International Research Journal of Human Resources and Social Sciences
ISSN(O): (2349-4085) ISSN(P): (2394-4218)
Impact Factor- 5.414, Volume 5, Issue 07, July 2018
Website- www.aarf.asia, **Email** : editor@aarf.asia , editoraarf@gmail.com

INNOVATIVE STORAGE, PROCESSING AND PRESERVATION TECHNIQUES OF FOOD ITEMS PRACTICED BY *LOTHA-NAGA* TRIBES OF NAGALAND, INDIA

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ABSTRACT

Storage, preservations, processing plays a vital role for food security. . The losses of major agricultural commodities in India is estimated about Rs. 926,510 billion due to poor post harvest management. Since long back the farmers of Wokha district, Nagaland, has developed traditional system for safe storage. Deplorable transport facilities and remoteness are two major constraints for proper marketing service to the local people and as self-reliant society; they can't totally depend on the external food sources. For safe storage, effective processing and preservations indigenous techniques have been developed since ancient times. Therefore, the present investigation was made to study the indigenous traditional knowledge's (ITKs) on storage and preservation of food items by the indigenous Lotha-Naga tribe of Wokha district of Nagaland. The result reveals that the tribe follows traditional but sound scientific methods of storage, processing and preservation techniques of local food items. The tribe store rice in a bamboo made structure by plastering the same with mud, maize grains by simply tying and hanging the cobs in bunches, soybean by traditional fermentation process, Traditional gooseberry, chowchow, bamboo shoot, colocassia, fish and meat, etc. which are traditional but scientific methods of preservation of food.

Keywords- Food preservation, Indigenous traditional knowledge, Naga tribe

Introduction

Agriculture in NEH Region is fragile vulnerable and inaccessible agro-ecosystem. Undulating topography, uneven distribution of rainfall are the major constrains in crop production. The NEH Region consist of 7 sister states, Assam, Nagaland, Manipur, Arunachal Pradesh, Meghalaya, Mizoam, Tripura and a brother state, Sikkim. The Nagaland state consisted of 11 districts and Wokha district of Nagaland is inhabited by the *Lotha-Naga* tribes whose key occupation is agriculture. More than 80% of the farmers in the district cultivates the crops like, Rice, Maize, Rajmah, Soybean, Tubers during the *pre-Kharif* and *Kharif* season although some oilseeds, pulses and vegetables are also cultivated during the *rabi* season. The diets of the *lotha-Naga* tribes are rice, maize, potato, colocassia, tapioca and variety of meat and fish. The tribes of the district also prepare bamboo shoot, fermented dry fish, jaggery traditionally. Foods are mostly consumed by the tribe as boiled with little or no species and oils. They are very much particular both in their food preparation as well as in habit of taste.

Deplorable road condition and remoteness are the two major constrains for the lack of proper marketing service to the district and the local people cannot totally dependent on the external food sources rather they predominantly rely on their own produce. Besides this, unavailability of proper storage and processing facilities of agricultural produce for value addition is also one of the important bottlenecks for the large-scale agricultural intervention which sometimes associated with huge post-harvest losses. Therefore, there is the tendency of the farmers cultivate in small areas to meet their own family requirement. Simultaneously, hilly tribal farmers adopt or create immense post-harvest processing and storage methods to make available most of the seasonally grown food items during lean period. The indigenous traditional food storage and preservation knowledge are also helpful to make the food items free from its anti-nutrient properties, and to make themselves secure nutritionally. At the same time, storage and preservation of food items using modern equipment and techniques are becoming more costly due to higher initial capital investment and impossible to adopt by the local tribes.

The information on traditionally storage, processing and preservation of food items practiced by the *lotha* tribes has not yet being documented till date. Therefore, the present investigation was made to study the indigenous traditional knowledge's (ITKs) on storage and preservation of potential food items with an objective to document the ITKs of processing and

preservation methods in order to popularize and disseminate these ITKs for the further adoption by the people living in the interior areas.

Methodology

The study was conducted at twelve (12) villages of Wokha district during 2016. About fifteen to twenty (15-20) farm families from each village including 70% women and 30% men were randomly selected (preferably 40 years and above age of members) for interview and accordingly the total sample size of the study was two hundred and ten (n=210) including 150 women and 60 men within the selected villages (Table 1). Primary information's about the indigenous storage, processing and value addition methods of some food items were collected through extensive household assessment.

