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Variables Contributing to Farmers' Perception on Mustard Cultivation in Between Aman and Boro Rice

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Abstract

The paper examines the factors associated with farmers' perception on mustard cultivation in between Aman and Boro rice in some selected areas and also ascertains the factors contribute to the farmers perceptions. Data were collected following random sampling method from a sample of 110 farmers out of a total population of 550 residing in four villages namely, Sadipur of Jessore, Baro Bamandaha of Jhenaidaha, Kalidaspur of Chuadanga and Purba Abdalpur of Kushtia districts using an interview schedule during 09 September to 03 October 2013. Five point Likert-type scales were used to measure farmers' perception on this issue. The overall perception of farmers in the study areas revealed that majority of the farmers (59 percent) had high perception and 41 percent having medium perception towards mustard cultivation in between Aman and Boro rice. Test of hypotheses indicated that ten variables out of thirteen namely, education, farm size, annual income, training, extension contact, cosmopoliteness, knowledge, risk orientation, suitability of technology and profitability of technology were positively correlated with the perception of farmers on mustard cultivation in between Aman and Boro rice. Results of stepwise regression depicted that only three variables contributed positively to the farmers' perception which were profitability of technology, knowledge on mustard cultivation and risk orientation. These three variables combinedly explained 71.1 percent of the variance.

Keywords: Perception, Farmer, Mustard cultivation, Aman and Boro rice

Introduction

Rapeseed-mustard are the first largest sources of edible oil in Bangladesh and it covers 75% of the total oil crop area (BBS, 2010). For rapeseed-mustard, we commonly use the term 'mustard'. Although mustard is the principal oil crop in Bangladesh but its cultivation is neglected. Mustard seeds contain 40-44% oil and 20-25% protein. Oil cake is a nutritious food item for cattle and fish. It is also a good organic fertilizer. Dry mustard plants may be used as fuel. It is a cool loving oilseeds crop and grows during Rabi season (October-February). It accounts about 71 percent of total oil seeds production in the country (BBS, 2010). The area under rapeseed and mustard is 0.30 million hectares which is about 80 percent of total oilseed area (BBS, 2003). The area under rapeseed and mustard is 0.24 million hectares which is about 75 percent of total oilseed area (BBS, 2010). These data revealed that the area under mustard is declining year after year. The late harvest of medium duration T. Aman rice and increased cultivation of Boro rice causes the decline of mustard area. Though the production of edible oil is being decreased, the demand is increasing day by day with the increasing population. The present domestic edible oilseed production is 568 thousand tons which meets only one fifth of national demand. The present per capita oil

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consumption is only 10 g day^{-1} as compared to the total need of 22 g day^{-1}. To fulfill the shortage of edible oil of Bangladesh has to import a large quantity of edible oil every year. However, the Bangladesh Rice Research Institute (BRRI) and Bangladesh Institute of Nuclear Agriculture (BINA) have recommended the T. Aman-Mustard-Boro cropping pattern for the irrigated ecosystem with the inclusion of 65-85 days mustard variety, Tori 7 in the transition period between T. aman and Boro to address the issue. But the farmers harvest poor yield from Tori 7 that can be increased manifold by introducing high yielding varieties. Recently, Bangladesh Institute of Nuclear Agriculture (BINA) and Bangladesh Agricultural Research Institute (BARI) developed high yielding mustard (*Brassica campestris*) varieties, Binasarisha-4, Binasarisha-9, Binasarisha-10, BARI sarisha 14 and BARI sarisha 15, whose yield potential is higher than Tori 7 and recommended for T. Aman - Mustard-Boro cropping sequence. Inclusion of these new varieties with growth duration of 80-85 days in between existing shortum duration T. aman rice (145-150 days) and Boro rice causes delay transplanting of Boro and results decreased yield. Higher grain yield of Boro rice are obtained when transplanting is carried out no later than 25 January, after which date the grain yield declines significantly. The cultivation of short duration Aman rice can create opportunity to fit the new varieties of mustard in the T. Aman- fallow- Boro cropping sequence. The recommended varieties with such characteristics are Binadhan-7, BRRI dhan 33 and BRRI dhan 39. However, mustard cultivation in between Aman and Boro rice is existed more or less everywhere of the country though in a limited basis. Massive extension programme is needed for popularizing of this cropping pattern to achieve self sufficiency in oilseed production. It is imperative to assess the farmer's perception and their knowledge regarding the above cropping sequence and understand the constraints to adopt this cultivation technique before undertaking any extension programme. The innovation- decision process is the process through which an individual (or other decision making unit) passes (1) from first knowledge of an innovation,(2) to forming an perception or attitude towards the innovation, (3) to a decision to adopt or reject. In extension work efforts are made towards eliciting the intended response from the farmers' in a particular situation. But the response of a farmer depends upon his favourable or unfavourable perception. However, perceptions are the functional parts of a system through which a farmer relates to his surroundings. Hence, farmers' perception assessment study was undertaken with the following objectives: i) To determine the farmers' perception level on mustard cultivation in between Aman and Boro rice, (ii) To measure the selected factors associated with farmers' perception on mustard cultivation in between Aman and Boro rice and (iii) To determine the contribution of the selected factors in explaining the variation of perception

