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ADOPTION BEHAVIOR OF INTEGRATED PEST MANAGEMENT (IPM) AMONG CHILLI FARMERS IN RAICHUR DISTRICT OF KARNATAKA

[a]Mahalakshmi, S.M., [b]Tulasiram, J., [b]Shivanand Kammar and [c]Arun Kumar Hosamani
[a]Department of Agricultural Extension,UAS, GKVK, Bengaluru-560065, Karnataka, India
[b]Department of Agricultural Extension Education, UAS, Raichur
[c]Department of Agricultural Entomology, UAS, Raichur
*Corresponding author email:divyamgowda47@gmail.com

ABSTRACT
The present study was undertaken during the year 2015-16 in the selected two talukas of Raichur district of Karnataka state. Based on maximum area under chilli cultivation, two talukas were selected. From each taluka, three villages were selected based on maximum number of chilli growing farmers. From each village, 20 IPM trained farmers were selected thus constitute a sample size of 120 for the study. The data was collected from the respondents using structured interview schedule developed for the purpose. The data collected was analyzed and tabulated using appropriate statistical tools. The results of the study revealed that, majority (37.50 %) of the chilli farmers belonged to medium adopters' category. All the respondents were found to practice inter-cultivation followed by practice of removal of previous crop residues (96.67 %), summer ploughing (95.83 %) and application of FYM (93.33 %). The practices like destruction of damaged fruits at each harvest and regular destruction of infected flowers of trap crops were noticed to adopt among 97.50 and 33.00% respectively. Practice of spraying of NSKE and growing pulses on the edge rows were noticed to adopt among 60.83 and 54.17 % of farmers. Cent per cent of the respondents adopted control measures for fruit borers, thrips and mites.

KEYWORDS: Adoption, Intercultivation, Integrated Pest Management and NSKE.

INTRODUCTION

Chilli (*Capsicum annuum* Linn) is one of the important spice/vegetable/cash crops grown in India and known as the king of spices, it belongs to genus Capsicum under solanaceae family. It is also called as red pepper, an important condiment crop, grown for its pungent fruits which are used both as green and riped to impart pungency to food. It is an indispensable spice crop used in every Indian cuisine due to its colour, pungency, taste, appealing odours and flavour. Chilli fruits are rich source of vitamin A, C and E. In recent days, it is gaining popularity as vegetable as well as spice crop apart from its medicinal value as it prevents heart attack by dilating the blood vessels (www.ikisan.com). In the world, chilli is cultivated in an area of 1.45 million hectares with an annual production of 19.50 million tonnes and productivity of 2,808 kg/ha (Anon., 2013). The top 10 chilli producing countries are India, China, Ethiopia, Myanmar, Mexico, Vietnam, Peru and Pakistan. India accounted for more than 85% of the world production in 2012 (www.faostat.in). In India, chilli is grown in almost all states of the country. The important states growing chilli in terms of production are Andhra Pradesh (60%) followed by Karnataka (11 %), west Bengal (7 %), Orissa (5 %), Madhya Pradesh (3 %), Maharashtra (3 %) and Tamil Nadu (2.6 %). In Karnataka, chilli is grown in an area of 100.73 thousand hectares with a production of 107.00 thousand MT and productivity of 1.06 MT/ha in 2011-12 to 2013-14 (Anon, 2011). In Hyderabad-Karnataka region, chilli is grown in an area of 2036 hectare with an average productivity of 1100 kg/ha in Raichur district and 3076 hectare with an average productivity of 1400kg/ha in Yadgir district (Dept. of Horticulture, GOK, 2010). Indiscriminate and injudicious use of chemical pesticides in agriculture has resulted in several associated adverse effects such as environmental pollution, ecological imbalances, pesticides residues in food, fruits, vegetables, fodder, soil and water, pest resurgence, human and animal health hazards, destruction of biological agents, development of resistance in pests *etc*. In this direction there is a need to minimize the chemical inputs and save environmental damage, thus integrated pest management (IPM) approach has been globally accepted for achieving sustainability. Several studies have been conducted on food crops to know the adoption of improved cultivation practices and integrated pest management practices, but very few research studies have been conducted on spice crops in this regard. Keeping the above facts and figures in mind, the present study was undertaken with an objective to know the extent of adoption of integrated pest management practices by chilli farmers.

