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Farmers' Awareness Regarding Environmental Sound Practices in Bangladesh

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ABSTRACT
This paper aims to contribute to assess farmers' awareness on the environmental sound practices towards sustainable agriculture. Besides, attempt was made to explore the relationships between some selected characteristics of the farmers' and their awareness on the environmental sound practices towards sustainable agriculture. The study was conducted in 3 villages of Harian union under Paba upazila of Rajshahi district. 15% of the farmers were randomly selected from a population of 770 farmers. Out of the total population 110 farmers were selected as the sample of the study. Data were collected from the farmers through using an interview schedule during 03 January to 03 February 2019. Pearson's Product Moment Correlation Co- efficient were used to test relationships between the independent and dependent variables. The findings reveled that majority of the farmers 46.36% had medium awareness on the environmental sound practices while 30.91% and 22.73% of them had low and high awareness, respectively. Family size, farm size, family income, innovativeness, extension media contact, organizational participation, awareness on the environmental sound practices and use of indigenous practices of the farmers were positively correlated with their awareness on the environmental sound practices, but family size and Age, educational qualification, farming experiences of the farmers had no significant relationship with their awareness on the environmental sound practices.

1. Introduction

Climate change is one of the most important global issues now a day. Climate change impacts are likely to occur in and are channeled through agriculture which is the most natural resource-base and climate-sensitive sector (Georgopoulou, 2017; Pandey *et al*. 2017). Hence, climate change is threatening decades of global agricultural development efforts, particularly in developing countries where the agriculture sector highly relies on rain-fed crops to ensure the nation's economic growth and food security (Okonya, Syndikus and Kroschel 2013; IPCC 2014; Winsemius *et al*. 2014; Niles and Mueller 2016; Pandey *et al*. 2017; Zamasiya, Nyikahadzoi and Mukamuri 2017). As most of the people are taking agriculture as their main profession besides industrialization High Yielding Variety (HYV) of crop has to be cultivated in order to provide food for the large amount of people. Farming

practices are largely responsible for climate change. Excessive use of chemical fertilizer and pesticide and more irrigation water are essential input for HYV of rice, vegetable etc. Due to lack of awareness of our farmers and their excessive use of pesticide, it kills beneficial organism of soil land through water contamination following by the kill of aquatic animal, it breaks down ecological cycle. Farmers often use high level of N fertilizer which always favor insects and many plants more susceptible to insect infestation. Bangladesh is mainly an agricultural dependent country with an area of about 1, 47,570 sq. kilometers. It has a population of about 16.08 core with a per capita GDP of USS 1,909 annually (BES, 2018). Agriculture is the economic backbone of Bangladesh. Approximately 48.1 % of its total population are directly and indirectly depend on agriculture for subsistence and agriculture contributes about 15.33% of gross domestic production (BBS, 2018). According to BES report, agricultural output at current prices has been found to contribute 16.25 % to the GDP in which 14.10% comes from crops (BBS, 2017). So, agriculture plays a vital role through employment generation. poverty alleviation, food security, enhance standard of living by increasing income levels of rural population.

Environment is considered as a composite term for the conditions in which organisms live. It includes both biotic and abiotic substances, energy and forces e.g. temperature, light, water, air, soil and other chemical factors individually as well as collectively that compose the nature and manmade surroundings. Our environmental balance is deteriorating rapidly because of a number of causes such as haphazard use of insecticides in farming, deforestation and various green house gases like Chlorofluorocarbon, Carbon dioxide, Methane, Nitrous Oxide , Ozone etc. These gases are accessible to high energy solar radiation having short wave length but absorb long wave terrestrial radiation thus trapping heat in the lower atmosphere. This phenomenon is popularly known as the "Green House Effect" and its consequential effect is known as "Global warming". Sustainable agriculture seeks to sustain farmers, resources and communities by promoting farming practices and methods that are profitable, environmentally sound and good for communities. Sustainable agriculture fits into and complements modern agriculture whereas the pressure of greenhouse gases is increasing on our atmosphere that changes the climate and reduces ozone layer. Popular agricultural practices like land clearing, burring, ploughing, leveling. irrigation, use of fertilizer and insecticides cause the irregularities of the physical environment. The developing countries used no more than 10 percent of the total (Furtick, 1979). Two million tons of pesticides were used globally in 1979. In that year 1,400 different chemicals were registered in the USA for use under hundreds of pesticides formulation (Muller, 1982). The rate of increase in the use of insecticides in developing countries is considerably higher than the developed countries.

