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Traditional processing of non- timber forest products in Cachar, Assam, India

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Non timber forest products (NTFPs) play significant role in the protection of the livelihood safety net of the forest dwellers of North East India. The present study has the objectives of documenting the traditional knowledge pertaining to the processing of non-timber forest products in the Inner Line Reserve Forest (ILRF) of Cachar district, Assam, India. This forest harbours about 21 commercially important NTFPs, 8 of which are subjected to different traditional processing techniques before marketing to ensure their durability and enhanced resistance to fungal and insect attacks. The methodology adopted for conducting this study comprised household survey, interview, focal group discussion, and seasonal field surveys with enumeration of important NTFP taxa. Different traditional processing technologies such as smoking of the product on bamboo trays, sun drying on elevated racks, boiling, etc. comprise simple, cost-effective yet efficient ways of value addition to the products.

Keywords: Traditional processing, NTFPs, Value addition, Forest management, Cachar, Assam

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Since ancient times, human societies are characterized by their ability to develop traditional knowledge bases through their influence over, and experience and interactions with, the ecosystems they belong to[1]. This knowledge base is therefore developed, nurtured, conserved and transmitted from generation to generation[2] and becomes a part of the cultural identity of a given community. Besides, traditional knowledge in a society also crosses geographical barriers with the migration of communities and the subsequent interactions among two or more identical and apart societies. Traditional knowledge has wide range of applications in preparation of medicine, food, construction of shelter, weaving of cloth, magico - religious and religious uses and the like. Traditionally processed wild fruits, nuts, bush meat, and invertebrates such as caterpillars are used in countries of Africa, the Caribbean and the pacific[3-4]. In Latin America, biodiversity of plant origin was exploited, harnessed and manipulated for thousands of years for the use of aboriginal people[5]. In Asia, particularly in south Asia, forest products of plant and animal origin are largely used as food, medicine, for making handicraft, construction of shelter, and others. However, in many cases the forest products have to undergo some kind of processing before final utilization. For example, in the state of Andhra Pradesh, India, of the 38 NTFPs collected, six go through some sort of processing through village cooperatives (Van Samrakshana Samiti) or at the level of primary collectors[6]. In North East India, non-timber forest product (NTFP) plays a significant role for sustaining the livelihoods of many tribal and even non-tribal communities. Traditional processing techniques used by forest dwellers and other forest-dependent communities contribute significantly towards adding market value to the NTFPs. Diversification of timber-based forest industry to NTFP-based forest industry may be preferred because the latter widens the opportunity of employment since harvesting is mostly done manually and cottage based traditional processing unit also ensures sustainability[7]. In addition to marketing information related to traditional system, processing provides valuable information related to sustainable forest management[8].This not only ensures economic freedom to marginalized forest dwellers but also otherwise opens up the opportunity of biodiversity conservation. In the forest divisions of Hazaribagh, Simdega and Gumla of Jharkhand State, women play noteworthy roles in the collection of NTFPs like *Madhuca longifolia* var. *latifolia* (Roxb.) A.Chev.

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syn. *Madhuca indica* J.F.Gmel, *Diospyros melanoxylon* Roxb. and *Buchanania cochinchinensis* (Lour.) M.R.Almeida and their traditional processing at household level to ensure protection from putrefaction during storage and from insect attack. This adds value to the products than if these were sold onsite[9]. Inner Line Reserve Forest (ILRF) of Assam in the northeastern region of India came into existence in 1878 through a notification under the Indian forest Act 1878 of the revenue department of the Government of Assam[10]. This forest originally had an area of 1318.13 sq km. However, about 570.3 sq km went under the jurisdiction of Mizoram state Forest after the Lushai Hills district gained union territory status in 1972. The area of the forest located within Cachar district was further reduced to 442.66 sq km in 1989 when its Hailakandi sub-division was given the status of a separate district. ILRF harbours valuable timber yielding tree species such as *Tectona grandis* L.f., *Shorea robusta* Gaertn., *Dipterocarpus turbinatus* C.F.Gaertn. and others in addition to several NTFP-yielding plant and animal species, thereby providing substantial livelihood support to forest dwellers[15]. Some of the NTFPs having commercial value are processed to increase their durability and pliability as well as to protect them from insect and fungal attack. Such processing adds commercial value to the product. Consequently, such value-added products are able to attract a larger number of potential buyers. This study attempts to document the traditional knowledge of the processing of NTFPs prevalent in ILRF. It may be worth mentioning that the traditional knowledge base in ILRF represents an amalgamation of the traditional knowledge of tribes such as *Hmar, Pnar* and others with those of several non-tribal communities from this region as well as other parts of the country.

