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Farmers' Response to Intercropping with Sugarcane

M.K. Bashar, M.A. Kashem[1], A. Halim[1] and A.S.M.Z. Karim[1]
Bangladesh Sugarcane Research Institute,
Ishurdi, Pabna, Bangladesh.

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ABSTRACT

The study was undertaken in Joypurhat Sugar Mills Ltd. (JSM) to determine relationship of 10 independent variables with extent of adoption of intercropping in sugarcane cultivation. A Sample of 105 sugarcane growers were selected at random from a population of 525 growers. Data were collected using pretested interview schedule and computed to examine relationship between concerned variables. Stepwise multiple regression analysis was used to a certain effects of independent variables on dependent variables. Out of 10 independent variables included in the study growers education, family labour, agircultural knowledge, extension contact and organizational participation showed significant positive relationship with adoption of intercropping with sugarcane. All 10 independent variables were jointly explained 46.63 per cent (R^2 x100 = 0.4663 x100) of total variance on adoption of intercropping which was also found highly significant (F = 8.212). The findings on step-wise multiple regression analysis revealed that education alone explained 30.4 per cent of variance in adoption of intercropping with sugarcane followed by family labour explained 6.6 per cent and organizational participation (2.36 per cent) of variance.

Key words : Sugarcane, intercropping, adoption.

INTRODUCTION

Intercropping with sugarcane is a popular practice in sugar mills zone in Bangladesh. Sugarcane is a long duration crop usually grown in interrow spacing of 75 to 122 cm in Bangladesh. Short duration winter crops like potato, garlic, onion, tomato, cabbage, chilli and mustard are grown in vacant space between two rows of sugarcane before canopy development to get an additional crop with minimum investment without affecting of main crop sugarcane (Ali *et al.*, 1989; Kabir, 1988; Shaheen *et al.*, 1989). Ali *et al.* (1989) found that intercropping potato with sugarcane increased cane yield compared to pure stand sugarcane irrespective of different row adjustment. Singh and Singh (1973) also found increased cane yield by 64.3% from intercropping potato with sugarcane. Kabir (1988) observed that potato, mustard and gram are most compatible intercrops with sugarcane which reduced cost of sugarcane cultivation.

In Bangladesh, intercropping of short duration winter crops with sugarcane is essential (a) to get interim retur, (b) increase growers total income and (c) keep sugarcane in cultivation especially in high and medium highland.

Intercropping requires sufficient knowledge and skills in agriculture. It also requires additional investment in the form of seed, fertilizer, labour etc. and put extra pressure on growers. Factors that are expected to exert influence on fluctuation of

[1] Dept. of Agricultural Extension Education, BAU, Mymensingh.

intercropping behaviour of sugarcane growers need to be identified for greater understanding of adoption pattern of intercropping with sugarcane. Results would help both scientists who generate technologies and extension workers who disseminate the same to end-users.

MATERIALS AND METHODS

The study was conducted at Panchbibi sub zone of the Joypurhat Sugar Mills Ltd. during 1999-2000, 2000-2001 & 2001-2002 cropping seasons. Data were collected from a sample of randomly selected 105 growers each year during March to April, 1992 using pretested interview schedule. Adoption of different intercropping in sugarcane cultivation was the dependent variable of this study. It was measured on the basis of the extent of adoption of different intercrops by cane growers. In India adoption rate was measured in a number of ways (Roy,1991). The simplest way is preparation of Indexes. A more regorous and widely used method of measuring adoption by the formula of adoption quotient was developed by Chattopadhyay (1963). According to Chattopadhay adoption quotient is the ratio scale designed to quantify adoption behaviour of an individual. The method of adoption quotient is more accurate as it involves all the related concepts like potentiality, extents, time, consistency and weightage.

In this study Intercropping Adoption Index (IAI) was computed by using the following formula.

$$\text{Intercropping Adoption Index (IAI)} = \Sigma \, {}^{e}/_{p} Ps$$

Where, Σ = Summation

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.

Ps = Period of study (1999-2000, 2000-2001 and 2001-2002)

This intercropping adoption index has been expressed in percentage.

