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Factors Associated with Knowledge, Attitude and Adoption of Integrated Pest Management Practices in Rice Cultivation

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ABSTRACT. Extension activities encouraging adoption by farmers of integrated pest management (IPM) practices in rice cultivation started in Sri Lanka in 1984. The objective of this paper is to identify the factors associated with farmers' knowledge about, attitude towards and adoption of these practices.

Data were collected by personal interviews with a stratified random sample of 120 farmers from Mahaweli system 'C' area using a structured questionnaire.

Farmers' knowledge of IPM was positively related to their attitude towards IPM, social participation, wealth and extension contacts. Knowledge of IPM and extension contacts together explained about 43 percent of the variability in attitude towards IPM. Knowledge of and attitude towards IPM together explained about 47 percent of the variability in the adoption of IPM practices.

Enhancing the knowledge about and developing positive attitude towards IPM practices through extension contacts will, therefore, help achieve higher levels of adoption by farmers of these practices.

INTRODUCTION

Rice is the principal crop of the domestic food crop sector in Sri Lanka. With the introduction of new improved rice varieties, use of fertilizer

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and pesticides was increased as these varieties are highly responsive to fertilizer and more prone to pest problems. To combat these pest problems pesticides were recommended to be used. Due to the quick action of pesticides, farmers became more reliant on pesticides than the other control methods. The heavy dependence on pesticides resulted in numerous problems: the development of resistant pest, resurgence of pest population, emergence of secondary pests, crop and environmental contamination, and hazards to human health.

In order to avoid the harmful effects of pesticides, more efficient alternative methods of pest control were sought. This was initiated at international and national levels. At the international level, a panel for Integrated Pest Management (IPM) was established by the Director General of the Food and Agriculture Organization (FAO) in 1966.

The IPM is a strategy or plan that utilizes various tactics or control methods - cultural, plant resistance, biological and chemical in a harmonious way (Reissig *et al.*, 1985). The IPM includes all approaches ranging from single component control method to the most sophisticated and complex control methods. Basically rice IPM technology is categorized into five principal methods namely use of resistant varieties, cultural methods, mechanical methods, biological control and chemical control.

Rice IPM strategy gives high profit to farmers and minimizes the bad effects of chemicals. The ultimate objective of IPM is to produce maximum returns at minimum cost taking into consideration the ecological and sociological constraints in each ecosystem and the long term preservation of the environment (Falcon and Smith cited in Food and Agriculture Organization, 1979). In fact, Vander Fliert (1992) reported that adoption of IPM practices resulted in consistently higher yields in addition to lower expenditure in pest management.

Rice IPM extension activities started in Sri Lanka in 1984. Since then the IPM extension activities were conducted to different degrees among paddy farmers in Sri Lanka. At the initial stage, IPM extension activities were conducted by the Extension Division of the Department of Agriculture with the assistance of FAO of the United Nations. At a later stage, several non-governmental organizations (NGO) also came forward to implement IPM extension activities at farmer level.

Proper knowledge about and positive attitude towards IPM practices are important pre-requisites for the adoption of these practices. This paper attempts to examine the factors associated with the knowledge, attitude and adoption of IPM practices. This information will be useful to IPM implementers in conducting their programs successfully.

METHODOLOGY

This study was conducted in Mahaweli system 'C' area in Sri Lanka at the end of *Maha* 92/93 season. Personal interviews were conducted with a stratified random sample of 120 farmers who had completed two crop seasons after being exposed to IPM training, using structured questionnaire. As there was not much variability among the rice farmers in the study area with reference to living conditions and farming pattern, four block manager (BM) areas were selected for data collection out of eight BM areas. Then, from each BM area, 3 villages were randomly selected and 10 IPM trained farmers were selected from each village.

In this study knowledge denotes the understanding of principles underlying the different IPM practices. Twelve items were used to measure the level of IPM knowledge. Prior to data collection a test was conducted to assess the reliability and validity of the knowledge items included in the questionnaire Twelve rice farmers who were personally known to the author to have high IPM knowledge were identified from the study area. Similarly, 12 farmers who had not been exposed to IPM also were selected and information was gathered individually from each farmer. The response to each knowledge item was categorized as correct, partially correct and incorrect, and scores were assigned as 3, 2 and 1, respectively. All such scores were summed upto compute the overall knowledge score. Knowledge score of each item was compared and total knowledge score of the two groups was tested. Mean knowledge scores of the two groups were significantly different.

The same test was administered to the same group of trained and untrained farmers after a lapse of two months to test whether the performance in the knowledge test was the same after the lapse of a period of time. The knowledge level of each group was not significantly different before and after the two months period.

Attitude towards rice IPM was measured with respect to four different aspects. To measure each attitudinal aspect, multiple items were used. The response to each item was recorded as strongly agree, agree, not sure, disagree and strongly disagree, and scored as 5, 4, 3, 2 and 1, respectively for favourable items and vice versa for unfavourable items. In order to get an idea of overall attitude, total scores for all the four attitudinal aspects were summed up.

