RESEARCH PAPER

Therapeutic Benefits Of Local Herbs, Spices And Culinary Preparations Of Northeastern India.

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Abstract

'Northeastern India", one of the richest biodiversity regions of India and South Asia, has several native plant varieties used in traditional cooking by locals. The locally grown herbs and spices contribute to flavor and have nutritional and medicinal value. In many tribal and ethnic cuisines, food and medicine are often integrated foods are consumed not only for nutrition but also to support digestion, immunity, and the treatment of ailments. Northeast India is home to hundreds of indigenous communities, each with its own food traditions, ingredients, and cooking technique which plays a vital role in regional gastronomy and health traditions. The study majorly uses secondary data to scrutinize the culture, cuisines of northeastern states and some locally used rare herbs and spices to review their botanical identity, local known names, culinary applications, and ethnobotanical relevance of species. Despite their importance, systematic research on phytochemical and agronomic aspects remains inadequate. The study highlights the need for interdisciplinary research, conservation strategies, and sustainable commercialization of these underutilized culinary botanicals. This paper reviews extensive literature on local food Habits of the region and synthesizes findings on prevalent cooking techniques, their cultural relevance, and nutritional implications. The distinctive culinary repertoire is shaped due to ecological diversity and cross-cultural interactions with Southeast Asia. The diversity of Northeastern India cuisines and cooking techniques reflect an amalgamation of environmental necessity, cultural tradition, and social practice emphasizing steaming, fermentation, smoking, boiling, and minimal processing. Over the last two decades, tribal cuisine from the Northeast has begun to gain national and international recognition, celebrated for its authenticity, sustainability, and bold flavors. Despite prominence of local herbs and spices in local diets, many of these botanicals are un-documented. This paper aims to consolidate existing research and provide a comprehensive academic overview of selected rare herbs and spices used in Northeastern Indian cooking.

Keywords: Northeastern India, Indigenous herbs & spices, culinary biodiversity, Indigenous cuisine, food preservation, Therapeutic benefits

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Introduction

Northeast India's seven sister states—Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Tripura, and a brother state Sikkim— offers a distinct culinary tradition and unique experience of the region's vibrant heritage shaped by tribal lifestyles, natural resources, and seasonal rhythms. The marginal 7.97% of India's geographical landscape is home to a 200 plus distinct ethnic groups have inimitable tongues, dialects, and socio-cultural characteristics, contributing to its richness. Arunachal Pradesh alone has 26 tribes, & more than 100 sub-tribes with distinct identities and aspirations showcasing profound internal diversity. Every tribal community has distinct identities and aspirations which have led to the formation of new states like Nagaland in 1961, Meghalaya in 1972 and Mizoram in 1981. Northeastern region constitutes plains of Assam's Brahmaputra Valley to misty mountains, deep valleys and numerous waterfalls to rocky terrains of Mizoram and Tripura. Northeast region shares borders with Bangladesh (1,880 km) Myanmar (1,643 km) China (1,346 km), Bhutan (516 km), and Nepal (99 km) fostering significant cultural and culinary exchanges and commercial exchanges. Poignantly, the sister states are narrowly connected by Siliguri corridor, colloquially called as "Chicken's Neck." Due to this geological isolation, there is significant culinary influence of neighboring countries and less influence of culinary delights from Rest of India. The lack of culinary and cultural intermingling of Northeastern cuisine and culture