An individual personal interview was conducted to collect the information about the household level traditional storage and preservation knowledge of the different food items for cereals, oilseed, seasonal fruits, spices, vegetables and others items like meat, fish, sugarcane, tea, etc. Information was also gathered through focused group discussion with the help of well-structured schedules format to collect the information on the purpose and methods, quality of the final product and duration of storage and preservation, type of containers and wrapping employed, materials or ingredients used before or during the storage and preservation, etc. The details of the selected villages, GPS locations under study and its relevant information about the involvement of a number of storage and preservation items are listed in Table 1.

Table1. Location of villages under study and their relevant information's on storage and preservation methods

Village Name	Location (Latitude & Longitude)	Altitude (m)	No. of farmers (n) selected		Number of Food Items Stored/ Preserved
			Male (M)	Female (F)	
Longsachung	$26^0 01' 717"N$ $094^0 16' 097"E$	1189	4	16	8
Yanthamo	$26^0 03' 988"N$ $094^0 17' 335"E$	1363	6	12	9
Wokha	$26^0 06' 649"N$ $094^0 15' 543"E$	1450	3	13	5
Yikhum	$26^0 09' 207"N$ $094^0 14' 666"E$	979	7	11	5
Koio	$26^0 07' 271"N$ $094^0 18' 612"E$	1190	5	15	5

Chukitong	26^{0}07$^{'}$054"N 094^{0}19$^{'}$010"E	1137	6	11	6
Yanpha	26^{0}00$^{'}$584"N 093^{0}55$^{'}$125" E	139	4	12	4
Old Ralan	26^{0}00$^{'}$176"N 093^{0}57$^{'}$474" E	160	4	14	5
Sanis	26^{0}12$^{'}$602"N 094^{0}13$^{'}$935" E	409	5	13	4
Riphyim	26^{0}10$^{'}$922"N 094^{0}16$^{'}$152" E	1035	6	13	6
Humtso	26^{0}05$^{'}$372"N 094^{0}12$^{'}$429" E	1067	6	9	5
Chungsu	26^{0}11$^{'}$573"N 094^{0}17$^{'}$461" E	912	4	11	7

Results and Discussion

Indigenous food storage and preservation methods adopted by *Lotha-Naga* tribe of Nagaland for some essential food items since time immemorial are presented and discussed below.

1. Indigenous paddy grain storage (granary) system

Rice is the major food crop which occupies about 77% of the total cultivable area of the district. Since rice is grown only one season during the *pre-kharif* or *kharif* season of the year, therefore, proper storage of the harvested paddy is most crucial to meet the year-round household demand for the tribal people. The major post-harvest damaged of paddy grain caused by the rat (*Rattusnorvegicus*) and to culminate this problem, farmers designed various types of paddy storage units since time immemorial. It was observed during the study that most of the villagers constructed/developed various sizes and types of paddy storage granary for storage of paddy depending on their requirement (Fig. 2, 3 & 4). Most of the granaries were designed in a square or rectangular shape and made up of locally available timber or bamboo and the platform was made at 1-1.5ft above the ground level where the GI tin sheet is mostly used as a roof. Some of the villagers also used split bamboo in sidewall followed by plastering of mud. Grain stored capacity among the granaries varied from 20-50 q/unit. It was also observed that the paddy storage units were constructed either at the entry or exit points of the villages in a companionable manner by demarking their own serial numbers or symbol in every granary. Interestingly, it was also found that all the storage units were established in such a way so that it could receive full day sunlight. Probably this helps to keep the grain dry and to preserve it for a long time.

Villagers have reported that the granaries were very much suitable for storage of harvested paddy grains upto a year or more and reduced the post harvested grain losses significantly by the rat or any other means as well.



Fig. 1 Small sized granary with demarcation. Fig. 2 Medium sized granary Fig. 3 Large sized granary

2. Traditional maize seed storage system

Maize is stored as seed purpose for the next year crop for a period of 8 to 9 months from August to February every year. *Lotha* tribal farmers are mainly adopted two types of maize grains storage system i.e., drying of grains in sunshine after removing the grains from cobs (Fig. 5) and/or by simply tying and hanging the cobs in bunches (Fig. 6), where, 7-10 numbers of cobs are tied together and hung below the kitchen roof over the cooking place. Participated farmers informed that the hanging of maize with cobs is the best and cheaper maize storage method and it has been practicing successfully for more than 100 years. In this storage system, maize seed remains dry and continuous release of kitchen smoke keeps the seeds free from insects and pest. However, the external side of maize cobs becomes black in colour due to a longer period of hanging over the cooking place.


