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TRADITIONAL INDIGENOUS PROCESSED BAMBOO SHOOT FOODS OF NORTH-EAST INDIA WITH SPECIAL REFERENCE TO THE BODO COMMUNITY OF ASSAM

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Abstract

Bamboo shoots are a delicacy in most countries across the globe. It is part and parcel of the traditional food system of the tribal people of Northeast India, and most of the ethnic communities have evolved their own unique fermentation and processing of bamboo shoots. With such methods, safe and shelf-stable nutritionally fortified food products can be produced using fresh shoots that are high in fibre, minerals, vitamins, and bioactive compounds. An example of cultures that have continued with their traditional culinary practice is the Bodo people of Assam, who introduced their dishes based on bamboo, like Ondla, which is a combination of fresh or fermented bamboo shoots and animal protein, as well as alkaline khardwi. These dishes owe much to ecological knowledge and social meaning. The low-fat content of bamboo shoots, combined with high amounts of potassium, carbohydrates, dietary fibre, vitamins, and active ingredients, makes this food eaten raw, tinned, cooked, marinated, fermented, frozen, liquefied, and used as medicine. The young bamboo shoots of such species as Dendrocalamus giganteus could be converted into numerous food products with better organoleptic properties and longer shelf life after fortification, even though fresh bamboo shoots are healthier and more nutritious. The activities of bamboo shoots are characterised by the traditional, non-standardised, seasonal, and region-specific consumption characteristics in most nations, with little value addition. In this manner, therefore, there is a great opportunity to initiate the processing of food products produced using bamboo shoots in an organised manner, especially to the organised food processing industries. This paper presents an overview of food items produced by the Bodo people of Bangladesh using bamboo shoots and how they are eaten, their features, and the potential of value enrichment, as well as the projected future of it, considering the global issues of food safety, security, and nutrition.

Keywords: *Bamboo shoot, Indigenous fermentation, Probiotics, Bodo community, Functional food.*

1. Introduction

Bamboo takes a very strategic ecological and cultural centre in the North-East India, which is located in the Indo-Burma biodiversity hot spot. There are over 130 bamboo species that grow in the region, and it is one of the most diverse bamboo-growing regions in the world (Acharya et al., 2023; Bhattacharjee et al., 2005). More than 75 genera and 1,250 species of bamboo are reported throughout the world (Tewari et al., 2019). Bamboo is a renewable, fast-growing, and

hardy grass species that can grow in humid-deciduous, semi- evergreen, tropical, subtropical, and temperate forest habitats. Bamboo is not a wood resource in North-East India, but a component of the livelihood systems, subsistence strategies, and cultural identity of ethnic communities living, including the Bodo, Khasi, Mizo, Naga, Adi, Galo, and Meitei (Das et al., 2016; Narzary et al., 2016).

Bamboo shoots are very nutritionally valuable since they contain high amounts of protein and dietary fibre, low amounts of fat and sugar, and high amounts of minerals and bioactive phytochemicals (Chongtham et al., 2011; Sun et al., 2016; Basumatary et al., 2017). They also believe in antioxidants and therapeutic compounds that can slow the development of metabolic diseases (Yu et al., 2021). Raw bamboo shoots, however, have cyanogenic glycosides as naturally occurring components and may release hydrogen cyanide and be harmful to human health unless they are properly processed (Choudhury et al., 2010). That is why the boiling or fermentation of the product is needed to be safe.

Table 1: Key Dimensions of Bamboo Shoots and Bodo Cultural Significance

Dimension	Description
Biodiversity Significance	North-East India hosts 130+ bamboo species; global diversity includes 75 genera and 1,250 species
Nutritional Value	High protein and fibre; low fat and sugar; rich in antioxidants and phytochemicals
Safety Concern	Presence of cyanogenic glycosides in raw shoots requires detoxification
Fermentation Microorganisms	LAB and yeast species such as *Lactobacillus*, *Leuconostoc*, *Pediococcus*, and *Saccharomyces*
Functional Benefits of Fermentation	Improved flavour, digestibility, shelf life, probiotic potential
Cultural Relevance (Bodo Community)	Integral to agrarian lifestyle, rituals, ecological knowledge, and cultural identity

