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Knowledge of the pineapple growers towards integrated pest management (IPM) in Chumukedima district of Nagaland

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Abstract

Agriculture is the primary source of livelihood in Nagaland and pineapple is one of the major horticultural crops. Integrated Pest Management (IPM) is a sustainable approach to pest management that combines cultural, biological, mechanical, and chemical methods to minimize environmental and health risks. However, the successful implementation of IPM largely depends on farmers' knowledge and understanding of its principles and practices. Therefore, the present study was carried out in Chumukedima district of Nagaland during 2025-26 in order to assess the knowledge level of integrated pest management (IPM) among pineapple growers. This paper draws on primary survey data from 110 pineapple growers of four villages (Molvom, Medziphema, Pherima and Bungsang) of Medziphema block. The study revealed that most of the respondents were middle-aged males with primary education, medium farming experience and limited access to credit. It was found that 49.09% had medium level of knowledge, 30.91% a high level and 20.00% low level of knowledge regarding IPM. Correlation analysis identified training exposure ($r = 0.6803$), extension contact ($r = 0.4247$), social participation ($r = 0.3521$) and education ($r = 0.3470$) as significantly and positively associated with knowledge level at the 1 per cent level of significance. The findings highlight that strengthening training programmes and extension services is the most effective way to build IPM knowledge among pineapple farmers in the region.

Keywords: Knowledge level, integrated pests management, pineapple growers

Introduction

Agriculture continues to be the mainstay of rural livelihoods in India, and Nagaland is no exception, where more than 70 per cent of the population depends directly on farming. Pineapple has emerged as one of the state's most important horticultural crops, and Chumukedima district, particularly the Medziphema block, is popularly regarded as the "pineapple bowl" of Nagaland owing to its favourable agro-climatic conditions and long tradition of commercial cultivation.

Integrated Pest Management (IPM) combines cultural, biological, mechanical, and chemical methods to keep pests below damaging levels while minimising health and environmental risks, using judicious, threshold-based pesticide application rather than rejecting chemicals outright (Gupta *et al.*, 2020)^[3]. Since IPM decision-making depends on farmers' ability to recognise pests and apply the right combination of controls, it is fundamentally knowledge-based making adoption inseparable from awareness (Baite *et al.*).

Despite promotion through schemes, many Northeast farmers still rely on conventional, calendar-based spraying due to limited awareness and weak extension outreach (Roy & Ghosh, 2022; Pongener & Patra, 2024)^[9, 8]. This study therefore assesses pineapple growers' knowledge of IPM

practices in Chumukedima district and identifies the socio-economic and communication factors associated with it.

Methodology

The study followed a descriptive research design and was conducted in medziphema block of chumukedima district, Nagaland. Four villages were selected randomly from which a total of 110 respondents were drawn through random sampling.

Data were collected through personal interviews using pre-structured interview scheduled developed specially for the study. Each statement was scored on a three-point scale (Fully corrected = 3, Partially corrected = 2, Not corrected = 1). Total knowledge scores obtained by each respondent were summed and respondents were classified into low, medium and high knowledge categories using the mean and standard deviation of the scores as class boundaries (Low: below Mean – SD; Medium: Mean $\pm$ SD; High: above Mean + SD). The data were presented in tabular form and interpreted scientifically.

Result and Discussion

A. Socio-economic profile of respondents

The Socio-economic profile of the 110 respondents is presented in table 1.

Table 1: Socio-economic profile of the respondents.

Sl. No.	Variables	Category	Frequency	Percentage
1	Age	Young age (below 35 years)	24	21.82
		Middle age (36-55 years)	53	48.18
		Old age (above 55 years)	33	30
2	Gender	Male	83	75.45
		Female	27	24.55
3	Education	Illiterate	8	7.27
		Can read and write	21	19.09
		Primary school	35	31.82
		Junior high school	22	20.01
		Intermediate	7	6.36
		Graduate and above	17	15.45
4	Family type	Nuclear	67	60.91
		Joint	39	35.45
		Extended	4	3.64
5	Operational land holding	Small (up to 2 acres)	26	23.64
		Medium (2-3 acres)	53	48.18
		Large (above 3 acres)	31	28.18
6	Area under pineapple cultivation	Up to 1 acre	24	21.82
		1-2 acres	52	47.27
		Above 2 acres	34	30.91
7	Occupation	Farming	87	79.09
		Farming + Business	14	12.73
		Farming + Service	9	8.18
8	Farming experience	Low (below 10 years)	35	31.82
		Medium (11-20 years)	52	47.27
		High (above 20 years)	23	20.91
9	Annual income	Up to ₹1,00,000	13	11.82
		₹1,00,001 - ₹2,00,000	64	58.18
		Above ₹2,00,000	33	30
10	Access to credit	Yes	31	28.18
		No	79	71.82
11	Extension contact	Low	10	9.09
		Medium	53	48.18
		High	47	42.73
12	Training exposure	Training attended	42	38.18
		Training not attended	68	61.82
13	Social participation	No participation	69	62.73
		Member in an organisation	28	25.45
		Office bearer in an organisation	13	11.82

