

Adoption of Recommended Potato Cultivation Practices by the Farmers in Some Selected Areas of Naogaon District

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Abstract

The main purpose of the study was to determine the extent of adoption of recommended potato cultivation practices by the farmers in some selected areas of Naogaon district. The study also explored the relationships between nine selected characteristics of the farmers and their adoption of recommended potato cultivation practices. Data were collected from 100 randomly selected potato farmers in five selected villages of Sreemanthopur union under Niamatpur upazila of Naogaon district during 01 February to 14 March 2007 with the help of a structured interview schedule. A great majority of the farmers had low to medium adoption of recommended variety (81%), recommended dose of fertilizers (60%), recommended plant protection measures (64%) and composite adoption of recommended potato cultivation practices (57%). Correlation analysis indicates that among the selected characteristics of the farmers, education level, organizational participation, extension media contact, innovativeness and cosmopolitanism showed significantly positive relationships with their adoption of recommended potato cultivation practices. Only age of the farmers showed significant negative relationship with their adoption of recommended potato cultivation practices. Farmers indicated that there were 20 problems which hindered them to adopt recommended potato cultivation practices. Among the problems, late blight disease infestation, non-availability of improved seed in time, virus attacks, non-availability of credit in time and lack of training about use of fertilizers were the major adoption barriers towards potato cultivation. It was also found that overwhelming majority (100%) of the farmers faced problems ranging from medium to high extent.

Keywords: Adoption, potato, recommended cultivation practice.

Introduction

In Bangladesh the cultivation of potato was started in the late 19th century. But the cultivation was started as a cash crop after 1920 (Hussain, 1993). Potato is the leading vegetable crop (Thompson and Kelly, 1957). The crop ranks first among the vegetables in Bangladesh both in area and production (BBS, 2006). The deficit of food grains in Bangladesh is a chronic problem as the pressure of population is massive. So, to ensure adequate food supply, it is necessary to give thrust to increase food production using recommended practices. The adoption of recommended practices of potato cultivation by the farmers can, therefore, easily

raise food production and net income of the users. Several research institutes have developed quite a good number of recommended practices but only the farmers have so far adopt a few of them. Technical, biological, environmental and socio-economic barriers are the main hindrances of technology transfer and adoption of recommended potato cultivation practices. In spite of dominance of agriculture in the national economy, Bangladesh facing a chronic food shortage due to rapid growth of population and has to import on an average of 1.5 million tons of food grains in each year. The present rice production is not

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sufficient to meet the increasing requirements of calories for the growing population in the country. In this regard, potato can play an important role as an alternative and multipurpose food crop in Bangladesh (Hasan, 2003). Farmers are the key element in the process of adoption of recommended potato cultivation practices. The findings of this study can be a key indicator to highlight the adoption of recommended potato cultivation practices in the country. This can be helpful both for the scientists of BARI who generate technologies of potato cultivation and also extension workers who disseminate the same to the end users. With a view to have an understanding of

the adoption of recommended practices in potato cultivation the researcher undertook the following specific objectives for this study:

1. To determine the extent of adoption of recommended potato cultivation practices by the farmers,
2. To explore the relationships between the extent of adoption of recommended potato cultivation practices by the farmers and their selected personal and socio-economic characteristics, and
3. To identify the problems faced by the farmers in adopting recommended potato cultivation practices.

Methodology

The locale of the study was Niamotpur upazila of Naogaon District. The population of the study was the potato growers of Sreemanthopur union under Niamotpur upazila. The union consists of 18 villages. Out of 18 villages, 5 villages were selected at random. A list of potato growers of these five villages was prepared with the help of local village leaders and the concerned Sub Assistant Agriculture Officers. The total numbers of potato growers in these five villages were 500 farm families which constituted the population of the study. Twenty percent of the potato growers from the population were selected as sample from each of the village by using a table of random number which gave 100 potato growers. Adoption of recommended potato cultivation practices was the dependent variable of the study. The researcher selected four practices were recommended varieties, recommended dose of fertilizer, recommended dose of irrigation and recommended plant protection measures. Adoption has been measured in a number of ways in India (Ray, 1991). The simplest amongst them are preparation of indexes. Bose and Saxena (1965) developed

an adoption index by asking the farmers how many improved practices recommended by the Extension Services they had adopted and for how many years.

