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Review: Ethno-mycological perception towards wood ear fungi (*Auricularia* spp.) in and around the Indian Subcontinent

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Abstract. *Giri S, Paul P, Pradhan P. 2025. Review: Ethno-mycological perception towards wood ear fungi (*Auricularia *spp.) in and around the Indian Subcontinent. Asian J For 9: 82-96.* The genus *Auricularia*, commonly called wood ear fungi, is a notable group of basidiomycetes valued for their culinary, medicinal, and nutraceutical properties. These fungi, widely distributed across tropical, subtropical, and temperate regions, play a crucial ecological role as saprophytes and potential plant parasites. Domesticated for over 2,000 years in East Asia, *Auricularia* spp. has been integral to traditional Chinese medicine, treating ailments such as sore throats, ophthalmia, and staphylococcal infections. Their bioactive compounds exhibit antiviral, antibacterial, antiparasitic, and immune-enhancing properties, with *Auricularia auricula-judae* is notable for its lovastatin content, beneficial in managing hypercholesterolemia. In the Indian subcontinent, *Auricularia* spp. hold significant ethnomycological value, particularly among indigenous communities in the Northeastern states, as well as in Bhutan and Nepal. However, their usage varies, with communities of Tibeto-Burman language family integrating them deeply into culinary and medicinal practices, while communities of Austro-Asiatic language family remain less familiar. This disparity in use is influenced by factors such as cultural practices, availability, and the transmission of traditional knowledge. Despite their economic potential, commercial cultivation in the region is underdeveloped, contrasting with China's dominance in global *Auricularia* production. With improved cultivation techniques, awareness, and market strategies, these fungi could bolster rural economies. The present review explores the ethno-mycological perception towards the genus *Auricularia* in and around the Indian sub-continent, highlighting their cultural, medicinal, and economic significance.

Keywords: Basidiomycetes, culinary practice, folk medicine, non-timber forest products, subsistence

INTRODUCTION

Mycophily has been integral to human culture since prehistoric times. The spore-producing fruitbodies of Basidiomycetes and Ascomycetes have enchanted humans through their beauty and various values based on their aesthetic, culinary, monetary, and nutraceutical properties (Giri et al. 2012a, 2013). Macrofungi or mushrooms, especially wild ones, are prized non-timber forest products (NTFPs), and they have been used across the globe by mycophilic societies (Jones et al. 1994).

The genus *Auricularia* a typical member of the family Auriculariaceae, is found in almost all terrestrial ecosystems except alpine regions (Wang et al. 2016; Wu et al. 2015, 2021). Auriculariales has 13 species documented for human use, of which, 10 are consumed by humans, and four have medicinal value (Boa 2004). *Auricularia mesenterica* (Dicks.) Pers. (Wu et al. 2014), and *A. auricula-judae* (Bull.) Quél., have been treated as a species complex (Wu et al. 2015). *Auricularia* grows upon diverse substrate types as saprophytes and plays crucial role in the forest ecosystem by degrading dead trees, fallen trunks, and rotten branches (Dai and Bau 2007; Baldrian and Lindahl 2011; Priya et al. 2016). The basidiocarps of *Auricularia* are generally called wood ear fungus due to their resemblance to the human ear, and they hold mythological significance linked to Judas (Choudhury and Sarma 2014; Kejariwal 2023). Members of *Auricularia* exhibit considerable morphological plasticity, partly because they lack distinct identifying features (Wong and Wells 1987). Additionally, some species show seasonal color variations (Choudhury and Sarma 2014). To aid in the identification of *Auricularia* species, González-Colón and Maldonado-Ramírez (2017) developed a comprehensive data sheet. Beyond morphological traits, species boundaries have been delineated through phylogenetic analyses. Studies by Malysheva and Bulakh (2014), Wu et al. (2015), Bandara et al. (2015, 2017) have refined the classification within this genus through combination of rpb2 and ITS sequence data. Basidiocarps of *Auricularia* species are recognized as low-calorie dietary options and rich in biologically active polysaccharides and essential amino acids. They provide essential minerals such as iron, calcium, potassium, and zinc (Kadnikova et al. 2015). Notably, wild *A. auricula-judae* has the highest magnesium content (2,014 mg/kg) among wild mushrooms (Shin et al. 2007). The species also contain about 30% protein by dry weight and serve as a key source of vitamins (Chang and Miles 2004). Polysaccharides from *Auricularia* are known to inhibit hepatocellular carcinoma proliferation, promote apoptosis,

and restrict cell migration (Shan et al. 2017). They also possess antiviral, antimicrobial, antiparasitic, and blood pressure-regulating components (Ukai et al. 1983; Yang et al. 2005; Giri et al. 2012b), help regulate intestinal flora (Zhang et al. 2020), may slow aging (Xu et al. 2016; Qian et al. 2020), and enhance the immune system (Bao et al. 2020).

In Chinese traditional medicine, *Auricularia* species find topical usage for sore throat, ophthalmia, staphylococcal infections, tonsillitis, atherosclerosis, hemorrhoids, and laryngocele (Hall et al. 2003; Kadnikova et al. 2015). They are also recognized as substances that prevent thrombosis (Yoon et al. 2003) and reduce cytotoxicity (Oke and Aslim 2011). *Auricularia auricula-judae* is notable for its high lovastatin content, which suppresses the activity of 3-hydroxy-3-methyl-glutaryl coenzyme A reductase, beneficial for hypercholesterolemia (Pushpa et al. 2016). However, *A. polytricha* contains soluble oxalates, and those prone to hyperoxaluria or kidney stones should avoid it (Nile and Park 2014).

Auricularia, despite being cosmopolitan plant saprophytes, and possibly plant parasites, have seen increased domestication, owing to their medicinal potential and nutritional value (Chang and Miles 2004). Ranking fourth among cultivated mushroom groups, they preceded *Agaricus*, *Lentinula*, and *Pleurotus* in significance (Zhang et al. 2017). China dominates global production, contributing 90% of the total output. In 2018, China produced 674,000 tons of *Auricularia*, generating 37.46 billion yuan (5.13 billion USD) in revenue and 6.15 billion yuan (0.84 billion USD) from exports (Li and Bi 2021). Exports primarily go to Japan and South-East Asia, with a steady annual growth rate of 3.96% up to 2020 (Wang et al. 2022a). While *Auricularia* species are reported as edible in 24 countries, their recognition for food value is noted in at least 10 countries, including East Asian nations, Korea, Japan, and parts of Africa (Boa 2004). This review explores the ethno-mycological perception towards genus *Auricularia* in and around the Indian subcontinent.

ETHNOMYCOLOGICAL PERSPECTIVES OF *Auricularia* spp. AROUND INDIAN SUB-CONTINENT

Auricularia species have a deep-rooted significance across various cultures, serving as a vital component in both culinary and medicinal practices. Historically, the Chinese pioneered the collection and artificial cultivation of wild *Auricularia* dating back to 300-600 BC, with its culinary use documented since 600 AD (Cheng and Tu 1978; Chang 1993). These mushrooms have been intricately linked to cultural practices, being consumed as a delicacy, used in traditional medicine, and appreciated for their nutritional benefits.