The profile shows farmers who are predominantly middle-aged (48.18%), male (75.45%), and educated only up to primary school (31.82%), running small nuclear-family (60.91%) operations on medium landholdings (48.18%), with farming as their main occupation (79.09%) and medium farming experience of 10-20 years (47.27%). While annual income (58.18% medium) and extension contact (48.18% medium) are moderate, most lack credit access (71.82%) and have never attended formal training (61.82%) or joined any organisation (56.36%). Similar findings also reported by

Patra and Kense (2021) ^[6], studying fruit growers in Nagaland, similarly reported small to medium landholdings, low institutional credit access, and inadequate extension services

B. Knowledge of the respondents on Integrated Pest Management (IPM) practices

The statement wise distribution of respondent is presented in table 2, followed by overall distribution in table 3

Table 2: Statement wise distribution of respondents according to their knowledge.

Sl. No.	Statements	Response		
		Fully correct F %	Partially correct F %	Not correct F %
1	Do you know about Integrated Pest Management (IPM)?	52(47.27)	32 (29.09)	26 (23.64)
2	Do you know that IPM involves the use of multiple pest control methods?	41 (37.28)	39 (35.45)	30 (27.27)
3	Do you know that IPM reduces dependence on chemical pesticides?	26 (23.64)	43 (39.09)	41(37.27)
4	Do you know that chemical pesticides should be used only when pest infestation crosses economic threshold level?	33 (30.00)	15 (13.64)	62 (56.36)
5	Do you know that insect pests cause damage to pineapple crops?	76 (69.09)	23 (20.91)	11 (10.00)
6	Do you know that mealy bug is a major pest of pineapple?	22 (20.00)	53 (48.18)	35 (31.82)
7	Do you know that pest attack affects yield and fruit quality?	85 (77.27)	16 (14.55)	09 (8.18)
8	Do you know that use of healthy planting material reduces pest incidence?	63 (57.27)	25 (22.73)	22 (20.00)
9	Do you know that field sanitation and weed removal reduce pest infestation?	36 (32.73)	51 (46.36)	23 (20.91)
10	Do you know that removal of affected plants prevents pest spread?	49 (44.55)	44 (40.00)	17 (15.45)
11	Do you know that hand picking of insects helps in pest control?	40 (36.36)	46 (41.82)	24 (21.82)
12	Do you know that natural enemies help in controlling insect pests?	13 (11.82)	38 (34.55)	59 (53.64)
13	Do you know that neem-based products can be used for pest management?	30 (27.27)	29 (26.36)	51 (46.36)
14	Do you know that indiscriminate use of pesticides is harmful to human health and environment?	82 (74.55)	20 (18.18)	08 (7.27)
F= Frequency %= Figures in parentheses indicate percentages				

The statement-wise analysis reveals a knowledge base that is experience-driven rather than technically grounded among pineapple growers. Awareness was highest for practical, field-observed aspects pest damage to yield and fruit quality (77.27%), harmful effects of indiscriminate pesticide use (74.55%), and pest damage recognition (69.09%). In contrast, the scientific components scored lowest understanding of natural enemies (11.82%), how IPM reduces pesticide use (23.64%), Awareness of neem-based products (27.27%), and threshold-based spraying (30.00%). This suggests farmers know what they've observed in the field, but the technical, training-based side of IPM has yet to reach them.