has grown to be a self-reliant food system, deeply rooted in native practices. The region's food culture is generally misunderstood by National and International visitors due to the unique tastes and methods used by distinct tribes. Northeast Indian cuisine fundamentally prioritizes using the inherent, natural flavors of its fresh, locally sourced ingredients minimal use of oil and spices and ingenious cooking and Food preservation methods. Cuisines of Northeast rely more on natural fermentation, smoking, and minimal use of oil and spices creating a healthy yet intensely flavorful food culture. Ecological diversity and cultural heterogeneity of Northeast have produced idiosyncratic food habits rooted in indigenous knowledge as it comes under Indo-Burma biodiversity hotspot. Northeastern dishes include fresh herbs, wild aromatics, and intense heat from locally grown chilies. These traditions emerge from both adaptation to humid, forested environments and centuries of intercommunity exchange with adjacent regions (e.g., Southeast Asia). Understanding prevalent cooking methods offers insight into local food systems, nutrition, and cultural resilience. Northeastern states are hotspots of world's biodiversity and home of rich tradition using farm and forest products for food as well as medicine. The indigenous communities across this region have established ethnobotanical practices by culminating various herbs and spices into daily consumption for treatment of general ailments. Ethnobotanical studies on regional cuisines reveal antioxidative, antimicrobial, anti-inflammatory effects & health benefits from the oils and bioactive compounds of the spices (Sajem & Gosai, 2006; Das et al., 2025). For example, among the Jaintia tribes of Assam, at least 39 plant species were recorded with medicinal use spanning about 30 ailments (Sajem & Gosai, 2006). Local tribes use Conventional wisdom of medicinal plants and endemic herbs and spices as the primary therapeutic resource for various ailments. The Northeast's food is inclined by its geography consists of rolling hills, impenetrable forests, and river valleys. Ingredients like wild herbs, fermented vegetables, Bamboo shoots, smoked meats, and freshwater fish are often grown locally, searched, or hunted for sustenance. The inherent reverence for natural ingredients and legacy of diverse tribal communities have influenced the culinary philosophy of Northeast India. Communities and tribes of Northeastern cuisine rely on seasonal availability from nature, wild foraging, and zero wastage cooking. Nothing goes to waste right from nose-to-tail, bones are used in soups, skins are dried for snacks, and leftovers are fermented or sun-dried. Tribes and communities of Northeast Practices eco-conscious and low-impact living especially using Bamboo as food, cooking vessel, and utensil. Leaf plates, clay pots, and natural fibers replacing plastic and metal from kitchen. Many tribes gather around fireplaces with extended families and neighbors to prepare common meals and transform food preparation into a communal and bonding experience. Food in northeastern states is deeply intertwined spiritually with tradition, rituals, festivals, and social gatherings with community spirit i.e. Bohag Bihu (Assam), Yaoshang (Manipur) Solung (Arunachal Pradesh), Losar (Sikkim) Chapchar Kut (Mizoram), Garia Puja (Tripura), Hornbill and Sekrenyi (Nagaland) and Wangala in Meghalaya i.e. harvest festival of the Garos. Rice beers, like Apong, Zutho, and Ki Kiad, are integral components of most meals and ceremonies highlighting the interlacing of food, beverages / drink, and social life. Recipes are passed down orally, and cooking techniques are learned by observation and participation.

Literature Review

Traditional healthcare systems in Northeast India are predominantly plant based and community oriented. The concept of "food as medicine" is deeply embedded in Northeast Indian cultures. Culinary ingredients such as sour fruits, pungent chilies, and aromatic spices are believed to contribute to digestive health, immunity enhancement, and relief from respiratory and gastrointestinal diseases (Das et al., 2025; Sharma & Das, 2018). Furthermore, similar research indicate extensive consumption of fermented foods across tribal populations and their implications for nutrition and immunity (Das et al., 2024). Basumatary et al. (2017) describe fermented bamboo shoots as nutritionally enriched region's gastronomic foods with enhanced digestibility and probiotic potential. These ethnobotanical insights provide a foundation for modern scientific inquiry into their phytochemical and Therapeutic properties. Huidrom et al., 2025 highlight the Ethnobotanical survey of Manipur's Meitei community using 30 odd spices and aromatic herbs grown wildly or semi-domesticated in traditional cuisine and hold high cultural significance revealing a close relationship between biodiversity and culinary tradition. Many plant species used as spices like Zingiber officinale (ginger), Allium odorum (wild garlic), Litsea cubeba (wild pepper), and Houttuynia cordata hold high cultural significance and food value among the Meitei ethnic group.

Existing literature on Northeastern Indian culinary practices is limited but growing. Research on Northeastern food has progressively driven towards ethnogastronomy, traditional fermentation technology, and the effects of traditional diets on health. Apeksha et al. (2025) studied ethnic snacks across Northeastern India, emphasizing the nutritional preservation and cultural embeddedness of steam cooking technique. Das and Singh (2022) surveyed traditional preservation modes used by Assam's Bodo community highlighting fermentation and smoking as key adaptive strategies. Anthropological research on specific ethnic groups like Bodo tribe of Assam highlights fermentation and smoking as critical preservation techniques integral to

identity and sustainability (Das & Singh, 2022; Brahma, 2025).

