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Extent of Information Utilization Behaviour of Vegetable Growers Regarding Integrated Pest Management Practices

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ABSTRACT

The study was undertaken in the Jaipur district of Rajasthan. Chomu and Amber tehsil were selected for the research purpose as Chomu and Amber have the maximum number of vegetable growers in the Jaipur district. List of villages in the selected tehsils were prepared, out of which, eight villages had the maximum number of vegetable growers from the two identified Tehsils. From each selected villages a sample of 15 respondents was selected randomly making a total of 120 respondents. It is evident from the study that the highest level of utilization was found in respect of the application of *Cultural practices* as summer ploughing followed by crop rotation. In *Mechanical/ physical practices* mass trapping of pests followed by use of pheromone traps was majorly utilized. Among *Biological practices,* use of predators followed by use of beneficial insects and among *Chemical practices,* uses of pesticides followed by safe application of pesticides were the major practices utilized.

INTRODUCTION

A number of factors, including pests, pose a challenge to achieving the goal of increasing food production. In terms of accelerated crop production, pests and diseases are the most significant restraining factor (Wilson, 2001). In the global agriculture sector, pests cause the loss of 32.1 per cent of global crop production annually (Dhawan et al., 2010). Pests are responsible for the majority of the crop losses in Africa (Bonabana-Wabbi et al., 2006). In Bangladesh, estimates that annually, 25 per cent of vegetables, 20 per cent sugarcane, 16 per cent rice, 15 per cent jute and 11 per cent wheat are lost to pest infestations (MoA, 2010; Kabir & Rainis, 2013a).

The loss is presumed to be higher than those caused by various natural disasters, such as floods, droughts, cyclones, although there is no formal record (Kabir & Rainis, 2013b). In spite of the fact that pesticides are a remarkable innovation for modern agriculture and are needed to minimize crop losses due to pest infestation, their frequent use results in resistant pests that appear as new pests. Furthermore, the frequent use of pesticides pollutes the environment by contaminating soil, groundwater and surface water (Kabir & Rainis, 2012). Additionally, the way and how pesticides are applied in developing countries causes several diseases (Cuyno, 1999). Due to these issues, it is assumed that a certain approach is needed to increase food production without harming the environment and the health of people. Pests can be controlled by organic farming without using chemicals. Hence, this system is better in social (health) and environmental aspects, but has limitations as it relates to productivity (Rattanasuteerakul, 2009). A system of integrated pest management emphasizes non-chemical approaches to control pests, and chemicals are only used if no other

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means are available (Kabir & Rainis, 2013c). IPM is preferred to conventional and organic agriculture in countries that need to increase food production sustainably (DAE, 2012).

Research into vegetable production is moving fast, as evidenced by the current state of vegetable technology, which has resulted in an increase in vegetable production to a remarkable extent through research carried out in the country. Despite rapid advances in knowledge, research findings have little practical application. It depends on the source and channel of information whether farmers respond differently. Research has shown that the variability in the knowledge acquired by the farmers through different sources and channels is a function of their age, education, family background, and farming experience Incorporated pest management (IPM) is a strategy that uses a variety of techniques such as biological control, habitat manipulation, modification of agronomic practices, and the use of resistant varieties to solve pest problems over the long term. Various aspects of IPM stand reported by Wason et al., (2009); Hooda et al., (2009); George et al., (2010); Ghanghas et al., (2017); Gupta et al., (2020). A single tactic for controlling a particular organism is not sufficient to constitute IPM, even if that tactic is an integral part of the system. It is most likely to sustain long-term crop protection when multiple pest suppression methods are integrated. Monitoring and scouting are needed to determine if pesticides are necessary to prevent economic damage from the organism before use.

METHODOLOGY

The study was undertaken in the Jaipur district of Rajasthan. Chomu and Amber tehsil were selected having the maximum number of vegetable growers in the Jaipur district. Out of which, eight villages with the maximum number of vegetable growers from the two identified Tehsils were selected. From the selected village a sample of 15 respondents was selected randomly from each village. Thus, a total 120 respondents were selected for the study. The data was collected through personal interview method with the help of pre-tested interview schedule. The data gathered were analysed for statistical treatments in the light of objectives. Mean score was obtained by total scores of each item divided by total number of respondents. The correlation coefficient (“r” value) was used to measure the relationship between dependent and independent variables.