In countries such as China, Japan, and the Philippines, *Auricularia* spp. are highly valued for their texture and taste, making them a staple in local cuisines. In China, *Auricularia heimuer* (黑木耳-hēimù'ěr) and *A. cornea* (毛木耳-máomù'ěr) are commercially cultivated, contributing to a market value of approximately US$4 billion annually (Wang et al. 2022b). Similarly, *Auricularia auricula-judae* and *A. polytricha*, collectively known as *kikurage* are integral to various dishes in Japan, although domestic production only meets 8.4% of the demand, with the rest imported from China (Tabuchi et al. 2021). Indigenous communities in the Philippines, such as the Aeta and Gaddang, consume *A. auricula-judae* and *A. polytricha*, known locally as *kuwat malabalugbogdagis* and *taingang daga* (De Leon et al. 2012; Lazo et al. 2015). Tibetan communities also utilize (du: na ~~z~~u [*na ju*]) as food (Winkler 2008; Kang et al. 2016). In Thailand, *Auricularia* species are traditionally consumed and are locally known as *hed hoo noo* (Jones et al. 1994). In Malaysia, these species are recognized by several vernacular names, including *cendawan memeh*, *cendawan telinga kera*, and *kulat telinga* (Chang and Lee 2004; Shin et al. 2007; Abd Razak et al. 2013), highlighting the regional significance of *Auricularia* in myco culinary practices.

Auricularia spp. have also been recognized for their medicinal properties, particularly in Korea and Europe. Korean traditional medicine acknowledges the therapeutic benefits of *A. auricula-judae*, as documented in 'Dong Yi Bao Jian' by Heo Jun in 1613. In Europe, these mushrooms have been used for disease prevention since the 18th and 19th centuries (Berch et al. 2007; Sekara et al. 2015; Yao et al. 2019). In many regions, *Auricularia* spp. serve as an important food commodity. In Indonesia, the Pamona community uses *Auricularia* spp. viz. *jamur kuping*, *tanggorugoru*, *talinga mbalesu* for both culinary and medicinal purposes (Yusran et al. 2024). In Tanzania, these mushrooms are referred to as *uyoga hindi* and are widely consumed (Härkönen 2002). Additionally, in Kenya, *Auricularia delicata* and *A. polytricha* are harvested for food and medicine (Onyango et al. 2016). The Gbagyi people of Nigeria consume *A. auricula-judae*, locally known as *kpunbwa munu* (Oso 1975; Kelly et al. 2015). *Huntsul* in Ethiopia (Sitotaw et al. 2020) and *Kpunbwa munu* in Nigeria (Oso 1975; Kelly et al. 2015) refer to edible species of *Auricularia*.

Auricularia spp. have gained appreciation worldwide, with their use documented in diverse regions including Fiji, Peru, and Brazil. In Fiji, these species are considered edible, while in Peru and Brazil, *Auricularia fuscosuccinea* and *A. delicata* are integral to local diets (Prance 1984; Remotti and Colan 1990; Obodai and Apetorgbor 2001). Furthermore, their historical significance is noted in early Hawaiian culture, with exports to San Francisco recorded during the end of 1800s (Schenck and Dudley 1999).

The use of *Auricularia* spp. across different cultures showcases a trend towards their dual role as both a food source and a medicinal resource (Table 1). They are commonly incorporated into traditional dishes for their unique texture and nutritional benefits. The mushrooms are often dried and preserved, ensuring their availability during off-seasons. Medicinally, they are valued for their health benefits, with historical texts and modern studies highlighting their role in disease prevention and overall well-being. Their widespread cultivation and commercialization, particularly in China, highlight their economic importance, making them a significant commodity in global markets.

Table 1. Ethnomycological utilization of *Auricularia* spp. around Indian subcontinent

Region/country	Species of *Auricularia* utilized	Uses	Reference(s)
China	*Auricularia heimuer, Auricularia cornea*	Food	Cheng and Tu (1978); Chang (1993); Wang et al. (2022b)
Korea	*Auricularia auricula-judae*	Medicines	Heo (1613)
Europe	*Auricularia* spp.	Medicines	Sekara et al. (2015); Berch et al. (2007); Yao et al. (2019)
Tibet	*Auricularia auricula-judae*	Food	Winkler (2008); Kang et al. (2016)
Japan	*Auricularia polytricha, Auricularia auricula-judae*	Food	Tabuchi et al. (2021)
Philippines	*Auricularia auricula-judae, Auricularia fuscosuccinea, Auricularia polytricha*	Food	De Leon et al. (2012); Lazo et al. (2015); Corazon and Licyayo (2018)
Indonesia	*Auricularia auricula-judae, Auricularia nigricans*	Food, medicines	Burkhill (1935); Irawati et al. (2012); Yusran et al. (2024)
Malaysia	*Auricularia* spp.	Food	Chang and Lee (2004); Abd Razak et al. (2013); Shin et al. (2007)
Vietnam	*Auricularia* spp.	Food	Boa (2004)
Thailand	*Auricularia* spp.	Food	Jones et al. (1994)
Tanzania	*Auricularia polytricha, Auricularia fuscosuccinea, Auricularia delicata*	Food	Härkönen et al. (1994); Härkönen (2002); Juma et al. (2016)
Kenya	*Auricularia delicata, Auricularia polytricha*	Food, medicines	Onyango et al. (2016)
Bénin and Togo	*Auricularia cornea*	Food	Boa (2004); Osarenkhoe et al. (2014)
Nigeria	*Auricularia auricula-judae*	Food	Oso (1975); Kelly et al. (2015)
Ethiopia	*Auricularia* spp.	Food	Sitotaw et al. (2020)
Democratic Republic of Congo	*Auricularia cornea, Auricularia delicata, Auricularia polytricha, Auricularia tenuis,*	Food	Rammeloo and Walleyn (1993); Milenge Kamalebo et al. (2018)
Burundi and Rwanda	*Auricularia delicata, Auricularia auricula-judae*	Food	Degreef et al. (2016)
Ghana	*Auricularia auricula-judae*	Medicines	Obodai and Apetorgbor (2001)
Mozambique	*Auricularia auricula-judae*	Food	Wilson et al. (1989)
Malawi	*Auricularia auricula-judae, Auricularia delicata*	Food	Rammeloo and Walleyn (1993)
Chile	*Auricularia auricula-judae, Auricularia polytricha*	Food	FAO (1998)
Madagascar	*Auricularia auricula-judae*	Food	Bouriquet (1970)
Mexico	*Auricularia delicata, Auricularia fuscosuccinea, Auricularia mesenterica, Auricularia polytricha*	Food	Boa (2004); Villarreal and Perez-Moreno (1989)
Peru	*Auricularia delicata, Auricularia fuscosuccinea*	Food	Remotti and Colan (1990)
Guatemala	*Auricularia delicata*	Food	Flores (2002)
Brazil	*Auricularia fuscosuccinea*	Food	Prance (1984)
Fiji	*Auricularia* spp.	Food	Obodai and Apetorgbor (2001)
New Zealand	*Auricularia* spp.	Export	Stamets (2003)

ETHNOMYCOLOGICAL PERSPECTIVES OF *Auricularia* spp. IN THE INDIAN SUBCONTINENT

Globally, over 2189 macrofungi species of macrofungi have been identified as edible (Rai et al. 2005; Li et al. 2021), out of which about 283 are available in India (Purkayastha and Chandra 1985), apart from 100 medicinal fungi (Debnath et al. 2019). The Indian subcontinent has a special reservoir for ethnomycology as evidenced by records of mushroom utility in ancient medical treatise, Charaka Samhita (Thatoi and Singdevsachan 2014). Though India has rich macrofungal diversity, most traditional knowledge about mushrooms has been suggested to come from Northeastern countries like China, Japan, Korea, and Russia (Karwa and Rai 2010).