Scientific literature confirms that the botanicals contain bioactive compounds—capsaicin, curcumin, flavonoids, essential oils—bridging traditional food systems and modern nutritional science (El-Saadony et al., 2023; Meghvansi et al., 2010). Tender shoots of Risut-rúbú are consumed along with fish, which is also used in Mizoram for the treatment of ulcer, stomach ache etc. (Lalawmpuii et al. 2017). Yumrang- O:ri is a spice in powder or paste cooked with chicken and is used against cough and bronchitis (Das and Rahman, 2011). Fruits of Sita-bangko are used for preparation of starter dish, similarly the leaves of these plants are also used in the preparation of traditional rice beer by the Deori tribe of Assam. (Deori C. et al. 2007). Traditionally fermented Apong is an alcoholic beverage which is essential part of Mising culture (Pegu et al. 2013).

Studies specify that northeastern culinary methods prioritize minimal use of oil and microbial fermentation to elevate flavor, food safety and sustainability. Brahma (2025) later noted the role of fermentation in Bodo cuisine as a cultural identity formation and ritual practice. Das et al. (2024) emphasized microbiological and nutritional parameters of fermented products and ethnic foods of Northeast India as a perspective of public health. Dominance of Protein can be visualized in Northeastern cuisines particularly pork, smoked beef, Meats, various types of freshwater fish, wild game, and sometimes insects constitute a major component of the Northeast Indian diet. These proteins are frequently prepared through boiling, smoking, or grilling which align the emphasis of using minimal oil and extracting natural flavors. Beyond conventional meats, tribal cuisines often incorporate wild game. Additionally, some communities are hardheaded in their approach to sustenance and consume a wide range of protein sources like silk worms, snails, specific toad meat, spiders, birds, crabs, and maggots. The methods of preparing these proteins, such as smoking and sun-drying, highlight an adaptive strategy. Das et al. (2025) supports knowledge transmission, and the importance of preserving ethnobotanical heritage due to biodiversity threats.

The rich ethnomedicinal heritage and scientific documentation, positions North east region as storehouse for natural product-based benefits (Das et al., 2025; Sajem & Gosai, 2006). The following table offers a comparative overview of the culinary highlights across the Northeast Indian states. It showcases their defining characteristics. The table also highlights key ingredients and signature dishes.

Northeast India's Unique Cuisine and Cultural Identity

Unlike many parts of India, Northeast Indian dishes rarely rely on ghee or heavy masalas. Instead, they use herbs like chameleon plant, ghost chili (bhut jolokia), and sichuan pepper, which lend sharpness and heat without overwhelming the palate. The focus is on natural flavors, enhanced by fermentation, smoking, and slow cooking. India is the second largest producer of rice in the world after China and stands as the biggest exporter of the same in the list of major rice exporters of the world. Numerous rice varieties like white rice, wild-pigmented etc, are cultivated in North eastern India. Rice (Oryza sativa L.), plays a vital role in global food security (Kumawat et al., 2023). In species Oryza, Pigmented rice is classified in four types i.e black, brown, red and white depending on the pigments it contains (Das et al., 2024). Rice is the staple grain, served in various forms—steamed, sticky, puffed, or ground into flour. In Northeast, Food reflects identity because the recipes preserve stories, mark rites of passage, and bind communities. Tribal communities pass down recipes and preparation methods through generations. e.g, smoked pork with bamboo shoots of Nagaland, Jadoh, i.e. a spiced rice and meat dish is prepared by Meghalaya's Khasi tribe. The age-old fermentation methods using natural preservatives not only enrich flavor but add depth and nutrition in the region's humid climate e.g. Axone (fermented soybean from Nagaland), soibum (fermented bamboo shoot in Manipur), and berma (fermented fish in Tripura). Studies have explored various species with ethnomedicinal relevance, many of which are also utilized in food preparation (Timungpi, 2026; Kaphungkui et al., 2024). Spices and herbs of this region serve multifunctional roles as culinary flavoring agents, medicinal ingredients and ritual components, and cultural identity markers. Gogoi et al. (2024) highlights plants used against metabolic disorders for diabetes, digestive health. During Hornbill Festival in Nagaland, tribes showcase their traditional dishes, offering visitors a feast of culture. Similarly, Meghalaya's Wangala Festival and Manipur's Yaoshang also feature community feasts where rare dishes reappear. These celebrations provide a perfect setting for tourists and locals to bond over food. They also serve as cultural preservation platforms, ensuring that recipes and techniques survive modernization. The food produced is of pristine quality because retaining food Freshness is a paramount principle which does not allow even minimal disruption of ingredients to retain the inherent flavors with subtle spices and naiver cooking techniques. The abundance of wild edibles, freshest catches from local rivers and ponds, foraged greens and local produces reflect the region's deep connection to its natural environment and thus diminishes the need for flavor masking. Huidrom et al. (2025), and Kaphungkui et al. (2024) in their studies have stressed on the traditional knowledge and community use patterns for culinary botanicals with therapeutic claims.