RESULTS AND DISCUSSION

To explore relationship between intercropping index with independent variables, correlation analysis was used (Table 1) and found that education, family labour, organizational participation had a significant and positive relationship with adoption of intercropping. In multiple regression analysis of 10 independent and dependent variables showed that education, family labour, annual income and organizational participation have significant contribution on adoption of inercropping (Table 2). In this study age was found insignificant and negative relationship with adoption of intercropping index. Similar insignificant negative relationship between growers age and adoption of STP was reported earlier (Ali, 1993). Education and agricultural knowledge had highly significant positive relationship with adoption of intercropping with sugarcane. Similar results were reported elsewhere (Ali *et al.*, 1986; Ali, 1993). It was found that extension contact and organizational participation had a significant and positive relationship with adoption of intercropping. Similar results also reported by Haque (1984) and Ali (1993). It is revealed that a significant positive relationship between family labour of growers with their adoption

of intercropping with sugarcane. Hossain (1974) also observed higher productivity in HYV paddy and other crops in small farms owing to low labour scarcity. The family size of growers had no significant positive relationship. Similar results found by Mustafi *et al.* (1987) and Ali (1993). Farm size and annual income of the growers had no significant relationship with their adoption of intercropping. This finding agrees with the finding of Singh (1989). Credit availability of the sugarcane growers had on significant relationship with their adoption of intercropping. Credit availability were also found to be significantly related to adoption of recommended practices (Beal & Sibley, 1967; Reddy & Kivlin, 1968; Rahman, 1974).

Multiple regression analysis of 10 independent variables showed that growers education, family labour, annual income and organizational participation had significant contribution on adoption of intercropping (Table 3). Education showed a highly significant positive relation ($p = 0.000$) with adoption of intercropping. Similarly, family labour and organizational participation also indicated a highly significant positive contribution ($P<0.01$) and ($P<0.05$) respectively on adoption, where sugarcane growers income showed positive influence ($P < 0.05$) on adoption.

In step-wise regression analysis following progressive inclusion of one independent variable in each step was shown in the Table 4. Step-wise regression analysis showed that out of total 46.63 percent variance explained by 10 independent variables, education alone contributed 30.44 percent of total variance followed by family labour (6.56 percent), organizational participation (2.36 percent), annual income (1.96 percent) and agricultural knowledge (1.62 per cent). Other variables have showd negative contribution on adoption of intercropping.

From step-wise regression analysis, growers education was found to be the single most dominant independent variable contributed on adoption of intercropping. Education helped an individual to form favourable attitude towards the technology. Because of education individual growers can read and understand different technical aspects of technology; can communicate with extension personnel and understand the complex and complicated issues in using the technologies. Probably these factors might be responsible for the highest contribution of education of sugarcane growers for adoption of sugarcane intercropping. These facts lead to a conclusion that any attempt to educate (non-formally) sugarcane growers by concerned authorities would definitely help to increase expansion of intercropping among sugarcane growers. Availability of labour is very helpful to adopt innovations. The second most important factor contributing towards adoption of intercropping with sugarcane by growers come out as the availability of family labour. In fact adoption of intercropping with sugarcane is a labour intensive technology. The correlation coeffiients also showed that adoption of sugarcane intercropping had significant (at 0.01) positive correlation with family labour of sugarcane growers. Now-a-days wages of labourer is increasing day by day. Specially labour scarcity is high in the peak period of sugarcane cultivation. As a result wages of labour becomes very high in the mills zone. Therefore, it is assumed that during peak period adoption of intercropping in sugarcane might be hampered due to scarcity of family labour, which is necessary for different intercultural operations.

Table 1. Multiple regression analysis of 10 independent variables showing their contribution on adoption of intercropping with sugarcane.

Variables	Regression Coefficient	Standard Error	T (DF=94)	Probability
Age	-0.0561	0.2025	-0.277	0.78223
Education	2.9566	0.5755	5.138	0.00000
Family size	-0.8247	0.8185	-1.008	0.31619
Family labour	7.9430	2.3553	3.372	0.00108
Agril. knowledge	0.4693	0.2866	1.637	0.10488
Farm size	1.8508	1.9851	0.932	0.35356
Annual income	-0.1099	0.0483	-2.275	0.02521
Credit availability	0.0445	0.2838	0.157	0.87566
Extension. Contact	0.0149	0.2824	0.053	0.95806
Orgnization Participation	2.3284	1.1434	2.036	0.04452
Constant	22.6643			

Adjusted R2 = 0.4095 F = 8.212**

Table 2. Step-wise regression analysis showing contribution of each independent variables separately.

