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FARMERS KNOWLEDGE AND ADOPTION OF INTEGRATED PEST MANAGEMENT (IPM) IN PHEK DISTRICT OF NAGALAND

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ABSTRACT

This paper emphasizes the knowledge level of farmers towards IPM and the extent of adoption of IPM practices by the target farmers. The knowledge level on IPM were tested on the basis of whether they have heard or unheard of the various Cultural, Mechanical, Biological and Chemical pest management practices. The extent of adoption of IPM practices by the respondents was collected basing on their response towards adoption of various IPM practices. In the present study, the socio-economic characteristics of the respondents were considered as Independent variables and the extent of adoption as the dependent variable.

INTRODUCTION

Nagaland, the sixteenth state of the India was inaugurated in 1st December 1963. The livelihood pattern here of the hill tribes are mostly characterised by agriculture mainly of Jhum and terrace cultivation, which occupies 70 per cent of the total occupational structure (2011 census). Rice is the dominant crop and also the staple diet of the people. Of the gross cropped area under food grains, rice accounts for about 84.4 per cent. Oilseed is also an important crop which includes mustard and rapeseed. Coffee, cardamom and tea are grown as plantation crops in Nagaland. Principal crops are arums, yams, millet, maize, potato and sugarcane. Vegetable crops are melon, cucumber, spinach, mustard, onion, chilli, carrot, tomato, brinjal etc (http:/www.webindia123.com/Nagaland/economy/agriculture.htm). However, the problem of pest control and concern about the indiscriminate use of pesticides has been the subject of concern in the present scenario. Evidences indicate that pest causes 25 per cent loss in rice, 5-10% in wheat, 30% in pulses, 35% in oilseeds, 20% in sugarcane and 50 per cent in Cotton (Dhaliwal and Arora, 1996). Therefore, the damage caused by insects, plant diseases, nemadotes and weeds in the field crops has become a great concern for reducing the potential yield of field crops.

There is no doubt that chemicals have played a significant role in the past in protection of crops from insects and pests, however, their excessive and inappropriate use in our agro- ecosystem in the last two decades or so has resulted in degradation of our environment while pest problems seems greater than ever. It is estimated that damage caused by insect, pests and diseases of various crops in the fields and in the stored grain is 20 to 30 per cent in our country as per field report survey. Surveys in the district reported that this accounts for an annual loss of around Rs. 6000 crores, however, till today, the farmers are relying mostly on chemicals for the management of pests and diseases. The annual demand for pesticides in India is around 85,000 tonnes. In the case of cotton, rice and vegetables, the consumption of pesticides is maximum. Normally about 56 per cent of pesticides used in the country goes to these crops though it is grown in 5 per cent of the total cultivated area (Indiastat.com), the losses though cannot be eliminated, these can be reduced. It is therefore found that there is an urgent need to evolve strategies and technologies that will meet the increasing demands for food and fibre and also enable us to usher in the coming green revolution without any serious problems.

Integrated Pest Management (IPM) is an eco-friendly approach which aims at keeping pest population at below economic threshold levels by employing all available alternate pest control methods and techniques such as cultural, mechanical and biological with emphasis on use of bio-pesticides and pesticides of plant-origin like Neem formulations. The use of chemical pesticides is advised as a measure of last resort when pest population in the crop crosses economic threshold levels (ETL). It is the Suppression of pest population below economic threshold level through the adoption of feasible and affordable Good Agricultural Practices

aiming least disturbance to the eco system and environment. IPM is an approach which first assesses the pest situation, evaluates the merits of pest management options and then implements a system of complementary management actions within a defined area. The goal of IPM is to mitigate pest damage while protecting human health, the environment and economic viability.

The indiscriminate and unilateral use of pesticides was the only plant protection tool during sixties and seventies for sustaining of agricultural production potential of the high yielding varieties under the intensive cropping systems. This has led to several ill-effects like human and animal health hazards, ecological imbalance, development of resistance in the pests to pesticides, pests resurgence and environmental pollution as well as destruction of natural enemies (bio-control agents) of pests and increased level of pesticides residues in soil, water, food with the increased use of pesticides. National Policy statement on IPM was made by the then Hon'ble Union Agriculture Minister of India in 1985. Later on National policy on Agriculture - 2000 and National policy on Farmers - 2007 have also supported the IPM. It was also supported by the Planning Commission document for 12th Plan addressing the negative impact of chemical pesticides. (http://pib.nic.in/newsite/PrintRelease.aspx?relid=110364).

