

Original Research Article

USE OF INTEGRATED PEST MANAGEMENT (IPM) PRACTICES BY THE FARMERS OF KALIA UPAZILA UNDER NARAIL DISTRICT

ABSTRACT

The purpose of this study was to determine the extent use of IPM practices by the farmers and to explore the relationship of the selected characteristics of the farmers with their use of IPM practices. The selected characteristics were age, education, farm size, annual family income, training exposure on IPM practices, farming experience, extension contact, problem faced in IPM practices, knowledge on IPM practices and attitude towards IPM practices. Data were gathered from 103 farmers of four villages of Joynagar and Khasial Union of Kalia Upazila under Narail district by using a pretested interview schedule during the period from 20 May to 30 June, 2015. For harmonious representation from each village 10 percent farmers were selected as the sample by using proportionate random sampling method. Pearson's Product Moment Co-efficient of Correlation was used to examine the relationship of the selected characteristics of the farmers with their use of IPM practices. The findings reveal that more than three fifth (61.10%) of the farmers had medium use of IPM practices while 21.40 percent had high use of IPM practices and rest 17.50% had low use IPM practices. Correlation analysis indicated that among the ten selected characteristics of the farmer's age, education, farming experience, problem faced in IPM practices, knowledge on IPM practices and attitude towards IPM practices had significant positive relationship and problem faced in IPM practices had significant negative relationship with their use of IPM practices. The rest ^{of the} characteristics of the farmer namely farm size, annual family income, training exposure on IPM practices and extension contact had no significant relationship with their use of IPM practices. The finding leads to the conclusion that there is necessity to increase the use of IPM practices.

Keywords: Use, integrated pest management, farmers, correlation analysis

1. INTRODUCTION

Pests (insect, pathogen, weeds etc.) are one of the most important barriers to increase food production, a usual need for both develop and developing countries. To ensure ^{desired} production or to minimize crop loss due to pest infestation, there is a trend to use ^{large quantities of} ~~huge~~ chemical pesticides across the countries. Research reports revealed albeit pesticide is efficient to protect crop loss from pests, its heavy use causes several negative impacts on environment like soil infertility, pollution of surface and ground water, destruction of natural enemies, ^{emerge} ~~emerges~~ of new pests etc. [1] [2]. FAO estimated the global harvest losses due to pests to be about 42% of attainable production [3]. The Environmental Protection Agency (EPA) has defined IPM as an effective and environmentally sensitive approach to manage pests that relies on a combination of common-sense practices [4]. Using current information

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about pests and the environment, IPM combines available pest control methods to manage pest damage by the most economical means, and with the least possible harm to people, property, and the environment. According to the EPA (2007), IPM practices can be implemented in agricultural and non agricultural settings (like the home, garden, and workplace). IPM is an approach which uses increased information to make pest control decisions, and also uses multiple tactics to manage pest populations in a way that is both economically efficient and ecologically sound [5]. IPM practices natural, environmentally friendly approaches that increase agricultural productivity. Examples of IPM practices are adoption of pest-resistant varieties of crops; biological and physical control methods; environmental modification; biopesticides; and when absolutely necessary, non-residual, environmentally-friendly and low mammalian toxic chemical pesticides [6]. In Bangladesh, IPM activities first started in 1981 with the introduction of the first phase of FAO inter-country programme (ICP) on IPM in rice crop. However, it was in 1987 that IPM activities began to expand and became a popular topic among people from all walks of life. From 1989 to 1995, the ICP played a strong catalytic role in promoting the IPM concept and approach among the government officials and donor community [7]. IPM aims to change farmers' attitude towards growing a healthy crop and increasing the farm output and farmers' income on a sustainable basis, which results in improving the environment and community health. But the success of the strategy of the IPM is depending upon the appropriate and timely decision making ability of the farmers to control the pests. Most of the cases farmers apply the insecticides in their fields without knowing the appropriate insecticide for the specific insects. Even sometimes they do not know in which stage of crops, insecticides are effective and they fail to take the appropriate decision whether they use the insecticides or not. So this is a great problem of our farmers and it is a barrier to achieve our aspiration of food sufficiency. Many extension led projects have been implemented by the DAE and other NGOs to popularize IPM practices among the farmers throughout the country, since its inception. Farmers' training result demonstrations, method demonstrations etc. have been conducted to educate the farmers about IPM practices but there is hardly any study on ^{the} how much extent farmers are ^{using} ~~being used~~ IPM practices in their farming. In view of the above background and facts, the present study was undertaken with the title "Use of Integrated Pest Management Practices by the Farmers of Kalia upazila under Narail District". The study aimed at providing information regarding the following objectives:

- i. To assess the extent of use of IPM practices by the farmers
- ii. To determine and describe the following selected characteristics of the farmers:
- iii. To explore the relationship between the selected characteristics of the farmers and their extent of use of IPM practices

2. MATERIALS AND METHODS

Kalia upazila of Narail district was selected purposively for the study as this is a typical upazila of Bangladesh. Out of 11 unions of this upazila 2 were selected randomly. Then four villages were selected randomly as the locale of the study by taking 2 villages from each selected union. Four separate lists of the farmers of the selected four villages were prepared with the help of the local Sub Assistant Agriculture Officers. There were 1030 farmers in these villages which constitute the

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numbers from each village?

77 population of the study. Data were collected from ^athe sample rather than the whole population due to
78 time and fund^{ing} constants. A total of 103 farmers were selected proportionately and randomly from the
79 selected four villages by taking 10% from each village. A reserve list of 10 farmers was also prepared
80 which was used in case of absence of any farmers included in the sample while interviewing.
81 Use of IPM practices was measured by computing the use of IPM practices score on the basis of a
82 respondent's extent of use of IPM practices with 10 selected IPM technologies. Each respondent was
83 asked to indicate the extent of use of IPM practices with four alternative responses as 'frequently',
84 'occasionally', 'rarely' and 'not at all' basis and weights were assigned as 3, 2, 1 and 0, respectively.
85 The use of IPM practices scores of a respondent was determined by summing up his/her scores of all
86 the 10 selected IPM practices.. Thus possible score could vary from zero (0) to 30, where Zero
87 indicated no use and 30 indicated the highest level use of IPM practices.

were these defined?

88 Age of a farmer was measured by counting the actual years from his/her birth to the time of interview.
89 Education of a farmer was measured by the number of years of schooling completed in an
90 educational institution. A score of one (1) was given for each year of schooling completed. If a farmer
91 didn't know how to read and write, his education score was zero, while a score of 0.5 was given to a
92 farmer who could sign his name only. Farm size of a farmer is referred to the total area of land on
93 which his/her family carried out farming operations, the area being in terms of full benefit to his/her
94 family. The farm size was measured in hectares for each farmer using the following formula:

$$FS = A_1 + A_2 + \frac{1}{2} (A_3 + A_4) + A_5$$

96 [Where FS= Farm size, A_1 = Homestead area, A_2 = Own land under own cultivation, A_3 = Land given to
97 others on barga, A_4 = Land taken from others on barga, A_5 = Land taken from others on lease]

98 Annual family income of a farmer was measured in Thousand Taka. The total yearly earning from
99 farm sources (crop, livestock, poultry and fisheries) and non-farm sources (business, job, laborer and
100 others) by the farmer himself/herself and other members of his family was determined. Training
101 exposure on IPM practices of a farmer was measured by the total number of days he/she participated
102 in different training programmes. A score of one (1) was assigned for each day of training received.

103 Farming experience of a farmer was measured by the total number of years of his/her cultivation. A
104 score of one (1) was assigned for each year of farming experience. Extension contact was measured
105 by computing an extension contact score on the basis of a respondent's extent of contact with 10
106 selected media. Each respondent was asked to indicate the frequency of his contact with each of the
107 selected media with four alternative responses as 'regularly', 'occasionally', 'rarely' and 'never' basis
108 and weights were assigned as 3, 2, 1 and 0 respectively. Problem faced in IPM practices was
109 measured by computing the extent of various problems of the respondents with 10 selected problems.
110 Each respondent was asked to indicate the extent of his/her problem as high problem, medium
111 problem, and low problem and not at all problem and score was assigned as 3, 2, 1 and 0
112 respectively. Ten questions regarding IPM practices were selected and those were asked to the

113 respondent to determine their knowledge on IPM practices. ^{A score of}Two (2) ~~score~~ was assigned for each
114 correct answer and zero (0) for wrong or no answer. Partial score was also assigned for partially
115 correct answer. Attitude of a respondent towards IPM practices was measured by developing an
116 attitude scale. Five-point Likert method of summated ratings was used to find out the farmers' attitude