Haphazard use of insecticides also affects in the aquatic organisms which heavily depend on fishes and aquatic plants, for their lives. It is very harmful for human health (Sarker, 1993). Use of improper doses of insecticides has been causing further degradation of environment. Strong residual effects of DDT, Edirne, Dieldrin also cause health hazards to human and animal and reduce the population of many beneficial insects.

Considering these points of view, the researcher intended to conduct the study with following objectives: to assess the awareness of farmers on the environmentally sound practices and explore the relationships between the selected characteristics of the farmers and their awareness regarding environmental sound practices towards sustainable agriculture.

2. Materials and Methods

The study was carried out in Harian union of Pabaupazila under Rajshahi district of Bangladesh. In

this union there are 9 villages. Out of nine villages this union only 3 villages (Kukhandi sonar para, Joypur and Mollikpur) were randomly selected.

Total number of farmers of these 3 villages who engaged in farming actively among them 770 which constituted the population of the study, 110 farmers were selected randomly by using random number table (Kerlinger, 1973) as the representative cover 15% of active population. Data were collected from the sample by using interview schedule during January to February 2019.

2.1 Measurement of Independent Variable

The independent variables such as age, education, family size and farm size were measured by using measuring units of year, year of schooling school, number of members and hectare, respectively. The family income was measured based on total earning annually by all the members of the family and expressed in Taka. Farming experience of a respondent was measured units of year involved in farming. Innovativeness of the respondents was measured by computing an innovativeness score based on adoption of agricultural practices by the respondents. The term extension media contact refers to one's becoming accessible to the influence of extension education through different extension media. Score based on a farmer's extent of contact with 13 information sources in this study. Organizational participation of a respondent was measured because of nature of his participation and duration of his participation in different organization in various capacities. Farmers' attitude towards injudicious use of fertilizer and insecticides was measured by using a five-point modified Likert scale such as strongly agree (4), agree (3), undecided (2), disagree (1) or strongly disagree (0). Use of indigenous practices was measured by score. Thus, indigenous practices score of respondents varied from 0 to 15 where 0 indicate no use of indigenous practice and 15 indicated the highest use of indigenous practice.

2.2 Measurement of Dependent Variable

Farmers' awareness on the environmental sound practices was considered as the dependent variable in the study. It was measured using 24 questions in closed from which could be answered by checking true or false. "The variable was divided into four different aspects each aspect consisted of six questions. The aspects were effect of insecticides (1) on soil. (1i) on agriculture (ii) on aquatic lives and water bodies and (iv) on animal and human health. A respondent got full mark (1) for each correct answer and got zero (0) mark for incorrect answer.

The collected data were coded, compiled, tabulated, and analyzed. The local units were converted into standard units. The qualitative data were transferred into quantitative data by appropriate scoring techniques. Data were analyzed in accordance with objectives of the study. SPSS (Statistical Package for Social Sciences) computer program was practiced performing the data analysis. Various statistical measures such as range, mean, number %age, standard deviations and rank order were practiced describing the selected characteristics of the respondents of the study area. To find out the relationship between the individual characteristics of farmers and attitude, Pearson's Product Moment Correlation Co-efficient (r) was computed.

3. Results and Discussion

3.1 Distribution of the respondents by the awareness on environmental sound practices

Farmers awareness on environmental sound practices ranged from 7 to 21 against the possible score 0 to 24. The average was 13.58 and standard deviation was 3.63. The respondents were classified into three categories, which are shown in Table 1. Table 1 reveals that the majority of the farmers (46.36 %)

had medium awareness while 30.91% and 22.73% of them had low and high awareness respectively. It was found that most of the respondents had medium awareness of harmful environmental sound practices on environment. The findings are presented in a pie graph in Figure 1.