METHODOLOGY

The present study was conducted in Raichur district of Karnataka during the year 2015-16. Raichur district was purposively selected for the study because of convenience and familiarity of the researcher with the study area. Among the spice crops, chilli is one of the major crops grown by the farmers in the district. Among the five talukas of the Raichur district, Raichur and Devadurga talukas were selected based on the highest area under cultivation of chilli. On the basis of maximum number of chilli growing farmers in each taluk three villages were selected randomly thus making 6 villages from 2 taluks.

From each of the selected village, 20 IPM trained farmers were selected. Thus the total sample constituted 120 chilli farmers for the study. The data was collected from the respondents using structured interview schedule developed for the study. The data collected was analyzed and tabulated using appropriate statistical tools.

RESULTS & DISCUSSION

Overall adoption level of individual IPM practices of Chilli

The results presented in Table 1 indicated that, 37.50 per cent of respondents belonged to medium adoption category followed by low adoption (36.67 %) and high adoption (25.83 %) categories.

The possible reason for average adoption of IPM practices in chilli crop might be that, IPM is a new concept to many farmers and in the process of acceptance by farmers they might have felt the practice as complex. This implied that farmers need to be trained and educated about IPM practices, its benefits and advantages for greater adoption by farming community. Similar results were also reported by Ram *et al*. (2012) and in contradiction with the results reported by Sumathi and Alagason (1998).

TABLE 1: Distribution of chilli farmers based on their overall adoption of IPM practices n=120

Sl. no.	Adoption level	Adoption	
		Frequency	Percent
1	Low (Mean-0.425*SD)	44	36.67
2	Medium (Mean ± 0.425*SD)	45	37.50
3	High (Mean + 0.425*SD)	31	25.83
	Mean =	16	
	SD =	2	

TABLE 2: Extent of adoption level of individual IPM practices in Chilli crop n=120

Sl. no.	Practices	Adoption	
		Frequency	Percent
I.	Cultural practices		
1	Removal of previous crop residues	116	96.67
2	Summer ploughing	115	95.83
3	Practice of raised nursery bed	29	24.17
4	Recommended seed rate	69	57.50
5	FYM	112	93.33
6	Trimming of field bunds	112	93.33
7	Trap crops	78	65.00
8	Intercultivation	120	100.00
9	Crop rotation	98	81.67
II.	Mechanical practices		
1	Use of mesh nylon net	11	9.17
2	Regular destruction of damaged fruits at each harvest stage	117	97.50
3	Regular destruction of infected flowers of trap crop	40	33.33
4	Pheromone traps	35	29.17
III.	Biological management		
1	Use of NSKE	73	60.83
2	NSKE on trap crop	25	20.83
2a	Quantity of NSKE	18	15.00
3	Application of NPV and Pseudomonas	15	12.50
3a	Time of spraying NPV	13	10.83
3b	Quantity of Pseudomonas	9	7.50
4	Seed treatment with biofertilizer	52	43.33
5	Growing pulses on the edge rows to build up natural enemies	65	54.17
IV.	Chemical management		
1	Balanced dose of fertilizer	82	68.33
2	Recommended dose of pesticides	113	94.17
3	Seed treatment with chemical	109	90.83
	Pests		
a.	Control measures for Fruit borers	120	100.00
b.	Control measures for Thrips	120	100.00
c.	Control measures for Mites	120	100.00
d.	Control measures for Aphids	112	93.33

Relationship between socio-economic characteristics of respondents with adoption of IPM practices

With respect to relationship of independent variables with adoption, a cursory look at Table 3 showed that, variables like education, land holding, mass media participation and management orientation exhibited positive and significant relationship with knowledge level at 1% level of probability. Whereas, annual income, land holding, risk orientation and scientific orientation showed positive and significant relationship with knowledge level at 5%. This might be due to fact that, as education, more land holding, increased mass media participation and better management orientation on the part of farmers increases the adoption of improved cultivation practices.

