Indian Journal of Traditional Knowledge
Vol. 12 (1), January 2013, pp. 97-101

Hukoti -An indigenous dry fish product of tribal communities of Upper Assam

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Received 20.12.11; revised 27.06.12

The present study is a maiden report regarding the existence, preparation procedure and uses of *Hukoti*, a traditional indigenous dry fish product, prepared by different tribal communities of Upper Assam. Dressed and washed fish, mainly *Puntius* spp, are ground with deskinned stems of *Colocasia macrorrhiza* (L.) G. Don and leaves of *Siju* (*Euphorbia ligulana* Roxb.). The resultant paste, stuffed into bamboo cylinders and sealed using dry banana leaves and clay, are dried over kitchen fire for a period of 3-4months. *Hukoti* is used a pain killer and also used as a local therapeutic to cure malaria. In the present study, the authors have suggested various means to improve its overall quality and also potential avenues to commercialize the product.

Keywords: *Hukoti, Colocasia, Siju,* Drying, *Motok* tribe

IPC Int. Cl.[8]: A01K 69/00, A23B 4/03

Tinsukia district of Upper Assam situated between latitude 27°30'N to longitude 95°22'E and covering an area of 3,790 sqkm is bounded East south by Arunachal Pradesh, in South West by Dibrugarh district and North by Brahmaputra river. Apart from Brahmaputra, this eastern most district of Assam is also gifted with a number of tributaries like Lohit, Burhidhing, Dibru, Dirakand also water bodies like beels, lakes, swamps, streams etc providing large varieties of fresh water fish resources. A large section of people are engaged in fishing activities as documented by several workers[1-5] and the catch is sold in the fresh condition or preserved by different traditional techniques. Dibru- Chaikuwa national park has already been declared as buffer zone prohibiting all kinds of destructive activities so as to protect the natural habitat and its flora and fauna. As such, people relying on these resources have shifted to other water resources for their livelihood. Tinsukia district is inhabited by ethnic tribes belonging to Indo-Mongoloid races including *Bodo*, *Mishing*, *Motok-Moran*, *Rabha*, *Dimasa*, etc.[6] and it has been noticed that a sizable quantity of fish catch are used for preparation of their specific traditional fish products. Communities like *Motok*, *Moran*, *Ahom*, *Chingfou*, etc. prepare a special product called *Hukoti* - a dry fish product from miscellaneous varieties of fish from time immemorial. After recession of flood, these types of products are usually prepared using surplus catch. However, some communities prepare it round the year for their own consumption or for sale. It is to be noted that some communities incorporate specific plants to cure variety of ailments, but they keep no records and the information mainly is passed on verbally from generation to generation [7].

Therefore, in the present study, a maiden attempt has been made to describe the preparation process of *Hukoti*, so that further investigation on different aspects related to the product can be undertaken.

Methodology

The study was conducted in Pokaban village of Guizan development block about 18 km Southwest of Tinsukia town. The village has a population of around 850 numbers mainly belonging to the *Motok* community. Even though agriculture is their main occupation, *Hukoti* is frequently prepared by the members of the community for their own consumption and sale using various types of fish species collected from water bodies like beels, rivers, swamps, etc. situated in and around the village. The study was conducted in the village with an idea to document traditional knowledge associated with indigenous product preparation process step by step. Random field survey was conducted and the data on related aspects were gathered. A number of three surveys were conducted in different localities of the

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Pokaban village during September to December, 2011. However, negligible variations in preparation procedure were noticed. Questionnaires in local language pertaining to different aspects of collection of raw material, preparation procedures, types of ingredients used, mode of consumption of the final product and other related aspects were distributed among the villagers and the relevant data was collected.The Prior Informed Consent including name of the respondents, their ages were collected during the study.

