

Relationships of Selected Characteristics of Sugarcane Growers with Adoption of Intercropping in Sugar Mills Zone

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ABSTRACT

Intercropping in sugarcane is a technology, generated and recommended by Bangladesh sugarcane research institute (BRSI), for judicious utilization of time and space to increase total crop output from a unit area. The actual number of intercropping growers in sugarcane cultivation were collected from a sub-zone. A sample of 105 sugarcane growers were selected at random from total population. Data were collected during March-April, 1992 with the help of interview schedule. Pearson product moment correlation coefficients were computed to examine relationship between concerned variables. Out of ten independent variables included in the study, farmers education, family labour, agricultural knowledge, extension contact and organizational participation showed significant positive relationship but other five variables such as age, family size, farm size, annual income, and credit availability did not show any significant relationships with adoption of intercropping in sugarcane by sugarcane growers in sugar mills zone.

INTRODUCTION

Sugarcane is a long duration crop usually requires 10-14 months to mature under agroclimatic condition of Bangladesh, and grown in a considerable interrow spacing of 75 to 122 cm. Most small and medium growers who are mainly the share-croppers in Bangladesh can not afford to wait for such a long period due to poor financial condition as well as higher demand for food and vegetables for over increasing population. The temporary vacant space in between two rows makes room for raising short-duration winter crops at an early stage of cane growth (Ali *et al.*, 1989). By utilizing this vacant space, growers are provided a scope of getting intermediate return from sugarcane field and this is only and effectively possible through raising intercrops with sugarcane. Intercropping with sugarcane was introduced to harvest several advantages. One of the most important considerations was to produce an additional crop with minimum investment without affecting the overall production of sugarcane (Ali *et al.*, 1989).

Intercropping with sugarcane is highly profitable. Generally potato, garlic, onion, tomato and mustard are the major crops grown as intercrops with sugarcane. Potato is the best suitable intercrop to grow with sugarcane. Ali *et al.* (1989) found that intercropping potato with sugarcane increases substantial cane yield compared to pure

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stand sugarcane irrespective of different row arrangement. Therefore, growing of winter crops with sugarcane as intercrop is becoming very popular to avoid competition between crops. It is very important for small and medium growers for the sugar industry and for the country as a whole. Intercropping demands sufficient knowledge and skills in agriculture. It also requires additional investment requirement. Additional input in the form of seed, fertilizer and labour inputs put extra pressure on growers. Adoption of intercropping in sugarcane by the sugarcane growers is a special type of behaviour. Some growers cultivate intercropping and some do not cultivate. Some do it very effectively and scientifically, others cannot do it in that way. Some farmers put less area, others divert most sugarcane areas in intercropping. Factors that are expected to exert influence on fluctuation of intercropping behaviour of sugarcane growers need to be identified for greater understanding of adoption pattern of intercropping with sugarcane. This will help both scientists who generate sugarcane production technologies and extension workers who disseminate the same to end users. Therefore, the study of adoption of intercropping in sugarcane deserve due attention, and as such present study was undertaken.

MATERIALS AND METHODS

The population of this study consists of all sugarcane growers of panchbibi sub-zone under Joypurhat sugar-mills. From this sub-zone 105 sugarcane growers were selected at random as sample for this study from the list of population by using a table of random numbers. These 105 growers constituted the sample for this study. A previously structured interview schedule was used as data collection device. The interview schedule was prepared in Bangla for clear understanding of the respondents. It may be mentioned that interview schedule was pre-tested in actual field situation and necessary modifications and alterations were made before finally accepted as an interview schedule for the collection of data. The data were collected during March to April 1992. Both dependent and independent variables were included in interview schedule for data collection for in interview schedule for data collection for the present study programme.

Independent variables:

Many factors are responsible for production. But in this study only ten characteristics of sugarcane growers were selected as independent variables which have been stated below:

a. Age: Age of sugarcane farmer is defined as period of time in years from his birth to time of interview.

b. Education: Education is an ability of an individual to read and write, and was measured by number of schooling years.

c. Family size: Number of individuals belongs to the family of a sugarcane grower including himself during period of study.

d. Famil labour: Family labour was measured in terms of actual number of labour in his family (excluding himself) during study period and was measured by using following formula.

$$\text{Family labour} = A_1 + 1/2 (A_2) + 1/4 (A_3)$$

where, A_1 = Number of labourers 18 years of age and above.

A_2 = Number of labourers whose age was above 12 and less than 18 years.

