Knowledge Level of Tribal Farmers on Processing of Non-Timber Forest Products in Meghalaya-An Analysis

Abstract

Non-timber forest products (NTFPs) play a crucial role in sustaining the livelihoods and preserving the cultural heritage of tribal communities in Meghalaya. Understanding the knowledge of tribal farmers in processing NTFPs is imperative for promoting sustainable resource management. NTFPs encompass all the biological materials other than timber which are extracted from forests for human use such as broomgrass, bayleaf, bamboo, honey etc. The study was conducted 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. The study revealed a mean knowledge score of 28.17 with a half-standard deviation of 1.48. Among the respondents, 43.75 per cent had low knowledge, 25.00 per cent had medium knowledge and 31.25 per cent demonstrated high knowledge levels. Correlation analysis revealed significant positive associations between knowledge level and variables such as educational status, material possession, annual income, extension contacts and scientific orientation at the 0.01 level of significance. Marketing pattern, cosmopoliteness, extension participation 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 (Rank I), lack of adequate knowledge (Rank II) and difficulties in accessing markets due to remote locations and poor transportation networks (Rank III) which need policy interventions by the concerned authorities.

Keywords: Knowledge level, NTFPs, Tribal farmers, Khasi tribes

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 (FSI, 2021) 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 (FAO, 1995). 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 (Duttagupta & Gupta, 2014), 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 of tribal farmers in Meghalaya regarding the processing 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. Furthermore, the study delved into the challenges and opportunities faced by these tribal farmers, shedding light on the pivotal role of NTFPs in the socio-economic framework of the region.

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, totalling 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, 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 benchmarks.

Results and Discussion

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 with more than one-third (36.25%) having medium knowledge, and 20.00 per cent of the tribal farmers had high knowledge respectively which is on par with the study of Kirar and Mehta (2009) and Bihari et al., (2012). 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 (Mistry *et al*., 2016; Sangma &Lalnundanga, 2018).

This is because of the lack of secondary and higher secondary educational institutions in the nearby village. Tribal communities were often known to have a strong connection to their traditional way of life, implying that they rely more on the traditional techniques that have been passed down from generation to generation and might not always adopt modern processing techniques. Furthermore, a noticeable transition from extended family to nuclear family can also have a significant effect on the passing down of traditional practices since there will be limited interactions between the younger and the older generations (Gour *et al.*, 2015).

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**

Relationship between profile characteristics of tribal farmers and their knowledge level

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*., (2012) and Gour *et al.,* (2015). 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 (Low *et al.,* 2020). Frequent contact with extension agents offers updated knowledge (Kannur *et al*., 2019) about different processing techniques and value addition. Scientific orientation encourages experimentation and evidence-based solutions. The study is in line with Rutsa and Jha (2023).

Characteristics such as marketing pattern, cosmopoliteness, extension participation and market orientation were significantly related at 0.05 level of probability. This suggests that tribal farmers' involvement in diverse markets, their openness to different perspectives, active participation in extension activities such as group discussion, exhibitions, training etc., and their focus on market demands significantly contribute to their knowledge regarding the processing of NTFPs. The results are partially in line with the study of Mistry *et al.*, (2016).

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 (Thompson *et al*.,1990). 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.

Table 2: Relationship between the selected profile characteristics and knowledge on NTFPs processing (n=160)

Variables	Independent variables	Correlation Coefficient (r)
X1	Age	-0.05^{NS}
X2	Educational status	0.311**
X3	Type of House	0.141 ^{NS}
X4	Material possession	0.283**
X5	Family Size	-0.072 ^{NS}
X6	Family Type	-0.06 ^{NS}
X7	Social participation	0.104 ^{NS}
X8	Political participation	0.066 ^{NS}
X9	Annual Income	0.322**
X10	Marketing pattern	0.191*
X11	Livestock Possession	-0.131 ^{NS}
X12	Mass Media Use	0.108 ^{NS}
X13	Cosmopoliteness	0.170*
X14	Extension contacts	0.726**
X15	Extension Participation	0.165*
X16	Opinion leadership	0.118 ^{NS}
X17	Awareness of Development Programmes	0.050 ^{NS}
X18	Scientific orientation	0.240**
X19	Risk orientation	0.117 ^{NS}
X20	Economic motivation	0.028 ^{NS}
X21	Market orientation	0.172*
X22	Innovativeness	0.100 ^{NS}
X23	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

Extent of contribution of characteristic to knowledge level of tribal farmers regarding NTFPs processing

The F value of 10.925 (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 0.660 explained that all the twenty-three independent variables put together explained about 66.00 per cent variation in the knowledge of tribal farmers regarding the processing of NTFPs. A similar study was reported by Kannur *et al.,* (2019). The partial regression coefficients further revealed that variables like extension contacts and extension participation were found positively significant at 0.01 and 0.05 level of significance and fatalism were found to be negatively significant at 0.05 level as evident from their significant 't' values. This implied that extension contact, extension participation and fatalism contributed the most to the variation in the knowledge level of tribal farmers.