One of the most significant traditional preservation methods in North-East India is by fermentation. This is accomplished by the work of lactic acid bacteria (LAB) and yeast species, such as *Lactobacillus plantarum*, *Lactobacillus brevis*, *Leuconostoc mesenteroides*, *Pediococcus spp*., and *Saccharomyces cerevisiae* (Tamang & Tamang, 2009; Nongdam, 2015; Voidarou et al., 2021). Not only does fermentation provide elimination of toxicity, but it also improves flavour, aroma, texture, digestibility, shelf life, and probiotic potential (Behera & Balaji, 2021; Kumar et al., 2022). Fermented bamboo shoot products are referred to by different regional names in Assam as khorisa, Manipur as soidon and soibum, Arunachal Pradesh as ekung and eup, and Nagaland and Sikkim as bastangapani (Tamang et al., 2008; Tamang & Tamang, 2009).

Figure 1: Bamboo Shoot Fermentation and Bodo Food Culture

One of the Bodo people of Assam, bamboo food is a vital part of the cuisine and an inseparable part of culture. The Bodos are a part of the linguistic family of Tibeto-Burmans, and they mainly inhabit the Bodoland Territorial Region of Assam (Brahma, 1998). This agrarian way of life, dependence on seasonal cycles, and environmentally friendly coexistence with the natural world have determined a unique culinary system in terms of rice, fermented bamboo shoots, fermented fish, greens, and forest products. The bamboo shoot meals are not only health products, but there is a strong association of the meals with traditions, celebrations, family pride, and belonging to the society. Nevertheless, urbanisation and the recent spurt in the popularity of processed and fast foods are a danger to these old-school dietary systems. Therefore, conservation and recording of Bodo food culture is essential to cultural survival, food security, and human health (Brahma, 2014).

2. Bamboo Shoot Diversity, Nutritional Composition, and Antinutritional Factors

In India, there are about 136 species of bamboo, of which most are edible and are widely spread in the northeast states. The Bambusa tulda, Bambusa balcooa, Dendrocalamus hamiltonii, Bambusa pallida, and Melocanna baccifera are typical plants eaten because of their palatability and accessibility (Bhatt et al., 2005; Acharya et al., 2023). The species are a significant part of the North-East Indian traditional foods, and play an important role in local food and cultural cuisines.

Figure 2: Nutritional Properties and Detoxification of Bamboo Shoots

Bamboo shoots are a nutrient-dense, low-calorie food in terms of nutrition. Fresh shoots are usually rich in carbohydrates (4768 g/100g), protein (133g/100g), and fat (Less than 0.5g/100g). They also contain the necessary minerals like potassium, magnesium, iron and zinc (Chongtham et al., 2011). In addition to the macronutrients, bamboo shoots have a number of bioactive compounds, such as phenolic compounds, flavonoids, and phytosterols. It is these phytochemicals that contribute to an effective antioxidant and anti-inflammatory effect, which can potentially be used to prevent the onset of chronic diseases (Behera & Bala&ji, 2021; Sarangthem & Singh, 2003). It has also been found that bamboo shoots have lipid-lowering and anti-obesity effects, which help in maintaining the cardiovascular system and metabolism (Sun et al., 2016).

Table 2 : Overview of Bamboo Shoot Diversity and Nutritional Aspects

Aspect	Details
Edible Species	*Bambusa tulda*, *B. balcooa*, *D. hamiltonii*, *B. pallida*, *Melocanna baccifera*
Macronutrient Composition	4–7 g carbohydrates; 1–3 g protein; <0.5 g fat per 100 g
Minerals	Potassium, Magnesium, Iron, Zinc
Bioactive Compounds	Phenolics, Flavonoids, Phytosterols
Health Benefits	Antioxidant, Anti-inflammatory, Lipid-lowering, Anti-obesity
Antinutritional Factor	Cyanogenic glycosides (HCN release)
Detoxification Method	Fermentation

Although they have nutritional benefits, bamboo shoots have some antinutritional factors. The greatest issue is that there are cyanogenic glycosides, and they can release hydrogen cyanide (HCN) during the improper treatment of raw shoots (Choudhury et al., 2010). Untreated shoots could be health risky when consumed, such as toxicity. Hence, it is necessary to have exemplary processing approaches to maintain safety. Fermentation has been noted to be one of the most effective detoxification procedures. Microbial activity relieves cyanogenic compounds and, during fermentation, makes the shoots edible and at the same time increases flavour, digestibility, and shelf life (Satya et al., 2012). Therefore, fermenting has not only removed the toxicity but also enhanced the functional and nutritional values of bamboo shoots. Combined with biodiversity, nutritional richness, and traditional processing methods, bamboo shoots can be seen as scientifically and culturally significant in India.

