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Diversity of Wild Edible Mushrooms in Indian Subcontinent and Its Neighboring Countries

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Diversity of Wild Edible Mushrooms in Indian Subcontinent and Its Neighboring Countries

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Abstract
Mushrooms are cosmopolitan heterotrophic organisms that are quite specific in their nutritional and ecological requirements. They are among the most relished food commodities among a number of nonconventional foodstuffs primarily because of their unique flavor and texture. Wild edible mushrooms have been collected and consumed by people since thousands of years. Mushrooms have been exploited commercially the world over. In India due to its diverse climatic conditions, many types of mushrooms are found in the wild. The knowledge of their historical uses as food, medicine, a source of income, and for small-scale businesses and the sociological impacts (myth, culture, and spirituality) are apparently threatened due to slow ethnomycology-research drive.

Keywords: Mushroom; Biodiversity; Species; Nutraceuticals; Nutrient; Diversity.

1. INTRODUCTION

The study of fungal biodiversity has been carried out the world over (Crous, 2006) and 1.5 million species have been reported so far (Hawksworth, 2004). About 50% of them have been characterized (Manoharachary *et al.*, 2005). Worldwide, an estimated 1,069 species of mushroom have been reported as being used for food purposes (Boa, 2004). For instance, on the African continent, most ethnic groups use wild mushrooms as food, and almost 300 species have been reported as consumed to some extent by humans (Rammeloo and Walleyn, 1993). In India 27,000 fungal species were reported by some researchers (Chang and Miles, 2004; Cowan, 2001). Exudates from mushroom mycelia are active against protozoans such as the malaria parasite *Plasmodium falciparum* (Isaka *et al.*, 2001). Their edibility, poisonous nature, psychotropic properties, and mycorrhizal and parasitic associations with the forest trees make them economically important and interesting to study. Many researchers have been working on wild mushrooms and reported more than 2,000 species of edible mushroom all over the world and 283 edible species from India (Adhikari, 2000; Purkayastha and Chandra, 1985) out of which some are cultivated. Wild edible mushrooms have been collected and consumed by people since thousands of years.

India is endowed with diverse soil and climatic conditions. There are twenty-one agro-ecological zones stretching from the northern hills to the southern seacoasts and from the western desert to the high-rainfall zones of the east. India, with its diverse agro-climatic conditions and abundance of agricultural wastes, has been producing mushrooms, mainly for the domestic market, for more than four decades. Archaeological evidences reveal edible species associated with people living 13,000 years ago in Chile (Rojas *et al.*, 1995), but it is in China where the eating of wild fungi was first reliably noted several hundred years before the birth of Christ (FAO, 1994). Commercial production picked up in the 1990s and several hi-tech, export-oriented farms were set up with foreign collaborations. But a major share of mushroom production is still on small farms. Edible mushrooms are a delicious source of food all over the world. The consumption of wild edible mushrooms is increasing, even in the developed world, due to awareness for their appreciable content of proteins and vitamins B, C, and D as well as a higher content of trace minerals. They have a high nutritional value, almost twice that of any vegetable or fruit. Apart from their use as food, sufficient evidences suggest that many species contain substances that may prevent or reduce the chances of contracting cancer, heart diseases, diabetes, and viral infections (Oei, 1991). Mushrooms are known to produce many kind of bioactive compounds, generally linked with the mycelial cell wall, that help in enhancing immunity against carcinogens (Ramesh and Pattar, 2010). Nutraceuticals are functional foods enriched/modified and consumed as part of a normal diet to provide health-giving benefits. Mushroom nutraceuticals may possess both nutritional and medicinal properties. It is also understood that the mushroom may be a potential source of therapeutically useful antioxidants (Jayakumar *et al.*, 2006; Nitha *et al.*, 2010; Sudha *et al.*, 2008). Wild mushrooms are a popular food and medicinal source in many parts of India. Traditional mycological knowledge of most Indian ethnic groups has proven to be extensive and profound, consuming nearly 283 species of wild mushrooms out of the 2,000 species recorded the world over (Purkayastha and Chandra, 1985). Ethnomycological aspects were also studied in different parts of India and the world over.