RESULTS AND DISCUSSION

The component-wise extent of utilization of integrated pest management practices by the farmers is presented in Table 1 and Figure 1. There were 17 components of integrated pest management practices and the farmers were categorized into three categories *viz*, (low, medium, and high) as per the utilization of a particular component using mean ± standard deviation method.

It is evident that the highest mean per cent score of utilization was found in the case of application of summer ploughing followed by Crop rotation. The highest mean per cent score of utilization was found in case of application Mass trapping of pests was found in case of application use of Pheromone traps followed by Destruction of crop residues. The highest mean per cent score of utilization was found in case of application Use of beneficial insects.

Table 1. Component-wise utilization of different IPM practices

S.No.	Component	MPS	Rank
1.	Cultural practices		
i.	Summer ploughing	83.61	I
ii.	Crop rotation	79.72	II
iii.	Trap crop	66.39	VIII
iv.	Clean cultivation	76.39	III
v.	Weed management	74.44	V
vi.	Timely sowing	75.63	IV
vii.	Proper water management	74.01	VI
viii.	Seed treatment	67.22	VII
	Over all MPS	74.44	
2.	Mechanical/Physical practices		
i.	Destruction of crop residues	71.39	III
ii.	Mass trapping of pests	74.44	I
iii.	Use of Pheromone traps	71.67	II
	Over all MPS	72.5	
3	Biological practices		
i.	Use of predators	64.44	I
ii.	Use of parasitoids	58.05	IV
iii.	Conservation of natural enemies	61.38	III
iv.	Use of beneficial insects	62.00	II
	Over all MPS	61.46	
4	Chemical practices		
i.	Use of pesticides	83.33	I
ii.	Safe application of pesticides	82.5	II
	Over all MPS	82.91	

The highest mean per cent score of utilization was found in the case of Use of pesticides, followed by application Safe application of pesticides.

After going through the practice-wise and aspect-wise utilization of various IPM practices, the utilization scores of all the 30 traditional practices were computed. The maximum and minimum possible scores of IPM practices could be obtained 35.9 and 41.9 scores, respectively. From the utilization scores obtained by all the IPM practices, the mean score and standard deviation were calculated to classify these practices into three different levels of utilization namely “High utilization practices” “Medium utilization practices” and “low utilization practices” as follows: The integrated pest management practices which obtained utilization scores of more than 41.9 score were classified as “High utilization practices” by the farmers. The integrated pest management practices which obtained the utilization scores from 35.9 to 41.9 score to were categorized as “Medium utilization practices by the farmers. The integrated pest management practices which obtained utilization scores below 35.9 scores were classified as “low utilization practice” by the farmers. The statistical data regarding the levels of utilization of integrated pest management practices by the farmers.

It is evident from the Figure 2 that 80.00 per cent of integrated pest management practices were moderately utilized by the farmers, whereas 11.67 per cent IPM practices were high information utilized practices by the farmers. Only 8.33 per cent were low utilized by the farmers. The findings are in conformity with the findings of Rathod & Chauhan (2012) that the majority of the respondents adopted cultural, mechanical and biological practices for pest control. Due to the adoption of IPM in cotton, the data regarding

