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FARMER'S PERCEPTION TO CLIMATE SMART POTATO VARIETIES IN NORTHERN REGION OF BANGLADESH

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ABSTRACT

Ali MM, Hossan MS, Akter N, Khanam MM, Khan MR (2020) Farmer's perception to climate smart potato varieties in northern region of Bangladesh. *Int. J. Expt. Agric*. 10(1), 1-5.

The main focus of the study was to assess the extent of perception level of farmers towards climate smart potato varieties that are capable of combating changing impact of climate. The study was carried out in three northern district of Bangladesh *viz.* Dinajpur, Thakurgaon and Panchagarh. Three hundred farmers were randomly selected for data collection from twenty villages under the upazilla namely, Birgang, Dinajpur Sadar, Thakurgaon Sadar, Debiganj and Panchagarh Sadar. A pre-tested interview schedule was used to collect the data from the respondents. For measuring the perception, eight climate smart potato varieties *viz.* BARI Alu-41 (heat tolerant), BARI Alu-46 (late blight resistant), BARI Alu-53 (late blight resistant), BARI Alu-72 (heat and salt tolerant), BARI Alu-73 (heat and salt tolerant), BARI Alu-77 (late blight resistant), BARI Alu-90 (late blight resistant), and BARI Alu-91 (late blight resistant)were considered in this study. Descriptive statistical measures such as frequencies, percentage distributions, ranges, means, standard deviations and coefficient of variations were used in describing the variables. The results revealed that most of the farmers (72.3%) had very low perception whereas only 7.0% of the farmers had high perception to climate smart potato varieties taken in this study. So, it is expected that the proper awareness program and planning should be taken in order to increase farmer's perception to climate smart potato varieties.

***Key words*:** *potato, climate smart potato, farmer's perception, Bangladesh*

INTRODUCTION

Potato (*Solanum tuberosum* L.) popularly known as 'The king of vegetables', it is the 4th most important food crop in the world after rice, wheat and maize (USDA 2016). It is also one of the most important foods as well as vegetable crops in Bangladesh and is being cultivated throughout the country. Bangladesh achieved a remarkable success in potato production to take its 7th rank in the world map (FAOSTAT 2017). Now a days, it is the third largest food crop in Bangladesh and production is increasing day by day (Uddin *et al.* 2013). Most farmers in Bangladesh produce potato at a subsistence level. They are vulnerable to climate change since the production of potato is highly sensitive to various abiotic stresses including temperature raise, soil salinity and disease severity due to unfavorable impact of climate change. The production of potato is adversely affected by high temperature during tuber initiation (Basu and Minhas, 1991) and tuber bulking (Minhas and Kumar, 2005) stages. A rise in temperature leads to increased transpiration in the plants, thus raising their demand for water. This will cause water stress and leading yields to decline in many of the drought prone regions. Winter season in Bangladesh is in November to March and that is very short. In the later stage temperature raises very fast so potato plants cannot survive in high temperature. Many parts of Bangladesh, especially in Barind areas (drought prone) are also facing the problem of temperature fluctuation. Furthermore, the saline areas of the country are also vulnerable to crop production including potato (Miah *et al.* 2013). So, there is an urgent need of varieties suitable for growing under varied temperature and salinity stress. Developing heat, drought, and saline tolerant potato varieties will not only enhance production but may also resilience to climate change. However, Bangladesh Agriculture Research Institute (BARI) has developed some climate smart (late blight resistant, heat tolerant and salinity tolerant) potato varieties to reconcile this problem, but the farmers are still not familiar enough with these potato varieties and the socio-economic farm level information and farmers' perception on these climate smart potato varieties and their cultivation are quite limited in Bangladesh. Considering of all these facts the present study was undertaken to assess the extent of perception level of the farmers towards these climate smart potato varieties.

MATERIALS AND METHODS

Study Area

The study was carried out in three northern district of Bangladesh *viz*. Dinajpur, Thakurga on and Panchagarh. For the survey, stratified sampling technique was followed to select districts and simple random sampling technique was used to select sample areas in districts. A total of 20 villages were selected under 5 sampled upazilla namely Birgang, Dinajpur Sadar, Thakurgaon Sadar, Debiganj and Panchagarh Sadar of these three districts.

Study Design

Fifteen farmers were interviewed in each village through a pre-tested questionnaire. For measuring the perception to climate smart potato varieties by the farmers, eight climate smart potato varieties *viz*. BARI Alu-41 (heat tolerant), BARI Alu-46 (late blight resistant), BARI Alu-53 (late blight resistant), BARI Alu-72 (heat

and salt tolerant), BARI Alu-73 (heat and salt tolerant), BARI Alu-77 (late blight resistant), BARI Alu-90 (late blight resistant), and BARI Alu-91 (late blight resistant) were considered. The extent of perception towards climate smart potato varieties were measured by using a 4-point modified Liker type scale like no knowledge = 0, little knowledge = 1, moderate knowledge = 2, high knowledge = 3, respectively (Kamaly 2011) by using 7 characteristics of different climate smart potato varieties. The perception score of a respondent was determined by adding up the weights for responses against 7 characteristics *viz.* size, shape, color, abiotic stress tolerance, days to maturity, storage quality and yield. Thus, perception score of a respondent could range from 0 to 21, while 0 indicating no perception and 21 indicating high perception to climate smart potato varieties. There were some well-defined data indicators in the questionnaire namely name, age, sex, education, profession, farm size, family annual income, involvement in potato production, knowledge on potato production, constraints faced in potato production in Bangladesh.

