

Adoption of eco-friendly crop management practices by the farmers in Tamil Nadu

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ABSTRACT

The study was carried out to find out the relationship and influence of social-economic-communication-psychological characteristics of the respondents/farmers on adoption of eco-friendly crop management practices. The study included 120 farmers from five intensive cultivation practicing villages of Cumbum block of Theni district in Tamil Nadu. The respondents were interviewed personally by a well-structured and pretested interview schedule. Percentage analysis, cumulative frequency, correlation coefficient and multiple regression were used to analyse the collected data. Age, farm waste disposal behaviour and adoption behaviour of integrated pest management (IPM) showed a positive and significant while the livestock possession, innovativeness and scientific orientation showed a negative and significant contribution to adoption of eco-friendly crop management practices of the respondents.

Keywords: Adoption; eco-friendly; intensive cultivation; scientific orientation; characteristics

INTRODUCTION

In India green revolution has witnessed a quantum jump in agricultural production with the introduction of high yielding varieties of various crops and by following intensive cultivation practices with the use of fertilizers, pesticides and other inorganic inputs. Maliwal (2005) reported that environment is a word which describes in the aggregate all of the external forces, influences and conditions which affect the life, nature, behavior, growth, development and maturation of living organisms. The harmful effects caused to an agricultural system are due to the mismanagement of natural resources. In order to balance this situation eco-friendly farming which aims at cultivating the land and raising crops in such a way so as to keep the soil alive in good health may be an alternative to the present system of farming which solely depends on chemicals. Accordingly Shashidhara (2012) revealed that majority of the respondents were in medium level adoption of ecofriendly technologies. With respect to adoption on integrated nutrient

management majority of the respondents were not practicing application of organic manures, selection of crops and cropping pattern, mixed cropping, inter-cultivation practices, application of bio-fertilizers to soil and use of limited inorganic fertilizers. The maximum vegetable growers had low extent of adoption of the eco-friendly management practices followed by medium and high extent of adoption (Patel et al 2013).

In a research study on awareness about environmental issues and management of natural resources conducted by Arunachalam (2003) it was found that the variables viz education, farm size, social participation, risk orientation, farm waste disposal behaviour, integrated pest management, integrated water management, integrated weed management, integrated nutrient management, great concern for environment, progressive nature and farm machinery use behaviour of the respondents had their influence on the adoption of natural resource management practices. The innovativeness, attitude, perception on organic manures, perception on feasibility, perception

on health hazards, information source utilization, decision making and perception on environmental degradation were variables that had positive and significant association with adoption of eco-friendly technologies (Chandra 2001). The eco-friendly technology utilization among farmers concluded that participation in trainings and perception on environmental degradation had shown a positive significant contribution for adoption of eco-friendly technologies (Nalini 2004). It is essential to know the characteristics of the intensive growers and their influence on the dependent variable to have a clear understanding about their background, attitude, perception and mindset in general.

The present study was done with an objective to assess the relationship and influence of the independent variables on adoption of eco-friendly crop management practices among the farmers.

METHODOLOGY

The study was conducted in Theni district of Tamil Nadu where Cumbum block of Uthamapalayam Taluk was selected for the study by purposive sampling. Among eleven revenue villages of Cumbum block five villages namely Annumandanpatti, C Pudhupatti, KK Patti, NT Patti (North) and Melagudalore (North) were selected by judgment sampling and based on the judgment of assistant agricultural officer, the agricultural officer and the agricultural development officer of the block. Proportionate sampling method was employed to draw the 120 respondents from the five revenue villages. For this study ex post facto research design was followed. The data were collected with the help of a well-structured and pretested interview schedule. With the statistical tool of percentage analysis, cumulative frequency, correlation and multiple regression the data were analyzed.