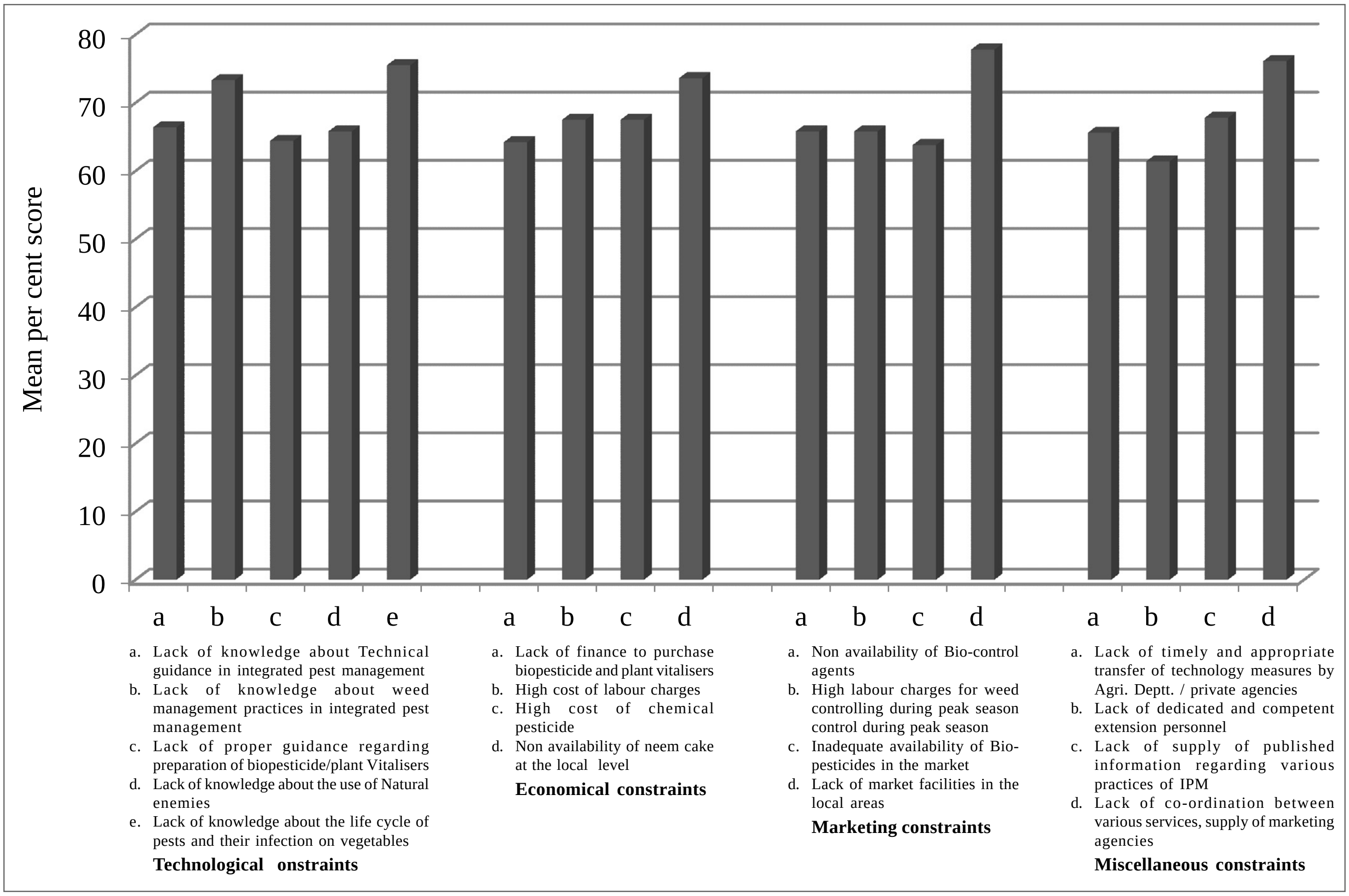

Figure 1. Distribution of farmers according to their component wise extent of utilization of different IPM practices

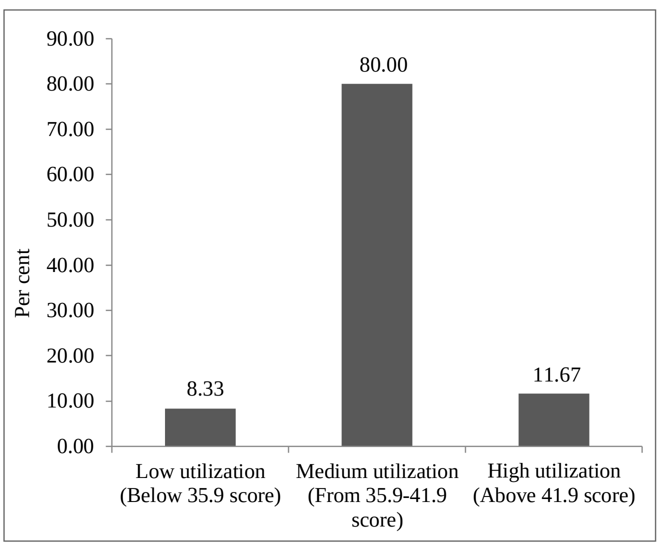

Figure 2. Distribution of respondents into different levels of utilization behaviour regarding IPM

