



Diversity of Traditional food in Northeastern Region of India: A Review

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ARTICLE INFO

Article history:

Received: 27th November 2021

Revision Received: 01st December 2021

Accepted: 02nd December 2021

Key words: North East India, Food, Traditional, Tribal, Indigenous.

ABSTRACT

The Northeastern part of India with its cultural and traditional variations is known for its food diversity ranging from vegetarian to non-vegetarian based items. The art of food making in the Tribal communities that has been passed down from one generation to another has been kept alive up to the present generation and practiced among individual families. The products are supplied and sold commercially at a local level but not at a national or a global level. Though known for their tasty and healthy qualities, northeast traditional food products are mostly confined to smaller regions and its surrounding areas. Knowledge of Northeastern food items is less or even non-existent in the rest of India. This paper highlights the well-known traditional foods and their areas of origin, their methods of processing and the marketable potential that they have at a global scale. It further highlights on the constraints caused due to any scientific and technological gaps in the production process or any marketing gaps in the marketing process and the solution that can be undertaken to overcome such limitations so the indigenous market can be commercialized into a global market to accelerate entrepreneurship development in Northeast.

1. Introduction

Northeast India with its special distinct topography of culture is a trove of indigenous knowledge systems on agriculture, food, medicine and natural resource management. Made up of the Seven Sister states of India, Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, and Tripura; along with a brother state Sikkim, it accounts for about 8% of India's total geographical area, with a population of about 40 million, comprising about 3.1% of the total Indian population (Mao and Hynniewta, 2000). It has rich floras and faunas and the most bio diverse hotspot in the world. People in the North East rely on shifting cultivation and forest based food products influenced by the tribal community for their sustainable survival. People are used to living and surviving with the forest culture and Jhum cultivation, which offers a range of nutritious ethnic foods compatible with the culture and the ethnicity of the tribes (Dutta and Dutta, 2005). The people can easily obtain food from their local and natural environment, through their traditional knowledge of farming, harvesting, hunting and gathering (Kuhnlein *et al.*, 2009) which has resulted in traditional and cultural diversity among

the different regional communities (Mahajan *et al.*, 2015). Meat-based foods are mostly preferred and a variety of non-vegetarian dishes and fermented and non-fermented foods in combination with local vegetables are prepared to fulfill the food and nutritional security. In recent times, the Indigenous food system has gained substantial attention as it can serve as a major contributor to food security, nutrition and health. The ethno botanical resources used in traditional foods are focused on local demand, culture, economy, ethnicity, food habits and requirements based (Dutta and Dutta, 2005). Traditional foods are usually confined to the community level, sold locally in a small scale. These traditional food items are mainly produced in individual households and are not commercially available at food stalls in the area. There are more than a hundred traditional foods available in North East India and only a few promising popular traditional foods are highlighted. Documentation of these popular traditional foods is required to commercialize the products to create awareness regarding such. Thus, this paper reviews the popular traditional food, the constraints and scientific intervention in producing this traditional product and the strategy for commercialization.

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Traditional food consumption pattern in North East India

The Socio-cultural and spiritual life and health are closely linked to the traditional food eaten by the tribal people. Despite transition in consumption pattern in the North East, rural people still follow the food pattern of the previous generations. The people eat a variety of food, but rice forms their staple food. Rice is the preferred source of energy and meat the protein source. Tribal people are very fond of meat like pork, beef, chicken, fresh and dried fish. The spices used in traditional cooking practices are Turmeric/Shynrai (*Curcuma domestica Valetton*), Salt, Ginger/ Sying-Bah (*Zingiber officinale Rose.*), Sesame seeds/ Nei-lieh/Nei-iong (*Sesasum indicum L.*) and green chillies (*Capsicum annum*

L.) Most of the traditional snack items are rice based, commonly eaten at breakfast and tea time. Compared to the rest of India the region consumed more green leafy vegetables in the form of salads and boiled vegetables and less spices used in the cuisine.

Popular traditional Food in North East India

To distinguish one's ethnic group, food plays a major role (Somishan and Banu, 2013). The region has a vast variety of traditional food and each food is different since their preparation method and mode of consumption is based on the traditional knowledge passed for generations.

