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Farmers Perception and Propensity for Adoption of Integrated Pest Management Practices in Vegetable Cultivation

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ABSTRACT

Promotion of integrated pest management (IPM) has been emphasized to contain chemical pesticide led hazard to health as well as environment. The study aimed at examining vegetable growers perception and prosperity to adopt IPM. Farmers having propensity to adopt differed significantly with those having no propensity to adopt with respect to perception about IPM as revealed by their endorsement pattern to the statements like "IPM practices may ruin the crop and incur heavy losses" ($p<0.01$). "Use of IPM practices are labour intensive" ($p<0.01$). "Use of IPM practices are cumbersome" ($p<0.05$): and "Application of bio agent and bio-formulations may affect bio-safety" ($p<O.OI$). Logit regression revealed that adoption of integrated management by the farmers was affected significantly by the factors like level of education environmental orientation (+) scientific orientation (+) and extension contact (+).

The realization has set in that the pesticides are not the perfect answer to controlling pests and pathogens though they account for huge loss of agricultural produce across the globe. the range being in tune of 10-40 per cent. Deleterious effects or chemical pesticides on human health and ecosystem have forced agriculturists even the proponents of modern agricuhural technology. to look for integration of cultural practices plant products based formulations and bio-agents for lessening the quantum of deadly pesticides. Of late, there is an increased acceptance of integrated pest management strategy and practices. Farmers Field School programme got momentum to make farmers aware of pest dynamics and their eco-friendly management However the rate of diffusion and adoption Of IPM practices is not encouraging. Cases of adoption are sporadic, Mahesh and Rao (2008) reported successful use of non-pesticidal management of pests and farmers could get their mortgaged land back from moneylenders by the earned profit. Hilli el. at. (2004) studied the adoption of IPM technology in cotton production in Dharwad district of Karnataka in which the farmers expressed that they could not adopt technology after IPM demonstration was terminated and the support by University of Agricultural Sciences (UAS) and State Department of Agriculture (KSDA) Karnataka was withdrawn. It reflected that the sustainability of IPM programme depended on subsidy and financial assistance. Reichelders and Botarell (1985) opined that both social at d economic factors affect pest control pesticides and hence, emphasized that socio-economic criteria must be met in order to Judge new pest management technique to be a feasible alternative to current practices. It is apparent from studies that for wider acceptance. IPM technology must be promoted till adequate focus upon farmers' opinion and conviction. The present study was conducted with the objective of assessing farmers perception and propensity for adopting IPM practices in vegetable cultivation.

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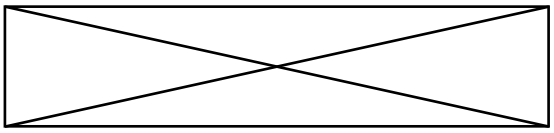
METHODOLOGY

The study was conducted in Gurgaon district of Haryana. An interview schedule based survey of randomly selected 80 vegetable growers was done. In the present study, perception was considered as the meaning attributed by the respondents to integrated pest management. It was measured with the help of Likert type scale having reliability (Crobancha alpha) score of 0.65. The respondents rated the statements on integrated pest management practices on a five-point continuum of strongly agree, undecided, disagree and strongly disagree with respective weightage of 5,4.3,2 and I. The weightage was reversed for negative statements. Mean scores for each statement was worked out to find the perception of sample farmers towards the integrated pest management practices for vegetable crops. For assessing the propensity of adoption. logit regression was employed. Logistic regression is categorized under Limited Dependent variable model and is extensively used in social research when the dependent variable is dichotomous. The dependent variable takes the value I with a probability of success (p). or the value 0 with probability of failure (I - p). This type of variable is called a Bernoulli (or binary) variable. Here in this study. farmers were grouped as having. Propensity to adopt and not having propensity to adopt. A value of I was given to the category of farmers saving propensity to adopt and value 0 for the category of farmers not having propensity to adopt 0 was given to non-adopter. The relationship between the predictor and response variables is not a linear function in logistic regression: instead, the logistic regression function is used, which is the Logit transformation of p:



