Journal of Pharmacognosy and Phytochemistry

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A study on knowledge and constraints in adoption of botanical pesticides

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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. A study was conducted in Kanyakumari district to find out the knowledge of botanical pesticides. The data were collected from 120 farmers. More than half of the respondents were found with medium level of knowledge on botanical pesticides. More than two-thirds (66.66 per cent) of the paddy farmers had knowledge about controlling the diseases through application of neem products. The occupational status showed a positive and significant relationship with extent of knowledge.

Keywords: botanical pesticides, Green revolution, botanical pesticides

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 agroecosystems, 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.

Ever since the drawbacks of synthetic pesticides were realized, efforts all over the world were underway for the chemicals which are cheap, easily biodegradable, 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.

Methodology
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, Thiruvattar 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.

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The required number of respondents (120) were selected from four villages by identifying equal number of respondents (30) from each of the villagers. The data were collected from 120 farmers. To find out the knowledge level of botanical pesticides a well structured interview schedule was used for the data collection. Nine knowledge items were selected to find out the knowledge of botanical pesticides. To assess the knowledge a score of two was given for correct response and one for incorrect response.

Findings and Discussion
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 knowledge of botanical pesticides reveal that majority (59.16 per cent) of the respondents were found to posses medium level of knowledge and 28.33 per cent of them had low level of knowledge. The remaining 12.51 per cent of the respondents had high level of knowledge on various dimensions of botanical pesticides. These results may be due to more extension agency contact, mass media exposure and high educational status of the respondents. The result is in accordance with the outcome of the study of Vijayakumar (1997) [4].

Practicewise knowledge level of respondents on botanical pesticides
Nine knowledge items were selected for assessing the knowledge level. The results regarding the practicewise knowledge of the respondents are furnished in Table 2

Table 2: Practicewise knowledge level of respondents on botanical pesticides (n=120)

S. No	Practices	Respondents	
		Number	Per cent
1	Recommended quantity of neem cake and kerosene for mixing with urea	66	55.00
2	Quantity of neem oil to be applied to control the paddy brown plant hopper	58	48.33
3	Recommended quantity of neem kernel extract to be applied to control rice leaf folder	42	35.00
4	Recommended quantity of neem oil to control tungro virus	39	32.50
5	Recommended quantity of neem kernel extract to control tungro virus	41	34.16
6	Mixing neem oil with standard insecticides.	78	65.00
7	Required seed to prepare 5 per cent of neem seed kernel extract	58	48.33

Table 2 reveals that more than two-thirds (66.00 per cent) of the paddy farmers had knowledge about controlling the diseases through application of neem products. The technology was known to majority of the respondents probably due to efficiency of the products. Most of the farmers (65.00 per cent) had knowledge about mixing neem oil with standard insecticides like endosulphan and monochrotophos to increase the effectiveness of botanical 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

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

The table 2 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.

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) [3].

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) [1].

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 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. 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) [4].

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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