Traditional fermented foods of the Naga tribes of Northeastern, India

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The paper describes the various traditional fermented foods of Naga tribes, their method of preparation, uses and the potential for improving using modern biotechnological tools.

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The Northeastern India, with various ethnic groups, offers an excellent opportunity for ethnobotanical studies. The Nagas are one of the Mongolian racial groups making up the population of Northeast India hill states. The people called, Naga lie in the present state of Nagaland, in the hills of Manipur, in North Cachar and Mikir hills, Lakhimpur, Sibsagar and Nowgong in Assam, in the two districts (Changlan & Tirap) of Arunachal Pradesh, in the Somrat tract and across the border into Myanmar. The Naga tribes consist of 31 different tribes, viz. Angami, Chakhesang, Ao, Sema, Rengma, Lotha, Chang, Konyak, Sangtam, Phom, Zeliang, Mao, Maram, Tangkhul, Maring, Anal, Mayao-Monsang, Lamkang, Nockte, Haimi, Huangun, Ranpan, Kolyo, Kenya, Kacha, Yachimi, Kabui, Uchongpok, Makaoro, Jeru and Somra. The Nagas are basically cultivators. They grow rice crop, which is their staple food. They also grow maize, millet and fruits such as pears, plums, oranges, lemon, pineapple, passion fruit, etc. on the hills by clearing the forest patches.

In spite of the vast scope for ethnobotanical researches of the Naga tribes, so far a few accounts on ethnovatany, which largely deal with medicinal and wild edible plants used by the Angami, Ao, Mao, Tangkhul and Zeliang of the Naga tribes with the only report on rice beer preparation by the Mao tribe have been reported. Traditional fermented foods and beverages have been reported from Darjeeling and Sikkim hills and from Himachal Pradesh. However, so far no detail studies have been undertaken about the Naga tribes and therefore, there is still a lot of scope for studying traditional fermented foods and beverages of the different Naga tribes.

In olden days, the use of oil to fry food items was completely unknown to simple Naga villagers living in the remote hills. Their main diet consisted of rice, meat, fish and vegetables. Preparation of food was simple and in most cases, meat, fish or vegetables were cooked only with salt and chilly or meat cooked with some vegetables. Nagas are very fond of fermented foods. They often flavour their simple curries with different kind of fermented food items and herbs. The women folks of Naga villages, process traditional fermented foods, such as fish, animal fats and vegetables and beverages, viz. rice beer as done in all other tribal communities. The most popular raw materials for fermented food items among the Naga tribes are: bamboo shoots, soybean, Colocasia leaves, crabs, animal fats and fish. The paper, therefore, for the first time describes some traditional fermented foods of the Naga tribes in detail:

Anishi

Anishi is prepared from edible Colocasia species leaf mainly by Ao Naga tribe. The fresh mature green leaves are taken, washed, and then the leaves are staked one above the other and wrapped finally with banana leaf. It is then kept aside for about a week till the leaves turn yellow. The yellow leaves are then ground into paste and cakes are made out of it. The cakes are dried over the fireplace in the kitchen. During grinding if desired, chilly, salt and ginger are added to it. The dried cakes are ready for use. It is

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cooked with dry meat especially with pork, which is the favourite dish of the Ao tribe (Figs. 1a-d).

**Axone (Akhone)**

Fermented soyabean [*Glysinax max* (L.) Merrill.] is popularly known in Sema Naga dialect as Axone (Akhone). It is prepared by boiling the beans till it become soft and water is drained out. The cooked beans are then wrapped in banana, *Phrynium pubinerve* Blume (Marantaceae) or *Macaranga indica* Wight (Euphorbiaceae) leaves and kept above the fireplace to ferment for a week (Figs. 2a-f). Within a week, the beans are used in chutney preparation along with chilly, tomato and salt. However, for long-term storage and depending on choice of taste, the fermented beans are kept in cake form above the fireplace or individual beans are separated, dried in the sun and stored in containers (Figs. 3a-c). The dried beans or cakes are cooked with meat or are used for the preparation of chutney as mentioned above.

**Bamboo shoot**

Bamboo shoot fermentation process is done during May to June when new shoots are formed. Young and tender bamboo shoots are collected, the sheaths removed, pounded or sliced into small pieces and put in a conical bamboo basket with the inner wall lined with banana leaves. Prior to this, a hole is made at the bottom (tapered end) of the basket and a pointed bamboo stick a little longer than the length of the basket is inserted in the hole passing through the centre for draining the juice/sap. The basket is tied to a post, the upper portion covered with banana leaves and stones are placed above it as weight. The stick passing through the centre of the basket is turned/twisted from time to time to ensure proper drainage of the juice that comes out from the ground bamboo shoots which is collected in a container (Figs. 4a-d, 5a).

