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Knowledge Level of Tribal Farmers on Processing of Non-Timber Forest Products in Meghalaya, India

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

The study entitled "Knowledge Level of Tribal Farmers on Processing of Non-Timber Forest Products in Meghalaya" aimed to explore the knowledge level of tribal farmers regarding the processing of NTFPs, to find out the relationship between knowledge and profile characteristics of tribal farmers and to enlist the constraints faced by the tribal farmers in two districts of Meghalaya i.e., East Khasi Hills and Ri Bhoi district, with respondents from eight villages. An ex-post facto research design was followed and based on the availability of NTFPs in the villages and dependency, a total of 160 participants belonging to Khasi tribes were purposively selected for data collection using pre-tested interview scheduled. The study revealed a mean knowledge score of 28.17 with a half-standard deviation of 1.48. Among the respondents, more than two third i.e., 68.75 per cent had low to medium knowledge and 31.25 per cent demonstrated high knowledge levels. Correlation analysis revealed significant positive relationship between knowledge level and

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educational status, material possession, annual income, extension contacts and scientific orientation at the 0.01 level of significance. Marketing pattern and market orientation showed significance at the 0.05 level, while fatalism exhibited a negative correlation at the same level. The top three constraints faced by tribal farmers were insufficient infrastructure for processing and storage, lack of adequate knowledge and difficulties in accessing markets due to remote locations and poor transportation networks which need policy interventions by the concerned governmental bodies or agencies including departments or ministries of agriculture, rural development, food processing and transportation.

Keywords: Knowledge level; NTFPs; tribal farmers; regression.

1. INTRODUCTION

Meghalaya, a state nestled in the northeastern region of India, is known for its diverse, extensive and luxuriant forests ranking fifth (76.00%) in forest cover [1] and boasts rich biodiversity. This state is home to numerous indigenous tribes mainly Khasi, Jaintia and Garo each with their unique cultural practices and deep-rooted connections to the surrounding forests. For generations, these tribal communities have relied on the forests not only for their sustenance but also for their economic well-being. Food and Agriculture Organization (FAO) estimates that 80 per cent of the population in developing countries relies on NTFPs for nutritional and health needs [2]. One crucial aspect of this relationship centres around the collection and processing of Non-Timber Forest Products (NTFPs). Non-Timber Forest Products encompasses a diverse range of forest resources, including medicinal plants, spices, bamboo, honey and various fruits and vegetables. These products have been integral to the livelihoods of tribal communities in Meghalaya as well as Northeast India for centuries [3], providing them with essential resources for food, medicine, shelter, and income. However, the sustainable harvesting and processing of NTFPs require a deep understanding of local ecosystems, traditional knowledge and modern processing techniques.

This study was conducted to explore the knowledge level of tribal farmers in Meghalaya regarding the processing of NTFPs, to find out the relationship between knowledge and profile characteristics of tribal farmers and to enlist the constraints faced by the tribal farmers in collection, processing and marketing of NTFPs. Assessing the understanding of tribal farmers was crucial for ensuring sustainable harvesting practices that preserved the ecosystem. By gauging their existing knowledge, the study aimed to pinpoint areas for improvement and training, striving for higher-quality products capable of competing effectively in the market.

2. METHODOLOGY

East Khasi Hills and Ri Bhoi districts were selected as the study areas due to the prevalence of Non-Timber Forest Products (NTFPs) in these regions. Within each district, two blocks were selected and from each block, two villages were chosen randomly, totaling eight villages across both districts. A total of 160 farmers, residing near the forests and reliant on NTFPs, were selected (20 farmers from each of the eight villages) for participation in the study. A pre-tested interview schedule was administered to the selected farmers for data collection and various statistical methods, including frequencies, percentages, mean, standard deviation, rank, correlation and regression analysis were employed for data analysis. Assessing the knowledge level of tribal farmers necessitated the careful formulation of knowledge test questions and answers comprising of 14 questions, drawing upon expertise and extensive literature review. Farmers' responses were quantified using a scoring system: 3 for full knowledge, 2 for partial knowledge and 1 for no knowledge. Subsequently, respondents were categorized into low, medium and high knowledge groups using mean and standard deviation as measure of check.