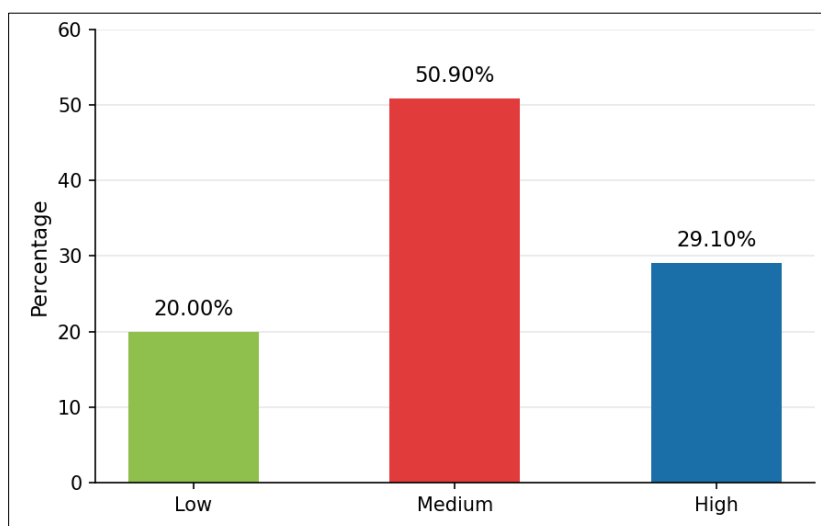
These findings are in agreement with Gupta *et al.* (2020) [3] and Roy and Ghosh (2022) [9], who reported that farmers generally possess better knowledge of pest damage and pesticide hazards than of ecological and biological components of IPM. The results highlight the need for strengthening farmer training and extension services to

improve knowledge of scientific IPM practices.

Table 3: Over Distribution of respondents according to knowledge level regarding IPM practices (n=110)

Sl. No.	Knowledge level	Frequency	Percentage
1.	Low <26.73	22	20.00
2.	Medium 27 to 32	56	50.90
3.	High >33.18	32	29.10
Total		110	100.00

As shown in the table, majority of the respondent (50.90%) fell in the medium knowledge, while (29.10%) possessed a high level knowledge and (20.00%) possessed a low level of knowledge regarding IPM. The predominance of medium-level knowledge is consistent with findings reported by patra and kense (2020) [5] among fruit growers in Nagaland, where (75.85%) of respondent possessed a medium level of knowledge of improved cultivation practices.

**Fig 1:** Distribution of respondents according to knowledge level regarding IPM practices

C. Association of socio-economic profile with knowledge.

Table 4 provided information about how socio-economic

factors and knowledge level relate to one another.

Table 4: Correlation between socio-economic and knowledge level among pineapple growers.

Sl. No.	Independent variable	Correlation coefficient (r)
1	Age	0.0058 NS
2	Gender	0.0358 NS
3	Education	0.3470 **
4	Family type	0.0547 NS
5	Operational land holding	0.1652 NS
6	Area under pineapple cultivation	0.0939 NS
7	Occupation	0.1072 NS
8	Farming experience	0.0514 NS
9	Annual income	0.0119 NS
10	Access to credit	0.0685 NS
11	Training exposure	0.6803 **
12	Social participation	0.3521 **
13	Extension contact	0.4247 **

** Significant at the 0.01 level of probability; NS = Non-significant

Correlation analysis showed training exposure had the strongest and most significant relationship with knowledge ($r = 0.6803$, $p < 0.01$) farmers who attended more training simply understood IPM better, since structured sessions directly build technical awareness. Extension contact ($r = 0.4247$) and social participation ($r = 0.3521$) followed close behind: farmers with regular extension visits stayed better informed, and those active in social groups picked up knowledge from peers in much the same way. Education ($r = 0.3470$) also mattered, as more schooling made it easier for farmers to grasp and apply recommendations. The remaining variables: age, gender, family type, landholding, area under pineapple, occupation, farming experience, income, and credit access were positively but not significantly related to knowledge, suggesting that on their own, these background factors don't really move the needle on how much farmers understand about IPM.

These findings align with earlier research. Das and Jha (2022) [2] found that farmers in Northeast India with better knowledge actively sought out more information sources, while Pongener and Patra (2024) [8] identified knowledge as a strong predictor of IPM adoption among pineapple growers in Nagaland. Together, these studies confirm that regular training and meaningful extension contact do far more to build farmers' technical understanding of IPM than their socio-economic background alone.

Conclusion

It is concluded that pineapple growers in Chumukedima district possess a moderate level of knowledge regarding IPM practices, with 20.00 per cent of respondents falling in the low category, 50.90 per cent in the medium category, and 29.10 per cent in the high category. Farmers understood general pest damage and pesticide hazards better than they understood scientific IPM components such as biological control and economic threshold concepts. Training exposure, extension contact, social participation, and education were found to be the key factors influencing farmers' knowledge. Therefore, strengthening extension services, organizing regular need-based training programmes, and promoting practical demonstrations on IPM technologies are essential to raise more farmers from the low and medium categories into the high knowledge category, thereby encouraging sustainable pest management in pineapple cultivation.

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