Fig. 4 Maize storage system as bundle with cobs. Fig.5 Fermented soybean into cake formed.

Traditional soybean (*lymhum*) fermentation methods

Traditionally *lotha-Naga* tribes consume soybean as a cake form prepared through the fermentation process. In this preparation technique, first soybean grains are washed and boiled, and then it put into a basket or any container by layering with banana leaves and allowed for 4-5 days for proper fermentation. After 4-5 days, fermented soybean is shaped into small cakes (Fig. 7) and covered by the locally available forest broad leaves and then shifted it above the fireplace or on the roof under sunshine to dry it properly. Optimal drying ensures the cakes to keep it free from the insect or pest attack. During the fermentation process sugars and other carbohydrates content of soybean are converted into alcohol or preservative organic acids. Moreover, fermentation process reduces the phytate content of soybean at a consumable level, the toxic genistin transform into genistein and drops off the enzyme inhibitors to some extent. Boiling and fermenting process of soybean also significantly increase its nutritional value through the enrichment of protein, essential amino acids, vitamins, calcium, iron and elimination of the anti-nutrients properties. Therefore, regular use of fermented soya foods in smaller quantities may help to build the inner ecosystem, assimilation of nutrients, boost immunity and provide the cancer protective effects by the genistein. The final product of fermented soybean usually contains 59.1% moisture, 23.5% total sugar, 6.0% reducing sugar and 18.3% crude protein. The participating farmers informed that the dried soybean cakes may be used for 5-6 month or more. *Lotha-Naga* tribes used the processed soybean in small quantities as *chatni* with their favourite dish regularly.

3. Traditional gooseberry (*chukithi*) preservation methods

Lotha tribe usually processes the fresh gooseberry to minimize its acidity and astringent taste. Naturally, fresh gooseberry can be stored only for 5-6 days after harvesting, but in view of its medicinal importance, *lotha-Naga* housewives preserve gooseberry at home scale level to make the fruit accessible for a longer period of time. The products are mainly prepared through drying, boiling and grinding processes, and the final products appear brown to black in colours which can be preserved for a year or more without turn down its taste. Some of the villagers also store gooseberry after drying it in sun without grinding. In this method fruits are washed, boiled and seeds are removed, and then added a little quantity of salt, chili and sugar before drying under the sunshine (Fig. 6 & 7). The addition of salt helps to release moisture at the faster rate from the gooseberry through osmosis process and added sugar helps to form crystalline structure of the gooseberry product. Fresh gooseberry is dried directly under the sunshine to preserve for

longer periods of time are also being practiced by the several villagers. Properly dried gooseberry products are packed into polyethene bags and then sealed, some villagers also kept it into the airtight bottles or plastic containers (Fig. 8). Most of the villagers grind the dried gooseberry and consumed it after taking their meal for proper digestion. The powder form of gooseberry contains 10.18% carbohydrate, 0.58% protein, 0.88% fat, 27.7 mg/100mg vitamin C and 0.37 mg/100mg vitamin E besides Ca (25 mg/100g), Mg (10 mg/100g), P (27 mg/100g) and K (198 mg/100g).



Fig.6 & 7 Drying of gooseberry before packaging. Fig 8 Dried packed gooseberry in polyethene

4. Traditional chowchow (*sechiumedule*) preservation methods

To make chowchow available for a longer duration, *lotha-Naga* tribe evolved a variety of indigenous traditional chowchow preservation methods, among these sun drying technique is one the oldest and popular preservation method in the district. The process involves peeling, washing, cutting and drying, where the fresh chowchow is cut into small pieces with the help of a sharp knife to ensure even drying of chowchow, locally this product is known as *Iskos*. The dried chowchow are usually kept inairtight plastic container or bags. It was observed that some villagers also preserved chowchow following both the boiling and drying methods. In this method, fresh chowchow is chopped and immersed in boiling or near boiling water for blanching for a little span of time to minimize the nutrient losses. Blanched chowchow is then spread thinly on a flat open surface or grass mats or tray or rooftop directly to the sun (Fig. 9). The blanching process may have some beneficial effect for chowchow, particularly, to destroy the enzymatic activity. During the off-season, *lotha* tribe consumes these dried chowchow slices after boiling it with water and salt solely or along with other vegetables or with pork as curry. Farmers usually preserved chowchow not only for their home consumption but few of them packaged the dried chowchow (Fig. 10) into plastic bags forsell in the local markets.