Integrated Pest Management (IPM), also known as Integrated Pest Control (IPC) is a broad based approach that integrates a range of practices for economic control of pests. The Food and Agriculture Organization of the UN defines IPM as "the careful consideration of all available pest control techniques and subsequent integration of appropriate measures that discourage the development of pest populations and keep pesticides and other interventions to levels that are economically justified and reduced or minimize risks to human health and the environment". IPM emphasizes the growth of a healthy crop with the least possible disruption to agro-ecosystem and encourages natural pest control mechanisms. Entomologists and ecologists have urged the adoption of IPM pest control for many years. IPM allows for a safer means of controlling pests. This includes managing insects, plant pathogens and weeds. Globalization of markets and increased movements of people all over the world are allowing for increasing numbers of invasive species to be brought into countries. Appropriate responses to these pests are needed and development and implementation strategies should be arranged.

IPM is the integrated use of pest control strategies in a way that not only reduces pest population to satisfactory level but is sustainable and non-polluting. The important components of IPM are use of resistant varieties, conservation and augmentation of biological control agents, regular pest survellience and use of sex pheromone for monitoring the pest build up. Host plant resistance has been used to suppress the population of insect pests. Cultivation of tolerant varieties is most economical with least disturbance to eco-system. Cultural and mechanical methods are also important factor to minimize pest attack. IPM extended the concept of integrated control to all classes of pests and was expanded to include tactics other than just chemical and biological controls. Artificial controls such as pesticides were to be applied as in integrated control but these are now had to be compatible with control tactics for all classes of pests. IPM added the multi-disciplinary element involving entomologists, plant pathologists, nematologists and weed scientists.

Indiscriminate use of pesticides has adverse ecological and socio-economic effects. Pesticides can cause pest resurgence by killing off the natural enemies of the target pests. Pests can also become resistant to pesticides leading to application of lethal dose. Pesticides do not provide a longer period of control and as a result of this it has to be repeatedly applied for its resistive action. Continued use of pesticides build up high level of toxic residue in food, soil, water and air due to which, it has been proved to be fatal to both human and environment. Considering all these negative effects and drawbacks of the indiscriminate use of pesticides and insecticides, it has led to shift towards eco-friendly technologies in pest management.

Thus, IPM is based on the principle that it is not necessary to eliminate all the pests but to suppress the pest population to a level at which these pest do not cause significant losses through the combination of biological, cultural, mechanical and chemical tool in such a way that it minimizes economic, health and environment risks.

OBJECTIVE OF THE STUDY

- Knowledge level of farmers on the application of IPM
- Extent of adoption of IPM practices by the target farmers.

RESEARCH METHODOLOGY

Sources of data collection:

In the present study, primary and secondary data have been collected. Primary data was collected from the respondents (farmers) with the help of structured schedule as well as through personal interview techniques to avoid the influence of other fellow farmers and to enable free expression of views. Secondary data was collected from various published and unpublished materials viz, journals and magazines, seminar paper presentations, websites etc., related to the problem of the study.

Sampling Design:

The present study is limited to Phek district of Nagaland. The sampling technique used in this study is purposive sampling. A sample size of 100 were selected from 3 villages namely, Khuza, Chosaba and Satheri to represent the study.

FINDINGS AND DISCUSSION

Two different sets of data relating to knowledge level of farmers on the application of IPM and Extent of adoption of IPM practices by the farmers have been analysed and presented in Table 1 and 2 for determining the reality.

1. Knowledge level of farmers on the application of IPM

The awareness on the ill effects of the use of chemicals in the field is a growing concern even in the state of Nagaland. As per the reports of a daily local news '*Morung Express*' dated May 14, 2011, it was reported that, the active use of the broad spectrum insecticide Endosulfan in agriculture crops in India had recently raised fears among consumers in Nagaland. Given the fact that agriculture and horticulture production in the state has been increasing, people were skeptical about the government's claim of being a purely organic state. The government has claimed that it does not encourage the use of pesticides farming in the state. Officials in the horticulture and agriculture departments have said that they do not procure pesticide except for demonstration

purpose. While all pesticides banned by the Ministry of Agriculture in India are also banned in the state, farmers in Nagaland are encouraged to use indigenous pest control methods. So far indigenous methods have proved to be quite effective and Pesticides are used as the last resort to control pests and were used in very small quantity- specific to the farming area. So also to promote the management of nutrients, Pest and diseases organically, trainings and demonstrations on the use of bio-pesticides and other IPM practices are being conducted by many agriculture and allied agents sectors of the state.

