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A STUDY ON ADOPTION OF BOTANICAL PESTICIDES AND ITS RELATIONSHIP WITH THE CHARACTERISTICS OF THE RESPONDENTS AND THE CONSTRAINTS

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Abstract

Green revolution in our country, while ushering in the much needed self-sufficiency in food production also paved way for intensive use of harmful chemical pesticides. Excessive and indiscriminate use of these chemicals played havoc with our agro ecosystems, caused numerous problems and hazards to man and his environment besides inducing resistance in insects and undesirable residues in the food stuff. One of the best alternative methods of approach to pest control is achieved by replacing the chemical pesticides by products derived from plants. These plant products also known as botanical pesticides being non persistent and biodegradable contribute admirably to the preservation of ecosystem. Among the plant products neem-based botanical pesticides occupy a unique position and these emerged as viable alternative to chemical pesticides. Today more than three dozen commercial formulations of neem are available in the Indian market. Besides neem, nearly 500 compounds derived from 275 plant species were found to have pesticidal properties. The principal barriers to commercialization of botanical pesticides include the relative scarcity or availability of the natural resources, standardization of extract and quality control based on active ingredients and special problem in regulatory approval of botanicals. A study was conducted in Kanyakumari district to find out the adoption of botanical pesticides. The data were collected from 120 farmers. More than half of the respondents were found with low level adoption of botanical pesticides. Application of neem cake and kerosene to control paddy green leaf hopper was adopted by 34.16 per cent of the respondents. The occupational status showed a positive and significant relationship with extent of adoption.

Key words : Botanical pesticides, neem etc.

Introduction

Green revolution in our country, while ushering in the much needed self-sufficiency in food production also paved way for intensive use of harmful chemical pesticides. Excessive and indiscriminate use of these chemicals played havoc with our agro-ecosystems, caused numerous problems and hazards to man and his environment besides inducing resistance in insects and undesirable residues in the food stuff. One of the best alternative methods of approach to pest control is achieved by replacing the chemical pesticides by products derived from plants. These plant products also known as botanical pesticides being non persistant and biodegradable contribute admirably to the preservation of ecosystem.

Among the plant products neem based botanical pesticides occupy a unique position and these emerged as viable alternative to chemical pesticides. Today more than three dozen commercial formulations of neem are available in the Indian market. Besides neem, nearly 500 compounds derived from 275 plant species were found to have pesticidal properties. The principal barriers to commercialization of botanical pesticides include the relative scarcity or availability of the natural resources, standardization of extract and quality control based on active ingredients and special problem in regulatory approval of botanicals.

Ever since the drawbacks of synthetic pesticides were realized, efforts all over the world were underway for the chemicals which are cheap, easily biodegradable and safer to human beings, non-polluting which will not harm non-target organisms and does not leave any harmful residues on plants and plant products with greater selectivity. Botanical pesticides would play an important role as an alternative and provide an ideal source of low cost, safe and effective insecticides.

Material and Methods

The study was carried out in Kanyakumari district. There are four taluks in Kanyakumari district viz., Agastheeshwaram, Thovalai, Kalkulam and Villavancode. All the four taluks were identified for collection of data. One block from each taluk was

selected randomly and the selected blocks were Agastheeshwaram, Thovalai, Thiruvatar and Killior from Agastheeshwaram, Thovalai, Kalkulam and Villavancode taluk respectively. From each block one village was randomly selected. Thus a total of four villages viz., Theroor, Vellamadam, Arumanai and Karungal were selected for data collection from Agastheeshwaram, Thovalai, Thiruvatar and Killior blocks respectively. The list of farmers in the selected villages were obtained from village extension workers concerned. The respondents were selected by random sampling. The required number of respondents (120) were selected from four villages by identifying equal number of respondents (30) from each of the villagers. A well structured interview schedule was prepared taking into consideration of the objective of the study. Interview schedule was prepared in English questions were translated and asked in Tamil. Data were collected by personal interview of respondents. Before finalizing the interview schedule, it was pre-tested in a non-sample area to identify the inconsistencies and later necessary changes in the schedule were made. The data were collected from 120 farmers. To find out the level of adoption of botanical pesticides a well structured interview schedule was used for the data collection. Seven adoption practices were selected to find out the adoption of botanical pesticides. To assess the adoption a score of two was given for adoption and one for non-adoption.

Results and Discussion

Adoption of Botanical Pesticides

The cumulative frequency method was used to classify the variables into three categories viz. low, medium, and high by dividing the difference between the maximum and minimum scores of a variable into three equal classes. The result on over all adoption of botanical pesticides reveal that more than half (51.66 per cent) of the respondents were found with low level adoption, followed by medium (43.34 per cent) level. This may be due to lack of interest and conviction to use botanical pesticides. The results on distribution of respondents according to their practice wise adoption are furnished in Table 1.

