

# Improved Vegetable Cultivation Practices: An Adoption Study aAmong the Farmers' of Some Selected Areas in Bangladesh

## ABSTRACT

**Aims:** The research work has been done to determine the extent of adoption of improved vegetable cultivation practices by the farmers. Attempt was also made to explore the contribution of selected characteristics of farmers viz. age, education, family size, farm size, experience in vegetable cultivation, annual income, vegetable cultivation knowledge, extension media contact, organizational participation, innovativeness, training experiences, and problems confrontation on their adoption of improved practices in vegetable cultivation.

**Study design:** Field Survey research

**Place and Duration of Study:** Shajahanpur upazila under Bogra district of Bangladesh by the department of Agricultural Extension and Information System between January to June of 2018.

**Methodology:** Data were collected from randomly selected 112 farmers of Chopinagar union under Shajahanpur upazila of Bogra district by using a structured interview schedule. Appropriate scales were developed in order to measure the variables. Multiple regression test was used to ascertain the contribution of the concerned independent variables on the dependent variable of the research work.

**Results:** ~~Majority (50.00 percent)~~50% of the farmers had low adoption while 40% ~~percent~~ had medium adoption and 9.80% ~~percent~~ had high adoption of improved practices in vegetable cultivation. Among the selected characteristics education, experiences in vegetable cultivation, annual income, innovativeness and training experiences showed significant and positive contribution to their adoption of improved practices in vegetable cultivation. However, family size and problems confrontation showed the negative significant contribution to adoption of improved practices in vegetable cultivation of the farmers. Age, farm size, vegetable cultivation knowledge, extension media contact and organizational participation did not show any significant contribution on the adoption of improved practices in vegetable cultivation of the farmers.

**Conclusion:** Adoption of improved vegetable cultivation practices by the farmers will not be possible to improve in a significant extent unless the concerned authorities (like-Bangladesh Agricultural Research Institute, Department of Agricultural Extension) take proper steps.

**Keywords:** Adoption, Vegetable, Practices, Cultivation, Farmers, Bangladesh

Formatted: Font: 11 pt

Formatted: Font: 11 pt

## 40 1. INTRODUCTION

41 Bangladesh is predominantly an agricultural country. Agriculture remains the major pillars of the  
 42 Bangladesh national economy and is highly dependent on its rural economy as 80% percent of  
 43 the people live in rural areas [1]. Sustained government investment in irrigation facilities, rural  
 44 infrastructure, agricultural research and extension services has helped Bangladeshi farmers  
 45 achieve dramatic increases in agricultural production. The process of agricultural production is,  
 46 however, fortified by the increasing use of agrochemicals and multiple cropping. And while  
 47 significant production transformation has been achieved, and food production has more than  
 48 doubled since independence in 1971. The normal diet of the people of Bangladesh is cereal  
 49 based, particularly rice based. The intake ratio of cereals and vegetables is about 5:1, whereas  
 50 in many other developing countries it is about 1:2. Better provide a reference regarding intake of  
 51 kilo calories per day per person which is less than minimum requirement. The traditional food  
 52 and culture of Bangladeshi people is one of the reasons for such inequity in the consumption of  
 53 cereals and vegetable. Hence, Vitamin and mineral deficiency diseases are very common in  
 54 Bangladesh [2]. Our present situation of vegetable production show that, we are producing 8.75  
 55 lakh metric tons of vegetable, from 1.79 lakh hectares of land against the total cultivable land of  
 56 9.17 million hectares [3]. To supply the minimum daily requirement (220g/person/day) of  
 57 vegetables for the population, the production should be 11.24 million tons. Hereafter, a massive  
 58 effort is required to conduit the wide gap between supply and demand. On the other hand, the  
 59 forgoing discussion suggests that to meet the food shortage and to get other economic benefit  
 60 like earning foreign currency through export, the only alternative is to increase per hectare yield  
 61 of vegetable production. But it is a matter of sorrow that the quality of vegetables intake is very  
 62 negligible in Bangladesh. Nutrition survey of Bangladesh [4] reported that average intake meets  
 63 only 80% percent of Calorie, 58% percent of Vitamin A, 50% percent of Riboflavin and 51%  
 64 percent of Vitamin C requirements. The Production of vegetables in Bangladesh is so low that  
 65 per capita/day available is hardly 32 gm whereas the requirement is estimated to 220 gm. This  
 66 gap is probably one of the main reasons for widespread malnutrition in the country. Recent  
 67 studies have shown that Vitamin A is not only important to prevent blindness but also has effect  
 68 on digestion of food, child morbidity and mortality. It is estimated that about 80% percent of the  
 69 population suffers from Vitamin C deficiency [2]. Being a poor nation, it is difficult to overcome  
 70 such a big malnutrition problem by eating fish, meat, egg, butter, ghee. But vegetables can play  
 71 a very important role to improve the nutritional level of the rural people in the country which is  
 72 almost entirely overlooked. In other words, problems related to malnutrition can easily be  
 73 overcome by eating adequate quantity of vegetables, which requires some adjustment in the  
 74 dietary habit and also by increasing per yield of vegetable [5]. The above-mentioned discussion  
 75 simply indicates the importance of vegetable in our daily life from nutritional point of view. From  
 76 the economic point of view, vegetables should be cultivated for higher farm income, increasing  
 77 cropping intensity, improvement of socio-economic condition and protection of environmental  
 78 pollution, development of healthy and efficient manpower; higher export potentials, reducing  
 79 import and enhancement of industrialization, employment generation, and less consumption of  
 80 cereals, which leads to overcome food shortage. According to Agricultural Marketing  
 Department, Bangladesh earned Tk. 31 core by exporting 8 thousand tons of vegetable [5].