Table 1: Distribution of the respondents by the awareness on environmental sound practices

Categories	Number	Percentage	Mean	SD	Range
Low awareness (07-11)	34	30.91	13.58	3.63	7-21
Medium awareness (12-16)	51	46.36			
High awareness (17-21)	25	22.73			
Total	110	100			
Min=07.00; Max=21.00; Range=14.00					

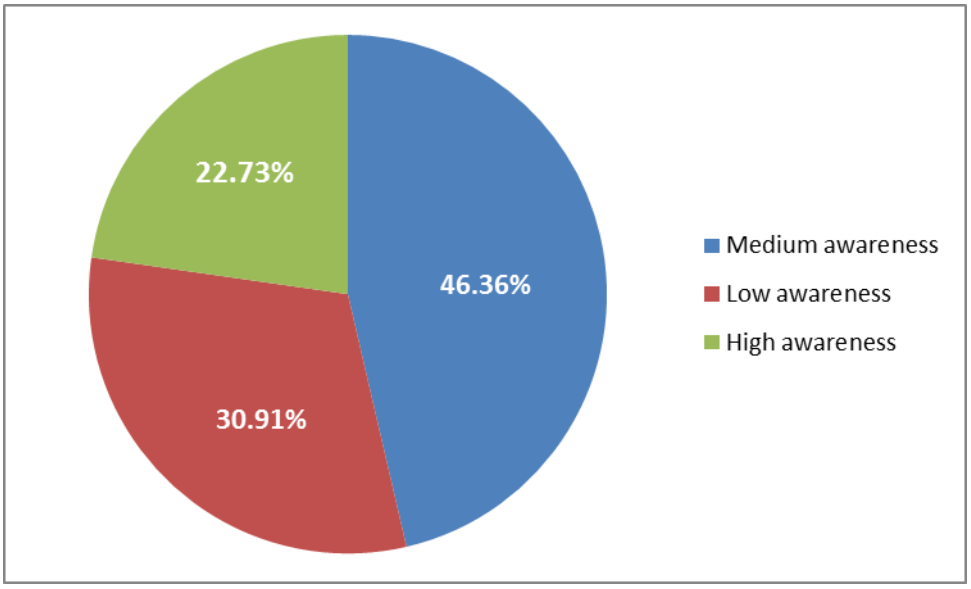

Figure 1: Pie graph showing the awareness on the environmental sound practices

3.2 Characteristics of the Farmers

The distribution of farmers based on their characteristics has been shown in Table 2. The highest proportion 47.27% of the farmers fell in the young aged category, while 35.45% fell in the middle aged category and 17.28% in the old aged category. Thus, 82.72% respondents fell in the young to middle aged categories respectively. The young farmers are perceived as the most potential groups and the middle aged as the most productive group from the view point of development psychology. Therefore, it is expected that the young and middle aged group are very much aware of their environment compared to old aged group. A large proportion (47.28%) of the farmers had secondary education compared to 13.63% respondents with no education or can sign only, 30.91% having primary education and 8.18% having above secondary education. The overwhelming majority (86.37%) of the respondent were literate from primary to above secondary. This finding also indicated that the respondents had relatively higher level of education than the national level, which is 72% on an average (BBS, 2018). Farmers those who had higher level of education were more awareness on

the environmental sound practices. The majority proportion (43.64%) of the farmers fell under the medium family category followed by 40% and 18.36% small and large family respectively. These findings indicate that more than 62%of the respondents had either medium or large family size. The highest proportion (56.36%) of the farmers belonged to small farm size compared to 9.09% and 34.55% having large and medium farm size respectively. Thus, most of the farmers were in possession of small farm and number of farmers having marginal and medium farm is almost similar.

Table 2: Farmer's characteristics profile

Characteristics	Measuring unit	Observed value	Categories	No	%	Mean ± SD
Age	Year	40-20	Young(up to 35)	52	47.27	38.32±11.35
			Middle (36-49)	39	35.45	
			Old (>49)	19	17.28	
Education	Scores	0-12	Illiterate (0)	15	13.63	5.62±3.54
			Primary (1-5)	34	30.91	
			Secondary (6-10)	52	47.28	
			Above Secondary (>10)	09	8.18	
Family size	No.	3-12	Small (Up to 4)	44	40	5.82±2.47
			Medium (5-8)	48	43.64	
			Large (>9)	18	18.36	
Farm size	Hectare	0.04-3	Marginal (.021 to .2 ha.)	10	9.09	0.90±0.56
			Small (.21 to 1 ha.)	62	56.36	
			Large (1.01 to 3 ha.)	38	34.55	
Family income	Taka (Thousand)	31-250	Low (up to 75)	26	23.64	105.75±45.24
			Medium (76-150)	74	67.27	
			High (>150)	10	9.09	
Farming experience	Year	6-40	Low (6-16)	49	44.55	19.47±8.98
			Medium (17-28)	38	34.55	
			High (above 28)	23	20.10	
Organizational participation	Scores	0-29	No participation (0)	17	15.46	13.10±8.90
			Low (up to 9)	29	26.36	
			Medium (10-19)	33	30.00	
			High (20 to 29)	31	28.18	
Innovativeness	Scores	12-38	Less (12-20)	59	53.64	21.35±5.21
			Medium (21-29)	43	39.10	
			High (>29)	8	7.27	
Injudicious use			Low (27-33)	54	49.09	

