Bangladesh Journal of Extension Education *ISSN 1011-3916*
Volume 24, No. 1&2, 2012:115-121 *Research Article*

Food Security through Crop Diversification: Farmers' Adoption of Improved Practices in Vegetable Cultivation

J. C. Pandit[1] and N. C. Basak[2]

Abstract

The study was conducted to determine the extent of adoption of improved vegetable production practices by the farmers and to explore relationship between the selected characteristics of the farmers with their adoption. Data were collected through personal interview from 136 randomly selected vegetable growers of the four villages, viz. Bijaynagar, Char Nilakshiya, Sathiyapara and Bhatipara under Sadar Upazila of Mymensingh district during January to March 2011. In terms of overall adoption the highest portion (86.0%) of the respondents had low to medium level of adoption. On the basis of adoption index, use of recommended doses of fertilizer ranked first followed by use of improved variety, use of improved cultural practices and use of integrated pest management. Among the eleven selected characteristics of the farmers level of education, farming information exposure, knowledge on vegetable production, cosmopoliteness, innovativeness and organizational participation showed significant positive correlation and age showed significant negative correlation with their adoption of improved vegetable production practices.

Key words: Adoption, improved practices, vegetable cultivation, farmer

Introduction

Vegetables are the integral part of our diet. It supplies vitamins and minerals. Bangladesh is producing 3.07 million tones of vegetables from 0.38 million hectares of land (BBS, 2011). The present productivity is 8.35 ton per hectare which is very low in comparison to other countries of the world like China (23.21 t/ha), India (13.97 t/ha) and Vietnam (12.35 t/ha) (FAOSTAT, 2011). The normal diet of Bangladeshi people is seriously imbalanced, with inadequate consumption of protein, fat, vitamins and minerals. Specially, women and children are vulnerable to their greater nutritional requirements. Profound malnutrition is prevailing all over the country (Rahman *et al.*, 2008-10). However, intake of a minimum 400g of fruit and vegetables per day (excluding potato and other starchy tubers) is recommend for the prevention of chronic diseases as well as prevention and alleviation of several micronutrient deficiencies (WHO, 2004).

From the point of view of economic return vegetables growing is an important farming activity. It is reported that monthly net return from vegetable is 350% higher than rice (Zaman *et al.*, 2010). On the other hand, vegetables are occupying a significant position in our export sector. As many as 55 different kinds of vegetables are exporting from Bangladesh to about 25 countries of the world which constitutes 60.08 percent of the earnings from agricultural products (Karim *et al*., 2011).

Hence, promoting the production of vegetables is an important strategy for combating nutritional deficiency and ensuring economic development of the

[1]Horticulture Specialist, Department of Agricultural Extension, Mymensingh, Bangladesh & [2]Principal Scientific Officer, Bangladesh Agricultural Research Institute, Joydebpur, Gazipur, Bangladesh

country. For this, dissemination of improved technologies and their adoption by the farmers may be the key factors to increase the production of vegetables. Research institutions have so far been developed a number of high yielding varieties and production technologies of different vegetable crops. Simultaneously, extension service providing agencies have been doing their best to disseminate those technologies to the farmers. However, adoption of technology is largely influenced by a number of socio-economic factors of the farmers (Ali *et al*., 2008).

Very little is known about the extent of adoption and adoption behavior of vegetable growers in the country. But, this information is needed for future planning. In view of the foresaid discussion the study was undertaken. .

i. To study the socio-demographic characteristics of the vegetable growers.
ii. To study the extent of adoption of improved production technologies by the vegetable growers.
iii. To study the problems faced by them in adopting vegetable production technologies.
iv. To study the relationships of the selected characteristics of the vegetable growers and their extent of technology adoption.

Methodology

The study was conducted in four villages namely Bijaynagar, Char Nilakshiya, Sathiyapara and Bhatipara under Sadar Upazila of Mymensingh district. The villages were selected purposively. The basis of the selection was availability of intensive vegetable growers. An updated list of vegetable growers of the selected villages was prepared first. Total number of vegetable growers in four villages was 1363, which constituted the population of the study. Out of them 136 (10% of the total population) vegetable growers were selected randomly and proportionately from each of the four villages to constitute the sample. Data were collected from the respondents through direct interviewing method using a pre-tested structured interview schedule during January to March 2011.