117 towards IPM practices. Eight statements expressing positive and negative feelings towards IPM
 118 practices were constructed. A statement was considered positive if it indicated a favourable attitude
 119 towards IPM practices. If the case was reverse, it was considered as a negative statement. Out of
 120 these eight statements four were positive and four were negative. Scoring was done by assigning 5,
 121 4, 3, 2 and 1 scores to the five alternative responses as "strongly agreed", "agreed", "undecided",
 122 "disagreed", and "strongly disagreed", respectively in case of a positive statement. Reverse score was
 123 assigned for a negative statement. However, attitude towards IPM practices of a farmer was obtained
 124 by summing up his/her scores for all the eight statements. The data were analyzed in accordance with
 125 the objectives of the study. Qualitative data were converted into quantitative data by means of
 126 suitable scoring technique wherever necessary. The statistical measures such as range, means,
 127 standard deviation, number and percentage distribution were used to describe the variables.
 128 Pearson's Product Moment Coefficient of Correlation (r) was used in order to explore the relationships
 129 between the concerned variables. Five percent (0.05) level of probability was the basis for rejecting
 130 any null hypothesis throughout the study. The SPSS computer package was used to perform all these
 131 process.

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132 3. RESULTS AND DISCUSSION

133 Use of IPM practices
 134 Use of IPM practices of the respondents ranged from 14 to 28 against the possible range of 0 – 30
 135 with an average of 21.06 and standard deviation of 4.32. Based on the observed scores of use of IPM
 136 practices, the respondents were classified into the three categories i.e. low use, medium use and high
 137 use. The distribution has been shown in Table 1.

Scores for score

total mean?

139 Table 1. Distribution of the farmers according to their use of IPM practices

Categories	Basis of categorization (score)	Farmers		Mean	Standard deviation
		Number	Percent		
Low	<16.74 (<Mean-1sd)	18	17.50	21.06	4.32
Medium	16.74-25.38 (Mean ± 1sd)	63	61.10		
High	>25.38 (>Mean+1sd)	22	21.40		
Total		103	100		

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141 Findings reveal that more than three fifth (61.10%) of the farmers had medium use of IPM practices
 142 while 21.40 percent had high use of IPM practices and rest 17.50% had low use. This scenario is
 143 moderate, satisfactory and should increase by taking necessary steps by DAE and NGOs. Appropriate
 144 knowledge can effectively change behaviour of the farmers towards adopting IPM practices. So, for
 145 the continuous improvement in the earning, living status of the farmers and environmental pollution of

146 the country it is the ~~high~~ time to increase the use of IPM practices by the rural farmers to a great
 147 extent. ^A Motivational campaign should promote to increase the IPM practices as well as ^{buildness} aware ^{among}
 148 farmers about the bad effect of using different insecticides and pesticides indiscriminately.

149 **Selected characteristics of the farmers**

150 **Age**

151 ^{The} Majority (55.32%) of the respondents were middle aged, as compared to 40.78 percent being young
 152 and 3.90 percent old aged. Findings again reveal that overwhelming majority (96.10%) of the
 153 respondents were young to middle aged. Therefore, it could be said that decision ^S regarding the
 154 farming practices in the study area were expected to be considerably influenced by the young and
 155 middle aged farmers.

156 **Education**

157 36.90 percent of the farmers had secondary education while 26.20 percent had primary level of
 158 education compared to 19.40 percent above (higher) secondary education, 14.60 percent higher
 159 secondary education and rest 2.90 percent were illiterate. The findings of this study, however, indicate
 160 that almost all (97.10%) of the farmers had different level of education which is very much helpful for
 161 diffusion of any innovation. ^A Comparatively educated person is relatively more responsive to the
 162 technology and new innovation.

163 **Farm size**

164 ^{The} Majority (57.28%) of the farmers had small farm, ^S compared to 38.83 percent having medium farm and
 165 3.89 percent large farm. ^S In Bangladesh most of the farmers live on below a subsistence level and this
 166 is ^A one of the vital reasons for not ^S belonging large farm. ^S

167 **Annual family income**

168 About half (49.52) of the respondents had low family income, ^{having} while 25.24 percent and 25.24 percent of
 169 the respondents had medium and high annual family income respectively. The gross annual family
 170 income of a farmer is an important indicator of how much s/he can invest in his farming. Generally
 171 higher income encourages one's integrity to achieve better performance and to show his/her
 172 individual better status in the society. The higher income increases the risk taking capacity of the
 173 farmers.