2. SIGNIFICANCE OF MUSHROOMS

Mushrooms have so many significant benefits for our body. If we make mushroom apart of our daily diet, it provides us immunity against many diseases. Like all fruits and vegetables, mushrooms are naturally gluten free and make a delicious and nutritious addition to a gluten-free diet. Beta-glucans, found in numerous mushroom species, show marked immunity-stimulating effects, contribute to resistance against allergies, and may also participate in physiological processes related to the metabolism of fats and sugars in the human body. The beta-glucans contained in oyster, shiitake, and split gill mushrooms are considered to be the most effective (Duyff, 2006; Rop *et al.*, 2009). Mushrooms are a good source of B vitamins, including riboflavin, niacin, and pantothenic acid, which help to provide energy by breaking down proteins, fats, and carbohydrates (U.S. Department of Agriculture *et al.*, 2009). B vitamins also play an important role in the nervous system. Mushrooms are low in calories, fat free, cholesterol free, and very low in sodium, yet they provide several nutrients that are typically found in animal foods or grains (U.S. Food and Drug Administration, 1994). Shiitake (*Lentinula edodes*): Shiitake is a popular culinary mushroom used in dishes around the world. It contains a number of health-stimulating agents, including lentinan, the polysaccharide for which it was named. Lentinan has been isolated and used to treat stomach and other cancers due to its antitumor properties (Sasidharan *et al.*, 2010). Shiitake mushrooms also demonstrate antiviral (including against HIV, hepatitis, and the "common cold"), antibacterial, and antifungal effects, blood-sugar stabilization, reduced platelet aggregation, and reduced atherosclerosis (Yamada *et al.*, 2002).

3. NORTHEAST INDIA

3.1. Assam

Macrofungi grow prolifically and are found in many parts of the world (Smith, 1963). Regular survey and collection of macrofungi were carried out in Kachugaon, Haltugaon, Parbatjhora, and Chirang reserve forests of the erstwhile Goalpara district in western Assam. Some of the ethnic tribes, namely, Adivashis, Bodos, and Rajbangshis, residing near these forests consume some of the mushrooms available. The relationship of ethnic groups with mushrooms is based on one hand on being aware of the religious sacredness of Hinduism and on the other hand on traditional knowledge. The origin and distribution of some ethnic castes are found to be localized in a particular zone or area. The ethnic groups are the traditional collectors. The different kinds of edible and nonpoisonous mushrooms that are consumed in the region grow wild. Their knowledge on mushrooms and fungi are quite different. This study revealed that in this area of the state, the majority of macrofungi are *Ganoderma lucidum* (100%) followed by *Cantharellus tubaeformis* (83.33%) and *Agaricus bisporus* (83.33%), *Schizophyllum commune, Auricularia delicata, Boletus luteus, Cantharellus cibarius, Lycoperdon cladopus, Termitomyces clypeatus* (66.66%), *Auricularia auricula, Lentinus edodes, Laetiporus sulphureus, Morchella esculanta, Termitomyces mammiformies, Auricularia polytricha, Agaricus silvaticus, Calvatia gigantea, Lentinus sajor-caju, Lentinus ostreatus, Tricholoma terreum* (33.33%), and *Agaricus campestris, Boletus edulis, Lenzites betulina, Lycoperdon pyriforme, Termitomyces robustus, Termitomyces microcarpus* (16.66%). Few Basidiomycetes fungi were reported at Sibsagar district in Assam (Sarma *et al.*, 2010).

3.2. Meghalaya

In India, the northeast region is a high-rainfall area and boasts some of the wettest areas of the world. The high-humidity level during the monsoon season (June–October) provides ideal atmospheric conditions for the growth of many saprophytes, including mushrooms. There are several wild mushrooms that grow in the forests of Meghalaya, and the locals relish them. The mushrooms are picked from the forest, and they form an integral part of the diet during the monsoon months when these are abundantly available. In spite of the immense popularity of this food in the region, data regarding the nutritive value of wild mushroom varieties available in the region are very meager. Mushrooms are a rich source of natural antibiotics. The glucans found in the cell wall are well known for their immune-modulatory properties, and the secondary metabolites have been found to be active against bacteria (Kupra *et al.*, 1979) and viruses (Suzuki *et al.*, 1990). The study of Agrahar and Subbulakshmi (Agrahar and Subbulakshmi, 2005) determined the nutritional content of the commonly consumed wild mushrooms found in Meghalaya (Tables 1 and 2). Khasi tribals collected some of the mushroom species, such as *Calvatia gigantea* and *Cantharellus cibarius*, easily from the nearby forest in the region. However, others such as *Clavulina cinerea*, *Ramaria brevispora*, *Russula integra*, *Gomphus floccosus*, and *Lactarius quieticolor* were easily identifiable in this region and can be procured from the local markets.