Table 1: Popular traditional foods and its market potential

Sl no.	Traditional products	Description	State	Market potential	
1	Milk based	Prepared by boiling buttermilk, the solid mass obtained is then separated, wrapped and hung in a thin cloth to drain out the water.	Sikkim and Arunachal Pradesh	All parts of the world	
	Chhurpi				
	Chhu				Prepared by churning the curd in bamboo or wooden vessel. The collected buttermilk is then boiled and solid mass is placed in a closed vessel for natural fermentation for 5-7 days at room temperature.
	Philu				A cream-like fermented product is prepared by pouring fresh milk into a wooden vessel, where a thick mesh of dried creeper or sticks kept inside holds the milk. The milk is then fermented for 6-7 days.
	Somar				Prepared by fermenting fresh chhurpi in an airtight container for 10-15 days.
	Shyow				Prepared by addition of mother culture to fresh milk and fermented for 1-2 days.
	Mohi				Liquid by-products during the preparation of butter. Fresh milk is churned in a hollow wooden vessel container, the drained liquid is called as Mohi
	Gheu				Prepared by churning fresh milk in hollow wooden vessel and collecting the solids particle.
2	Grain based	Rice cake prepared by steaming and cooking the powdered rice in a pot called khiewranei.	Meghalaya	All states of Northeast India and South India	
	Kpu Maloi				
	Kpu Tharo				Steamed rice cake prepared by cooking the rice batter in an earthen pot
	Kpu Khlein				A deep fried snack made from rice flour and jaggery.
	Kpu Sla	A boiled rice based snacks, dough of mixture of rice flour, jaggery and water is wrapped in the leaf and boiled in water.	Assam	All states of Northeast India and South east Asia	
	Tong-Tep Pitha	A rectangular shape steamed rice cake prepared by steaming the pasty mixture of rice flour, grated nuts, jaggery, ground nuts, clove and cardamom packed in banana leaves.			
	Paing-sen	A fried snack where by the dough of mixture of rice flour and sugar/ jaggery is rolled into thick and small flat cake.			
	Paing-lam	Rice cake prepared by placing the small round cake of mixture of jaggery and rice flour inside green and young bamboo covered with banana leaves. It is then fire heated till heat cooks the rice cakes			

		inside the cylinder.		
	Paing-pan	Rice flour is mixed with sugar, crushed black sesame seeds, grated coconut, clove and cardamom. Round shaped cakes are made that are put inside the sewa-soru to be cooked in steam		
	Khoo-tek	Puffed riced mixed with molasses and made into balls like laddus.		
	Khoo-pok	Fried snacks of steam and cooked rice pounded with sesame seeds and made into small cakes.		
	Khoo-toum	A steamed glutinous rice roll. Rice is roll and wrapped in ko leaf and soaked and boiled in water for 1-2hours.		
	Khoo-mou-ning	A cookie made from steamed glutinous rice		
	Bangwi	A steam rice cake prepared by stuffing the mixture of pounded rice with condiments inside a leaf of lairu in the shaped of a cone and kept for steaming till cooked	Tripura	All states of Northeast India and South east Asia
	Putang	Noodles made from grain of powdered buckwheat(local name meetha phaphad)	Arunachal Pradesh	All states of Northeast India
3	Fish based	A fermented fish prepared by rubbing the fish (<i>Puntius sophor</i>) with salt, dried in the sun for 3–4 days, pressed tightly in an earthen pot, sealed airtight and then stored at room temperature for 4–6 months.	Manipur	Asian and South Asian Countries
	Ngari			
	Hentak	A ball-like thick paste prepared by fermentation of a mixture of sun-dried fish (<i>Esomus danricus</i>) powder and petioles of aroid plants (<i>Alocasia macrorhiza</i>)		
	Tungtap	Fermented fish paste prepared by mixing dried fish (<i>Danio spp.</i>) with salt, kept in an earthen pot and fermented for 4–7 days.	Meghalaya	Asian and South Asian Countries
	Gnuchi	An ethnic smoked fish product prepared by degutting and mixing fish (<i>Schizothorax richardsonii</i> Gray, <i>Labeodero</i> Hamilton, <i>Acrossocheilus</i> spp., <i>Channa</i> sp.) with salt and turmeric powder, sieved in bamboo tray and smoked in earthen pot for 10-14days.	Sikkim	All parts of the world
	Sidra	An ethnic sun-dried fish product prepared by washing fish (<i>Puntius sarana</i> Hamilton) and sun dried for 4-7days. A pickle is prepared by mixing dried and roasted fish with boiled tomato, chilli and salt.	Sikkim	All parts of the world
	Sukuti	A popular ethnic sun-dried fish product prepared by washing fish (<i>Harpodon nehereus</i> H.), rubbed with salt, and dried in the sun for 4–7 days. A pickle is made by by mixing with oil, onion, dry chillies and salt		
	Karati	An ethnic sun dried and salted fish product prepared from (<i>Gudusia chapra</i> Hamilton) eaten as a side-dish.	Assam	All parts of the world
	Bordia	An ethnic sun dried and salted fish product prepared from (<i>Pseudeutropius atherinoides</i> Bloch), eaten as a side-dish.		
	Lashim	An ethnic sun dried and salted fish product prepared from (<i>Cirrhinus reba</i> Hamilton), eaten as a side-dish.		
	Mio	A sundried fish consumed as curry.	Arunachal Pradesh	All parts of the world
4	Meat based	A khasi cuisine made from a mixture of pork belly, pork intestine and spices and mainly consumed as curry.	Meghalaya	All parts of the world
	Dohjem			

