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Review

A review of wild edible and medicinal mushrooms in Sri Lanka: Systematic exploration and industrial applications

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Abstract

Sri Lanka's varied ecosystems, climate, geography, and soils support a rich fungal diversity. Despite the recording of ≈ 53 species of edible wild mushrooms, only a few are popular among the local populace. The global significance of wild mushrooms to livelihoods is well-known, yet this potential remains largely unexplored in Sri Lanka. Additionally, there is a lack of studies on the edibility and medicinal value of wild mushrooms in the region. This review compiles available literature on Sri Lanka's edible wild mushrooms, highlighting their characteristics and potential industrial uses. The study delves into nutritional profiles, bioactive compounds, and traditional uses of these mushrooms, emphasizing their importance in local diets and traditional medicine. Furthermore, it explores the possibilities of integrating wild mushrooms into various sectors, including pharmaceuticals, nutraceuticals, and agriculture. Additionally, the review identifies several underutilized species with high nutritional value, which could be promoted as alternative food sources to enhance dietary diversity and food security in Sri Lanka. The significance of this study lies in its potential to bridge the existing knowledge gap, providing a better understanding of the untapped potential of these mushrooms and stimulating further research and industrial exploitation. The findings emphasize the need for sustainable harvesting practices and conservation efforts to protect these valuable fungal resources. Moreover, promoting the cultivation and commercialization of wild mushrooms could enhance food security, contribute to rural livelihoods, and drive economic development in Sri Lanka.

Keywords: Basidiomycota, Ceylon, Edible Mushrooms, Fungi, Non-Timber Forest Products, Taxonomic Classifications

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1. Introduction

Since ancient times, edible wild fungi have been known and utilized worldwide as a culinary wonder and an important source of medicine. Rural communities of many Asian and African countries utilized this valuable natural resource, knowing their values through their cultures. China is well-represented in both the early and later historical records of edible wild fungi. In addition, central and southern Africa, Mexico, and Turkey also have a long and illustrious legacy of using edible wild fungi (Boa 2004). About 2,189 edible species of mushrooms are identified worldwide, and 2,006 of them are confirmed for safe consumption (Li et al. 2021). Edible mushrooms are a source of revenue for countries like China and the United States of America (Boa 2004).

Mushrooms are generally consumed in either fresh or dried forms, and different communities have unique culinary practices for their preparation. Generally, mushrooms are known as ‘white vegetables’ (Weaver and Marr 2013). Since they are protein-rich, they are meat substitutes, especially for the communities where meat consumption is low or nill (Ayimbila and Keawsompong 2023). Medicinal mushrooms are used widely in biopharmaceutical applications and are produced as liquid extracts and powders (Elkhateeb et al. 2019). Mushrooms have been used in folk medicine in China (including Taiwan), India, Japan, Korea, and Sri Lanka. Mushrooms contain bioactive compounds such as phenolics, terpenoids, polysaccharides, glucans, and lectins. These compounds act as immunomodulators, antioxidants, anti-inflammatory, and anti-cancer agents (Hewage 2015, Kumar et al. 2021b).

Edible wild mushrooms have become a topic of great interest among diverse communities worldwide. This keen interest stems from their ability to provide high-quality protein with superior biological efficiency. Moreover, mushrooms are also rich in dietary fibers, minerals, and essential vitamins. Furthermore, they stand out due to their low-fat content and a significant presence of polyunsaturated fatty acids (PUFA) (Sitotaw et al. 2020). Among the edible mushroom species, ≈ 90 are cultivated, and about 8 to 10 species are used explicitly for industrial-scale production worldwide (Naeem et al. 2020).

Sri Lanka is one of the South Asian countries with a history of using wild mushrooms as a source of food and medicine. Even though the diversity of mushrooms has not been properly evaluated, the island has important fungal lineages due to the close juxtaposition of areas with a great diversity of altitude, rainfall patterns, and soil variability. Even though many edible and medicinal mushrooms inhabit Sri Lanka with numerous endemic species, a few studies have been carried out to evaluate their edibility and medicinal usage (Karunarathna et al. 2017). Generally, the modern community is not aware of the importance of wild mushrooms as a food source, thus showing some reluctance to consume them due to a lack of knowledge, myths, and misconceptions descending from past generations.

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Sri Lanka has a fascinating history of utilizing wild mushrooms for both culinary and medicinal purposes. However, the absence of comprehensive scientific studies before the 18th century has caused limited documentation regarding mushrooms (Karunarathna et al. 2017). Several wild mushroom species are well-known, but their distribution is often restricted to specific geographical locations due to unique environmental conditions. Local communities have traditionally classified these mushrooms as edible, non-edible, or medicinal. However, the recognition of their value can diverge between regions. Consequently, a species widely regarded in one area may be disregarded in another due to limited local knowledge. Due to poor knowledge of identifying edible mushroom species, many fatalities have been reported following the consumption of wild mushroom species (Govorushko et al. 2019).

This review aims to compile and report edible and medicinal mushroom species from Sri Lanka, providing short descriptions for each genus and species. It focuses on the morphology, habitat, and uses of these mushrooms. The primary objectives are to improve our understanding of Sri Lanka's fungal diversity, promote the sustainable use of these natural resources, and highlight their potential benefits for food security and healthcare. This study is significant because it addresses gaps in knowledge, dispels myths, and encourages informed consumption of wild mushrooms, thereby contributing to public health and local economies.

Furthermore, this research emphasizes the importance of conserving Sri Lanka's rich fungal biodiversity. The study hopes to create a foundation for future research and conservation efforts by documenting and classifying these species. It also seeks to educate local communities on the safe and beneficial uses of wild mushrooms, reducing the risk of poisoning and promoting their inclusion in the diet for nutritional benefits. Additionally, by exploring the medicinal properties of these mushrooms, this review opens avenues for developing new pharmaceuticals and natural health products, potentially boosting the country's biopharmaceutical industry.

2. Edible mushrooms in Sri Lanka

To date, 53 edible mushroom species have been identified in Sri Lanka (Table 1). Most of them are from natural habitats. A few of these are popular as edible species throughout the country, and most are locally used for culinary or medicinal purposes. Currently, Sri Lanka cultivates several commercial species. The two most common species are *Agaricus bisporus* (J.E. Lange) Imbach (button mushroom), and *Pleurotus ostreatus* (Jacq.) P. Kumm. (Oyster mushrooms), whereas *Calocybe indica* Purkay. & A. Chandra (Makandura white: MK-white) is a recently introduced commercial variety (Wickramasinghe et al. 2023). *Pleurotus ostreatus* (Jacq.) P. Kumm., *P. cystidiosus* O.K. Mill., *Volvariella volvacea* (Bull.) Singer, *Agaricus bisporus* (J.E. Lange) Imbach, *Schizophyllum commune* Fr., *Pleurotus sajor-kaju* (Fr.) Singer, *Calocybe indica* Purkay. & A. Chandra are mushroom species commonly cultivated in Sri Lanka. Sawdust has been used in the development of successful commercial cultivating techniques for *P. giganteus*, an endemic mushroom found in Sri Lanka (Udugama and Wickramarathna 1991). A successful attempt was made to domesticate *Schizophyllum commune* (Namalee et al. 2012) and *Pleurotus sajor-kaju* (Namalee 2019) on saw dust-based compost medium. Paddy straw and sawdust have been used as media to successfully cultivate “Kankooria” (*Auricularia mesentrica* Pers.) in the past (Udugama et al. 2005). *Ganoderma lucidum* is being cultivated since the medicinal values of this species have been recently revealed (Karunarathna et al. 2017).

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Table 1. List of edible mushrooms recorded in Sri Lanka

Sl. No.	Species	Reference(s) that confirm/s the location as Sri Lanka	Reference(s) that confirm/s their edible nature
1.	*Agaricus crocopeplus* Berk. & Br.	Berkeley and Broome (1871)	Kamalebo et al. (2018), The Global Fungal Red List (2022)
2.	*Agaricus endoxanthus* Berk. & Br.	Berkeley and Broome (1871)	Boa (2004)
3.	*Agrocybe pediades* (Fr.) Fayod	Fayod (1889)	Boa (2004)
4.	*Amanita hemibapha* (Berk. & Br.) Sacc.	Saccardo (1887)	Boa (2004), Joshi and Joshi (2008), Mortimer et al. (2014)
5.	*Auricularia auricula-judae* (Bull.) Quél.	Gunasekara et al. (2021)	Gunasekara et al. (2021)
6.	*Boletellus emodensis* (Berk.) Singer	Karunarathna et al. (2017)	Boa (2004)
7.	*Calocybe indica* Purkay. & A. Chandra	Karunarathna et al. (2017)	Boa (2004), Subbiah and Balan (2015)
8.	*Calvatia gardneri* (Berk.) Lloyd	Kreisel (1992)	Coetzee and Wyk (2009)
9.	*Calvatia gautieroides* (Berk. & Broome) Petch	Kreisel (1992)	Coetzee and Wyk (2009)
10.	*Coprinellus castaneus* (Berk. & Broome) Voto	Berkeley and Broome (1871)	Desai and Peeraly (1990), Boa (2004)
11.	*Coprinellus disseminatus* (Pers.) J.E. Lange	Gray (1821)	Boa (2004)
12.	*Filoboletus manipularis* (Berk.) Singer	Singer (1945)	Karun and Sridhar (2016)
13.	*Flammulaster fulvoalbus* (Berk. & Broome) Pegler	Hewage (2015)	Hewage (2015)
14.	*Ganoderma lucidum* (Curtis) P. Karst.	Hapuarachchi et al. (2016)	Silva (2003)
15.	*Helvella crispa* (Scop.) Fr.	Adikaram et al. (2020)	Rana (2016), Li et al. (2021)
16.	*Hygrocybe alwisii* (Berk. & Br) Pegler	Pegler (1986)	Dattaraj et al. (2020)
17.	*Hygrocybe conica* (Schaeff.) P. Kumm	Kummer (1871)	Chong et al. (2014), Samsudin and Abdhullah (2018)
18.	*Hygrocybe miniata* (Fr.) Kummer	Kummer (1871)	McKnight and McKnight (1998), Bessette et al. (2019)
19.	*Hygrocybe similis* (Petch) Pegler	Pegler (1986)	Abdullah and Rusea (2009), Samsudin and Abdhullah (2018)
20.	*Inocybe cutifracta* Petch	Petch (1917)	Retnowati et al. (2020), Sai et al. (2020)
21.	*Lentinus connatus* Berk.	Berkeley (1842)	Afiukwa et al. (2015), Sharma et al. (2015)
22.	*Lentinus polychrous* Lev.	Léveillé (1844)	Thongekkaew (2009)
23.	*Lentinus sajor-caju* (Fr.) Fr.	Fries (1838)	Boa (2004), Obodai et al. (2014)

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24.	*Lentinus squarrosulus* Mont.	Montagne (1842)	Boa (2004), Karunarathna et al. (2017)
25.	*Lentinus strigosus* Fr. (Current name: *Panus neostrigosus* Drechsler-Santos & Wartchow)	Fries (1825)	Boa (2004)
26.	*Lentinus torulosus* (Pers.) Lloyd (Current name: *Panus conchatus* (Bull.) Fr.)	Lloyd (1913)	Bi et al. (1993), Singdevsachan et al. (2013)
27.	*Lentinus velutinus* Fr.	Fries (1830)	Boa (2004)
28.	*Lepista sordida* (Schumach.) Singer	Singer (1949)	Bao (2004), Thongbai et al. (2017), Kinghorn et al. (2018)
29.	*Leucocoprinus cepistipes* (Sowerby) Pat.	Patouillard (1889)	Dejene et al. (2017), Uzun and Kaya (2020)
30.	*Macrocybe crassa* (Sacc.) Pegler & Lodge	Saccardo (1887)	Inyod et al. (2016)
31.	*Macrocybe gigantea* (Massee) Pegler & Lodge	Galappaththi et al. (2022b)	Razaq et al. (2016)
32.	*Macrolepiota dolichaula* (Berk. & Br.) Pegler & Rayner	Pegler and Rayner (1969)	Boa (2004), Rizal et al. (2016)
33.	*Marasmius crinis-equi* F. Muell. Ex Kalchbr	Kalchbrenner (1880)	Boa (2004)
34.	*Oudemansiella canarii* (Jungh.) Höhnel	Höhnel (1909)	Boa (2004)
35.	*Panaeolus cyanescens* Sacc.	Singer (1949)	Boa (2004)
36.	*Parasola plicatilis* (Curtis) Redhead, Vilgalys & Hopple	Fries (1838)	Boa (2004), Bessette et al. (2019)
37.	*Parasola setulosa* (Berk. & Broome) Redhead, Vilgalys & Hopple	Berkeley and Broome (1871)	Okhuoya et al. (2010)
38.	*Phallus indusiatus* Vent.	Karunarathna et al. (2012)	Boa (2004), Mortimer et al. (2014)
39.	*Phlebopus portentosus* (Berk. & Broome) Boedijn	Boedijn (1951)	Kumla et al. (2012)
40.	*Pleurotus djamor* (Rumph. ex Fr.) Boedijn	Wit (1959)	Saha et al. (2012)
41.	*Pleurotus giganteus* (Berk.) Karun. & K.D. Hyde	Pegler (1983), Udugama and Wickramaratna (1991)	Pegler (1983), Udugama and Wickramaratna (1991)
42.	*Pleurotus tuber-regium* (Fr.) Singer	Fries (1832)	Boa (2004)
43.	*Russula virescens* (Schaeff.) Fr.	Karunarathna et al. (2017)	Panda and Tayung (2015)
44.	*Schizophyllum commune* Fr.	Hewage (2015)	Hewage (2015)
45.	*Termitomyces eurrhizus* (Berk.) R. Heim	Gunasekara et al. (2021)	Verma et al. (2019)
46.	*Termitomyces heimii* Natarajan	Gunasekara et al. (2021)	Gunasekara et al. (2021)

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47.	*Termitomyces microcarpus* (Berk. & Broome) R. Heim	Gunasekara et al. (2021)	Hewage (2015), Verma et al. (2019)
48.	*Tremella fuciformis* Berk.	Karunarathna et al. (2017)	Boa (2004)
49.	*Tricholoma crassum* Sacc. (Current name: *Macrocybe crassa* (Sacc.) Pegler & Lodge)	Saccardo (1887)	Inyod et al. (2016)
50.	*Trogia infundibuliformis* Berk. & Broome	Berkeley and Broome (1873)	ENVIS Centre: Kerala (2022)
51.	*Volvaria diplasia* (Berk. & Broome) Sacc. (Current name: *Volvariella diplasia* (Berk. & Broome) Singer)	Singer (1951)	Ghosh (2020)
52.	*Volvariella glandiformis* (Berk. & Br.) Pegler	Pegler (1986)	Panda and Tayung (2015)
53.	*Volvariella terastia* (Berk. & Br.) Singer	Singer (1961)	ENVIS Centre: Kerala (2022)

3. Medicinal properties of mushrooms

Medicinal mushrooms are commonly used to treat a variety of conditions, including wounds, skin diseases, epilepsy, rheumatoid arthritis, heart ailments, cholera, irregular fevers, dysentery, and diarrhoea. They are also used for their diaphoretic properties and for treating colds, liver disease, and gallbladder infections. Additionally, they are believed to be effective in addressing asthma, tumours, high cholesterol, stress, diabetes, and insomnia (Mohammad et al. 2015). Mushrooms contain various active substances with potential anti-cancer effects, such as lentinan, krestin, hispolon, lectin, calcaelin, illudin S, psilocybin, *Hericium* polysaccharide A and B, ganoderic acid, schizophyllan, and laccase (Prasad et al. 2015, Galappaththi et al. 2022a). *Ganoderma lucidum* has the longest history of medicinal use, with extracts and products being popular not only in China, Japan, Korea, North America, Asia, and other parts of the world. It has gained international recognition for its antitumor, immunomodulatory, cardiovascular, respiratory, liver-protective, and pain-relieving properties, primarily due to the presence of ganoderic acid, triterpenes, and polysaccharides (Reddy 2015).

