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RESEARCH ARTICLE

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## ASSESSMENT OF FERMENTED BAMBOO SHOOT IN KAKCHING DISTRICT OF MANIPUR, INDIA

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### ABSTRACT

Fermented bamboo shoot is one of the delicacy culinary of the major Meitei community of Manipur and also most used ingredient in Northeast Indian cuisine. The fermentation process is almost similar in different states like Nagaland, Manipur and in other states of North East, India. Different varieties of fermented bamboo shoot such as Kakching soibum, Wakak soibum, Lamangdon soibum, soidon etc. are available at the Ima Market through out the year. Khwairamband Ima Market is the only market in the world run by only women and also one of the leading market in Manipur at the heart of Imphal City. All the different varieties of fermented bamboo shoot (soibum) come from Kwatha, Lamangdong, None, Kakching etc are sold at the Ima Market. There is an old saying about the popularity of fermented bamboo shoot “**Kakching soibum**” for its softness, smoothness, and taste. Ethno botanical information of six different varieties of bamboo like *Dendrocalamus giganteus*, *D. strictus*, *D.hamiltonii*, *Bamboosa tulda*, *B. arundina*, *Melocanabambusoides* which are used in preparation of fermented bamboo shoot is recorded. Fermented bamboo shoot becomes a means of conservation of food as the young shoot of bamboo grows only once annually during the rainy season.

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## INTRODUCTION

Kakching District is one of the 16 districts of Manipur, a state of northeastern India, occupies the bigger portion of the southeastern half of Manipur valley. It lies between 24.64°N and 24.23°N latitude and 94.07°E and 93.82°E. Out of the new seven district formation in the year 8<sup>th</sup> December 2016 by the state Govt. of Manipur, Kakching District came into its existence. On the north it is bounded by Thoubal and Imphal West District, on the east by Tengnoupal and Chandel, Bishnupur District on the south (NIC,2021).The altitude is about 790 metres above the sea level. All of the area of Kakching is not a plain valley but it has many hilly areas. According to 2011 census the population of Kakching is 1,35,481 of which 48,649 were urban population and 86832 were rural population (census 2011). The main occupation of the people of Kakching is traditionally farming of crops and hence Kakching is known as Granery of Manipur (produce highest percentage of grain in Manipur state, wikipedia.org). In addition fermenting bamboo shoot is also one of the main occupation done by womenfolk.

Fermentation is as old as food processing. The history of fermentation has early records in South East Asia. China is considered as the cradle of mold- fermented foods while Egyptians developed the combined brewery-bakery fermentation (Nauut 1992). In advanced countries, the techniques of baking brewing, wine making and dairying have emerged into large scale industries producing fermented goods like cheese, pickles, wines, beer, spirits, fermented meat products, soy sauces etc. The current century is the era of custom- made foods satisfying personal and health benefit demands (Steinkraus, 1995). With this changing social demands, fermentation technology has a meaning. From the new perspective, traditional fermented foods are receiving new attention to their health promoting aspects as well as their nutritional supplements. Moreover, increasing population, drought, natural calamities and inadequate food production compel us to seek better options for food production. Consequently, Fermented foods begin to have a new role for stabilizing the global food supply, (N.S.Singh, 2007). The fermented bamboo shoot is very famous and used as an important food item of all the communities in Manipur particularly the Meitei community.

For centuries fermented bamboo shoots lent unique flavors and a distinctive texture to Asian dishes (Fu *et al.*, 2002). Mesu, a non salted fermented bamboo shoots product is consumed in Darjeeling hills of West Bengal and Sikkim in India (Tamang *et al.*, 1998). Most of the people of Kakching are scheduled castin their status. Meitei community of Manipur have many traditional fermented foods like fermented soybean (hawaijar) which have multifarious health benefits, fermented fish (utonga/ ngari and hentak) and locale alcoholic beverages-yungou (a product of fermentation). Traditional fermented foods increases many fold like flavour, preservation of substantial amount of food through lactic acid, alcoholic and alkaline fermentation, enrichment of foods substances biologically with protein, essential amino acids, essential fatty acids and vitamins, detoxification during food fermenting processing, decrease in cooking times and fuel requirement (Steinraus, 1995). Fermentation is a low energy preservation process. It increases shelf and decreases the need for refrigeration or other preservation technology (N.S.Singh, 2007). Fermented bamboo shoot (Kakching soibum) are usually processed at different villages of Kakching. The names of villages where fermentation of bamboo shoot were carried out are Arong Nongmaikhong, Chairel, Elangkhanfpokpi, Hiyanglam, Keirak, Irong Chesaba, Hayel Hangoon, Irengband, Pallel and Wabgai. Kakching soibum which is famous for its good taste and become good source of income to the villagers. Out of the six species of bamboo *Dendracalamus hamiltonii* gives the best test in fermented bamboo shoot. Other places of Manipur like Bishnupur District fermentation of bamboo shoot is also carried out which is known as Lamangdong soibum, Lamangdong soidon and fermentation of bamboo shoot were also done at None, Andro, Kwatha, and Chandel. The taste of fermented bamboo shoot is more tastier and costly in two year old product. Animal or plant tissues subjected to the action of microorganism and / or enzymes to give desirable bio chemical changes and significant modification of food quality are referred to as fermented foods (Campbell-Platt, 1994). Fermented bamboo shoots are used in various dishes by the different communities of Manipur. The best dishes of the Meiteis, the major community of Manipur out of the fermented bamboo shoot are the soibum-ngakra thongba (soibum cooked with a kind of fish called *Clarias batrachus*), Soibum iromba (Chutney with fermented fish), cooked with meat (chicken and pork) by some tribal and soibum pickle. By selling the fermented bamboo shoots becomes the main sources of income of the villagers of Kakching. The plant resources have become a key factor for economic development and well being of their settlement.