In India, *Auricularia* spp. is collected and consumed in many Northeastern states (Sharma and Kumar 2011). They are reportedly consumed in Western Assam by Garos, Bodos, Adivashis, and Rajbangshi. Garo people also use *A. auricula-judae* to cure ailments like rheumatic pain and minor injuries (Sarma et al. 2010). *Auricularia auricula-judae* is reported to be utilized by the Bodo and Kachari communities inhabiting the buffer region of the Nameri National Park, Assam (Choudhury and Sarma 2014). In Nameri National Park, fruitbodies of *A. auricula-judae* are mostly collected by elder women after taking necessary precautions to be fit for consumption. The fruitbodies are used in soups and salads, along with other ingredients. Medicinal values and practice of *A. auricula-judae* adjoining the localities of Nameri National Park include their use in the treatment of eye irritation, and cold, as a tonic along with ginger and basil leaves in sore throat after proper sterilization by moist stream for several hours and treatment of jaundice along with hot water (Choudhury and Sarma 2014). *Auricularia auricula-judae* is among the mushrooms consumed by the people of Ultapani Reserve Forest, within Manas Biosphere Reserve (Paul et al. 2015). *Auricularia delicata* is considered edible in the mycophagic tradition of Garos and Bodos in Western Assam and this mushroom also finds use to stop bleeding in local traditional healing practices (Sarma et al. 2010).

Auricularia delicata (Mont. ex Fr.) Henn. (called *ozenabi* by Mao subtribe of Naga; *yaonupa* by Poumei subtribe of Naga; *sonabi* by Naga, *uchina* by Meitei, *shiokhanavar* by Tangkhul tribe of Naga, *pachop* by Kuki community of Manipur and generally referred in Ima markets of Imphal as *uchi-na*) are consumed by the respective tribes. The Tangkhul tribe of Naga uses *A. polytrica* as food. They eat the fungi either fried or cooked with pulses. The price of the fungi ranges from Rs. 50-70 (USD 0.58-0.81) in the local market of Ukhrul District, Manipur (Salam and Jamir 2018). In the Thadou tribe of the Kuki community, *Auricularia delicata* is commonly referred to as *pachop*, which is also used to denote *A. auricula-judae* (Singson et al. 2015). Despite extensive ethnomycological research on other tribes in Manipur, the Thadou tribe has been less studied, with the notable report by Singson et al. (2015) highlighting that *A. auricula-judae* and *Schizophyllum commune* are the primary mushrooms utilized by them. In Manipur, mushrooms are typically prepared by frying them (fresh or dried) with soaked peas, mentha, and potatoes. They fetch a price of Rs. 20-30 per kilogram in the Ima market (Srivastav et al. 2009; Devi et al. 2010; Pfoze et al. 2011). However, *Auricularia delicata* commands a higher price in markets of Mao Gate, Senapati, Kangpokpi, and Motbung in Senapati District, where collectors sell it for an average of Rs. 338 (USD 3.90) per kilogram and vendors for Rs. 470 (USD 5.42) per kilogram (Pfoze et al. 2012). This price discrepancy reflects the high demand and value of *A. delicata* in these regions.

The tribes of Nagaland, including Ao, Angami, Chakhesang, Chang, Khemungan, Konyak, Lotha, Pachury, Phom, Rengma, Sangtam, Sema, Yimchunger, and Zeliang, residing in and around forested regions such as Lahorijan, Puliebzie, Zakhama, Pherma, Mankoi, Chungtia, Nongkham, Namcha, and Tigit, are known to consume *Auricularia auricula-judae* and utilize it for medicinal purposes (Kumar et al. 2013). Ao et al. (2016) also noted the sale of dried *A. auricula-judae* alongside other wild edible mushrooms in markets across Mokokchung, Zunheboto, Kohima, Tuensang, Phek, and Wokha. These mushrooms are sold throughout the year, depending on the availability of local stocks.

Interestingly, the Ao tribe of Mokokchung District in Nagaland has been reported to prioritize the medicinal use of *A. auricula-judae* over its consumption as food (Kumar et al. 2014). Meanwhile, in the Kohima district, locals consume a variety of wild mushrooms, including *Agaricus* spp., *Auricularia delicata*, *Calvatia gigantea*, *Lentinus* spp., *Lycoperdon* sp., *Pleurotus* spp., *Termitomyces eurrhizus*, and *Tricholoma* spp. as part of their diet (Tanti et al. 2011). In the same study, *Schizophyllum commune*, a mushroom that grows year-round, was reported to sell for approximately Rs. 300 per kilogram in local markets, while no mention was made of the marketing of *A. delicata*.

In Meghalaya, the Khasi tribe has a history of extensive wild mushrooms utilization in subsistence and traditional systems of health (Das et al. 2014). However, with growing urbanization, and changes in the food habits accruing due to it, the ancient tradition of gathering and consuming wild mushrooms by the local Khasi tribals is slowly on the decline (Agrahar-Murugkar and Subbulakshmi 2005). In Meghalaya, various wild edible mushrooms are collected and consumed by the Khasi and Jaintia tribes living in regions such as Jingkiengmawkdok, Lapalang, Mawlai, Mawphlang, Mawsmai, Shillong Peak, Shyrwat, and Upper Shillong Reserve Forests. Notable species include *Agaricus bisporus* (locally called *tit bol*), *Albatrellus ellisii*, *Armillaria mellea*, *Boletus edulis*, *Calvatia gigantea*, *Cantharellus cibarius* (locally called *tit khang paipylleng*), *Clavaria flava* (locally called *tit thynatsyiar*), *Clavulina cinerea*, *Clavulina cristata*, *Gomphus floccosus*, *Inocybe* aff. *sphaerospora*, *Laccaria laccata*, *Lactarius* spp. (locally called *tit doh* or *tit tung*), *Lentinus edodes*, *Ramaria* spp. (locally called *tit lbonghati*), *Russula* spp., *Suillus bovinus*, and *Tricholoma viridiolivaceum*. These mushrooms are not only consumed locally but are also marketed, reflecting their importance in local diets and economies, as documented by various studies (Agrahar-Murugkar and Subbulakshmi 2005; Khaund and Joshi 2013, 2014; Das et al. 2014; Kalita et al. 2016). Despite the rich diversity of mushrooms utilized and marketed in these areas, research indicates that *Auricularia* spp. are not among the mushrooms commonly used or sold by these tribes. Although *A. delicata* has been reported in Meghalaya (Kumar et al. 2015), it is not a significant part of the local mushroom economy or cuisine in the region.

In Arunachal Pradesh, the Garo tribe collects mushrooms for their own consumption and selling in the market. They primarily collect *Auricularia auricula-judae*, *A. delicata*, and *A. polytricha*. *Auricularia delicata* is locally called *imbuk*, and *A. polytricha* is called *takek marek* in the Garo language (Singh et al. 2015). In Mizoram, *Auricularia auricula-judae* is called *pu Vana beng* and is eaten by the local community (Lalrinawmi et al. 2017). In Tripura, a study by Roy Das et al. (2017) documented thirteen edible macrofungi from the local market belonging to eight genera, including *Lentinus* spp., *Pleurotus* spp., and *Termitomyces* spp. However, they did not find evidence of the edibility of *Auricularia* in Tripura. In Sikkim the *Auricularia cornea* is locally called *kane chyau* or *namcho shamo*, is edible however it is not so liked by the communities for its leathery texture (Das 2010; Wangdi 2019).