The dry matter ranged from 4.37% to 15.9% in *C. gigantean* (lowest) and *C. cibarius* (highest). The high-protein and low-fat characteristics of the edible wild mushrooms have been reported. Edible mushrooms are highly valued as a good source of protein, and their protein contents usually range from 19.0% to 27.5% of dry weight. In the table, the highest-protein content (27.5%) was obtained from *C. cinerea*, while the lowest (19.0%) was obtained from *L. quieticolor.* Mushrooms contained low amounts of fat in almost all species 1.0% (*C. gigantean*) to 5.3% (*G. floccosus*). From the results shown in Table 1, the macronutrient profile, in general, revealed that mushrooms were rich sources

Table 1: Macronutrient profile (g%) of selected mushrooms.

S. no.	Scientific name	DM%	Protein	Fat	Fiber	Ash
1	*C. gigantean*	4.37	27.3	1.0	22.0	6.3
2	*C. cinerea*	13.0	27.5	2.5	8.41	3.9
3	*C. cibarius*	15.9	21.1	1.6	12.8	13.2
4	*R. brevispora*	10/5	24.1	1.3	8.8	10.9
5	*R. integra*	9.7	21.1	4.5	6.4	11.5
6	*G. floccosus*	13.0	21.2	5.3	9.2	8.0
7	*L. quieticolor*	8.2	19.0	2.6	14.4	6.6
	Average	10.7	23.0	2.68	11.7	10.1

Values are expressed on dry-weight basis.

Table 2: Micronutrient profile of selected mushrooms.

S.no.	Scientific name	Ca[a]	P[a]	Fe	Mn	Cu	Zn	Na	K	Mg	Se[b]	Vita.[c]
1	*C. gigantea*	0.63	0.33	10.7	4.41	1.39	10.3	0.18	22.3	**150**	91.2	14.9
2	*C. cinerea*	1.91	0.42	75.2	6.79	23.9	11.1	0.33	52.1	143.8	0.17	41.8
3	*C. cibarius*	0.42	0.58	53.5	7.68	4.36	6.83	0.29	47.9	46.2	**295**	41.9
4	*R. brevispora*	0.53	0.51	7.17	11.4	16.7	6.76	0.31	35.5	217.2	5.28	28.0
5	*R. integra*	1.27	0.24	56.2	7.28	3.33	10.5	0.56	41.0	327	26.9	19.6
6	*G. floccosus*	1.37	0.34	22.3	7.04	3.48	13.0	0.14	18.7	**136**	X_c	25.8
7	*L. quieticolor*	1.46	0.42	19.4	5.32	1.41	39.4	0.21	17.0	25.31	**975**	18.1
	Average	1.08	0.41	34.9	7.13	7.8	14.0	0.29	33.5	**135**	**199**	27.2

Values are expressed on dry-weight basis. [a]Ca and P in g% and the rest of the minerals in mg%; [b]Selenium in µg/kg; [c]Negligible quantities.
Source: Murugkar and Subbulakshmi (2005).

of protein and fiber and had low amounts of fat. Generally, fresh mushrooms contain a relatively high amount of fiber, which may be responsible for its relatively high amount of ash.

Micronurients like Ca, P, Fe, Mn, Cu, Zn, Na, K, Mg, Se, and so on are found in all mushroom species. Iron ranges from 7.17% to 75.2% in *R. integra and C. cinerea*, respectively. Vitamin C is present in a good quantity in mushrooms, which is beneficial for our body. Potassium is present in a high amount, mainly from 17.0% in *L. quieticolor* to 52.1% in *C. cinerea.* Ash content ranged from 3.9% to 13.2%.