	Achardohsn iang	A pickle made with pork pieces and spices.	Meghalaya	All states of Northeast India
	Dohsnam	Blood sausage prepared by stacking mix blood with fats and seasoning in the pig intestine and boiled for few minutes.	Meghalaya	All parts of the world
	Kargyong	Smoked and dried sausage prepared by mixing the lean meat of yak/ cattle/ pigs, finely chopped fat, crushed garlic, ginger, salt and little amount of water. The mixture is stuffed into the segment of gastrointestinal tract of animal (yak/ox/pig) locally called gyuma. It is boiled for 20-30mins and smoked for 10-15 days.	Sikkim and Arunachal Pradesh	All States of Northeast India and South Asian Countries
	Doh Thad	Smoked and dried meat usually done by cutting the meat into strips and hanged them above challah.	Meghalaya	All States of India and Thailand, Burma, US, etc,
	Vawksha Rep	It is a local name for smoked pork prepared traditionally by piercing the pork chunks to the wooden stick and then placing the meat chunks above the fire for desirable time.	Mizoram	All States of India and Thailand, Burma, US, etc,
5	Functional Foods	Fermented cake made from Colocasia leaves prepared by packing the leave in gunny bag/banana leaves for 3-4days till the leave become yellow, leaves are pounded to paste which are made into cakes. The cakes are then packed in banana leaves and kept under the hot ash near the fire place or sun dried till it become hard and consumed as condiments.	Nagaland	Meghalaya, Manipur and Mizoram
	Anishi			
	Miyamikhri	Fermented bamboo shoot prepared by packing the cut bamboo shoot in banana leaves and placed inside earthen pots for fermentation up to 4-5 days.	Assam	All Northeast State and South East Asia
	Soibum	Fermented bamboo shoot prepared by slicing the juvenile bamboo shoot and pressed tightly in a bamboo or earthen chamber and ferment for 6 months to 1 year.	Manipur	All Northeast State and South East Asia
	Gundruk	Fermented leafy green vegetable prepared by shredding the vegetable and packed in earthen pot covered filled with warm water and allowed to ferment. The fermented vegetables is then sundried	Sikkim	Europe, Central Asia and State of Northeast India.
	Sinki	A non-salted traditional fermented radish tap root product prepared by fermenting the wilted and shredded Radish tap root for 15-30 days followed by sun drying for 3-4days.	Darjeeling and Sikkim	Nepal and African region.
	Tungrymbai	Fermented soybean, produce by covering the washed and boiled soybean in a leave and allow for fermentation.	Meghalaya	All states of Northeast India