The adoption behaviour of the potato growers was measured on the basis of opinion provided by them according to their extent of application of four recommended cultivation practices either fully or partially during the previous potato-growing season. However, variety adoption score was measured on the basis of the nature of one's adoption of nine (9) different varieties. The nature of variety adoption responses of the farmers were 'no cultivation', 'from 1-2 years', 'from 3-4 years' and from 'above 4 years' and score were assigned as 0, 1, 2 and 3, respectively. The score could range from 0 to 27, 0 indicated absolute non-adoption of recommended variety and 27 indicated high adoption of recommended variety. Fertilizer score consist of two-scores, namely recommended fertilizer dose score and over dose fertilizer score.

Recommended fertilizer dose score was computed by the following scale: use of

'one-fourth of the recommended dose', 'half of the recommended dose', 'three-fourths of the recommended dose', and 'full recommended dose' and the score were assigned as 1, 2, 3 and 4, respectively. Since there were six (06) items of fertilizer (Cow dung, Urea, TSP, MOP, Zypsum and Zinc Sulphate) included in the interview schedule the fertilizer sub-score of a respondent thus ranged from 6 to 24, 6 indicating use of low dose and 24 indicating use of full recommended dose of fertilizer. Similarly, the over dose of fertilizer score of a respondent was calculated by using the following scale: use 'one-fourth more than recommended dose', 'half over than recommended dose', 'three-fourths over than recommended dose' and 'double than recommended dose' and the score were assigned as 3(4-1), 2(4-2), 1(4-3) and 0(4-4), respectively. The over dose of fertilizer score of a potato grower could range from 0 to 18, 0 indicating use of double dose than recommended dose and 18 indicating one-fourth over dose of fertilizer than recommended dose in their potato field. Thus, the overall fertilizer score of a respondent could range from 0 to 24, 0 indicating use of no or double over dose than recommended dose of fertilizer and 24 indicating recommended dose of fertilizer in their field. There were five categories of extent of adoption of irrigation which is application of 'no irrigation', 'one irrigation', 'two irrigation', 'three irrigation' and 'four or more irrigation' and the score were assigned as 0, 1, 2, 3 and 4, respectively. Irrigation score could range from 0 to 4, where 0 indicated no use and 4 indicated high use of irrigation. But, in case of plant protection measures the extent of measures were 'not at all', 'occasionally' and 'accordingly' and the score were assigned as 0, 1 and 2, respectively. The score could range from 0 to 12, 0 indicating no use and 12 indicating high

use of practices regarding plant protection measures. Hence, the extent of adoption of each of the four recommended practices was first ascertained by computing an adoption score, then the overall adoption score of the recommended potato cultivation practices. Thus, overall adoption score was the sum total of variety score, fertilizer score, irrigation score and plant protection measure score of the farmers. A score for composite adoption of recommended potato cultivation practices was computed for each potato farmer by adding his scores for four practices. Thus, the overall adoption score of the respondent could range from 0 to 67, 0 indicated absolute non-adoption and 67 indicated very high adoption of recommended practices in potato cultivation by the farmers.

Appropriate methods were used to measure the personal and socio-economic characteristics of the farmers. In order to have an overall understanding of the problems faced by the farmers, problem-facing scores were computed for each individual. Scoring in this connection was made as follows: high problem was denoted by giving a score of '3', medium problem '2', low problem '1' and not at all problem '0'. Scores obtained by an individual for all the 20 problems togetherly were formed his problem facing score. For clear understanding of problems faced by the potato growers, a Problem Facing Index (PFI) for each item along with rank order was computed by using the following formula:

$$\text{Problem Facing Index (PFI)} = \text{Php} \times 3 + \text{Pmp} \times 2 + \text{Plp} \times 1 + \text{Pnp} \times 0$$

Where,

Php = Percent of respondent with "high problem"

Pmp = Percent of respondent with “medium problem”

Plp = Percent of respondent with “low problem”

Pnp = Percent of respondent with “not at all problem”

Problem facing index (PFI) of the farmers of the 20 items in recommended potato

cultivation practices could range 0 to 300. A structured interview schedule was used for collection of relevant data for the study. The entire process of collecting data took place during the period from 01 February to 14 March 2007.

Findings and Discussion

Extent of Adoption of Recommended Potato Cultivation Practices by the Farmers

Adoption of recommended potato cultivation practices by the farmers was the dependent variable of this study. Among the practices,

main focus was given to the adoption of four (4) selected practices in potato cultivation. The practices were use of recommended variety, recommended dose of fertilizer, recommended dose of irrigation and recommended plant protection measures.