In Himachal Pradesh, *Amanita citrina*, *Amatita fulva*, *Laccaria laccata*, *L. pubescens*, *Russula lepida*, *R. mairei* are reported of local culinary use in Mcleodganj (Sharma and Gautam 2015). Similarly, other reported mushrooms of culinary use across the state by Sharma and Gautam (2015) include *Agaricus sylvicola* and *Hygrocybe nivea* from Dharamshala, *Agaricus comtulus* and *Hygrocybe coccinea* from Jhatingri, *Cantharellus cibarius* and *Lepista nuda* from Khajjiar, *Agaricus arvensis* from Shimla, *Agaricus campestris* from Kullu, *Amanita caesarea* from Janjehli, *Conocybe tenera* from Kufri, *Pleurotus cystidiosus* from Palampur, *Lentinus cladopus* from Bhadrol. Savitri and Bhalla (2007) have reported *Humaria hemisphaerica* (locally *kanifru*), *Cantharellus cibarius* (locally *peelichhatri*) and *Ramaria botrytoides* (locally *siun*) to be consumed as vegetable or vegetable curry by tribal

communities of Chamba, Kangra, Kinnaur, Kullu, Mandi areas of the state, and Chauhan et al. (2014) have reported *Agaricus campestris* (locally called *kammu*, *khorpotey*, *shong*), *Gyromitra* sp. (locally called *chianjuh*), *Helvella compressa* (locally called *aayokan*, *maein*), *Hygrophorus* sp. (locally called *rachela*), *Lactarius deliciosus* (*chanmoo*, *jadmoh*, *migang*), *Lycoperdon* sp. (*lalari*, *lalrishal*), *Morchella conica* (*gopal*, *guchhi*), *M. deliciosa* (*gopal*, *guchhi*), *M. esculenta* (*chlango*, *guchhi jamoo*, *shaime*), *Ramaria botrytis* (*mooh*), *Rhizopogon vulgaris* (*khorpatey*, *migang*), *Sparassis crispa* (*aayokan*, *kathmooh*, *mohin*, *moohcho-sho*) to be utilized by the residents (without naming particular tribe) of seventeen villages under Nichar, Kalpa and Poohs of Kinnaur District in Himachal Pradesh. The above studies indicate that there is no tradition of *Auricularia* spp. being utilized by the local tribes and communities, though, studies on antioxidant activity (Puttaraju et al. 2006) and nutritional values (Kumari et al. 2015) of *Auricularia polytricha* collected from Himachal Pradesh have been reported.

Amongst 620 edible plants of Uttarakhand, Shah (2015) has reported several mushrooms like *Agaricus campestris*, *Armillaria mellea*, *Cantharellus cibarius*, *Clavulinopsis fusiformis*, *Craterellus cornucopioides*, *Flammulina velutipes*, *Lactarius deliciosus*, *Lycoperdon pyriforme*, *Morchella esculenta*, *Pleurotus ostreatus*, *Polyporus grammocephalus* as edible from Uttarakhand, however, the book does not have a record of *Auricularia* being utilized in Uttarakhand. *Gymnopilus junonius* is reported for local culinary use in Nainital, Uttarakhand (Sharma and Gautam 2015). In Jaunsar, Chakrata of Dehradun, *Auricularia auricula-judae* (locally known as *kanode* or *kanchatta* = ear mushroom) and *A. polytrica* (locally known as *kanode*) are reported to be consumed by the Nepali community. Additionally, *Auricularia auricula-judae* is reported to be used as a medication for ear pus (Kumar et al. 2017).

Amongst the edible fleshy fungi utilized by the populace of Chunar, Gorakhpur, Varanasi, and Vindhyachal in Eastern Uttar Pradesh, there is no mention of *Auricularia* spp. being utilized in culinary practices (Ram et al. 2010; Chandrawati et al. 2014; Vishwakarma et al. 2017).

The local villagers, Nepalis and Van Gujjar residing in Baniyakund, Chopta, Devariyatal, Kund, Mandal, Nagdev-Jhandidhar, Tungnath Trek, and Ukhimath areas of Garhwal Himalaya are reported by Bhatt et al. (2016) to consume *Amanita hemibapha*, *Boletus edulis*, *Cantharellus cibarius*, *C. minor*, *Craterellus cornucopioides*, *Grifola frondosa*, *Hydnum repandum*, *Lactarius deliciosus*, *L. subindigo*, *Lactifluus hygrophoroides*, *Marasmius oreades*, *Morchella esculenta*, *Russula brevipes*, *R. virescens*, and *Strobilomyces floccopus*. However, the report of Bhatt et al. (2016) does not reflect myco culinary preference of local people towards *Auricularia* spp. and such lack of awareness about edibility of *Auricularia* spp. in Garhwal Himalaya has also been hinted by Semwal et al. (2014). Amongst the reported mushrooms used for medicinal purposes globally, which are available in Garhwal Himalaya like *Agaricus campestris*, *Cantharellus cibarius*, *Coprinus comatus*, *Ganoderma lucidum*, *Hydnum repandum*, *Morchella exculenta* (Vishwakarma et al. 2011), there is no mention of *Auricularia* spp.

However, Tibetan refugees (Tibeto-Burman Population) living in Garhwal Himalaya are reported to consume locally occurring *Auricularia auricula-judae* and *A. polytricha* who refer to these mushrooms as Muro (Semwal et al. 2014). The Tibetans use to collect the species from the wild and consume it fresh and dried as well. The Tibetan culinary culture, dried fungi are commonly prepared by a method that involves 10-20 minutes soaking in hot water, followed by frying process that includes onions and additional ingredients (Semwal et al. 2014).

According to Pala et al. (2013), *Auricularia auricula-judae* (locally called *rudh papad*) grows gregariously upon Walnut trees and black locust trees in Chadoora, Hirpora, Keller, and Shopian areas of Kashmir and are recommended by local herbalists as remedial food for patients with cold, hypertension, jaundice, sore throat, sore eyes, and as astringent. Female and child members of the Gaddi and Shippi tribes of Jammu and Kashmir are reported to collect *Auricularia* spp. along with other mushrooms like morels for consumption (Choudhary et al. 2015). In Jammu Province of Jammu and Kashmir, many mushrooms like *Coprinus comatus*, *Geopora arenicola*, *Inocybe splendens*, *Ramaria* spp., *Sparassis crispa*, *Termitomyces striatus* are consumed by locals (Kumar and Sharma 2009; Sharma and Gautam 2015). However, the said report does not enlist *Auricularia* spp.

West Bengal has reports of 31 edible mushrooms utilized by indigenous communities as food (Dutta and Acharya 2014). Amongst these people from the Himalayan Hill region of West Bengal, especially the Kalimpong subdivision (as far as Lava-Lolaygaon) of the Darjeeling district are known to consume *Auricularia auricula-judae* (Dutta and Acharya 2014). Locally called *kane* or *baje kane chiyaou* or *kan chatka* [*kaan*=Ear, *chiau*=Mushroom in Nepali], the local collectors use to collect fruitbodies of *Auricularia* spp., from the wild, sun dry and sell in the local haat bazaar (market) in Kalimpong, fetching as much as INR 1,200/kg or 13.86 USD/kg, especially during marriage season.

Although local collections of *Auricularia* are reportedly marketed in Darjeeling town (Acharya et al. 2004) and are used in Tibetan dishes like *shapta*, *shaptak* or *thenthuk* (Figure 1), which includes meat pieces and hot water-soaked local vermicelli made from rice, known as *fing* in a soupy base, which is available in Tibetan restaurants in Darjeeling and Kalimpong, it is noteworthy that many residents of Darjeeling town are unaware of their edibility. However, locals do consume other myco-commodities, such as the cultivated *Pleurotus* species (available most of the year) and wild edible mushrooms like *Entoloma lividoalbum* and *Grifola frondosa*, during the monsoon season when they are available. In Kalimpong, the traditional Nepali culinary method for preparing *Auricularia* species is a derivative from Tibetan cuisine, which involves soaking the dried basidiocarps in hot water for 10-20 minutes before frying them with onions and *fing* (Dutta and Acharya 2014).