A_3 = Number of family labour, 12 years old and less.

e. Agricultural knowledge: The agricultural knowledge of respondents was measured by computing an agricultural knowledge score of an individual. Agricultural knowledge consists of 15 questions with a maximum possible scores of 50.

f. Farm size: Size of farm was an area on which a sugarcane grower continued his farming operation during study period and was measured in terms of hectare by using following formula:

$$\begin{aligned} \text{Farm size} &= A_1 + A_2 + 1/2 (A_3 + A_4) \\ \text{where, } A_1 &= \text{Self cultivated owned land;} \\ A_2 &= \text{Cultivated area taken as lease or mortgage from others;} \\ A_3 &= \text{Cultivated area taken from others on barga system; and} \\ A_4 &= \text{Cultivated area given to others on barga system.} \end{aligned}$$

g. Annual income: All earnings of a respondent and members of his family engaged in agriculture, service, business etc were added together to determine his gross annual income and it was measured in taka. However, a unit score of one was taken for every Tk. 1000.00 of annual income.

h. Credit availability : It is the requirement of credit for sugarcane cultivation of a respondent was fulfilled by amount of credit actually received by him. Credit availability was initially measured in Taka. However, a unit score of one was taken for Tk. 1000.00

i. Extension contact: Extension contact of a sugarcane grower was measured as an extent of exposure of different extension teaching methods for the production technology of sugarcane. The scoring system for extension contact media were as follows:

<u>Extent of contact</u>	<u>Weights assigned</u>
Frequent	3
Occasional	2
Poor	1
Not at all	0

j. Organizational participation : Organizational participation of respondents was measured according to nature of their participation in different organizations. Scores were assigned in the following manner for participation in each organization.

<u>Nature of participation</u>	<u>Scores</u>
No Participation	0
Ordinary member	1
Executive committee member	2
Executive committee office bearer	3

Organization participation score of a respondent was obtained by adding the score of participation in all the organizations participated in a year.

Dependent variable: Adoption of intercropping in sugarcane cultivation was considered as dependent variable of this study. Adoption of intercropping in this study, however, covered 1989-90, 1990-91 and 1991-92 cropping seasons.

Measurement of dependent variable: Adoption of different intercropping in sugarcane cultivation was the dependent variable of this study. It was measured on this basis of extent of adoption of different intercrops by sugarcane growers for three cropping seasons (1989-90, 1990-91, and 1991-92). Adoption has been measured in a number of ways in India (Roy, 1991). The simplest amongst them are preparation of indexes.

However, Intercropping Adoption Index (IAI) in this study was computed by using following formula:

$$\text{Intercropping Adoption Index (IAI)} = \frac{\sum e/p}{P_s} \times 100$$

- where, Σ = Summation of e/p
 e = Extent of adoption of sugarcane intercropping in a particular land in a particular year.
 p = Potentiality of sugarcane intercropping in a particular land in a particular year.
 P_s = Period under study of sugarcane intercropping. In this study it is three cropping seasons (1989-90, 1990-91 and 1991-92).

The intercropping adoption index was expressed in percentage. Hence, IAI of a sugarcane growers could range from 0 to 100, where, 0 indicating no adoption of sugarcane intercropping and 100 indicating very high adoption.

Statistical analysis: Data were computed, tabulated and analysed by using statistical measures. For exploring relationship between adoption of intercropping and individual characteristics of growers, correlation analysis was used.

RESULTS AND DISCUSSION

The individual characteristics of growers were categorically arranged in Table 1. From the table it is seen that average age of the respondent was 40.64 and a minimum of 18 to maximum of 73 years with a standard deviation of 12.44. Education level was ranged from 0 to 14, with a standard deviation of 4.33 and a mean value of 7.33. The family member of growers ranged from 1 to 21 with a standard deviation of 3.10 and a mean value of 6.49. The actual range of family labourer scores of growers was 0 to 5.00 and mean score was 1.22 with a standard deviation of 0.82. Average scores of agricultural knowledge of respondents was 33.26 and a minimum 12 to maximum 47 with a standard deviation of 7.60. The average farm size of respondents were 2.56 hectares and ranged from 0.40 to 12.35 ha with a standard deviation of 1.77. The minimum income score of a grower was 14.9 and maximum was 395 with an average of 90.58 and standard deviation 66.13. Credit availability scores of respondents ranged from 0 to 45 with an average 3.84 with a standard deviation of 7.25. The range of extension contact scores was 4 to 42 against possible range of 0 to 50 and average score was 11.90 and standard deviation of 7.38. The computed organizational participation scores of respondents ranged from 0 to 12 against possible range of 0 to 21, the average being 2.61 with a standard deviation of 2.11.

To explore the relationship between intercropping adoption index with independent variables correlation analysis was used (Table 2). From the analysis, it was found that education, family labourer, agriculture knowledge, extension contact and organizational

participation had a significant and positive relationship with adoption of intercropping index.

Table 1. Basic Statistical values of individual characteristics and adoption of intercropping (N=105).

Individual characteristics	Range		Mean	Standard Deviation
	Minimum	Maximum		
1. Age	18.00	73.00	40.64	12.44
2. Education	0.00	14.00	7.33	4.33
3. Family size	1.00	21.00	6.49	3.10
4. Family labour	0.00	5.00	1.22	.82
5. Agricultural knowledge	12.00	47.00	33.26	7.60
6. Farm size	0.40	12.35	2.56	1.77
7. Annual income	14.90	395.00	90.58	66.13
8. Credit availability	0.00	45.00	3.84	7.25
9. Extension contact	4.00	42.00	11.90	7.38
10. Organizational participation	0.00	12.00	2.61	2.11
11. Adoption of intercropping	3.80	100.00	63.23	25.14

Table 2. Intercorrelation of different individual characters of sugarcane growers (N=105).