Results

For preparation of *Hukoti*, miscellaneous fish were collected from nearby water bodies. According to information gathered from the villagers, fatty fishes such as *Puthi* (*Puntius* spp) are normally preferred. Usually fishes are carried to home in uniced condition in bamboo made baskets and other containers covered with banana leaves for preparation of product. After collection, fishes were dressed to remove scales, fins, intestines. In case of bigger sized fishes after washing, only scales and fins were removed. Fishes were then mixed with salt and turmeric with no fixed ratio and kept for 8-9 hrs in a container covered with a plastic sheet so as to prevent fly infestation. The very next day fishes were washed and again mixed with salt and turmeric and spread uniformly on a *chelani* (a perforated and rounded bamboo tray) and the *chelani* was either sun-dried for 3-4 days (Fig. 1) or dried over kitchen fire by placing it on a rack made up of wood or bamboo (Fig. 2). As per the information, the main objective of this step is to dry the fish to an extent which makes the fish texture tough and to facilitate subsequent grinding operation. However, keeping fish over kitchen fire was more popular. Dried fishes were later ground using a traditional wooden grinder called *Dheki* in Assamese (Fig. 3). In this step, the dried fishes were reduced to a powdery form. The powder was retrieved manually from the grinder and sieved using a locally prepared bamboo siever to remove extraneous matter such as scales, bones, etc. The objective of this screening step was to obtain a nearly homogenous powder. The powder so obtained was again ground (Fig. 4). During this second grinding step, the stems of deskinned *Colocasia macrorrhiza* (L.) G. Don (locally called as *BorKosu*) (Fig. 5) cut into pieces (1/2" in length), were mixed with the powdered fish. About 100gm of *Colocasia* stems was mixed with 1 kg of dry fish powder. In some cases, leaves of a shrubby plant *Euphorbia ligularia* Roxb., commonly known as Leafy Spurge or Milk Hedge and locally known as *Siju* (Fig. 6), is also added along with *Colocasia*. Approximately 100gm of *Siju* leaves per kg dry fish powder were mixed and ground properly. The purpose of incorporating these ingredients is to increase the adhesiveness of the prepared mixture. Some communities also add a particular type of chilli (locally referred to as *Bhoot Jolokia* (*Capsicum chinense* Jacq) (Fig. 7), ginger, garlic, etc. during the grinding operation to suit their own taste and preferences. After grinding, the resultant paste becomes deep green in colour. The paste was then collected and manually stuffed in locally available matured bamboo cylinder of approximately 2.5 feet in length to accommodate nearly 2kg of the paste (Fig. 8). After filling the paste upto a particular level, the contents were covered with dry banana leaves and then with moistened clayey soil to make it airtight. Subsequently, the stuffed bamboo cylinders were placed on bamboo made racks and the same were dried over kitchen fire. Usually drying is done 4-5 times a day for 10-15 minutes duration and the process of drying continues for 3 months. Later, the prepared *Hukoti* (Fig. 9) is used for consumption or sold in local markets.The different steps in the traditional preparation of *Hukoti* is presented in Flow chart- (Fig. 10).

Hukoti, as informed by the villagers is consumed in different ways such as,

1. In fried mustard oil, a little quantity of ground ginger, garlic, turmeric and salt is fried for a 2-3 minutes to which 1-2 spoons of *Hukoti* is added.
2. Alternatively, *Hukoti* is mixed with ground garlic and ginger, wrapped in banana leaves and heated and later it is consumed after removing the banana leaves.
3. *Hukoti* is mixed with boiled potato, salt, green chilli, onion and pepper. All these preparations are consumed along with rice diet.

Discussion

During the preparation procedure of *Hukoti*, the authors observed that many steps and aspects related to its production were not in conformity with the scientific principles of fish processing technology such as good manufacturing practices, good hygienic practices, sanitation operating procedures, etc. This is to be expected as *Hukoti* is a traditional dried fish product prepared by the tribal communities from time

Fig. 1 to 9; 1. Sundrying of fish in *chelani;* 2. Drying fish over kitchen fire; 3. Fishes ground using *dheki;* 4. Grind fish powder; 5. Deskinned *kosu* (*Colocasia*); 6. *Siju* leaves; 7. *Bhoot jolokia;* 8. Stuffing of fish paste in bamboo cylinder and 9. Final product- *Hukoti*

immemorial in the courtyards of their villages which are not maintained in a sanitary state. Strict adherence to personal hygiene practices and proper sanitation in the preparation area is a prerequisite for any product preparation. Dutta *et al*[8] has also suggested proper maintenance of cleanliness during preparation of traditional food products in Assam. However, in the present study, it was observed that these two important aspects were not followed. This is to be expected as the tribal people are ignorant about aspects related to hygiene and sanitation. Nonetheless, improper hygiene and sanitation contribute significantly to spoilage of product and also curtail its shelf life.

