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Traditional fermented foods of Manipur

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In Manipur, traditional fermented soybean (*Hawaijar*), bamboo shoot products (*Soibum/Soijim*, *Soidon*), fish products (*Ngari*, *Hentak),* mustard leaf extract (*Ziang Sang, Ziang Dui*) and fermented beverages, viz. A*tingba* and *fruit wines* have been consumed as a regular food in different recipes over a long period of time. These household arts are handed down through generation by generation. In the study, the traditional preparation processes of fermented foods of Manipur were documented.

Keywords: Traditional foods, Traditional fermented foods, Manipur, Hawaijar, Soibum/ Soijim, Soidon, Ngari, Hentak, Hamei, Atingba,Ziang Sang

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Fermentation is one of the oldest and most economical methods for producing and preserving foods. In addition to preservation, fermented foods can also have the added benefits of enhancing flavour, increased digestibility, improving nutritional value and pharmacological values. Each fermented food is associated with a unique group of microflora which increases the levels of protein, vitamins, essential amino acids and fatty acids. The protein and vitamin deficiencies are the major problems of the third world countries. Three quarters of humanity are intermittently or permanently faced with a shortage of balanced food and endemic malnutrition among nearly 1,000 m people. In this regard, production of fermented food will become increasingly important to the world's diet. Indigenous fermented foods (fermented soybean, bamboo shoot, fish, milk, meat and leafy vegetables) contribute to a large proportion of the daily food intake in Northeastern states of India. However, these are still produced traditionally by spontaneous fermentation and only limited knowledge has been obtained regarding the microflora of these products. In Manipur, traditional fermented foods and beverages, viz. *Hawaijar*[1], *Soibum/Soijim*[2,3], *Soidon*[2,3], *Ngari*[4], *Hentak*[4], *Ziang Sang*[12], *Atingba*[5] *and* other fermented beverages have been consumed as a regular food in different recipe over a long period of time. These household arts are handed down through generation by generation. In the study, above lesser known fermented foods preparation process were documented from different villages of Manipur.

Methodology

The documentation study was carried out in different villages of Manipur. The idea here was to document the traditional knowledge associated with indigenous fermented foods preparation processes in step by step. For each food five selected production sites were visited and the diversified indigenous practices were also recorded. In some cases, identified practitioners were invited and specially requested to demonstrate in the laboratory. It is important to note here that the plant and animal material traditionally used were taxonomically identified and the local name of those materials also included. For ease of understanding, analysis and discussion the acquired information were grouped into fish based foods, bamboo shoot based foods, soybean based foods, and leafy vegetable based foods and fermented beverages.

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Results and discussion

Fermented fish products

Ethnic people of North-East India catch fresh water fish from the Brahmaputra river and lakes. A key factor limiting freshwater fish utilization is its extreme perishable character and small size. Traditional processing of fish such as salting, drying and smoking are the principal methods of fish preservation in this region. Some of these are traditionally fermented and preserved for year long period as reserve food. Indigenous fermented and dried fish products, viz. *Karoti* and *Bardia* in Assam, *Ngari* and *Hentak* in Manipur, *Tungtap* in Mehalaya, *Suka ko machha*, *Gnuchi*, *Sidra* and *Sukuti* in Nepal, Darjeeling hills and Sikkim are traditionally consumed by people of this region[4,13-15]. *Ngari* is a popular traditional fermented fish product of Manipur which is eaten as a daily compulsory side dish called *Ironba* (mixed with potato, chilies, etc.) with cooked rice by all communities of people in Manipur and nearby states[6]. In fish fermentation, the methods of preservation are traditionally used with cultural identity. In Manipur, these household arts are handed down through generations.

Preparation of *Ngari*

Sun dried non-salted dry fish called *Phoubu* (*Puntius sopore)* is imported from Brahmaputra valley of Assam and Bangladesh and fermented by traditional ways in valley region of Imphal and surrounding areas. *Phoubu* is collected during October to January @ Rs 50-110/kg and different grades/sizes are mixed together and stored in gunny bags as dried form (Figs 1 & 2). Before fermentation, it is washed with water using porous bamboo based baskets and allowed to drain the water for one night. Next day morning, pressed by legs using gunny bags excess water is removed by breaking the head & bones. Oil released from head during pressing is believed to cause initiating fermentation. Earthen pot (capacity of 45-50 kg) inner surface was coated with mustard oil. For new pots, 8-10 times oil coating are required with interval of 7-10 days. In old pots, only one coat is sufficient for quality fermentation. Oil coating might be creating anaerobic environment inside the chamber. Above, pressed dry fish is packed tightly inside the pot by pressing legs. Skilled labours are used for this purpose. After packing, pots are sealed with polythene sheet, fish scales, oil slurry, mud and cow dung slurry. These packed pots are kept in dark up to 6-12 months at room temperature. The fermented fishes are consumed by all NE states; even in Myanmar.