Methodology

Sources of the data

Considering the mustard growing area and intensive T. Aman and Boro rice (mono rice cropped area), the study was conducted purposively in four villages namely, Sadipur of Jessore, Baro Bamandaha of

Jhenaidaha, Kalidaspur of Chuadanga and Purba Abdalpur of Kushtia districts. All the farmers of selected four villages who cultivate Aman rice followed by Boro rice constitute the population of the study. A list of growers of selected villages was prepared with the help of local Sub-Assistant Agriculture Officer of the concerned area. The list comprised of 550 farmers which served as population of the study. Out of them 20% of the farmers were selected following stratified sampling technique. Thus, 110 Aman followed by Boro growers were the sample of the study. Data were collected using a pretested structured questionnaire during 9 September to 3 October, 2013.

Variable of the study and their measurement

Farmers' perception on mustard cultivation in between Aman and Boro rice was the dependent variable of the study. For measuring perception of the respondents a 5 point Likert scale was used. There were 16 statements including both negative and positive against the 5 point scale. The respondents indicated for each statement of the scale whether they. 'strongly agreed', 'agreed', 'undecided', 'disagreed' and 'strongly disagreed' and assigned. weights assigned to the above five alternative positive statement as 4, 3, 2, 1 and 0, respectively. The weighting system for negative statements was reverse. Perception score of a respondent could thus, ranged from 0 to 64 where 0 indicating no perception and 64 indicating highest level of perception regarding mustard cultivation in between Aman and boro rice. All the statements were arranged randomly to avoid subject bias in expressing their opinion. Each respondent was asked to indicate his extent of agreement or disagreement against any of the following five responses: The total score of a respondent was determined by summing up the weights for responses against all the 16 statements (8 positive and 8 negative). Perception score for each respondent was calculated by using Perception Index (Roy, 2009) and it was calculated by using the following formula:

Perception Index (PI) =

$$4 \times SA + 3 \times A + 2 \times U + 1 \times DA + 0 \times SDA$$

Where,

SA= Total number of respondents expressing their perception 'strongly agree' for the statement.

A = Total number of respondents expressing their perception 'agree' for the statement.

U = Total number of respondents expressing their perception 'undecided' for the statement.

DA = Total number of respondents expressing their perception 'disagree' for the statement.

SDA = Total number of respondents expressing their perception 'strongly disagree' for the statement.

On the other hand, thirteen selected individual characteristics of respondents and factors relating to the this type of mustard cultivation were the independent variables of the study, namely, age, education, family size, family education, farm size, Annual income, training exposure, extension contact, cosmopoliteness, knowledge, risk orientation, suitability of technology and profitability of technology. Rated scoring method was used for measuring independent variables. Statistical tests like frequency distribution, percentage, mean, standard deviation, correlation and regression analysis etc. were employed to interpret the data.

Findings and Discussion

Farmers' Perception on Mustard Cultivation in Between Aman and Boro Rice

The observed perception scores of the respondents ranged from 30 to 63 against the possible score of 0 to 64 with an average score of 49.07 and standard deviation of 6.84. On the basis of mean and standard deviation, the greater fluctuation of perception scores was within 42.22 to 55.91. Based on their perception scores, the respondents were classified into three categories having possessed "low perception", "medium perception" and "high perception". The distribution of the farmers according to the scores has been shown in Table 1. Data furnished in the Table 4.2 indicate that 59 percent of the farmers had high perception followed by 41 percent of farmers had medium perception and zero (0) percent had low perception. It revealed that majority of the respondents (59 percent) had high level of perception about mustard cultivation in between Aman and Boro rice. It was probably due to the effect of farmers' training and pattern based demonstrations that are being implemented by BINA under the Krishi Gobeshona Foundation (KGF) support project from 2011 in these locality.