In most of the surveys carried out in the Pokaban village, it was observed that washing of the raw material and also final washing of the dressed fish were carried out using tube well water. Since tube well water is not chlorinated, deviations from potability standards as per the guidelines set by ISI are to be expected.

Food contact surfaces used for product preparation should be smooth, corrosion resistant and easily cleanable by any approved detergent or cleaning agent. In the present study, the grinding operation of the fish muscle along with other ingredients was carried out using a wooden grinder (*dheki*). These types of grinders contain pits, cavities or

crevices on its outer surfaces. During the grinding step, dry fish pieces may get entrapped in these cavities and hence may constitute potential sites for bacterial proliferation. Further, retention of these bacterial laden fish pieces shall contaminate future batches of fresh raw material leading to greater spoilage of the product. Also, use of wooden grinders may introduce wood pieces into the paste thereby contributing to physical filth of the final product. An additional observation noted during the grinding step was the frequent problem of fly infestation.

In the traditional method of ***Hukoti*** preparation, tribal people use dry banana leaves and clayey soil for sealing the paste. In the present study, mold growth was observed in some samples which may be attributed to higher moisture content resulting from improper drying in the initial stages and also may be attributed to leakiness of the clayey seal. Since stuffing and compaction of the ground fish into the bamboo cylinders is performed manually, retention of air pockets within the product is likely which may lead to oxidation of fish lipids and changes in flavour and taste of the final product. Further, it was noted that uncleaned, immature bamboo cylinders were employed to stuff the paste on many occasions. Organoleptic evaluation of the final product was carried on the site itself to examine its taste, colour, flavour and texture. A bitter taste was noted in some of the samples. An exact reason for this bitter taste cannot be put forth at this juncture as detailed biochemical analyses are necessary to ascertain the correct cause. However, one of the probable causes could be due to retention of gut entrails containing gastric juice as a result of improper evisceration procedures and insufficient washing.

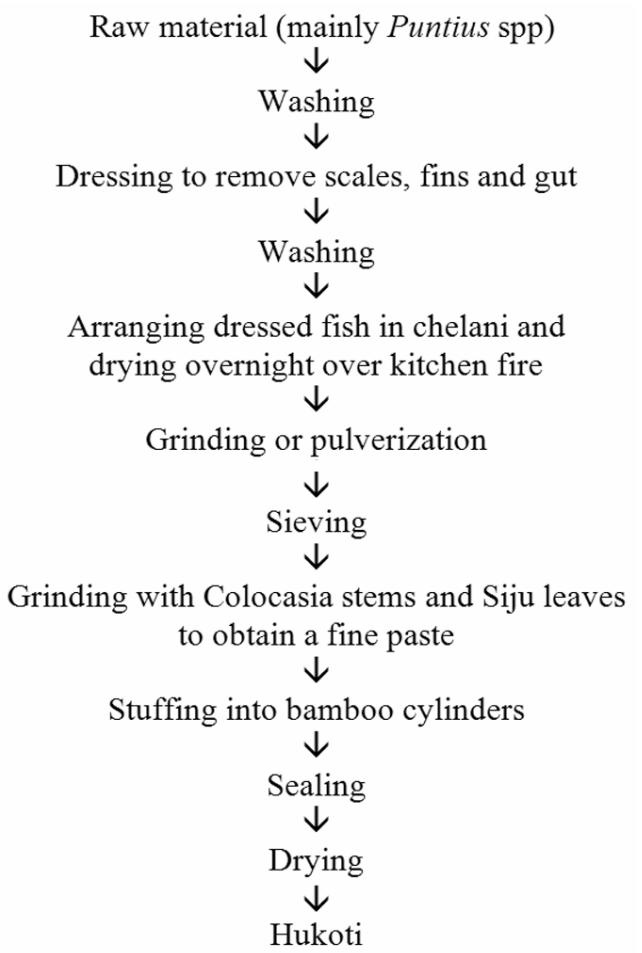

Fig. 10—different steps in the traditional preparation of ***Hukoti***

Conclusion and suggestions

Hukoti enjoys wide popularity and is relished as a protein supplement among the tribal communities. Its appeal and popularity can be extended to attract more consumers, specifically in the urban areas, provided scientific principles are adopted during pre-processing, processing and final storage of the product.