3.3. Manipur

Mushrooms are one of the many foods from the wild that are found in the diet of the various Naga tribes of Northeast India. Normally mushrooms are consumed fresh, but the use of dried mushrooms during the off-season is not uncommon. These wild mushrooms form an integral part of the diet during monsoon months when these are abundantly available. Among the edible mushroom, *Termitomyces* is the most popular due to their unique and subtle flavor and is found during the rainy season (i.e., May-July). *Termitomyces R. Heim* is a genus of termitophilous fungi living symbiotically in a termite nest with species of the Macroterminae (Isoptera) (Batra and Batra, 1979; Bels and Pataragetvit, 1982; Heim, 1977; Rouland-Lefevre *et al.*, 2002). Of the varieties of mushroom from the wild that are used by the Nagas as food source, two species *Schizophykm commune* and *Lentinusedodes* are used fresh as well as in dry form during the off-season (Longvah and Deosthale, 1998). Different biological (anticarcinogenic, anticholesterol, immune-stimulating) effects of Lentinusedodes are known, but little is known about its nutritive values.

The results of the nutritional analysis of the mushroom samples showed that the specimens have moisture content between 5.3 and 4.p (per 100 g) (Table 3). Edible mushrooms are highly valued as a good source of carbohydrates and their contents usually range from 68% to 64.4% of dry weight. The relatively high-carbohydrate content in the samples (Table 3) is a proof of mushrooms being highly nutritious and good for humans. The moisture content is an indication that fresh mushrooms cannot be kept for a long time. Edible mushrooms are highly valued as a good source of energy and the values usually range from 399 Kcal mg to 411 Kcal mg of dry weight. In this table, the high values of Phosphorus and Magnesium are also seen.

Table 3: Proximate and mineral composition of mushrooms from northeast India (per 100 g sample).

Mushroom	Schizophyllum commune	Lentinus edodes
Moisture (g)	5.3	4.7
Protein (g)	15.9	22.8
Fat (g)	2.0	2.1
Ash (g)	8.0	6.0
Carbohydrates and fiber (g)	68.0	64.4
Energy (Kcal mg)	399	411
Phosphorus (mg)	408	493
Magnesium (mg)	221	200
Calcium (mg)	188	121
Iron (mg)	12.3	20.1
Zinc (mg)	5.7	4.3
Manganese (mg)	8.8	5.1
Copper (mg)	0.9	0.9
Chromium (µg)	133	140

Use of wild mushroom as a food supplement in North Sikkim was reported (Lachungpa, 2009), where *Agaricus* spp. is found in the wild near grazing areas and is locally known as *Shamu*. Values are expressed on dry weight basis. *Source:* Longvah and Deosthale (1998).

3.4. Nagaland

There are many mushrooms growing in the forests of Nagaland and the locals relish them. Recently, thirteen numbers of macrofungi under nine genera and six families were recorded as available in the market of Kohima town of the Nagaland (Tanti *et al.*, 2011). They have diverse shapes, sizes, and colors and also have varied appearance, ranging from patches on wood to brackets, coral-like tufts, simple clubs, rosettes, cauliflower-like structure or centrally or laterally stalked fruit bodies. Nagaland, being a distinctive hotspot of rich biodiversity has served as the habitat for a wide variety of mushroom species (locally called Laphu); either it is a commonly cultivated oyster or a naturally grown species. ICAR Research Complex for NEH Region, Nagaland, working with different stakeholders took the opportunity to give a new dimension to mushroom cultivation in the state. The prominent tribes of Nagaland state are Chakhesang, Angami, Zeliang, Ao, Sangtam, Yimchunger, Chang, Sema, Lotha, Khemungan, Rengma, Konyok, Pochury, and Phom (Sharma and Mazumdar, 1980). These edible species are *Termitomyceseurrhizus*, *Tricholoma virgatum*, *Tricholoma gingateum*, *Agaricus silvaticus*, *Agaricus campestris*, *Lentinus conatus*, *Lentinus cladopus*, *Pleurotus ostreatus*, *Pleurotus flabellatus*, *Shizophyllum commune*, *Lycoperdon* sp., *Calvatia gigantea*, and *Auricularia delicata.* The proteins of wild edible mushrooms contain considerable amounts of nonessential amino acids like alanine, arginine, glycine, glutamic acid, aspartic acid, proline, and serine (Manzi and Pizzoferrato, 2000).