Fig. 9 Drying of blanched chowchow on the roof. Fig. 10 Dried chowchow product.

5. Traditional bamboo shoot preservation methods

Bamboo shoot is normally processed through fermentation, roasting, boiling, blanching and pickling methods. Likewise, the *lotha* tribe also prepared varieties of bamboo shoot products like *Ruchu* (bamboo shoot water), *Avoh* (fresh bamboo shoot), *Ruchak* (fermented bamboo shoot) and *Ruchon* (dried bamboo shoot). Indigenous bamboo shoots preservation methods practiced by the *lotha* tribe are summarized below;

5.2.Bamboo shoot water (***ruchu***) extraction

To extract fluid (water) from the fresh bamboo shoot, *lotha-Naga* tribes used a bamboo made basket by layer with banana leaves onto the basket and hung it at a1-1.5ft height above the ground level (Fig. 13). For collection of fluid from the fresh bamboo shoot, it is washed and cut into slices, then kept into the basket for the extraction of bamboo juice. After two-three hours, bamboo shoots water starts to drip down from/through the below end part of the basket and this water is collected by keeping a container below down the basket for 2-3 days (Fig. 11). Drained bamboo shoot water is then filled in bottles and tightly capped (Fig. 12) to use for the next 1-3 years. *Lotha* tribal farmers usually extract bamboo fluid for both commercial and home consumption purpose. The harvested/drained out water of bamboo shoot is usually bitter/acidic in taste and used as an ingredient in their preferred dish (*chatni*) in small quantity as a replacement of tomato. Due to its natural flavour/aroma and taste, it is considered as a important ingredient for *lotha* dish. Although, the drained out bamboo shoot water may contains some amounts of potentially toxic compounds called cyanogenic glycosides (*Taxiphyllin*), which breaks down disruption of plant cell to form hydrogen cyanide (Anonymous, 2004) may harmful for consumption.


Fig. 11 Draining out process of bamboo shoot water. Fig. 12 Extracted bamboo shoot water

5.3. Fresh bamboo shoot (*avoh*)

The tribal community loves to take fresh bamboo shoot as well. To consume the fresh bamboo shoot, local people are usually sliced the bamboos shoot into small strips and put into a plastic jar with little water and it can be used up to 7-10 days. Harvested fresh bamboo shoots are also stored/collected in a bundle to sell at the local markets (Fig. 13). The fresh shoot usually contains 92.6% moisture, 22.3% carbohydrate, 24.5% protein, 0.39% fat, 2.1% ascorbic acid and 0.7% citric acid (Table 2).



Fig. 13 Fresh bamboo shoot. Fig. 14 Fermented bamboo shoot. Fig. 15 Dried packed shoot.

5.4.Fermentation process of bamboo shoot (*ruchak*)

Fermentation is an important processing method that reduced the toxic compounds present into the bamboo shoot. In this process, fresh bamboo shoot is chopped after peeling and kept into wide mouth bottles for fermentation. The bottles are capped properly and allowed for fermentation upto 8-10 days (Fig. 14). Fermented bamboo shoots are then dried under sunlight for future use. Fermentation process of bamboo shoot reduced moisture (44.6%), carbohydrate (18.6%), vitamic C & E, and eliminate citric acid content. But the protein (27.5%), fat (3.35%) and total fibre (20.8%) content increased as compared to fresh shoot (Table 2). Singh *et al.*, (2007), reported that traditional fermentation process reduced its cyanide percentage to some extent as compared to the fresh shoot. Several researchers also found that the fermentation

process of bamboo shoot increased NDF, ADF, lignin, hemicellulose and cellulose content and decreased carbohydrates, ash, total free amino acids, vitamin C, vitamin E and fat content as compared to the fresh bamboo shoot (Nirmala *et al.,* 2007;Kumbhare and Bhargava, 2007; Nirmala *et al.,* 2008).

Table 2. Composition of different bamboo shoot products.