Methodology

The study was conducted in Inner Line Reserve Forest (ILRF) of Cachar district, North East India, which has a vegetation type of tropical evergreen and sub-tropical semi-evergreen, with bamboo comprising the dominant secondary vegetation. ILRF harbours a diverse forest type including riparian forest growing along Sonai and Rukni rivers - two major tributaries of River Barak - which flow through this forest. Besides, a number of small springs, streams, marshes and other water bodies are also common (Fig. 1). There are 22 forest villages inside ILRF, of which 7 are predominantly inhabited by tribal groups, 5 by

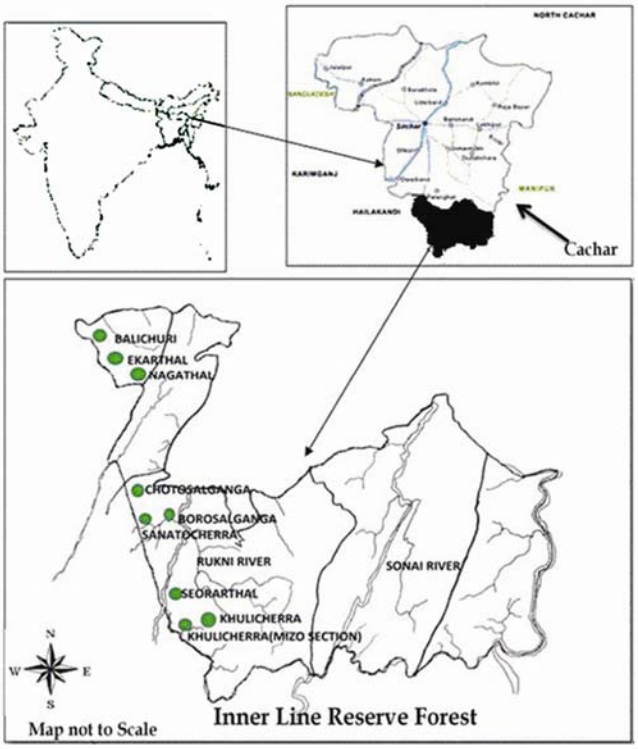

Fig. 1—Map of Inner Line Reserve Forest of Cachar, Assam, India

non-tribals, and 10 by mixed populations of tribals and non-tribals. Accordingly, approximately 40 % of the villages were selected on the basis of their demographic composition as follows: 3 tribal, 2 non-tribal and 4 having mixed population. Inhabitants of these forest villages comprise several tribes of Mongoloid origin, viz. *Halem, Jaintia* (P'nar), *Reang, Mizo, H'mar, Dimasa* and *Kuki*; and non-tribals from North India, south west part of West Bengal, Orissa, eastern Bihar and Chhattisgarh. All these communities were settled by the Assam Forest Department from time to time since the early part of twentieth century to provide the work force for maintaining and managing the forest resources[11].

Information related to traditional processing of NTFPs in ILRF was collected through house to house surveys [n= 654 (Bengali Hindu:119; Bengali Muslim:72 ; North Indian: 110; *Hmar*: 27; *Kuki*: 69; *P'nar*:111; *Dimasa*: 46; *Reang*: 8; *Halem*: 27; *Mizo*: 65) in the 9 randomly selected villages using structured and semi structured questionnaire. Focal group discussions were also conducted by involving different strata of the society giving special emphasis to women. Field data were collected through numerous surveys conducted in pre monsoon, post monsoon and winter seasons, with the active help

of NTFP collectors, processors and local owners of small collection centers (*Khola*), small NTFP traders and local knowledgeable persons[11]. During field work, plant material were collected and herbarium was made with standard methods[12]. Authentic identification was done with the help of different flora and monograph[13-14]. Identified herbarium sheets were deposited to the Museum of the Department of Ecology and Environmental Science, Assam University, Silchar, Assam, and assigned a field number. Photographic documentation was done with the help of a high resolution digital camera. Prior informed consent was taken from the headman and respondents in each village.

