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Socio-economic profile and constraints faced by the farmers in adoption of integrated pest management (IPM) practices in Chümoukedima district of Nagaland

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Abstract

Integrated Pest Management (IPM) is a sustainable pest management strategy that emphasizes long-term prevention and suppression of pest problems with minimal impact on the environment, human health, and non-target organisms (Flint *et al.*, 2003). It reduces reliance on chemical pesticides while improving crop yield, quality, and profitability (Mauceria, 2004), thereby contributing to ecological balance and sustainable agricultural development. The present study was conducted purposively in Chümoukedima district of Nagaland. Dhansiripar block was selected, and five villages were chosen purposively. From each village, 20 farmers were randomly selected, constituting a total sample of 100 respondents. The study aimed to examine the socio-economic characteristics of farmers and identify the constraints faced by them in the adoption of IPM practices. The findings revealed that 66.00% of the respondents were middle-aged (35-55 years), and 80.00% were male. A majority (87.00%) were married and 82.00% had education up to primary-middle level. Farming was the main occupation for 88.00% of the respondents. Most (62.00%) belonged to medium-sized families, and 84.00% lived in nuclear family systems. About 52.00% resided in semi-pucca houses, while 66.00% had marginal landholdings (<1 ha). More than half (52.00%) reported annual income above ₹1,00,000, and 87.00% had a medium level of material possession. The majority exhibited medium levels of social participation (80.00%), information source utilization (79.00%), risk orientation (78.00%), and scientific orientation (75.00%). Additionally, 77.00% had attended training programmes conducted by various organizations. Among the constraints identified, the high cost of inputs, particularly seeds and fertilizers, emerged as the major barrier in adopting IPM practices. The study suggests that timely institutional support and cost-reduction measures are essential to address these constraints and strengthen sustainable pest management practices in the study area.

Keywords: IPM, socio-economic, constraints, Chümoukedima, Nagaland

Introduction

During agricultural growth, pesticides became a vital tool for plant protection and for enhancing crop yield (Sharma *et al.*, 2019) ^[15]. In order to boost agriculture productivity and profitability, there has been a huge increase in the level of crop protection, as evidenced by a 15 to 20-fold increase in the number of pesticides used globally (Nayak and Solanki, 2021) ^[10]. We are applying more pesticides and treating crops more frequently than ever before. According to a report on a detailed examination of pesticide use, the number of pesticides used globally (measured in tonnes of active ingredients) increased by 46% between 1996 and 2016 (WHO, 2019). The most widely used pesticides are pyrethroid, carbamate, and organophosphate (Gilbert, 2012) ^[8]. Currently, four million tonnes of pesticides are used annually worldwide, with the majority being herbicides

56%, followed by fungicides 25%, insecticides 19%, and other types like rodenticides and nematicides (FAOSTAT, 2018) ^[16]. Crop losses over the past 40 years have not greatly diminished despite a marked increase in pesticide use (Oerke, 2006) ^[11].

According to the Economic Survey 2015-16 (Upadhyay and Nishant, 2016) ^[18] pesticide residues in food and crops are directly related to the irrational application of pesticides to the growing crops. Pesticide residues in food products have been associated with a broad variety of human health hazards, ranging from short-term effects to long-term toxic effects. In this regard, Integrated Pest Management (IPM) is a pest management strategy that focuses on the long-term prevention or suppression of pest problems with the minimum impact on the environment, human health, and non-target organisms (Flint *et al.*, 2003) ^[7]. So, it enables

farmers to reduce their reliance on pesticides while increasing yields, crop quality, and profitability (Mauceria, 2004). IPM's goal is to use fewer pesticides while maintaining the ecological balance thereby generating sustainable agricultural growth.

In comparison to its surrounding states, Nagaland uses fewer pesticides. However, a greater focus on yield maximization will almost certainly result in an increase in insect problems, so farmers should be urged to use traditional pest control methods such as bio-organic pesticides and IPM. However, in the current situation, the problems of pest management and concerns about the indiscriminate use of pesticides have been a source of concern (Department of Agriculture, Nagaland, Vision 2050) ^[4]. Chümoukedima district has a total geographical area of 610 square kilometres (240 sq. mi) situated at 25°79' North latitude and 93°78' East longitude with an elevation of 190 metres above sea level. According to 2011 Census of India, the total population and population density per sq. km of the district adds up to 1,25,400 and 530 respectively. It has a diverse population and may be considered a smaller version of India. All Naga tribes make up the majority of the city's population, with people from other regions of the nation making up the remaining population. Predominantly an agrarian state, the farmers in Chümoukedima district rely on agriculture and has become the economic activity for the farmers. The people have a strong sense of tradition and culture with progressive farmers largely practicing IPM in the district.