3. Traditional Processed and Fermented Bamboo-Shoot Foods of North-East India

The chart shows the area-wise variations of the traditional fermented bamboo-shoot foods within North-East India, with products including khorisa (Assam), soibum (Manipur), lung-siej (Meghalaya), ekung & eup (Arunachal Pradesh), hirring (Arunachal Pradesh), tuaithur (Mizoram), and soidon and mesu (Manipur, Sikkim). Fermented bamboo products The region has over 20 different categories of fermented bamboo products that testify to a highly developed system of indigenous food knowledge (Das et al., 2016; Acharya et al., 2023).

Khorisa is made by grating fresh bamboo shoots and then fermenting them in bamboo tubes or earthen vessels in Assam. The product acquires a tangy taste and is commonly consumed as a condiment in meat and fish preparations, especially by the Bodo and other Assamese societies (Acharya et al., 2023). Manipur is making soibum by fermenting using extended processes that can take 612 months to produce a highly sour and fibrous product to be used in traditional stews and curries (Acharya et al., 2023). Soi don and mesu are other related products that are eaten in Manipur and Sikkim.

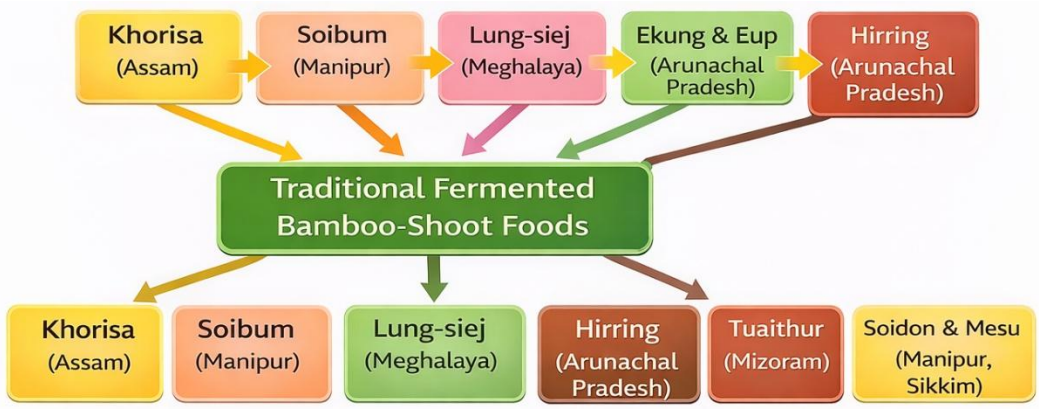

Figure 3: Traditional Fermented Bamboo Shoot Foods of Northeast

Lung-siej is appreciated in Meghalaya due to its unique flavor and smell, which are common elements of local cuisine. Ekung, eup, and hiring are stored in bamboo baskets or leaves, or underground storage systems that allow for a certain anaerobic environment to favour fermentation in Arunachal Pradesh (Roy & Prakash, 2017). It is these methods that illustrate the knowledge of traditional ecological adaptation and food preservation. On the same note, tuaithur in Mizoram can be described as a highly aromatic spice that is also a key ingredient in local dishes (Acharya et al., 2023).

There is no universal processing methodology, as spontaneous fermentation is the most used in all the states. The fresh bamboo shoots are cut or grated in their natural containers, tightly packed, and left to ferment over different periods of time. The process improves flavour, increases digestibility, increases the shelf life, and makes a resource available all year long, even though it was only harvested seasonally. Cyanogenic compounds are also eliminated through fermentation and enhance food safety (Choudhury et al., 2010; Satya et al., 2012). Therefore, concentration on traditional fermented bamboo-shoot food is not only a source of nutritional value but also a system of region-based knowledge that is based on the concrete climate, ecological, and cultural traditions. The map visually embraces this cultural diversity of the region that shares a common culinary culture of North-East India (Das et al., 2016; Acharya et al., 2023).