Comment [HH1]: Provide references examples????

82 Adoption of improved practices of an individual on certain aspects serves as a driving force for  
83 constant efforts on certain perceived action. Unless the farmers of Bangladesh have sufficient  
84 knowledge about improved vegetable cultivation practices it would be practically impossible to  
85 develop its full potential in Bangladesh. Considering the above fact, it is necessary to undertake  
86 a study to determine the adoption of improved vegetable cultivation practices by the farmers.  
87 The main purpose of the study was to have an understanding of the adoption of improved  
88 vegetable cultivation practices and problems confrontation by the farmers in vegetable  
89 cultivation. In order to explore the main issue, this study attempts to find out the answers of the  
90 following research questions: (a) What is the extent of adoption of improved vegetable  
91 cultivation practices? (b) What are the characteristics of the farmers who cultivate vegetables?  
92 (c) What is the contribution on the selected characteristics of the farmers to adopt improved  
93 vegetable cultivation practices?

## 94 2. MATERIALS AND METHODS

95 The study was conducted in two villages like Shahnagar and Bihigram of Chopinagar union  
96 under Shajahanpur Upazila in Bogra District. The site was purposively selected. One farmer  
97 from each of the farm families was considered as the respondent. The total number of  
98 respondents under the study area was 199. There are several methods for determining the  
99 sample size; here, Yamane's ~~6](1967)~~ formula was used to make appropriate sample size for  
100 the study.

$$101 \quad n = \frac{z^2 P (1-P)N}{z^2 P (1-P) + N (e)^2}$$

102 Where,

103 n = Sample size;

104 N = Population size = 199;

105 e = the level of precision = 8%;

106 z = the value of the standard normal variable given the chosen confidence level

107 =2.57 (with a confidence level of 99%)

108 p = the proportion or degree of variability = 50%

109

110 By using this formula 112 vegetable farmers were selected proportionately and randomly as the  
111 sample of the study. For the purpose of data collection, a structured interview schedule was  
112 used. Both open and closed form questions were designed to obtain information relating to  
113 qualitative variable.

114

115 Age of a respondent was measured by counting the years from his birth to the time of interview.

116 Education of a respondent was measured in terms of classes passed by his/her formal

117 education system. The family size was measured by the total number of members in the family

118 of a respondent. Farm size of the respondent was measured as the size of his farm (including

119 vegetable and other crops) on which he continued his farm practices during the period of study.

