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Assessment of training needs of rice growers for improved rice cultivation practices in Nagaland

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Abstract
The present study was conducted to assess and prioritize the training needs of the rice growers on improved agricultural techniques in Nagaland and its relationship with districts. The study was conducted with ex-post-facto research design in four districts, Phek, Kohima, Peren and Dimapur. From each district two blocks were chosen, from each block three villages and from each village 12 respondents, making a sample size of 288 respondents. Primary datas were collected through personal interview with the help of a standardized interview schedule including six areas that is, seed-bed preparation, nursery management, soil management, integrated pest management, market access and value addition and harvest and post-harvest management. The training needs were identified and ranked through the use of frequencies, percentages and weighted mean scores. Relationships at the district level were examined with chi-square tests and Monte Carlo simulated p values based on 10,000 replicates and Cramer's V. Integrated pest control was the most significant area of training with a mean score of 2.45 followed by harvest and post-harvest management (2.39), market access and value addition (2.24), soil management (2.07), seed-bed preparation (1.97) and nursery management (1.95). Districts were strongly related with all six training areas (p<0.001). Soil management was the highest associated at district level ($\chi^{\wedge 2}$=110.81; V=0.439) and integrated pest management the lowest but significant correlation ($\chi^{\wedge 2}$=31.11; V=0.232). The findings show that there is a need for training in all the areas identified by rice growers, but the level of the requirement differs among districts. The study suggested need based and district specific training programmes to be developed especially on integrated pest management, post-harvest practices and market-oriented competencies to enhance farmers technical abilities, reduce losses and promote adoption of improved rice cultivation practice.

Keywords: Improved cultivation practice, Training needs, Nagaland

Introduction
Rice (*Oryza sativa*) is a staple food commodity in India, contributing significantly to agricultural economy, rural livelihood and household food security. In the northeastern region, particularly in Nagaland, rice cultivation forms the backbone of the farming economy and is intrinsically linked to the socio-economic well-being and dietary habits of rural households. Rice is the main crop of Nagaland grown under various agro-ecological conditions like terraced systems, lowlands and uplands. Despite its importance, rice farming in Nagaland faces a number of technological regulatory and economic constraints. Farmers depend on traditional farming methods, while access to scientific technologies and extension support remains inadequate. The scattered nature of towns, small and fragmented holdings, poor irrigation and extension contact and variable terrain may impede the timely adoption of improved methods. Therefore, simply inventing or acquiring agricultural technologies will not result in the expected outcome unless farmers possess the practical skills and knowledge to apply them in their specific local contexts. Well-designed training programs can improve the ability of farmers to select appropriate varieties, prepare seed beds, manage nurseries, maintain soil fertility, control insect pests and diseases, reduce post-harvest losses and increase market opportunities. However, the efficiency of a training program depends on the content's adequacy with the actual needs and goals of the target audience. Training that begins without a systematic assessment may teach what farmers already know, and may exclude important things about which there are apparent gaps in their knowledge and skills. Training needs assessment is a systematic process of identifying the gap between the skills required to improve the performance of farmers and their existing skills.

It helps extension organizations to set training priorities, develop curriculum relevant to local realities and to make the best use of scarce budget and manpower resources. This study was aimed to identify and rank training needs of rice farmers in modern agricultural practices. The main areas of focus are, seedbed preparation, nursery management, soil management, integrated insect control, market access and value addition, and harvest and post-harvest management. The study also examined whether there was any difference in the perceived need for training among the selected districts. The findings are expected to help educational institutions, extension workers and other agricultural development agencies to undertake pragmatic, region-specific and need-based capacity building interventions for rice producers in Nagaland.

Objectives

1. To analyze the training needs of rice growers on improved rice farming practices in Nagaland.
2. To find out the association of district and perceived training needs of rice growers.

Methodology

Ex - post facto research design was followed for the present research. It was conducted in the state of Nagaland. There are 17 districts in Nagaland out of which four districts were selected. Since paddy is being cultivated in all the blocks. Therefore, two blocks were randomly selected from each district. Hence, a total of eight blocks were selected. Three villages were selected randomly from each of the selected blocks. Thus, a total of twenty-four villages were selected for the present study. Twelve respondents were selected from each of the selected villages making a sample size of total 288 respondents. The primary data was collected through personal interview method using structured interview schedule. The training-needs segment included six primary areas of improved rice cultivation, seed-bed preparation, nursery management, soil management, integrated pest management, market access and value addition, harvesting and post-harvest management. Frequencies and percentages were calculated to describe the distribution of respondents across the three response categories. Weighted mean score was calculated for every training area using the following formula:

$$\text{Mean score} = \Sigma (f_i \times w_i) / N$$

where $f_i$represents the frequency of respondents in a response category, $w_i$represents its corresponding weight and Nrepresents the total number of respondents. Training areas were ranked in descending order of their mean scores, therefore, a higher mean score indicated a greater perceived training need.

Statistical analysis

A chi-square test of independence was applied separately to each training area to determine whether the perceived level of training need was associated with district. Some contingency-table cells contained small or zero frequencies, Monte Carlo simulated p-values based on 10,000 replicates were used instead of relying exclusively on asymptotic p-values. Statistical significance was assessed at the 5 per cent (p <0.05) and 1 per cent (p <0.01) levels.