4. Industrial applications of mushrooms

Mushrooms have the potential to offer medicinal products for use in cosmeceuticals, such as topical creams, lotions, and ointments. Additionally, these products can be incorporated into nutricosmetics for oral consumption. Cosmetics, which are personal care products for cleansing and beautifying the skin, are increasingly in demand when made with natural ingredients due to their organic, healthier, and eco-friendly properties. Compounds such as lentinan, carotenoids, ceramides, schizophyllan, and omega fatty acids (ω-3, ω-6, ω-9), along with resveratrol, extracted from macrofungi like mushrooms, are gaining popularity in cosmetics. These ingredients are known to target beauty concerns like fine lines, wrinkles, and uneven skin tone and texture due to their antioxidant and anti-inflammatory benefits (Kumar et al. 2021a). Mushroom cultivation helps reduce residue accumulation issues and offers a cost-effective way to produce high-quality food and fodder, potentially boosting farmers' income. Additionally, the by-product, spent compost, can be repurposed as animal feed and crop fertilizer (Israilides et al. 2003). Mushroom nutraceuticals were traditionally prepared in various forms, such as extracts, health tonics, concentrates, fermented drinks, tinctures, teas, soups, herbal mixtures, powders, and nutritious food dishes (Prasad et al. 2015).

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5. Descriptions of edible and medicinal mushrooms reported in Sri Lanka

Morphology, habitat, distribution, and the importance of each species are given below.

5.1. *Agaricus* L., Sp. pl. 2: 1171 (1753)

Agaricus accommodates several well-known mushroom species (Kerrigan et al. 2006, Zhao et al. 2012, Bau et al. 2014), most of which are edible, and a few are poisonous. Some species in *Agaricus* are especially important as a source of food and medicine. *Agaricus* species come under *Agaricaceae* showing a cosmopolitan distribution (Saini et al. 2018). *Agaricus* currently includes 434 species worldwide, with 60 edible species from 29 countries, while 200 are known as tropical species (Karunarathna et al. 2016, Singh et al. 2019). Currently, 169 species of *Agaricus* have been reported from Sri Lanka (Karunarathna et al. 2023); among them, *A. crocopeplus* and *A. endoxanthus* are known as edible mushrooms (Li et al. 2021). Moist soils rich with decaying leaf litter and woody debris facilitate habitat for most of *Agaricus* species reported in Sri Lanka. *Agaricus* species possess small to medium-sized fruiting bodies with free lamellae. An annulate stipe arises as a result of a partial veil. The spore print is dark brown, while the pileus is white to brown and somewhat yellowish or rufescent pileus (Chen et al. 2016, Karunarathna et al. 2016).

5.1.1. *Agaricus crocopeplus* Berk. & Broome, J. Linn. Soc., Bot. 11(no. 56): 546 (1871)

Agaricus crocopeplus was originally described from Sri Lanka. It appears to be part of a species complex, and other related species, such as *A. trisulphuratus* Berk., have been identified in Africa. The fruiting body is small to medium-sized, exhibiting a fleshy texture. The cap is orange-brown, the gills appear dark brown, and the stipe is creamish orange. It grows in a scattered pattern, tends to be solitary, appears annually, and lacks a distinctive odour. The cap displays a yellowish-orange center that transitions to brownish-black towards the margin. The cap remains smooth in both dry and wet conditions. The cap usually starts to grow as convex and later becomes flattened, with an occasionally incurved margin that extends beyond the gills and seldom splits. The lamellae are dark-brown, free, narrow, and densely packed. The stipe exhibits a creamish orange colour, cylindrical shape, almost equal dimensions, solid structure, and a fibrillose surface. The spores are hyaline, ellipsoidal in shape, and possess thick walls (The Global Fungal Red List Initiative 2022). Typically, *A. crocopeplus* is discovered in soil conditions characterized by a high content of pebbles, often found in laterite soil or soil accumulated near rocks, where charcoal and ash debris are present. *Agaricus crocopeplus* is mainly considered a food source in China, including the Tibet region (The Global Fungal Red List Initiative 2022).

5.1.2. *Agaricus endoxanthus* Berk. & Broome, J. Linn. Soc., Bot. 11(no. 56): 548 (1871)

Agaricus endoxanthus is a tropical species originally described in Sri Lanka (Berkeley and Broome 1871, Chen et al. 2016), and later described from the Hawaiian Islands as *A. rotalis* K. R. Peterson, Desjardin & Hemmes (Bessette et al. 2019). *Agaricus endoxanthus* has been reported in several regions of Africa, Asia, Oceania, Europe, and South America, where its growth is significant in tropical regions. The pileus is dark greyish; it may exhibit a fibrillose texture, usually radially and/or concentrically cracked. When cut or rubbed, the stipe base may show chrome-yellow discolouration. The spores and pileipellis hyphae consist of distinctly constricted elements at the septa. Vacuolar pigments are the major characteristic of *A. endoxanthus* (Chen et al. 2016). *Agaricus endoxanthus* is considered an edible species in Malawi (Boa 2004).

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5.2. *Agrocybe* Fayod, Annls Sci. Nat., Bot., sér. 7 9: 358 (1889)

Agrocybe was first described by Fayod in 1889 (Halama 2016). *Agrocybe* species show widespread distribution, encompassing about 100 species worldwide (Kirk et al. 2008) and are reported with small to medium gill fungi. Fruitbodies of *Agrocybe* are composed of a surface smooth cap of white to yellow, brown, or olive colour, and occasionally present annulus (McKnight and McKnight 1998). A glabrous or occasionally aerolate pileus surface, a broad germ-pore in the basidiospores (occasionally some reduced), a hymeniform pileipellis made of an inflated cell palisade, and prominent cheilocystidia are the characteristics that define *Agrocybe*. Additionally, *Agrocybe* species possess collibioid to tricholomatoid basidiomata, with spore prints ranging in colour from rusty brown to tobacco brown or dark brown. Because of the pileipellis characteristics and the colour of the spore print, *Agrocybe* was classified as a member of Bolbitiaceae (Niveiro 2020). Several *Agrocybe* species, such as *A. cylindracea* (Uhart et al. 2008), and *A. striatipes* (Li et al. 2023), are edible and can be commercially cultivated (Uhart et al. 2008). Besides, some antibiotics have also been discovered, which are named Agrocybin (Ngai et al. 2005) and Agrocybenine (Koshino et al. 1996).

5.2.1. *Agrocybe pediades* (Fr.) Fayod, Annls Sci. Nat., Bot., sér. 7 9: 358 (1889)

Agrocybe semiorbicularis is synonymous with *A. pediades* (McKnight and McKnight 1998, Roody 2003). It is also known as Common Field cap (Acharya et al. 2017) or Hemispheric *Agrocybe* (Roody 2003). This mushroom grows on grassy fields, lawns, and pasture lands and is characterized by a hemispheric or convex cap. The cap surface is smooth, matching straw yellow to tawny or orange-brown, with a darker center. It is highly prized due to its edibility and medicinal properties of antimicrobial and antiviral activities (Roody 2003, Fatimi et al. 2013, Acharya et al. 2017). However, some literature reveals that the species is technically edible, but not recommended for consumption due to possible misidentifications with poisonous species of *Galerina* and *Hebaloma* due to similar morphology (McKnight and McKnight 1998). However, detailed information on the phytochemical, antioxidant as well as molecular standardization of *A. semiorbicularis* is still not known (Acharya et al. 2017).

5.3. *Amanita* Pers., Tent. disp. meth. fung. (Lipsiae): 65 (1797)

The agaric genus *Amanita* is distributed worldwide which consists of more than 800 species. Eighty-three edible *Amanita* species have been reported from 31 countries, while most of them are beautiful and attractive, but produce deadly poisons (Boa 2004). *Amanita hemibapha* (Berk. & Broome) Sacc., *A. pseudoprinceps* Y.Y. Cui, Q. Cai & Zhu L. Yang, *A. rubromarginata* Har. Takah., and *A. subhemibapha* Zhu L. Yang, Y.Y. Cui & Q. Cai are some edible *Amanita* species found in Northern Thailand (Kumla et al. 2023). The most potent toxin could present in *Amanita* spp. is α-amanitin. Common features shared by the members of this genus are a bilaterally divergent gill tissue and stipe with vertically oriented connective hyphae and numerous, large, terminally inflated club-shaped cells (Woehrel and Haugen 2017). They are identified by their distinctive characteristics, such as a white spore print and the presence of volval remnants in the form of warts or patches on the cap surface and the stipe base. Many of these fungi also exhibit an annulus on the stem (Zhang et al. 2015).

5.3.1. *Amanita hemibapha* (Berk. & Broome) Sacc., Syll. fung. (Abellini) 5: 13 (1887)

Amanita hemibapha is an edible species (Vrinda et al. 2005), originally described from Sri Lanka (Berkeley and Broome 1871) and commonly known as Caesar's mushroom (half-died slender Caesar). The species consists of a bright reddish-orange cap with lines along the edge, yellow gills, a yellow ring on the stem, and a thick white cup (volva) at the stem base (Russell 2006). They have a white spore print and gills that are creamy to yellow and not attached to

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the stem. The context, or the inner part of the mushroom, can be white, creamy, or yellowish. The annulus is thin and membranous and hangs loosely at the top, with colours ranging from yellow to pale orange. It easily collapses (Sanmee et al. 2008). *Amanita hemibapha* is a nutrient-rich mushroom that contains all the essential amino acids in ample amounts, excluding tryptophan (Ravikrishnan et al. 2017). *Amanita hemibapha* grows as solitary or gregarious on humus and is always associated with some forest trees. This species has been reported in Sri Lanka, India, China, Japan, South Korea, and the USA (Yang 1994), while *A. hemibapha* is considered an edible species in Guatemala, Mozambique, Senegal, Nepal, Malawi, Thailand, and the Lao People's Democratic Republic (available in local markets) (Boa 2004). Several subspecies of *A. hemibapha* such as *A. hemibapha* (Berk. Et Br.) Sacc. subsp. *Hemibapha* Corner & Bas., *A. hemibapha* (Berk. Et Br.) Sacc. subsp. *Javanica* Corner & Bas. and *A. hemibapha* (Berk et. Br.) Sacc. subsp. *Similis* are consumed in Nepal (Joshi and Joshi 2008, Mortimer et al. 2014).

5.4. *Auricularia* Bull., Herb. Fr. (Paris) 3: pl. 290 (1780)

Auricularia is widely distributed worldwide and highly valued for its edibility and medicinal properties. Various *Auricularia* species play a crucial role in the decomposition of forest ecosystems, particularly in tropical forests. These organisms are commonly found in angiosperm wood, such as dead trees, stumps, fallen trunks, and branches, as well as in decaying wood. While some species flourish on gymnosperm wood, many are utilized as essential edible and medicinal mushrooms in China and other East Asian countries (Wu et al. 2021). *Auricularia* species produce gelatinous fruiting bodies commonly known as wood ears or jelly ears. Their distinctive ear-like shape and dark brown-to-black colouration make them easily recognizable. They are abundant in tropical, subtropical, and temperate areas. *Auricularia* species have been widely grown, harvested, and consumed for hundreds of years in China, Thailand, Korea, Vietnam, Japan, and New Zealand (Miao et al. 2020).

5.4.1. *Auricularia auricula-judae* (Bull.) Quél., Enchir. fung. (Paris): 207 (1886)

Auricularia auricula-judae (Fig. 1) grows either singly or in clusters, on dead or decaying woody materials. They become contracted, hard, and brittle when dry, but when fresh and moist, they are gelatinous, elastic, soft, and floppy. They are often compared to and can resemble a human ear with undulations, folds, and wrinkles, sometimes with a short stalk but usually flat or spreading out. The upper surface is sterile, reddish-brown, sometimes with purple tones, smooth or finely downy with colourless hairs. The lower surface is fertile, smooth, or coarsely reticulate, often slightly paler, or greyer from spores. The spore print is white (Minter and Soliman 2021). *Auricularia* is an edible wild mushroom found in Sri Lanka, though no commercial cultivation has been carried out yet. In Sri Lanka, it is known as "Kannoriya hathu". Nutritional compositions of *Auricularia* contain moisture (91.02 g/100g), ash (6.36 g/100g), Crude fat (2.71 g/100g), Crude protein (8.54 g/100g), and insoluble fiber (28.55 g/100g) (Gunasekara et al. 2021).

5.5. *Boletellus* Murrill, Mycologia 1(1): 9 (1909)

Boletellus belongs to Boletaceae (Binder and Hibbett 2006). This genus was originally described by Murrill (1909) as having 50 species. *Boletellus* species show a widespread distribution (Kirk et al. 2008), and some species form an ectomycorrhizal symbiosis with their host trees (Tedersoo et al. 2010). Some saprotrophic species of *Boletellus* are often found on tree stumps or rotten wood. *Boletellus* species are generally characterized by a yellow hymenophore and olive brown elongate to fusoid, and longitudinally winged basidiospores (Pegler and Young 1981, Singer 1986).

