

## Socio-Economic Factors Influencing the Farmers' Awareness about Ill Effects of Pesticides on the Environment

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**ABSTRACT.** *The indiscriminate use of pesticides on crops adversely affects the environment. Many researches were conducted to evolve technical alternatives for eco-friendly agriculture, but very less emphasis was given to the behavioural component of the farmers. The role played by the attitude of the farmers' on agro-ecological aspects and programmes are often overlooked. Considering the need, present study was conducted to assess the farmers' awareness level and socio-economic factors influencing the awareness about ill effects of the pesticides on the environment.*

*The study was conducted in Alipur Block of Delhi among vegetable growing farmers. Thirteen variables were selected as independent variables and the awareness of farmers as the dependent variable. Selected respondents were personally interviewed with the help of a structured interview schedule by the researchers. The data was analysed using Statistical Package for Social Sciences. Out of 13 variables Caste, Education, Social Participation, Operational Land Holding, Annual Income, Extension Contact, Mass-media Exposure and Cosmopolitanism were significantly correlated with the farmers' awareness. Regression analysis revealed that education, social participation and mass media exposure had significant contribution for awareness.*

*It is recommended that there is a great need to initiate the awareness generating programmes by the government. Increased social participation, extension contacts and mass media exposure could be given due importance by extension agencies to enhance the eco-friendly agriculture in years to come, which is really the need of the new millennium.*

### INTRODUCTION

"We have forgotten how to be good guests, how to walk lightly on the earth as its other creatures do."

Stockholm Conference, Only One Earth, 1972

The indiscriminate use of pesticides on crops adversely affects the environment. Swaminathan (1968) cautioned that indiscriminate use of pesticides could cause adverse changes in biological balance as well as lead to an increase in the incidence of cancer and other diseases through toxic residues. The overemphasis on the use of chemical pesticides and their indiscriminate use by the farmers lead to excessive chemicalisation of agriculture with multitude of consequences viz., development of resistance to the pesticides in the target pest species, resurgence of pests, secondary pest outbreaks, residues in food, feed, fodder etc. and above all environmental pollution. The growing need to create a consciousness of the environment among all the age groups of farmers were given by Archana (1996). Farah (1994) and Naoroji (1999) stated that the use of chemical pesticides

and their impact on the environment have come under close scrutiny, particularly when their use directly affect the human welfare.

Jourdain (1995) has mentioned four important factors that should be kept in mind while working for the eco-friendly agriculture. Those are as follows: (1) Technical alternatives available to farmers and their constraints, (2) Economic and environmental indicators required to evaluate these alternatives, (3) Producer's (Farmers) behaviour and (4) The rules underlying his decision-making. Many researches have so far been conducted to evolve technical alternatives, but very less emphasis was given on the behavioural component of the farmers in this connection. Martin and Andrew (1997) argued that the role played by the farmers' own ideas and intention in agro-ecological aspects and programmes are often overlooked. With this background, the present study was conducted in order to find out the socio-economic factors influencing the awareness of farmers about ill effects of pesticides on the environment.

## METHODOLOGY

The study was conducted in Alipur Block of Delhi State. Out of five blocks, Alipur Block was selected purposively. Four villages namely; Palla, Kulakpur, Akbarpur Majra and Tajpur Kalan were selected purposively for conducting the study.

All the farmers cultivating vegetables in these four villages constituted population of the study. Out of that, 20% of total vegetable growing farmers from each village were randomly selected. Accordingly, 30 farmers from Palla, 10 farmers from Kulakpur, 20 farmers from Akbarpur Majra and 30 farmers from Tajpur Kalan were selected, which made the total of 90 respondents for the study.

### Data collection tools

In order to collect the relevant information, a structured interview schedule was developed. The schedule also consisted of exhaustive number of open-ended questions, to assess the level of awareness of farmers about ill effects of pesticides on environment. A score of 1 was assigned if the farmer was not aware of the fact, and 2 was assigned if he was aware of the fact. An utmost care was taken to avoid the fake answers from the respondents, which is why the open-ended questions were asked during the investigation, even though close-ended questions could have served the purpose.

### Variables and measurement

Efforts were made to explicit each general level concept to the operational level so that it could be measured. Keeping in view the objective of the study, socio-economic variables like age, education, caste, family size, family type, occupation, number of milch animals, social participation, operational landholding, annual income, extension contact, mass media exposure and cosmopolitanism were selected as independent variables. The awareness of farmers was the dependent variable. In consultation with the experts, various dimensions of the environment which are adversely affected by the pesticides were identified. The dimensions thus selected for the study were as follows; human health,

pesticides residues in the food chain, natural enemies, drinking water tanks and rivers, ground water, aquatic life, soil and soil organisms, beneficial insects like honeybees, wildlife and birds. Then, respondents' awareness about ill-effects of pesticides on these dimensions were assessed. Finally, a total score was calculated.