Independent variables	R^2 (for step-wise stages)	R^3 increases
X_1	0.0289	-
$X_1+ X_2$	0.3333	0.3044
$X_1+ X_2+ X_3$	0.3390	0.0057
$X_1+ X_2+ X_3+ X_4$	0.4046	0.0656
$X_1+ X_2+ X_3+ X_4+ X_5$	0.4208	0.0162
$X_1+ X_2+ X_3+ X_4+ X_5+ X_6$	0.4225	0.0017
$X_1+ X_2+ X_3+ X_4+ X_5+ X_6+ X_7$	0.4421	0.196
$X_1+ X_2+ X_3+ X_4+ X_5+ X_6+ X_7+ X_8$	0.4422	0.0001
$X_1+ X_2+ X_3+ X_4+ X_5+ X_6+ X_7+ X_8+ X_9$	0.4427	0.0005
$X_1+ X_2+ X_3+ X_4+ X_5+ X_6+ X_7+ X_8+ X_9+ X_{10}$	0.4663	0.0236

Where, X_1 = Age, X_2 = Education, X_3 = Family size, X_4 = Family labour, X_5 = Agricultural knowledge, X_6 = Farm size, X_7 =Annual income, X_8 = Credit availability, X_9 = Extension contact, X_{10} = Organizational participation, R^2 = Per cent of variance in the adoption of intercropping with sugarcane explained by each variable.

Table 3. Interrelation of different individual characters of sugarcane growers (N = 105)

Variable	1	2	3	4	5	6	7	8	9	10	11
Age	1.000										
Education	-.396***	1.000									
Family size	.061	.175	1.000								
Family Labour	-.043	.069	.087	1.000							
Agricultural Knowledge	-.235*	.428***	.161	.060	1.000						
Farm size	-.053	.325***	.613***	-.002	.222*	1.000					
Annual Income	-.165	.375***	.441***	.013	.241*	.778***	1.000				
Credit Availability	.121	.103	-.067	-.009	.129	.171	.198	1.000			
Extension Contact	-.157	.324***	.006	-.071	.292**	.108	.111	-.051	1.000		
Organizational Participation	.352**	.229***	.274**	-.015	.131	.320***	.328***	.158	.150	1.000	
Adoption of intercropping	-.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

REFERENCES

Ali, M.; Hossin, A.H.M.D.; Imam, S.A. and Shaheen, M. 1989. Row Adjustment of Sugarcane on the Yield of Intercropping Cane and Potato. *Bangladesh Journal of sugarcane*, 11: 78-82.

Ali, M.K. 1993 Farmers Response to Spaced Transplanting Technology of Sugarcane. M.S. Thesis Department of Agricultural Extension Education. Institute of Postgraduate Studies in Agriculture, Shalna, Gazipur.

Ali, M.K.; Chowdhury, S.A.; Kader, M.A. and Gani, M.O. 1986. Factors Influencing Adoption of Improved Sugarcane Production Technologies Among the Growers of Sugar Mills Zone. *Bangladesh Journal of Extension Education*, **1 (2) :** 25-31.

Beal, G.M. and Sibley, D.N. 1967. Adoption of Agricultural Technology by the Indians of Guatemala-A summary. *Rural Sociology Report*, 62. Department of Sociology and Anthropology, Iowa state University.

Chattopadhyay, S.N. 1963. A study of Some Psychological Correlates of Adoption of Innovations in Farming. Ph. D. thesis, Jadavpur University, Kolkata .

Haque, M.S. 1984. Adoption of Improved Practices in Sugarcane Cultivation of Some Selected Areas of Jessore District. *M. Sc. Thesis*. Deparment of Agril. Extn. Education, Bangladesh Agricultural University, Mymensingh.

Islam, M.M. and Halim, A. 1976. Adoption of IRRI Paddy in a selected Union of Bangladesh. M. Sc. Thesis, Department of Agricultural Extension and Teachers' Training , Bangladesh Agricultural University, Mymensingh.

Kabir, M.H. 1988. Economics of Intercropping with sugarcane in Some Selected Areas of North Bengal Sugar Mills Zone. *Bangladesh Journal of Sugarcane*, **10**: 81-86.

Roy, G.L. 1991. Extension Communication and Management. Calcutta, Naya Prakarh.

Singh, P.P. and Singh, K. 1973. Studies on the Intercropping of Sugarcane Multiple Cropping. Indian Soc. Agron. New Delhi, India.

Singh, V.; Kothari, S.K. and Tripathi, H.N. 1986. Studies on Intercropping in Sugarcane in Central Uttar Pradesh. *Indian Sugarcane Journal*. **35**: 559-562

Singh, P.K. 1989. Extent of Adoption of Selected Recommended Practices by Kinnow Growers of Ferozepur and Faridkot District of Punjab. *M.Sc. Thesis Abstracts*, Punjab Agricultural University, Ludhiana, India.

Hossain, M.A. 1993. Relationships of Farmers Characteristics with their Adoption of HYV Rice as T. Aman and Other Related Aspects in Bhabakhali Union of Mymensingh District. *M.Sc. (Ag. Extn. Ed.) Thesis*, Bangladesh Agricultural University, Mymensingh.