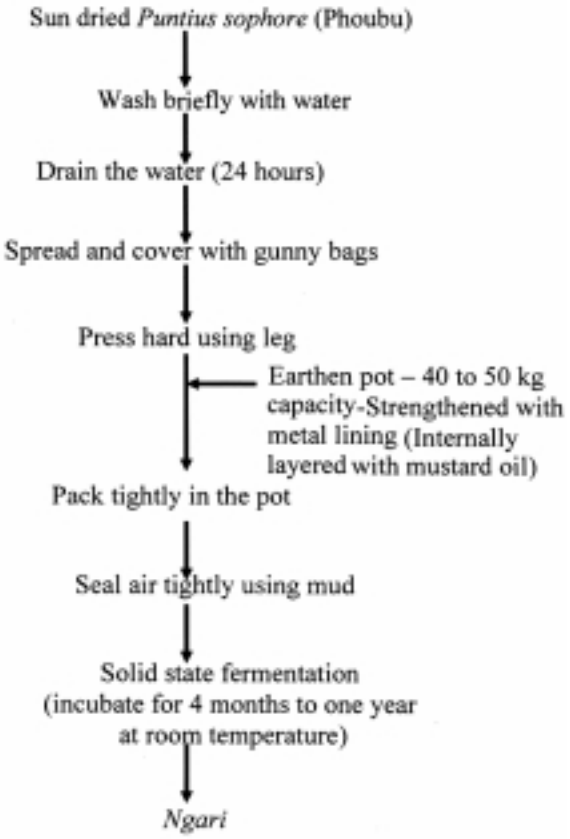

Fig. 2 — Flow chart for *Ngari* preparation

Fig. 1 — Traditional *Ngari* fermentation

Preparation of *Hentak*

Hentak is a traditional fermented fish paste. During indigenous preparation process, the sun dried *Esomus danricus* are crushed to power. The petioles of *Alocasia macrorhiza* are cut into pieces washed with water and exposed to sunlight for an hour. An equal weight of the cut pieces is then crushed along with fish power to make a paste (Fig. 3). Small balls are prepared and put in earthen pots and stored. After two weeks of fermentation, it is ready to use and are preserved. These become hardened on keeping for few months and are then propounded to paste with a little water and stored as balls for reserve food.

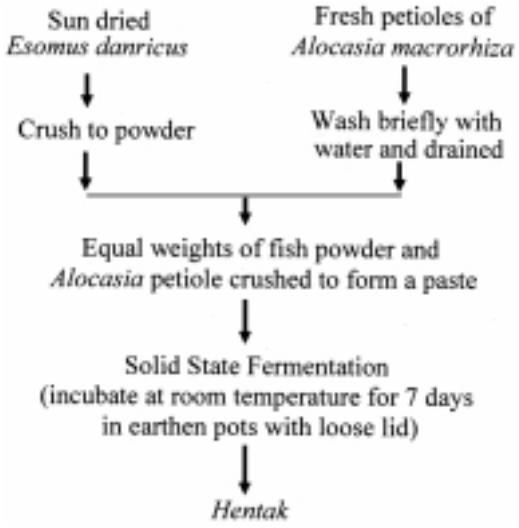

Fig. 3 — Flow chart for *Hentak* preparation

Fermented bamboo shoot products

Indigenous fermented bamboo shoot products, viz. *Soidon*, *Soibum* and *Soijin* in Manipur, *Mesu* in Sikkim, *Rep* in Mizoram and *Lung-siej/Syrwa* in Mehalaya are traditionally consumed by the people of North Eastern Himalayan region[2]. In Manipur, these fermented preparations of bamboo shoot products are prepared only during June-September when bamboo shoots sprout[3]. Usually, it is consumed after cooking with *Colacasia* corms, green peas, pumpkins, potato, etc. in different recipes, especially chutney. Some people extend its consumption as supplementary ingredient by frying with fishes. This non-salted fermented food is commonly used as chutney by mixing with salt and green chillies, locally called *Ironba*. The important *Soibum* producing sites in Manipur are mostly in the hills and have been localized according to the abundancy of the raw material[7,8].