Results and discussion

Subsistence of forest dwellers in ILRF was considerably supported by NTFPs available in the reserve forest[11]. A total of 88 NTFPs of plant and animal origin are known to be harvested from Inner Line Reserve Forest (ILRF) of Cachar, Assam, North East India, of which 67 are of plant and 21 of animal origin. Of the plant NTFPs, 21 are harvested extensively as they are of significant commercial value. Among the commercially important NTFPs harvested from ILRF, a few are processed by the NTFP collectors on site or at the household level. In most of the cases, the technique adopted for processing does not involve any modern or sophisticated technology; instead the processing is traditional and the pertinent knowledge is transmitted orally across generations, as well as horizontally in case of the amalgamation of two alike and distant societies. Such traditional processing adds value to the products and imparts more commercial importance. Collected and value-added products are either sold to the privately managed local collection centers (*Khola*) or in the local weekly market. The techniques involved in the processing of eight commercially important NTFPs along with the nature and extent of value addition achieved are presented in Table 1. Being located in the humid sub-tropics, the NTFPs collected from this area are especially vulnerable to insect and fungal attacks that can affect their durability and quality. As the Table shows, most of the processing, therefore, involves drying in the sun, although elaborate smoking techniques and appropriate storage methods are also employed. Photographic depictions of the different processing techniques are provided in Figure 2 (A-T). Highlights of processing techniques employed along with the nature of value addition or benefits obtained are listed in Table 1. Details of processing techniques of the different plant NTFPs are provided here.

Herb

Rhizomes of *Homalomena aromatica* (Spreng.) Schott are collected and cut into 0.5-1 inch pieces. These are then dehydrated by spreading in the sun. Rhizomes are further dehydrated by smoking on a large bamboo tray over a slow, simmering fire to protect them from insect and fungal attack (Fig. 2 A-C).

Thysanolaena latifolia (Roxb.ex Hornem.) Honda. is an important cash crop for the forest dwellers of ILRF. Long inflorescence of *T. latifolia* is collected from the forest in a semi-mature stage and then dried in the sun. Initial drying at household level is done by spreading the inflorescence thinly and uniformly on pieces of bamboo or wood in the courtyard to ensure air circulation from bottom. Large scale processing is done in local collection centers (*Khola*) by spreading the inflorescence over 1.5-2.0 ft high bamboo racks in order to ensure ventilation from below to have uniform drying (Fig. 2D-F).

Imperata cylindrica (L.) Raeusch, an herb, is extensively used as roofing material. Mature semi-dry leaf is usually harvested during the month of January-February or early March. Bundles (*Golla*) of leaves are kept in the field for about 5 to 7 days for further drying in the sun. Processed leaves are then ready for domestic use or for sale in the local market (Fig. 2G-I). After harvesting, the field is set on fire to induce gregarious sprouting of the plant after experiencing first shower which starts in late March or early April.

Bamboo and Rattan

Mature *Schizostachyum dullooa* (Gamble) R.B.Majumdar and *Calamus guruba* Buch.-Ham are used for manufacture of bamboo trays (*Dala*). Thin slats of 0.5 cm width are carved from mature bamboo (4 - 5 yrs old) and shaped with the help of carving knife (*Dao*). The slats are then woven into mats. Mature *C. guruba* - pre- boiled to prevent fungal and insect infestations - is used for binding the slats together to lend more strength (Fig. 2 J-M). Mature pre- boiled *C. guruba* is used to give more strength to binds.