comparison of economics between conventional and IPM technology indicated that the 63 per cent reduction in the cost of plant protection in IPM as compared with conventional methods of pest control and (Ram et al., 2012) reported that majority of the respondents had medium level of adoption of IPM practices, while equal per cent of respondents (20%) had high and low level of adoption. With regard to cultural practices, the majority of farmers had adopted the practice of transplanting of the recommended number of seedlings per hill. As mechanical control measures, the use of bamboo-cage-cum-perchers to control pest in cole crops had been adopted by (70%) of farmers (Singh et al., 2018). In respect to biological control measures, use of neem products / neem-based pesticides was also noticed in the case of 40 per cent of farmers. The application of chemical control measures was in significant among the farmers. Among the cultural, mechanical, biological and chemical measures of integrated pest management, respondents mainly followed cultural and mechanical methods for management of pests of cabbage and cauliflower crops.

The results of the multinomial logit model presented in Table 3, indicates that 2 out of 8 variables in the model were statistically significant at the 0.05 and 0.01 levels. Nagelkerke's R square is 0.249, indicating that the explanatory variables explain about 25 per cent of the variation in utilization behaviour regarding IPM. The age of the farmers had a significant and negative effect on their utilization behaviour regarding IPM at the 1 per cent level of significance. It might be possible that the elderly age of farmers is not interesting in increasing their knowledge. They believe in their traditional knowledge to prevent their crop. It is another possibility that the sampled farmers have a secondary occupation to maintain their livelihood. (Mubushar et al., 2019) have also conducted a similar study. The result shows that farming experience has a significant and positive effect on their utilization behaviour regarding

Table 2. Logit regression model of utilization behaviour regarding IPM (dependent variables)

Explanatory Variable	β	S.E.	Wald
Age	-0.118**	0.039	8.940
Caste	0.437 NS	0.253	2.987
Occupation	0.444 NS	0.330	1.806
Education	0.327 NS	0.196	2.776
Landholding	0.375 NS	0.303	1.532
Social participation	-0.010 NS	0.219	0.002
Farming experience	0.106*	0.053	4.083
Income	-0.098 NS	0.331	0.087
Constant	-2.460 NS	2.491	0.975

Dependent variable: Total utilization behaviour regarding IPM; 1 = acceptable (above the mean), 0 = low (below the mean), -2 Log likelihood: 141.054, Nagelkerke R Square:0.249, Level of signiûcance: ** (P < 0.01); * (P < 0.05), NS = not significant.

Table 3. Correlation between utilization behaviour regarding IPM and various socioeconomic parameters

Socioeconomic parameters	Utilization behaviour regarding IPM
Age	-0.150 NS
Caste	0.127 NS
Occupation	0.259**
Education	0.204*
Landholding	0.221*
Social participation	0.232*
Farming experience	0.036 NS
Income	0.209*

Level of significance: ** (P < 0.01); * (P < 0.05), NS = not significant

IPM 5 per cent level of significance. It can be understood that the professional type of farmers who are gaining experience year to year and observing the better practice as utilization behaviour regarding IPM. Chandran & Podikunju (2021) to measure the constraints faced by the respondents in vegetable production, a suitable schedule was developed and the constraints were ranked accordingly based on the total score obtained by summing up the total score for each constraint. A similar type of study has been conducted by (Sharifzadeh et al., 2018) & (Deguine et al., 2021).

It could be seen from the Table 3 that the characteristics of respondents namely, occupation, education, landholding, social participation, and annual income were positive and significantly related to their information utilization of integrated pest management. While, the characteristics of respondents namely age, caste, and farming experience were found to be non-significantly related to extent of information utilization of IPM practices by vegetable growers.

CONCLUSION

The study reveals that the highest level of utilization was found highest in respect of the application of summer ploughing, mass trapping of pests, use of predators and use of pesticides in their major categories. The highest and lowest percentage was been found in terms of IPM practices and varied from medium to low utilization. Age and farming experience have been found to influence information utilization of IPM practices. The socio-economic factors *i.e.* occupation, education, landholding, social participation, and annual income were positive and significantly correlated to their information utilization of IPM. It is, therefore, suggested to great opportunity to extend the study in other part of state with more sample size, other sampling procedure and more possible way to find gap between technology recommended and its utilization.

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