Methodology

This research paper is based on extensive literature review and Government reports, secondary data collected

from various ethnobotanical surveys, Peer-reviewed journal articles food science research papers and phytochemical studies. Search terms included Northeast India medicinal plants, ethnomedicinal spices Assam, Garcinia pedunculata pharmacology, Zanthoxylum acanthopodium medicinal properties, and related keywords. Articles published between 2000–2024 were prioritized. This study employs a qualitative literature review approach. Peer-reviewed journal articles, ethnobotanical surveys, food science research papers, and governmental reports were explored. Emphasis was placed on documentation of local common names, their history behind culinary applications and the influence of Culture. Sources were selected based on relevance to Northeastern India and adherence to academic standards. The study also overviews the Botanical identification and Nutritional or Therapeutic evidence of the local Produces.

Discussion

Biodiversity shapes the culinary identity in Northeastern cuisines and emphasize freshness of herbs and spices used, fermentation, and minimal oil usage. Scientific literature confirms that herbs and spices contain bioactive compounds—capsaicin, curcumin, flavonoids, and essential oils bridging traditional food systems and modern nutritional science (El-Saadony et al., 2023; Meghvansi et al., 2010).

The culinary and therapeutic aspects of Northeast Indian spices portray "food as medicine." Sour fruits such as Garcinia species are commonly used for digestive ailments, while ghost pepper stimulate metabolism and circulation. Many plants show promising Therapeutic properties due to the presence of phenolics, terpenoids, and alkaloids.

Despite promising in vitro and animal studies, human clinical trials remain limited. Standardization of dosage, toxicity profiling, and sustainable harvesting practices are needed.

Local Name	State	Therapeutic beneficial Property
Bih Jolokia, Umorok	Assam, Manipur	High capsaicin improves metabolism, pain relief, antimicrobial properties
Lakadong Haldi	Meghalaya	High curcumin, anti-inflammatory, antioxidant, supports joint health
Karbi angling Ginger	Assam, Nagaland	High gingerol:- anti oxidant, anti-inflammatory, treatment of Gastro intestinal disorders and respiratory issues
Thoiding	Manipur	Omega-3 rich
Ganya, Jaiur	Nagaland, Meghalaya	Numbing citrus taste
Soibum, Bastangapani	Meghalaya , etc	Probiotic potential
Toningkhok	Manipur	Medicinal bioactives
Bayleaf	Mizoram and manipur	Antiseptic, Supports digestion, reduces bloating
Cinnamon	Arunachal Pradesh	Antimicrobial, Regulates blood sugar, improves circulation,
Black Cardamom	Sikkim, Assam	Antioxidant, Respiratory relief, digestive aid,
Neem	Assam, Tripura	Antibacterial, antifungal, detoxifying, skin health
Amarvela or Kodiyar kundal	Assam,	Antibacterial Antioxidant, anti-inflammatory, anti cancer, for neuro and liver protection
Methi shaak	Assam, meghalaya	Anti microbial, anti oxident
Taro (kosu)		Regulates blood sugar, Rich in vitamins and minerals, good for heart health and digestion.
Tulsi (Holy Basil,)	Manipur	anti-inflammatory, Immunity booster, stress reduction
Gotu kola or tiger grass,Indian pennywort	Assam, meghalaya	Antioxidant, anti-inflammatory and collagen stimulating Properties. for stomach disorders and brain tonic
bharangi	Nagaland, assam	anti-inflammatory, Treatment of Respiratory disorders
Tajig dimoru paat	Assam	Rich in vitamins and minerals, low in calories, fibrous
Mesaki paat	Assam	used for malaria treatment, pain relief, prevents from