## MATERIALS AND METHODS

This study is based on a thorough survey of the inhabited villages at different interval through out the year mainly in Kakching district which have vast extensions of deep forest and plain area. The villagers mainly womenfolks gather the young shoots of bamboo which is called ushoi in Manipuri. They also buy from other places like Kwatha, Komlathabi, Salemthar, Chumbang of Chandel District. The young shoots are formed only once in a year during rainy seasons. The new shoot will initiate around March and can be collected from Juneto July and may be extend to August. This period will vary a little with different species and local ecological conditions (Figure A & G).

Mainly the womenfolk collected the young shoots from the forest, cleaned, skinned the scales till it got the central white core and make longitudinal/ oblique thin slices. The thin slices of bamboo shoot are compactly put inside a basket made of bamboo chip up to the brim. Generally the size of the basket is about 4 feet high and 6 feet in diameter for large scale production of fermented bamboo shoot or it can be fermented in wooden box or glass bottle for small quantity (Figure E & F). The above size basket requires 80 kg and the outcome is about 60 kg. The bottom of the basket is made lining with leaves of *Musa sp.*, *Canna, sp.* or *Stachyphrynium imbricatum* (leioura). Nowadays, these leaves are replaced by thin plastic sheets. The lining of the walls of the basket has a unique pattern that there should be very little air gap. If the lining of the basket is made too much airtight the bamboo shoot is spoiled and if there is more aeration the bamboo shoots cannot be fermented (Ningthoujam Sanjoy Singh *et al.*, 2007). After covering the top of the basket with leaves or plastic sheet to make airtight enough stone pebbles spread over to give adequate pressure (Figure F) and allowed to ferment. The duration of fermentation is about 3-6 months and the shelf life is two or more years. During the fermentation exudes appears as shining liquid which are to be removed by pricking the plastic sheets. The leak out exudates is washed with water externally. Fermented bamboo shoots are sold in the market (Figure B, C, D, & H) in loose or in packets. The tastiest fermented bamboo shoots are those which are kept fermented for 2 years or more and its price is about Rs. 600/Kg. Fermented bamboo shoots can be stored for a long time after complete sundried and pickles are also prepared by Manipuri women self help group as business.

For bamboo shoot fermentation no starter is added. It is a spontaneous type of fermentation. During bamboo fermentation a complex chain of reaction takes place. Many microbes are found to be associated with bamboo shoot fermentation. The reported microbes are *Lactobacillus corneformis*, *L.debrueckii*, *L.plantarum*, *L. brevis*, *Leuconostoc mesenteroides*, *Streptococcus lactis*, Yeast, Lactic acid bacteria and *Pseudomonas*. Fermentation begins with the action of *Leuconostoc* followed by *Lactobacillus* (Ningthoujam Sanjoy Singh *et al.* 2007). Yeast also start growing along with the formation of acid during fermentation by the action of bacteria (Singh, 1996). Major acids produce during bamboo shoots fermentation are lactic acid and other volatile acids. Taxiphyllin present in the bamboo is degraded into D-galactose, benzaldehyde and HCN (Hydrocyanic acid) under the hydrolytic action of acid accumulation in fermentation and escape of HCN from the meshes (Giri, 1996).

## RESULTS AND DISCUSSION

The traditional process of bamboo shoot fermentation by the people of Kakching has become a good business and a good source of economic earning. They have taken up bamboo shoot fermentation on large scale as there is great demand of this food. S.P. Food Kakching (now Uyokching Foods) exported fermented bamboo shoot to California and Australia (Picture B) As traditional modes of fermentation practice in Manipur usually involve fungi, bacteria other microbes there is risk of production of mycotoxins. These microorganisms have to be eliminated so as to make fermented food safe for consumption. When there is contamination or more aeration during fermentation browning of soibum occurs.

A. Young bamboo shoot of *Bamboosa tulda*

B. High quality packed of bamboo shoot for Export to other country



C. Big Un sliced Fermented bamboo shoot



D. Fermented bamboo shoot sold in market



E. Basket made of bamboo chip 4 feet high and 6 feet in diameter for large scale production



F. Decrease of volume as fermentation progresses

G. *Dendrocalamus giganteus*

H. Fermented bamboo shoot

There is great chance of growth of food poisoning micro flora during traditional process (Ningthoujam Sanjoy Singh *et al.* 2007). By fermentation a particular variety of food can be available throughout the year without changing the food values but there may also increase of other additional food values. In hentak (Fermented sun dried fish powder with petioles of *Alocasia macrorhiza*) the protein content and total amino acid increases (Chungkham, 1988). In hawaijar (fermented soya bean) a total increase of amino acid occurs. There is sudden increase of lysine, isoleucine, leucine, glutamic acid during first 2 hours of fermentation and phenylalanine, methionine, cysteine and arginine during 36 hours.

Hawaijar (fermented soybean) is associated with the increase in the content of thiamine which plays an important role in carbohydrate metabolism (Gurumayum, 1994). Documentation of traditional processing technique is one of the methods to improve the understanding the fermented products.

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