Methodology

The present study was carried out in the year 2023 in Chümoukedima district of Nagaland. Dhansiripar block was selected and within it 5 villages were selected purposively. A total of 20 farmers from each village were selected by proportionate random sampling technique to form a total sample size of 100. The study aimed to examine the socio-economic characteristics of farmers and identify the constraints faced by them in the adoption of IPM practices. The primary information for the study was gathered through personal interviews utilizing a predefined research schedule. Keeping in view the objectives of the study, a total of 17 variables were selected for the study *i.e.* Age, Gender, Marital status, Educational status, Occupation, Family size, Family type, House type, Land holding, Annual income, Material possession, Social participation, Extension contact, Information sources utilization, Training exposure, Risk orientation and Scientific orientation on IPM practices.

Reading (1971) ^[14] defined constraints as use of force to influence or prevent as action or utility or state of being compelled to do or not to do something. In the present study, 'constraints' is operationally defined as the problem encountered or perceived by the farmer with regard to adoption of recommended IPM practices. For studying various constraints faced by the farmers in adoption of IPM,

they were asked to mention constraints which had influenced their decision for non-adoption of the recommended IPM practices.

Results and Discussion

Socio economic profile of the famers in study area

For the purpose of this study, a total of 17 personal, socioeconomic, and psychological variables of the respondents were taken into consideration. These were- Age, Gender, Marital status, Educational status, Occupation, Family size, Family type, House type, Land holding, Annual income, Material possession, Social participation, Extension contact, Information sources utilization, Training exposure, Risk orientation and Scientific orientation on IPM practices. Findings revealed that most (66.00%) of the respondents practicing IPM were middle aged (35-55 years). This finding is in accordance with the finding of Ofuoku *et al.* (2009) ^[12] where majority (80.00%) of the respondents were male. Majority of the respondents (87.00%) were married where majority (82.00%) had education up to primary-middle level. This finding is in agreement with the finding of Dharmanand *et al.* (2020) ^[5]. Majority (88.00%) of the respondents were involved in farming as their main occupation. This finding is in conformity with the finding of Shweta (2014). It was found that majority (62.00%) of the respondents belonged to medium sized family where majority (84.00%) of them lived as nuclear family. It was revealed that majority (52.00%) of the respondents had semi-pucca type of house where majority (66.00%) of them had marginal land holding (<1 ha). This finding is in similarity with the findings of Jha and Das (2019) ^[9]. Majority (52.00%) of the respondents had high annual income (>₹1,00,000) where majority (87.00%) of the respondent had medium level of material possession. This finding is in similarity with the findings of Singh *et al.* (2020) ^[16]. It was observed that most (80.00%) of the respondents had medium social participation. This finding is in agreement with the findings of Pendam (2021) ^[13]. Majority (66.00%) of them had medium level of extension contact. This finding is in accordance with Thakuria *et al.* (2025) ^[17]. The findings also showed that majority (79.00%) of the respondents had medium level of information sources utilization, (47.00%) of the respondents received information most-often from mobile as mass media and ICT sources of information and majority (26.00%) of the respondents received information most often from relatives as informal sources. The study revealed that majority (77.00%) of the respondents have attended some trainings conducted by various organizations such as ATMA, SAMETI and KVKs. The study also indicated that majority (78.00%) of the respondents possessed medium level of risk orientation. This finding is in accordance with Aglawe (2022) ^[1] and medium level of scientific orientation (75.00%).