- The duration of the initial drying step practiced by the tribal communities is solely a traditional practice arrived at by trial and error basis. As stated earlier, such an unscientific procedure is beset with the problem of mold growth, oxidation of lipids and inconsistent product texture. Therefore, standardization of this step through further research is needed to prevent problems encountered in the traditional method.
- During the preparation procedure, various ingredients such as salt, turmeric, chilli, etc. are used with no fixed ratio. If the popularity of this product is to be extended to more areas, studies based on organoleptic evaluation are needed to standardize these ingredients. Besides, the use of wooden grinders must be abolished so as to improve its final quality.
- Colour and flavour of a product influences the saleability and marketability of a product. The blackish green colour of ***Hukoti*** in itself shall be a big impediment in its saleability and commercialization in urban markets. Some samples, as mentioned earlier, showed mold growth and tasted bitter.The marketability and popularity of this nutritious protein supplement can be enhanced if its colour and flavour can be

improved by the addition of approved artificial colours and flavouring agents. The associated problem of mold growth can be overcome by the use of proper food grade fungicides. To achieve this, a detailed biochemical and organoleptic investigation is necessary.

- Packaging greatly contributes to the sale and marketability of a product. *Hukoti* is traditionally packed and sealed in bamboo cylinders and sold in the local markets. Since, *Hukoti*'s preparation is an age old practice, the consumers in the villagers are habituated to accept and buy it in its traditional form. However, traditional method of sale in bamboo cylinders shall dissuade potential customers in urban areas. Hence, if proper and attractive packaging methods are adopted, it shall protect the product from oxidative damage and also rein in more customers and contributes towards its popularity.
- Fly infestation is a routine phenomenon observed during *Hukoti* preparation. This is expected as this product is prepared in the open areas of the village households. Food preparation areas must install facilities which preclude entry of flies, rodents and other pests so as to prevent contamination from these sources. It is suggested that strict adherence to personal hygiene practices and maintenance of sanitation in the working area shall improve the overall quality of the final product.
- In the preparation of *Hukoti*, the stuffed and sealed bamboo cylinders are subjected to prolonged drying for three months. It is known that methods of fish preservation such as freezing, salting, drying, fermentation, pickling, marinading, etc. impacts on the nutritional value of the products to variable extents. Therefore, research effort must be directed to curtail and standardize the drying time. Also, the effect of prolonged drying time on the nutritional value of the final product is another promising area of research.

Hukoti is popularly used as a painkiller and also as a local remedy to cure diseases like malaria, etc. Though this is a long held belief among the tribal communities, the authenticity of these claims needs to be thoroughly researched and documented. The authors are presently working on certain aspects relating to biochemical composition, nutritional value of *Hukoti* and standardization of ingredients used, the results of which shall be published soon in later editions of this journal. Thrust areas of our future research shall be directed towards use of artificial colours and flavouring agents to improve its organoleptic quality.

Acknowledgement

The authors are thankful to the fisheries community of Pokaban village particularly Mrs. Upoma Dutta (Age 25yrs), Miss Purobi Dutta (Age 25yrs), Mrs. Dimeshari Borpatra (Age 28yrs), Mr. Dimbeshar Chetia (Age 55yrs), Mr. Chiranjib Chetia (Age 27yrs), Mr. Arup Chetia (Age 26yrs) of Guizan development block, Tinsukia district, Assam, for providing valuable information on *Hukoti*. The authors express their profound gratitude to DRDA, Tinsukia, Assam, for their assistance in carrying out the work. They are also thankful to the Associate Dean, College of Fisheries, Assam Agricultural University, Raha, Assam, for granting permission and for his whole hearted support during the period of investigation.

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