Where P_i - (1 for adoption and 0 for non-adoption); b_0, b_1 are the parameters to be estimated or the coefficient of the predictor variables; r is the number of independent or predictor variables used in the model; "i" is the "i" observation (or) farmer : and , is the random error. Since logistic regression calculates the probability of success (p) over the probability of failure (q), the results of the analysis are in the form of an odds ratio (p/q). The minimum value of - 2 log likelihood is 0, which corresponds to a perfect fit, hence; lower its value the better is the model. Chi-square test of significance and Nagelkerke R^2 value provides the basis to represent the overall model fit. Wald statistics provides the statistical significance for each estimated coefficient (β). The estimated coefficients ($\beta_0\beta_1....\beta_n$) tell about the influence of a variable on the dependent variable.

RESULT AND DISCUSSION

Perception of farmers: Farmers have realized that the quantum of pesticide use has been increasing to manage insect pests and diseases and to secure good yield. They also knew about the health hazards to humans. cattle and other living organisms as well as the ecological imbalance due to rampant use of pesticides. However. they resorted to indiscriminate use of pesticides to manage the risks or losing crops and income due to pest incidence. Extension programmes had been taken in the area hinter land by KVK to educate the farmers about judicious use of pesticide and application of integrated pest management practices. However, the uptake of integrated pest management practices by the Farmers was found low. A person's perception towards an object has a bearing on his or her decision to accept and use that object. This study to probe into the adoption propensity among vegetable growers for integrated pest management practices firstly analysed Farmers perception towards integrated pest management practices. Two samples of forty farmers each were randomly selected. One sample constituted of the farmers having propensity to adopt the integrated pest management practices. While the other sample did not have the propensity to adopt them. It was observed that both the groups of farmers differed on some important issues significantly (Table -1)

The mean scores of about 4 of both groups of the farmers reflect their strong affirmation that IPM practices arc eco-friendly. With a mean score of 3.5 and above for non-adopters and 4 for adopters, both categories of farmers strongly agreed that by using IPM practices. the quality of produce would be better. That the cost of cultivation will be reduced with use of IPM practices was agreed by both the groups of farmers. Such observations reveal that farmers had positive toward, the use of IPM practices in vegetable crops. Then the question arises about low to no adoption of IPM practices. Insight was gained from farmers significantly differential perception towards crucial issues related to use of IPM practices. Farmers having propensity to adopt differed significantly with those having no propensity to adopt for statements like "IPM practices ma) ruin the crop and incur heavy losses" ($p<O.OI$);"Use of IPM practices' are labour intensive" ($p<O.OI$); "use of IPM practices arc

cumbersome" (p<O.05); and" Application of bio-agents and bio-formulations may affect bio-safety (p<O.OI). The respective mean scores fort these statements reveal that farmers with propensity for adoption str(lllgl) disagreed to these statements having negative shades. Strong affirmation to such negative statements about IPM practices by the farmers having no propensity to adopt IPM reveal that because operational problems and conviction about efficacy, there is a lack of favourable perception and propensity for adoption of IPM.

Factors affecting adoption of IPM: Adoption is a social process (Rogcrs. 1993). Therefore. it is expected that adoption behaviour would be influenced by the personality of the decision maker. their social networks, personal circumstances and family situation. It seems that in the empirical literature every measurable characteristic of farms and farmers has been found to be statistically related to some measure of adoption of some innovation (Pannell et al 2006). For this study, the influences of socio-economic and psychological factors like age, education. farm size. environmental orientation, scientific orientation. farm management pattern, and extension contact upon adoption propensity was analyzed using logit regression model. The descriptive statistics and the hypothesized relationship of the factors with adoption of integrated pest management practices are presented in the Table-2

A positive relationship with adoption of integrated pest management practices was expected in case of level of education, size of holding, scientific orientation, environmental orientation, extension contact, while negative relationship was hypothesized for the factors like age of the farmers and risk perception about integrated pest management practices.