Bamboo shoot	Moisture (%)	Carbohydrate (%)	Protein (%)	Fat (%)	Ascorbic acid (%)	Vit. C (mg/100 g)	Vit. E (mg/100 g)	Fibre (%)	Citric acid (%)
Fresh	92.6	22.3	24.5	0.39	2.1	13.7	0.69	5.2	0.7
Fermented	44.6	18.6	27.5	3.35	-	0.32	0.52	20.8	-
Dried	4.6	9.2	16.3	-	0.2	-	-	5.0	-

5.5.Drying method for bamboo shoot (*ruchon*) preservation

Lotha tribe also preserved bamboo shoot by drying method, which is low energy consuming and easy for the rural people. In this method, bamboo shoot issliced longitudinally and the cut pieces are dried under sunlight till the colour turn to light brown and stored in a wide mouth bottle or packed into a polyethene bag. The dried shoot (Fig. 15) is also stored in air tight plastic bag to use for the longer duration. Dried bamboo shoot contains 4.6% moisture, 9.2% carbohydrate, 16.3% protein, 0.2% ascorbic acid and 5.0% fibre (Table 2). Muchtadi and Adawiyah, (1996) reported that the drying process of bamboo shoot relatively lost its protein (22.2%), starch (67.5%), fibre (4.6%) and ascorbic acids (88%) percentage as compared to the fresh bamboo shoot , besides losing its bright colour.

6. Traditional colocasia (*mani*) stem and leaf preservation methods

Colocasia is an important vegetable for the *lotha* tribal people and it is consumed as root vegetable for its edible starchy tuber. The stem and leaves of colocasia are also considered as an important seasonal and off-seasonal vegetable after processing it through indigenous technical skills. *Lotha-naga* tribes traditionally preserved the leaves and stems of colocasia by the sun-drying system to meet the year-round family needs. Locally processed colocasia stem and leaf are known as *Mani tung* and *Mani wo* respectively. Colocasia leaves are the rich source of β-carotene, ascorbic acid, folic acid, riboflavin and minerals like Fe, Ca and P. The "itching" characteristic of colocasia is one of the major problems for direct consumption and it is due to

the presence of crystals of calcium oxalate (Gaosong, 1996) and the concentrations of oxalate is relatively higher in young leaves as compared to the older leaves (Redak and Savage, 2008; Savage and Dubois, 2006). According to Oscarsson and Savage (2006), there are soluble and insoluble forms of oxalate present in colocasia and its concentration is reduced markedly after boiling it into water (Chai and Liebman, 2005). Thus, to preserve the stems and leaves of colocasia, *lotha* tribes cut these stem (Fig. 16) and leaves (Fig. 18 &19) into relatively small pieces for proper drying. Both the colocasia stem and leaves are often sun-dried after slicing into small pieces and stored them in polybag (Fig. 17), baskets, jars, etc. The drying processes discourage the microbial growth and increased the longest shelf life for a year or more. Participating farmers apprised that the dried leaves and stem of colocasia are having relatively less itching aptitude than the fresh leaves and stems, which indicated that drying process, may help in reduction of oxalate concentration into colocasia. It was noticed that dried leaves contains relatively higher dry matter (92.2), crude protein (26.7%), crude fiber (15.2%) and calcium oxalate (0.76%) as compared to the dried stem (Table 3).

Table 3. Composition of dried leaves and stems of colocasia.

	Crude Protein (%)	Crude Fiber (%)	Dry matter (%)	Calcium oxalate (%)
Dried leaves	26.7	15.2	92.2	0.76
Dried stems	25.6	11.3	88.4	0.60

Du Thanh Hang and Preston**,** (2015) also reported that sun-drying reduced the concentration of oxalate but the effects were most pronounced for cooking and ensiling. Dried vegetables are initially reconstituted by soaking inwater before cooking. *Lotha* tribes consumed the dried colocasia leaves and stem with the curry of pork, dry fish, chicken, beef, etc. During the study, local peoples also informed that the dried colocasia products lost its taste and flavourto some extent as compared to the fresh colocasia.


Fig. 16 Drying of colocasia stem. Fig.17 Dried colocasia packed in polythene.


Fig. 18 & 19 Drying of colocasia leaves.

Traditional tea leaf processing method

Lotha-Naga tribes preserve green tea leaves following both the fermentation and drying methods and the final products becomes brown to black in colour. During the study, it was observed that the some of the farmers planted tea in their backyard to meet annual household tea leaf demand. The home-scale processing and preservation of green tea leaf by the *lotha* tribe is very much simple, where, the young tea shoots are harvested during the month of July to October and keep into boiling or near boiling water for blanching for 15-20 minutes and then take it out from the water and kept into a moist cloth for 2-3 days, before drying it by spreading thinly on a flat open surface or grass mats or tray or rooftop directly or indirectly to the sun. As the tea leaves drying progress, the whole tea leaves are broken down into smaller pieces by the hands and the breaking process are further continues at a regular interval until it's dried completely and the colour of the final dried product becomes brown and gives a pleasant smell. Some of the farmers are also dry the fermented leaves over the fireplace by keeping the leaves onto aluminium trays, but the colour of the final product in this method becomes black (Fig. 20). The processed brown and black tea leaves are used for a year or more. Tea leaf contains a higher amount of tannins and oxidizing enzymes that modify the chemical constituents in the tea leaves during the processing, as a result, the colour becomes brown or black (Sato *et al.*, 2007).