Table 1 : Practicewise adoption of botanical pesticides

S. No	Knowledge items	Respondents	
		Number	Per cent
1	Neem cake application for paddy	57	47.50
2	Blending urea with neem	58	48.33
3	Blending urea with neem cake and kerosene	41	34.16
4	Controlling rice brown plant hopper by using neem oil	26	21.66
5	Controlling rice leaf folder by using neem kernel extract	25	20.83
6	Controlling leaf blight through neem oil	27	22.50
7	Controlling the leaf spot through neem kernel extract	31	25.83

It reveals that nearly half the farmers (47.50 per cent) were found to have adopted neem cake in paddy nursery. The smell of neem cake repels the pest. Application of neem cake and kerosene to control paddy green leaf hopper was adopted by 34.16 per cent of the respondents. Mixing of neem cake and kerosene increases the effectiveness to control paddy green leaf hopper. Blending urea with neem cake was found to be adopted by 31.66 per cent of the respondents. This will release the nitrogen slowly and control the pests. Controlling the diseases through neem kernel extract was found to be adopted by 28.53 per cent of the respondents as this had been an age old practice. Controlling the diseases through neem oil application was found to be adopted by 22.50 per cent of the respondents. Application of neem kernel extract to control paddy leaf folder was found to be adopted by 20.83 per cent of the respondents. Few of the farmers only adopted this technology when compared to the usage of chemical pesticides. The zero–order correlation was computed to know the relationship of the socio-economic and psychological characteristics of the respondents with their adoption of botanical pesticides. The relationship of the socio-economic and psychological characteristics of the respondents with their extent of adoption of botanical pesticides are given in Table 2.

It shows that out of thirteen characteristics of the respondents, three characteristics viz. educational status, occupational status and extension agency contact were found to have positive and significant relationship with extent of adoption of botanical pesticides whereas the remaining characteristics *viz.,* age, farm size, farming experience, annual income, social participation, innovativeness, risk orientation, scientific orientation, economic motivation and mass media exposure were found to have non-significant relationship with the extent of adoption of botanical pesticides.

Table 2 : Relationship of the socio-economic and psychological characteristics of the respondents with their extent of adoption of botanical pesticides

Variable No	Independent Variables	Correlation Coefficient
X1	Age	-0.157NS
X2	Educational status	0.286**
X3	Occupational status	0.192*
X4	Farm size	-0.073NS
X5	Farming experience	0.035NS
X6	Annual income	0.092NS
X7	Social participation	-0.011NS
X8	Extension agency contact	0.373*
X9	Innovativeness	-0.091NS
X10	Risk orientation	-0.019NS
X11	Scientific orientation	-0.157NS
X12	Economic motivation	0.072NS
X13	Mass media exposure	-0.175NS

** significant at 1 per cent level *significant at 5 per cent level
NS- Non-significant

Based on this, it may be inferred that more the educational status, occupational status, better the extension agency contact of the respondents higher would be the adoption of botanical pesticides.

The educational level reveals a positively, significant relationship with adoption. It may be due to the reason that more educated people can have better knowledge about the botanical pesticides leading to better adoption. This finding is in line with the findings of Renjini (2000).

Occupational status showed a positive and significant relationship with extent of adoption. The respondents who have farming with additional occupation can spend more money on farming and this may be the reason for positive and significant relationship between occupation and adoption. This finding is in line with the findings of Devanand (2000).

Regression of characteristic of respondents with their extent of adoption of botanical pesticides

Regression was computed to know the relationship of characteristics of the respondents with their adoption of botanical pesticides. The results are given in Table 3.

It could be observed from table 3 that all the selected thirteen independent variables together explained 31.00 per cent of variations in adoption. Hence it could be concluded that the functional linear relationship between independent variables and dependable variables could be established of the thirteen variables taken for the analysis. Occupational status X3 was significant at 0.05 level of probability towards the adoption of botanical pesticides. This revealed that a unit increase in occupation would increase the adoption by 0.05 units keeping other variables at constant level. Increased occupation score revealed that most of the respondents doing agriculture along with their other occupations like business and other services thereby enhance their economic base leading to better adoption of botanical pesticides.

Constraints in Adoption of Botanical Pesticides

This section deals with the constraints expressed by the respondents for their non adoption of recommended botanical pesticides in paddy. The general problems as encountered by the respondents were also collected and discussed below.

The constraints experienced in adoption of botanical pesticides are given in Table 4.