of fertilizers and insecticides	Scores	27-45	Medium (34-39) High (>39)	43 13	39.09 11.82	34.19±4.19
Indigenous practices	Scores	3-11	Low (3-5) Medium (6-8) High (>8)	24 56 30	21.81 50.17 27.27	7.15±1.88
Extension media contact	Scores	11-39	Low (11-21) Medium (20-29) High (>29)	26 38 46	23.64 34.55 41.81	26.73±7.51

Thus, the possessed majority (90.91%) of the farmers were the owners of small to medium farms. About 67.27% of the respondents had medium revenue likened to 23.64% of them having low and 9.09% having high income. The highest proportion (44.55%) of the respondents had low farming experience and 40% of the respondents had very low experience and the medium experienced categories contributed to 34.55 % of the respondents. The majority (53.64%) of the respondents was less innovative while 39.10% moderately innovative and 7.27% was high innovative. Here highest categories of farmers were in less innovative, because they were not agreeing to take any risk and for this reason they were not take new technology easily. The highest ratio 28.18% of the respondents fell in the high participation category while 15.45% respondents fell in no participation, 26.36 % fell in low participation category and 30 % fell in medium participation category. The villagers were always very busy in their work and they were not willing to participate organization due to lack of time. Table 2 shows that 49.09% of the respondents fell in low attitude and only 11.82% in high attitude and 39.09% felt in the category of medium attitude towards injudicious use of fertilizer and category insecticides. Due to lack of proper knowledge on insecticides the farmers' were use it moderately. In case use of indigenous practices majority (50.91 %) of the respondents felt in medium user category and 27.27 % were high user and only 21.81 % fell in the category of low user. Generally the farmers used to use insecticides to control insects, for this reason they were not agree to take indigenous practices.The largest proportion (41.82%) of the respondents high extension media contact while 34.55% had medium extension media contact and 23.64% had very low extension media contact.

3.3 Relationship between the Characteristics of the Farmers and Their Awareness on Environmental Sound Practices

The objective of this article is to pursue the relationships of selected characteristics of the respondents with their awareness on environmental sound practices. The reference between the selected characteristics of the farmers and their awareness on environmental sound practices is presented in Table 3. Pearson’s Product Moment Correlation Co-efficient (r) was practiced to test the invalid presumption concerning references between any two changeable. Out of 11 variables, the relationships of 7 variables with farmers attitude were found significant and positive and 4 were non-significant.

Table 3: Correlation between farmers' characteristics and their awareness on environmental sound practices

Dependent variable	Independent variable	Observed co-efficient of co-relation (r) with df 102	Table value of 'r' of 102 degree of freedom (N=104)	
			At 0.05 level	At 0.01 level
Farmers awareness on the environmental sound practices	Age	0.111	0.181	0.236
	Education	0.122		
	Family size	0.497**		
	Farm size	0.743**		
	Family income	0.794**		
	Organization participation	0.333**		
	Farming experience	0.018		
	Innovativeness	0.226*		
	Attitude towards the use of fertilizer and insecticides	0.470**		
	Use of indigenous practices	0.788**		
	Extension media contact	0.617**		

*Significant at 0.05 level; **Significant at 0.01 level; NS=Non-significant

Out of 11 selected characteristics of the farmers, 7 characteristics namely Farm size, Family income, Organization participation, Innovativeness, Attitude towards the use of fertilizer and insecticides, Extension media contact had significant positive relationships and 4 characteristics namely Age, Education, Family size, Farming experience showed non-significant relationship with their awareness on environmental sound practices.

4. Conclusion

Ecological balanced agro-environment is a must to attain a sustainable agricultural system. Insecticides are the hazardous entity of ecological balanced environment. Overall findings indicate that more than four-fifths of the farmers had low to moderately favorable awareness on the environmental sound practices towards sustainable agriculture. It indicated that there is a gap in case of farmers awareness in our agricultural sector. Massive and relevant training program should be taken for the farmers to upgrade their awareness and understanding of the knowledge about environmental sound practices. It also needed for the Ministry of forest and environment and DAE (Department of Agricultural Extension) to take proper steps to minimize the adverse effect to insecticides on environment.

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