Shrub

Leaves of *Licuala peltata* Roxb. ex Buch.-Ham are collected from the forest, made into bundles of 100 – 120 leaves, and kept in the open for about

Table 1—Traditional processing of NTFPs in Inner Line Reserve Forest, Cachar, Assam

Sl no	Name of the NTFP yielding plant (Family) [(Location*); Field number]	Highlights of processing technique	Value addition/ Benefit out of processing
		Herb	
1	Homalomena aromatica (Spreng.) Schott (Araceae) [(BC; BS; CS; ET; KC; KCM; NT; SC; ST); F. No. ILRF/ NTFP/ 451]	Sun-drying of rhizome followed by further dehydration by smoking.	Improves storage and transportation; protects the product from fungal and insect attack.
2	Thysanolaena latifolia (Roxb.ex Hornem.) (Poaceae) [(BC; BS; CS; ET; KC; KCM; NT; SC; ST); F. No. ILRF/ NTFP/ 452]	Initial sun- drying at household level Followed by large scale drying in local collection centers (*Khola*).	Improved durability by uniform drying of the inflorescence that fetches more value in the market.
3	Imperata cylindrica (L.) Raeusch (Poaceae) [(BC; BS; CS; ET; KC; KCM; NT; SC; ST); F. No. ILRF/ NTFP/ 453]	Mature semi-dry leaf kept in the field for further drying in the sun.	Uniform drying of the leaf can make it withstand heavy rainfall and temperature variation as well as microbial growth in the damp weather conditions prevalent in the region.
		Bamboo and Rattan	
4	*Schizostachyum dullooa* (Gamble) R.B.Majumdar (Poaceae) [(BC; BS; CS; ET; KC; KCM; NT; SC; ST); F. No. ILRF/ NTFP / 454] And *Calamus guruba* Buch.-Ham (Palmaceae) [(BC; KCM; NT; SC; ST); F. No. ILRF / NTFP/455]	Carving and weaving of bamboo slats into mats; pre-boiling of *C. guruba* to prevent fungal and insect infestations and to lend more strength.	Improvement of durability and resistance to fungal and insect attack as well as wear and tear.
		Shrub	
5	*Licuala peltata* Roxb. ex Buch.-Ham (Arecaceae) [(BC; BS; CS; ET; KC; KCM; NT; SC; ST); F. No. ILRF/ NTFP/ 456]	Sun-drying of leaves to reduce water content.	Dehydration of the leaf enables it to withstand extreme climatic conditions such as strong sun and heavy rainfall.
		Climber	
6	*Smilax lanceifolia* Roxb**.** (Liliaceae) [(BC; BS; CS; ET; KC; KCM; NT; SC; ST);F. No. ILRF/ NTFP/ 457]	Sun drying followed by smoking.	Smoking and sun drying help to protect the product from insect attack and fungal infection that lead to premature decomposition and consequent decline in market value.
7	*Dioscorea sp* (Dioscoreaceae) [(BC; BS; CS; ET; KC; KCM; NT; SC; ST); F. No. ILRF / NTFP/448]	Storage in a room with mud-plastered walls.	Storage in room made of bamboo and thatch and plastered with soil-cow dung slurry helps maintain uniform temperature and low humidity and prevents early sprouting that can lead to carbohydrate loss.
		Tree	
8	*Litsea glutinosa* var. *glutinosa* syn. *Litsea sebifera* Pers. (Lauraceae) [(BC; BS; CS; ET; NT; ST); F. No. ILRF/NTFP/449]	Small pieces of bark dried in the sun.	Dehydration of the bark leads to the increase of gum concentration and substantial loss of weight and protects from insect and fungal attack during transportation and long term storage up to 10 to 12 months in the warehouse.

* BC-Balichuri; BS-Borosalganga; CS- Chotosalganga; ET-Ekarthal; KC- Khulicherra; KCM- Khulicherra Mizo section; NT- Nagathal; SC-Santocherra; ST-Seorarthal

15 days for sun-drying. This process turns the leaves from green to pale brown and reduces their water content (Fig. 2N-P). Dehydrated leaves are then used as roofing material and for making traditional umbrella.

Climber

Root of mature *Smilax lanceifolia* Roxb., which is a climber, is dried in the sun for 2-3 days. After initial drying, the roots are spread on bamboo trays and smoked by burning husk in a slow fire (Fig.2Q-R). *S. lanceifolia* is largely used by the forest dwellers for making traditional tea which is used as an energy drink and is used in Ayurvedic medicine.