Figure 1. Tibetan dish of Chicken *shapta, shaptak* or *thenthuk* along with rice noodles (*fing*), broccoli, and brownish *Auricularia* basidiocarps (Photographed in Darjeeling by PP)

As is the case for *Auricularia*, it is typically a village dwelling species of Lateritic region of West Bengal comprising of parts of Bankura, Burdwan, Birbhum, Murshidabad, and West Midnapur Districts (Pradhan et al. 2012, 2013) and Sundarban area of West Bengal (Dutta et al. 2013). A study by Singha et al. (2020) conducted in the Gurguripal forest of West Medinipur highlighted that the Bhumija, Kheria, Kurmi, Lodha, Munda, Oraon, and Santal communities utilize *A. auricula* (locally known as *kan chhatu*) to treat earaches, ear infections, and manage cardiovascular diseases, diabetes, and hypertension. Santals, the Austro-Asiatic tribe of the pre-Aryan period, living in the Lateritic tract of West Bengal, are known to consume a good number of macrofungi. However, their myco culinary practice does not incorporate locally abundant and frequent *Auricularia* spp. (Pradhan et al. 2010).

Similarly, studies conducted in Odisha by Sachan et al. (2013) and Panda and Tayung (2015) documented the ethno-utilization of 14 and 19 species of wild edible mushrooms, respectively, from the Similipal Biosphere Reserve and the districts of Mayurbhanj, Keonjhar, and Balasore. These studies revealed that Austro-Asiatic tribes including the Bathudi, Bhumija, Bhuyan, Birhor, Ho, Khadia (or Kharia), Kolha, Kudumi, Mankidia (or Mankdias), Munda, and Santal do not utilize *Auricularia* spp. for either food or medicinal purposes. Kandha tribe of hilly areas of Junagarh and Thuamul Rampur areas of Kalahandi District, Odisha are reported to use nine species of wild edible mushrooms, which are consumed by the tribals as curry preparation and dried and preserved (Panda and Padhy 2007). However, this report also does not suggest the use of *Auricularia* spp. by Kandha people.

Tribal populations comprise a substantial portion of Madhya Pradesh and Chhattisgarh, constituting 25% of their combined population (Rajak and Rai 2005). A comprehensive ethnomycological study conducted by Rajak and Rai (2005) across 120 tribal localities in these states documented the utilization of 23 *Russula* species, nine *Lactarius* species, two species each of *Cantharellus* and *Termitomyces*, and single species of *Astraeus* sp., *Calvatia* sp., *Clitocybe gibba*, *Lentinus cladopus*, *Lycoperdon* sp., *Pleurotus florida*, and *Scleroderma* sp. by the local tribal communities. Notably, the study did not reveal any evidence of *Auricularia* spp. consumption among these tribal populations. During the ethnobotanical study of Baiga, Kanwar, Kol, and Pradhan tribes of the Amarkantak-Achanakmar Biosphere Reserve (spanning Anuppur and Dindori Districts of Madhya Pradesh, and Bilaspur District of Chhattisgarh), Kapale et al. (2013) found that three wild mushrooms with local names of *bhodu*, *chirkhu*, and *spittu* were being sold in the local market. However, their scientific identity is not mentioned in the report.

In an ethno-pharmacological study conducted by Soni (2013) in Belapani, Dhavaipani, Jaampani, and Sarodhdadar Villages in Chilpi forest range in Karwarda District of Chhattisgarh, questionnaire surveys revealed that besides 18 plants, there was no utilization of wild mushrooms, including *Auricularia* spp. in traditional medicinal practice by native Baiga and Gond tribes and their indigenous medicine man (Vaidyas or Guniyas). In Jharkhand, Srivastava and Soreng (2014) through their surveys in Khunti forest and adjoining markets have reported the local collection and consumption of *Boletus edulis*, *Calvatia*, *Geastrum*, *Lycoperdon*, *Macrolepiota procera*, and species of *Termitomyces*. However, *Auricularia* spp. were not found to be used by the locals.

Distribution of *Auricularia* in Chennai, Tamil Nadu has been documented (Manjunathan et al. 2011; Pithchai et al. 2015), and even nutritional values of locally collected *A. polytricha* have been evaluated (Manjunathan et al. 2011; Usha and Suguna 2014), yet they have not reported the use of the wood ear mushroom by the local population. Even *Auricularia* spp. is not listed amongst the 12 edible and 19 medicinal mushrooms collected by Pushpa and Purushothama (2012) from Bangalore, Karnataka. However, *Auricularia auricula-judae* (locally called *murukan kumizh*) along with edible wild mushrooms belonging to the genus *Grifola*, *Lentinus*, *Pleurotus*, *Termitomyces*, *Volvaria* are reported to be consumed by the Kaani Tribe of Kanyakumari District of Tamil Nadu as alternative source of protein (Johnsy et al. 2011; Davidson et al. 2012). The Kaani tribe incorporate *Auricularia* mushrooms into their culinary practices by collecting the fruitbodies, cleaning them, and then gently pounding them with an equal quantity of rice in a wooden mortar. This mixture is subsequently boiled with a small amount of water. To enhance flavor and aroma, salt, spices, and wild green chilies are added. The final dish is typically served alongside cooked rice or tapioca. Some Kaani individuals incorporate grated coconut into this preparation (Davidson et al. 2012). Furthermore, *Auricularia auricula-judae* holds medicinal significance within the Irula tribal community of the Walayar Valley, located in the southern Western Ghats of Coimbatore District, Tamil Nadu. Venkatachalapathi and Paulsamy (2016) documented the use of this fungus by the Irula tribe for treating common ailments such as fever, cough, and fungal infections.

Wayanad (in Kerala) with adjoining regions of Tamil Nadu has a native population of around 11 tribal

communities viz. Adiya, Kattunaikkar, Kurichya, Kuruma, Kurumar, Mullukurumar, Naykkar, Oorali, Ooralikurumar, Paniya, and Vallukurumar. Amongst them the study of Varghese et al. (2010) has revealed that amongst them the tribes of Kattunaikkar, Kuruma and Paniya are known to collect wild mushrooms. The mushrooms utilized by these three tribes were *Agaricus silvaticus*, *Cantharellus* spp., *Coprinus comatus*, *Laccaria laccata*, *Lentinus* spp., *Lepista sordida*, *Oudemansiella* spp., *Phlebopus portentosus*, *Pleurotus* spp., *Russula congoana*, *Termitomyces* spp. (Varghese et al. 2010), yet in the report there is no mention of *Auricularia* spp. finding ethno-utilization by the local tribes.

There are reports of the occurrence of *Auricularia* spp. from the Melghat forest Tiger Reserve of Maharashtra in India (Karwa and Rai 2010), Mantha, Jalna of Maharashtra (Kakde and Gaikwad 2014), and Gautala Wildlife Sanctuary (Gavhane et al. 2015). However, in Rajasthan the report by Sharma et al. (1992) lack the details of local utilization and consumption of *Auricularia* spp. In Gujrat, *Auricularia* spp. has been reported to be available (Rajput et al. 2015), yet it does not find a place in the list of 12 species of wild edible mushrooms utilized by tribal people of Mahal forest range of Gujarat (Parihar et al. 2015).