		cancer, heart disease and hormonal disorders
Ou tenga	Assam	Immunity booster, remedy for hypertension and regulating heartbeat, vitamin c and potassium
pakkom	Assam	Antioxidant, anti-inflammatory, weight management
bhim kol	Assam	Fibrous, rich in potassium and vitamins, low fat and cholesterol free
Risut-rúbú	mizoram	Treatment of ulcer,stomach ache
Arjun chaal	Assam	Hormone regulation and Bone health, heart health, for respiratory disorders and wound healing.
Bor elashi	nagaland	anti-inflammatory, Rich in vitamins and minerals, helps in digestion
Amlokhi	Assam	Helps in Dysentery, diarrhea ,piles etc
Bor manimuni	Assam	Used as digestive, heals Dysentery, diarrhea.
Tezpat	Assam	Rheumatism, gonorrhea, Diarrhoea, diabetes
Nephaphu	Assam, Manipur	Kills intestinal worms, reduce blood pressure
Xylosma longifolia	Assam, Manipur.	Treatment of liver disorders, dysentery, gastritis, respiratory issues, skin infections; also antispasmodic and antifungal activities observed
Garcinia lanceifolia	Ethnic communities of Northeast India.	Treats dysentery, dyspepsia, and biliousness (assimilating antibacterial activities
Curcuma prakasha	Garo Hills, Meghalaya (rare species).	Tripathi, S. (2002). Curcuma prakasha sp. nov. Nordic Journal of Botany
Homalomena pendula		Used for its aromatic rhizome in folk remedies; potential anti-inflammatory components identified

Ingredients in Northeastern cuisine offer both culinary enjoyment and health benefits	
Bhut Jolokia (Capsicum chinense) Ghost Pepper International recognition- hottest chili in the Guinness World Records in 2007.	Commonly known as Bhut Jolokia / Raja Mircha, Bih Jolokia or Kordoi Hira (Assam), Umorok (Manipur), King Chilli or Naga Jolokia (Nagaland), this chili is among the world's hottest peppers and Often used in very small quantities due to its extreme pungency. It is Primary source of spicy taste in many dishes, chutneys, pickles, has Antioxidant properties as is used as digestive aid if used in moderation. Naga Chutney, Hmarcha Rawt (Mizoram). Its cultural prominence has made it pivotal in regional identities. It is locally Added to curries, pickles, chutneys, and stews in Assam, Nagaland, and other states for intense heat and flavour. Traditionally regarded as a digestive stimulant, believed to help with metabolism and circulation, high capsaicin content is associated with anti-inflammatory effects in recent studies of chili bioactives. In culinary practice, Bhut Jolokia is used sparingly in chutneys, smoked meat curries, pickles, and fermented condiments. Phytochemical analyses reveal presence of Dihydrocapsaicin, Carotenoids, Flavonoids and extremely high capsaicin content. Capsaicin exhibits analgesic, anti-inflammatory, and metabolism-stimulating properties contributing to both its intense heat and antimicrobial