Table 1. Distribution of the respondents according to different characteristics

Variable	Parameter/category	f	%
X_1	Age		
	Young	39.00	32.50
	Middle	34.00	28.30
	Old	47.00	39.20
X_2	Education		
	Illiterate	09.00	07.50
	Functionally literate	00.00	00.00
	Primary education	17.00	14.20
	Middle school education	29.00	24.20
	Secondary school education	25.00	20.80
	Collegiate	40.00	33.30
X_3	Farming experience		
	Low	27.00	22.50
	Medium	00.00	00.00
	High	93.00	77.50
X_4	Farm size (acres)		
	Up to 2.5 (marginal)	11.00	09.17
	2.6 to 5 (small)	40.00	33.33
	5.01 to 10 (medium)	41.00	34.17
	10.1 and above (big)	28.00	23.33
X_5	Farm power utilization		
	Low	30.00	25.00
	Medium	48.00	40.00
	High	42.00	35.00
X_6	Source of irrigation		
	Canal	42.00	35.00
	Tank	00.00	00.00
	Well	15.00	12.50
	Canal + well	63.00	52.50
X_7	Livestock possession		
	Low	88.00	73.34
	Medium	00.00	00.00
	High	32.00	26.66

X ₈	Cropping intensity				
	Low	09.00	07.50		
	Medium	69.00	57.50		
	High	42.00	35.00		
X ₉	Farm waste disposal behavior	Method of disposal	f	%	
	Waste water after washing the containers, equipments used for storing/putting chemical inputs	Thrown in the main field	93.00	77.50	
		Disposed safely outside	27.00	22.50	
	Plastics and aluminum containers after the use of inputs like herbicides and other chemicals	Just thrown in the field	17.00	14.16	
		Cleaned and used for domestic purpose	56.00	46.66	
		Safely disposed	47.00	39.18	
	Disposal of crop waste	Left uncared	45.00	37.50	
		In situ ploughing	69.00	57.50	
		Preparing compost for future use	06.00	05.00	
	Disposal of tree waste	Fuel purpose, sold	66.00	55.00	
		Left as such	47.00	39.16	
		Stored for future use	07.00	5.84	
	Disposal of animal waste Animal waste	Domestic purpose	90.00	75.01	
		Fuel purpose	16.00	13.33	
		Compost preparation	14.00	11.66	
	Dead animal/bird	Burnt safely	55.00	45.83	
		Buried	65.00	54.17	
X ₁₀	Concern for environment	Agree		Disagree	
		f	%	f	%
	It is our duty to plant more trees to conserve environment	109.00	90.84	11.00	09.16
	By following organic farming practices we can have clean and healthy environment	83.00	69.17	37.00	30.83
	One should not pollute the air at any cost including intensive farming activities	107.00	89.17	13.00	10.83
	Environmental education to all is necessary	105.00	87.50	15.00	12.50
	Water is a precious resource and should not be polluted	112.00	93.34	08.00	06.66
	Utmost care should be taken to preserve the natural enemies while going for chemical control of pests	110.00	91.67	10.00	08.33
	STL-based fertilizer application will help to avoid pollution	95.00	79.17	25.00	20.83
	Now the situation is so emergent that we have to go for minimum use of chemical inputs to avoid environmental hazards	106.00	88.34	14.00	11.66
	Parameter	f	%		
X ₁₁	Community participation				
	Low	101.00	84.20		
	Medium	19.00	15.80		
	High	00.00	00.00		
X ₁₂	Environmental education				
	Low	40.00	33.33		
	Medium	56.00	46.67		
	High	24.00	20.00		