Table 1: Socio economic profile of the famers in study area

Sl. No	Variables	Categories	Score range	Frequency	Percentage
1.	Age Mean = 46.4 SD = 11.3	Young	Below 35 years	11	11.00
		Middle	35-55 years	66	66.00
		Old	Above 55 years	23	23.00
2.	Gender	Male	1	80	80.00
		Female	2	20	20.00
3.	Marital status	Married	1	87	87.00
		Unmarried	2	7	7.00
		Widow	3	3	3.00
		Widower	4	3	3.00
4.	Educational Status	Illiterate	1	11	11.00
		Primary-middle	2	82	82.00
		Secondary	3	6	6.00
		Graduate	4	1	1.00
5.	Occupation	Farming	1	88	88.00
		Govt. service	2	2	2.00
		Organizational leader	3	0	0.00
		Business	4	10	10.00
		Others	5	0	0.00
6.	Family size Mean = 5.4 SD = 1.5	Small	2-4	29	29.00
		Medium	5-7	62	62.00
		Large	Above 7	9	9.00
7.	Family type Mean = 0.84, SD = 0.37	Joint	1	16	16.00
		Nuclear	2	84	84.00
8.	House type	Kutchha	1	45	45.00
		Semi-pucca	2	52	52.00
		RCC	3	3	3.00
9.	Land holding Mean = 1.4 SD = 0.6	Marginal	<1 ha	66	66.00
		Small	1-2 ha	30	30.00
		Semi-Medium	2.1-4 ha	2	2.00
		Medium	4.1-10 ha	2	2.00
		Large	>10 ha	0	0.00
10.	Annual income Mean = 1.52 SD = 0.50	Low	<₹50,000	0	0.00
		Medium	₹50,000-1,00,000	48	48.00
		High	>₹1,00,000	52	52.00
11.	Material possession Mean = 2.47 SD = 0.72	Low	<2	4	4.00
		Medium	2-3	87	87.00
		High	>3	9	9.00
12.	Social participation Mean = 1.81 SD = 1.20	Low	<1	18	18.00
		Medium	1-3	20	20.00
		High	>3	2	2.00
13.	Extension contact Mean = 10.85 SD = 1.96	Low	<9	15	15.00
		Medium	9-13	66	66.00
		High	>13	19	19.00
14.	Information sources utilization Mean = 9.9 SD = 2.9	Low	<11	12	12.00
		Medium	11-15	79	79.00
		High	>15	9	9.00
15.	Training exposure	Attended	1	77	77.00
		Not attended	0	23	23.00
16.	Risk orientation Mean = 12.9 SD = 1.7	Low	<11	8	8.00
		Medium	11-15	78	78.00
		High	>15	14	14.00
17.	Scientific orientation Mean = 16 SD = 2.4	Low	<14	13	13.00
		Medium	14-18	75	75.00
		High	>18	12	12.00

Constraints faced by the farmers in adoption of IPM

For studying various constraints faced by the farmers in adoption of IPM, they were asked to mention constraints which had influenced their decision for non-adoption of the recommended IPM practices.

The perusal of the data presented in the Table 2 revealed the information about the major constraints involved in adoption of IPM in the study area by the respondents and

the measures suggested by them to overcome the constraints. The major constraints were ranked based on the number of respondents highlighting the problems and constraints. Table 2 shows that majority (91.00%) of the respondents have revealed that high cost of inputs (seeds and fertilizers) was the major constraint being faced by them. Due to the high cost of quality seeds and fertilizers the farmers are unable to procure which in turn led them to

use poor quality of seeds that are prone to pest infestation. Therefore, the distributors should maintain a minimal rate for the seeds and fertilizers so that the farmers can buy better quality of seeds and fertilizers. It also revealed that majority (87.00%) of the respondents stated that lack of proper irrigation facilities was the second constraint faced by them in the study area. Since most of the farmers are dependent on rainfall for the irrigation of crops, it becomes crucial for the farmers during dry season. Therefore, the concerned departments should construct irrigation infrastructures in the study area. Findings revealed that lack of knowledge about bio-control agents and bio-fertilizers was the other major constraints faced by the 84.00% of the respondents in the study area. Therefore, the agriculture and allied departments should disseminate proper knowledge about the use of bio-control agents and bio-fertilizers. The concerned department should promptly distribute bio-control agents and bio-fertilizers to the farmers which are capable of providing beneficial outcomes in crop plant growth and health. In case of training facility respondents revealed that 81.00% of the respondents faced the major problem of lack of proper training facilities. Therefore, the agriculture and allied departments should disseminate

proper knowledge about the use of bio-control agents and bio-fertilizers. Table 2 also stated that 77.00% of the respondents faced problem relating to discouraging the use of chemical pesticides by the state agriculture department as animals like pollinators and humans alike are adversely affected by the widespread usage of pesticides. According to the concept of IPM, pesticides can be used judiciously so further knowledge should be imparted to the farmers on economic and judicious use of pesticides. Findings revealed that majority (66.00%) of the respondents faced problems due to non-availability of soil testing laboratories near the vicinity. Fertile soil is necessary for healthy growth of the plant as well as it provides higher tolerance to diseases and pest damage. Therefore, soil testing laboratories should be established near the vicinity of the study area so that the farmers can easily get the proper status of the soil. Table 2 showed that 41.00% of the respondents faced problems due to lack of storage facilities in the study area. Cold storage of fruits and vegetables delay the senescence, prevent the attack of insect pests and minimize both quantitative and qualitative losses of food products. Therefore, construction of proper cold storage units should be carried out in the study area.