Preparation of *Soibum/Soijim*

Soibum, an indigenous fermented food, exclusively produced from succulent bamboo shoots (*Dendrocalamus hamiltonii* (Wanap/Unap/Pecha), *D. sikkimensis* and *D. giganteus* (Maribop), *Melocana bambusoide* (Moubi/Muli), *Bambusa tulda* (Utang), *B. vulagaris, B. balcooa* (Ching Saneibi) and *B. pallia* is consumed as an indispensable constituent of the diets, familiar with social customs of Manipur and neighboring states since time immemorial. In the traditional method, succulent bamboo shoot sprouts are defoliated, chopped, pressed tightly into the wooden or earthen pots to ferment for 6-12 months. Two types of Soibum preparations are documented in Manipur called Noney/Kwatha type and Andro type (Fig. 4).

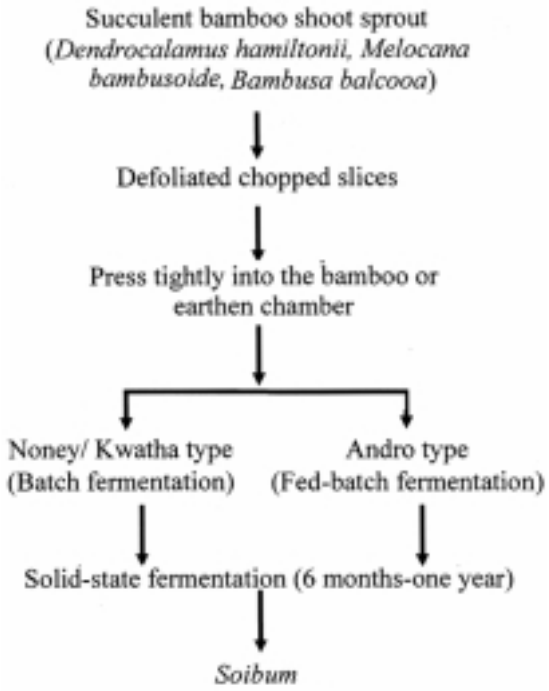

Fig. 4 — Flow chart for *Soibum* preparation

Noney/Kwatha type was found to be more common and popular. In *Noney* type, batch fermentation with more acidic taste is carried out in traditionally designed bamboo chamber. Traditional lining of bamboo chamber with forest leaves is now replaced with polythene sheet. The thin slices of the succulent and soft bamboo shoots are packed compactly into this chamber. After filling the chamber with the slices to its capacity, the upper surface is sealed with polythene sheet and weights are then put on top for

proper pressing. It is believed that production of good quality soibum can be achived with adequate pressing. The bottom of the chamber is perforated for draining acidic fermented juice during fermentation. The whole stuff is left for 6-12 months for solid-state fermentation. After complete fermentation, *Soibum* could be stored even up to one year before marketing.

Andro type of preparation of *soibum* is practised (only in Andro village) in the bulky roasted earthen pot by fed-batch fermentation. In this method, the practitioner fills a portion of the pot with the bamboo shoot slices and allow it for fermentation. When the fermentation occurs and the mash volume is reduced, additional quantity of fresh bamboo slices are added. After every addition of the slices, slight pressure is given with the hand. This process is repeated till the pot is filled with the bamboo shoot slices and allowed for fermentation (6-12 months). Here, the fermented juice is not allowed to drain out. In all types of soibum preparation, aging is very important. When the incubation is kept for longer days, the quality of the *soibum* improves[9]. The immature stage of above fermented products is called *Soijim* and the completely fermented one is called *Soibum*.

Preparation of *Soidon*

In *Soibum* and *Soijim* preparation, succulent shoots are used for fermentation. But *Soidon* is prepared from *Teinostachyum wightii* (*Nath*) apical meristem.The best quality *soidon* is produced from the Bishnupur village. The succulent tender apical meristems are harvested by shaking the bamboo shoots. The unwanted portions are removed and cut transversely into pieces (Fig. 5). In traditional methods, the earthen pots are used. At present in most of the places, plastic containers and pots layered with polythene cover are used. Milky fermented soup of previous batch (1:1 dilution) is used as a starter for fermentation. This submerged fermentation in open plastic container is prolonged up to 5 days with intermittent stirring. In some cases, addition of *Garcinia pendunculata* (*Heibung*) as a acidifier had given the best quality products. Addition of rice washed water (*Chenghi*) @1:10 improved the colour of *soidon*. The milky soup of this submerged fermentation is reported as acute poison for cows. This might be due to cyanogenic glycosides. Studies are required to find out its cyanogenic toxicity and its transformation during fermentation.