Table 3 : Regression of characteristic of respondents with their extent of adoption of botanical pesticides

Variable no	Independent variables	Regression coefficient	Standard error	't' Value
X1	Age	-0.040	0.024	-1.670NS
X2	Educational status	0.148	0.304	0.487 NS
X3	Occupational status	0.057	0.023	2.481*
X4	Farm size	-0.273	-0.250	-1.080 NS
X5	Farming experience	0.004	0.022	0.221 NS
X6	Annual income	-0.002	0.027	-0.081 NS
X7	Social participation	-0.070	0.127	-0.591 NS
X8	Extension agency contact	-0.090	0.049	-1.837 NS
X9	Innovativeness	-0.030	0.275	-0.110 NS
X10	Risk orientation	0.016	0.024	0.692 NS
X11	Scientific orientation	-0.345	0.213	-1.621 NS
X12	Economic motivation	-0.109	0.324	-0.337 NS
X13	Mass media exposure	-0.520	-0.627	-0.830 NS

F= 3.663 R^2 =0.310 *significant at 5% level NS- Non significant

Table 4 : Constraints in adoption of botanical pesticides

S. No	Practices	Constraints	Number	Per cent
1.	Neem cake application for rice nursery (n=25)	Non-availability in time	14	56.00
		High cost	03	12.00
		Poor quality of neem cake	08	32.00
2.	Blending urea with neem cake (n=42)	Inadequate water availability	27	64.28
		Inability to plan in advance	15	35.72
3.	Blending urea with neem cake and kerosene (n=55)	Lack of reinforcement upon the technology	14	25.45
		Unable to remember the quantity	41	74.55
4.	Controlling rice pest by using neem oil (n=60)	Lack of conviction	09	15.00
		Inability to remember	03	05.00
		Not visible immediately	48	80.00
5.	Controlling rice pest by using neem kernel extract (n=75)	Non-availability of seeds in time	51	68.00
		High labour	15	20.00
		Lack of knowledge	09	12.00
6.	Controlling the diseases through neem oil application (n=80)	Unable to remember the quantity	25	31.25
		Lack of reinforcement	37	46.25
		Inability to attend plant protection campaigns and farm trainings	18	22.50
7.	Controlling the diseases through neem kernel extract (n= 75)	Lack of understanding over the details given by the extension workers	56	74.66
		Inadequate knowledge	10	13.34
		Non-availability of labours	09	12.00

Neem cake application for paddy nursery

It could be observed from the Table 4 that non-availability of neem cake in time (56.00 per cent), high cost (12.00 per cent) and the poor quality of neem cake (32.00 per cent) were the constraints expressed by the respondents. Non-availability of neem cake in time was the major constraint experienced in adoption of botanical pesticides.

Blending urea with neem cake

Inadequate water availability at the time of application of blending urea with neem cake was found to be reported by more than two-thirds (64.28 per cent) of the respondents. During the dry season they avoid the mixing of neem cake with urea. The next constraint expressed was the inability to plan in advance in the use of blending urea with neem cake and it was reported by over one-third (35.72 per cent) of the respondents.

Blending urea with neem cake and kerosene

The resons as indicated by 74.55 per cent of the farmers for their non-adoption of blending urea with neem cake and kerosene were inability to remember the quantity and reinforcement of the technology was reported by 25.45 per cent of the respondents. The respondents were unable to remember the proportions.

Controlling rice pest by using neem oil

It was observed that lack of conviction about the merits of the practice (15.00 per cent) and inability to remember the correct quantity of application (5.00 per cent) were the constraints in using the neem oil. The sudden knock down of the pest population by using the neem oil is not visible immediately. This was the major constraint as reported by 80.00 per cent of the respondents.

Controlling rice pest by using the neem kernel extract

The reasons as indicated by 68.00 per cent of the farmers for their non-adoption of the practice was non-availability of neem seeds in time and high labour and more time for the preparation of neem kernel extract was reported by 20.00 per cent of the respondents. Lack of neem seeds in time is major constraint experienced in adoption of botanical pesticides. About 12.00 per cent of the farmers indicated lack of knowledge about the preparation of the neem seed kernel extract.

Controlling the diseases through the neem oil application

More than 30.00 per cent of the respondents reported that they were unable to remember the correct quantity and time of application of botanical pesticides. This might be due to lack of reinforcement by extension agents before the time of application as stated by 46.25 per cent of the respondents. Inability to participate in plant protection campaigns and farm trainings were reported by 22.50 per cent of the respondents. Lack of reinforcement by extension agents is the major constraint.

Controlling the diseases through neem kernel extract

Lack of understanding of the details given by the extension workers and inadequate knowledge and non-availability of labour were the constraints reported by 74.66 per cent, 13.34 percent and 12.00 per cent of the respondents respectively. The farmers were unable to understand the details given by the extension workers. All the above findings are in line with the findings of Vijayakumar (1997).

Conclusion

This study clearly shows that extent of adoption of botanical pesticides was generally low especially in the control of diseases. Follow-up programmes and field visits may be organized to promote the adoption of botanical pesticides among the farming community.

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