Statement-wise perception score of the respondents

Farmers' perception on mustard cultivation in between Aman and Boro rice was investigated in this research. The extent of agreement against each statement as perceived by the farmers was assessed in this regard. Perception score for each statement was calculated by using perception index (PI) and was shown in Table.2

Table 1 Distribution of respondents according to their perception

Categories (unit in score)	Respondents		Mean	Standard deviation
	Number	Percent		
Low perception (up to 23)	0	0	49.07	6.847
Medium perception (24–46)	45	41		
High perception (> 46)	65	59		
Total	110	100		

The Table 2 Shows that most of the farmers perceived clearly the fact "Triple crop can be obtained profitably by growing mustard in between Aman and Boro rice" (statements 1). It was found that 50 percent of the respondents were strongly agreed and 60 percent of the respondents were agreed with the total PI of 380. Followed by next two statements based on PI scores were "Binasharisha- 4 and BARI sharisha 14 & 15 are short duration high yielding mustard varieties which can be cultivated in between Aman and Boro rice profitably" obtained the second highest PI 366. A total of 66 percent respondents agreed to this statement and 40 percent of them were strongly agreed to this statement. "Binadhan- 7 can be harvested 15 days earlier than other modern varieties which facilitated mustard cultivation as an extra crop" got the third highest PI score of 365. 61 percent among the respondents agreed to this statement and 42 percent of them were strongly agreed to this statement. Other positive statements

Table 2 Statement-wise perception score of farmers regarding mustard cultivation in between Aman and Boro Rice

Sl. No	Statements	Extent of agreement					PI
		SA	A	UD	DA	SDA	
+1	Triple crop can be obtained profitably by growing mustard in between Aman and Boro rice.	50	60	0	0	0	380
-2	Mustard cultivation in between Aman and Boro rice reduce total rice production, so it is not a profitable crop in our locality.	0	0	18	60	32	344
+3	Binasarisha- 4 and BARI sarisha 14 & 15 are moderately short duration and high yielding mustard varieties, which can be cultivated in between Aman and Boro rice profitably	40	66	4	0	0	366
-4	Binasarisha- 4 and BARI sarisha 14 & 15 are not suitable for cultivation as an extra crop in between Aman and Boro rice profitably in this locality	0	0	12	73	25	343
+5	Binadhan-7 can be harvested 15 days earlier than other modern varieties which facilitated mustard cultivation as an extra crop	42	61	7	0	0	365
-6	Binadhan 7 cultivation reduces yield of Aman rice, so short duration Aman cultivation is meaningless	0	0	13	71	26	343
+7	Crop cultivation following the pattern of Binadhan-7-Binashaisha-4-BRRI dhan 28 give double economic return compared to traditional rice-rice cropping system.	31	68	11	0	0	350
-8	Traditional rice-rice cropping is better than cultivating mustard in between Aman and Boro rice.	0	0	11	72	27	346
+9	For getting good yield from mustard need to follow modern cultivation practices like, timely sowing, application of balanced fertilizer, applying irrigation and weeding etc.	42	61	7	0	0	365
-10	Modern cultivation practices like, timely sowing, application of balanced fertilizer, applying irrigation and weeding etc. for mustard cultivation increases cost of production as a result it is not profitable	0	0	14	71	25	341
-11	Mustard cultivation causes low yield of Boro rice due to late transplanting.	0	0	38	54	18	310
+12	Planned cultivation of short duration Aman-moderate duration mustard and Boro does not reduce yield of Boro rice	41	51	18	0	0	353
+13	Mustard seed sowing in between 08-15 kartik (23 - 30 Oct.) gives good yield and facilitated triple cropping	39	49	22	0	0	347
-14	Mustard cultivation in kartik is not possible due to delay harvest of Aman rice	0	0	65	30	15	280
+15	Borax and sulpher fertilizer is needed for good yield of mustard.	46	35	29	0	0	347
-16	Borax and Sulpher fertilizer is not needed for good yield of mustard.	0	0	100	8	2	232

SA= Strongly Agree, A= Agree, UD= Un-decided, DA= Dis-agree, UDA= strongly dis-agree and PI= Perception Index

were: "For getting good yield from mustard need to follow modern cultivation practices like, timely sowing, application of balanced fertilizer, applying irrigation and weeding etc(PI-365), Planned cultivation of short duration Aman-moderate duration mustard and Boro does not reduce yield of Boro rice (PI-(353) , Crop cultivation following the pattern of Binadhan-7- Binashaisha-4-BRRI dhan 28 give double economic return compared to traditional rice-rice cropping system (PI-350), "Mustard seed sowing in between 08-15 Kartik 23 - 30 Oct.) gives good yield and facilitated triple cropping"(PI-347), "Borax and sulpher fertilizer are needed for good yield of mustard (PI-347) and "Mustard cultivation causes low yield of Boro rice due to late transplanting (PI-310)

Relationship between Selected Factors and Their Perception

Thirte**e**n selected factors were investigated in the study in order to find out relationship between farmer perception on mustard cultivation in between Aman and Boro rice and these factors. Correlation analysis indicated that farmers' education, farm size, annual income, training exposure, extension contact, cosmopoliteness, knowledge on mustard cultivation, risk orientation, suitability of technology, and profitability of technology were positively and significantly correlated with their perception. On the other hand, age, family size, family education of the farmers had no significant relationship with farmers' perception level in this regard. The results of correlation of co-efficient test between the factors and their perception have been shown in Table 3.