### Method of data collection

Each of the selected respondents was personally interviewed by the researcher using a structured schedule. This was supported with personal discussions, observations (e.g., Transact Walk) etc.

### Research design and statistical analysis

Survey research design was used in this study. The data were entered and analysed using SPSS (Statistical Package for Social Sciences). Descriptive statistics (frequency tables, simple percentage, standard deviation, mean), correlation and multiple regression were worked out.

## RESULTS AND DISCUSSION

Efforts were made to assess the level of awareness of respondents about ill effects of pesticides on environment. The mean and the standard deviations of awareness scores were calculated. Using these values, the total respondents were categorized into three levels as follows:

*Low awareness = Less than  $(\bar{X} - 1 SD)$*

*Medium awareness =  $(\bar{X} - 1 SD)$  .....  $(\bar{X} + 1 SD)$*

*High awareness = Greater than  $(\bar{X} + 1 SD)$*

Where;

$\bar{X}$  = Mean of awareness score of all respondents

*SD = Standard Deviation*

Distribution of respondents by level of awareness about ill effect of pesticides on environment is presented in Table 1. The results presented in Table 1 shows that 11.11% respondents had low awareness. But about 78% of respondents were having medium level of awareness about the ill effects of pesticides on environment. However, only 11.11% respondents were having high level of awareness about the ill effects of pesticides. The lower percentage of the respondents under high level of awareness category is an alarming fact. It may be inferred from this finding that the majority of the pesticide users are not fully aware about the ill effects of pesticide on environment.

**Table 1. Frequency distribution of respondents in different levels of awareness.**

Sl. No.	Awareness level	Frequency	Percentage
1	Low level	10	11.11
2	Medium	70	77.78
3	High level	10	11.11
	Total	90	100.00

In order to find out the factors influencing the awareness of respondents about ill effects of pesticides on environment, correlation was computed. Coefficient of correlation between awareness level and all the socio-economic variables was computed and compared with the table value at two different levels of significance *i.e.*, 1 and 0.1% levels of significance.

Table 2 presents the correlation coefficient of socio-economic variables of farmers with respect to their awareness scores.

**Table 2. Correlation coefficient matrix of socio-economic variables with awareness.**

Socio-economic variables	'r' value
Age	-0.3327**
Caste	0.3993**
Education	0.6266**
Family size	-0.1624
Family type	-0.1791
Occupation	0.1383
Number of milch animals	0.0281
Social participation	0.4364**
Operational land holding	0.3749**
Annual income	0.3548**
Extension contact	0.4546**
Mass-media exposure	0.5244**
Cosmopolitanism	0.5924**

**Age**

As presented in Table 2, age of respondents was negatively and significantly correlated ( $r = -0.3327^{**}$ ) with the awareness of the respondents about ill-effects of

pesticides on environment. The negative correlation indicates that more the age lower the awareness is. Younger farmers were having high level of awareness where as older farmers were having lower level of awareness about the ill-effects of pesticides on environment.

### Caste

The caste was found highly, positively and significantly correlated with awareness ( $r = 0.3993^{**}$ ) of ill-effect of pesticides on environment. Since the majority of the respondents belonged to higher caste, it is evident from the matrix that higher caste people who have land for cultivating vegetables are more aware than the backward and lower caste people about the ill-effect of pesticides on environment.

### Education

Education of respondents was highly and significantly correlated with the awareness of the ill-effect on the environment. The correlation matrix indicates positive correlation ( $r = 0.6266^{**}$ ) of education and level of awareness. Younger farmers were having more educational level than older respondents. Accordingly younger farmers were more aware in contrast to older ones.

### Social participation

Social participation of the respondents was highly, positively and significantly correlated with the awareness scores of respondents ( $r = 0.4364^{**}$ ). It can be stated that those respondents who were participating in one or more social organisations were likely to have more exposure, and hence having high awareness scores. It may be inferred, therefore, that higher the social participation of a respondent, higher the level of awareness about the ill-effects of pesticides on environment.

### Operational landholding

Operational landholding was significantly and positively correlated with the awareness of the respondents ( $r = 0.3749^{**}$ ). The respondents who were having higher landholding were having more awareness about the ill-effects of pesticides.

### Annual income

Annual income of the respondents was highly, positively and significantly correlated with the awareness ( $r = 0.3548^{**}$ ). Those respondents who had the higher annual income were found to have high awareness and *vice versa*. Since farmers in the higher income group used to be cosmopolitan (as per the personal observations of the researcher in the study area) in nature, they get all kinds of information from different sources. Because of this, the level of awareness was high for those having higher annual income.