	properties (Meghvansi et al., 2010). Its Geographical Indication (GI) status further reinforces its regional identity and economic importance.
Lakadong Turmeric (Curcuma longa)	Lakadong turmeric, cultivated primarily in Meghalaya's Jaintia Hills, is renowned for its high curcumin content (often 6–8%), exceeding that of conventional turmeric varieties. While not exclusive to one species, local variants such as Ing Makhir Ginger are recognised in parts of Northeast India for their distinct aromatic flavour and use in chutneys and meat preparations. Its Phytochemical constituents consist of essential oils, Demethoxycurcumin and high curcumin content, used in curries and stews for flavour and deep golden color. Curcumin is widely recognized for its anti-inflammatory, Wound healing, Digestive disorders, Joint pain and antioxidant properties (El-Saadony et al., 2023). Curcumin is widely documented for anti-inflammatory and antioxidant properties, supporting traditional use for joint discomfort, liver ailments, skin glow, digestive issues, and overall wellness. Curcumin is widely reported to possess antioxidants, anti-inflammatory, anticancer, and hepatoprotective properties (Prasad & Aggarwal, 2011). In local cuisine, Lakadong turmeric provides color, earthy flavor, and medicinal value to rice dishes, soups, and curries. Scientific reviews indicate potential applications in chronic inflammation management, metabolic disorders, and immune modulation (El-Saadony et al., 2023). Its increasing demand highlights its potential for agro-economic development.
Zanthoxylum acanthopodium (Indian Prickly Ash) Wild Pepper / Timur / Andaliman	Known locally as Ganyā (Nagaland), Jaiur (Khasi), and Iaiur (Pnar), this aromatic spice produces a citrusy, tingling sensation is like Sichuan pepper. It is used in meat preparations and chutneys across tribal communities. The dried seed pericarps are used as a spice in regional dishes for their citrusy aroma and mild numbing sensation. Traditionally employed as a digestive aid and for managing mild infections and stomachache; studies indicate antioxidative, antifungal, anti-inflammatory, antiviral, antimicrobial and larvicidal activities of its essential oils, Limonene, Linalool and Alkaloids suggesting broad ethnomedicinal applications beyond simple flavoring (Lalthanpuii et al., 2022). Although less studied compared to turmeric and chili, species of Zanthoxylum are known to contain essential oils and bioactive alkaloids with antimicrobial properties (Huidrom et al., 2025). The spice contributes a unique sensory dimension to Northeastern cuisine, characterized by its numbing-citrus flavor.
Fermented Bamboo Shoots	Local names for fermented bamboo shoot products are Soibum, Soidon, Soijim (Manipur), Bastangapani (Nagaland), Ekhung & Hirring (Arunachal Pradesh), Lung-Siej (Meghalaya) as staple flavoring agents. The fermentation process enhances nutritional bioavailability and introduces beneficial lactic acid bacteria (Basumatary et al., 2017). Other locally recognised ingredients include Perilla seeds (Meitei: Thoiding), which are roasted and used in Manipuri salads or chutney mixes like Singju, imparting nutty flavours. These shoots are commonly used in pork curries, fish stews, and vegetable dishes. Research indicates improved protein digestibility and probiotic potential, reinforcing the

	integration of culinary and health traditions.
Perilla seeds, Perilla frutescens (Thoiding)	Food and medicine often overlap in traditional knowledge, where flavoring agents also carry digestive, anti-inflammatory, antimicrobial, and antioxidant properties recognized by local cultures and increasingly validated by scientific research. Perilla seeds (Bhangjeera) known as Thoiding in Manipur, Nutty flavour and are roasted and ground into chutneys and salads such as Singju. The seeds are rich in alpha-linolenic acid (omega-3 fatty acids) and possess antioxidant properties. Although global research recognizes perilla's nutritional significance, region-specific agronomic and nutritional studies remain limited, traditional its believed that it helps in respiratory and digestive support, though specific research is limited.
Houttuynia cordata (Toningkhok)	Locally called Toningkhok in Manipur and Masundori in Assam, this herb is used in raw salads and chutneys. Studies report antimicrobial, anti-inflammatory, and antiviral activities associated with its flavonoid content.Its pungent, slightly fishy aroma distinguishes it as a culturally specific flavoring herb. One of the most sustainable aspects of Northeast India's unique cuisine is its eco-friendly cooking methods. Tribal communities often cook in bamboo tubes, steam food in leaves, and use earthen pots that conserve both nutrients and energy. Smoking and drying meat and fish over open fires allows preservation without refrigeration. These time-tested techniques are not only sustainable but also ideal for a health-conscious audience. As organic lifestyles trend globally, Northeast India's food ethos offers inspiration.
Garcinia pedunculata (Amlavetasa / Bor Thekera)	Ripe fruits are eaten raw or cooked; sun-dried slices are used as a souring spice in fish curries and other dishes in Assam. The Phytochemical Constituents include Hydroxycitric acid, Xanthones, Benzophenones and Flavonoids. Traditional use includes treatment of gastro-intestinal ailments (e.g., dysentery, diarrhea), cough, asthma, bronchitis, and fever. Research of (Islam et al., 2021) highlights antioxidant, anti-inflammatory, antimicrobial, hypolipidemic, cardioprotective, and hepatoprotective properties of processed fruit extracts, supporting its use beyond culinary applications. Research indicates that G. pedunculata extracts exhibit antioxidant, hepatoprotective, hypolipidemic, and antimicrobial effects, supporting its use beyond flavoring to therapeutic applications (Islam et al., 2021).
Garcinia lanceifolia (Rupohi Thekera / Kon Thekera)	It is commonly called as Rupohi Thekera, Kon Thekera (Assam); Chengkek (Mizo); Thisuru (Garo); Dieng-soh-jadu (Khasi). Used in local pickles and sometimes in curries for souring. Traditionally used by ethnic communities for dysentery, dyspepsia, biliousness and general Gastrointestinal disorders. Studies on related species also suggest antibacterial activity, aligning with traditional usage for digestive health. Extracts show antibacterial activity against selected pathogens (Sharma Bora et al., 2014).
Fermented bamboo shoots	Sour flavouring agent; traditionally believed to aid digestion and nutrient absorption.
Fermented soybean (Axone/Akhuni):	Axone/Akhuni) is used as flavour enhancers and believed to support gut health due to fermentation processes.
Bird's eye chili,	It is also known as Thai chili, is a small but extremely spicy pepper