Variables of the study

Independent variables

Some socio-economic and demographic characteristics of the farmers were selected as the independent variables of the study. These were age, level of education, family size, farm size, annual income, farming information exposure, knowledge on vegetable production, cosmopoliteness and innovativeness. Appropriate methods were used to operationalize the independent variables by developing suitable scales.

Dependent variable

Adoption of improved practices in vegetable production was the dependent variable of the study. Four categories of practices were selected for the study. The selected categories of practices were use of high yielding variety, use of recommended dose of fertilizer, use of modern cultural practices and use of integrated pest management techniques. A four point scale, such as used not at all, used for 1-2 years, used for 3-4 years and used for >4 years, was used for ascertaining score to the adoption of improved practices in vegetable cultivation with the weightage of 0, 1, 2 and 3, respectively. The adoption score of an

individual was measured by adding the scores obtained from different statements. Thus the possible score in each aspect could range from 0 to 15 for each respondent, where 0 indicating no adoption and 15 indicates high adoption. An overall adoption score for each respondent was computed by adding his adoption scores in all four aspects. Possible range of overall adoption score of a respondent could range from 0 to 60, while 0 indicating no adoption and 60 indicating high adoption.

For better understanding, the four aspects of adoption were arranged in a rank order by developing adoption Index (AI) by using the formulae

$$AI = P_n \times 0 + P_l \times 1 + P_m \times 2 + P_h \times 3$$

Where,

AI = Adoption Index
P_n = Percentage of farmers having no adoption
P_l = Percentage of farmers having low adoption
P_m = Percentage of farmers having medium adoption
P_h = Percentage of farmers having high adoption

AI for any aspect could range from 0 to 300, 0 indicating no adoption and 300 indication high adoption.

Data analysis was performed by using the Statistical Package for Social Sciences (SPSS). Descriptive analysis such as range, number, percentage, mean, standard deviation and rank order were used. Pearson's Product Moment Coefficient of Correlation was used in order to explore the relationship between the concerned variables.

Findings and Discussion

The selected socio-economic and demographic characteristics of the respondents have been presented in Table 1. Most (83.8%) of the respondents of the study area were young to middle aged. Only a small (16.2%) portion of the respondents were old aged. The highest portion (45.6%) of the respondents had primary level of education. About one-third (33.8%) of them had secondary to above secondary level of education. However, one-fifth (20.6%) of them had no education. The majority (83.8%) of the respondents possessed small to medium family and only a few (16.2%) of them possessed large family. More than half (52.2%) of the respondents were medium farmer, about one-third (36.8%) of them were small farmer and a small portion (11.0%) of them was large farmer. Average farm size of the respondents was 1.62 ha. The majority (68.4%) of the respondents had medium level of farming experience compared to low (18.4%) and high (13.2%) level of farming experience. Respondents' annual income ranged from Tk 41 thousand to 204 thousand with an average of Tk 94.73 thousand. About two-third (68.4%) of the respondents were medium income category followed by high (27.2%) and low (4.4%) income category.

The majority (66.2%) of the respondents had medium farming information exposure. A considerable portion (22.8%) of them had high farming information exposure and only a few (11.0%) of them had low farming information exposure. Vegetable production knowledge score of the respondents ranged from 16 to 37 with an average of 27.45. About 43% of the respondents had medium level of knowledge, while 33.8% had high and 22.8% had low level of knowledge on vegetable production. The majority (70.6%) of the respondents had low to medium level of cosmopoliteness and about 29% had high level of cosmopoliteness. Half of the respondents had low level of innovation, 43.4% had medium level of innovativeness and only 4.4% had high level of

innovativeness. However, 2.2% of the respondents had no innovativeness. More than half (56.6%) of the respondents had no organizational participation, 39% had low to medium and only 4.4% had high level of organizational participation.