### Extension contact

Extension contact of the respondents was highly and positively correlated with the awareness ( $r = 0.4546^{**}$ ). The respondents, who were having more extension contacts, had more exposure to various aspects of agriculture and hence they had high awareness about ill-effects of pesticides on environment.

### Mass media exposure

Mass media exposure was also found highly and positively correlated with the awareness of respondents ( $r = 0.5244^{**}$ ). The respondents who were having more exposure to mass media, are likely to know many things regarding agriculture and as the result they were found to have high awareness. In no uncertain terms, it can be said that the respondents with low mass media exposure tended to have low awareness.

### Cosmopolitanism

Cosmopolitanism was another socio-economic variable which was highly and positively correlated with the awareness of the respondents ( $r = 0.5924^{**}$ ). Respondents who were more cosmopolitan were having high awareness about the ill-effects of pesticides on environment and *vice versa*.

### Regression analysis

The simple correlation analysis between awareness of the respondents and 13 socio-economic variables were examined to study the degree of association between them. However, awareness is not solely influenced by any one of these variables, but by all of them as a part of an inter-dependent system through their interactive relations. For explaining the cumulative effect of these socio-economic variables and the extent of influence of these variables on the awareness of the respondents, regression analysis was carried out and a hypothesis that the socio-economic variables in the model are contributing towards awareness of the ill-effect of pesticides on environment at 0.05 level of significance was also tested.

### Findings of multiple regression analysis

The  $P < 0.001$  for the F value in the ANOVA indicates that the fitted model can be accepted (Tables 3). Table 4 gives the standardized coefficients of 13 independent variables with respect to their influence on the awareness. It reveals that variables such as, education ( $\beta = 0.3355$ ,  $P < 0.05$ ), social participation ( $\beta = 0.2726$ ,  $P < 0.05$ ) and mass media ( $\beta = 0.2248$ ,  $P < 0.05$ ) had significant contribution for awareness of ill-effect of pesticide on environment.

**Table 3. Results of overall 'F' test.**

Multiple R	0.78030			
R square	0.60887			
Adjusted R square	0.54197			
Standard error	1.39642			
Analysis of variance				
	DF	Sum of square	Means square	F
Regression	13	230.70077	17.7462	9.10
Residual	76	148.19923	1.94999	

Significant  $F = 0.0000$

**Table 4. Multiple regression coefficient with awareness as dependent variable.**

Variable	$\beta$	t ratio	Probability level
Cosmopolitanism	0.16796	1.611	0.1113
Milch animals	0.05930	0.735	0.4648
Family type	-0.08275	-0.760	0.4498
Occupation	0.03410	0.425	0.6720
Landholding	0.10152	0.584	0.5652
Social participation	0.27268	3.021	0.0034
Mass media exposure	0.22487	2.512	0.0141
Caste	0.05164	0.575	0.5672
Extension contact	-0.07459	-0.751	0.4547
Age	-0.08948	-0.860	0.3927
Education	0.33559	3.296	0.0015
Family size	0.09985	0.902	0.3697
Income	7.4700E-03	0.042	0.9667
(Constant)		8.935	0.0000

The adjusted  $R^2$  value for the selected variables was found to be 0.54197 (Table 3). This shows that more than 54% of the variability in awareness can be explained by 13 selected socio-economic variables in the model.

## CONCLUSIONS

The findings of the study may be utilized by the Extension Agencies, Ministry of Environment, Non Government Agencies, other organizations and policy makers in developing countries, working for minimizing the ill-effects of pesticides on environment. The study reveals that majority of respondents were found to have medium level of awareness about the ill-effects of pesticides on ecosystem. Age was found to have negative correlation with the awareness. Socio-economic variables like caste, education, social participation, operational landholding, income, extension contact, mass media exposure and cosmopolitanism were found to have significant and high correlation with the awareness about ill-effects of pesticides on ecosystem. For minimizing the use of pesticides and thereby safeguarding the ecosystem, it is suggested to initiate the awareness generating and enhancement programmes by the government. Special emphasis should be given for older farmers, who were having lower awareness about ill-effects of pesticides on environment. In order to increase the level of awareness of farmers about ill-effects of pesticides on environment, increase in social participation, extension contacts and mass media exposure could be given due importance by extension agencies, Government and NGOs. Small and marginal farmers are to be given special emphasis in generating awareness about ill effects of pesticides on environment. Until and unless small and marginal farmers are made aware of the ill-effects, they will not be motivated to reduce the pesticide consumption. Government should initiate some programmes to generate and enhance the awareness of the farmers about ill-effects of pesticides on environment. Eco-friendly agriculture will be possible only if the farmers are highly aware about the ill-effects of pesticides on environment.

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