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	Age	-0.018	0.013	-0.072	0.942
X2	Educational status	0.123	0.150	1.739	0.084
X3	Type of house	0.033	0.062	0.331	0.742
X4	Material possession	0.044	0.029	0.537	0.592
X5	Family Size	-0.027	0.078	-0.497	0.620
X6	Family Type	-0.021	0.668	-0.384	0.702
X7	Social participation	-0.063	0.067	-0.711	0.478
X8	Political participation	-0.024	0.239	-0.512	0.609
X9	Annual Income	0.089	0.000	1.267	0.207
X10	Marketing pattern	0.089	0.172	1.643	0.103
X11	Livestock Possession	0.024	0.047	0.282	0.779
X12	Mass Media Use	-0.061	0.139	-0.715	0.476
X13	Cosmopoliteness	0.094	0.038	1.671	0.097

X14	Extension contacts	0.621	0.077	11.079**	0.000
X15	Extension Participation	0.154	0.121	2.392*	0.018
X16	Opinion leadership	0.033	0.134	0.579	0.564
X17	Awareness of Development Programmes	-0.100	0.183	-1.818	0.071
X18	Scientific orientation	0.062	0.093	1.168	0.245
X19	Risk orientation	0.083	0.059	1.600	0.112
X20	Economic motivation	-0.018	0.094	-0.301	0.764
X21	Market orientation	-0.034	0.126	0.999	0.320
X22	Innovativeness	0.076	0.208	0.754	0.452
X23	Fatalism	-0.167	0.104	-2.992*	0.003
*Significant at 0.05 level of probability; **Significant at 0.01 level of probability F value =10.925** R^2 = 0.660					

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

Table 4 outlines 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., (2015) and Puneeth et al., (2016)

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

Table 4: Constraints faced by tribal farmers with regards to collection, processing and marketing of NTFPs (n=160)

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

Conclusion

Since, the majority of farmers have low to medium knowledge about NTFP processing, strategies aimed at improving knowledge should focus on creating awareness and expanding educational initiatives like Agro-ecology Learning Circles where farmers, experts, researchers and stakeholders come together to share knowledge, experiences and practices related to agro-ecology. To overcome major constraints in NTFPs collection and processing, the establishment and growth of micro-enterprises specializing in NTFPs processing in nearby villages should be a focus. The government should promote the existing NGOs and encourage new NGOs 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.

References

Bihari, B., Kumar, R., Prasad, K., & Sundarambal, P. (2012). Role performance and knowledge level of tribal women farmers in Meghalaya. *Indian Research Journal of Extension Education,* 12(1), 60-62.

Chauhan, G. G., Choudhary, M., &Aklade, S. (2019). Adoption of improved mushroom production technology by tribal farmers of Dang district. *Gujarat Journal of Extension Education*, Special Issue, 132-135.

Dattagupta, S., & Gupta, A. (2014). Traditional processing of non-timber forest products in Cachar, Assam, India. *Indian Journal of Traditional Knowledge*, 13(2), 427-433.

FAO (Food and Agriculture Organization). (1995). Planning for sustainable use of land resources: Towards a new approach: Land and Water Bulletin 2, Rome, Italy: 53 p.

Forest Survey of India [FSI]. (2021). India State of Forest Report 2021 (Volume 17). Forest Survey of India, Ministry of Forest Environment and Climate Change.

Gour, S., Mandal, M. K., & Singh, R. (2015). Assessing knowledge of tribal farmers regarding scientific animal husbandry practices. *Indian Research Journal of Extension Education*, 15(2), 91-94.

Gupta, A. K., Sharma, M. L., Khan, M. A., Narbaria, S., & Pandey, A. (2015). Problems faced by tribes in collection and marketing of non-timber forest products (NTFPs) in Chhattisgarh, India. *Plant Archives*, 15(2), 789-793.

Kannur, C., Nagaraj, K.H., &Shivalinge Gowda, N.S. (2019). Knowledge level of beneficiary farmers regarding the activities of agricultural technology information centre, UAS, Bangalore. *Mysore Journal of Agricultural Sciences. 53(4), 89-93.*

Kirar, B. S., & Mehta, B. K. (2009). Extent of knowledge of tribal farmers about rice production technology. *Indian Research Journal of Extension Education*, 9(1), January.

Low, B. S., Selvaraja, K. G., Ong, T. H. (2020). Education background and monthly household income are factors affecting the knowledge, awareness, and practice on haze pollution among Malaysians. *Environmental Science and Pollution Research*, 27 (24), 30419-30425.

Mistry, J. J., Patel, D. B., & Patel, V. M. (2016). Knowledge level of recommended green gram cultivation technology of tribal FLD farmers. *Gujarat Journal of Extension Education*, 27(1), 53-55.

Puneeth, J., Nataraju, M. S., & Lakshminarayan, M. T. (2016). Collection and marketing of non-timber forest products by tribals in Sirsi Forest Division of North Canara District. *Mysore Journal of Agricultural Sciences*, 50(1), 98-103.

Rutsa, A., & Jha, K. K. (2023). Factors influencing knowledge of farmers on Sri Paddy Cultivation: Evidence from Kohima District of Nagaland. *Biological Forum – An International Journal*, 15(7), 235-239.

Sangma, A. J. T., &Lalnundanga. (2019). Non-timber forest products (NTFPs) used by Garo tribe of Rongram block in West Garo Hills, Meghalaya. *Indian Journal of Traditional Knowledge*, 18(1), 151-161.

Thompson, M., Ellis, R., &Wildavsky, A. (1990). Cultural Theory. Westview Press Boulder.

Gupta, A. K., Sharma, M. L., Khan, M. A., Narbaria, S., & Pandey, A. (2015). Problems faced by tribes in collection and marketing of non-timber forest products (NTFPs) in Chhattisgarh, India. *Plant Archives*, 15(2), 789-793.