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5.5.1. *Boletellus emodensis* (Berk.) Singer, Annls mycol. 40(1/2): 19 (1942)

Boletellus emodensis (Fig. 1) is considered an edible wild fungus (Boa 2004), which has been recorded in Sri Lanka (Karunarathna et al. 2017). It is also found in Honshu and Kyushu in Japan, Darjeeling in India, and likely broadly distributed in evergreen oak forests in East, Southeast, and South Asia. These fungi exist either individually or in clusters on the ground, tree stumps, or decaying wood in mixed forests dominated by *Castanopsis* spp. and evergreen *Quercus* spp. They are believed to be ectomycorrhizal fungi (Halling et al. 2015, Sato and Hattori 2015). The mushroom cap is either convex or applanate, with a dry surface that starts purple to dull crimson, often lightening to a pale fawn as it ages. When young, the surface is finely tomentose, developing into large squamules as it matures. Initially, the margin extends as a false veil, covering the pores. Later, it splits radially and retains remnants of the false veil, appearing appendiculate. Context is yellowish, showing a strong and rapid bluing reaction when injured. The hymenophore is poroid, yellow, and exhibits a pronounced bluing reaction when injured, with a depressed area around the apex of the stipe. These fungi may exist in solitary or form clusters on the forest floor, tree stumps, or decomposing wood within habitats where Fagaceae is the dominant vegetation (Zeng et al. 2011).

5.6. *Calocybe* Kühner ex Donk, Beih. Nova Hedwigia 5: 42 (1962)

Calocybe is characterized by bright-coloured or white pileus and small basidiospores. It is widely distributed, adapting to both temperate and tropical climates, although it thrives in warm, humid environments (Subbiah et al. 2014). Some *Calocybe* species are edible (Li et al. 2017) and 102 records of *Calocybe* are currently listed in the Index Fungorum (www.indexfungorum.org). Kirk et al. (2008) have accepted 40 species of *Calocybe* (Xu et al. 2019). *Calocybe* is predominantly associated with grasslands, functioning as a saprophyte, and occasionally forming ectomycorrhizal associations. The milky mushroom typically emerges in areas with humus-rich soil, commonly observed along roadsides and in forested areas (Subbiah et al. 2014).

5.6.1. *Calocybe indica* Purkay. & A. Chandra, Trans. Br. mycol. Soc. 62(2): 415 (1974)

Calocybe indica, a saprophytic mushroom, is commonly known as the Milky White mushroom. Sometimes, it can be ectomycorrhizal with *Borassus flabellifer* L., *Cocos nucifera* L., and *Tamarindus indicus* L. This species grows on humus-rich soil in agricultural fields or along roadsides (Subbiah and Balan 2015). This species is considered an edible mushroom in India (Boa 2004, Subbiah and Balan 2015), and extracts of milky mushroom are given orally to normalize the insulin and glycosylated haemoglobin levels in diabetes-induced rats, thus increasing the red blood cells, platelets, lymphocytes, and life span of treated rats (Selvi et al. 2006, Rajeswari and Krishnakumari 2013, Subbiah and Balan 2015). Fresh and dried milky white mushrooms have been reported to contain water-soluble vitamin C, which acts as a free radical scavenger and a well-established antioxidant, effectively inhibiting lipid peroxidation (LPO). Studies have revealed the presence of antioxidants in methanol extracts obtained from both the cap and stem of *C. indica*. Notably, the stipe of *C. indica* demonstrated higher levels of chelation, hydrogen peroxide scavenging activity, as well as flavonoid and total phenolic contents in comparison to its cap. Milky white mushrooms are exceptionally well-suited for commercial cultivation in humid tropical and subtropical regions worldwide. The average temperature consistently ranges between 25°C and 35°C throughout the year in these regions. The milky white mushroom, bearing resemblances to the button mushroom in several aspects, such as prolonged shelf life, heightened productivity, and an appealing milky white colour, is positioned to secure a more significant presence in the international market (Subbiah and Balan 2015).

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5.7. *Calvatia* Fr., Summa veg. Scand., Sectio Post. (Stockholm): 442 (1849)

Calvatia belongs to Lycoperdaceae, and all *Calvatia* species are terrestrial saprophytes. All *Calvatia* species are edible, but it is crucial to note that their consumption is best limited to the immature stage. It is advisable to harvest them before the commencement of spore maturation, ensuring the gleba remains firm and white for optimal edibility. Many *Calvatia* species, including fungal puffballs, have been used extensively by various cultures worldwide, particularly as a food item and/or in traditional medicine (Coetzee and Wyk 2009). Species of *Calvatia* hold pharmacological significance, as evidenced by the reporting of Calvacin, a novel anti-tumour agent (Kshirsagar et al. 2020). Fruit bodies could be stalked or sessile, globose, sub-globose, turbinate, pyriform, or agaricoid, and a firm, white gleba are the main characteristics of *Calvatia* (Coetzee and Wyk 2009).

5.7.1. *Calvatia gardneri* (Berk.) Lloyd, Mycol. Writ. (Cincinnati) 1(2): 2 (1904)

Calvatia gardneri was originally described from Sri Lanka. At times, it was considered synonymous with *C. pyriformis* (Lév.) Kreisel. They are commonly found in forested areas, frequently beneath the trees. Fruit bodies of *C. gardneri* exhibit young pyriform structures and mature into a later turbinate form with a distinct sharp edge and a lengthy stipe. The exoperidium, initially whitish cream in its early stages, transitions to yellowish, with a tendency to discolour to yellow, orange-yellow, or orange upon bruising. After drying, it assumes a clear ochraceous colour. The surface is characterized by a granulate to furfuraceous texture, with fine short spines on the stipe, becoming smooth. Upon dehiscing, it develops an alveolate pattern. Spore print colour is umber-brown (Kreisel and Hausknecht 2009).

5.7.2. *Calvatia gautieroides* (Berk. & Broome) Petch, Ann. R. bot. Gdns Peradeniya 7(1): 68 (1919)

Calvatia gautieroides was originally described in Sri Lanka. It is commonly found in tropical forests in Africa, Mauritius, Sri Lanka, Java, and Japan (Kreisel 1992).

5.8. *Coprinellus* P. Karst., Bidr. Känn. Finl. Nat. Folk 32: XXVIII (1879)

Coprinoid mushrooms are characterized by their deliquescent lamellae, dark brown to blackish basidiospores, and thin-fleshed pileus that becomes plicate upon opening. In Psathyrellaceae, *Coprinellus* represents one of the significant coprinoid mushroom lineages. The classification of species within *Coprinellus* primarily relies on characteristics such as the presence or absence of a veil, the structure of the veil and cystidia on the pileus, the presence of cystidia on the lamellae, and the morphology of basidiospores. These mushrooms are frequently found as saprotrophs, thriving on wood chips, leaf litter, and herbivore dung (Hussain et al. 2018b).

5.8.1. *Coprinellus castaneus* (Berk. & Broome) Voto, Rivista Micologica Romana, Boll. AMER 110(2): 89 (2020)

Coprinellus castaneus is considered an edible wild mushroom and an indigenous species in Mauritius. Sugar estate workers in Mauritius regularly harvest it from sugarcane waste (Desai and Peeraly 1990, Boa 2004).

5.8.2. *Coprinellus disseminatus* (Pers.) J.E. Lange [as 'disseminata'], Dansk bot. Ark. 9 (no. 6): 93 (1938)

Coprinellus disseminatus generally grows in Britain, Ireland, and throughout Europe and North America. The common names of this species are Fairy Inkcap (Scottish Fungi 2022), Little Helmets, and Non-Inky *Coprinus* Pers. (Bessette et al. 2007), which are also found in most parts of Asia, South America, and Australia. *Coprinus disseminatus* (Pers.) Gray is a synonym for *Coprinellus disseminatus.* It usually appears in large trooping groups on stumps or well-

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rotted wood or buried wood in woodlands and occasionally in shaded hedgerows (Scottish Fungi 2022). The wide cap is hemispheric to bell shape or convex, and a surface covered with fine short hair (Bessette et al. 2007). The pileus is creamy to white, smooth on the surface, and exhibits a translucent-striate margin. Hymenophores possess lamellae which are black when mature and white when young. The gill attachment is adnate and crowded. The stem is white and hollow with a delicate, cylindrical shape that easily breaks (Noviyanti et al. 2022). This species shows oxidant activities from its methanol extracts, whereas it possesses antibacterial properties in dichloromethane, methanol, and aqueous extracts (Novaković et al. 2018). Methanol and aqueous crude extracts of *C. disseminatus* exhibit significant antiradical and antioxidant properties, along with antiproliferative activity against the MCF-7 human breast cancer cell line (Novakovic et al. 2016). *Coprinellus disseminatus* is used as an edible species in the Lao People's Democratic Republic and Malawi (Boa 2004). The nutritional analysis of *C. disseminatus* originating from Serbia, including its protein content, amino acid composition, fatty acid profile, mineral composition, and phenolic profile, suggests that this mushroom qualifies as a functional food. It can be utilized as a dietary supplement or spice in a regular diet due to its beneficial nutritional characteristics (Novaković et al. 2018).

5.9. *Filoboletus* Henn., in Warburg, Monsunia 1: 146 (1899) [1900]

5.9.1. *Filoboletus manipularis* (Berk.) Singer, Lloydia 8(3): 215 (1945)

According to Karun and Sridhar (2016), immature and mature fruit bodies of *Filoboletus manipularis* are considered edible. *Filoboletus manipularis* is a bioluminescent fungus that tends to grow in clusters, sometimes fused together and is typically found on decaying wood. It has been observed in various regions in Malaysia, specifically in Selangor, Perak, Negeri Sembilan, Kelantan, and Pahang. Additionally, reports of its presence extend to tropical Asia, encompassing Sri Lanka, Sumatra, Borneo, Krakatau, the Karimun Islands, the Philippines, and Pohnpei. It has also been identified in New Guinea, New Caledonia, Australia, Madagascar, Venezuela, and Japan (Chew et al. 2015). The cap of *F. manipularis* may exhibit various shapes such as conical, rounded, plane, or depressed, with or without an umbo. As it matures, the colour ranges from white to cream or beige or pale pink. Initially, developing fruiting bodies may appear white or brownish with the intensity of the brown pigment decreasing as they mature. The spore print is white colour (Paul et al. 2019). Notably, there are distinct variations in the patterns of bioluminescence, with the cap alone being luminescent, luminescence occurring from underneath, only the stipe being luminous, the entire fruiting body emitting light, or showing no luminescence at all (Vydryakova et al. 2014). Bioluminescence is specifically localized to regions, such as the stipe and the underside of the cap. This luminosity arises from an oxygen-dependent chemical reaction involving luciferin acting as a catalyst, luciferase enzyme, ATP, and oxygen (Paul et al. 2019).

5.10. *Flammulaster* Earle, Bull. New York Bot. Gard. 5: 435 (1909)

Earle initially described *Flammulaster* in 1909 as a subdivision of *Naucoria* (Fr.) Kumm. The basidiocarps are small, ranging in colour from white to dark brown, with a pileus that is granular, flocculose, or squamulose, and a stipe that is mostly flocculose-fibrillose. The spore print is pale ochraceous, rusty, or dark brown. Spores are very pale brown to brown, smooth, with thin to thick walls, either lacking or having a germ pore and very rarely showing a dextrinoid inner wall. Cheilocystidia are present. Pleurocystidia and chrysocystidia are absent (Vellinga 1986).

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5.10.1. *Flammulaster fulvoalbus* (Berk. & Broome) Pegler, Kew Bull., Addit. Ser. 6: 493 (1977)

Flammulaster fulvoalbus is a seasonal wild mushroom found in Sinharaja Rainforest in Sri Lanka and is locally known as "*Athuru-Hathu*". *Agaricus fulvoalbus* Berk. & Broome is a synonym for *F. fulvoalbus*. *Athuru-hathu* is known by two other synonyms, namely *Muukalan-hathu* and *Pus-hathu*. Its long shelf life with no preservatives, great flavour, and texture similar to pork have made this mushroom species a culinary wonder in past Sri Lankan communities (Fernando et al. 2015). Methanol extract of *F. fulvoalbus* has excellent antioxidant activity and it also possesses antifungal properties against *Rhizopus stolonifera* Vuillemin, *Aspergillus niger* van Tieghem, *A. flavus* Link, and *Penicillium* species and antibacterial properties against *Staphylococcus aureus* Rosenbach, *Bacillus subtilis* (Ehrenberg) Cohn, *Escherichia coli* (Migula) Castellani & Chalmers, and *Ralstonia solanacearum* (Smith 1896) Yabuuchi. As a result, *Athuru-hathu* can be a functional food source as well as a source for the creation of novel drugs (Fernando et al. 2015). This species is characterized by its brown colour and typically reaches a significant size, with well-grown specimens measuring around 20 cm in diameter and featuring a 15 cm stalk. Smaller ones are approximately 5–8 cm in diameter. During the fruiting season, the forest floor becomes adorned with a captivating display of *Athuru-hathu* fruiting bodies of varying sizes, creating a rare and impressive spectacle. Remarkably, a single location can yield a harvest of around 50–60 kg of *Athuru-hathu* during this season. Notably resilient to pests, *Athuru-hathu* thrives in dry conditions, with fruiting bodies emerging gradually over a month. However, the fruiting bodies tend to perish quickly in the rainy season. Before the fruiting bodies emerge, the fungal mycelia densely spread over an area of approximately 4–5 meters in diameter and a depth of around 15 cm beneath the surface (Ranawake 2021). Some people experience a burning feeling in their bodies as well as what the locals refer to as "urine trouble" after consuming *Athuru-hathu*. On the next day, a huge amount of mucus can be noticed on the faces of several people. As a result, villagers regard *Athuru-hathu* as an exceptionally hot food. No other mushrooms are identical to this one either in shape or taste (Hewage 2015).

5.11. *Ganoderma* P. Karst., Revue mycol., Toulouse 3(no. 9): 17 (1881)

Ganoderma, belonging to Ganodermataceae, currently comprises 181 species (He et al. 2022). For a very long time, *Ganoderma* has been considered one of the most significant medical fungi in the world. *Ganoderma* species show a broad distribution worldwide from temperate to tropical regions. They show a remarkable diversity in tropical regions. They inhabit as facultative parasites on living and dead trunks more commonly and occasionally on tree branches (Zhou et al. 2015, Hapuarachchi et al. 2018). These mushrooms are large, possessing a dark colour, a glossy outer surface, and a firm, woody texture. The Latin term "lucidus" meaning "shiny" or "brilliant," aptly describes the brown-varnished look of the mushroom's surface (Mansy 2019). *Ganoderma* is rich in various compounds that exhibit a wide range of biological activities, such as boosting the immune system, anti-tumour effects, antimicrobial properties, anti-inflammatory actions, antioxidant capabilities, and inhibition of acetylcholinesterase. These bioactive compounds are primarily associated with triterpenoids and polysaccharides classes, but the presence of proteins, lipids, phenols, sterols, and other constituents has also been documented. *Ganoderma* has become a significant source in the pharmaceutical industry and is considered a highly promising avenue in the realms of both food and medicine, garnering increased attention in recent times (Mansy 2019).