4. NORTHWEST INDIA

4.1. Jammu and Kashmir

The Indian state of Jammu and Kashmir, which lies in the northwest Himalayas, is a rich repository of unexplored macrofungal wealth due to its varied climatic and topographic conditions, thus providing a congenial environment for the lavish growth of this heterogeneous group of fungi. Mushroom species such as *Geopora arenicola*, *Sepultaria sumneriana*, *Morchella* spp., *Pleurotus* spp., *Russula* sp., and *Sparassis* spp. are sun dried in the open and then stored in gunny bags, polythene bags, or jars. In addition, a unique method for the preservation of *Geopora arenicola* and *Sepultaria sumneriana* is followed. Species of *Pleurotus* are found to possess significant antioxidant, anti-inflammatory, and antitumor properties (Jose *et al.*, 2002). A number of reports on mushrooms from the northwestern Himalayas have been provided by Atri and Saini (1989) who reviewed work on the Russulaceae worldwide including the Indian components. They have described many species of mushroom, which include *Russula* and *Lactarius* (Atri *et al.*, 1991a), *Agaricus campestris* (Atri *et al.*, 1991b), *Termitomyces* (Atri *et al.*, 1995), *Agaricales* and *Gasteromycetes* (Atri *et al.*, 1995), and Lepiota (Atri *et al.*, 1996). Atri *et al.*, (1997) also studied the taxonomy, distribution, ecology, and edibility of thirty taxa of genus *Russula*, which are new records from India. To date only eighty-one taxa (fifty-five of *Russula* and twenty-six of *Lactarius*) have been recorded from India. Wild edible mushrooms were reported (Kumar and Sharma, 2011) in various locations of the northwest Himalayas of Jammu and Kashmir. Ethnomycological information was recorded from reliable sources such as hakims, tribals, and local inhabitants who were considered to have good knowledge of the wild resources of the region. It was found that the collection of wild mushrooms was undertaken early in the morning, as there was intense competition for mushroom gathering, especially for the morels because of their high commercial value. Women and

children from *Gaddi* and *Shippi* tribes were frequently involved in these activities rather than men. A total of sixty-six taxa of wild mushrooms belonging to thirty-three genera spread over twenty-two families, ten orders, and three classes were identified. The identified species and varieties spread over in the following genera: namely, *Agaricus*, *Astraeus*, *Amanita*, *Auricularia*, *Boletus*, *Bovista*, *Cantharellus*, *Chalciporus*, *Clavaria*, *Clavulina*, *Coprinus*, *Flammulina*, *Geopora*, *Gyromitra*, *Helvella*, *Lactarius*, *Lentinus*, *Leucopaxillus*, *Lycoperdon*, *Macrolepiota*, *Morchella*, *Otidea*, *Peziza*, *Pleurotus*, *Ramaria*, *Rhizopogon*, *Russula*, *Schizophyllum*, *Scleroderma*, *Sepultaria*, *Sparassis*, *Termitomyces*, and *Verpa*.

4.2. Garhwal Himalaya, Uttarakhand

Garhwal Himalaya consists of the widest range of altitudes (ca. 350 m to 7,817 m asl), having contrasting climatic conditions, namely, the warm, humid Terai belt on the one hand and on the other, cold desert at the Tibetan border. So, Garwal Himalaya is blessed by a rich diversity of mushrooms. The wild mushrooms have been used as medicine since time immemorial. Some medicinally important mushrooms were collected from the Garhwal region and studied (Vishwakarma *et al.*, 2011). Their medicinal uses are recorded in India and elsewhere in the world. These species are *Ganodermaleucidum, Agaricus campestris, Hydnum repandum, Coprinus comatus*, *Morchella esculenta*, and *Cantharellus cibarius.* Medicinally important mushrooms of the Garhwal Himalaya discussed in the present paper are *Ganoderma lucidum, Agaricus campestris*, *Hydnum repandum*, *Coprinus comatus, Morchella esculenta*, and *Cantharellus cibarius*. For 4,000 years *G. lucidum* has been used as a part of Chinese and Japanese medicine especially for the treatment of most human ailments including chronic hepatitis, nephritis, hepatopathy, neurasthenia, arthritis, bronchitis, asthma, gastric ulcer, and so on. Extracts from fruiting bodies and mycelia of *G. lucidum* occurring in South India were found to possess *in vitro* antioxidant activity (Jones and Janardhanan, 2000; Lakshmi *et al.*, 2003) and antimutagenic properties (Lakshmi *et al.*, 2003).

