1 or more)	10	0.18	0.47
Extension media contact (score)			
Low (up to 13)	33		
Medium (14-27)	62	15.14	5.26
High (above 27)	5		
Training exposure (day)			
No training (0)	92		
Training received (1-3)	8	0.1	0.38
Knowledge on sugarcane cultivation (score)			
Low (up to 13)	30		
Medium (14-26)	70	21.69	1.72
High (above 26)	0		

SD = Standard Deviation; ha = hectare; BDT = Bangladeshi Taka*

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Extent of problems of sugarcane farmers

Findings shown in Fig. 2 present the extent of problems of sugarcane farmers in the study area. Results hint that majority of the respondents (80%) had medium problems in sugarcane cultivation followed by high problems (20%). In comparison, no farmer (0%) reported low problems in sugarcane cultivation in the study area. The findings imply that the sugarcane farmers in the study area had trouble in sugarcane cultivation. Several factors might be responsible for those problems such as low income of the farmers, lack of training facilities, limited organizational participation etc. in the study area (Table 1). The findings are akin to those of Karim *et al.* (2016) who reported that the highest proportions of the respondents (63%) faced medium constraints in sugarcane cultivation. Azad *et al.* (2014) stated that majority of the farmers (79.9%) perceived medium to high problems in vegetable cultivation in Chuadanga district of Bangladesh. Pandit and Basak (2013), Kabir *et al.* (2011), Amin *et al.* (2016) and Uddin *et al.* (2020) also found similar results in their studies.
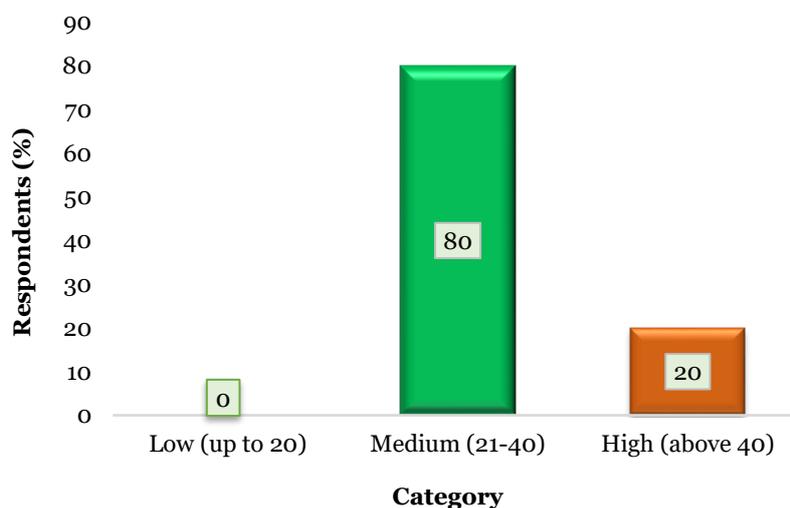
Fig. 2. Extent of problems of sugarcane farmers.

Table 2. Problems of sugarcane farmers (n = 100)

Problems	Extent of problems				PFI	Rank Order
	High	Medium	Low	Not at all		
Difficulty in getting sugarcane setts	75	15	5	5	2.60	1
Low market price of sugarcane	65	15	10	10	2.35	2
Lack of capital for sugarcane cultivation	60	20	10	10	2.30	3
Lack of modern sugarcane processing machineries in the sugar mills	55	25	15	5	1.75	4
Difficulty in getting price from sugar mill	55	20	15	10	1.65	5
Lack of high yielding varieties	20	35	32	13	1.62	6
Lack of mechanical harvester	11	45	30	14	1.53	7
Lack of training facility on sugarcane cultivation	7	50	28	15	1.49	8
Drainage problem	12	45	17	26	1.43	9
Lack of knowledge on sugarcane maturity	6	40	41	13	1.39	10
Lack of transport facilities	10	30	40	20	1.30	11
Lack of land preparing machineries	5	45	22	28	1.27	12
Lack of disease free setts	8	40	20	32	1.24	13
Facing problem in tying and earthing up of sugarcane	10	33	23	34	1.19	14
High price of fertilizers and pesticides	5	35	29	31	1.14	15
Irrigation problem	6	30	34	30	1.12	16
Weeding problem	5	25	43	27	1.08	17
Lack of knowledge on preparing setts	12	28	15	45	1.07	18
Lack of suitable land	15	20	35	30	1.05	19
Lack of labor	10	15	42	33	1.02	20

PFI = Problem Facing Index; setts = stem cuttings of sugarcane used as propagating material.