120 Each respondent was asked to mention the homestead area, the area of land under his own

121 cultivation, own land given to others on barga system, land taken from others on barga system,

122 and land taken from others on lease system. The area was estimated in terms of full benefit to

123 the farmers or his family. Vegetable cultivation experience measurement included from the year

Comment [HH2]: Add>>>

124 of starting of first vegetables cultivation till the year of data collection. A score of one (1) was  
125 assigned for each year of experience. Annual family income of a respondent was measured on  
126 the basis of total yearly earning from agricultural and non-agricultural sources (business, service  
127 etc.) earned by the respondent himself and other family members. To measure the vegetable  
128 cultivation knowledge of a respondent, a 17-items questionnaire was constructed in the  
129 interview schedule. Each question was assigned 2 scores. Practical score was given for  
130 practically correct answer. So the correct answer of 17 questions supposed to obtain a  
131 maximum of 34 marks. Wrong answer was assigned zero. So, a respondent could get zero if  
132 he/she answers wrong all the 17 questions wrong. The possible score of vegetable cultivation  
133 score range from 0 to 34. The extension media contact of a respondent was measured by  
134 computing an extension contact score on the basis of his/her extension contact with seventeen  
135 (17) selected extension media. Respondents mentioned the nature of his/her/their contact by  
136 putting a tick mark against any one of the four responses -not at all, rarely, frequently and  
137 regularly. The score for each respondent was determined by adding his/her response to all the  
138 items on the basis of his/her frequency of contact with a score of 0, 1, 2 and 3, respectively. The  
139 extension media contact score of the respondents could range from 0 to 51, where 0 indicating  
140 no extension media contact and 51 indicating very high extension media contact. Organizational  
141 participation of a respondent was measured by his/her nature of membership in different  
142 organizations for a particular period of time. This was measured by participation of a respondent  
143 in an organization. Different weights were assigned as 0, 1, 2 and 3 for no participation, ordinary  
144 member, executive member and president/secretary, respectively. Innovativeness of a  
145 respondent was measured on the basis of the earlier or later adoption of 16 improved  
146 agricultural practices. The scores were assigned on the basis of time required by an individual  
147 to adopt each of the practices. Innovativeness score of a respondent farmer was obtained by  
148 adding his/her scores for adoption of all the 16 selected improved agricultural practices.  
149 Innovativeness score of a respondent farmer could range from 0 to 64, where, 0 indicating no  
150 innovativeness and 64 indicating very high innovativeness. Training experiences was measured  
151 by the total number of days of a respondent participated different training programs from  
152 different organizations. A score of one (1) was assigned for each day of training attended. To  
153 measure problem confrontation of the respondents in adoption of improved practices in  
154 vegetable cultivation a 3-point rating scale was developed and designed with 4 kinds of  
155 responses namely high, medium, low and not at all problem confrontation and, the  
156 corresponding scores assigned for each kind of response were 3, 2, 1 and 0, respectively.  
157 Score of problem of a respondent in 24 items could range from 0 to 72, where 0 (zero) indicates  
158 no problem confrontation of the respondent within respect of vegetable cultivation and 72  
159 indicate serious problem confrontation. Adoption was measured by using 4-point rating scale.  
160 The respondents were asked to indicate their adoption of 15 improved vegetable cultivation  
161 recommended practices. The extent of adoption scores of a respondent was measured by  
162 adding all 15 improved practices. Thus, the extent of adoption scores of a respondent could  
163 range from 0 to 60, 0 indicating no adoption of improved practices and 60 indicate highest  
164 adoption of improved vegetable cultivation practices.

165  
166

167 **3. RESULTS AND DISCUSSION**

168 **3.1 Salient features of the farmers' selected characteristics**

169 In the study, there were 12 selected characteristics of the farmers such as age, education,  
 170 family size, farm size, experience in vegetable cultivation, annual income, vegetable cultivation  
 171 knowledge, media contact, organizational participation, innovativeness, training experiences  
 172 and problems confronted in adoption of improved practices in vegetable cultivation. The  
 173 composite findings of the selected characteristics of adoption of improved vegetable cultivation  
 174 practices are presented and have been discussed in subsequent sections. The selected  
 175 characteristics which were the independent variables of the study were investigated and the  
 176 descriptions of each of the individual characteristics are presented in Table 1.