	widely used in Noth eastern cooking. belongs to the species Capsicum annuum and is Rich in vitamins C, A, and E. it is known for enhanced metabolism, pain relief, improved digestion, anti-inflammatory effects and other health benefits. Digestive aids like wild pepper and sour fruits support traditional approaches to gastrointestinal health.
Nadia ginger	Its an organic ginger of Assam and Meghalaya known for its robust flavor and strong medicinal properties. Nadia ginger has high essential oil and has rich and pungent aroma. It is rich in gingerol, packed with antioxidants, vitamins, and essential oils which helps in digestion, prevents dyspepsia, reduces nausea, relieves muscle pain, promotes heart health and has anti-inflammatory characteristics. In north east, Ginger is used as a Flavoring agent in curries, stews, chutneys Ginger Dal (Monsoon dish), Amrusu (Naga chicken dish)
Black Pepper	Spicy taste, seasoning in various dishes Stimulates digestion, improves nutrient absorption (esp. curcumin), anti-inflammatory (Arunachal chicken dish), Misa Mach Poora (Mizoram shrimp)
Fiddlehead Ferns (Dhekia Xaak)	Fiddlehead Ferns (Dhekia Xaak) Stir-fries, curries, chutneys, salads Rich in vitamins A & C, iron, dietary fiber; supports immunity & digestion Dhekia Xaak Bhaji (Assam), Dalle chutney (Sikkim)
Taro (Kosu)	Boiled, fried, added to dahl/meat dishes; leaves, petioles, corms used Rich in nutrients; Hinkejvu (Naga staple) uses Colocasia roots Kosu thuror pitika (Assam)
Khamti Lahi Rice-	'Khamti Lahi' rice is a strongly scented sticky rice variety grown by traditional Khampti tribal farmers in Namsai region. It is reserved for religious/special occasions and has high medicinal properties. Generally eaten as steamed rice and used to prepare tupula vat by the Tai Khamti and Missing tribes of Assam during festivals and special occasions.
Kola sawl	It was known as Kola sawl by Assamese people. There are three distinct tribes in Meghalaya, each giving it a unique name. The Garo tribe called it Mi-gisim, while the Khasi and Jaintia tribes called it Ja-iong. Kola Bora is black and is a unique variety of waxy rice. It is an Assamese breakfast cereal (Jolpan) and is also used for the preparation of kheers and pithas The layer is deep purple due to the presence of anthocyanins. Black rice bran contains one of the highest quantities of anthocyanins, a type of Antioxidant, in the diet. (Wahengbam et al., 2015) Among all rice genotypes, black rice has the highest level of bioactive components. It has higher Total phenolic content, total flavonoid content, total anthocyanin content, fiber, and minerals than white rice. (Liu et al., 2020) Its iron content is rich (Ito & Lacerda, 2019) enough to avoid anemia if consumed as a part of an iron-rich diet (Kumar, 2020).