A problem-facing index (PFI) was computed and presented in Table 2 in order to show the extent of individual problems in sugarcane cultivation. The findings indicated that difficulty in getting sugarcane setts was the most important problem of farmers in sugarcane cultivation (PFI = 2.60). Availability of good quality setts is essential to ensure proper growth and development of the seedlings of sugarcane. The high yielding variety of sugarcane setts increases the overall sugarcane production and makes handsome profit for the farmers. Vishwakarma *et al.* (2021) found non-availability and high cost of sugarcane setts for seed as second most significant problem.

Low market price of sugarcane (PFI = 2.35) was the second important problem reported by the respondents. The medium and small farmers in the study area, who faced limited ability to supply sugarcane to the sugar mills, sold their sugarcane with low price in the local market. Karim *et al.* (2016) observed low price of sugarcane/sugar as the third problem in his study. A study conducted by Pandit and Basak (2013) reported low market price of vegetable during harvesting as the most severe problem in commercial vegetable cultivation.

Lack of capital for sugarcane cultivation with a PFI score of 2.30 was reported as the third important problem in sugarcane cultivation.

According to Singas and Manus (2014), a lack of funds may lead to poor farm management in which farmers are unable to adopt improved technologies for increasing production. Lack of capital was stated as the second crucial constraint by Musaba and Namanwe (2020) and Onyeneke *et al.* (2020) in their respective studies. However, lack of labour (PFI = 1.02) was the least important problem stated by the sugarcane farmers because there were available labour sources for sugarcane cultivation in the study area. Kabir *et al.* (2020) found shortage of labor as a least significant problem in his study.

Correlation between socioeconomic characteristics and problems of sugarcane farmers

Results contained in Table 3 represent the summary of relationship between explanatory and focus variables. Findings indicate that three (3) out of fourteen (14) explanatory variables, i.e. credit received, input availability, and extension media contact showed a negative but significant relationship with the focus variable. Therefore, the results specify that if there would increase in of all the previously mentioned variables there would decrease the level of problems in sugarcane cultivation.

Table 3. Result of correlation analysis between explanatory variables and focus variable.

Focus variable	Explanatory variables	Correlation coefficient (r) with 98 *df*
Problems of sugarcane farmers	Age	0.108
	Education	-0.084
	Household size	0.186
	Farming experience	0.096
	Farm size	-0.006
	Sugarcane cultivation area	-0.006
	Sources to sell sugarcane	0.172
	Annual family income	-0.100
	Credit received	-0.235*
	Input availability	-0.213*
	Organizational participation	-0.092
	Extension media contact	-0.372**
	Training exposure	0.119
	Knowledge on sugarcane cultivation	0.029

*** Significant at 1% level of probability; * Significant at 5% level of probability.*

The results reveal that credit received showed a negative significant relationship (r = -0.235) with the problems of sugarcane farmers (Table 3). Uddin *et al.* (2020) and Islam (2008) found similar relationship between the concerned variables. The negative significant correlation (r = -0.213) of input availability with the problems of sugarcane farmers clearly pointed out that the farmers with more available inputs (seed, fertilizer, pesticide, insecticide) can minimize the undesirable loss during sugarcane cultivation. An overwhelming majority of the sugarcane farmers (95%) had medium to high level of available inputs for sugarcane cultivation in the study area (Table 1). Similar relationship was observed by Islam (2008) in his study. Extension media contact had significant and negative relationship (r = -0.372) with the problems of sugarcane farmers (Table 3), indicate that the farmers with frequent contact with extension media received necessary information on handling of different problems in sugarcane cultivation. According to

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Odini (2014), access to extension personnel renders good sources of information for managing diversified farm activities effectively. A research carried out by Kabir *et al.* (2020) found that extension media contact contributed significantly to the farmers' problems in Bangladesh. Pandit and Basak (2013) observed similar relationship between extension media contact and constraints faced by the farmers in commercial vegetable cultivation. Amin *et al.* (2016) reported similar findings in their research.

Conclusions

Sugarcane farmers in the study area experienced a number of problems, of which, difficulty in getting sugarcane setts, low market price of sugarcane, and lack of capital for sugarcane cultivation were significant. Several factors such as credit received, input availability, and extension media contact of the farmers were found more influential to the problems in sugarcane cultivation. This indicates an opportunity to work on those features to minimize the problems that will make sugarcane cultivation more profitable. Therefore, it is highly recommended that the respective authority may provide better interventions like training, available inputs and extension services to the farmers about sugarcane cultivation that would increase the profitability of sugarcane production. Moreover, different credit organizations (both GOs and NGOs) may come forward with easily accessible credit services to boost up sugarcane production within the study area and other areas with a similar topographical and socioeconomic condition.

Acknowledgements

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