177 **Table 1. Characteristics profile of the respondent farmer**

SI No	Characteristics (with measuring unit)	Measuring Unit	Range		Mean	Standard deviation
			Possible	Observed		
01	Age	Year	Unknown	26-65	44.21	10.017
02	Education	Year of schooling	Unknown	0-10	3.29	3.750
03	Family size	Score	Unknown	3-13	6.44	2.168
04	Farm size	Hectare	Unknown	0.01-3	2.15	0.808
05	Experience in vegetable cultivation	Year	Unknown	0-6	2.19	1.151
06	Annual income	'000' taka	Unknown	40-245	108.79	41.716
07	Vegetable cultivation knowledge	Score	0-34	8-24	13.99	4.716
08	Extension media contact	Score	0-51	0-32	14.93	6.694
09	Organizational participation	Score	Unknown	1-35	16.67	7.491
10	Innovativeness	Score	0-64	17-55	29.22	9.703
11	Training experiences	Score	Unknown	0-13	4.64	4.492
12	Problems of adoption	Score	0-72	10-53	32.52	20.629

13 Adoption of improved vegetable cultivation practices Score 0-60 12-46 21.63 14.664

179

180 Adoption of improved vegetable cultivation score of the respondent farmers ranged from 12 to  
 181 46 against possible range 0-60 with a mean and standard deviation of 21.63 and 14.664,  
 182 respectively. According to adoption of improved vegetable cultivation score of the respondents,  
 183 they were classified into three categories viz. 'low adoption (1-20)', 'medium adoption (21-40)'  
 184 and 'high adoption (above 40)'. On the basis of their observed scores and the distribution has  
 185 been presented in Table 2.

186 **Table 2. Distribution of the respondents according to their adoption of improved**  
 187 **vegetable cultivation practices**

188

Categories (score)	Respondents number	Percent	Mean	Standard deviation
Low adoption (1-20)	56	50.00		
Medium adoption (21-40)	45	40.20	21.63	14.664
High adoption (above 40)	11	9.80		
Total	112	100		

189

190 Table 2 indicates that the low adoption experience constitutes the highest proportion (50.00 %)   
 191 followed by medium adoption (40.20 %) and high adoption (9.80 %). Results revealed that the   
 192 maximum percentage of respondents was in the category of low to medium adoption (90.20 %).   
 193 Adoption is the measurement of implementation by the farmers as well as vital indicator of   
 194 agricultural development. It is a continuous process due to change of social system, change of   
 195 technologies, change of human behavior, change of cropping patterns, change of adoption   
 196 patterns etc. So, it is suggested that there should be continuous adoption research in various   
 197 aspects for agricultural development.

198

199

200 **3.2 Variables contributed to Adoption of improved vegetable cultivation practices:**

201

202 In order to estimate the adoption of improved vegetable cultivation practices, multiple regression   
 203 analysis was used which is shown in the Table 3.

204

205 **Table 3. Multiple regression coefficients of contributing variables related to adoption of**  
 206 **improved vegetable cultivation practices**  
 207

Dependent variable	Independent variables	$\beta$	$p$	$R^2$	Adj. $R^2$	F	$p$
<b>Adoption of improved vegetable cultivation practices</b>	Age	-0.004	-0.064 <sub>ns</sub>	0.383	0.342	1.838	0.003***
	Education	0.011	0.009**				
	Family size	-0.004	-0.014*				
	Farm size	-0.084	-0.096 <sub>ns</sub>				
	Experience in vegetable cultivation	0.013	0.018*				
	Annual income	0.007	0.035*				
	Vegetable cultivation knowledge	0.012	0.079 <sub>ns</sub>				
	Extension media contact	-0.049	-0.051 <sub>ns</sub>				
	Organizational participation	0.217	0.150 <sub>ns</sub>				
	Innovativeness	0.001	0.011*				
	Training experience	0.001	0.004**				
	Problem confrontation in adoption of improved vegetable practices	-0.016	-0.008**				

208 \*\* Significant at  $p < 0.01$       \* Significant at  $p < 0.05$       NS = Non-significant  
 209

210 The data in Table 3 test the final null hypothesis: There is contribution of the selected  
 211 characteristics (education, family size, experience in vegetable cultivation, annual income,  
 212 innovativeness, training experiences and problems confronted in adoption of improved  
 213 vegetable cultivation practices) of farmers in adoption of improved vegetable cultivation  
 214 practices.  
 215

216 In order to assess which factors, contribute to adoption of improved vegetable cultivation  
 217 practices, multiple regression analysis was used. Table 3 shows that education, training  
 218 experience and problems confronted in adoption of improved vegetable cultivation practices  
 219 were the most important contributing factors (significant at the 1% level of significance). Family  
 220 size, experience in vegetable cultivation, annual income, innovativeness were also the important  
 221 contributing factors (statistical significant at the 5% level of significance) while age, farm size,

222 vegetable cultivation knowledge, extension media contact and organizational participation had  
223 no significant contribution on the adoption of improved vegetable cultivation practices.