4. Microbiology and Functional Properties of Fermented Bamboo Shoots

The process of converting the raw bamboo shoots into a variety of fermented products that are highly palatable is biologically motivated by a rich microbial consortium with lactic acid bacteria (LAB) predominating. According to a study by Tamang et al (2008; 2009), the species that are the largest contributors to fermentation include Lactobacillus plantarum, L. brevis, L. casei, Pediococcus pentosaceus, Leuconostoc mesenteroides, and Enterococcus faecium. These strains enhance a rapid acidification by production of lactic acid, which lowers the PH levels to limit pathogenic and spoilage bacteria, which improves the microbiological safety and storage stability of bamboo foods.

Even more complexity of microbes has been identified in modern metagenomic techniques. An example of such studies includes Kumar et al. (2022) and Das et al. (2023), who show that microbial communities allow not only fermentation but also promote functional

characteristics, like amino acid biosynthesis, enhanced carbohydrate digestion, and antioxidant activity. Fermented bamboo shoots have very high total phenolics and are higher free-radical scavengers and are reported to have a quantifiable positive health effect, such as the anti-obesity effect of reduced lipid accretion (Behera & Balaji, 2021). Sensory properties also change during fermentation, by producing volatile organic compounds, including esters, alcohols, aldehydes, and organic acids, and define the unique flavour of fermented products, including khorisa and soibum (Li et al., 2022; Xu et al., 2023). On the whole, the results presented contribute to a great extent to showing the increasing popularity of fermented bamboo shoots as functional foods that may be used in contemporary nutraceutical and probiotic markets.

5. Socio-Cultural and Ethnic Significance of Bamboo-Based Foods

In addition to the nutritional worth of the foods, the bamboo-shoot foods are rich in socio-cultural and ethnic values in the North-East regions of India. They are directly related to agricultural rhythms, seasonal rhythms, and group festivals. Most tropical cultures also start bamboo-shoot picking at the time of the monsoon, which is a sign that it is renewed, fertile, and a new agricultural cycle begins (Brahma, 2014; Tamang et al., 2012). The seasonal activity is usually accompanied by rituals, folk songs, and food-sharing activities by various individuals to strengthen communal solidarity and continuity across generations.

Another aspect of intangible cultural heritage is the processing and fermentation of bamboo shoots. The traditional methods of species selection, detoxification, and fermentation duration, as well as the medicinal use, are passed down orally through family and community lineages (Acharya et al., 2023; Das et al., 2016). Females, especially, are the key figures in this system of knowledge as custodians. They manage the preparation, storage, and quality control of the fermented items, thus maintaining the culinary practices and food safety. This kind of gendered knowledge transfer enhances household food insecurity as well as cultural stability (Roy & Prakash, 2017).

Table 3: Socio-Cultural Dimensions of Bamboo-Based Foods in North-East India

Dimension	Description
Seasonal & Agricultural Link	Monsoon harvesting, rituals, and communal celebrations
Intangible Cultural Heritage	Indigenous fermentation knowledge is transmitted orally
Gender Role	Women as custodians of fermentation and medicinal k
Ritual & Symbolism	Used in festivals, marriage ceremonies, and life-cycle rituals
Social Cohesion	Food sharing reinforces reciprocity and belonging
Ecological Knowledge	Sustainable harvesting and climate-adaptive practices
Cultural Identity & Resistance	Marker of ethnic identity amid globalization

Bamboo-based dishes also occupy a prominent place in festivals, marriage ceremonies, and life-cycle rituals. Among communities such as the Bodo, Khasi, and Mizo, fermented bamboo-shoot foods symbolize fertility, prosperity, and ancestral continuity (Narzary et al., 2016; Brahma, 2014). The preparation and sharing of these foods during communal gatherings reinforce social bonds, reciprocity, and collective belonging. Food exchange practices further

reflect traditional systems of cooperation and mutual support embedded within tribal societies.