5.11.1 *Ganoderma lucidum* (Curtis) P. Karst., Revue mycol., Toulouse 3(no. 9): 17 (1881)

Ganoderma lucidium is the most investigated *Ganoderma* species in Sri Lanka (Hapuarachchi et al. 2018). This species, recognized for its wood-degrading characteristics, presents a range

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of pharmacological benefits. Due to its scarcity in the wild, there has been a focus on artificial cultivation of its fruiting bodies. This cultivation is achieved on wood logs and through methods involving sawdust in plastic bags or bottles. Moreover, biotechnological approaches have been successfully implemented for cultivating *G. lucidum* mycelia in bioreactors. This cultivation occurs on solid substrates and in liquid media, employing submerged techniques for the growth of fungal biomass (Boh et al. 2007). *Ganoderma lucidium* has been cultivated successfully in countries, including China, Japan, India, and Sri Lanka, using sawdust from mango and rubber trees, and several value-added products have been introduced to the local and international markets (Konara et al. 2022). The pileus, with a diameter of up to 20 mm, possesses a surface characterized by radial rugosity and concentric sulcation. It is typically brilliantly laccate, occasionally semi-dull, and varies in colour from dark reddish-brown or mahogany to nearly black, displaying a brittle texture. The margin is generally thick and blunt, ranging in colour from yellowish to reddish-brown. The stem, reaching up to 10 cm, is reddish-black and can be pleuropodal, mesopodal, or pleurovertical (Gottlieb and Wright 1999). This species contains a wide range of bioactive compounds such as fatty acids, glycoproteins, nucleosides, phenols, polysaccharides, steroids, and terpenoids, while polysaccharides and triterpenes present as the most dominant physiologically active compounds (Hapuarachchi et al. 2018). *Ganoderma lucidum* stands out for its predominant pharmaceutical rather than nutritional significance. It offers a range of health benefits and applications, including the regulation of blood glucose levels, support for immune system modulation, hepatoprotection, and bacteriostasis. A range of commercial products derived from *G. lucidum* is accessible in different forms, including powders, dietary supplements, and tea. These products are sourced from various parts of the mushroom, including mycelia, spores, and the fruit body (Mansy 2019).

5.12. *Helvella* L., Sp. pl. 2: 1180 (1753)

Helvella, belonging to Helvellaceae, Ascomycota (Adikaram et al. 2020), is widespread in the northern and southern hemispheres (Kirk et al. 2008). *Helvella* is characterized by a cupulate to saddle-shaped and convex to campanulate apothecia and stipitate or sub-sessile fruiting body (Skrede et al. 2017). *Helvella* ascomata typically showcase a variety of colours, including white, creamy white, grey, and brown to black. Certain *Helvella* species form ectomycorrhizal symbioses with plants in various families, such as Fagaceae, Pinaceae, and Salicaceae. *Helvella* holds economic significance due to the edible properties of some members. Notably, *H. crispa* (Scop.) Fr. is widely consumed as an edible species (Yu et al. 2023).

5.12.1. *Helvella crispa* (Scop.) Fr., Syst. mycol. (Lundae) 2(1): 14 (1822)

Helvella crispa is commonly known as the saddle mushroom, and is associated with *Pinus banksiana* Lamb., *Populus tremuloides* Michx., *P. balsamifera* L., *Bertula papyrifera* Marshall, *Picea glauca* (Moench) Voss, and *P. sitchensis* (Bong.) Carr. (Zhao et al. 2015). Rana (2016) reported *H. crispa* as an edible wild mushroom in India. Two distinctive stipitate fruiting bodies of *H. crispa* were identified in the Hantana region and adjacent to Dunumadalawa Forest Reserve in the Kandy District of the Central Province of Sri Lanka. The apothecium exhibited a capitate structure characterized by a whitish colour and an irregularly saddle-shaped form (Adikaram et al. 2020). The pileus of the fungus is pure whitish, bi-lobate, and externally irregularly shaped, measuring 5.3–5.5 cm in diameter and 3.8–4.0 cm in height. The outer surface exhibits irregular arrangements, with the periphery consisting of petal-like projections, each possessing serrated margins. Internally, the pileus is multi-layered and the lowest whorl of petal-like projections in the cap is curved or bent inwards and downwards towards the stipe. The cap edge is free and not fused with the stipe. The hymenium surface is brownish-yellow, and the receptacle surface (apothecial underside) has a brown colour,

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appearing softly pubescent to villose. The asci are cylindrical and 8-spored, while the ascospores are ellipsoid and hyaline, and paraphyses are hyaline and septate. The spore print is beige. The stem, or stipe, is prominent, with the aboveground portion measuring 5.5 cm in height and displaying a white colour. The outer surface is shallowly ribbed along its entire length, extending to the receptacle margin. The stipe is internally solid, fleshy, and white. At its broadest point at the soil level, the stipe has a diameter of 4.2 cm, tapering to about 2.2 cm at the cap level. The stipe extends underground to a length of 7 cm. It has a brown colour, initially broader at ground level and tapering down over the initial 1/3rd to 2 cm, maintaining the same diameter thereafter (Adikaram et al. 2020). According to Adikaram et al. (2020), *H. crispa* has been observed growing on exposed, sand-rich soil with limited ground cover in proximity to the lower montane forest vegetation. The environmental conditions at the site were characterized by a slightly wet substrate, moderate temperatures around 25±2 ^{o}C, and a relative humidity of 90%.

5.13. *Hygrocybe* (Fr.) P. Kumm., Führ. Pilzk. (Zerbst): 26 (1871)

Hygrocybe, the largest genus of agarics in Hygrophoraceae, is generally called Waxcaps (Lodge et al. 2014, Wang et al. 2018, Wang et al. 2019b), which is the most prominent and easily observable elements within grassland mycota (Griffith et al. 2002). *Hygrocybe* species are distributed worldwide, from the tropics to the sub-polar regions. Around 150 *Hygrocybe* species have been described to date (Kirk et al. 2008, Lodge et al. 2014). Major morphological features of the genus are basidiomata (rarely dull) with a thick, bright-coloured, waxy cap with distant lamellae. The lamellar trama is regular, subregular, or interwoven. The basidiospores are smooth, white, and non-amyloid. The basidia are slender, with a ratio of length to width at 6–9 (Young 2005, Boertmann 2010, Lodge et al. 2014).

5.13.1. *Hygrocybe alwisii* (Berk. & Br) Pegler, Kew Bull., Addit. Ser. 12: 66 (1986)

Hygrocybe alwisii grows solitary, scattered, or in small groups amongst decaying leaves, in the shade of cashew trees (*Anacardium occidentale* L.). Previous records revealed that this species is reported from Sri Lanka and Kerala, India (Pradeep and Vrinda 2007). According to Dattaraj et al. (2020), *H. alwisii* is an edible macrofungus in the Scrub jungles of South-west India. It is mostly entirely white, occasionally displaying a pale yellowish hue, and often showing a more distinct yellowish tinge towards the disc. The surface is somewhat sticky when moist, smooth, and glabrous, with the margin initially straight and entire, later becoming recurved and fissile. The lamellae are adnexed to almost free and crowded. The cylindrical stipe is positioned centrally, slightly tapering towards the apex, and hollow. Stipe is white or rarely pale yellowish, faintly striate lengthwise, and occasionally adorned with loose, somewhat recurved fibrils, especially in the lower half. The odour is indistinct (Leelavathy et al. 2006).

5.13.2. *Hygrocybe conica* (Schaeff.) P. Kumm., Führ. Pilzk. (Zerbst): 111 (1871)

Hygrocybe conica is commonly known as the Witch's Hat mushroom or Conical Waxy Cap. It is a type of ectomycorrhizal species mainly found in grasslands, usually in woods (Chong et al. 2014). This species is generally considered an edible wild mushroom in Malaysia (Chong et al. 2014, Samsudin and Abdhullah 2018). The cap is initially hemispherical and later expanding with a slightly depressed center. It is dry, covered with scales, and exhibits colours ranging from orange-yellow to orange-reddish, becoming paler upon drying and assuming an orange-ochraceous or brownish-orange hue in the exsiccate state. The lamellae are distant, broadly adnate to decurrent, starting off yellow and transitioning to a yellow-orange colour. The stipe is yellow-orange, smooth, and either cylindrical or slightly flattened. The context of *H. conica* is orange-yellow, lacking any distinct smell or taste (Ronikier and Borgen 2010).

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5.13.3. *Hygrocybe miniata* (Fr.) Kumm., Führ. Pilzk. (Zerbst): 112 (1871)

This species is commonly known as Vermilion Waxcap or Fading Scarlet Waxcap. Basidiomata are small and pileus is bright red to reddish-orange or yellowish-orange colour. The cap is convex initially, but later flattens and becomes depressed with wavy edges. The center of a mature fruiting body is noticeably scurfy, or scaly (McKnight et al. 2021). *Hygrocybe miniata* shows a cosmopolitan distribution and grows on the ground among mosses or on decaying wood in groups or in a scattered manner (Bessette et al. 2019). This species is known as edible (McKnight et al. 2021).

5.13.4. *Hygrocybe similis* (Petch) Pegler, Kew Bull., Addit. Ser. 12: 61 (1986)

This species is commonly known as the Waxcap mushroom. *Hygrocybe similis* is considered an edible wild mushroom in Malaysia (Samsudin and Abdhullah 2018). Its fruiting bodies are attractive, small, and reddish-orange to yellow. It is a favourite food source among several Indigenous populations in Malaysia (Abdullah and Rusea 2009).

5.14. *Inocybe* (Fr.) Fr., Monogr. Hymenomyc. Suec. (Upsaliae) 2(2): 346 (1863)

Inocybe (Fr.) Fr. (*Inocybaceae*) is one of the larger ectomycorrhizal genera of *Agaricales* (Matheny 2009). It includes about 500 species worldwide and their geographical distribution ranges from the tropics to the arctic-alpine areas. *Inocybe* species are recognized by their brownish basidiomata, occasionally exhibiting a lilac or purplish tint. The pileus and stipe possess a coarsely fibrillose or squamulose texture, and the lamellae are brown. These fungi produce a brown spore print and typically thrive in soil. Certain species in this genus are notable for having thick-walled cystidia adorned with crystalline, apical encrustations, and some exhibit distinct odours. While some species feature smooth basidiospores, many are characterized by gibbous or nodulose basidiospores. *Inocybe* is well-recognized for forming ectomycorrhizal associations, consistently being associated with either gymnosperms or angiosperms. The basidiomata of *Inocybe* species are known to contain the toxin muscarine, which stimulates the parasympathetic nervous system in humans. Due to the pharmacological significance of this toxin, many species of *Inocybe* hold pharmaceutical importance (Latha and Manimohan 2017).

5.14.1. *Inocybe cutifracta* Petch, Ann. R. bot. Gdns Peradeniya 6(3): 201 (1917)

Inocybe cutifracta (Petch 1917) was originally described from Peradeniya, Sri Lanka (Latha et al. 2016). According to Retnowati et al. (2020) and Sai et al. (2020), *I. cutifracta* is considered an edible species in Indonesia and India. It abundantly inhabits among litter, in dense groups associated with a variety of evergreen and deciduous trees (Pradeep and Vrinda 2010).

5.15. *Lentinus* Fr., Syst. orb. veg. (Lundae): 77 (1825)

Species of *Lentinus* are wood-decaying basidiomycetes (Pegler 1983, Ishaq et al. 2022), belonging to *Polyporaceae*. *Lentinus* encompasses 55 species globally and is recognized for its role in wood rot and white rot, particularly in the decay of hardwood (Sysouphanthong et al. 2023). *Lentinus* is characterized by xeromorphic tough fruit bodies having gills with serrated margins (Pegler 1977, Singer 1986). *Lentinus* species are dominant in the tropics and located in temperate regions often (Pegler 1983). The mushrooms belonging to this genus become corky or woody with maturity and frequently form shelf-like growths on trees (Pegler 1983, Singer 1986). Species of *Lentinus* are characterized by decurrent lamellae, while their anatomical composition includes dimitic tissues and hyaline, ellipsoid to cylindric spores. A notable trait is the extended lifespan of many basidiocarps, often found in dry conditions, resulting in a resilient texture upon drying. This species is versatile, occupying various habitats, and is prevalent in both tropical and temperate zones (Ishaq et al. 2022). Many species are

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popular as excellent edible varieties in many countries (Isaka et al. 2015). The majority of *Lentinus* species are not only edible but also noted for their medicinal properties. Certain species within the genus have been cultivated for both consumption and medicinal purposes on a global scale (Sysouphanthong et al. 2023). In India, *Lentinus* is emerging as a promising edible mushroom known for its rich nutritional profile and potential health benefits. This fungus is recognized for its abundant vitamins, nutraceutical properties, and antimicrobial and antioxidant attributes. Its nutritional value is notably high, featuring ample proteins, amino acids, and sugars, as well as essential vitamins B, C, and D. Additionally, it contains minerals and lipids, further contributing to its nutritional significance (Ishaq et al. 2022).

5.15.1. *Lentinus connatus* Berk., London J. Bot. 1(3): 145 (1842)

Lentinus connatus (Fig. 1) is considered an edible mushroom in Nigeria and India (Afiukwa et al. 2015, Sharma et al. 2015). The nutritional analysis of *L. connatus* revealed that it contains protein (30.14%), carbohydrate (59.85%), fat (0.86%), ash (10.14%), vitamins A, C, D_2, and several amino acids. This mushroom is also known for its medicinal properties (Sharma et al. 2015). *Lentinus* has been a source of various biologically active secondary metabolites, including an antitumor polysaccharide, the antibiotic cortinellin, and hirsutane sesquiterpenes with antimicrobial properties. The crude ethyl acetate extract from the culture broth of *L. cornatus* displayed significant cytotoxicity against human oral epidermoid carcinoma cells (KB), human breast cancer cells, human lung cancer cells, and Vero cells. Moreover, it exhibited activity against the malarial parasite *Plasmodium falciparum* Welch (Rukachaisiriku et al. 2005).

5.15.2. *Lentinus polychrous* Lév., Annls Sci. Nat., Bot., sér. 3 2: 175 (1844)

Lentinus polychrous (Fig. 1) is an edible mushroom normally found in Thailand (northern and north-eastern part) and is traditionally used for treating fever and inflammation due to snake or scorpion envenomation (Fangkrathok et al. 2013). This mushroom grows either solitary or gregarious on logs of deciduous trees (Chandrasrikul et al. 2008). *Lentinus polychrous* has been popularly consumed in Thailand due to its appealing taste and nutrient content. It was reported that *L. polychrous* contains protein, fat, carbohydrate, fiber, and some other important elements such as sodium, potassium, calcium, iron, magnesium, and zinc (Thongekkaew 2009).