Fig. 5 — Flow chart for *Soidon* preparation

Fermented soybean products

Preparation of *Hawaijar*

Hawaijar is a traditional fermented soybean food for Manipur. In traditional preparation, medium and small sized soybean seeds are boiled, washed with hot water and packed tightly in a small bamboo basket having lid with a base layer of *Ficus hispida (Assee heibong)* or banana plant leaves[1]. The basket is then kept near to stove or layered gunny bags for maintaining above ambient temperature (Fig. 6). The palatable stage of fermented soybean is noticed with in 3 to 5 days. Ammonia odour and mucilage fiber production are the indicators of good quality products.

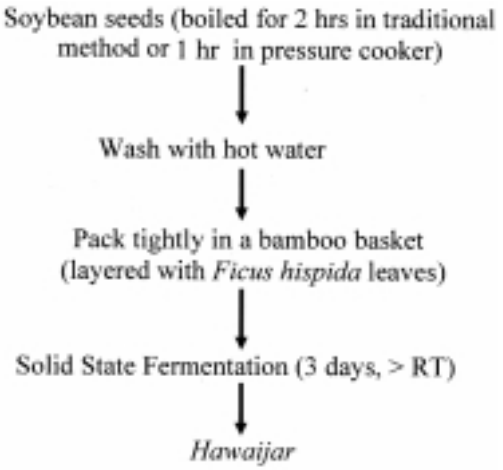

Fig. 6 — Flow chart for *Hawaijar* preparation

Fermented leafy vegetables

Preparation of Ziang Sang/Ziang Dui

During winter season, 2-3 days withered *Brassica* leaves (*Hangam*) is crushed using traditional wooden chamber and allowed to go for semisolid fermentation for 2-3 days (Fig. 7). The fermented juice is extracted by squeezing with hand and concentrated by boiling. The liquid form of fermented extract is called *Ziang dui* and the concentrated paste is called *Ziang Sang*. This leaf extract concentrate is stored in traditional bamboo container for yearlong as reserve food.

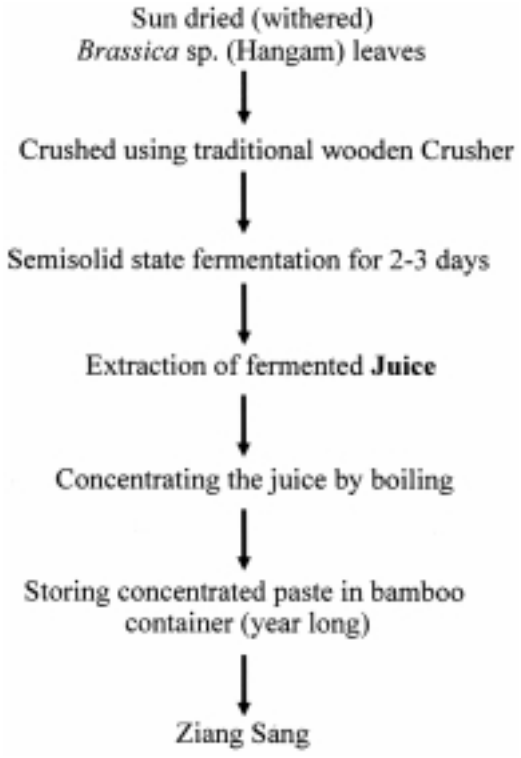

Fig. 7 — Flow chart for *Ziang Sang* Preparation

Traditional beverages

Preparation of *Hamei*

Hamei is a natural starter (flat rice cake), similar to *Rag*i of Indonesia, *Budob* of Philippines, *Chu* of China, *Naruk* of Korea and *Marcha* of Darjeeling hills and Sikkim that has been traditionally used for the preparation of rice wine, *Atingba* in Manipur[5,16]. The *Hamei* cakes are prepared from crushed raw rice with *Yangli* (*Albizia myriophylla)* bark powder @ 0.25 kg/kg and pressed into flat cakes approximately 2-7 cm in diameter and 0.6-1.5 cm thickness (Fig. 8). The rice cakes are kept over rice husk in bamboo basket for 2-3 days at room temperature. The desired state of fermentation is indicated by the swelling of cakes, alcoholic flavour production and yellowish coloration. Mostly preparation of *Hamei* is done during summer (May-July) and dried cakes are stored yearlong.