A total of 14 independent variables related to the study were selected. The variables were measured as: educational status (0=illiterate, 1=can read and write, 2= primary school, 3 = middle school, 4 = secondary school, 5 = higher secondary school, 6 = college education); material possession [furniture (1=chair, 2=tea poy, 3= table, 4= dining table, 5 =cot, 6= cupboard, 7= sofa); electronic gadgets (1= radio, 2=television, 3=mobile phones, 4= internet); Transportation (1=two-wheeler, 2=four wheeler); farming equipments (1=manually operated, 2=power operated)]; social participation (0=never, 1=occasionally, 2=regularly); annual income (low=Less than Rs.1.07 lakh, medium =

Rs.1.07 to Rs. 2.39 lakh and high = More than Rs.2.39 lakh); marketing pattern (1=in local or regional market, 2= in district market, 3= in state level, 4=out of state); mass media use and extension contact (0=never, 1=occasionally, 2=regularly); awareness of development programme (1= aware, 0=not aware); scientific orientation, risk orientation, economic motivation, market orientation and fatalism (5=strongly agree, 4= agree, 3=undecided, 2=disagree and 1=strongly disagree for positive statements and reverse scoring for negative statements); innovativeness (3=as soon as it is brought to my knowledge, 2= after I have seen other farmers have tried it successfully on their farms, 1= I have preferred to wait and took my own time).

3. RESULTS AND DISCUSSION

3.1 Knowledge Level of Tribal Farmers Regarding NTFPs Processing

Table 1 illustrated that more than two-fifth (43.75%) of the tribal farmers possessed low knowledge regarding NTFPs, followed by 25.00 per cent had medium knowledge and 31.25 per cent of the tribal farmers had high knowledge respectively which is on par with the study of Kirar and Mehta [4] and [5]. This implies that there is limited access to formal education in the remote areas of Meghalaya. For instance, almost half of the tribal farmers only had basic education till primary school and only a few pursued higher education [6] and [7]. Without proper education and awareness, the tribal farmers might not recognize the value or potential of NTFPs. Therefore, creating awareness and educational campaign regarding NTFPs and its potential by the concern authorities should be a priority. Likewise, farmers with more knowledge should be recognized and engaged for knowledge sharing. Their potential need to be harnesses to uplift the entire community for sustainable development in this sector.

3.2 Relationship Between Profile Characteristics and Knowledge Level of Tribal Farmers

The relational analysis (Table 2) between the knowledge level of tribal farmers on NTFPs processing and their profile characteristics indicated that five variables i.e., educational status, material possession, annual income, extension contacts and scientific orientation were related significantly at 0.01 level of probability. This indicates a robust statistical relationship, implying that changes or variations in one of these factors might be associated with corresponding changes or variations in the others. Tribal farmers with higher educational status tend to have more knowledge regarding NTFPs. Similar findings were reported by Bihari et al. [5] and [8]. Greater material possession enhances access to resources, allowing experimentation with processing techniques and promoting a balanced approach combining modern methods and indigenous wisdom. A higher income enables investment in education and skill development [9]. Frequent contact with extension agents offers updated knowledge [10] about different processing techniques and value addition. Scientific orientation encourages experimentation and evidence-based solutions [11].

Characteristics such as marketing pattern and market orientation were significantly related at 0.05 level of probability. This suggests that tribal farmers' involvement in diverse markets and their focus on market demands significantly contribute to their knowledge regarding the processing of NTFPs [6].

The negative significance of fatalism at 0.05 level of probability suggests an interesting dynamic within the studied population. Fatalism typically refers to a belief in a predetermined fate that events are beyond one's control [12]. Fatalistic beliefs might hinder farmers' motivation or willingness to actively seek and acquire knowledge about NTFP processing. It can discourage tribal farmers from embracing new ideas and might prevent them from adopting new practices believing that the outcomes are predetermined regardless of their actions.