5.15.3. *Lentinus sajor-caju* (Fr.) Fr., Epicr. syst. mycol. (Upsaliae): 393 (1838) [1836-1838]

Lentinus sajor-caju (Fig. 1) is an edible mushroom commonly known as the Gray Oyster mushroom (Bi et al. 1993, Obodai et al. 2014). It grows in the wild in Sri Lanka (Karunarathna et al. 2017). This is a saprotrophic species (Njouonkou et al. 2020) reported in tropical Africa and Asia (Njouonkou et al. 2013). *Lentinus sajor-caju* is a common mushroom in tropical rainforests and grows after sufficient rainfall. These mushrooms can be seen on dead fallen trees in troops (Leon et al. 2012). The cap has an infundibuliform shape with a deeply depressed center. The cap may develop a slightly rough texture as it ages and transforms from white in its young to yellowish-brown to light brown when mature. The margin starts smooth but becomes wavy and broken in maturity. The gills are decurrent, extending downward, and range from white to yellowish-brown with a white, eroded margin. The stem is 5–10 mm in width and 10–15 mm in height, positioned centrally or laterally, maintaining an even or slightly tapered form towards the base. The stem is smooth and white. Annular rings are present and attached at the apex of the stem, appearing membranous and white and becoming fragile as they mature. The internal tissue is white in both the cap and stem, exhibiting a fleshy to leathery consistency. The spore print is white (Sysouphanthong et al. 2023). It is considered an edible wild species in Tanzania (Boa 2004, Hussein et al. 2015), India, China, Congo (Boa 2004), Peninsular, and Malaysia (Lee et al. 2009). Air-dried fruiting bodies of *L. sajor-caju* contain

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crude protein (22.06%), Crude fiber (21.48%), Crude fat (1.33%), Ash content (4.89%), total carbohydrates (59.51%) and moisture (12.21%) (Reneses et al. 2016).

5.15.4. *Lentinus squarrosulus* Mont., Annls Sci. Nat., Bot., sér. 2 18: 21 (1842)

Lentinus squarrosulus (Fig. 1) is saprotrophic (Njouonkou et al. 2013) and palaeotropical species showing a wide distribution throughout equatorial Africa, Australasia, the Pacific islands, and Southeast Asia (Pegler 1983). Also, it is utilized as an edible species in Sri Lanka (Karunarathna et al. 2017), and is popular among local communities in Africa (such as Tanzania, and Congo) for its appealing taste and meaty texture, while it is used as a medicine in some Asian countries such as Malaysia and China (Bi et al. 1993, Boa 2004, Lee et al. 2009, Hussein et al. 2015, Lau and Abdhulla 2017). *Lentinus squarrosulus* is identified by its whitish or greyish basidiocarps featuring prominent squamules on the surface (Njouonkou et al. 2013). The gills are decurrent, white, and can narrow to a width of up to 2 mm, featuring a smooth white margin. The stem is central to laterally positioned, appearing either smooth or with white fibrils, and lacks an annular ring. The context is white in both the cap and stem, displaying a fleshy to leathery consistency (Sysouphanthong et al. 2023). It is often mistaken for *Lentinus tigrinus* (Bull.) Fr., which is distinguished by brownish or blackish squamules, a finely denticulate lamellae edge, and the presence of a cortinate annulus on the stipe (Njouonkou et al. 2013). Basidiocarps of *Lentinus squarrosulus* are a good source of carbohydrates, proteins, and minerals. Besides, bioactive chemical components, such as phenolic compounds, flavonoids, immune-stimulatory glucans, antifungal proteins, and lectins, have also been identified in *L. squarrosulus* (Hussein et al. 2015, Lau and Abdhulla 2017). *Lentinus squarrosulus* is usually found on buried or exposed roots of trees, fallen tree trunks, and old stumps (Mortimer et al. 2014). Further, studies revealed that the mycelial extract of *L. squarrosulus* showed a significant gastric mucosal protection of Sprague-Dawley rats compared to cimetidine (50 mg/kg) (Omar et al. 2011). *Lentinus squarrosulus* is utilized in ethnomedicine for managing conditions such as ulcers, anaemia, cough, and fever. Contemporary research has highlighted its promising attributes, demonstrating potential in combating cancer and diabetes and offering antioxidant benefits (Ugbogu et al. 2019).

5.15.5. *Lentinus strigosus* Fr., Syst. orb. veg. (Lundae): 77 (1825); Current name: *Panus neostrigosus* Drechsler-Santos & Wartchow, J. Torrey bot. Soc. 139(4): 438 (2012)

Lentinus strigosus is an edible mushroom typically clustered on deciduous logs and stumps (Yamac et al. 2008). The fruiting bodies of *L. strigosus* contain a variety of elements, including crude protein, crude fat, reducing sugar, fiber, soluble polysaccharides, dietary fiber, carbohydrates, and minerals such as potassium, phosphorous, magnesium, iron, calcium, and zinc. Additionally, they contain bioactive metabolites like saponins, alkaloids, flavonoids, anthraquinones, anthrones, phenols, steroids, and coumarins. The ethanol extract of this mushroom demonstrates antioxidant, antibacterial, and teratogenic activities. This is recognized as a promising source of natural and functional food with potential anti-obesity properties (Kris et al. 2020). *Lentinus strigosus* is recognized for its economic significance and various advantageous activities, including the production of ligninolytic enzymes, dye decolourization, metal biosorption, production of extracellular polymeric substances, and antimicrobial activities (Yamac et al. 2008). Chagas disease is a health concern caused by the protozoan parasite *Trypanosoma cruzi* Chagas, impacting millions of individuals in Latin America. The disease carries significant economic and social consequences, particularly in the regions where it is endemic. *Lentinus strigosus* exhibited inhibitory activity against *Trypanosoma cruzi* and trypanothione reductase. Remarkably, the crude extract of *L. strigosus* exhibited full inhibition of TR at a concentration of 20 µg/ml (Cota et al. 2008).

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5.15.6. *Lentinus torulosus* (Pers.) Lloyd, Mycol. Writ. (Cincinnati) 4 (Letter 47): 13 (1913); Current name: *Panus conchatus* (Bull.) Fr., Epicr. syst. mycol. (Upsaliae): 396 (1838) [1836-1838]

Lentinus torulosus is considered an edible wild mushroom in India and China (Bi et al. 1993, Singdevsachan et al. 2013). It is distributed in Asia, Europe, and North America (Bi et al. 1993). The moisture content of the mushroom was found to be 80.97% (fresh weight), and the dominant compounds were protein and carbohydrates (including starch). *Lentinus torulosus* contains 28 g/100 g (dry weight) protein, 64.95 g/100 g (dry weight) carbohydrates, less amount of reducing sugar (0.71 g/100 g dry weight), 6.22 g/100 g dry weight of starch, higher levels of free amino acids (10.79 g/100 g dry weight), 1.36 g/100 g dry weight of crude fat, and 13.16 g/100 g of ash. In addition, major types of minerals and amino acids were also recorded from *L. torulosus* (Singdevsachan et al. 2013). *Lentinus torulosus* inhabits in solitary or small groups or clusters on decaying logs and stumps of broad-leaved trees (Roody 2003).

5.15.8. *Lentinus velutinus* Fr., Linnaea 5: 510 (1830)

Lentinus velutinus is considered an edible wild mushroom, and this species is consumed by the local tribes in the Brazilian Amazon, Congo, and Benin (Boa 2004), tropical regions in South America, Southeast Asia, and southern Africa (Yemul et al. 2019). The cap ranges from 1.5 to 8 cm in width, displaying a convex shape with an umbilicate center, taking on an infundibuliform and dry texture. Its upper surface is brown, lacking zones, and features a striated pattern. The margin is either smooth or undulating, initially involute, and becomes rimose as it matures. The gills are decurrent, purple, and extend outward from the apex of the stipe. The stem is centrally located, brown, measuring 2–8 cm long and 4–10 mm thick. It is solid and firmly attached to the substrate. The surface of the stem is covered with a velvety texture, featuring long and thick hairs. The basidiocarp is initially thin and fleshy when young, transitioning to a tough and leathery consistency as it matures. There is no distinctive odour associated with it. This fungus was found on a piece of wood in a forested area (Yemul et al. 2019). A cytotoxic effect on human cancer cell lines has been observed with the crude polysaccharide extracted from the fruiting body of *L. velutinus* (Udchumpisai et al. 2019).

5.16. *Lepista* (Fr.) W.G. Sm., J. Bot., Lond. 8: 248 (1870)

Lepista is a clitocyboid agaric genus belonging to Tricholomataceae. About 50 species have been described in *Lepista*, which is widely distributed over Asia, North America, and Europe (Alvarado et al. 2015). The distinguishing features of *Lepista* include the coarse surface of its spores, a spore print that varies from white to pale pink, and the presence of clamped hyphae, setting it apart from other genera (Wang et al. 2019a).

5.16.1. *Lepista sordida* (Schumach.) Singer, Lilloa 22: 193 (1951) [1949]

Lepista sordida was first described in 1821 by Elias Magnus Fries under *Agaricus* (Thongbai et al. 2017). *Lepista sordida*, commonly known as the “Flesh-Brown Blewit” in English literature, is called “Hed Chong Kho Lek” (small, violet mushroom) in Thailand (Anong et al. 2008). The cap measures 1.5–8 cm in diameter, broadly convex, with a depressed center in mature specimens. Its surface is dull violet with brownish colour, light purple at the edges, smooth, and dry. The gills are 3–4 mm in length, adnate to adnexed, closely packed with small lamellulae, having a wavy margin, and light purple. The stem is 3–3.2 cm long and 0.8–1.1 cm wide, subcylindrical, flattened, solid to semi-hollow, with a smooth, brownish-purple surface (Putra et al. 2022). This species is saprobic and inhabits mixed woodlands, usually in areas where leaf litter collects and rots and sometimes on compost heaps. *Lepista sordida* is an edible and medicinal mushroom with anticancer, antimicrobial, and antitumor properties from *in vivo*

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and *in vitro* (Thongbai et al. 2017, Kinghorn et al. 2018) and is a common dish in Thailand and China (Boa 2004, Thongbai et al. 2017).

5.17. *Leucocoprinus* Pat., J. Bot., Paris 2: 16 (1888)

Leucocoprinus is a genus belonging to Agaricaceae, with about 40 species that have cosmopolitan distributions (Uzun and Kaya 2017). These fungi are found worldwide and are characterized by small to medium-sized basidiocarps, ranging from lepiotoid to coprinoid in shape. Their caps are typically convex to flat and membranous and may display radial grooves or striations. The gills are free, whitish, and closely spaced, while the stems are cylindrical, usually hollow, occasionally bulbous, and centrally positioned. They feature a membranous ring and club-shaped, typically four-spored basidia, occasionally with one or two spores. The basidiospores are elliptical, translucent, smooth, stainable with dextrin, thick-walled, and have apical germ pores. While *Leucocoprinus* species may resemble those of *Leucoagaricus* Locq. Ex-Singer and *Macrolepiota* Singer are distinguished from *Macrolepiota* by their smaller basidiocarps and the absence of clamp connections. Additionally, they can be set apart from *Leucoagaricus* by their delicate, coprinoid caps with folded or grooved margins (Uzun and Kaya 2017).

5.17.1. *Leucocoprinus cepistipes* (Sowerby) Pat. [as 'cepaestipes'], J. Bot., Paris 3: 336 (1889)

Leucocoprinus cepistipes is commonly known as Onion Stalk Lepiota or Onion Stalk Parasol, which occurs scattered or in groups on wood, mulch, straw, organic compost, lawns, and rich soil (Bessette et al. 2019). Also, the species is considered an edible mushroom in Ethiopia (Dejene et al. 2017, Uzun and Kaya 2020). However, some researchers revealed that the edibility of the species is still unknown or even poisonous (Bessette et al. 2019, McKnight et al. 2021). The cap measures 30–50 mm in diameter, initially narrow ovoid shaped, then becoming conic campanulate, and finally broadly convex to plano-convex, occasionally with a slight central umbo as it matures. The surface is predominantly white, sometimes with a greyish tint, darker towards the center, and covered in soft, whitish scales and granules, giving it a powdery appearance. The margin is slightly curved inwards, showing striations and occasionally splitting, often adorned with scattered fragments of veil. The flesh is thin, tender, white, and possesses a mild to indistinct odour and taste. The gills are initially free and white, later turning pale to faintly cream-coloured. The stipe measures 40–70 mm in height and 4–7 mm in diameter, cylindrical, sometimes slightly curved, hollow, tapering towards the apex, with a white membranous ring towards the upper portion. It may be somewhat swollen at the base and occasionally adorned with scattered, soft, powdery remnants. The surface of the stipe is smooth or sparsely covered in fine hairs (Uzun and Kaya 2017).

5.18. *Macrocybe* Pegler & Lodge, Mycologia 90(3): 496 (1998)

Macrocybe species are widespread in tropical areas worldwide and are closely related to *Calocybe* Kühner. In the past, *Macrocybe* was classified under *Tricholoma* (Fr.) Staude. However, Pegler et al. (1998) reclassified *Macrocybe* as its own genus, separated from *Tricholoma*, based on observations of both morphology and genetic analysis (Kui et al. 2021). *Macrocybe* species are known for producing remarkably large, fleshy basidiomata that frequently grow in dense clusters, sometimes weighing over 30 kg when fresh. Despite their impressive size, certain *Macrocybe* species are prized for their flavourful fruiting bodies, making them a valuable food source. However, it is important to note that these mushrooms often contain toxic cyanide compounds, which must be eliminated by thorough cooking before consumption. These fungi are saprophytic, growing on the ground in grasslands or near decaying wood, and are not involved in mycorrhizal associations (Pegler et al. 1998).

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5.18.1. *Macrocybe crassa* (Sacc.) Pegler & Lodge, in Pegler, Lodge & Nakasone, Mycologia 90(3): 497 (1998)

Macrocybe crassa is reported from the Asian region, mainly in Japan, Sri Lanka, and Thailand (Thai and Keawsompong 2019) as an edible wild mushroom. Cap surface displays hues ranging from pale cream to yellowish-brown or greyish-brown, appearing smooth initially but developing minute cracks and occasional radial splits as it dries. The margin of the cap is involute and may exhibit weak crenations. Lamellae are white colour, broad, and crowded. The stipe is cylindrical shaped. The stipe surface is off-white, with brown fibrillose streaks (Inyod et al. 2017). *Macrocybe crassa* has a large fruiting body with a meaty texture and a delicious taste (Inyod et al. 2016). In 100 g, the fresh weight of this species contains protein (18.58 g), carbohydrate (10.02 g), and fat (0.287 g) (Thai and Keawsompong 2019).