The bamboo shoots and juice get fermented within two weeks, which are now ready for use in cooking. In olden day they were stored in hollow internodes of bamboo with one end of the node removed and plugged with a leaf or a vat made of wood and covered with banana leaves. The juice is stored in Gourd (*Lagenaria siceraria* Standl., *Molina*) (Cucurbitaceae) shell/jar commonly used by the Nagas as container. Also the fermented bamboo shoots are dried in the sun as it produces a different aroma after drying and for longer storage. The dried bamboo shoots are graded according to size for preparing different dishes. Thus, from the above methods three products of fermented bamboo shoots such as wet, dry and juice are obtained (Figs. 5b-f). Three products mentioned above are used in cooking meat or vegetable dishes. However, choice of the products for cooking depends on individual or tribes. The juice has preservative property similar to vinegar and meat, fish or vegetables are cooked with it have longer shelf life.

**Fish**

Small fishes are used as a whole and big ones are cut into smaller pieces. Fish is washed and put inside a bamboo (normally in *Dendrocalamus hamiltonii* Nees et Arn. ex Munro) and tightly plugged with leaves, and kept over the fireplace for fermentation (Figs. 6a & b). Within few days the fish becomes fermented and ready for use as a tastemaker for vegetable curry. However, the fermented fish can only be stored for a period of one month, as it rots gradually and becomes unpalatable. This is mainly prepared by the Lotha tribe and is still a favourite food item of the villagers.

**Crab**

The black species of crabs with hard shell is preferred as it produces an aroma with good taste. Crabs are washed, hard appendages and entrails removed, ground and mixed properly with ground black til (*Sesamum orientale* L.) wrapped in banana, *Macaranga indica* or *Phrynium pubinerve* leaf and kept over the fireplace in the typical Naga kitchen for a week to ferment. On opening the wrapped banana leaf, it gives a strong inherent smell, and is ready for use in cooking or chutney preparation. It is one of the favourite items of several tribes, such as Lotha, Mao, Angami, etc.

**Animal fats**

Fermentation process of animal fats is similar to fish fermentation. The fermented fat is stored in the bamboo and usually a spoon of it is added during cooking of vegetable curry to soften the vegetables and also it impart nice taste to the curry. Today, the practice is observed only in remote villages.

**Discussion**

Barely a century had gone that distinct tribes of Naga came into contact with the outside world, which
MAO & ODYUO: TRADITIONAL FERMENTED FOODS OF THE NAGA TRIBES

Fig. 1 Anishi preparation: a. A roll of fresh colocasia leaves b. Fermented leaves c. Ground leaves d. Two grades of Anishi.

Fig. 2 Showing steps in Axone (fermented soyabean) preparation: a-f. The procedures: a. Cleaned soyabean. b. Cooking of bean. c. Draining of water after the beans are cooked. d. & e. Wrapping in banana leaf. f. Fermenting and drying over fire in kitchen.

Fig. 3 Showing Axone: a. Wrapped in Phrynium leaf. b. Cake form and c. Dry beans.

Fig. 4 Showing steps in traditional fermentation of Bamboo shoot: a. Young shoots, b. Sliced shoot, c. Ground shoot, d. Basket used for fermentation and e. Container for collecting sap/ juice.
Fig. 5. Showing fresh bamboo shoots and fermented products: a. Fresh bamboo shoots, b. Wet sliced fermented bamboo shoot, c. Wet ground fermented bamboo shoot, d. Fermented bamboo shoot sap, e. & f. Dry fermented shoots of different grades.

Fig. 6 Fermentation of fish: a. Cleaned fish and b. Bamboo culm where the fish are placed, covered with banana or Phrynium leaf for fermentation.
has opened up the closed world of the Naga villages. They are being exposed from their life of simplicity to the life of modern sophistication. Today, their approaches to life have changed completely and it is hard to find the age-old simple life style even in the villages. Traditionally fermented foods are still a favourite item in the food preparation of Naga tribes. The advent of modern civilization has adversely affected the age-old tradition and thus the younger generations are not exposed to traditional practices. Today, nutritional values of traditional fermented foods and its quality of preserving foods is well known and therefore, it is high time to revive and improve this valuable traditional biotechnology by intervening with modern biotechnology. At present, there is a need for the understanding of microbiology and biochemistry involved in the entire fermentation process in Naga traditional fermented foods. Many a times the products are spoiled or the taste of the products varies considerably making it difficult to standardize. The nutritional aspects of the various fermented foods of the tribes need to be investigated. Therefore, a thorough study of microbiology and biochemistry involved in the entire fermentation process and nutritional aspects of Naga traditional fermented foods need to be carried out.

The preparation for fermentation, its processing and harvesting can be improved through selection and development of productive microbial strains, control of culture conditions, improvement in product purification and concentration. Isolation and characterization of the essential microorganisms, determination of physical and chemical environment affecting metabolism of these microorganism need to be investigated. Also, the effects of pretreatment of raw materials on the fermented process, identification of options of down stream processing and their effect on taste and texture of the product need to be investigated. Understanding of the above mentioned aspects would certainly enable to improve and control the quality of the products, and also overcome the problems presently faced in the preparation of traditional fermented foods & its safety considerations. Therefore, with proper intervention of modern biotechnology, no doubt the traditional fermented foods of Naga tribes can be improved and boost its commercial potential.

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