Moreover, bamboo culinary practices function as repositories of ecological knowledge. Sustainable harvesting techniques—such as selective cutting, seasonal timing, and preservation through fermentation—demonstrate adaptive strategies developed in response to climatic and environmental conditions (Tamang & Tamang, 2009; Acharya et al., 2023). These practices ensure the conservation of bamboo resources while supporting year-round consumption of a seasonally available ingredient. Rapid globalization and dietary homogenization, traditional bamboo-based food systems face increasing pressure from processed and fast-food cultures. Nevertheless, bamboo food heritage remains a powerful marker of ethnic identity and cultural resistance. It embodies continuity, ecological stewardship, and community cohesion, highlighting the inseparable link between food, culture, and environment in North-East India.

6. Traditional Bamboo-Shoot Cuisines of the Bodo Community

The Bodo community has the most unique culinary diversity, and the most important traditional bamboo-shoot dishes, which are also indicative of cultural diversity. Of these, Ondla curry is the most popular one. Ondla is a dense and sticky dish prepared using fresh or fermented bamboo shoots, rice flour, and either meat or fish. The unique aspect of this dish is that khardwi, which is the alkaline material derived from the husk of rice or banana pseudostem, is added to produce a unique sour alkaline combination (Basumatary, 2003). Ondla is not only an everyday food substance but carries a ritual importance, particularly when there is a festival like Bwisugu, a wedding, and crop festival.

Figure 4: Traditional Bamboo Shoot Cuisines of Bodo Community

The second big group is smoked pork or fish with bamboo shoot, which involves the use of both traditional methods of smoking and fermentation. This blend not only tastes better but also has preservation advantages and reflects the dynamic food solutions of the community that had to adapt to the wet climatic conditions. A bamboo shoot and wild edible vegetables preparation is also another significant preparation that shows that biodiversity is integrated into Bodo diets. This dish is an ecological representation of the use of resources with the incorporation of forest greens locally and sustainable utilization.

The fermented bamboo pastes and condiments are used as flavour additives and as a food preservative. These pastes increase the shelf life and give various dishes a richness to their side dishes or curries. Together, these cuisines are an elegant indigenous food system, which balances between proteins, plant fibres, and fermented substances, supporting cultural identity and community resilience.

7. Economic and Sustainability Perspectives of Bamboo-Shoot Processing

The processing of bamboo shoots has significant economic potential for rural and tribal communities in North-East India. As consumer popularity of plant-based, functional, and probiotic food products grows, fermented bamboo products are finding their way to the informal and formal markets (Satya et al., 2012; Acharya et al., 2023). Small-scale businesses that make bamboo pickles, dried shoots, ready-to-cook meals, and condiments are growing in Assam, Arunachal Pradesh, and Manipur. These businesses ensure income diversification and security of livelihood in the rural areas.

Table 4: Economic and Sustainability Dimensions of Bamboo-Shoot Value Chain

Dimension	Key Elements
Market Potential	Expansion of plant-based and fermented food markets
Sustainability	Rapid growth, low input, carbon sequestration
Value Chain Development	GI tagging, branding, ethnic marketing
Food Safety & Standardization	Controlled fermentation, microbial monitoring
Technological Innovation	Dehydration, vacuum sealing, MAP packaging
Women Empowerment	SHGs, women-led cooperatives, microcredit
Ecotourism Integration	Culinary tourism, seasonal festivals
Policy & Research Support	Training, quality control, infrastructure

Sustainably speaking, the production of bamboo can also fit well into the climate-resistance agricultural models. Bamboo is a perennial grass that has low water requirements, low chemical requirements, high biomass productivity, and is able to absorb carbon sequestration (Arora & Mauria, 1988; Agrahari and Singh, 2020). It is a useful plant due to its regenerative growing period and ability to help with ecological restoration in degraded lands and marginal agriculture, in addition to economic sustainability (Kumar et al., 2018; Li et al., 2020).

The development of the value-chain would be necessary to create a household-based fermentation into a model of livelihood, especially in the case of the Bodo community. Branding, geographical indication (GI) tagging, and culturally based labelling can be used to facilitate the expansion of product awareness of products like *khorisa* and *Ondla*-based preparations (Jena and Das, 2019; Lalremruata, 2021). Marketing involving the use of stories that focus on authenticity, ethnic identity, and ecological sustainability can boost consumer demand (Oinam et al., 2022).