The North eastern region is familiar for plant diversity and endemic species biodiversity and provides a wide array of imperative medicinal plants used in culinary preparations. They are also broadly used as herbal medicine (bon-oukhodi) in local healing by Traditional healers who possess extensive knowledge of these plants to inherently link health and well-being. Ingredients are selected based on centuries of empirical observation considering both taste and therapeutic properties E.g. Illicium griffithii (Star Anise), Aconitum feorx (Indian Aconite), Swertia chiryata (Chirayita), and Coptis teeta (Mishmi teeta/Gold thread). Others are the distinctive fish mint (Houttuynia cordata), Naga Basil, and Laksa leaves. There are also innumerable wild herbs, Foraged greens, fresh river fish, Various wild meats and snails are prevalent in the diet. The prevalent use of native herbs and searched ingredients indicate profound ethnobotanical knowledge. This approach embodies the ancient philosophy, "Let food be thy medicine and medicine be thy food". It highlights the self-sufficiency

and profound connection of these communities to their natural environment.

Experienced community members recognize, understand various wild varieties of plants and their specific medicinal properties. The elderly men and women of the community skillfully choose specific plants to extract the best flavors and therapeutic benefits to dishes. Beyond extensive use of wild herbs, commonly used culinary ingredients also possess recognized medicinal properties. Spices like turmeric (containing curcumin) and phenolic-rich fruits which have antioxidants and anti-inflammatory characteristics are traditionally used against inflammation and infection. Ginger is widely known for its ability to aid digestion, prevent dyspepsia, and alleviate nausea. It is also used for various ailments including stomach ulcers and liver issues. Black pepper is called king of spices as it boosts flavor but also improves the absorption of essential nutrients. Even specific rice varieties from Arunachal Pradesh have high medicinal properties, e.g. Khamti Lahi sticky rice.

Challenges and Research Gaps

The region has varied terrain ranges which influences the availability of ingredients and restricts the propagation of culinary practices of one region to the other region. Despite growing interest, tribal cuisine faces challenges. Urban migration, loss of oral traditions, and limited documentation threaten its survival. Ingredients like wild herbs and fermented fish are hard to source outside the region, and younger generations may not learn traditional cooking methods. To preserve this heritage, NGOs and cultural organizations are working with tribal communities to record recipes, train chefs, and promote sustainable farming. Efforts are also underway to create GI tags for indigenous ingredients and dishes, protecting their authenticity and origin. Preservation of native knowledge combined with scientific validation can support sustainable development. Despite efforts towards findings, limitations found are:-Lack of longitudinal study and inadequacy in agronomic data, Limited profiling of some lesser-known herbs used by specific Tribes and communities, Need for sustainable commercialization models.

Final recommendations: -

In recent years, tribal cuisine has gained visibility through food festivals, documentaries, and culinary tourism. Chefs and food entrepreneurs from the Northeast are opening restaurants in metro cities, offering curated menus that introduce diners to tribal flavors. Social media has played a key role in this revival. Instagram reels, YouTube channels, and food blogs are documenting recipes, ingredients, and cooking methods, making them accessible to wider audiences. Government initiatives like the North East Food Show and Tribal Food Fairs are promoting indigenous food systems, while culinary schools are beginning to include tribal cooking in their curricula. Northeastern India's Rare herbs and spices are used for flavoring as well as for therapeutic remedies. Scientific validation supports several traditional claims and ethnobotanical heritage. Species like Bhut Jolokia, Lakadong turmeric, Zanthoxylum, fermented bamboo shoots, Perilla, and Houttuynia cordataare used as antioxidant, antimicrobial, and anti-inflammatory. The demand for Northeast Indian dishes is rising. Cities like Delhi, Mumbai, and Bangalore now host restaurants that serve authentic meals from the region. Establishments such as Rosang Café and Dzukou Tribal Kitchen offer menus full of smoked pork, bamboo shoot stew, and rice beer. Globally, chefs from the region are gaining recognition. Culinary influencers are spotlighting the health benefits and sustainable elements of these diets. From pop-up events in New York to tribal food festivals in Europe, the appeal is growing. Occasionally, people report "disgust and lack of acceptance" towards certain Northeast Indian dishes. This is particularly true for those featuring bamboo shoots, fermented soybeans, or dried fish, due to their unique aromas. These reactions further underscore this divergence. However, many claims are based on traditional knowledge and preliminary studies; further controlled clinical research is needed to validate therapeutic effects and determine safe usage thresholds. Future interdisciplinary research integrating ethnobotany, phytochemistry, and clinical pharmacology is recommended. Future interdisciplinary collaboration of ethnobotanists, food scientists, and agricultural economists

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