Table 1. Salient features and distribution of the farmers according to their extent of adoption of recommended potato cultivation practices

Dimension of improved potato cultivation practices	Categories of farmers	Range		Farmers (N=100)	Mean	SD
		Possible	Observed	Number or percent		
Recommended variety	Low adoption (up to 10)	0-27	4-25	11	16.12	4.86
	Medium adoption (11-20)			70		
	High adoption (above 20)			19		
Recommended dose of fertilizer	Low adoption (up to 9)	0-24	4-22	17	16.00	5.05
	Medium adoption (10-18)			43		
	High adoption (Above 18)			40		
Recommended dose of irrigation	Low adoption (Up to 2)	0-4	1-4	18	3.30	0.93
	Medium adoption (3)			27		
	High adoption (Above 3)			55		
Recommended plant protection measures	Low adoption (up to 5)	0-12	3-12	22	8.02	2.33
	Medium adoption (6-9)			42		
	High adoption (Above 9)			36		
Composite adoption	Low adoption (up to 22)	0-67	12-62	05	43.44	11.80
	Medium adoption (23-45)			52		
	High adoption (Above 45)			43		

Table 1 showed that a great majority of the farmers had low to medium adoption of recommended variety (81%), recommended dose of fertilizers (60%), recommended plant

protection measures (64%) and composite adoption of recommended potato cultivation practices (57%). These facts implies that adoption of recommended variety,

recommended dose of fertilizers and recommended plant protection measures is yet far from the desired level of satisfaction. But, in case of adoption of recommended dose of irrigation most of the farmers (55 %) were found to have high adoption. Research has proved that irrigation can increase the yield of potato to a remarkable extent (BARI, 2000).

Personal and Socio-economic Factors of the Farmers

Salient features of the selected (three personal, two economic and four social) factors of the farmers have been shown in

Table 2 for clear understanding. Data contained in Table 2 indicates that the largest proportion of the farmers were middle aged, while most of them had primary and secondary (40% in each case) education, small size farm, medium annual income, medium organizational participation, medium extension media contact, medium innovativeness and medium cosmopolitaness. Thus, in most cases, the farmers existed in the middle situation. In case of farming experience, majority of the farmers had low experience.

Table 2. Salient features of the selected personal, economic and social factors of the farmers (n=100)

Factors (with measuring units)	Range		Categories (with basis of categorization)	Farmers (Number/P ercent)	Mean	SD
	Possible	Observed				
Age (years)	Unknown	26-75	Young (up to 30) Middle (31-45) Old (above 45)	22 66 12	38.30	9.78
Education level (years)	Unknown	0-14	Illiterate (0) Can sign only (0.5) Primary level (1-5) Secondary level (6-10) Above secondary (above-10)	00 08 40 40 12	5.60	3.17
Farming Experience (years)	Unknown	1-35	Low experience (up to 10) Medium experience (11-20) High experience (above 20)	49 36 15	10.89	8.15
Farm size (in ha)	Unknown	0.45-4.0	Marginal farm (up to 0.02) Small farm (0.21-1.00) Medium farm (1.01-3.00) Large farm (above 3.00)	07 61 30 02	1.33	0.73
Annual income (in '000 BDT)	Unknown	10-219	Low income (up to 80.00) Medium income (80.1-150.00) High income (above 150.00)	39 46 15	97.09	42.62
Organizational participation (score)	Unknown	1-27	No participation (0) Low participation (1-10) Medium participation (11-18) High participation (above 18)	00 25 54 21	15.68	6.76
Contact with extension media (score)	0-60	2-56	Low extension contact (up to 18) Medium extension contact (19-38) High extension contact (above 38)	15 51 34	32.60	13.99
Innovative- ness (score)	0-30	3-24	Low innovativeness (up to 10) Medium innovativeness (11-18) High innovativeness (above 18)	13 48 39	17.05	5.25
Cosmopolite- ness (score)	0-30	2-26	Low cosmopolitaness (up to 10) Medium cosmopolitaness (11-18) High cosmopolitaness (above 18)	10 52 38	17.65	4.32

Relationships Between Dependent and Independent Variables

Pearson's Product Moment Coefficient of Correlation (r) was computed to explore the relationships between two variables. Five percent (0.05) and one percent (0.01) level of significance were used as the basis for acceptance or rejection of a hypothesis. Summary results of the correlations coefficient (r) between the selected characteristics of the farmers and their adoption of recommended potato cultivation practices have been presented in Table 3. The Table clearly shows that farmer's adoption of recommended potato cultivation practices had significantly positive relationships with

their education level, organizational participation, extension media contact, innovativeness and cosmopolitaness. Other characteristics except age showed positive sign although the relationships were not statistically significant. Only age showed significantly negative relationships with their adoption. The correlations test indicates that peoples with higher education, higher organizational participation, higher extension media contact, higher innovativeness and higher cosmopolitaness had more opportunities to adopt recommended potato cultivation practices because these are the important characteristics in determining one's enhanced adoption of a new practice.