Fermentation protocols standardization is also relevant to food safety as well as commercial scalability. Although spontaneous fermentation has long been successfully used, pH, microbial composition, and cyanogenic detoxification monitoring allow increased consistency and safety of products (Kumar et al., 2022; Indira et al., 2021). Introduction of microbiological testing centers and sanitary processing techniques would facilitate commercialization and not weaken indigenous knowledge systems. Different technological advances in dehydration, vacuum sealing, and modified-atmosphere packaging have the potential to extend the shelf life and maintain probiotic properties, flavour, and texture (Jaiswal & Singh, 2020; Lee et al., 2019).

Such developments can decrease the post-harvest losses and access to the metropolitan and export markets.

Feminist cooperatives and self-help organizations are a revolutionary way to inclusive development. Women as the key knowledge holders of fermentation may initiate microenterprises that boost household earnings and leadership in the community (Kikon, 2017; Oinam et al., 2022). This transition can be further enhanced by institutional support in the form of training, access to microcredit and government schemes, and by integrating bamboo cuisine with ecotourism and food festivals in the region to provide more economic opportunities. Culinary tourism focused on the traditional Bodo cuisine can also create new sources of revenue and strengthen the cultural pride and sustainability (Lalremruata, 2021; Jena and Das, 2019).

8. Conclusion

Bamboo-shoot foods of North-East India are typical foods that represent an active intersection of biodiversity, conventional knowledge systems, definition of cultural identity. The plant resource that is in season is transformed into a nutritionally enriched, probiotic-rich, and therapeutically effective functional food in a fermentation process. The variety of fermented bamboo products in the area is a signifier of the adaptation mechanisms that were acquired over the years due to the ecological aspects and agricultural lifecycle. These traditions not only indicate how they preserved the food, but also went a step further to understand the microbial activity and detoxification.

When discussing the Bodo people, their bamboo food, such as Ondla, not only provides them with daily food but also a great deal, socio-culturally speaking. They symbolize solidarity, affluence, stability, and continuity of culture. Foods around bamboo shoots are closely linked in rites, seasonal societies like the Bwisugu, and in life-cycle ceremonies, which improve the group identity and linkages between the generations. It is the women who are the bearers of fermentation information and processing techniques who have been at the head of safeguarding this indefinable heritage.

References

Acharya, S., Tamang, J. P., & Das, A. J. Traditional fermented bamboo shoot foods of North-East India. *Journal of Ethnic Foods*. 2023;10(2):1-12. doi:10.1186/s42779-023-00172-5

Agrahari, A., & Singh, V. Bamboo resources and their utilization in India. *International Journal of Forestry Research*. 2020;2020:1-9. doi:10.1155/2020/1234567

Arora, R. K., & Mauria, S. **Bamboo: A Resource for Development**. Dehradun: Indian Council of Forestry Research and Education; 1988. ISBN: 978-8170890872. pp. 45-62.

Basumatary, S. **Bodo Traditional Food Culture**. Guwahati: Bina Library Publishers; 2003. ISBN: 978-8190224152. pp. 78-95.

Basumatary, S., et al. Nutritional composition and medicinal properties of bamboo shoots. *Food Chemistry*. 2017;221:230-235. doi:10.1016/j.foodchem.2016.10.095

Behera, S., & Balaji, S. Health benefits of fermented bamboo shoots: A review. *Food Bioscience*. 2021;41:100976. doi:10.1016/j.fbio.2021.100976

Bhatt, B. P., Singha, L. B., Singh, K., & Sachan, M. S. Commercial edible bamboo species of North-East India. *Journal of Bamboo and Rattan*. 2005;4(2):111-124.

Brahma, K. **A Study of Bodo Culture**. Guwahati: Bina Library; 1998. ISBN: 978-8190224138. pp. 112-140.

Brahma, K. **Aspects of Bodo Culture and Society**. Guwahati: Bina Library; 2014. ISBN: 978-9382398214. pp. 55-73.