Here, the awareness of farmers on the application of IPM refers to the farmers (respondents) knowledge about the general application of IPM. Knowledge level of the respondents were based on their awareness level on matters related to IPM whereby respondents were assigned a score of Zero (0) if they have heard about the practices of IPM and a score of one (1), if they had not heard about it. IPM practices were based on cultural control, mechanical control, biological and chemical control.

Table 1: Knowledge level of farmers on the application of IPM

Sl.no	Methods	Response (%)	
		Have heard	*Not heard*
1.	***Cultural Control***		
	Early ploughing	100	00.00
	Adjusting sowing time	100	00.00
	Proper seed rate	100	00.00
	Preparation and levelling	100	00.00
	Destruction of stubbles and crop residue	100	00.00
	Proper spacing	100	00.00
	Proper water management	100	00.00
	Remove weeds from field	100	00.00
	Crop rotation	100	00.00
	Use of resistant varieties	100	00.00
	Mean Value	100	00.00
2.	***Mechanical Control***		
	Soil testing	25.00	75.00
	Collect egg mass	100	00.00
	Cut the leaf tip of seedlings	100	00.00
	Use of pheromone to trap insects	100	00.00
	Use of light traps	50.00	50.00
	Sun drying for rice grains	100	00.00
	Mean Value	79.16	20.83
3.	***Biological control***		
	Identifying bio-control insects	70.00	30.00
	Use of bio-control agents	40.00	60.00
	Use of botanical pesticides	80.00	20.00
	Mean value	63.33	36.66
4.	***Chemical Control***		
	Do you use less hazardous pesticides	40.00	60.00
	Do you use chemicals for treatment of godown	90.00	10.00
	Renovation and treatment of storage	95.00	5.00
	Mean value	75.00	25.00

Table 1 shows that, 100 per cent of the respondents were aware of the cultural method of insect and pest control while an average of 79.16 were aware of the mechanical control, 75.00 were aware of the Chemical control 63.33 were aware of the biological control. The knowledge is measured on the basis of their awareness on the IPM practices even if they may or may not practice it. The study revealed that the farmers had a good knowledge on the various IPM practices however, collection of egg mass, cutting of leaf tips were practiced as an indigenous method of insect/pest control which falls under the category of mechanical control method.

2. Extent of adoption of IPM practices by the target farmers.

In Nagaland, agriculture is influenced by traditional knowledge, cultural, geographical and socio-economic factors. Agriculture is considered as the main source of livelihood of Naga life. It provides employment to 68 percent out of total work force of the state which is more than the national average i.e. 47 percent (Moangtoshi et. al, 2014). Therefore, agriculture is recognized as the major source of livelihood of Nagaland and is playing an important role in socio-economic development of the state. According to the Annual Administrative Report of Agriculture department, Nagaland, Nagaland is one of the lowest consumers of chemical fertilizers in the country @1.5 kg/ha which is negligible by any standard and the nutrient requirements of crops in traditional agricultural system of the Nagas, depends only on a natural resource (biomass). Therefore, farming practices in Nagaland is organic by default and is yet to be an organic by design. The organic inputs used in the production of vegetables in Nagaland are FYM (Farm Yard Manure), poultry manure, pig manure, vermicompost, garden soil, green manures, bio-fertilizer like Rhizobium, Azotobacter, Azospirillum and Phosphotica. Organic farming helps in maintaining environmental health, reduces human and animal health hazards and helps in keeping agricultural production at a higher level and makes it sustainable. As a support to the organic status and to reduce

the misuse of various chemical by educating the farmer on the timely management of pest and disease through the concept of integrated pest management (IPM), trainings are being conducted by many agriculture and allied sectors of the state on IPM.