Cramer's V was calculated to determine the strength of association between district and perceived training needs:

$$V = \sqrt{\frac{\chi^2}{N \times \min(r-1, c-1)}}$$

where χ^2 denotes the chi-square statistic, N denotes the sample size, and r and c represent the numbers of rows and columns.

Results and Discussion

Training needs of rice growers on improved rice farming practices in Nagaland

The data presented in Table 1, revealed that seed-bed preparation, 59.72 per cent in Phek, 80.56 percent in Kohima, 94.44 percent in Peren and 95.83 percent in Dimapur reported the need for training. The share of farmers who reported that training was most needed was relatively low from 4.17 per cent in Dimapur to 13.89 percent in Kohima. 34.72 percent and 5.56 percent in Phek and Kohima believed that training was not required. The nursery management followed a similar path. 63.89 percent of the respondents in Phek, 86.11 per cent in Kohima, 91.67 percent in Peren and all the respondents in Dimapur reported that there was a need for training. Only 2.78 percent of respondents in Phek and 8.33 per cent in Kohima and Peren felt that training in nursery-management was most needed. 33.33 per cent in Phek, 5.56 percent in Kohima reported that training was not needed. In soil management 59.72 percent in Phek, 75.00 percent in Kohima, 63.89 per cent in Peren and 97.22 percent in Dimapur reported that soil management training was needed. Peren had the highest percentage for soil-management training which was most needed (36.11 percent), followed by Kohima (22.22 percent). Whereas, in Phek 36.11 percent thought that it was not needed, followed by Kohima (2.78 per cent). In Integrated pest management it was reported that more than half of the respondents of Phek (54.17%), Kohima (52.78 percent) and Peren (52.78 percent) felt that IPM training was most needed. In Dimapur, 75.00 per cent said it was needed and 25.00 percent said it was most needed. In Phek, just 5.56 percent of respondents said that IPM training was not needed whereas none of the respondents from the other districts chose this group. This finding was in line with Kumar *et al.* (2026) who stated that insect-pest control is one of the major training goals of oilseed farmers.

In Market access and value addition, 69.44 percent in Phek, 61.11 percent in Kohima, 47.22 percent in Peren and 88.89 percent in Dimapur needed training. Peren had the most share under the most needed category (47.22 percent) followed by Kohima (36.11 percent), 19.44 percent in Phek and 11.11 percent in Dimapur. In harvest and post-harvest management, Peren, 58.33 percent said training was the most needed, followed by 47.22 percent in Kohima, 40.28 percent in Phek and 16.67 percent in Dimapur. On the other hand, in Dimapur 83.33 per cent of the respondents described it as needed. This findings was in accordance with the findings of Kamanda (2022) who also found in his study that demands among smallholder rice farmers for moisture assessment, mechanized harvesting, grading and enhanced post-harvest handling.

Table 1: District-wise distribution of rice growers according to training needs (n = 72)

S/N	Training-need area	Level of need	Phek F (%)	Kohima F (%)	Peren F (%)	Dimapur F (%)
1	Seed-bed preparation	Not needed	25 (34.72)	4 (5.56)	0 (0.00)	0 (0.00)
		Needed	43 (59.72)	58 (80.56)	68 (94.44)	69 (95.83)
		Most needed	4 (5.56)	10 (13.89)	4 (5.56)	3 (4.17)
2	Nursery management	Not needed	24 (33.33)	4 (5.56)	0 (0.00)	0 (0.00)
		Needed	46 (63.89)	62 (86.11)	66 (91.67)	72 (100.00)
		Most needed	2 (2.78)	6 (8.33)	6 (8.33)	0 (0.00)
3	Soil management	Not needed	26 (36.11)	2 (2.78)	0 (0.00)	0 (0.00)
		Needed	43 (59.72)	54 (75.00)	46 (63.89)	70 (97.22)
		Most needed	3 (4.17)	16 (22.22)	26 (36.11)	2 (2.78)
4	Integrated pest management (IPM)	Not needed	4 (5.56)	0 (0.00)	0 (0.00)	0 (0.00)
		Needed	29 (40.28)	34 (47.22)	34 (47.22)	54 (75.00)
		Most needed	39 (54.17)	38 (52.78)	38 (52.78)	18 (25.00)
5	Market access and value addition	Not needed	8 (11.11)	2 (2.78)	4 (5.56)	0 (0.00)
		Needed	50 (69.44)	44 (61.11)	34 (47.22)	64 (88.89)
		Most needed	14 (19.44)	26 (36.11)	34 (47.22)	8 (11.11)
6	Harvest and post-harvest management	Not needed	5 (6.94)	0 (0.00)	0 (0.00)	0 (0.00)
		Needed	38 (52.78)	38 (52.78)	30 (41.67)	60 (83.33)
		Most needed	29 (40.28)	34 (47.22)	42 (58.33)	12 (16.67)