Data Collection

Data were obtained by face to face interview of 300 respondents of selected areas. Before interviewing, objectives of the study were explained to them. The survey was carried out during the major potato growing season of Bangladesh (November 2018 to March 2019). Necessary secondary data were also collected from different sources in addition to primary data.

Data Analysis

After the completion of data collection, all filled up questionnaires were preserved according to the category of respondents for processing and data analysis. Data on different parameters were analyzed by using the Statistical Product and Service Solutions computer software SPSS version 22,an IBM product since 2009 (Hejase and Hejase, 2013). Furthermore, according to Hejase and Hejase (2013), "descriptive statistics deals with describing a collection of data by condensing the amounts of data into simple representative numerical quantities or plots that can provide a better understanding of the collected data." Therefore, descriptive statistical measures such as number, percentage distribution, range, mean, standard deviation and coefficient of variation were used in describing the variable.

RESULTS

Demographic and socioeconomic characteristics of the farmers

A summary of nine selected characteristics of the farmers has been presented in the Table 1. The age of the farmers ranged from 23 to 70 years, with a mean of 44 years. The farmers were classified into three age groups: 'young' (up to 35 years), 'middle aged' (36–50) and 'old' (> 50). The majority of farmers belong to the middle aged category. Based on the educational level, farmers were divided into five groups. The largest proportion (41.2%) of the farmers had above secondary education (above 10 years of schooling), 23.5% farmers had secondary education (6–10 years of schooling), 8.8% had primary educational qualification (1–5 years of schooling), 17.6% can sign only, and 8.8% of the farmers were illiterate. Regarding family size, 64.7% of the farmers had a medium sized family (4–6 family members), followed by 32.4% with a large family (>6 family members) and 2.9% had a small family (≤ 3 members). The majority of the respondents were marginal farmers (44.2%), followed by small farmers (25.8%), medium farmers (28.3%) and large farmers (1.7%). Regarding family annual income, majority of the respondents (25.8%) medium annual income, followed by low income (34.2%) and high annual income (22.5%). Majority of the respondents were under medium (47.5%) involvement in potato production, followed by high and low are 28.3% and 27.2% respectively. 7.7% of the respondents had no training exposure on potato production followed by 81.7% and 10.7% had low and medium training exposure, respectively. In case of knowledge on potato production, 49.2% of the respondents had medium knowledge on potato production followed by adequate (26.7%) and low (24.2%).the respondent faced high constraint (67.7%) during potato production followed by 23.7% and 8.7% faced medium and low constraint, respectively.

Table 1. Characteristics profile of the farmers (n=300)

Selected Characteristics	Categories	Respondent		Scoring Method	Range Observed	Mean	SD
		No	%				
Age	Young (≤30)	134	44.7	Year	19-60	34.44	12.71
	Middle aged (31-50)	114	38.0				
	Old (>50)	52	17.3				
Level of education	Illiterate (0)	9	3.0	Year of schooling	0-16	2.36	2.95
	Can sign name only (0.5)	188	62.7				
	Primary level (1-5)	54	18.0				
	Secondary level (6-10)	49	16.3				
Family size	Small family (<4)	86	28.7	Number	3-12	4.50	1.48
	Medium family (4-6)	183	61.0				
	Large family (>6)	32	10.7				
Farm size	Marginal farm holder (<0.20)	140	46.7	Hectare	0.036-1.77	0.517	0.513
	Small farm holder (>0.20-1.00)	106	35.3				
	Medium farm holder (>1.00-3.00)	54	18.0				
Family annual income	Low family income (≤ 50)	140	46.7	'000" TK	2-199.5	68.56	39.77
	Moderate family income (>50-100)	103	34.3				
	High family income (>100)	57	19.0				
Involvement duration in potato production	Low duration (3-6)	243	81.0	Years	3-14	5.13	2.43
	Medium duration (7-10)	43	14.3				
	High duration (11-14)	14	4.7				
Training exposure score	No training exposure (0)	23	7.7	Rated Score	0-4	1.32	0.88
	Low training exposure (1-2)	245	81.7				
	Medium training exposure (3-4)	32	10.7				
Knowledge on potato production	Poor knowledge (15-17)	20	6.7	Rated Score	15-29	21.00	1.94
	Moderate knowledge (18-21)	149	49.7				
	Adequate knowledge (22-24)	131	43.7				
Constraints Faced in potato production	Low constraints (6-8)	26	8.7	Rated Score	6-13	8.42	1.63
	Medium constraints (9-11)	71	23.7				
	High constraints (12-13)	203	67.7				