In Bhutan, *Auricularia* spp. are harvested from the regions of Pangkhar, Shingkhar, Tangsibi, and Ura, and sold to dealers at prices ranging from Nu. 1600-2300 (USD 18.48-26.56) per lamshu (lamshu is indigenous weighing system which equals approximately 200 g), with an average price of Nu. 1888 per lamshu or 21.80 USD/ 200 g. These mushrooms are ultimately sold in the Chinese markets of Northern Bhutan (Tshering et al. 2012). *Auricularia auricula-judae* (locally called *jilli namcho*) is popular in Bhutanese cuisine (Vantomme et al. 2002). However, not all of the populace consumed *Auricularia* spp. in Bhutan and some even did not have any idea about its edibility (Tshering et al. 2012). Nepal has a long tradition of collecting wild edible fungi and many species have been reported to be utilized for food and medicine in the Western Terai region of the Country (Aryal and Budathoki 2013). Although the export volume of *A. auricula-judae* is only next to the Morels (Adhikari 2000b) in Nepal, there is very little mention of *Auricularia* spp. being utilized in the country. Indigenous people (including Tharu communities) living in Parroha Village Development Committee of Rupandehi District, Nepal are reported to consume *Ganoderma* (*chyau*), *Morchella* (*guchi-chyau*), *Pleurotus* (*chyau*) (Acharya and Acharya 2010), yet it seems there is no utilization of *Auricularia* spp. Amongst the few reports of utilization *Auricularia* spp. from Nepal comes from the Tibeto-Burman tribes of Tamang (Pandey et al. 2006), Sherpa (Giri and Rana 2008), and discreet local utilization in the Nagarjun area of Kathmandu Valley (Joshi and Joshi 2008) and Majphal area of Dolpa district (Devkota 2008). Tamangs belong to the most dedicated mycophagous society of Nepal. They are not only one of the important ethnic groups but also the largest community of the Tibeto-Burman language family of Nepal. Their religion originates from Tibet and they follow "Lamaism" most of their lives still gravitate around the forests and retain primeval forests, and the culture is rooted in the old beliefs, taboos, folklore, and traditional attitudes (Pandey et al. 2006). Tamang community of Bhedetar, Dakshinkali, Langtang, Namobuddha, Sundarijal, and Talku areas of Nepal, refer to *Auricularia* spp. as *chipley shyamo*, *kaney shyamo*, *nabhyang shyamo*, and *thalthaley shyamo*, and use them as food, especially for making soup in Langtang (Pandey et al. 2006). In Sagarmatha National Park, the Sherpa community, particularly those residing near the forests of Chire (Kunde area), Deboche, and Omakha (Pangboche area), identify *Auricularia polytricha* as *durkha chyau*, where *durkha* translates to 'hard cheese', and *chyau* refers to 'mushroom' in local dialect. This species commonly grows on *Rhododendron* trees and are traditionally left to dry naturally on the trees until winter. Once dried, the mushrooms are harvested and consumed raw, with their texture resembling that of hard cheese (Giri and Rana 2008). In Kathmandu, *Auricularia auricula-judae* (locally *thalthaley chyau*) is reported to be of culinary use. However, along with other mushrooms like *Clavulinopsis fusiformis* (*kesari chyau*), *Coprinus comatus* (*gobrey chyau*), *Exobasidium butleri* (*pani pokey chyau*), and *Lactarius piperatus* (*dudhey chyau*). *Auricularia auricula-judae* is considered just edible and not delicious (Adhikari et al. 2005). *Auricularia mesenterica* growing on dead wood is reported from Maipokhari of Ilam District, Nepal, but the work does not report its local utilization (Adhikari 2000a). *Auricularia delicata* has also been reported as edible from Nepal (Adhikari 1999). Brahmin class of Hindus specializing as priests of sacred learning across generations in India and Nepal are purely vegetarians and are not reported to use mushrooms primarily because in their sect, the flesh of mushrooms is considered like the flesh of animals due to their flavor and taste (Christensen and Larsen 2005; Semwal et al. 2014).

Pakistan has a history of collections of *Morchella conica* and *M. esculenta* which dominate the local market and contribute to the economy in rural areas (Christensen and Larsen 2005). *Auricularia auriculae-judae* is a naturally occurring saprophytic mushroom in Pakistan (Khan et al. 2016). *Auricularia auricula-judae* and *A. polytricha* along with *Cantharellus* are considered edible in Kaghan Valley of Pakistan. In Kaghan Valley, *Auricularia polytricha* is also mentioned to be used for medicinal purposes (Sultana and Qreshi 2007). In the report of Kamal et al. (2009), mushroom consumption and cultivation in Bangladesh is dominated by Pleurotus, followed by *Agaricus*, *Calocybe*, *Volvariella*, and *Auricularia*, however, the later lacks consumption detail in the report. In Bangladesh, Khan et al. (2009) have tried the cultivation of *Auricularia* spp. upon straw and sawdust; however, there is no mention of their local utilization. Kamal et al. (2009) have assessed the temperature and humidity conditions of Bangladesh and found it to be ideal for the cultivation of *Auricularia* spp. Ediriweera et al. (2015) have studied the growth of *A. polytricha* in various lignocellulosic substrates of Sri Lanka. However, the study cites medicinal usage in China, yet there is no mention of local utilization in Sri Lanka (Table 2).

Table 2. Ethnomycological utilization of *Auricularia* spp. in the Indian subcontinent

Region	Tribes/communities	Species utilized	Usage	Reference(s)
Assam	Garos, Bodos, Adivashis, Rajbangshi, Kachari	*A. auricula-judae*, *A. delicata*	Consumed, medicinal uses (rheumatic pain, eye irritation, jaundice)	Sarma et al. (2010); Sharma and Kumar (2011); Choudhury and Sarma (2014)
Manipur	Naga (major subtribe: Mao, Poumei, Tangkhul), Maitei, Kuki (major subtribe: Thadou)	*A. auricula-judae*, *A. delicata*, *A. polytricha*	Consumed, medicinal uses	Srivastav et al. (2009); Devi et al. (2010); Pfoze et al. (2011); Singson et al. (2015); Salam and Jamir (2018)
Nagaland	Chakhesang, Angami, Zeliang, Ao	*A. auricula-judae*, *A. delicata*	Consumed, medicinal uses	Kumar et al. (2013, 2014); Ao et al. (2016)
Arunachal Pradesh	Garo	*A. auricula-judae*, *A. delicata, A. polytricha*	Consumed, sold in market	Singh et al. (2015)
Mizoram	Lusei, Chakma	*A. auricula-judae*	Consumed	Lalrinawmi et al. (2017)
Meghalaya	Khasi, Jaintia	Various wild mushrooms	Not significant for *Auricularia* spp.	Agrahar-Murugkar and Subbulakshmi (2005); Khaund and Joshi (2013, 2014); Das et al. (2014); Kalita et al. (2016)
Tripura	-	-	Not significant for *Auricularia* spp.	Roy Das et al. (2017)
Sikkim	Local communities	*A. cornea*	Consumed, not popular	Das (2010); Wangdi (2019)
Himachal Pradesh	-	-	Not significant for *Auricularia* spp.	Puttaraju et al. (2006); Savitri and Bhalla (2007); Chauhan et al. (2014); Sharma and Gautam (2015); Kumari et al. (2015)
Uttarakhand	Nepali community, Tibetan refugees	*A. auricula-judae*, *A. polytricha*	Consumed, medicinal uses	Shah (2015); Sharma and Gautam (2015); Kumar et al. (2017); Semwal et al. (2014)
Jammu and Kashmir	Gaddi, Shippi, various others	*A. auricula-judae*	Consumed, medicinal uses	Kumar and Sharma (2009); Pala et al. (2013); Choudhary et al. (2015); Sharma and Gautam (2015)
West Bengal	Tibeto-Burman, Santal, Kheria, Munda, Bhumija, Oraon, Lodha and Kurmi	*A. auricula-judae*	Consumed by Tibeto-Burman Communities, sold in markets of Kalimpong; used for medicinal purposes by Austro-Asiatic tribes	Acharya et al. (2004); Pradhan et al. (2010, 2013); Dutta and Acharya (2014); Dutta et al. (2013), Singha et al. (2020)
Odisha	Various tribes	Various wild mushrooms	Not significant for *Auricularia* spp.	Panda and Padhy (2007); Sachan et al. (2013); Panda and Tayung (2015)
Madhya Pradesh and Chhattisgarh	Baiga, Kol, Kanwar, Pradhan	Various wild mushrooms	Not significant for *Auricularia* spp.	Rajak and Rai (2005); Kapale et al. (2013); Soni (2013)
Jharkhand	Various tribes	Various wild mushrooms	Not significant for *Auricularia* spp.	Srivastava and Soreng (2014)
Tamil Nadu	Kaani, Irula	*A. auricula-judae*	Consumed, medicinal uses (fever, coughs)	Johnsy et al. (2011); Davidson et al. (2012); Venkatachalapathi and Paulsamy (2016)
Karnataka	Kaani	*A. auricula-judae*	Food	Pushpa and Purushothama (2012)
Kerala	Paniya, Kuruma, Kattunaikkar,	Various wild mushrooms	Not significant for *Auricularia* spp.	Varghese et al. (2010)
Maharashtra	Various tribes	Various wild mushrooms	Reported occurrence, utilization not significant for *Auricularia* spp.	Karwa and Rai (2010); Gavhane et al. (2015); Kakde and Gaikwad (2014)
Gujarat	Various tribes	Various wild mushrooms	Reported occurrence, utilization not significant for *Auricularia* spp.	Rajput et al. (2015); Parihar et al. (2015)
Bhutan	Local communities	*A. auricula-judae*	Consumed, sold in markets	Vantomme et al. (2002); Tshering et al. (2012)
Nepal	Tamang, Sherpa	*A. auricula-judae*, *A. polytricha*	Consumed, medicinal uses	Pandey et al. (2006); Giri and Rana (2008); Adhikari (2000b, 2005); Joshi and Joshi (2008)
Pakistan	Various tribes	*A. auricula-judae*, *A. polytricha*	Consumed, medicinal uses	Christensen and Larsen (2005); Sultana and Qreshi (2007); Khan et al. (2016)
Bangladesh	Various tribes	Various wild mushrooms	Cultivation reported, but utilization not significant for *Auricularia* spp.	Kamal et al. (2009); Khan et al. (2009)
Sri Lanka	Various communities	Various wild mushrooms	Cultivation reported, but utilization not significant for *Auricularia* spp.	Ediriweera et al. (2015)