Milk based

Traditional food from milk as a substrate is seen throughout the states of Sikkim, Assam and Arunachal Pradesh. The people prepare a variety of fermented milk food for consumption and economic purposes. The most popular products are Chhurpi, Chhu, Philu, Somar, either made from cow milk or yak milk and Shyow, Mohi and Gheu made purely from cow milk. Chhurpi can be hard-based or soft and cheese-like in nature and is used in curry, pickle, etc., whereas products like Chhu is naturally soft with a strong flavor and is used in dishes. Another fermented product i.e., Philu is creamy and used in fried curry with butter. Somar from Sikkim is pasty in nature and consumed as flavors and condiments. Another fermented product is Shyow which is curd-like in nature and used as a savory. Mohi is a famous product in Sikkim consumed as butter-milk and Gheu is consumed along with steamed rice or mixed in dal and curry in Sikkim (Dewan and Tamang, 2006). Misti Dohi is a sweet curd mainly prepared in Assam and the substrate can be either from cow or buffalo milk. Lassi is also prepared in parts of Assam as a refreshing beverage. In Arunachal Pradesh Chhurpi is of three types i.e., Chhur singba, Chhur chirpen and Chhur pupuas a traditional food from milk. Chhur singba is the paneer-like product made from yak milk after fermentation of milk by adding the extract of crab apple fruits (thung). Chhur chirpen is a paneer-like product made by fermentation of yak milk and cuttings of crab apple kept inside a bamboo mat over the fireplace for flavor and color development. Chhurpupu is chhurpi kept and preserved inside a yak skin for 4-5 years sometimes consumed for a stomach ache (Singh *et al.*, 2007). Dahi (curd), another popular fermented milk product in Sikkim is used for direct consumption or for the preparation of various ethnic milk products such as gheu, mohi, and chhurpi (Tamang, 2010).

Grain based

Various types of rice based products called kpu by the tribal language are available in Meghalaya. Some of the popular products are Kpu Maloi, Kpu Tharo, Kpu Khlein, Kpu Sla, etc. These products are steamed or fried products (Joshi *et al.*, 2013). In Assam, varieties of Rice cake (Tong-Tep Pitha, Paing-sen, Paing-lam, Paing-pan, Khoo-tek, Khoo-pok, Khoo-tum and Khoo-mou-ning) are prepared (Sonowal *et al.*, 2018). Bangwi is a special rice cake made from a rice called Guria prepared in Tripura. The staple diet of the Mizo people is wholly rice-based eaten either steam boiled (ukhua) or sundried (aaro). Rice varieties like bora (sticky rice), malbhog, chakoa, etc, are also consumed. Several nutritious rice-based preparations and brew, called apong, zu in Arunachal Pradesh, sa, laopani, haria in Assam, kakiad in Meghalaya, madhu in Nagaland etc., are made. In Arunachal Pradesh, meetha phaphad (buckwheat) grains are used to

make a noodle called Putang. Another local dish i.e., Kharangpa, is prepared from powdered maize and given to the old people in Arunachal Pradesh (Singh *et al.*, 2007). In Sikkim, traditional products like Alum, Faldong, Gyathuk, Khapjay, Phaktoo, etc., are prepared (Tamang *et al.*, 2014). Sticky rice is prepared during festivals like Gan-ngai or Luingaini or during Christmas in Manipur (Kumar and Suresh, 2012).