5. SOUTHERN PART OF INDIA

From ancient times, wild mushrooms have been consumed by man as a delicacy, probably for their taste and pleasing flavor (Das, 2010). They have rich nutritional value with a high content of proteins, vitamins, minerals, fibers, trace elements, and little to no calories and cholesterol (Agrahar and Subbulakshmi, 2005; Wani *et al.*, 2010). Medicinal mushrooms occurring in South India, namely, *Ganoderma lucidum*, *Phellinus rimosus*, *Lentinus tuber-regium, Pleurotus florida*, and *Pleurotus pulmonaris* possessed great antioxidant and antitumor properties. This indicated that these mushrooms would be valuable sources of antioxidant and antitumor compounds. Investigations also showed that they had significant antimutagenic and anticarcinogenic properties. Thus, Indian medicinal mushrooms are potential sources of antioxidant and anticancer compounds.

6. IN CHINA

The traditional mushroom-production region was located in southeast China where the climate is warm, humid, and favorable for mushroom growth. The Chinese have identified 966 edible mushrooms and 576 medicinal species (Dai *et al.*, 2009), of which around seventy species can be cultivated and eighteen species can be cultivated commercially. China tops the world in growing straw mushrooms (*Volvariella volvacea*), tuckahoe (*Wolfiporia cocos*), shiitake (*Lentinula edodes*), agaric (*Agaricus bisporus*), wood ear (*Auricularia auricula-judae*), black fungus (*Auricularia polytricha*), white jelly fungus (*Tremella fuciformis* Berk.), eniki mushroom (*Flammulina velutipes*), oyster mushroom (*Pleurotus ostreatus*), King trumpet mushroom (*Pleurotus eryngii*), and hedgehog fungus (*Hericium erinaceus*). Mushroom production is continuously increasing, with China being the biggest producer in the world (Aida *et al.*, 2009; Chang and Miles, 2008; Patel

Table 4: Top six species of mushroom production in China, 2007–2011.

	Production (1,000 tons)					
Year	**Pleurotus ostreatus**	**Lentinulae dodes**	**Auricularia polytricha**	**Flammulina velutipes**	**Agaricus bisporus**	**Auricularia polytricha**
2007	4,146	2,885	1,113	1,178	2,507	1,441
2008	4,340	3,090	1,000	1,360	1,910	630
2009	4,429	3,435	2,697	1,568	2,181	890
2010	5,599	4,276	2,896	1,848	2,206	1,258
2011	5,633	5,018	3,461	2,493	2,462	1,435

Source: Wu *et al.* (2013).

and Goyal, 2012). Since the 1990s, the production center has been moving toward the north where the labor costs are lower, raw materials, particularly residuals of agriculture, are cheaper and abundant, and market access is closer to more populated northern cities like Beijing and Tianjin. More recently the production has been moving to northeastern China where woods and land are more abundant and central China where the agricultural residues are more available. Table 4 presents the top six species of mushroom in production in China from 2007 to 2011 (Wu *et al*., 2013).

7. IN BANGLADESH

The climatic conditions and seasonal diversity of Bangladesh is ideal for the cultivation of the oyster mushroom (Amin *et al*., 2007). The collection of the National Mushroom Development and Extension Centre (Namdec) in Bangladesh includes different strains of oyster mushrooms. Oyster mushrooms are a diverse group of saprotrophic fungi belonging to the genus *Pleurotus* (Kong, 2004). These mushrooms are a good source of nonstarchy carbohydrates, with high content of dietary fiber and moderate quantity of proteins, including most amino acids, minerals, and vitamins (Croan, 2004). The protein content varies from 1.6% to 2.5%, and the niacin content is about ten times higher than that of any other vegetable. Moreover, it is reported that oyster mushrooms are rich in Vitamin C, B complex, and mineral salts required by the human body (Randive, 2012). Mushroom production in rural communities can alleviate poverty and improve the diversification with any other mushroom species (Rosado *et al*., 2002). In recent years, four new strains have been introduced: *Pleurotus* highking (PHK), *P. ostreatus* (PO3), and *P. geesteranus* (PG1 and PG3). However, the performances of these strains have not yet been properly investigated in the climatic conditions of Bangladesh. Moreover, studies concerning the nutritive analysis of oyster mushrooms are not available in the country.

8. CONCLUSION

Mushrooms are a chief source of nutrient-rich food easily available throughout India and an important food item among the tribal communities of the country, as they generally live near forests. There have been many species of wild edible mushrooms identified so far, and they have been found to be superior to other food items with respect to vitamins, minerals, and other nutraceuticals. Therefore, the diversity of these wild mushrooms should be preserved for the benefit of the posterity of humankind.

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