Parameter		f	%		
X ₁₃	Innovativeness				
	Low	15.00	12.50		
	Medium	44.00	36.66		
	High	61.00	50.84		
X ₁₄	Information seeking behaviour				
	Low	37.00	30.83		
	Medium	43.00	35.84		
	High	40.00	33.33		
X ₁₅	Economic motivation				
	Low	29.00	24.16		
	Medium	35.00	29.16		
	High	56.00	46.68		
X ₁₆	Scientific orientation				
	Low	37.00	30.83		
	Medium	37.00	30.83		
	High	46.00	38.34		
X ₁₇ Adoption of IPM practices		Adopted		Not adopted	
		f	%	f	%
Cultural practices					
Selection of right season		120.00	100.00	00.00	00.00
Summer ploughing (recommended tillage operations)		118.00	98.34	02.00	01.66
Raising pest and disease resistant varieties		50.00	41.67	70.00	58.33
Maintaining weed free environment		113.00	94.17	07.00	05.83
Training and plastering of bunds		113.00	94.17	07.00	05.83
Synchronized sowing		114.00	95.00	06.00	05.00
Mechanical practices					
Removal and destruction of pests, infected plant parts		117.00	97.50	03.00	02.50
Use of light traps		16.00	13.33	104.00	86.67
Use of sticky traps		02.00	01.66	118.00	98.34
Use of scarecrow		81.00	67.50	39.00	32.50
Botanical methods					
Use of natural enemies		00.00	00.00	120.00	100.00
Use of pheromones, traps		15.00	12.50	105.00	87.50
Use of bio-pesticides		07.00	05.83	113.00	94.17
Chemical methods					
Use of recommended doses of insecticides/fungicides		00.00	00.00	120.00	100.00
Use of recommended doses of herbicides		00.00	00.00	120.00	100.00
Seed treatment with chemicals		00.00	00.00	120.00	100.00
Avoiding repeated use of same pesticides		00.00	00.00	120.00	100.00
STL-recommended fertilizers		00.00	00.00	120.00	100.00

RESULTS and DISCUSSION

Socio-economic-communication-psychological characteristics of respondents: Seventeen characteristics were taken up for analysis in the study (Table 1). Majority of the respondents were found to be old and had a high level of education ie primary education to college level. Most of them had high level of farming experience with medium-size land holdings (5-10 acres) and medium farm power utilization behaviour. More than half of the respondents depended on both canal and well for irrigation and had low

livestock possession. A majority of the respondents had medium level of cropping intensity and had not disposed the farm waste in a way that would reduce the environmental issues documented. The respondents possessed low level of community participation to protect the environment but showed their great concern for environment. More than two-third of the respondents had medium to high level of environmental education, innovativeness, information seeking behaviour, economic motivation and scientific orientation. Among the integrated pest management practices, cultural and mechanical practices were widely adopted by the

majority of the respondents whereas none had adopted botanical and chemical methods.

Adoption of eco-friendly crop management practices: The contribution of independent variables was studied with the dependent variables adoption. To find out the relationship between the dependent variables adoption and the seventeen independent variables the simple correlation was worked out and the results are presented in the Table 2.

Correlation: The contribution of the independent variables namely age, educational status, farming experience, farm size, farm power utilization behavior, source of irrigation, livestock possession, cropping intensity, farm waste disposal behaviour, concern for environment, community participation, environmental education, innovativeness, information seeking behaviour, economic motivation, scientific orientation and adoption behaviour on IPM with adoption. were studied

It can be seen in the table that three variables namely age, educational status, adoption behaviour on IPM and farm waste disposal behaviour had positive and significant relation with adoption. Livestock possession, innovativeness and scientific orientation had a negative and significant relation with adoption. Thus it may be stated that the adoption was a function of age, educational status, farm waste disposal behaviour, livestock possession, innovativeness and scientific orientation.

Multiple regression: Multiple regression was carried out to find out relative contribution of each variable towards the adoption rate of the respondents. The Table 2 shows that F-value was significant and R^2 value was 0.456 which was interpreted as 45.60 per cent variation in the adoption level explained by the seventeen independent variables selected for the study. Since the F-value was significant the prediction equation was fitted for the adoption of the respondents as given below:

$$Y_3 = 46.302 + 0.416^{**}X_1 + 0.189X_2 - 0.040X_3 + 0.124X_4 + 0.026X_5 - 0.044X_6 - 0.487^{**}X_7 + 0.004X_8 + 0.231^{**}X_9 - 0.015X_{10} + 0.008X_{11} + 0.354^{**}X_{12} - 0.509^{**}X_{13} + 0.010X_{14} - 0.008X_{15} - 0.107^{**}X_{16} + 0.247^{**}X_{17}$$

The equation shows that the regression coefficient of the variables viz age (X_1), farm waste disposal behaviour (X_9), environmental education (X_{12}) and adoption behaviour of IPM (X_{17}) had shown a

positive and significant while livestock possession (X_7), innovativeness (X_{13}) and scientific orientation (X_{16}) had a negative and significant contribution to adoption of the respondents at one per cent level of significance.