The data regarding the adoption of IPM practices were collected for three consecutive seasons. A score of 5 was given if a farmer had adopted the particular practice fully in his entire field within a season, 4 if it was fully adopted only in a specific field, 3 if it was partially adopted in his entire field, 2 if it was partially adopted in a specific field and 1 if it was not adopted in any field. In order to compute a farmer's adoption score for a particular practice, the corresponding scores for all three seasons were added. Finally, overall adoption score for each farmer was computed by summing up his adoption scores for all the practices.

The data were analysed by using correlation and stepwise multiple regression techniques.

RESULTS AND DISCUSSION

Strength of the relationships among the study variables was determined by using Pearson's Product Moment correlation coefficient. The following relationships were found to be significant at 0.05 probability level.

Farmers' knowledge of IPM was found to be positively related to their attitude towards IPM (r = 0.59), social participation (r = 0.34), wealth (r = 0.26) and extension contacts (r = 0.27) (Table 1).

Most of the farmers (90 percent) reported IPM as a useful technology. In fact, 70 percent indicated that adoption of IPM was profitable. Farmers' attitude towards IPM was positively related to extension contacts (r = 0.93), knowledge (r = 0.59), social participation (r = 0.33) and wealth (r = 0.21) (Table 1).

Farmers' adoption of IPM practices was found to be positively related to knowledge (r = 0.59), attitude (r = 0.62), extension contacts (r = 0.34), social participation (r = 0.29) and wealth (r = 0.24) (Table 1).

Stepwise multiple regression analysis was done to find out the explanatory variables for the knowledge, attitude and adoption of IPM. Among the nine variables investigated, social participation, and extension contacts significantly explained the knowledge of IPM. This finding is consistent with Wilkening *et al.* (1962), and Rogers and Shoemaker (1971). However, only about 16 percent of the variability in the knowledge score could be explained by these two variables together (Table 2). Thus other variables not examined may be important in explaining the knowledge of IPM.

Table 1. Inter-correlations among the scores of the study variables.

	Adoption	Knowledge	Attitude	Age	Education	Farm Size	Wealth	Income	Experience	Social Participation	Extension contacts
Knowledge	0.592*										
Attitude	0.623*	0.590*									
Age	-0.089	-0.093	0.031								
Education	0.011	0.124	0.098	-0.332*							
Farm Size	0.037	-0.052	0.033	0.212*	-0.088						
Wealth	0.237*	0.256*	0.213*	-0.075	0.202*	0.158					
Income	0.145	0.122	0.011	0.074	0.054	0.114	0.358*				
Experience	0.121	0.018	0.115	0.715*	-0.220*	0.180*	0.084	0.181*			
Social Participation	0.289*	0.336*	0.326*	0.003	0.276*	0.091	0.162	-0.020	0.027		
Extension Contacts	0.336*	0.266*	0.925*	-0.035	0.207*	0.053	0.164	-0.090	0.111	0.153	
Tenurial Status	-0.055	-0.036	-0.132	-0.191*	0.097	0.141	0.168	0.192*	-0.106	-0.082	-0.111

* Significant at 0.05 level

Table 3 shows that, the best predictors of attitude towards IPM In order of significance were knowledge about IPM and extension contacts. These two variables together explained about 43 percent of the variability of attitude towards IPM in rice.

Table 2. **Stepwise multiple regression on knowledge of IPM by independent variables.**

Variables	R^2	R^2 change	t-value
Social participation	11.28	-	3.87*
Social participation + extension contacts	15.99	4.71	2.56*
Social participation + extension contacts + wealth	18.37	2.38	1.84

* Significant at 0.05 level.

Table 3. **Stepwise multiple regression on attitude towards IPM by independent variables.**

Variables	R^2	R^2 change	t-value
Knowledge	34.82	-	7.94*
Knowledge + extension contacts	42.58	7.76	3.98*
Knowledge + extension contacts + social participation	43.93	1.35	1.67

* Significant at 0.05 level.

According to the results of stepwise multiple regression analysis presented in Table 4, attitude towards rice IPM and knowledge of IPM significantly explained the adoption of rice IPM practices. About 47 percent of the variability in adoption of IPM was explained by these two variables together. Rogers and Shoemaker (1971), Opare (1976), Fligels Fedrick (1979), Talawar and Hirevenkangouder (1989) also reported similar relationships with the adoption of recommended farm practices.

Table 4. Stepwise multiple regression on adoption of IPM by independent variables.

Variables	R^2	R^2 change	t-value
Attitude towards IPM	38.55	-	8.66*
Attitude + knowledge	46.59	7.74	4.12*
Attitude + knowledge + income	47.57	0.98	1.47

* Significant at 0.05 level.

CONCLUSIONS

The study clearly shows that higher levels of adoption by farmers of IPM practices could be achieved by increasing their knowledge about and developing positive attitude towards these practices.

According to the findings of this study, In order to improve the knowledge of and attitude towards IPM, the farmer level social participation, and the number of extension contacts should be increased.

Steps should, therefore, be taken to increase farmer participation in IPM training classes. This could be achieved, to a great extent, by organizing the training classes in consultation with the trainee farmers. The training classes should be supplemented by the use of mass media materials such as banners, posters and leaflets.

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