174 **Training exposure on IPM practices**

175 Overwhelming majority (87.40%) of the farmers had no training exposure; while 12.60 percent of the
 176 farmers had short term training exposure. Training develops the farmers' knowledge, skill, and attitude
 177 in positive manner. The findings suggest that training experience might be the most important factor
 178 for the respondents to change their knowledge and skill level on IPM practices. However, in the study
 179 area it is observed that due to no training exposure on IPM practices farmers are lacking of adequate
 180 knowledge and skill on IPM.

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183 **Farming Experience**

184 ^{The} Majority (64.08%) of the farmers had medium [?] to long farming experience while 35.92 percent had
 185 short farming experience. Farming experience is helpful to increase knowledge, improve skill and
 186 change attitude of the farmers. Generally, experience helps to cope ^{with} any problematic situation.
 187 Therefore, the higher experience might be increased the risk bearing ability of the farmers.

188 **Extension contact**

189 An overwhelming majority (93.20%) of the farmers had low to medium extension contact while 6.8
 190 percent had high extension contact. Generally people having high extension media contact assume
 191 that they have more information regarding crop cultivation as well as IPM practices. More extension
 192 contact make the people acquainted with new technologies and information. Discussion with the
 193 agriculture related personnel makes the people more up to date about the modern practices. In the
 194 study area, it is noticed that farmers had low to medium extension media contact.

195 **Problem Faced in IPM Practices**

196 ^{The} Overwhelming majority (82.50%) percent of the farmers faced medium to high problems and 17.50
 197 percent faced low problems in IPM practices. In the study area overwhelming majority (87.40%) of the
 198 farmers had no training exposure. This is one of the main reasons of farmers' problem facing in IPM
 199 practices.

200 **Knowledge on IPM Practices**

201 About four fifth ^S (79.65%) of the respondents fell in medium knowledge category followed by 15.50
 202 percent in high knowledge category and only 4.85 percent in low knowledge category. A rigorous
 203 dissemination process can play important role to improve farmers' level of knowledge regarding IPM.
 204 In this context, DAE is the most responsible. The organization had already developed four
 205 dissemination techniques namely FFS training, extension contact, field day and IPM club to
 206 disseminate this approach. Besides, they used mass media for publicity. They should continue these
 207 approaches with more attention. In addition, some initiative like establishment of adult school or
 208 farmer organization in the rural level may be helpful to fill their knowledge gap of IPM.

209 **Attitude towards IPM practices**

210 More than half (50.50%) of the respondents had less favorable attitude towards IPM practices out of
 211 which 21.40% unfavorable and 18.40% highly favorable only 9.70 percent had neutral attitude. The
 212 extension agents, NGO's personnel and mass media should more highlight IPM issue that helps the
 213 farmers ^{to} create favorable attitude towards IPM program. On the other hand, arranging more
 214 practical training and demonstration program may assist the farmers about effective use of IPM
 215 technologies that can save their time. Additionally, through participation on these events, they may
 216 realize that as IPM give emphasize on non-chemical ways for controlling pest ^S, then it is normal to take α
 217 little more time than conventional practice that is use of chemical pesticides. [^]

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Table 2. Salient Features of the Farmers Selected Characteristics