Table 2, revealed that, regarding seed-bed preparation, 10.07 percent said no training was needed, 82.64 percent said training was needed and 7.29 percent said training was most needed. Seed-bed preparation had mean score of 1.97 with Rank V. In nursery management, 85.42 percent said training was needed, 4.86 percent thought it was most essential and 9.72 percent said it was not needed. The mean score of nursery management was 1.95 with rank VI. For soil management, 9.72 percent said that training was not needed while 73.96 percent said that it was needed and 16.32 percent said that it was most needed. Soil management had a mean score of 2.07 and was ranked IV. In integrated pest management, 1.39 percent indicated not needed, while 52.43 percent indicated needed and 46.18 percent indicated most needed. It has the highest mean score of 2.45 and thus was placed at Rank I. In Market access and value addition, 4.86 percent said training was not needed, 66.67 percent said it was needed and 28.47 percent said it was most needed. This area received a mean score of 2.24 and was ranked as Rank III. For Harvest and post-harvest management, 1.74 percent did not require any training, 57.64 percent needed training and 40.62 percent needed training the most. The mean score of the area was 2.39 and it was Rank II.

Table 2: Overall training needs of rice growers (N = 288)

S/N	Training-need area	Not needed F (%)	Needed F (%)	Most needed F (%)	Mean score	Rank
1	Seed-bed preparation	29 (10.07)	238 (82.64)	21 (7.29)	1.97	V
2	Nursery management	28 (9.72)	246 (85.42)	14 (4.86)	1.95	VI
3	Soil management	28 (9.72)	213 (73.96)	47 (16.32)	2.07	IV
4	Integrated pest management (IPM)	4 (1.39)	151 (52.43)	133 (46.18)	**2.45**	**I**
5	Market access and value addition	14 (4.86)	192 (66.67)	82 (28.47)	2.24	III
6	Harvest and post-harvest management	5 (1.74)	166 (57.64)	117 (40.62)	2.39	II

Table 3, revealed that all six training need categories were significantly related to all the districts, since their Monte Carlo p-values were less than 0.001. Soil management was scored with a maximum chi-square value (χ^2 = 110.81) with modest Cramer's V of 0.439. Seed-bed preparation (χ^2 = 72.62; V = 0.355) and nursery management (χ^2 = 70.32; V = 0.349) were next with moderate connections. Harvest and post-harvest management (χ^2 = 43.53; V = 0.275) and market access and value addition (χ^2 = 39.88; V = 0.263). Integrated pest management has the lowest chi-square value (χ2 = 31.11) and Cramer's V (0.232). These three areas showed small to moderate associations.

Table 3: Chi-square Test and Effect Size for District-wise Training Needs of Rice Growers

S/N	Training-need area	χ^2 value	Monte Carlo p-value	Cramer's V	Inference
1	Seed-bed preparation	72.62**	<0.001	0.355	Significant; Moderate
2	Nursery management	70.32**	<0.001	0.349	Significant; Moderate
3	Soil management	110.81**	<0.001	0.439	Significant; Moderate
4	Integrated pest management	31.11**	<0.001	0.232	Significant; Small-to-moderate
5	Market access and value addition	39.88**	<0.001	0.263	Significant; Small-to-moderate
6	Harvest and post-harvest management	43.53**	<0.001	0.275	Significant; Small-to-moderate

Policy recommendations

1. Training programmes should give top emphasis to integrated pest management and in particular to the identification of pests and diseases and to biological control approaches.
2. Practical training should be organized on harvesting, threshing, drying, moisture management and scientific storage to minimize post-harvest losses.
3. Rice growers should be trained on grading, packaging, value addition, market-price information and group marketing to enhance their access to the market and income.
4. Significant differences were seen in training demands across Phek, Kohima, Peren and Dimapur, so district-specific training courses should be established.
5. Strengthening training on soil testing, balanced fertilizer application, organic manure use and soil-fertility management is required in districts with higher needs of soil management.
6. Regular village-level training, field demonstrations and exposure visits should be organized by the Department of Agriculture, Krishi Vigyan Kendras, ATMA and other extension organizations before the rice-cultivation season.
7. Follow-up visits after training are essential to see if the farmers have grasped and applied the recommended procedures.
8. Training materials should be developed in basic language and wherever possible presented through local dialects, demonstrations, and visual aids.

Conclusion

The study revealed that the rice growers of Nagaland required training in all the six identified aspects of improved rice cultivation. The top training need was integrated pest management, followed by harvest and post-harvest management, market access and value addition. Soil management, seed-bed preparation and nursery management were ranked fourth, fifth and sixth correspondingly. However, the low ratings of these categories are not an indication that training is not needed as most respondents still classified them as needed. The chi-square results showed that there was a strong relationship between district and training demand areas. Soil management, seed-bed preparation and nursery management had moderate district level associations while other areas had small-to-moderate associations as indicated by the Cramer's V values. The data indicates that the training requirements of rice growers are not uniform across Phek, Kohima, Peren and Dimapur. Training programmes should be needs based and district specific with greater emphasis on integrated pest management, post-harvest management and market relevant competencies. Such focused extension interventions can improve farmers technical knowledge, reduce production and post-harvest losses, and promote the effective adoption of improved rice-cultivation practices.

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