Table 2. Correlation and multiple regression analysis of characteristics of respondents with their adoption

Variable	Parameter	'r' value	Regression coefficient	SE	t-value
X_1	Age	0.183*	0.416	0.164	2.532**
X_2	Educational status	0.202*	0.189	0.098	1.924 ^{NS}
X_3	Farming experience	0.100	-0.040	0.225	-0.178 ^{NS}
X_4	Farm size	0.082	0.124	0.171	0.725 ^{NS}
X_5	Farm power utilization	0.171	0.026	0.082	0.318 ^{NS}
X_6	Source of irrigation	0.068	-0.044	0.118	-0.375 ^{NS}
X_7	Livestock possession	-0.263**	-0.487	0.137	-3.564**
X_8	Cropping intensity	0.050	0.004	0.005	0.812 ^{NS}
X_9	Farm waste disposal behaviour	0.292**	0.231	0.078	2.966**
X_{10}	Concern for environment	-0.057	-0.015	0.103	-0.149 ^{NS}
X_{11}	Community participation	0.088	0.008	0.011	0.676 ^{NS}
X_{12}	Environment education	0.149	0.354	0.112	3.153**
X_{13}	Innovativeness	-0.303**	-0.509	0.198	-2.564**
X_{14}	Information seeking behaviour	0.067	0.010	0.014	0.697 ^{NS}
X_{15}	Economic motivation	0.021	-0.008	0.040	-0.197 ^{NS}
X_{16}	Scientific orientation	-0.277**	-0.107	0.038	-2.845**
X_{17}	Adoption behaviour on IPM	0.189*	0.247	0.077	3.200**

$R^2 = 0.456$, $F = 5.030^{**}$, **Significant at 1% level, *Significant at 5% level, NS= Non-significant

This reveals that a unit increase in age, educational status, farm waste disposal behaviour, environmental education, adoption behaviour on IPM etc by a unit would result in an increase in the adoption of eco-friendly crop management practices of the respondents by 0.416, 0.189, 0.231, 0.354 and 0.247 units respectively. A unit increase in livestock possession, innovativeness and scientific orientation would decrease the adoption level of the respondents by 0.487, 0.509 and 107 units respectively.

As the age increased the respondents saw the change that took place in cultivation by experience and further education and environmental education helped them to gain awareness about the ill-effects caused by modern agriculture. This would have influenced them to go for adoption of eco-friendly crop management practices. Farm waste disposal behaviour is the extent to which the farm waste is disposed off when the disposal behaviour is in-line with eco-preservation and it will influence the adoption of eco-friendly crop management practices. As adoption behaviour on integrated pest management increases the adoption level is also increased.

The innovators who followed scientific technologies generally adopted modern/new technologies ignoring eco-friendly technologies. This might be the reason for negative and significant contribution of innovativeness and scientific orientation to the adoption of eco-friendly crop management practices. At present as the demand for organic manure is very high which is highly remunerative the farmers have the tendency to sell the manure rather than applying it in their own fields. They have the practices of using chemical fertilizers which are cheaper than the organic manures. This could be the reason for negative and significant contribution of livestock possession to the adoption of eco-friendly crop management practices.

CONCLUSION

The findings on socio-economic-communication-psychological characteristics of farmers and the relationship of these characteristics with the dependent variable will help the extension workers to frame suitable extension strategies for creating awareness about imminent environmental hazards caused by the use of chemical fertilizers, pesticides and heavy implements. It would help the planners, policy makers and extension workers to find out the ways to raise the level of adoption of ecofriendly practices in order to reduce the quantum of environmental hazards by agricultural chemicals, development of pest resistance, pollution etc in the long run and thereby protecting the environment.

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