HABITATS OF *Auricularia* spp. IN THE INDIAN SUB-CONTINENT

Fungi dependent on specific substrates demonstrate wide host specificity, with their diversity closely tied to the plant host diversity, showing stronger correlations at the family level than within infra-familial groups (Pradhan et al. 2013; Giri and Pradhan 2023). However, *Auricularia* spp. are common to both monocots and dicots alike, and widely recognized for their saprophytic and lignicolous nature, primarily thriving on dead and fallen wood. Their distribution and growth patterns vary significantly across India. In the Garhwal Himalaya, these fungi are typically found between June and mid-October, corresponding to the monsoon season (Semwal et al. 2014). Conversely, in Assam, all *Auricularia* species, except for *A. polytricha*, are distributed throughout the year (Choudhury and Sarma 2014). Reports indicate that *Auricularia* spp. have been documented from a range of locations in India, including Bangalore in Karnataka, Manipur (Pushpa et al. 2016), Maharashtra, Kerala, and Madhya Pradesh (Nile and Park 2014). Furthermore, members of the Auriculariaceae family have also been recorded across the Northeastern Hills (Verma et al. 1987), Rajasthan (Sharma et al. 1992), and the Dhemaji District in Assam (Gogoi and Sarma 2012). However, Karun and Sridhar (2014) found that *Auricularia* spp. were absent from arboretums and plantations of *Acacia auriculiformis*, *Areca catechu*, and *Anacardium officinale* near Mangalore, Karnataka.

Auricularia auricula-judae (Bull.) Quél. exhibits a broad range of habitats and locations. In Assam, it is found on dead bamboo culms and *Psidium guajava* trees (Sarma et al. 2010; Paul et al. 2015), as well as on *Albizzia lucida*, *Bombax ceiba*, *Morus roxburghii*, and *Trewia nudiflora* (Choudhury and Sarma 2014). In the Meghalaya's East Khasi Hills, it is identified as a wood-rotting fungus (Lyngdoh and Dkhar 2014). In Nagaland, *Auricularia auricula-judae* grows on branches and dead stumps of subtropical and temperate trees, particularly species of *Alnus* (Ao et al. 2016). It is notably frequent and shows a high density on dead bamboo culms and underwood (Kumar et al. 2013). This species is also found in the Alongkima, Changtongya, Kubulong, Longchem, Mangkolemba, and Ongpangkong blocks of Mokokchung District in Nagaland, growing on dead wood (Kumar et al. 2014). In Basar, Arunachal Pradesh, it is identified as lignicolous (Singh et al. 2015). In the Kushmi Jungle of Gorakhpur District, Uttar Pradesh, it is parasitic on *Tecoma capensis*, growing in groups on healthy trees (Vishwakarma et al. 2017). The species also occurs in the Garhwal Himalaya, where it is found on the wood of *Bauhinia malabarica*, *Delonix regia*, *Grevillea robusta*, and *Quercus leucotrichophora* (Semwal et al. 2014). In the Walayar Valley of Coimbatore District and Kanyakumari District in Tamil Nadu, it grows upon the wood of deciduous shrubs and trees (Johnsy et al. 2011; Venkatachalapathi and Paulsamy 2016). In Bhadrachalam forest, Telangana, it is found on wood logs (Krishna et al. 2015). The species is also present in the villages of the Lateritic regions of West Bengal, where it is lignicolous and saprophytic (Pradhan et al. 2012, 2013; Singha et al. 2020), and in coastal villages of West Bengal, growing upon dead wood and logs (Dutta et al. 2013). Additionally, it is found in the forests of *Alnus*, *Lithocarpus*, and bamboo fringes in the Himalayan region of West Bengal, where it is saprophytic (Pradhan et al. 2016).

Auricularia delicata is reported from several locations as well. In Assam, it grows upon dead logs of *Semecarpus* species (Sarma et al. 2010). In Mao Gate, Senapati, Kangpokpi, and Motbung in the Senapati District of Manipur, it is found on dead wood in forests of *Alnus nepalensis*, *Castanopsis* species, *Quercus griffithii*, and *Quercus serrata* (Pfoze et al. 2012). It is also reported from Narpuh Reserve Forest of Meghalaya (Kumar et al. 2015) and in Basar, Arunachal Pradesh, where it is lignicolous (Singh et al. 2015). *Auricularia mesenterica* (Dicks.) Pers. has been observed in Maniram village of Gorakhpur District, Uttar Pradesh, where it grows saprobically in groups on decaying wood logs (Vishwakarma et al. 2017).