George *et al.* (2012) reported that, characteristics of vegetable growers like education, social participation, land holding, annual income, risk orientation, economic motivation, attitude towards IPM, information seeking

behavior, mass media contact had positive and significant relationship with adoption level of IPM practices.

TABLE 3: Relationship between socio-economic characteristics of respondents with knowledge and adoption of IPM practices

	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}
X_1	1										
X_2	-0.006	1									
X_3	0.693**	0.018	1								
X_4	-0.043	-0.077	-0.132	1							
X_5	-0.110	-0.056	-0.161	0.798**	1						
X_6	-0.057	-0.005	-0.055	-0.010	0.046	1					
X_7	0.043	0.003	0.053	-0.005	0.050	0.077	1				
X_8	-0.005	-0.036	-0.052	0.188*	0.182*	0.117	0.074	1			
X_9	-0.056	-0.036	0.028	0.095	0.132	0.044	0.120	-0.026	1		
X_{10}	-0.017	-0.076	-0.004	-0.060	0.040	0.014	0.015	0.101	-0.092	1	
X_{11}	-0.172	-0.072	-0.162	-0.052	0.016	0.061	-0.041	0.053	-0.003	0.005	1
X_{12}	0.078	0.61**	0.111	0.31*	0.29*	0.114	0.257**	0.212*	0.304**	0.33*	0.009

X_1 –Age
X_2 - Education
X_3 –Farming experience
X_4 – Annual income
X_5 - Land holding
X_6 – Extension participation
X_7 - Maas media participation
X_8 - Risk orientation
X_9 - Management orientation
X_{10} - Scientific orientation
X_{11} - Information seeking behaviour
X_{12} - Adoption

**Correlation is significant at the 0.01 level *Correlation is significant at the 0.05 level

Multiple regression analysis of characteristics of respondents and adoption of IPM practices

Multiple regression analysis was carried out for determining the contribution of independent variables with adoption of IPM practices by the chilli farmers and the data, thus obtained, have been furnished in Table 4.

Data presented in Table 4 revealed that, the variables like management orientation and risk orientation had positively significant relationship with adoption of IPM practices by the chilli growers. Hence, these variables could be considered as good predictors of adoption of IPM practices in chilli crop. Whereas, co-efficient of determination (R^2) of the independent variables was 0.685. It means that 68.50 per cent of total variation in the adoption was explained by the 11 selected independent variables. It implied that there are other unidentified variables contributing to the variation not included in the present study.

TABLE 4: Multiple regression analysis of characteristics of respondents and knowledge and adoption of IPM practices

SL. no.	Variables	Adoption	
		Reg. Coeff. 'b' value	't' value
1	Age	0.043	0.359
2	Education	-0.009	-0.100
3	Farming experience	0.053	0.440
4	Annual income	-0.105	-0.726
5	Land holding	-0.089	-0.615
6	Extension participation	0.065	0.763
7	Maas media participation	0.198	2.305
8	Risk orientation	0.236*	2.697
9	Management orientation	0.305**	3.506
10	Scientific orientation	-0.014	-0.156
11	Information seeking behaviour	0.013	0.149
		$R^2 = 0.685$	

** Significant at the 0.01 level * Significant at the 0.05 level

CONCLUSION

It can be concluded for the above results that, majority of the chilli growers were belonged to medium category with respect to adoption of IPM practices. Majority of them adopted practices like inter-cultivation, removal of previous crop residues, summer ploughing, application of FYM, destruction of damaged fruits, regular destruction of infected flowers of trap crops, practice of spraying of NSKE, growing pulses on the edge rows and control measures for fruit borers, thrips and mites which are easy to use and adopt and also economic. This bring to focus that it is of utmost important to design more number of skill trainings, demonstrations and exposure visits by the development departments, central and state plant

protection training centres to convince the farmers about IPM method for higher adoption and diffusion of IPM technology. There is a need to motivate the farmers in adoption of other important integrated pest management practices like pheromone traps, application of NPV and Pseudomonas and seed treatment with bio-fertilizer by conducting intensive extension educational activities.

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