224  
225 38.3% ( $R^2 = 0.383$ ) of the variation in the respondents' changed adoption can be attributed to  
226 their education, family size, experience in vegetable cultivation, annual income, training  
227 experiences, innovativeness and problems confronted in adoption of improved vegetable  
228 cultivation practices making this an excellent model (Table 3). The F value indicates that the  
229 model is significant ( $p < 0.003$ ).

230  
231 However, each predictor may explain some of the variance in respondents' adoption conditions  
232 simply by chance. The adjusted R-square value penalizes the addition of extraneous predictors  
233 in the model, but values of 0.342 still show that the variance in respondents' participation can be  
234 attributed to the predictor variables rather than by chance, and that both are suitable models  
235 (Table 3). In summary, the models suggest that the respective authority should consider the  
236 respondents' education, family size, experiences in vegetable cultivation, annual income,  
237 training experiences, innovativeness and problems confronted in adoption of improved  
238 vegetable cultivation practices.

239

#### 240 **4. CONCLUSION** Validate by referring to reported literature!!!

241 The findings of the study revealed that ~~majority (50% .00 percent)~~ of the farmers had low  
242 adoption of improved vegetable cultivation practices. These facts lead to conclude that farmers  
243 had not a satisfactory level of adoption of improved vegetable cultivation practices. But for the  
244 increasing need of vegetables, farmers should adopt improved vegetable cultivation practices  
245 through different GOs and NGOs to enhance production. Education, experience in vegetable  
246 cultivation, annual income, innovativeness, training experience had significant positive  
247 contribution to their adoption of improved vegetable cultivation practices. So, it may be  
248 concluded that more the education, experience in vegetable cultivation, annual income,  
249 innovativeness and training experiences of the farmer, more their adoption of improved  
250 vegetable cultivation practices. And result also indicating that family size and problem  
251 confrontation in adoption of improved vegetable practice of the farmers had negative significant  
252 contribution on their adoption of improved vegetable cultivation practices.

253 According to research's findings age, farm size, vegetable cultivation knowledge, extension  
254 media contact, organizational participation had no significant contribution on the adoption of  
255 improved practices in vegetable cultivation. But this variable may influence on the adoption of  
256 improved practices in vegetable cultivation.

#### 257 **COMPETING INTERESTS**

258 No competing interests exist.

#### 259 **REFERENCES** REVIEW CAREFULLY THE WRITE UP TO MATCH THE JOURNAL'S 260 STYLE....

261 1. BBS.Statistical Pocket Book. Bangladesh Bureau Of Statistics, Statistical Division, Ministry of  
262 Planning, Government of the People's Republic of Bangladesh, Dhaka. 2013.

263 2. HRDP.Training Manual Winter Vegetable and Spices Production,FAO/ UNDP/ASDB project  
264 BGD/87/025, Dhaka. Department of Agricultural Extension(DAE) and Bangladesh Agricultural  
265 Development Corporation, Dhaka. 2013;43-47.  
266

267 3. BBS.Yearbook of Agricultural Statistics of Bangladesh. Bangladesh Bureau of Statistics,  
268 Statistical division, Ministry of Planning,Government of the People'sRepublic of Bangladesh,  
269 Dhaka. 2013.  
270

271 4. INFS. Nutrient Content of Bangladesh Food, Institute of Nutrition and Food Science,  
272 University of Dhaka,Bangladesh. 2013.  
273

274 5. Mahasin, M. Adoption of High Yielding Winter Vegetable Varieties by the Farmers of  
275 Moinamaty Union under Comilla District. MS (Agril. Ext. Ed.) Thesis,IPSA, Gazipur. 1996.  
276

277 6. Yamane, Taro , Statistics: An Introductory Analysis (2nd Edn.), New York, NY: Harper and  
278 Row. 1967.

Formatted: Font: 11 pt

Formatted: Font: 11 pt, Not Bold

Formatted: Font: Not Bold

279

280

281

282