Auricularia nigricans (Sw.) Birkebak, Looney & Sánchez-García, sometimes reported as *A. polytricha*, is found in Assam upon dead bamboo culms (Sarma et al. 2010) and on *Albizzia procera*, *Delonix regia*, and *Sapium baccatum*, causing white rot (Choudhury and Sarma 2014). In Nagaland, it is reported to grow upon decaying logs and twigs (Ao et al. 2016). It is also present in Basar, Arunachal Pradesh, where it is lignicolous (Singh et al. 2015). In the Garhwal Himalaya, it is found on the wood of *Bauhinia malabarica*, *Delonix regia*, *Grevillea robusta*, and *Quercus leucotrichophora* (Semwal et al. 2014). In Himachal Pradesh, it is reported to grow on dead branches of *Ficus benghalensis* (Puttaraju et al. 2006). In Badhgahan Village of Gorakhpur District, Uttar Pradesh, it is parasitic on the *Mangifera indica* (Vishwakarma et al. 2017). In Kokam, Shoolpaneshwar Wildlife Sanctuary, and other areas of Gujarat, it is reported to grow upon the bark of trees such as *Butea* and *Mangifera* (Kokni et al. 2019). *Auricularia olivaceus* is found in the Shimla Tara Devi and Barot areas of Himachal Pradesh, where it grows gregariously upon old *Quercus incana* and under *Cedrus deodara* (Kumari et al. 2013). *Auricularia cornea* has been observed in Bardipada, Samgahan, Vangan, and Sati in Gujarat, where it grows on dead stems of *Butea* (Kokni et al. 2019). It is also found in Sikkim on dead and decaying wood (Wangdi 2019).

DISCUSSION

Traditionally, humans have favored soft-fleshed mushrooms for culinary use due to their ease of preparation and palatability. However, certain tough, leathery species, such as *Lentinus squarrosulus*, *Auricularia* spp., and *Schizophyllum commune*, have found a place in the diets of people in regions like China and several African countries. The nutritional richness and health benefits of these mushrooms make them an essential component of traditional folk healing practices (Rammeloo and Walleyn 1993; Härkönen 2002; Okwulehie et al. 2013; Osarenkhoe

et al. 2014; Chelela et al. 2015; Anno et al. 2016; Degreef et al. 2016; Onyango et al. 2016; Paul and Pradhan 2024). Among these, the genus *Auricularia* has gained considerable prominence, especially in East and South-East Asia, being celebrated as a delicacy in countries such as China, Japan, and Korea (Luo et al. 2009; Thakur 2014; Khaskheli et al. 2015; Tabuchi et al. 2021; Wang et al. 2022a). In contrast, *Auricularia* is generally considered bland and is less commonly consumed in the Western world, where it is often associated more with subsistence and ethnomedicine, particularly in Africa (Khan et al. 2016; Milenge Kamalebo et al. 2018).

Understanding the global spread and consumption of *Auricularia* mushrooms is complicated by the ambiguity in mycological literature, which often does not clarify whether a mushroom species categorized as "edible" is actively consumed by local populations (Boa 2004). For instance, while *Auricularia* spp. is classified as edible in studies like Purkayastha and Chandra (1985), local communities may avoid it due to a lack of culinary tradition. The development of mycogastronomy—a cultural practice encompassing the use of mushrooms in local cuisine—plays a vital role in shaping dietary habits. This cultural practice evolves as communities experiment with different edible fungi, not only contributing to subsistence but also providing an additional source of income for mushroom gatherers.

The habitat in which mushrooms are found also influences their culinary use. For example, *Grifola frondosa* thrives in *Lithocarpus* and *Quercus*-dominated forests in temperate montane regions and is unlikely to be consumed by residents of *Shorea robusta* forests in the plains. An interesting case is *Russula senecis*, which grows in both *Shorea robusta* and *Quercus* forests but is consumed only in regions dominated by *Shorea robusta*, where ethnic communities of Austro-Asiatic language family reside. This mushroom is not consumed in *Lithocarpus* or *Quercus*-dominated regions, which are home to Tibeto-Burman populations.

In the Indian subcontinent, leathery or rubbery species of *Auricularia* mushrooms are primarily consumed by Tibeto-Burman communities in the Northeastern states of India such as Assam, Manipur, and Nagaland as well as in Bhutan, Nepal, and parts of West Bengal like Kalimpong. Additionally, *Schizophyllum commune* is consumed by tribal populations in Manipur and Nagaland. This East-West belt of the Indian subcontinent represents a significant region for Oriental mycogastronomy, likely influenced by similar traditions in East and South-East Asia. However, there are notable exceptions, such as among the Khasi tribes of Meghalaya, who do not consume *Auricularia* spp. despite being geographically close. The Khasi, Jaintia, and other Mon-Khmer-speaking groups in India are part of Austro-Asiatic population which also has other Mundari speaking tribes like Lodha, Santal, Munda, suggesting that the absence of *Auricularia* in their diet may be linked to language and cultural heritage.

Further south in Tamil Nadu, the Irula and Kani tribes, part of the Dravidian language family, utilize *Auricularia* spp. for ethnomedicine and consumption, respectively. This raises intriguing questions about the role of subsistence and language in shaping mycogastronomy, as seen in these geographically distant yet culturally distinct tribes. The spread of *Auricularia* consumption in India may not be solely attributed to the influence of Tibeto-Burman groups; it may also be shaped by factors like trade, migration, and shared subsistence patterns with East and South-East Asia.

Despite the limited culinary use of *Auricularia* mushrooms in most parts of India and the absence of commercial farms dedicated to their cultivation (Thakur 2014), the country has made significant strides in research. Studies have focused on developing cultivation protocols (Bhandal and Mehta 1989; Kushwaha et al. 2006; Veena and Pandey 2012; Veeralakshmi et al. 2014), exploring the nutritional properties of the mushrooms (Goyal et al. 2010; Johnsy et al. 2011; Manikandan 2011; Manjunathan et al. 2011; Kumar et al. 2013; Usha and Suguna 2014; Kumari et al. 2015), and investigating their medicinal benefits, particularly their antioxidant properties and ability to activate nitric oxide synthase (Acharya et al. 2004). This body of research paves the way for the potential commercial exploitation of *Auricularia* in India.

Wild edible mushrooms offer numerous benefits to skilled collectors who can identify them and understand their edibility. Currently, the most prized and exported mushroom from the Indian subcontinent, besides *Ophiocordyceps*, is *Morchella* (commonly known as morel, locally *gucchi*), which is highly sought after in Europe and can fetch prices up to INR 5000.00/kg or 57.74 USD/kg (Christensen and Larsen 2005; Prasad et al. 2002). In contrast, *Auricularia* spp., though easily recognizable and available in wild and rural vegetation (Pradhan et al. 2013), are often neglected and not collected for utilization. However, in China, *Auricularia auricula*, which accounts for 90% of global production, is ranked fourth in importance among cultivated mushrooms, following *Agaricus*, *Lentinula* and *Pleurotus*, with its value widely recognized. Studies suggest that *Auricularia* is among the most frequent mushrooms in various wild habitats, with a relative frequency of around 46.8% (Dutta et al. 2013). Therefore, collecting, processing (e.g., cleaning, drying, pickling), and transporting or exporting *Auricularia* mushrooms to areas with high demand could create new income opportunities for rural collectors and cultivators.

CONCLUDING REMARK

Auricularia mushrooms have a long history of cultural, culinary, and medicinal significance, with their extensive domestication in China highlighting their economic potential. While widely integrated into East Asian diets and traditional medicine, their utilization varies across regions, influenced cultural practices and economic factors, and awareness levels. In the Indian subcontinent, their use is prominent among certain indigenous communities but remains limited in broader markets due to gap in broader socio-cultural acceptance and economic barriers. In contrast, western countries show minimal adoption beyond niche health-conscious consumers. Despite this disparity,

Auricularia spp. hold immense potential for expanded commercialization through improved cultivation practices, increased awareness, and strategic marketing. Addressing these challenges could enhance their role in both local and global economies, benefiting rural livelihoods and promoting their broader acceptance. Further research and initiatives aimed at integrating *Auricularia* spp. into diverse culinary and medicinal contexts could unlock significant economic and societal benefits.

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