Variable	No	1	2	3	4	5	6	7	8	9	10	11
Age	1	1.000										
Education ²	2	-.396***	1.000									
Family size	3	.061	.175	1.000								
Family Labour	4	-.043	.069	.087	1.000							
Ag. Knowledge	5	-.235*	.428***	.161	.060	1.000						
Farm size	6	-.053	.325***	.613***	-.002	.222*	1.000					
Annual Income	7	-.165	.375***	.441***	.013	.241*	.778***	1.000				
Credit Availability	8	.121	.103	-.067	-.009	.129	.171	.198*	1.000			
Extension Contact	9	-.157	.324***	.006	-.071	.292***	.108	.111	-.051	1.000		
Org. Participation	10	.352***	.229**	.274**	-.015	.131	.320***	.328***	.158	.150	1.000	
Adoption of Intercropping	11	-.170	.574***	.035	.287**	.353***	.106	.047	.085*	.207*	.238*	1.000

* Significant at $P < 0.05$, ** Significant at $P < 0.01$, *** Significant at $P < 0.001$.

Although some variation was present within their independent characteristics i.e. age was found insignificant but with negative trend and other five factors i.e. family size, farm size, annual income and credit availability exhibited positive trend but insignificant relationship with adoption of intercropping index. These findings give a clear indication that education, family labour, agriculture knowledge, extension contact and organizational participation had a major role on adoption of intercropping. Hence maximum emphasis should be given for increasing the literacy level of sugarcane growers by establishing night schools for an adult growers or by the suitable techniques and increasing extension contact for improving and updating cane production (agricultural) knowledge among sugarcane growers having larger family labour or growers who have ability to hire labour and finally the authorities concerned should take steps to organize local organization for sugarcane growers. Education of intercropping sugarcane growers had highly significant positive relationship with adoption of

intercropping. Most diffusion researchers in their studies showed similar significant positive relation between farmers education and adoption of improved crop production practices (Halim, 1982; Haque, 1984; Ali *et al.*, 1986; Ali, 1993).

For successful adoption of cultivation of sugarcane with intercrops, growers need to be aware of suitable intercrops and then know methods of their cultivation. Education helps growers to know methods of cultivation of sugarcane with intercrops by reading leaflets, books and other printed materials. Education may also bring individuals in such contacts as are helpful to know about different aspects of cultivation of intercrops. Family labourer of JSM growers had found significant positive relationship with their adoption of intercropping. Availability of labour is always helpful to adopt innovations. The present findings showed that higher was family labour higher was adoption of intercropping technologies. The growers with low family labour suffer due to a high labour scarcity compared to the farmers having medium and high family labours. As intercropping in sugarcane cultivation is a labour intensive technology it is quite logical that growers with high family labour brought proportionately more land under intercropping in sugarcane compared to farmers with low family labour. Labour scarcity is higher among families having large farm and lower in the families with small farm size i.e. small farm families have surplus labour in most of the cases. Hossain (83) also observed higher productivity in HYV paddy and other crops in small farms owing to low labour scarcity. Agricultural knowledge of growers had highly significant and positive relationship with their adoption of intercropping index. Similar findings between agricultural knowledge and adoption was also reported elsewhere (Ali and Chowdhury, 1983; Ali *et al.*, 1986; Ali, 1993). Knowledge is considered as an important function of adoption of improved practices (Rogers, 1983). Through agricultural knowledge of an individual grower becomes aware of recent information on various aspects of sugarcane cultivation. Consequently they become motivated to adopt intercropping in sugarcane. The relationship between extension contact of sugarcane growers and adoption of intercropping adoption index was positively significant which means that adoption of intercropping increase in extension contact of sugarcane growers. Most of the diffusion researchers (Haque, 1984; Osunlogun *et al.*, 1986; Mustafi *et al.*, 1987; Igodan *et al.*, 1988; Ali, 1993) obtained significant positive relationship between extension contact and adoption of improved farm production practices. Farmers become aware of improved agricultural practices through various extension teaching methods. Farmers having no or low extension contact are expected to be low in adoption of improved practices because of their unawareness about the practices. It is likely that farmers with high extension contact received more information on farm affairs which strengthened the base of their agricultural knowledge. Such knowledge was probably conducive to motivate farmers towards adoption of intercropping.

The organizational participation of growers had significant positive relationship with their adoption of intercropping index. Similar findings were found by many other researchers (Mannan, 1972; Karim, 1973). Through participation in organization an individual comes in contact with other persons, new ideas and new things. It exercises such influence on individuals which favorably dispose them towards acceptance of new ideas. Organizational participation to a considerable extent, helps in developing mental and intellectual make-up of farmers which were conducive to their adoption. It might also be due to the fact that growers participating in organizations were in general, influential persons of respective area and as such they were more frequently visited by

extension personnels. As a result they received more extension exposure resulting in their higher adoption of intercropping in sugarcane.

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