Table 3. Correlation co-efficient between the selected characteristics of the farmers and their adoption of recommended potato cultivation practices (n=100)

Dependent variable	Independent variable	Computed value of "r"	Table value of 'r' at 98 degrees of freedom	
			0.05	0.01
Adoption of recommended potato cultivation practices	Age	-0.270**	± 0.196	± 0.257
	Level of education	0.214*		
	Farming experience	0.120		
	Farm size	0.113		
	Annual income	0.065		
	Organizational participation	0.263**		
	Extension media contact	0.291**		
	Innovativeness	0.343**		
	Cosmopolitaness	0.355**		

*, **= Correlation is significant at 0.05 and 0.01 levels, respectively.

Farmers' Problems in Adopting Recommended Potato Cultivation Practices

In spite of greater potentiality of potato as a crop, the farmers of Bangladesh are not free from problems in cultivating potato. They

usually face various problems in potato cultivation. Problem facing index (PFI) in each of the 20 items along with rank order has been presented in Table 4 with frequency distribution of the farmers in percentage.

Table 4. Farmers' problems in adopting recommended potato cultivation practices

SI. No	Problems	Farmers (N=100)				Problem Facing index (PFI)	Rank order
		High	Medium	Low	Not at all		
1	Late blight disease infestation (Fungus attack)	90	10	0	0	290	1
2	Non-availability of improved seed in time	57	43	0	0	257	2
3	Attack of virus in potato	52	48	0	0	252	3
4	Non-availability of credit in time	44	56	0	0	244	4
5	Lack of training about use of fertilizers	31	68	1	0	230	5
6	High price of fertilizers and pesticides due to black marketing	25	75	0	0	225	6
7	Lack of technological knowledge about potato cultivation	18	82	0	0	218	7
8	Lack of proper advice about insect and disease control	16	79	5	0	211	8
9	High cost of potato cultivation	11	84	5	0	206	9
10	Non-availability of desired price of potato	10	85	5	0	205	10
11	Infestation of cut worms	12	77	11	0	201	11
12	Lack of own cash money	7	59	11	0	173	12
13	Lack of bullock for ploughing	15	36	29	20	166	13
14	Non-availability of organic fertilizers	10	31	59	0	151	14
15	Labour problem at the time of potato cultivation	2	40	58	0	144	15
16	Lack of sufficient water for irrigation	11	14	60	15	136	16
17	Non-availability of Power tiller	5	13	56	26	123	17
18	High preservation cost of potato in cold storage	1	22	77	0	122	18
19	Lack of facilities in cold storage for proper preservation	0	20	80	0	120	19
20	Non-availability of sprayer at the time of need	0	10	53	37	110	20

Among the problems, infestation of late blight disease (Fungus attack), non-availability of improved seeds in time, virus attacks, non-availability of credit in time and lack of training about use of fertilizers were the major adoption barriers towards potato cultivation.

Table 5 indicated that overwhelming majority (100 percent) of the farmers faced problems ranging from medium to high extent and there was nobody who did not face any problem in potato cultivation.

Table 5. Distribution of the farmers according to their overall problem facing

Categories	Range		Farmers (n=100)	Mean	SD
	Possible	Observed	Number or percent		
Low problem facing (Up to 20)	0-60	26-51	00	35.25	5.88
Medium problem facing (21-40.)			82		
High problem facing (Above 40)			18		

Conclusion

For increasing the yield of potato, the farmers need to adopt all the improved practices to a higher extent. The individual adoption of four recommended practices was not so good. Almost majority of the farmers were low to medium adopters regarding recommended variety, recommended dose of fertilizer and recommended plant protection measures (81%, 60% and 64%, respectively). Only in case of adoption of recommended dose of irrigation, about half (55%) of the farmers were high adopters. The extent of

composite adoption of four recommended practices was not also satisfactory to the expected level. Only 43 percent of the farmers were high adopters. Majority (57%) of them were medium to low adopters. The findings lead to the conclusion that efforts of Government Organization (GO) and Non-Government Organizations (NGO) has to be intensified to motivate the farmers about the need for the full adoption of all the recommended practices to get the expected results.

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