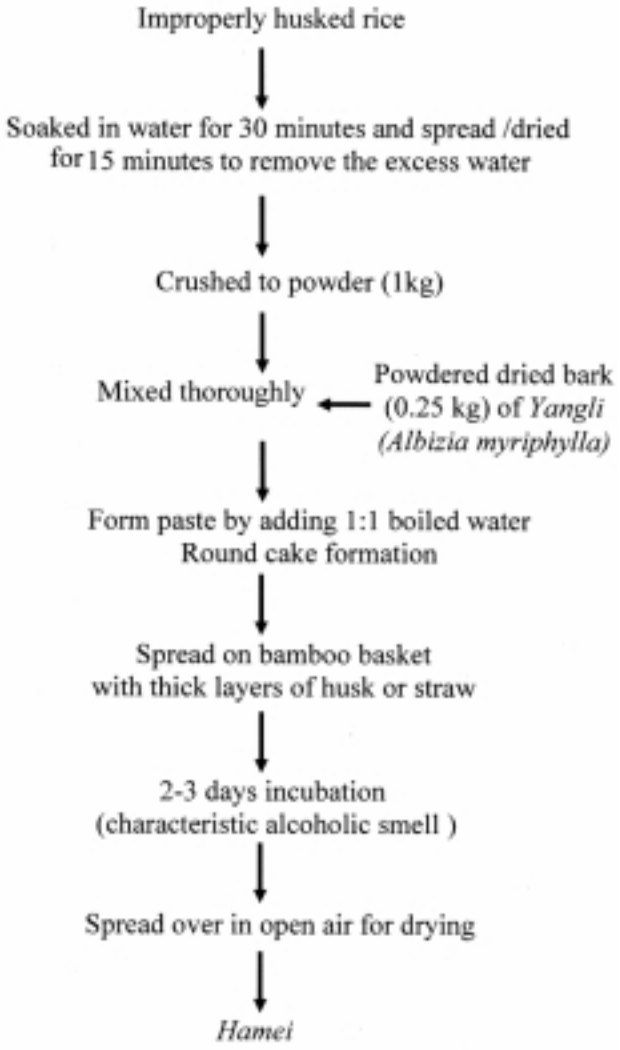

Fig. 8 — Flow chart for *Hamei* preparation

Preparation of *Atingba*

Hamei is used by crushing the flat cake then mixing the powder with cooked, cooled glutinous rice @ 5 cakes/10 kg (Fig. 15). The mixture is fermented for 3-4 days under Solid State Fermentation (SSF) in earthen pots covered with *Hangla* (*Alocasia* sp leaves) during summer and 6-7 days in winter. This is followed by 2-3 days submerged fermentation in

earthen pots. The fermented beverage is called *Atingba* and distilled clear liquor (using traditional assembly) is called *Yu*.

Conclusion

Traditional fermented foods of Manipur are prepared at the house hold level through the indigenous practices of food processing and preservation. There is a need of awareness about basic hygienic knowledge of production for Good Manufacturing Practice (GMP) and safety of the marketed food products as per HACCP system are the major issues to be focused with immediate attention. Due to huge domestic demand eg. *ngari*, some traditional producers started using urea to speed up the fermentation process. Recent entry of plastic containers & polythene bags for fermentation also to be studied for their allergic/toxic effects on human health.

Over the years, there were no systematic and deliberate efforts made by researchers for introduction of production technology through hygienic, utilization of pure microbial starter cultures and optimum process control. Still the local manufacturers are depending on the age-old traditional art. Recent works comparing the effect of different starter culture of indigenous microflora has shown significant difference in the taste, aroma and chemical composition of the traditional fermented food[10]. There has been a growing interest world over to explore search and collect microbial germplasm in search of gene pool, which can help biotechnologist to develop value added products for human welfare.

There is a need of intensive multi-institutional collaborative research and improvement efforts to develop fermented food production technology by reducing the processing/fermentation duration, health risk-free, consistent–quality products in packed form. Development of value added products by selecting microorganisms, genetic improvement, process improvement, raw material improvement, etc. will leads to industrialization of these food products. An increasing number of recent scientific articles report positive effects of fermented foods on various aspects of human health and diseases through different mechanisms[11]. Development of novel fermented foods, with clinically documented health promoting properties could be marketed at a lower price. Such an endeavor is expected to have positive impact on the health and welfare of the people, especially the low income group of the Northeastern states of India.

Acknowledgement

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