Fish based

Fish products are fermented using natural microbial cultures and preservative to increase the nutritional value and extend their shelf life (Ahmad and Srivastava, 2007). The low-valued small fish are dried, moistened and packed in oil smeared earthen pots and kept at room temperature for 6 months. In Manipur, the fermented fish product called ngari, an intrinsic tribal diet is prepared from dried *Puntius sophore* fish. Hentak is another traditional fermented fish paste prepared in Manipur (Sarojnalini and Singh, 1988). In Meghalaya, a fermented fish paste called 'Tungtap' is prepared from *P. sophore*. Fermentation enhances the palatability of the small fishes by softening the bones and improving the flavor and texture of the meat. Another traditional product is Gnuchi which is a smoked and dried fish product commonly eaten by the Lepcha community of Sikkim. The fish species used includes *Schizothorax richardsonii*, *Labeo dero*, *Acrossocheilus spp.*, and *Channa sp.* traditionally smoked fish product is called "Sukakomaacha" by the Gorkha. The hill river fish 'dothayasala' (*Schizothorax richardsoni*) and 'chuchayasala' (*Schizothorax progastus*) are air-dried by a specific method and consumed directly (Thapa *et al.*, 2006). Sidra from Sikkim is a sun-dried fish product of *Puntius sarana* fish, also made into a pickle (Thapa *et al.*, 2006). Sukuti from Sikkim is a sun-dried fish product cuisine of the Gorkha (Thapa *et al.*, 2006), consumed as a pickle, soup, or curry. Karati, Bordia, and Lashim are sun dried and salted fish products of Assam. Karati is prepared from a fish variety *Gudusia chapra*; Bordia from *Pseudeutropius atherinoides*; and Lashim from *Cirrhinus reba* respectively (Thapa *et al.*, 2007). Mio is another dried fish product from Arunachal Pradesh. Shidal is a salt-free, solid, semi-fermented fish product consumed in the North East. Shidal is prepared from small sized fish mainly *Puntius sp.*, also known as seedal, seepa, hidal, and shidal in different states like Assam, Tripura, Arunachal Pradesh and Nagaland (Ahmed *et al.*, 2016), prepared by a complex procedure including semi-drying of *Puntius sp.* in the sunlight and keeping them in vats or earthen pots for fermentation process for around 4–6 months in which the final product has a semi-solid appearance. Shidal bhorta a chutney or sauce-like recipe made from Shidal Fishis prepared as a side dish with rice or bread (Thapa *et al.*, 2007).

Meat based

Meat products are either fermented with natural microbial cultures and preservatives or are salted; dried and kept at very low temperature for long term storage (Tamang, 2013) while some meat are non-fermented. A large number of such ethnic meat products can be found in Meghalaya. Dohjem either prepared from the stomach, intestines, and clotted blood of beef, chicken or pork and items like Tungrymbai made with pork chopped into small pieces is popular in Meghalaya (Nehal, 2013). Pork pickle known as Achar Dohsniang and Dohsnam known as blood sausage tribe is a popular. In Sikkim the use of traditional knowledge in the preparation of various fermented items, including Langkaryong (beef/pork/yak meat sausage), Sukako Masu (buffalo or chevon meat dried or smoked), Satchu (dried beef/pork/yak meat) and Sukako Maacha (smoked fish), has been reported (Tamang *et al.*, 2010). Karyong is a sausage-like meat (yak/beef/pork) product of Sikkim and Arunachal Pradesh (Rai *et al.*, 2009). Another common food, Goyang, is prepared with beef or yak meat cooked with pre-treated leaves of the Maganesaag wild plant (*Cardaminemacrophylla wild*) (Das *et al.*, 2012) Falki is a special meat-based dish from the Nepali community's Gurung caste in Sikkim (Tamang and Tamang, 2009). Famous meat products in Nagaland are Anishi and Axone. Axone (Aakhone) is made from meat and fermented soybeans and is common among the tribes of Sema Naga (Mao *et al.*, 2007). Sa-um is a product made from fermented pig fat, Sawhchiar is pork or chicken porridge, and Sarep which is a smoked meat are meat products in Mizoram. In Meghalaya, smoked meats locally known as Dohthad is very common in almost all regions of the state. Another product called 'Bongsha Rep' and 'Vawksha Rep' are Smoked beef and smoked pork famous in Mizoram. For smoked meat, the Sarep is a wide category that includes domesticated and wild animals such as barking deer (*Muntiacus vaginalis*), sambar deer (*Rusa unicolor*), wild boar (*Suss crofa*) and macaque (*macaque*) (Lalthanpuii *et al.*, 2015).