Perception of farmers towards climate smart potato varieties

Scores of the perception toward climate smart potato varieties as perceived by the farmers ranged from 5 to 19 against the possible range of 0 to 21. The mean value was being with standard deviation and coefficient of variation 7.89 and 3.47, respectively. Based on the observed scores, farmers were classified into three categories such as "low" perception, "medium" perception and "high" perception as shown in Table 2. The results indicate that 20.7% had medium perception compared to high (7.0%) perception. But almost three-fourths (72.3%) of the farmers had low perception regarding size, shape, color, abiotic stress tolerance, days to maturity, storage quality and yield of the selected eight climate smart potato varieties.

Table 2. Distribution of the farmers according to their overall perception of climate smart potato varieties

Categories overall perception (scores)	Farmers		Mean	Standard deviation
	Number	Percent		
Low perception (5-9)	217	72.3	7.89	3.47
Medium perception (10-14)	62	20.7		
High perception (15-19)	21	7.0		
Total	300	100.0		

Relationships of selected characteristics of the farmers with the perception towards climate smart potato varieties:

The correlation analysis shows that out of 9selected characteristics of the farmers, 8 selected characteristics show positive significant relationship with the perception towards climate smart potato varieties, these are level of education, family size, annual family income, duration of involvement in potato production, training exposure, knowledge on potato production and constraints faced in potato production. Only age of the farmers showed negative non-significant relationship with the perception towards climate smart potato varieties (Table 3).

Table 3. Coefficient of correlation between the selected characteristics and perception to climate smart potato varieties

Selected characteristics	Correlation coefficient (df=298)
Age	-0.051^{NS}
Level of education	0.401*
Family size	0.250*
Farm size	0.184^{NS}
Family annual income	0.304*
Involvement duration in potato production	0.490**
Training exposure score	0.568**
Knowledge on potato production	0.260**
Constraints faced in potato production	0.346**

* Significant at 0.05 level of probability, ** Significant at 0.01 level of probability

DISCUSSION

Results indicate that all the variable were better associated with the perception of farmers towards climate smart potato varieties in the study area. As expected, the level of perception is higher of the young farmers tend to easily adopt climate smart potato varieties; this is in line with the literature as Feder *et al.* (1985), Kafle (2010), and Ouma *et al.* (2014) found that older farmers tend to prefer their traditional agricultural practices. Furthermore, young people are associated with higher risk-taking behavior than the elderly, as shown by Simtowe *et al.* (2009). Education can play a crucial role by reducing uncertainty and improving skills, the level of perception is increasing with the increasing level of education. That is, the educated farmers are more interested to climate smart potato varieties. This finding is in harmony with the report of Amin and Islam, (2009) and Hoque *et al.* (2010). In the same way, the results showed that the level of perception was affected by the number of family members working in the potato production process. The higher the number of family members, that the higher the level of perceptions to climate smart potato varieties. Annual income of the respondent had also significant positive relationship to the perception level of the farmers i.e., the higher is the annual income of the respondents, respondents were able to procure inputs for potato production so that they invested more which brought for them higher income. Farming experience also had positive relation level of perceptions which is consistent with the study of Rahim and Huffman, (1984). Training exposure had significant positive relationship with their perceptions. It is obvious that trainings might have changed the attitude of respondents and thus they become interested to grow climate smart potato varieties. The farmers of all categories believe that their current potato yield can be further increased through providing training on production technologies (Miah *et al.* 2013). This finding is very consistent with several studies carried out by Amin and Islam, (2009) and Hoque *et al*. (2010). Farmer perception towards climate smart potato largely depends on their knowledge and information level. Farmers' knowledge on improved agriculture can be accelerated with the help of extension agents and farm information sources (Dibba *et al.* 2015; Kafle 2010). De Steur *et al.* (2019) reported similar findings; that the knowledge of potato production were positively affect the willingness to adopt late blight resistant potatoes. The overall perception scores measured by the selected attributes showed that farmer's perceptions towards climate smart potato varieties to a low extent which was a negative indication of potato production.

CONCLUSION

Increasing population and increasing food demand is creating continuous pressure on nature. Every year Bangladesh is seriously facing adverse environmental effects on crop production. Climate smart potato can play a vital role in this context. The results revealed that most of the farmers (72.3%) had very low perception whereas only 7.0% of the farmers had high perception to different climate smart potato varieties. Most farmers believed that level of current potato yield could be uplifted through (a) introducing new high yielding potato varieties; (b) developing drought resistant varieties; (c) improving training on potato cultivation; (d) extending financial support; and (e) controlling late blight disease. So, it is expected that proper awareness program and planning should be implemented to increase farmer's perception to climate smart potato varieties.

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