3.3 Multiple Linear Regression Analysis of Selected Profile Characteristics with Knowledge of Tribal Farmers

The F value of 16.814 (Table 3) is greater than the critical value of 0.01. Hence the null hypothesis is rejected implying that at least one of the independent variables in the model has a significant impact on the dependent variable and the overall model is providing meaningful information about the relationship between the variables. The 'R^2' value of 0.637 explained that all the fourteen independent variables put together explained about 63.70 per cent variation in the knowledge of tribal farmers regarding the processing of NTFPs. This adjusted R^2 value of 0.599 indicates a moderate to strong fit of the model to the data, implying that the included

predictors are contributing significantly to explaining the variation in the dependent variable. The partial regression coefficients further revealed that extension contact was found positively significant at 0.01 and educational status and risk orientation at 0.05 level of significance. This implied that extension contact, educational status and risk orientation contributed the most to the variation in the knowledge of tribal farmers. This implied that there is a need to focus on improving the extension services, educational enhancements and addressing risk perceptions to significantly enhance the knowledge base of tribal farmers, subsequently empowering them with information and tools to make informed decisions about various aspects related to their livelihoods and practices [10].

Table 1. Distribution of tribal farmers based on their knowledge regarding processing of NTFPs

(n=160)

Knowledge Level	Score	No.	%
Low	<27	70	43.75
Medium	28-30	40	25.00
High	<30	50	31.25
Mean:28.17 1/2 SD: 1.48	Total	160	100

Table 2. Relationship between the selected profile characteristics and knowledge on NTFPs processing

(n=160)

Variables	Independent variables	Correlation Coefficient (r)
X1	Educational status	0.311**
X2	Material possession	0.283**
X3	Social participation	0.104 NS
X4	Annual Income	0.322**
X5	Marketing pattern	0.191*
X6	Mass Media Use	0.108 NS
X7	Extension contact	0.726**
X8	Awareness of Development Programmes	0.050 NS
X9	Scientific orientation	0.240**
X10	Risk orientation	0.117 NS
X11	Economic motivation	0.028 NS
X12	Market orientation	0.172*
X13	Innovativeness	0.100 NS
X14	Fatalism	-0.168*

*Note: **Correlation is significant at the 0.01 level of probability*
**Correlation is significant at the 0.05 level of probability*
NS Non-Significant

Table 3. Multiple linear regression analysis of selected profile characteristics with knowledge of tribal farmers

(n=160)

Variables	Characteristics	Regression Coefficient (b)	Standard Error	t-value	P value
X1	Educational status	0.138	0.146	2.409*	0.017
X2	Material possession	0.089	0.025	1.093	0.276
X3	Social participation	-0.004	0.058	-0.071	0.943
X4	Annual Income	0.088	0.000	1.239	0.218
X5	Marketing pattern	0.066	0.168	1.251	0.213
X6	Mass Media Use	-0.036	0.135	-0.573	0.568
X7	Extension contact	0.633	0.074	11.675**	0.000
X8	Awareness of Development Programmes	-0.068	0.172	-1.275	0.205
X9	Scientific orientation	0.078	0.092	1.475	0.142
X10	Risk orientation	0.107	0.070	2.041*	0.043

Variables	Characteristics	Regression Coefficient (b)	Standard Error	t-value	P value
X11	Economic motivation	0.074	0.057	1.451	0.149
X12	Market orientation	-0.036	0.091	-0.700	0.485
X13	Innovativeness	-0.045	0.125	-0.834	0.405
X14	Fatalism	0.064	0.204	1.200	0.232

Significant at 0.05 level of probability; **Significant at 0.01 level of probability F value =16.814 R^2 = 0.637 R^2 adjusted = 0.599*

Table 4. Step wise regression analysis for predicting the influence of selected profile characteristics on the knowledge of tribal farmers

(n=160)

Variables	Characteristics	Regression Coefficient (b)	Standard Error	t-value	P value
X7	Extension contact	0.673	0.072	12.805**	0.000
X2	Material possession	0.165	0.016	3.070**	0.003
X14	Fatalism	-0.135	0.099	-2.643**	0.009
X1	Educational status	0.120	0.140	2.193*	0.030

Significant at 0.05 level of probability; **Significant at 0.01 level of probability F value =57.045 R^2 = 0.595 R^2 adjusted= 0.585*

Table 5. Constraints faced by tribal farmers with regards to collection, processing and marketing of NTFPs

(n=160)