Dioscorea sp., which is another climber, plays a significant role as a nutritional supplement during lean season in the study area. As tuber of *Dioscorea* sp is rich in essential dietary nutrients [15-16] and can

Fig. 2—A-C: Traditional Processing of *Homalomena aromatica* (Spreng.)Schott at household level; D-F: Collection of *Thysanolaena latifolia* (Roxb.ex Hornem.) and processing at household level and at local collection center; G-I: processing , transportation and use of *Imperata cylindrica* (L.)Raeusch; J-M: Crafting of tray from *Schizostachyum dullooa* (Gamble) R.B.Majumdar and Calamus guruba Buch.-Ham; N-P: Collection and drying of *Licuala peltata* Roxb. ex Buch.-Ham Q-R: Collection of *Smilax lanceifolia* Roxb*;* S:Storage of processed *Dioscorea sp*. T: Processing of *Litsea glutinosa* var. *glutinosa* syn. *Litsea sebifera* Pers. Bark

consequently meet the calorie needs of the forest dwellers. In Africa and South East Asian countries such as Thailand, Lao PDR and others, *Dioscorea* spp. contribute significantly towards ensuring household food security[17-18]. Forest dwellers usually collect the tuber throughout winter and store in a room made of bamboo and thatch with its wall plastered with slurry of mud and cow dung mixed together (Fig. 2S). This maintains uniform temperature and moisture content throughout the year, which restricts early spouting of the tuber thereby restricting carbohydrate loss.

Tree

Bark of *Litsea glutinosa* var. *glutinosa* syn. *Litsea sebifera* Pers., a tree, is extensively harvested and used in the essence stick industry. After collection, bark is made into 2-3 inch pieces and dried in the sun for 7 - 10 days for evaporation of excess water (Fig. 2T). This processing increases the gum concentration and protects from insect and fungal attack during storage as well.

In ILRF, the forest dwellers are engaged in wide ranging occupations such as rain-fed agriculture, agricultural labour, betel leaf cultivation, shifting cultivation and NTFP collection[11]. However, during the lean season, particularly winter to pre-monsoon, root and tuber collected from the forest serve as major dietary supplements to fill the food gap.

Traditional significance of study to the society/ researchers and some constructive recommendations

Traditional knowledge of the forest dwellers on forest resources have the potential to address scientific approach to forest management as a source of bottom-line information from which researcher and forest manager might learn[19]. Traditional knowledge of forest dwellers contributes much and most efficient tools for the conservation of forest bio- resources and ecosystem services because of its efficiency toward the ecosystem, additionality of the knowledge and most importantly involvement of the community at forest village(rural) level[19]. Simple cost effective and eco-friendly traditional processing technique on forest product generates employment opportunity to the forest dwellers. Generation of employment at forest village level helps to develop small scale industry and combat rural-urban migration and associated socio- economical problem.

Conclusion

The increasing demand for timber has been largely responsible for the continued degradation of natural forest in ILRF in the last few decades, in spite of the existing ban on felling of trees imposed by the Supreme Court of India. Increased population and livelihood compulsions among the forest dwellers and forest-edge communities had their toll on the availability of NTFPs due to unsustainable harvesting as well. At the same time, increasing migration of youth to urban areas in search of more lucrative careers has led to rapid erosion of traditional knowledge pertaining to collection and processing of NTFPs. The mass media ought to play a pro-active role in spreading public awareness and in educating the young generation about the rich heritage in terms of the traditional knowledge base on NTFPs and other bioresources[20]. Women in particular should be trained and motivated to perpetuate traditional knowledge in view of its importance in sustainable income generation. Appropriate steps also need to be taken at the policy level to document and utilize the environment and forest friendly traditional knowledge for restructuring forest management practices in order to make them more conservation- and sustainability-oriented.

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References

1 Kennedy SMJ, Commercial Non- timber products collected by the tribals in the Palni hills, *Indian J Tradit Knowle*, 5(2) (2006) 212- 216.