Table 2: Constraints faced by the farmers in adoption of IPM

Sl. No.	Constraints	F	P	Rank	Measures suggested
1.	High cost of inputs (seeds and fertilizers)	91	91	I	The price of the seeds should be at a minimal rate
2.	Lack of proper irrigation facilities	87	87	II	Boring of wells so that irrigation can be provided during dry season
3.	Lack of knowledge about bio-control agents and bio-pesticides	84	84	III	Agriculture and allied departments should disseminate proper knowledge on IPM
4.	Lack of proper training facilities	81	81	IV	Agriculture and allied departments and KVKs should conduct timely trainings on IPM
5.	Discouraging the use of chemical pesticides by the State agricultural department	77	77	V	Judicious use of pesticides in small quantities whenever required
6.	Non-availability of soil testing laboratory near the vicinity	66	66	VI	Establishment of soil testing laboratory near the vicinity.
7.	Lack of storage facilities	41	41	VII	Construction of cold storage facilities.

Conclusion

The study revealed that majority of the respondents (66.00%) fall within the age group of 35-55 years of age which could possibly be because they are the most active, enthusiastic and mostly married people who are looking for opportunities to support their family financially. The study reveals that majority of the respondents have attained education up to primary-middle school level which could be due to the respondents not having the financial support for further education, lack of interest or other responsibilities. It was observed that the majority (88.00%) of the respondents were in farming by default as it was a part of their daily lives. It revealed that majority (84.00%) of the respondent's family type were nuclear. The reason for the nuclear family type is because most people in the community follow the practice of leaving the parents' home after marriage. Majority of the respondents deemed mobile phones as the most important necessary item for entertainment and information sources. It was also revealed that majority of the respondents (80.00%) had medium social participation. The responsibility of being a bread winner of the family may not leave enough time for the respondents to engage in social activities and thus, showing a medium level of social participation. The study revealed that majority (66.00%) of

the respondents had medium level of extension contact. This might be due to lack of visitations from the concerned departments, ignorance or less participation of the farmers or less extension activities in the concerned area. Majority of the respondents does not utilize the various Information Communication Technologies, and it denotes the lack of opportunity of gaining knowledge and information about various farming and IPM practices. Majority (77.00%) of the respondents have attended some kind of training conducted and organized by ATMA, SAMETI and KVKs. However, 23.00% of the respondents reported to have not attended the training. According to the study observations many respondents were unable to make time for attending trainings while some lacked the enthusiasm to learn, this could possibly explain why some of the respondents had not attended any training. It was also revealed that majority (78.00%) of the respondents had medium level of risk orientation. The respondents now feel more equipped to take risks strategically and adopt and invest in new ideas that show potential of fetching higher profit. Majority of the respondents were poorly educated having studied till the primary-middle level. This would hinder them in their ability to grasp concepts if they were to attend training sessions. Therefore, proper result demonstration and method

demonstration trainings should be conducted by the concerned departments and organizations so that the farmers can easily grasp the concepts and understand the trainings. It is crucial to make awareness to the farmers of keeping in contact with all the information sources especially with progressive farmers so that the farmers would be able to gain knowledge on IPM practices and also with formal information sources so that they can assist the farmers in various problems. The farmers could be hugely assisted in their endeavours by sustained regular visits to their villages from extension agents who can address their farm related problems and help overcome them. Trainings could be held close to the villages of the study areas. It was expressed by the respondents that most training sessions were usually held at places which were very far from the villages, especially those in remote regions for which transportation costs were an added burden. The present study was conducted in Dhansiripar block of Chümoukedima district, Nagaland. Therefore, generalization based on this study alone will not be meaningful. The influence of the IPM course on its trainees can be studied from a variety of angles, however the current study only looks at a few due to time and budget limitations. In future, it is therefore implicated that study may be extended to other similar areas of other of Nagaland district.

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