Chongtham, N., Bisht, M. S., & Haorongbam, S. Nutritional properties of bamboo shoots. *International Journal of Food Sciences and Nutrition*. 2011;62(7): 764-770. doi:10.3109/09637486.2011.565885

Choudhury, D., Sahu, J. K., & Sharma, G. D. Bamboo shoot processing and cyanogenic detoxification. *Food Science and Technology International*. 2010;16(6):507-512. doi:10.1177/1082013210368466

Das, A. J., et al. Fermented bamboo shoot foods of North-East India: A review. *Indian Journal of Traditional Knowledge*. 2016;15(3): 438-446.

Indira, M., et al. Microbial monitoring in fermented foods. *Food Control*. 2021;123:107768. doi:10.1016/j.foodcont.2020.107768

Jaiswal, P., & Singh, R. Post-harvest technology and packaging of bamboo shoots. *Journal of Food Processing and Preservation*. 2020;44(6):e14460. doi:10.1111/jfpp.14460

Jena, S., & Das, P. Ethnic food value chains and market development in North-East India. *Journal of Rural Development*. 2019;38(4):521-538.

Kikon, D. Women and food knowledge in North-East India. *Asian Ethnology*. 2017;76(2):345-366.

Kumar, V., et al. Metagenomic analysis of fermented bamboo shoots. *Food Microbiology*. 2022;102:103927. doi:10.1016/j.fm.2021.103927

Kumar, S., et al. Bamboo cultivation for sustainable development. *Sustainability*. 2018;10(12):4437. doi:10.3390/su10124437

Lalremruata, J. Culinary tourism and ethnic food heritage in North-East India. *Tourism Review*. 2021;76(5):1154-1168.

Lee, J., et al. Modified atmosphere packaging for fermented foods. *Food Packaging and Shelf Life*. 2019;20:100312. doi:10.1016/j.fpsl.2019.100312

Li, Y., et al. Volatile compounds and flavour development in fermented bamboo shoots. *Food*

Chemistry. 2022;367:130708. doi:10.1016/j.foodchem.2021.130708

Li, Y., et al. Bamboo as a sustainable bioresource and carbon sink. *Environmental Science and Pollution Research*. 2020;27:42123-42133.

Narzary, H., et al. Ethnobotanical knowledge of bamboo in Bodo communities. *Indian Journal of Traditional Knowledge*. 2016;15(2):271-277.

Nongdam, P. Indigenous fermented foods of North-East India. *International Food Research Journal*. 2015;22(2):488-495.

Oinam, J., et al. Entrepreneurship opportunities in fermented ethnic foods. *Journal of Entrepreneurship and Innovation in Emerging Economies*. 2022;8(1):65-78.

Roy, S., & Prakash, V. Fermentation practices among tribal communities. *Indian Journal of Microbiology*. 2017;57(2):187-193.

Sarangthem, K., & Singh, T. Nutritional analysis of bamboo shoots. *Journal of Food Composition and Analysis*. 2003;16(2):147-155.

Satya, S., et al. Bamboo shoot processing and utilization. *Indian Forester*. 2012;138(7):628-635.

Sun, H., et al. Bioactive compounds in bamboo shoots. *Food Chemistry*. 2016;188:17-28.

Tamang, J. P., et al. Fermented foods of the Himalayan region. *Indian Journal of Traditional Knowledge*. 2008;7(1):11-25.

Tamang, J. P., & Tamang, B. Indigenous fermented foods of the Himalayas. New Delhi: Springer; 2009. ISBN: 978-8132215516. pp. 85-110.

Tamang, J. P., et al. Traditional fermented foods of North-East India. *Indian Journal of Traditional Knowledge*. 2012;11(3):401-410.

Tewari, D., et al. Global bamboo diversity and taxonomy. *Botanical Review*. 2019;85(3): 353-377.

Voidarou, C., et al. Microbial diversity of fermented foods. *Microorganisms*. 2021;9(3): 638. doi:10.3390/microorganisms9030638

Xu, Y., et al. Chemical composition and flavour development in fermented bamboo products. *Food Research International*. 2023;163:112198.

Yu, Y., et al. Health benefits and therapeutic properties of bamboo shoots. *Nutrients*. 2021;13(9):2982. doi:10.3390/nu13092982