Table 3 Coefficient of correlation (r) between the selected factors and their perception

Focus variable	Characteristics of the farmers/related factors	Correlation co-efficient (r) with perception (df = 108)
Farmers' perception on mustard cultivation in between Aman and Boro rice	Age	0.007
	Education	0.292**
	Family size	- 0.086
	Family education	0.130
	Farm size	0.521**
	Annual income	0.414**
	Training exposure	0.379**
	Extension contact	0.611**
	Cosmopoliteness	0.390**
	Knowledge on mustard cultivation	0.667**
	Risk orientation	0.716**
	Suitability of technologies	0.659**
	Profitability of technologies	0.727**

* = Significant at 0.05 level ** = Significant at 0.01 level

Contribution of Selected Independent Variables to the Perception

Contribution of Variables

To determine the contribution of selected variables to dependent variable, stepwise multiple regression analysis was computed. In this method all of the 13 variables were entered for stepwise multiple regression analysis. Out of the 13 variables, only 3 variables were fitted in this analysis and other 10 variables excluded as their F-values or tolerance were too small to continue. The coefficient of multiple determinations (R^2) indicated that the 3 variables could explain 71.1 percent of the total variation of the perception. Contributions of all of the 3 selected variables were significant. The computed results of stepwise multiple regression analysis is shown in Table 4.

Table 4 Results of stepwise multiple regression analysis between the independent variables and perception score

Independent variable in steps	R^2	R^2 Changed	Variation explained (percent)	Un-standardized coefficients (B)	standardized coefficients (Beta)	t- value
X_{13} Profitability of Technology	0.529	-	52.9	1.001**	0.398**	5.918
X_{10} Knowledge on Mustard	0.663	0.134	13.4	0.637**	0.310**	4.802
X_1 Risk orientation	0.711	0.048	4.8	0.422**	0.300**	4.195

Coefficient of multiple determination (R^2) = 0.711, Adjusted R^2=0.703 Constant = 13.691, F = 86.80,
** Significant at 0.01 level of probability

It may be assumed that whatever contribution is, it was due to 3 variables included in the stepwise regression model. The contributions of different variables are discussed bellow.

The variable profitability of technology had the highest contribution of 52.9 percent to the perception. The second contributory variable was knowledge on mustard cultivation and contribution was 13.4. Finally, the factor risk orientation contributes 4.5 percent on perception

1. **Profitability of messages**: This variable contributed the highest among all other variables, which accounted for 52.9 percent in predicting the farmers` perceptions on cultivation mustard in between Aman and Boro rice. The perception about the profitability of mustard cultivation as an extra crop is important because a strong incentive and reward for any new act generally motivate the farmers. When they embark on the very high equivalent yield and profit given by alternative cropping pattern and package of practices might served as a strong force to convince the farmers and motivate them to go for these cropping technologies.
2. **Knowledge:** The second variable entered in the model was 'Knowledge of farmers on improved alternative cropping pattern, which contributed 13.4 percent in predicting the farmers`

perception. Knowledge is one of the important components of farmers' behaviour that plays a vital role in their covert or overt behaviour.

3. **Risk orientation**: This variable contributed 4.5 percent in predicting the farmers` perception on mustard cultivation in between Aman and Boro rice. High-risk oriented farmers have the ability to encounter risk and uncertainly by new idea. Risk bearing farmers generally have large farm size and higher annual income. Due to their large size of farms and higher annual income, they get involved in various agricultural operations in their farms. For doing these agricultural operations properly, the farmers are compelled to be exposed to demonstration, extension agents, fertilizers and pesticide dealers', mass media etc. These help them to gain knowledge and develop positive perception.

Conclusion

The study pointed out that about half of the farmers' (41 percent) had medium level of perception on mustard cultivation in between Aman and Boro rice, though a Krishi Goveshana Foundation project was running in the study areas since 2011. It is quite logical that the scenario of farmers perception are very poor in the other areas where no promotional activities had been carried out. Stepwise multiple regression analysis indicated that 3 variables contributed significantly to the farmers' attitude. These variables were: Profitability of messages, knowledge and risk orientation. All the there 3 variables contributed positively. These 3 variables were considered as the key factors for farmers' perception formation for the locality of the study and some other similar area. Based on the above findings the following recommendations put forward for maximize the cultivation of T. aman-mustard-boro rice cropping pattern:

1. To build farmers' awareness, attitude and high favorable perception on mustard cultivation in between Aman and Boro rice massive extension activities such as training, demonstration, field days, and motivational tour should be implemented.
2. Large framers should be given more attention for motivation as they have higher risk bearing capacity that pave the way of motivating fellow farmers by acquiring practical experience from the neighbours.

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