2 Daya Y & Vinj N, Protecting traditional ethno-botanical knowledge in South Africa through the intellectual property regime, *Agrekon*, 45(3) (2006) 319- 338.

3 Lo'pez C & Shanley P, (eds), *Riches of the forest: For health, life and spirit of Africa.* (Center for international forestry research. Indonesia), 2004a, 115.

4 Andel TV, Non-timber forest products the value of wild plants, (Agromia Foundation and CTA, Wageningen), 2006, 69.

5 Lo'pez C, Shanley P & Fantani AC, *Riches of the forest: Fruits,remedies and handicraft in Latin America*, (Center for international forestry research, Indonesia),2004, 140.

6 Anonymous, Sustainable Exploitation, cultivation and marketing Linkages of non- Timber forest products (NTFPs) in Andhra Pradesh, (The Energy and Resources Institute Project report No 2003 SF 63) 2004, 154.

7 Marles RJ, Non-timber forest products and aboriginal traditional knowledge, ncrs.fs.fed.us/pubs/gtr/other/gtr-nc217/gtr_nc217page%20053.pdf, 2001

8 Giliba RA, Lupala ZJ , Mafuru C. Kayombo C, Mwendwa P, Non- timber forest products and their contribution to poverty alleviation and forest conservation in Mbulu and Babati District- Tanzania, *J Hum Ecol*, 31(2) (2010) 73-78.

9 Gharai AK & Chakrabarti S, A Study on NTFP-related livelihood dependency and people's perception of the commercialization potential of selected NTFP s in selected locations of Gumla, Hazaribagh & Simdega districts of Jharkhand (2009) www.cpt.in/whatnew/NTFP_Study_JHpdk

10 Hunter WW: A Statistical Account of Assam, Vol 2, (Spectrum Publication), 1879,490.

11 Dattagupta S, Gupta A & Ghose M , Non-Timber Forest Products of Inner Line Reserve forest of Cachar, Assam, India: dependency and usage pattern of forest dwellers, Assam University J Sci Technol, 6(1) (2010) 21-22.

12 Jain S K & Rao R P, *A handbook of field and herbarium methods* , (Today and tomorrows Publishers, new Delhi), 1997, 157.

13 Kanjilal UN, Das A, Kanjilal PC, *Flora of Assam,* (Avon Book Company, Delhi) 1934-1940, Vol :I 184; Vol: II 409; Vol: III 578; Vol: IV 377 ; Vol: V 480.

14 Moulik S, *The Grasses and Bamboos of India*. Vol- 2 (Scientific Publication, New Delhi) 1997, 700.

15 Coursey DG, Yam: An Account of the Nature, Origins, Cultivation and Utilization of the Useful Member of the Dioscoreaceae, (Longmans, London), 1967, 230.

16 Hladik, A & Dounias E, (1993). Wild yams of the African forest as potential food resources, In: Tropical Forests, People and Food: Bio cultural Interactions and Applications to Development, Edited by CM Hladik, A Hladik, OF Linares, H Pagezy, A Semple & M Hadley, Vol 13. (The Man and the Biosphere Series, UNESCO, Paris and The Parthenon Publishing Group, London), 1993, 163-176.

17 Alozie Y, Akpanabiatu MI, Eyong EU, Umoh IB & Alozie G, (2009). Amino acid composition of *Dioscorea dumetorum* varieties, *Pakistan J Nutr*, 8 (2) (2009) 103-105.

18 Maneenon K, Sirirugsa P & Sridith K, Ethno botany of *Dioscorea* L.((Doiscoreaceae), a major food plants in the Sakai tribes Banthad Range, Peninsular Tahiland, *Ethnobot Res Appl*, 6 (2008) 385-394.

19 Rist L, Uma Shaannkar R, Milner-Gulland EJ & Ghazoul J, The use of traditional ecological knowledge in forest management : an example from India, Ecology and Society 15(1):3 (2010) http//www.ecologyandsociety.org/vol15/iss1 /art3/[Online]

20 Sharma A, Traditional processing of Shotti (Curcuma augustifolia Roxb.) – A rhizome based ethnic weaning food, *Indian J Tradit Knowle*, 11(1) (2012) 154-155.