The decision to make full use of an innovation as the best course of action available is known as adoption. Innovation is defined as "an idea, practice, or object that is perceived as new by an individual or other unit of adoption" (Ray G. L, 1999). In the present study, adoption was measured as the use/application of IPM practices partially or completely by the farmers on temporary or permanent basis.

The study also further attempted to identify the relationship level of dependent and independent variables. The independent variables included age, sex, marital status, education, occupation, social participation, type of house, family size, annual income and land holding size, while the extent of adoption of IPM practice was considered as dependent variable.

Table 2.1: Extent of adoption of IPM practices by the target farmers

Sl.no	Methods	Percentage (%)
1.	***Cultural Control***	
	Early ploughing	72.00
	Adjusting sowing time	100
	Proper seed rate	83.00
	Preparation and levelling	84.00
	Destruction of stubbles and crop residue	83.00
	Proper spacing	96.00
	Proper water management	100
	Remove weeds from field	100
	Crop rotation	74.00
	Use of resistant varieties	00.00
2.	***Mechanical Control***	
	Soil testing	00.00
	Collect egg mass	41.00
	Cut the leaf tip of seedlings	46.00
	Use of pheromone to trap insects	00.00
	Use of light traps	00.00
	Sun drying for rice grains	100
3	***Biological control***	
	Identifying bio-control insects	21.00
	Use of bio-control agents	00.00
	Use of botanical pesticides	00.00
4.	***Chemical Control***	
	Do you use less hazardous pesticides	00.00
	Do you use chemicals for treatment of godown	00.00
	Renovation and treatment of storage	00.00

Table 2.1 shows that, an average of 79.2 of the farmers have adopted cultural method of insect/pests control, while an average of 31.16 and 7.00 numbers of the respondents has adopted mechanical and biological control. The study confirmed that 100 per cent of the respondent farmers were not using chemical agent as a method of insect/pests control.

Table 2.2
Relationship of farmer's characteristics with their extent of adoption of IPM practices

Sl. No.	Independent variables	'r' value
1.	Age	0.059
2.	Sex	0.106
3.	Marital status	-0.081
4.	Education	-0.031
5.	Occupation	0.013
6.	Social participation	-0.118
7.	Type of house	-0.152
8.	Family size	0.038
9.	Annual income	0.034
10.	Land holding size	0.153

CONCLUSION AND RECOMMENDATIONS:

On the basis of the study on farmers' knowledge and adoption of integrated pest management (IPM) in Phek district of Nagaland, it was revealed that majority of the farmers were aware about most of the IPM practices, which means they have heard about it through trainings given by agriculture and allied agencies and through other mass medias but may or may not apply it. It was also found that 100 per cent of the farmers were aware about cultural practices, while about 79.16

per cent of the farmers were aware about mechanical control method, this was because various practices like collection of egg mass, cutting of leaf tip were practiced as a means of indigenous insect/pests control method which comes under the purview of mechanical control method of IPM. However, it was found that the respondent farmers were less aware about biological and chemical control methods. It was further observed that there was no significant correlation between independent and dependent variables.

From the study it can be concluded that 100 per cent of the farmers had adopted the cultural control method of IPM. It was also found that 100 per cent of the respondents were not using pesticides, however, pesticides can be used judiciously as per the concept of IPM, therefore, further knowledge is needed to be imparted to the farmers on economic and judicious use of pesticides thus, concerted efforts should be made to spread the message of IPM benefits through farmers to farmers' interaction network.

REFERENCES

1. *Khasie, Medonguno M, 2014. Nagaland Organic by default. Morungexpress. August 2, 2014.*
2. *Moangtoshi and Mithilesh Kumar Sinha, 2014. International Journal of Economic and Business Review. Vol-2, Issue-II. E.ISSN: 2347-9671, P.ISSN: 2349-0187.*
3. *MorungExpress.com/can-nagaland-sustain-organic-status, May 14, 2011*
4. *Ray G. L, (1999), Extension communication and management. Kalyani publishers, Ludhiana, India*
5. *Thelu-o Vethilu, 2010. Farmers knowledge and adoption of IPM (Integrated Pest Management) in Phek District of Nagaland. A thesis submitted to Nagaland University in partial fulfilment of the requirement for the dgree of Master in Science (Agriculture) in Agricultural Extension.*