Table 1 Distribution of respondents according to their selected characteristics

Characte-ristics	Scoring method	Possible score	Observed score	Categories	Respondents N=136		Mean	SD
					Number	Percent		
Age	No. of years	-	23-72	Young (≤ 35)	52	38.2	42.43	12.17
				Middle aged (36-55)	62	45.6		
				Old aged (>55)	22	16.2		
Level of education	Year(s) of schooling	-	0-14	Illiterate (0)	28	20.6	4.61	3.72
				Primary level (1-5)	62	45.6		
				Secondary level (6-10)	43	31.6		
				Higher secondary level and above (>10)	03	2.2		
Family size	No. of members	-	2-10	Small (up to 4)	56	41.2	5.27	2.00
				Medium (5-7)	58	42.6		
				Large (8 & above)	22	16.2		
Farm size	Size in hectares	-	0.42-6.36	Small (0.21-1.0)	50	36.8	1.62	1.19
				Medium (1.01-3.0)	71	52.2		
				Large (> 3.0)	15	11.0		
Farming experience	Years of farming	-	4-45	Low (≤ 10)	25	18.4	20.8	10.06
				Medium (11-30)	93	68.4		
				High (> 30)	18	13.2		
Annual income	'000' Tk	-	41-204	Low income (≤ 50)	06	4.4	94.73	42.99
				Medium income (50.1-100)	93	68.4		
				High income (> 100)	37	27.2		
Farming information exposure	Score	0-45	8-30	Low (≤ 10)	15	11.0	16.32	5.35
				Medium (11-20)	90	66.2		
				High (> 20)	31	22.8		
Vegetable production knowledge	Score	0-40	16-37	Low (≤ 20)	31	22.8	27.45	6.36
				Medium (21-30)	59	43.4		
				High (> 30)	46	33.8		
Cosmo-politeness	Score	0-18	1-17	Low (≤ 6)	31	22.8	10.82	4.39
				Medium (7-14)	65	47.8		
				High (> 14)	40	29.4		
Innovative-ness	Score	-	0-23	No (0)	03	2.2	9.77	4.95
				Low (1-10)	68	50.0		
				Medium (11-20)	59	43.4		
				High (> 20)	06	4.4		
Organiza-tional participation	Score	-	0-15	No (0)	77	56.6	2.75	4.30
				Low (1-5)	34	25.0		
				Medium (6-10)	19	14.0		
				High (> 10)	06	4.4		

Adoption of improved production practices by the vegetable growers in different aspects

Data on extent of adoption of improved practices in four aspects of vegetable production have been presented in Table 2.

Data indicate that in respect of use of improved variety, three-fourth of the respondents had low to medium level of adoption. Only one-fourth of the respondents had high level of adoption of improved variety in vegetable production. In respect of use of recommended dose of

fertilizer, about 90% of the respondents had medium to high level of adoption while a few (11.0%) of them had low level of adoption in this respect. Regarding use of improved cultural practices, half of the respondents had medium level of adoption followed by low (29.4%) and high (20.6%) level of adoption. In respect of use of integrated pest management, more than half (54.4%) of the respondents had medium level of adoption. However, 33.8% had low level and only 11.8% had high level of adoption in this respect.

Table 2 Distribution of respondents according to their adoption of individual technology

Technology	Observed score	Categories	Respondents N=136		Mean	SD
			Number	Percent		
Use of improved variety	2-14	Low (≤ 5)	40	29.4	8.31	3.77
		Medium (6-10)	62	45.6		
		High (> 10)	34	25.0		
Use of recommended dose of fertilizer	3-12	Low (≤ 5)	15	11.0	8.63	2.19
		Medium (6-10)	93	68.4		
		High (> 10)	28	20.6		
Use of improved cultural practices	3-14	Low (≤ 5)	40	29.4	7.93	2.77
		Medium (6-10)	68	50.0		
		High (> 10)	28	20.6		
Use of integrated pest management	3-12	Low (≤ 5)	46	33.8	6.79	1.76
		Medium (6-10)	74	54.4		
		High (> 10)	16	11.8		

Overall adoption of improved practices by the vegetable growers

Respondents were categorized on the basis of adoption all the four aspects of vegetable production practices by them and data have been presented in Table 3. Observed adoption score of the respondents ranged from 20 to 48 against a possible range from 0 to 60. The mean adoption score was 31.12.