Functional Foods of Northeast India

Traditional food preparations convey a cultural identity to the groups and tribes of North East through the uniqueness they have. They are more palatable, nutritious, and are best at room temperature to preserve consistency. Different varieties of fermented foods and drinks from the bamboo shoots have historically been found in the northeastern states (Thakur *et al.*, 2016). The indigenous fermented bamboo shoot products Soibum are eaten as an important diet and are a part of the people's social customs (Jeyaram *et al.*, 2009). Mesu is another fermented bamboo shoot product indigenous to the people of the Himalayan regions of Darjeeling hills and Sikkim (Tamang and Tamang,

2009). Ekung/Hirring are an ethnic fermented bamboo shoot product of Arunachal Pradesh (Tamang and Tamang, 2009). Miya mikhri is produced by the Dimasa tribe of Assam from bamboo shoots cut into small pieces, wrapped in banana leaf, and kept inside an earthen pot. Miya mikhrican be taken as a pickle or mixed with curry (Chakrabarty *et al.*, 2009). In Nagaland, Anishi a fermented vegetable of Colocasia leaves which is famous (Mao *et al.*, 2007). Gundruk is a common non-salted dried fermented leafy vegetable food of the Gorkha tribes of North East (Tamang and Tamang, 2009). In the Eastern Himalayas, Kinema is a fermented whole-soybean food prepared by the people of Nepal. Sinki is a non-salted fermented radish tap root (*Raphanus sativus L.*) eaten in Darjeeling, Sikkim, and Nepal by the Nepali tribe (Sekhar and Mariappan, 2007). Tungrymbai is another ethnic fermented soybean food from Meghalaya (Murungkar and Subbulaskmi, 2006). Processed fermented soybeans known as 'bethaobebung' is a part of almost every meal of Maring family in Manipur. Marings are also fond of rice beer (Wai-tull) and puffing Pipe/Hukah (hilhaksu-hoktangtungka) (Somishon and Thahira, 2013).

Specialty of Functional food in North East India

The specialty of traditional foods depends on the process of preparation. The most common techniques used are fermentation, smoking, and drying which extends their shelf life. Traditional foods are easily digestible; nutrient enriched with a less cooking time. Fermented Bamboo shoot, known to possess anti-oxidant, anticancer and anti-aging properties is consumed as a healthy appetizer in case of Gundruk since it has a high amount of ascorbic acid, lactic acid, anticancer properties and carotene. Traditional foods like Kinema are known to contain all the essential amino acids and have cholesterol lowering effects and anti-oxidant properties. Siku, another traditional nutritional food is consumed by the local tribes as a cure against diarrhoea and stomach disorders. The processing techniques i.e. Fermentation used in the preparation of traditional foods are known to reduce endogenous toxin as well as Anti Nutritional Factors present in the food. Traditional products like Hirring are known to have anti-cancer and anti-aging properties.

Constraints in traditional food products

Apart from all the specialties and benefits that traditional foods offer, they have limitations which act as constraints for commercialization. These include:

- Improper facilities and poor hygienic and quality control by food handler/ producers.

- Improper controlled environment during processing may lead to cross-contamination from adulterants and allergens which in turn render the products unsafe for human consumption.
 - Improper maintenance of protocol, lack of standardization of procedures for processing.
 - Lack of training given to food handlers and entrepreneur in food processing.
 - Lack of marketing strategy and adequate logistics for scaling up to large production.
 - Lack of availability and accessibility of meat processing equipment and technical know-how on handling.
 - Lack of knowledge on proper packaging materials and transport system
- Northeast practices a variety of food processing know have different benefits in terms of nutrition, preservative functionality etc. Apart from the beneficiaries of the different processing techniques, a scientific gap is seen. In order to produce consistent and high value product this gap has to be filled eliminate. Some of the scientific gaps in traditional food processing are discussed below:

Table 2. Scientific and technological inputs for up gradation in processing ethnic food products