5.18.2. *Macrocybe gigantea* (Massee) Pegler & Lodge, in Pegler, Lodge & Nakasone, Mycologia 90(3): 497 (1998)

Macrocybe gigantea is a large saprophytic mushroom with clamped hyphae. *Macrocybe gigantea* has been known as *Tricholoma giganteum* Massee since 1998 and is a well-known common edible mushroom in India (Razaq et al. 2016). *Macrocybe gigantea* inhabits subtropical rainforests in Asia and Africa under high temperatures and humidity. In addition to edible properties, it has medicinal values such as anti-oxidation, anti-tumour, and anti-bacterial (Li et al. 2015). The fruit bodies are medium to large. The pileus is initially convex or hemispheric when young and becomes broadly convex to nearly flat when mature. The surface is smooth and hairless, ranging in colour from pastel yellow, canary yellow, to chrome yellow when young, and transitioning to topaz brown, yellow ochre, or banana yellow as it matures. The margin is tightly curved inward when young, becoming slightly incurved when mature, lined, and matches the colour of the surface, with a smooth and uniform texture. The lamellae are adnexed, initially yellowish white or pale yellow, later becoming light yellow or pale yellow as the fruit body matures. The context is thick and fleshy and ranges from yellowish white to pale yellow. The stipe is solid and fleshy, cylindrical, elongated, and slightly club-shaped with a slightly swollen base. Its surface is smooth, often appearing canary yellow to pale yellow, with a denser squarrose texture closer to the apex and base. The odour is pleasant when young but becomes strong at maturity, while the taste is mild (Galappaththi et al. 2022b).

5.19. *Macrolepiota* Singer, Pap. Mich. Acad. Sci. 32: 141 (1948) [1946]

Macrolepiota is a genus of white-spored, gilled mushrooms belonging to Agaricaceae (Singer 1945). Prominent features are a large and fleshy pileus, squamules scattered on the pileus surface forming various patterns, and a prominent annulus, often movable (Ge et al. 2010). *Chlorophyllum molybdites* (G. Mey.) Massee is a mushroom that bears some morphological resemblance to edible species within *Macrolepiota*. However, it is poisonous and is often mistaken for edible mushrooms from *Macrolepiota*. One effective method to distinguish between *C. molybdites* and *Macrolepiota* species is by examining their spore prints. *Chlorophyllum molybdites* produces a green spore print, while *Macrolepiota* species produce a white spore print (Rizal et al. 2016). Edible *Macrolepiota* species are highly demanded due to their nutritional and culinary values (Kumari and Atri 2004). The edible *Macrolepiota* species are consumed as wild food in some African countries, China, Europe, India, North America, and northern Thailand. *Macrolepiota* species are saprobic and, therefore, have the potential to be cultivated. They can be readily isolated and grown on agar media, and they can decompose various agricultural wastes such as rice straw, rice bran, sawdust, and rice hulls (Rizal et al. 2016).

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5.19.1. *Macrolepiota dolichaula* (Berk. & Broome) Pegler & R.W. Rayner, Kew Bull. 23(2): 365 (1969)

Macrolepiota dolichaula was originally described in Sri Lanka (Ge et al. 2010), and it is an edible wild mushroom and a seasonal delicacy in China, India, Northern Thailand, Kenya, and Malawi (Boa 2004, Rizal et al. 2016). These mushrooms are terrestrial and saprophytic, often found either individually or scattered on the ground in mixed forests or along roadsides. They are distributed in southern and southwestern China (Ge et al. 2010). Macroscopically, *M. dolichaula* can be distinguished from other species of *Macrolepiota* by its notably large, umbonate pileus adorned with minute, pallid squamules and its long, slender stipe that may develop an orange hue at the base when sliced. Microscopically, it differs from other species due to its cheilocystidia, which are club-shaped to broadly club-shaped, and its squamules composed of a palisade of short, more branched, nearly cylindrical hyphae lacking clamp connections. *Macrolepiota dolichaula* contains biologically active molecules, high protein and carbohydrates, alkaloids, carotenoids, flavonoids, phenols, and vitamins A, B_1, B_2, and C, indicating its pharmacological importance. Significant amounts of carotenoids, flavonoids, phenolics, and the vitamins A, B1, B2, and C are also present in *M. dolichaula*. The presence of alkaloids in the extract and the comparatively high protein and carbohydrate contents of *M. dolichaula* are further signs that this fungus has pharmacological significance and is safe for human ingestion (Ge et al. 2010).

5.20. *Marasmius* Fr., Fl. Scan.: 339 (1836) [1835]

Marasmius Fries is a genus of gilled mushrooms characterized by diverse and complex morphological features. These include small to medium-sized marasmoid or collybioid basidiomata, a glabrous and smooth pileus with radially sulcate or grooved patterns (Asif et al. 2024). The genus was originally described in 1838 by Elias Magnus Fries (Fries 1838). It contains about 1,000 white-rot, leaf, and wood decomposer agaric species and displays a worldwide distribution (Grace et al. 2019). A few members of this genus are known as edible (Kirk et al. 2008).

5.20.1. *Marasmius crinis-equi* F. Muell. ex Kalchbr., in Kalchbrenner, Grevillea 8 (no. 48): 153 (1880)

Marasmius crinis-equi is among the more widely distributed species within its genus (Wannathes et al. 2009), and it is distributed in Africa, Asia, Oceania, North America, and South America. It is a plant pathogen (CABI 2020) and is considered an edible wild mushroom. *Marasmius crinis-equi* is used for jewellery or ornamental purposes in Congo and as a food in Hong Kong, China (Boa 2004). Cap measures between 0.5 and 4 mm in diameter, appearing convex with a central depression, papillate, striate, glabrous, dull, reddish brown to orange-brown with dark brown papilla or spot in the center. Context is cream colour and thin. Lamellae are adnate to a small collarium, narrow and cream to orangish yellow. The stipe is central, cylindrical, and glabrous appearing dark brown to black overall. There are no distinctive smells or tastes associated with it. It is known to cause ‘Horse-hair Blight,’ a pathogenic condition affecting tea, rubber, cocoa, and nutmeg crops. This fungus thrives on the leaves and stems of living or deceased trees, as well as on monocotyledonous plants and their clumps. Its rhizomorphs often cover the aerial branches of living trees. Recognizable by its small, brown to brownish-orange cap with a dark brown central tip, distant collariate gills, stem emerging directly from black rhizomorphs, and specific microscopic features such as Siccus-type pileipellis elements and cheilocystidia (Wannathes et al. 2009).

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5.21. *Oudemansiella* Speg., Anal. Soc. cient. argent. 12(1): 24 (1881)

Oudemansiella, belonging to Physalacriaceae, is widely distributed in tropical and temperate regions (Kirk et al. 2008). *Oudemansiella* species are consumed by people worldwide (Magingo et al. 2004). *Oudemansiella* is defined by characteristics such as a cap that ranges from dry to somewhat sticky, often with scattered floccules. The lamellae are typically white to off-white and spaced relatively far apart. The stem is usually central and lacks significant remnants of a veil, although there may be a rudimentary or fugacious veil. The basidiospores are notable for being large, globose to subglobose, and appearing white spore print. The cystidia on the gill edges and surfaces are well-developed. The cap surface is made up of either a layer of cells forming a polycystoderm or an ixotrichodermium, composed of chains of hyphae with variously shaped cells such as subspherical, fusiform, keg-shaped, filamentous, or rod-shaped (Alberti et al. 2020). Several *Oudemansiella* species are known to contain bioactive compounds, including mucidin, oudenone, oudemansin, lectin, and polysaccharides. These compounds exhibit various beneficial properties such as antihypertensive, immunostimulatory, anti-cancer, antimicrobial, and antibiotic effects. Additionally, they have shown inhibitory effects on sarcoma 180 and Ehrlich carcinoma in mice (Xu et al. 2016).

5.21.1. *Oudemansiella canarii* (Jungh.) Höhn., Sber. Akad. Wiss. Wien, Math.-naturw. Kl., Abt. 1 118: 276 (1909)

Oudemansiella canarii is an edible mushroom of Agaricales (Boa 2004, Xu et al. 2016) found in tropical America, Southeast Asia, and Australia. This species thrives on living, decomposing, or dead logs of both gymnosperm and angiosperm trees. They can be found either solitary or in small clusters of 1 to 5 basidiomes (Alberti et al. 2020). The basidiomata of this species grow clustered in small groups. The cap can reach up to 65 mm in diameter, starting as hemispherical-convex when young and then becoming plano-convex to flat. Initially, the cap appears dark brown and becomes lighter when dehydrated, transitioning to brownish-orange, yellowish-brown, and ultimately yellow-white at the center, with the margin turning yellowish-white to white as it matures. The surface is smooth or occasionally has scattered patches of veil, forming small, pressed, dark brown to yellowish-brown scales. In young specimens, these scales are embedded in the glutinous surface. The margin is smooth with tiny fragments of veil when young. The context is thin and appears white to ash or pale. Its odour is reminiscent of flour, which becomes more pronounced and sweeter when dried. The gills are initially adnate with a small descending extension when young then become adnate to adnexed, appearing white when young and sometimes yellowish-white when mature. Lamellulae occur in one or two orders. The stem is central, straight, or slightly curved, cylindrical, tapering towards the apex, with a bulbous to slightly bulbous base. The stipe appears white to pale, matching the colour of the gills, and is solid, firm, and fibrous. The surface is dry and longitudinally fibrillose, with small remnants of veil toward the apex, which disappear as the specimen matures (Alberti et al. 2020). This species is used by people in Papua New Guinea, Congo, and Mexico for its edible properties (Boa 2004). *Oudemansiella canarii* is a well-known as a valuable source of bioactive molecules (such as phenolic compounds), antioxidants (Acharya et al. 2019), antimicrobial properties, and containing antifungal compounds such as oudemansin A (Rosa et al. 2005).

5.22. *Panaeolus* (Fr.) Quél., Mém. Soc. Émul. Montbéliard, Sér. 2 5: 151 (1872), *Copelandia* Bres., Hedwigia 53(1-2): 51 (1912) [1913] Synonym

Most *Panaeolus* species comprise a delicate pileus and a long, thin, fragile stem. They grow abundantly in grasslands on dead moss, dead grasses, sand dunes, decayed wood, and dung, and are distributed in the tropics and neotropics in both hemispheres. A common feature of most species in the genus indicates the presence of hallucinogenic compounds such as psilocin,

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as well as other psychoactive compounds such as psilocybin and related alkaloids (Guzmán et al. 2000).

5.22.1. *Panaeolus cyanescens* Sacc., Syll. fung. (Abellini) 5: 1123 (1887) (Synonym: *Copelandia cyanescens* (Sacc.) Singer, Lilloa 22: 473 (1951) [1949])

Panaeolus cyanescens (Bk. & Br.) Sing. is also known as *Copelandia cyanescens* (Bk. & Br.) Sacc. This species is generally recognized as a hallucinogenic mushroom that produces psychoactive compounds namely psilocybin and psilocin. Pileus exhibits a broad parabolic to broadly convex shape with a smooth, hygrophanous surface. The colour is yellowish-white overall, with a light-yellow central region that transitions to bluish grey to dark blue when wounded, producing a distinctive colour change. The margin is non-striated, acute to slightly reflexed. Lamellae are adnate and crowded and feature two lamellullae, with a smooth to slightly crenate edge. The discolouration is paler toward the center and gradually deepens towards the sides, presenting a fleshy consistency in medium grey to grey with visible spots. The stipe is central, cylindrical, and either equal or slightly bulbous at the base. It is fistulose and exhibits a smooth to slightly fibrillose surface, becoming slightly velutinous near the apex. Some specimens may display a white mycelial pad. The colour of the stipe varies, being yellowish-white to yellowish-grey at the apex and brownish-grey at the base, turning bluish when touched on the pileus. The context exhibits a fleshy texture. There is no discernible veil. The spore print is dark grey (Silva-Filho et al. 2018). This species grows in tropical and neotropical areas in both hemispheres and is widely grown worldwide, including in Africa, Australia, Europe, South America, Hawaii, India, and Tasmania (Stijve 1992). It is commonly found in environments conducive to coprophilous conditions, particularly thriving on cow dung within human-made pastures (Wartchow et al. 2010). *Panaeolus cyanescens* is edible but psychoactive, thus used as a psychoactive agent in Costa Rica (Boa 2004).

5.23 *Parasola* Redhead, Vilgalys & Hopple, Taxon 50(1): 235 (2001)

Parasola Redhead, Vilgalys & Hopple consists of small coprinoid mushrooms in Psathyrellaceae, displaying a range of colours such as ochre-orange, lilac, and brownish tones (Szarkándi et al. 2017). *Parasola* species are saprotrophs that feed on decaying organic material in environments such as bare soil, grasslands, woody debris, and herbivore dung. The primary features used to identify species within this genus are the shape and size of their basidiospores (Hussain et al. 2018a).

5.23.1 *Parasola plicatilis* (Curtis) Redhead, Vilgalys & Hopple, in Redhead, Vilgalys, Moncalvo, Johnson & Hopple, Taxon 50(1): 235 (2001)

Synonyms for *Parasola plicatilis* include *Coprinus plicatilis* (Curtis) Fr. and *Agaricus plicatilis* Curtis. This species is commonly known as the Pleated Inkcap or Little Japanese Umbrella. It is a saprobic mushroom and occurs in short grassy lands. *Parasola plicatilis* is commonly distributed in Britain and Ireland. This mushroom is also found throughout mainland Europe as well as in many other parts of the world including North America (First Nature 2022). The pileus starts as ellipsoid or ovoid, then becomes campanulate to convex, and finally plane, sometimes with a depressed center. It is smooth and can range in colour from yellowish brown and reddish brown to pale ochre. The center is darker, transitioning to a greyish colour at the edges, with a striated margin. The free blades form a disk, radiating outward, loosely packed, and not very deliquescent. They are initially greyish beige, later turning black. The stem is thin, translucent, smooth, very fragile, and weakly bulbous at the whitish base. The flesh is thin and greyish-white. Spores are ovoid lentiform, broadly mitriform, convex, or flattened at the base, rounded at the apex, lentiform, smooth, with a rounded eccentric germinal pore. Basidia are tetrasporic. Cheilocystidia are lageniform. Pleurocystidia range from lageniform to ventrous.

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The species is typically solitary and emits a sweet smell (Pauline et al. 2022). In China, this species is considered edible for its medicinal value (Boa 2004, Bessette et al. 2007).

5.23.2 *Parasola setulosa* (Berk. & Broome) Redhead, Vilgalys & Hopple, in Redhead, Vilgalys, Moncalvo, Johnson & Hopple, Taxon 50(1): 236 (2001)

According to Okhuoya et al. (2010), *Parasola setulosa* is an edible wild mushroom in Nigeria. This species tends to cluster and grow prominently and can be found widely distributed on decomposing wood. It holds significance among Chinese locals who employ it for detoxification purposes and to alleviate swelling (Ma et al. 2018).