Innovative jaggery processing and preservation method

Lotha-Naga tribes cultivate sugarcane as sole crops or as an intercrop, where the average productivity is about 45 t/ha). Sugarcane is crushed by using a power operated simple crusher to extract juice during the month of September to November. The collected juice is filtered and then boiled in a large galvanized mild steel pan to drive off the excess water (Fig. 21). Scum is removed from the boiling juice by a simple perforated scoop on a long handle. Once the pan has been removed from the heat, a simple rake is used to stir the thickened juice. After removal from the heat, the pans of juice are usually stirred rapidly to incorporate air and promote an even crystallization. Cooled juice is then placed onto the pre-arranged single banana pseudostem (Fig. 22) for rapid cooling and also to get a unique shape of the dried jaggery. Each dried pieces of jaggery are about 1.2-1.5 kg by weight and sold @ Rs. 100-120 per pieces in local markets.

Fig. 20 Locally processed tea leaves. Fig.21 Boiling of sugarcane juice. Fig. 22 Shape formation of jaggery by using banana pseudostem.

Traditional fish (sukha mass) preservation methods

Lotha tribal people commonly preserved the harvested (catch) fish by using indigenous traditional techniques such as salting, sun drying, and smoke drying methods, to make the harvested fish available for a longer period of time. In this process, visceral organs or spinal column of fish are removed by cutting the mid-ventral side of the fish then kept on the platform that raised over the fire into kitchen or by hanging the fish by stopping at wire or plastic rope on a wooden stick for proper drying in the sunshine, even though, laying on flat open ground drying practice is not common in this region (Fig. 23). It was reported that some of them are also mixed salt and grinded red chilli powder with the fish before drying. Application of salt before drying helps to withdraw moisture at a faster rate from the fish through the osmosis process. The fire heats helps in reducing water activity into the fish and reduce microbial destruction and the fire smoke also released/formed some antibacterial chemicals like formaldehyde and phenols

(McWilliams and Stewart, 2002), that minimize spoilage and increase the storage durability of fish. Properly dried fish are usually kept or stored inairtight containers or polyethene bags and used for longer period of time. Since the local peoples are consumed huge quantities of dry fish and hence there is a potential scope for entrepreneurship development in dry fish marketing and preservation sector.



Fig. 23Dried local fish packed in polythene. Fig. 24 Drying of pork under sunlight. Fig. 25 Smoked dried meat

Traditional meat (oso) preservation methods

Lack of marketing facility and short shelf life of fresh meat forced the tribal farmers of the area to evolve indigenous meat preservation techniques. The fresh meat commonly gets spoiled rapidly particularly during the summer months, even in winter months meat could not be preserved at room temperature for a day without deteriorating its quality. *Lotha–Naga* tribes usually preserve pork (wokoso), chicks, beef, dog meat, etc. through smoking and drying methods onto raised platform over the fire or in sunlight (Figure 24).Some people are also used salt and sugar in meat and placed under the sunshine or above the fireplace for the faster cured of the meat. Preservation of meat by keeping it above the fireplace is very common, where, the fire smoke (Fig. 25) helps to seal the outer layer of the meat to secure and creates a protection layer on the meat which does not allow to enter the microbes into the meat (*Busboom, 2011*). *Lotha* people can preserve meat at home scale level for a month or more by adopting these indigenous methods.

Conclusion

The livelihood and subsistence of the rural people largely depend on indigenous traditional storage and processing system, which helps in preventing the post-harvest losses and make available most of the food staff during both the on and off season to sustain their living. Some traditionally followed storage, processing and preservation system may have some

disadvantages which need to be improved scientifically in order to disseminate among the other farming communities because of its commercial importance.

Acknowledgement

We are highly thankful to the farmers of Wokha district who shared their traditional wisdom for safe storage, preservation and value additions of different agricultural commodities. The cooperation of KVK Wokha also duly acknowledged in documentation of the information. The authors are also thankful to the Director, ICAR Research Complex for North eastern Hill regions for extending all support in preparation of the manuscript.

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