Table 3 Distribution of respondents according to their overall adoption

Categories and score range	Respondents (N=136)		Mean	SD
	Number	Percent		
Low adoption (≤ 25)	37	27.2	31.12	7.42
Medium adoption (26-40)	80	58.8		
High adoption (> 40)	19	14.0		

Data revealed that the majority (58.8%) of the respondents had medium level of adoption of improved vegetable production practices. A considerable portion (27.2%) of them had low level of adoption and only a few (14.0%) of them had high level of adoption of improved vegetable production practices. The findings of the study revealed that highest portion of the respondents had low to medium level of adoption of

improved vegetable production practices. The facts indicate that the desired level of vegetable production will not be possible if the level of adoption of improved vegetable production practices by the farmers would not be increased.

Comparison among the adoption of individual aspects

In order to measure respondents' extent of adoption in four aspects of vegetable production practices, an adoption index (AI) was developed. The computed AI and associated rank order of four aspects on the basis of AI values have been presented in Table 4.

Table 4 Rank order of the four aspects of vegetable production practices

Aspects of vegetable production practices	Adoption index (AI)	Rank order
Use of improved variety	195.5	2
Use of recommended dose of fertilizer	209.1	1
Use of improved cultural practices	191.0	3
Use of improved pest management	177.3	4

Adoption of recommended doses of fertilizer ranked first among the four aspects of production practices in the study area followed by use of improved variety, use of improved cultural practices and use of integrated pest management. The most of the positions of the rank orders could be explained by the situation of the locality.

Relationship between adoption of improved practices by the vegetable growers with their selected socio-demographic characteristics

To find out the relationships between the selected socio-demographic characteristics of the vegetable growers with their adoption of improved practices were computed which have been presented in Table 5.

Table 5 Relationship between respondents' selected characteristics and their adoption of improved vegetable production practices

Dependent variable	Characteristics of the respondents	Calculated value of 'r'
Adoption of improved vegetable production practices	Age	-0.219*
	Level of education	0.427**
	Family size	0.003
	Farm size	0.049
	Farming experience	-0.124
	Annual income	0.095
	Farming information exposure	0.666**
	Vegetable cultivation knowledge	0.368**
	Cosmo politeness	0.518**
	Innovativeness	0.195*
	Organizational participation	0.187*

Data revealed that age of the respondents had significant negative (-0.219*) relationship with their adoption of improved vegetable production practices. So, the relationship indicated that young farmers possessed more favourable attitude to adopt a new technology than the old farmers. The result is in conformity with the findings of Pandit (2007). He reported that aged farmers had a tendency to use traditional and proven technology.

Conclusion

Findings of the study indicated that majority of the respondents had low to medium level of adoption of improved vegetable production practices. So, there remains further scope to increase the level of adoption of different improved vegetable production practices. On the other hand, adoption of improved vegetable production technologies was increased with younger age, higher education, higher farming information exposure, higher cosmopoliteness, higher innovativeness, higher organizational participation and higher vegetable cultivation knowledge of the respondents. It implies that the socio-demographic characteristics of the vegetable growers have profound influence on their adoption of improved vegetable production practices. Therefore, government and non-government initiatives should consider these attributes while formulating any capacity strengthening programme to increase dissemination and adoption of improved vegetable production practices.

References

Ali, M.S., A.S.M.Z. Karim, M.A. Kashem and M.M. Islam. 2008. Adoption of selected ecological practices by the farmers. Bangladesh J. Extn. Edu. 20(1&2): 49-57.

BBS (Bangladesh Bureau of Statistics). 2011. Agricultural Statistical Yearbook 2011. Ministry of Planning. Govt. People's Repub. Bangladesh. p. 39.

FAOSTAT. 2011. Food and Agriculture Organization Corporate Statistical Database. Retrieved on 20 September 2013 from http://faostat.fao.org/site/ 567/ DesktopDefalt.aspx?PageID=567#ancor

Pandit, J.C. 2007. Farmers' preference of the farm broadcasting in receiving agricultural information. Bangladesh J. Extn. Edu. 19(1&2): 41-49.

Rahman, M.M., M. G. R. Akanda and M. A. Hossain. 2008-10. Problem confrontation of the farmers in vegetable cultivation . Bangladesh J. Train. Dev. 21-23(1&2): 59-66.

WHO. 2004. Fruits and vegetables for health: Report of a Joint FAO/WHO Workshop. 1-3 Sept. 2004. Kobe, Japan.

Zaman, M., R. A. Hemel and T. Ferdous. 2010. Comparative profitability of winter vegetables in a selected area of Dhaka district. ASA Univ. Rev. 4(1): 217-223.