The relative importance of the influence of the explanatory variables is reflected in their coefficients (B). which show the magnitude of change in the log or odds ratio for any change in the explanatory variables. This however, does not explain the change in probability. Except for the size of land holding and risk perception. coefficients of all other variables were found to be positive. The positively significant coefficients 01" explanatory variables indicate their positive influence on adoption decision of farmers towards integrated pest management'

Logit estimates revealed that level of education. environmental orientation, scientific orientation. And extension contact were statistically significant (P<O.O I) in explaining adoption propensity of farmers towards integrated pest management in vegetable cultivation. while age, size of holding and risk perception had no significant influence. The farmers' level of education was found to be significantly important for integrated pest management. It is essentially true that for understanding comprehension, appreciation and adoption of integrated pest management, the farmers must have the knowledge about the pest dynamics. The farmers need to understand the principles involved in integrated pest management to appreciate the advantages of integrated pest management by making judicious blend of chemical pesticides and bio-formulations, bio-agents and mechanical measures. Scientific orientation was found to have positive and significant influence on adoption of IPM. The result is consistent with a priori expectation that farmers with analytical and experimenting tendency while exploring. the cause-effect relationship and attribution process would have higher propensity to adopt. Negative influence size of holding on adoption of IPM was contrary to the a priori expectation that farmers with higher size of holding would have higher propensity to adopt IPM. It emanates from the result that farmers with small size or holding would prefer IPM might be because of high cost of pesticides as well as subsistence cultivation pattern. Envoirmental orientation has shown a positive significant relationship with adoption of IPM. The basic principle of IPM demands harmony among the living elements of the nature. Protection and conservation or natural enemies are crucial for effective IPM strategy. Therefore, it is important that farmers are educated but environmental values and practices to promote lPM. From the positive sign and the significance of extension contact it could be deduced that extension was an important lactor that could promote adoption of integrated pest management among the vegetable growers,

Table-1 Perception of farmers towards integrated pest management practices in vegetables

Sr. No.	Statements	Mean Scores		t-test
		Adopters	Non-adopters	
1.	IPM practices are eco-friendly	4.23	3.85	2.014
2.	With use of IPM practices, quality of produce are better	4.05	3.50	2.035

3.	Application of IPM practices effectively manage the insect pests and diseases	3.05	2.50	1.877
4.	The cost of cultivation is reduced with use of IPM practices	3.52	3.33	0.779
5.	IPM practices may ruin the crop and incur heavy losses	1.90	3.18	-5.327**
6.	Use of IPM practices are labour intensive	1.93	2.98	-4.587**
7.	Use of IPM practices are labour cumbersome	3.63	3.45	0.623*
8.	Application of bio agent and bio-formulations may affect bio-safety	3.15	3.03	0.538**
9.	IPM practices would be effective with community level adoption	3.58	3.93	-1.521

** P<0.01 and ** P<.05

Table-2 Definition and descriptive statistics of variables used in empirical model

Variable	Definition & measurement	Mean value	Standard error
Age (X1)	Age of the farmer, measured in years	42.73	11.31
Education(X2)	Farmer's education level	2.41	0.774
Size of holding(X3)	Farm size, measured in acres	6.66	3.785
Envoirmental orientation (X4)	Index worked out on scale 1-5	2.05	0.482
Scientific orientation(X8)	Index worked out on scale 1-5	2.11	0.432
Risk perception	Index worked out on scale 1-5	1.825	0.725
Extension contact(X6)	Contact with extension agent measured with Index worked out on scale 1-5	1.75	0.646

Table-3 Result of logit regression model

Variable	B	S.E.	Wald	Exp (B)
Age	0.039	.035	1.228	.268
Level of Education	2.826**	0.916	9.510	.002
Size of holding	-.083	0.148	0.313	.576
Envoirmental orientation	7.104**	2.248	9.988	.002
Risk perception	-.406	1.477	0.076	.783
Scientific orientation	1.586*	.797	3.963	0.047
Extension contact	3.520**	.970	13.161	.000
Constant	-30.428	8.501	12.812	.000

CONCLUSION

Development of positive perception among the farmers about lPM is prelude to its adoption. As the study has shown that factors like lack of conviction about the effectiveness. labour intensiveness cumbersomeness differ ill adoption decision; it is highly imperative to have large scale extension programme for educating the farmers and demonstrating the potential of IPM, extension contact has been very rightly identified as one of the important factors for influencing adoption decision about IPM.

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