5.24. *Phallus* Junius ex L., Sp. pl. 2: 1178 (1753)

Phallus is part of the group commonly referred to as stinkhorn fungi, which are classified within Phallaceae. It has a worldwide distribution in tropical regions and is prevalent in Africa, southern Asia, Australia, and America. These species thrive in woodlands and gardens, typically in nutrient-rich humus soil or decaying woody material. At maturity, they emit a foul-smelling, fetid odour that serves to attract insects and aids in the dispersal of basidiospores through these insects (Odamtten). Stinkhorns are non-poisonous. They are consumed in various ways, including in soups, as salad toppings, incorporated into sausages and pickled items, and even used as a short-term food preservative (Phillips et al. 2018).

5.24.1. *Phallus indusiatus* Vent., Mém. Inst. nat. Sci. Arts 1: 520 (1798)

Phallus indusiatus belonging to Phallaceae (Das et al. 2007) is known as stinkhorn mushroom. This species is saprobic in nature, obtaining nutrients by decomposing wood and organic matter from plants. The tropical regions where this species is found include Africa, South America, Central America, and Tobago. In North America, its distribution is limited to Mexico. Additionally, it is also found in Asian regions (Mortimer et al. 2014). In Madagascar, *P. indusiatus* was reported as an edible species though it is also known as poisonous (Boa 2004). This species grows on dead tree trunks and occasionally beneath the soil, producing reproductive structures known as “eggs” in their early stage, characterized by a prominent rhizomorph at the base, situated in the substrate. When young, the eggs are hypogeous but epigeous as they mature. The mature stinkhorn can reach heights of up to 15 cm and is encircled by a net-like structure called the indusium or “skirt,” which hangs around 7 cm from the conical cap. The openings in the skirt’s netting are either round or polyhedral. The cap, ranging from 2–4 cm in height, is coated with a greenish-brown slime known as “gleba”. The stalk measures 7–12 cm in height and 0.2–0.5 cm in diameter. A mature basidiocarp stands approximately 12–14 cm tall, with a white receptacle measuring 1.8–2.8 cm in thickness, cylindrical, spongy, and perforated, with a bulbous base. The volva is 2.4–2.8 cm in diameter, white, and thick. 15–30 days of life cycle, including both vegetative and reproductive stages (Dash et al. 2010). *Phallus indusiatus* is highly valued for its visually appealing appearance, delightful taste, and significant nutritional content, as well as its bioactive compounds with notable medicinal properties. This species is renowned for its diverse array of bioactive compounds, which contribute to its extensive nutritional and medicinal benefits for humans. It demonstrates antioxidative, anti-stress, anti-tumour, anti-inflammatory, anticancer, antibacterial, immunomodulatory, hepatoprotective, and antidiabetic activities. Additionally, it contains various vitamins. The primary active components of this fungus include polysaccharides, flavones, vitamins, and unsaturated fatty acids (Mazumder et al. 2022).

5.25. *Phlebopus* (R. Heim) Singer, Annls mycol. 34(4/5): 326 (1936)

Phlebopus belonging to Boletinellaceae is distributed in tropical and subtropical areas worldwide. It is characterized by an olivaceous brown spore print, hyphae with clamp

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connections, and ellipsoidal smooth basidiospores (Pham et al. 2012). Numerous reports have been made of *Phlebopus* species being both edible and nutritious. These mushrooms are highly esteemed delicacies in many Asian and South American countries and often fetch a higher price than other edible wild mushrooms (Raghoonundon et al. 2021).

5.25.1. *Phlebopus portentosus* (Berk. & Broome) Boedijn, Sydowia 5(3-6): 218 (1951)

Phlebopus portentosus (Berk. & Broome) Boedijn (Fig. 1) is a highly sought-after edible wild mushroom found in the pantropical region, particularly in Yunnan and Panzhihua of Sichuan, as well as southern Guangxi Province in China. It has also been discovered in Thailand and Sri Lanka. The cap of *P. portentosus* is convex and smooth. Initially, the margin is involute. The stem is thick, and nearly smooth, with grooves and ridges at the base, reaching up to 12 cm in length and 7 cm in width at the base, tapering to 4 cm near the top. Its colour is a dull blackish-brown, with innate dark fibrils. The context appears pale yellow, similar to Massicot yellow, and upon cutting, may gradually turn bluish in some areas, taking on shades of pale Niagara green to pale glaucous blue. The context within the stalk is dirty yellow, eventually becoming brownish with age. The basidia are club-shaped and four-spored. The spores themselves are yellowish-brown, ranging from oval to subglobose in shape, with a prominent central gutta. No cystidia are present (Boedijn 1951). Notably, *P. portentosus* is unique among Boletales species in its ability to produce sporocarps in culture without relying on a host plant. *Phlebopus portentosus*, along with mealy bugs, create a unique structure known as a "fungus-insect gall" on the roots of host plants. The honeydew secreted by mealy bugs serves to attract and facilitate the growth of *P. portentosus* mycelium, leading to the formation of a fungus-insect gall. This attraction occurs because the honeydew is abundant in amino acids and sugars, which provide essential nutrients for the mycelium to thrive. Unlike typical insect galls, this structure is distinctive because its crusty walls are formed by the mycelia of *P. portentosus* rather than by plant tissues (Fang et al. 2020). It is commonly found in association with *Dimocarpus longan* Lour., *Elaeocarpus hygrophilus* Kurz., *Mangifera indica* L., *Mimosa pigra* L., *Syzygium cumini* (L.) Skeels, and various *Quercus* species (Kumla et al. 2012). The retail price of this mushroom exceeds that of cultivated varieties due to its superior flavour and texture, elevated protein levels, and reduced fat content (Sanmee et al. 2010).

5.26. *Pleurotus* (Fr.) P. Kumm., Führ. Pilzk. (Zerbst): 24 (1871)

Pleurotus contains lignolytic fungi belonging to Pleurotaceae (Cohen et al. 2002). *Pleurotus* species are commonly known as oyster mushrooms. They are distributed in almost all latitudes showing a cosmopolitan distribution, except in Antarctica. They either inhabit as a saprotrophic on rotten wood or parasitic on living trees (Grabarczyk et al. 2019). Most *Pleurotus* species have been recorded as edible because of their unique texture and flavour (Kirk et al. 2008). *Pleurotus* species have high nutritional and medicinal value and therapeutic properties, and are applicable for various environmental and biotechnological applications (Cohen et al. 2002).

5.26.1. *Pleurotus djamor* (Rumph. ex Fr.) Boedijn, Rumphius Memorial Volume: 292 (1959)

Pleurotus djamor (Fr.) Boedijn (Fig. 1) is a common meal to tribal communities of Tripura, India, and is popular as a substitute for soybeans and eggs in the rural markets and along the Assam-Agartala national highway, India. *Pleurotus djamor* is a good source of antioxidants (Saha et al. 2012). According to Inci et al. (2024), *P. djamor* obtained from different compost materials contains dry matter (89.9–91.4%), moisture (8.6–10.1%), energy (250.8–277.5 kcal), protein (22.0–41.2%), fat (1.1–1.7%), ash (5.8–9.6%), organic matter (82.0–84.1%), and nitrogen-free extract (20.3–38.2%).

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5.26.2. *Pleurotus giganteus* (Berk.) Karun. & K.D. Hyde, in Karunarathna, Mycotaxon 118: 62 (2011) [2012]

Pleurotus giganteus (Fig. 1), was originally described from Sri Lanka (Berkeley 1847). A synonym of *P. giganteus* (Berk.) Karun. & K. D. Hyde (Karunarathna et al. 2012) is *Lentinus giganteus* Berk. *P. giganteus* is reported from Sri Lanka, Thailand (Klomklung et al. 2012), Australia, Vietnam (Pegler 1983), Oceania (Bi et al. 1993) and China (Bi et al. 1993, Phan et al. 2012). This valuable species is commonly known as "Ūrukammal Hatu" (Hewage 2015) or "uru paha" which is one of the largest edible mushrooms in Sri Lanka. Also, this species is well noted in Buddhist literature, treated as a special food since ancient times (Berkeley 1847, Udugama and Wickramaratna 1991). The cap is strongly convex to applanate and later becomes a slight depression at the center. Its colour ranges from dark brown to light brown camel towards the margin and greyish orange at the marginal area. The surface is fibrillose-scaly at the center, initially dark brown, fuliginous, or black, fading with age to pale ochraceous or yellowish brown, often with a darker center. The margin is strongly rolled inward, then straight, thin, and slightly grooved. The gills are moderately crowded, with lamellulae of various lengths, decurrent, slightly interveined, and sometimes connecting over the apex of the stipe. The stipe is fusiform, with a rooting base, solid, and concolorous with the pileus. Its surface is finely tomentose with indefinite zones of paler velar remnants in the early stages. The veil is thin, floccose, pale to dark brown soon reduced to floccose remnants but never forming an annulus on the stipe. The context is thick at the disk, submembranous at the pileal margin, appearing white in both the pileus and stipe, fleshy-spongy, and composed of a dimitic hyphal system with skeletal hyphae. *Pleurotus giganteus* is saprobic on buried well-rotted wood in forests and widely consumed in Sri Lanka (Karunarathna et al. 2012), China (Dai et al. 2010), and Thailand, where it is successfully cultivated (Karunarathna et al. 2012). Recently, an experimental approach for cultivating this mushroom artificially in Sri Lanka was developed (Namalee et al. 2015, Namalee 2019). However, in that study, the mushroom exhibited an excessively lengthy fruiting period. Consequently, additional research was recommended to reduce the fruiting time in preparation for commercial cultivation. The aqueous and ethanolic extracts of *P. giganteus* are important in their medicinal values because they contain compounds responsible for liver protection, genoprotection, and antioxidant properties (Wong et al. 2012). Experiments reveal that *P. giganteus* extracts stimulate the neurite outgrowth of PC12 cells with no detectable cytotoxic effect in rats (Phan et al. 2012).

5.26.3. *Pleurotus tuber-regium* (Fr.) Singer, Lilloa 22: 271 (1951) [1949]

Pleurotus tuber-regium (Fr) is a highly nutritious mushroom species well known in different parts of the world (found in tropical countries) (Watling 1993, Kues and Liu 2000, Manjunathan and Kaviyarasan 2010). Local people in Tanzania and Congo used this species as food and medicine (Boa 2004). *Pleurotus tuber-regium* is a popular culinary wonder due to its meaty taste and biting texture. The pileus, ranging from 6 to 12 cm in diameter, is hard, rigid, and dry, exhibiting a deeply depressed, infundibuliform shape. The surface is pale yellow to yellowish-white, smooth, and velvety at the center, with a fleshy texture. When young, the margin is inrolled, later becoming entire. The lamellae are deeply decurrent, ranging from yellowish-white to creamy, thin, and crowded with lamellulae of varying lengths. The central stipe measures 5 to 11.5 cm in length and 0.7 to 1.5 cm in diameter, slightly tapering downwards. The stipe is pale yellow, cylindric, hard, woody, and solid, with a velvety surface There is no veil present. The context is hard, thick, and pale yellow, with a dextrinoid nature. This species is characterized by its pale yellow infundibuliform pileus, well-developed long radicated stipe inserted into the wood substrate, cylindric spores with a prominent apiculus, and a thick trichodermial pileipellis (Manjunathan et al. 2018). The wild *P. tuber-regium* contains carbohydrates (55.8%), protein (25%), moisture (9.4%), total ash (4.7%), crude fiber

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(3.6%), fat (1.6%), potassium (7.53 mg/gm), calcium (2.66 mg/gm), magnesium (2.45mg/gm), sodium (1.2mg/gm), iron (0.53mg/gm), copper (0.11 mg/gm), zinc (0.41 mg/gm), manganese (0.08 mg/gm) and energy (331 kcal) (Manjunathan and Kaviyarasan 2010). Further, it is a valuable medicine against diarrhoea (Burkill 1966, Sumaiyah et al. 2007), and it has been used in many herbal preparations for cough, indigestion, and dysentery (Chang and Lee 2004). *Pleurotus tuber-regium* has been utilized in traditional medicine to address a range of health issues such as headaches, high blood pressure, smallpox, asthma, colds, and stomach problems (Wani et al. 2010).

5.27. *Russula* Pers., Observ. mycol. (Lipsiae) 1: 100 (1796)

Russula species, belonging to *Russulaceae*, encompass ectomycorrhizal fungi (Panda and Tayung 2015). The genus has over 750 species worldwide and accounts for economically valuable edible mushrooms. *Russula* has a global distribution, with over 2,000 species that are commonly associated with a diverse array of host trees, including both broadleaf and coniferous species, across various ecosystems. *Russula* species are characterized by their convex to funnel-shaped caps, which possess a structure consisting of heteromerous tissues and spores featuring amyloid ornamentation (Kaewgrajang et al. 2020). Numerous *Russula* species have been studied for their ecological, socio-economical, industrial, and medical value. Recently, some *Russula* species have been found to possess immunostimulatory, anticancer, anti-inflammatory, and beneficial antioxidant properties (Kostic et al. 2020).

5.27.1. *Russula virescens* (Schaeff.) Fr., Anteckn. Sver. Ätl. Svamp.: 50 (1836)

Russula virescens is an edible mushroom in Northern Odisha, India, and it fruits from June to November (Panda and Tayung 2015). The cap of these mushrooms usually spans from 2 to 6 inches in diameter, displaying a flat to slightly depressed center. Its colouration ranges from green to greyish-green or olive; as it matures, the solid hue reveals white flesh underneath. The gills are white and free, and the spores they release are also white. The stem measures 1 to 3 inches in length, often appearing thick and tapering near the base or at both ends. These mushrooms tend to grow solitary (Miller and Halls 1969). *Russula virescens* boasts high levels of mineral elements, amino acids, and vitamins. Polysaccharides are another key active component found in *R. virescens*, known for their antioxidant and anti-tumour properties (Shen et al. 2022).

5.28. *Schizophyllum* Fr. [as 'Schizophyllus'], Observ. mycol. (Havniae) 1: 103 (1815)

Schizophyllum, belonging to *Schizophyllaceae*, is characterized by several key features (Carreño-Ruiz et al. 2019). The pileus is conchate, flabelliform, dimidiate, or spatulate in shape, with lobed or dentate margins. The surface of the pileus is villous and greyish-white, and the texture is dry and leathery. The hymenium is located on split gills that are longitudinally divided into two parts. These split gills can fold into the hymenophoral trama during extended periods of drought to protect spores, or they can open during periods of adequate moisture to release spores. Microscopically, the pileus surface exhibits a villous layer, also known as a “pellicle,” composed of interwoven hyphae. The length and density of these hyphae can vary between species. The spores are typically hyaline, cylindrical, or elliptical (Carreño-Ruiz et al. 2019).