Sl.No.	Constraints	No. (%)	Mean	Rank
1.	Insufficient infrastructure for processing and storage	156 (97.50)	0.61	I
2.	Lack of adequate knowledge about the potential value and proper processing techniques	153 (95.63)	0.60	II
3.	Difficulties in the transportation of forest produce due to remote locations	149 (93.13)	0.58	III
4.	Limited access to credit and financial support	147 (91.88)	0.57	IV
5.	Complex and unclear regulations related to NTFP harvesting and processing	103 (64.38)	0.40	IX
6.	Distance from the field	145 (90.63)	0.57	V
7.	Fluctuation of prices of the produce	137 (85.63)	0.54	VI
8.	Changing weather patterns and environmental factors	130 (81.25)	0.51	VII
9.	Exploited by intermediaries	112 (70.00)	0.44	VIII
10.	Seasonal availability of NTFPS	101 (63.13)	0.39	X
11.	Loss of traditional knowledge and practices	96 (60.00)	0.38	XI
12.	Limited access to water	84 (52.50)	0.33	XII
13.	Lack of training programs and capacity building initiatives on modern processing techniques	83 (51.88)	0.32	XIII
14.	High cost of leased land	57 (35.63)	0.22	XIV

Note: Figures in parentheses indicates percentage

3.4 Step-Wise Regression Analysis for Predicting the Influence of Selected Profile Characteristics on the Knowledge of Tribal Farmers

Step-wise regression analysis was done for predicting the influence of selected profile characteristics on the knowledge of tribal farmers. The results revealed that extension contact and material possession were positive and significant at 0.01 level of probability and educational status was significant at 0.05 level. Fatalism is negatively significant at 0.01 level of probability. The F-value of 57.045, R^2 value of 0.595 and R^2 adjusted value of 0.585 represent a moderate to strong fit of the model. The R^2 value (0.595) suggests that approximately 59.50 per cent of the variability in the dependent variable is explained collectively by the included predictor variables. Overall, this analysis suggests that extension contact, material possession, fatalism and educational status are important predictors influencing the knowledge of tribal farmers, providing insights into their individual impacts while considering their statistical significance.

3.5 Constraints Faced by Tribal Farmers with Regards to Collection, Processing and Marketing of NTFPs

Table 5 outlined the primary constraints faced by tribal farmers regarding the collection, processing, and marketing of NTFPs. The most prevalent obstacles, as perceived by these farmers, include insufficient infrastructure for processing and storage (97.50%) followed closely by lack of adequate knowledge about the potential value and proper processing techniques (95.63%). Other significant challenges are difficulties in the transportation of forest produce due to remote locations (93.13%), limited access to credit and financial support (91.88%) and distance from the field (90.63%). The study is partially on par with Gupta et al. [13] and [14].

The geographical location of the study area likely contributes to these perceived constraints. The lack of educational institutions hampers farmers' access to advanced knowledge. Additionally, inadequate road infrastructure impedes the timely transportation of produce. The high risk associated with obtaining loans might be a key reason behind these perceived limitations. As NTFPs are forest-derived, their cultivation often occurs far from farmer's homes, adding logistical challenges in transportation and management.

4. CONCLUSION

Majority of the tribal farmers had low to medium knowledge regarding NTFPs processing. Five variables i.e., educational status, material possession, annual income, extension contacts, scientific orientation, marketing pattern, market orientation and fatalism were significantly related with knowledge of tribal farmers. The partial regression coefficients revealed that extension contact, educational status and risk orientation contributed the most to the variation in the knowledge of tribal farmers. Variables such as extension contact, material possession, fatalism and educational status are important predictors in explaining 59.50 per cent of variability in the knowledge of tribal farmers. It is therefore recommended to organize demonstration, field trips, study tour to different processing units inside and outside state which should be imparted by different training agencies/ extension agents. This may be helpful to enhance the knowledge of farmers regarding NTFPs processing. The state government should also focus in establishment of micro-enterprises specializing in NTFPs processing in nearby villages. Existing NGOs needs to be promoted and encourage to work with the tribal farmers in promoting the NTFPs available in the village. Ropeway systems could be extended to the unreached villages for easy transportation of their produce. Collaboration among government agencies, NGOs and training institutes is essential to provide comprehensive need-based training and capacity building for the tribal farmers. However, the results could not be generalized and similar studies need to be conducted in other regions as well.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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