Sl. No.	Traditional/Ethnic food products	Gaps	Scientific and technological interventions
1.	Fermented milk products (Chhu, Philu, Somar, Shyow, Mohi and Gheu)	-Fermentation in an uncontrolled environment. Poor knowledge on thermal treatment and handling of milk	-know-how on handling incubator. Important of different properties of strain of yeast - knowledge on thermal processing can be imparted
2.	Dry Meat/fish (Sarep, Dohthad, Sukako Masu, Satchu, Gnuchi, Sidra, Mio, Sukako maacha, Karati, Bordia and Lashim)	-Use of firewood and charcoal for drying in the traditional kitchen or sun drying in rural areas limits the factor of controlling temperature. This causes uneven drying of meat and reduces the quality of dry meat. -Traditional drying method is time consuming.	-know-how on handling scientific drying devices (solar dryers; dehydrators) that can be done on small scale level. -impart knowledge on maintenance of processing conditions (time, temperature, humidity, etc.) for production of quality dry meat products. -demonstrate different types of dry meat.
3.	Preparation of pork with bamboo shoot pickles (Achhar dohsniang)	-inadequate knowledge on hygienic practices; -lack of knowledge on importance of standardizing ingredients; -inaccessibility to meat preservatives; and poor know-how on their purposes and permissible limits;	-know-how on uses of different meat preservatives, their purposes, permissible limits; -hands-on training on meat pickling following hygienic and standard procedures.
4.	Fermented fish (Ngari, Tungtap and Hentak)	-Fermentation in an uncontrolled environment. Poor knowledge on process condition and process standardization	-know-how on handling incubator. Impart knowledge on maintenance of processing conditions (time, temperature and humidity). Trials on different types of fish.
5.	Grain based products (Ki Kpu, Tong-TepPitha , Paing-sen, Paing-lam, Paing-pan, Khoo-tek, Khoo-pok, Khoo-tum and Khoo-mouning, Bangwi and meethaPhaphad)	-poor knowledge on ingredient and process standardization. -poor shelf life -poor processing conditions lead to nutritional loss; more spoilage microbial load.	-how to standardized processing methods and ingredients. -use of natural preservative to increase the product stability -standardization on the packaging materials to enhance the shelf life of the product
6.	Fermented vegetables/legume (Soibum, Herring, Anishi,	-Fermentation in an uncontrolled environment. Poor knowledge on process	-know-how on handling incubator. Impart knowledge on maintenance of

	Gundruk, Kinema and Tungrymbai)	condition and process standardization	processing conditions (time, temperature and humidity).
7.	Traditional meat/ fish curries (Sawhchiar, Falki , Sukuti)	-poor knowledge on ingredient and process standardization. -poor shelf life -poor processing conditions lead to nutritional loss; more spoilage microbial load.	-how to standardized processing methods and ingredients. -Introduction to types of processing using different heat treatment methods (retort processing) -food grade product packaging
8.	Dohjem (Pig intestine with sesame meat cuury)	-inadequate knowledge on nutritional and functional properties of herbs, spices, etc. -lack of knowledge on various heat treatment methods of processing. -No quality control	-know-how on nutritional and functional properties of herbs and spices -know-how on different processing methods. -incorporate innovation into traditional meat product for longer shelf life such as retort packaging
9.	Traditional blood sausage (Dohsnam)	-poor shelf life due to poor processing hygiene -poorly standardized ingredients and processes. -Non-uniform product shape since manually done -uneven distribution of ingredients in product due to inadequate mixing.	-introduce grinders and bowl chopper for adequate mixing and mincing. -optimization of the ingredients and the process parameters -demonstrate handling of filling machine for blood sausage.
10.	Traditional meat/ fish chutneys (Shidal, Sidra)	-poorly standardized ingredients and processing method -non introduction to different packaging methods.	-chutneys to be packaged in appropriate packages and in different volumes as per consumer needs to facilitate convenience and longer storage stability.

Commercialization

Traditional food products prepared in individual households are not available commercially in large scale in markets. Native food handlers are unaware of the value of upholding hygiene and consistency standards which is a major drawback in commercialization. In the present scenario, the food consumption pattern has changed due to increased income and livelihoods of the people besides the high demand for ready to eat food. Further, a large population has been migrating to different parts of India for education, job, and business. Commercialization of ethnic food products and appropriate marketing will appeal to the population's palette and meet the demand for various food products. As the urban working women population increases, demand for processed products has increased to counteract women's time constraints for food preparation. Marketing of ethnic food items will, therefore, meet new consumer demands.

2. Conclusion

Northeast India harbors a variety of traditional food proven to be health beneficial. Market concern and knowledge about the type and quality of raw materials are continually growing. The traditional knowledge of the

indigenous people of Northeast in the fermented food preparation provides opportunities for the development of food industries of fermented products, quality improvements and increased marketing. A proper study on the scientific intervention of producing these traditional products into high quality products can attract consumers and help in large production of these products. Commercialization can convert the local indigenous market into a global market that can create job opportunities for self sufficiency of the tribal people.

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