Characteristics (with measuring unit)	Range		Categories	Farmers		Mean	SD
	Possible	Observed		No.	%		
Age (years)	Unknown	20- 60	Young aged (up to 35)	42	40.78	37.87	7.57
			Middle aged (36-50)	57	55.32		
			Old aged (>50)	4	3.90		
Education (schooling years)	Unknown	00 -17	Illiterate (0)	3	2.90	8.94	4.55
			Primary (1-5)	27	26.20		
			Secondary (6-10)	38	36.90		
			Higher secondary (11-12)	15	14.60		
			Above higher secondary (>12)	20	19.40		
Farm size (hectare)	Unknown	0.06 – 3.66	Small farm (≤1)	59	57.28	1.13	0.78
			Medium farm (>1-3)	40	38.83		
			Large farm (>3)	4	3.89		
Annual family income ('000'Taka)	Unknown	90 – 1500	Low income (up to 250-tax free income)	51	49.52	389.0	277.3
			Medium income (251-500)	26	25.24		
			High income (>500)	26	25.24		
Training exposure on IPM practices (number of days)	Unknown	00 - 03	No training (0)	90	87.40	0.38	1.0
			Short term training (1-3)	13	12.60		
			Short farming experience (<5.89)	37	35.92		
Farming experience (Years)	Unknown	02 - 30	Medium farming experience (5.89-11.95)	34	33.00	8.92	6.05
			Long farming experience (>11.95)	32	31.08		
			Low contact (<12.60)	21.40	21.40	14.39	1.79
Extension contact (score)	00-30	10-20	Medium contact (12.60 – 16.18)	71.80	69.90		
			High contact (>16.18)	6.80	6.80		
Problem faced in IPM practices (score)	00 - 30	10-26	Low (<12.10)	18	17.50	16.40	4.30
			Medium (12.10-20.70)	63	61.14		
			High (>20.70)	22	21.36		
Knowledge on IPM practices (score)	00 - 20	10-20	Low knowledge (<13.70)	5	4.85	16.16	2.42
			Medium knowledge (13.71- 18.58)	82	79.65		
			High knowledge (>18.58)	16	15.50		
Attitude towards IPM practices (score)	8 - 40	18-40	Unfavourable (8-23)	8-23	22	28.11	5.51
			Neutral (24)	24	10		
			Less favourable (25-32)	25- 32	52		
			Highlyfavourable (33-40)	33- 40	19		

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223 Relationship between the Selected Characteristics of the Farmers and their Use of 224 IPM Practices

225 The purpose of this section is to examine the relationship of 10 selected characteristics of the farmers
226 with their use of IPM practices. The 10 characteristics of the farmers included: age, education, farm
227 size, annual family income, training exposure on IPM practices, farming experience, extension
228 contact, problem faced in IPM practices, knowledge on IPM practices and attitude towards IPM
229 practices. Each of the characteristics constituted the causal variables, while use of IPM practices was
230 the predicted variable. Correlation analysis indicated that among the ten selected characteristics of

the farmer's age, education, farming experience, knowledge on IPM practices and attitude towards IPM practices had significant positive relationship and problem faced in IPM practices had significant negative relationship with their use of IPM practices. The rest characteristics of the farmer namely farm size, annual family income, training exposure on IPM practices and extension contact had no significant relationship with their use of IPM practices. The summary of the results of the correlation analysis has been presented in Table 3.

Table 3. Co-efficient of correlation showing relationships between each of the selected characteristics of the farmers and their use of IPM practices

(n= 103; with df 101)

Predicted variable	Causal variable	Computed value "r"	Tabulated value of "r"	
			at 0.05 level	at 0.01 level
Use of IPM practices score	➤ Age	0.215*		
	➤ Education	0.605**		
	➤ Farm size	0.130 ^{NS}		
	➤ Annual family income	0.067 ^{NS}		
	➤ Training exposure on IPM practices	0.138 ^{NS}	0.196	0.254
	➤ Farming experience	0.233*		
	➤ Extension contact	0.129 ^{NS}		
	➤ Problem faced in IPM practices	- 0.549**		
	➤ Knowledge on IPM practices	0.483**		
	➤ Attitude towards IPM practices	0.633**		

4. CONCLUSION

On the basis of the results and their interpretation it can be said that majority of the farmers had medium use of IPM practices. Therefore, DAE may take effective steps for strengthening extension services in order to change using percentage of the farmers regarding IPM practices. Age, education, farming experience, knowledge on IPM practices and attitude towards IPM practices had significant positive relationship and problem faced in IPM practices had significant negative relationship with their use of IPM practices. IPM practices were used more by old aged farmers than young aged farmers. Attempts should be taken by the concerned authorities to increase use of IPM practices especially for the young and middle aged farmers and adult learning centre should be established to increase educational level of the farmers. The extension agents, NGO's personnel and mass media should ~~more~~ highlight IPM issue that helps the farmers to develop favorable attitude towards IPM program. On the other hand, arranging more practical training and demonstration program may assist the farmers about effective use of IPM technologies that can save their time. Additionally, through participation on these events, they may realize that as IPM give emphasize on non-chemical ways for

256 controlling pest^S, then it is normal to take^a little more time than conventional practice that^S use of
 257 chemical pesticides.

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