5.28.1. *Schizophyllum commune* Fr. [as 'Schizophyllus communis'], Observ. mycol. (Havniae) 1: 103 (1815)

Schizophyllum commune (Fig.1) is commonly called split gill mushrooms which are distributed around the world, except Antarctica (Chang and Lui 1969, Adejoye et al. 2007). *Schizophyllum commune* can be found on fresh woodcuts, trunks of fallen trees, dead woods, and on more

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than 300 live plant hosts (Vázquez-Mendoza 2012). It fruits throughout the year (Degreef et al. 1997) and can survive during the dry season on woods exposed to the sun (Mata 1999). Due to its cartilaginous texture, it is more resistant to decomposition in tropical climates (García et al. 2018). This species has medicinal value and edible properties and is utilized in Costa Rica, Peru, Mexico, Malawi, and Zambia (Boa 2004). In Sri Lanka, it is locally known as "*Lena Hatu*" (Hewage 2015). The pileus ranges from 4 to 64 mm in width and 4 to 44 mm in length, displaying a flabelliform, semicircular to spatulate shape, and may be sessile or semi-stipitate. Its margin is lobed, crenate, irregular, ragged, and slightly rolled toward the hymenium. The surface is villous and soft to the touch, with hairs often matted. The pellicle measures 151 to 213 μm in thickness and may appear white, light grey, dark grey, light yellow, or light brown, with a zonate or azonate appearance that varies in colour. The hymenium features split gills, appearing white, dark grey, light brown, light yellow, or beige. Abhymenial hairs are simple and hyaline and cling to the surface opposite to the gills, with granules frequently incrusted along the outer third of their length near the apex. The spores are cylindrical, hyaline, apiculate, obliquely, and measure 4.5 to 7.2 × 1.5 to 3 μm. These mushrooms may appear either alone or in large clusters, exhibiting a saprotrophic or parasitic lifestyle consistency (Carreño-Ruiz et al. 2019). Proximate analysis of wild *S. commune* revealed 52% moisture, 4.5 % fat, 6.1 % Protein, 0.002 fiber, 35.59 % Carbohydrate, and 2 % ash (2.0) (Herawati et al. 2016). *S. commune* is known for containing antioxidant, antitumor, antibiotic, anti-carcinogen, and anticancer properties (Ooi and Liu 2000).

5.29. *Termitomyces* R. Heim, Mém. Acad., Sci., Paris 44: 72 (1941)

Termitomyces, belonging to Lyophyllaceae, comprises valuable species of both edible and medicinal properties (Mueller et al. 2005, Aanen et al. 2009). They bear a mutualistic relationship with termites (Mukiibi 1973) and are frequently reported in Asia and Africa (Mueller et al. 2005, Aanen et al. 2009). Certain species of *Termitomyces* mushrooms are grown on mound surfaces and other surrounding grounds during the rainy season. *Termitomyces* species form a symbiotic association with termites belonging to subfamily Macrotermitinae, with all species growing on the fungal comb within termite nests. In the field, *Termitomyces* species are identified by their more or less elongated pseudorrhiza, which can extend up to 60 cm in length. Almost all species possess this characteristic, with very few exceptions. Additionally, they are distinguished by the special structure of the typically free lamellae, perforatorium, and a spore print that appears pinkish (Tang et al. 2020). *Termitomyces* are very slow growers on culture media, and it is rather difficult to isolate them from their natural habitat due to the presence of many other fungi (Sargunam et al. 2012, Nakalembe et al. 2015). *Termitomyces* species also have shown antitumor, antioxidative, antimicrobial, and anti-inflammatory properties and bio-remedial activity (Singha et al. 2019).

5.29.1. *Termitomyces eurrhizus* (Berk.) R. Heim [as 'eurhizus'], Arch. Mus. Hist. Nat. Paris, ser. 6 18: 140 (1942)

Termitomyces eurrhizus is an edible mushroom in Dindori District, Madhya Pradesh in India (Verma et al. 2019), and in Sri Lanka. In Sri Lanka, this species is known as "Indalolu Hathu". It is a fleshy large agaric species with a cap exhibiting a vinaceous brown colouration, broadly conical umbo, and white gills. These mushrooms can be found frequently either solitary or scattered in soil, possess a pleasant odour, and have an excellent taste making them edible. The pileus is initially conico-campanulate, becoming applanate and eventually upturned, featuring a black, broadly conical umbo and a thin, silky-striate margin that is irregular, crenulate, and incised. The colour of the pileus ranges from greyish brown to fading vinaceous brown, with a paler colour towards the margin. It appears smooth, with radial rugulose texture, and is viscid or slimy when wet, otherwise semi-slimy. The context of the pileus is white, fleshy, and thick.

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The lamellae are whitish cream, free to adnexed, moderately crowded, broad, and regular. The stipe is cylindrical, central, and slightly swollen or bulbous near the soil surface. The stipe appears creamish white, smooth, solid, fibrillose, and without annulus. The basidiospores are hyaline, broadly ellipsoidal, and smooth (Karun and Sridhar 2013). Nutritional compositions of *T. eurrhizus* contain moisture (92.08 g/100g), ash (11.52 g/100g), crude fat (6.27 g/100g), crude protein (29.40 g/100g), and insoluble fiber (26.64 g/100g) (Gunasekara et al. 2021).

5.29.2. *Termitomyces heimii* Natarajan, Mycologia 71(4): 853 (1979)

Termitomyces heimii is another popular edible mushroom among Sri Lankan communities. It is a large fleshy mushroom with a white cap, long stipe with annulus, and pale pinkish lamellae. These mushrooms can be found either gregarious or in small to large troops on termite mounds or soil, and are common. They possess a pleasant odour and excellent taste, making them edible. The cap surface is silky, smooth, and fibrillose. Pileus context is white, fleshy, and thick (Karun and Sridhar 2013). Nutritional composition of *T. heimii* contains moisture (92.79 g/100g), ash (13.58 g/100g), crude fat (12.35 g/100g), crude protein (28.54 g/100g), and insoluble fiber (22.72 g/100g) (Gunasekara et al. 2021). Besides, the species is also considered an edible wild species in Malaysia, China, and India (Boa 2004).

5.29.3. *Termitomyces microcarpus* (Berk. & Broome) R. Heim, Arch. Mus. Hist. Nat. Paris, ser. 6 18: 128 (1942)

In Sri Lanka, this mushroom is commonly known as “Heenveli Hathu” (Hewage 2015). These mushrooms are grown on mounds of *Odontotermes redemanni* Wasmann. It is known that certain *Termitomyces* species grow as fruiting bodies, or mushrooms, on the surface of the mound and other nearby ground during the rainy season. It is revealed that about 90–135 fruit bodies arise in each place with the occurrence of six mushrooms per square inch (Gowda and Rajagopal 1990). The cap is convex with a depressed center. Its surface is dry and white, with an irregular margin that is inrolled. The context is white with a mild taste. The gills are free, narrow, and soft with serrated edges, ranging in colour from white to cream. The stipe appears white and dry with a central, glabrous surface. The basidiospores are ovate to elliptical, and exhibit a smooth pinkish appearance, sometimes appearing white or yellowish. Basidia are clavate with four sterigmata up to 3.0 µm long. The pileus cuticle is filamentous, and interwoven, while the hymenophoral trama appears irregular. The stipe cuticle is parallelly arranged, and hyaline (Chaubey et al. 2010). *Termitomyces microcarpus* (Fig. 1) is an edible mushroom in India (Verma et al. 2019), Nigeria, Malawi, and Congo (Boa 2004). Because of their exquisite taste and excellent nutritional value as food for humans, these mushrooms are highly priced (Gowda and Rajagopal 1990). Wild *T. microcarpus* has proximate compositions of ash (15.13%), crude protein (27.42%), crude fiber (3.95%), crude lipid (3.34 %), total carbohydrate (37.12%) and moisture (16.99%) (Nakalembe et al. 2015).

5.30. *Tremella* Pers., Syn. meth. fung. (Göttingen) 2: 622 (1801)

Tremella is a member of Tremellaceae (Peng et al. 2005) and it includes approximately 90 species. More than half of reported species are known as species that exclusively parasitize specific lichenized fungal hosts. In China and other Asian countries, some species of the genus have been used as food and medicine (Zhao et al. 2019).

5.30.1. *Tremella fuciformis* Berk., Hooker's J. Bot. Kew Gard. Misc. 8: 277 (1856)

Tremella fuciformis (Fig. 1) is also known as snow ear or white fungus (Ma et al. 2021). They can be found in tropic, subtropic, and temperate zones. This species is considered a major wild medicinal macro fungus, and it has been successfully cultivated for the generation of value-added products (Boa 2004). The basidiocarps of this species are sessile and foliose, featuring

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undulate caespitose lobes. These lobes have crenate or notched margins and can reach diameters of up to 5 cm. They are attached to the substratum by a central point. The consistency of the basidiocarps is firmly gelatinous. When fresh, they appear white; in dry conditions, they take on a whitish-yellow colour. They grow on the wood of deciduous trees (Malysheva et al. 2015). *Tremella fuciformis* polysaccharide (TFP) has an excellent moisturizing effect and anti-wrinkle effect. It can improve the skin texture, increase skin flexibility, and lower skin harshness (Lai et al. 2010). According to Li (2004), *T. fuciformis* polysaccharides have anti-aging effects by regulating transcription and expression of cell cycle negative regulator P21, strengthening immunity and autoxidation. Furthermore, *T. fuciformis* bears immune regulation and antitumor activity, neuroprotective effect, antioxidant, and anti-inflammatory properties (Ma et al. 2021). This is also an edible and medicinal species in China (Boa 2004).

5.31. *Tricholoma* (Fr.) Staude, Schwämme Mitteldeutschl. 1: xxviii, 125 (1857)

Tricholoma, belonging to Tricholomataceae, produces white-spored terrestrial mushrooms that are fleshy and relatively robust (Thai and Keawsompong 2019). *Tricholoma* exhibits a global distribution, although it appears to be most prevalent in temperate and subtropical areas in both the northern and southern hemispheres. It is noteworthy that all recognized species are either confirmed or presumed to engage in ectomycorrhizal relationships. These associations primarily occur with trees belonging to Pinaceae, Betulaceae, and Fagaceae. However, some species within the genus also form associations with other plant species such as *Eucalyptus*, *Dryas*, and *Helianthemum* (Heilmann-Clausen et al. 2017). The cap is hemispherical to obtusely flatten or, when young, somewhat bell-shaped with a thin incurved margin. The gills are of unequal length and emarginated or rounded where they approach the stalk. These are ectomycorrhizal or, in some cases, arbutoid mycorrhizal (Trudell 2012).

5.31.1. *Tricholoma crassum* Sacc., Syll. fung. (Abellini) 5: 109 (1887); Current name: *Macrocybe crassa* (Sacc.) Pegler & Lodge, in Pegler, Lodge & Nakasone, Mycologia 90(3): 497 (1998)

Tricholoma crassum, also known as *Macrocybe crassa* (Sacc.) Pegler & Lodge is reported in the Asian region, mainly in Japan, Sri Lanka, and Thailand (Thai and Keawsompong 2019) as a wild edible mushroom. Cap surface displays hues ranging from pale cream to yellowish-brown or greyish-brown, appearing smooth at first but developing minute cracks and occasional radial splits as it dries. The margin of the cap is involute and may exhibit weak crenations. Lamellae are white colour, broad, and crowded. The stipe is cylindrical shaped. The stipe surface is off-white, with brown fibrillose streaks (Inyod et al. 2017). *Tricholoma crassum* has a large fruiting body with a meaty texture and a delicious taste (Inyod et al. 2016). In 100 g fresh weight, *T. crassum* contains protein (18.58 g), carbohydrate (10.02 g), and fat (0.287 g) (Thai and Keawsompong 2019).

5.32. *Trogia* Fr., Fl. Scan.: 339 (1836) [1835]

Trogia belongs to Marasmiaceae (Kumar and Manimohan 2009). There are about 93 species reported under *Trogia* (Dutta et al. 2017). *Trogia* encompasses a variety of fruit body types, including clitocyboid mushrooms, which have gills lacking partial veils and produce white, yellowish, or pinkish spore prints. Additionally, there are omphalinoid mushrooms within the genus, which are characterized by their decurrent gill attachment, cartilage-like stem, broad or depressed cap surface, and the absence of a ring and volva. These mushrooms thrive on decaying wood or woody substrates for their growth. In terms of use, *Trogia* species are known as wood-rotting fungi. They contain enzymes capable of breaking down lignin, a complex polysaccharide that contributes significantly to the strength of wood (Mortimer et al. 2014).

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5.32.1. *Trogia infundibuliformis* Berk. & Broome, J. Linn. Soc., Bot. 14(no. 73): 45 (1873) [1875]

Trogia infundibuliformis grows scattered or in groups on decaying twigs on the forest floor (Kumar and Manimohan 2009). *Trogia infundibuliformis* is distributed in Africa, Thailand, Malaysia, and Sri Lanka (Desjardin and Perry 2017). It is considered an edible wild species in Congo, India, and Malawi (Boa 2004). *Trogia infundibuliformis* exhibits colours ranging from lilac-pink to light brown. Its cap is typically deep, thin, translucent, and often slightly conical or funnel-shaped, measuring up to 1–4 cm in depth. The cap is lined with grooves extending from the center to the edge, which curls at the edges. The stipe is solid, measuring 0.2–4 cm in length, cylindrical, and tapers down, matching the colouration of the cap. The flesh is resilient and white. Basidiospores are ellipsoid or conical with smooth walls (Mortimer et al. 2014).

5.33. *Volvariella* Speg., Anal. Mus. nac. Hist. nat. B. Aires 6: 119 (1898) [1899]

Volvariella belonging to Pluteaceae is characterized by very small to large basidiocarps with a volva. The members of this genus are widely distributed in tropical, subtropical, and temperate regions of both the western and eastern hemispheres (Acharya et al. 2012). Most species of *Volvariella* share common characteristics. The stipe has a volva at the base and lacks an annulus. The lamellae are free and crowded. Fruiting bodies decay rapidly, and the spore print colour is pink to brownish when fresh. Spores have thin to somewhat thick walls. These mushrooms typically grow on humus soils or well-decayed wood (Seok et al. 2002).

5.33.1. *Volvariella diplasia* (Berk. & Broome) Singer, Lilloa 22: 401 (1951) [1949]; Current name: *Volvariella diplasia* (Berk. & Broome) Singer, Lilloa 22: 401 (1951) [1949]

Volvariella diplasia is considered an edible wild mushroom in India (Boa 2004). The mycelium of *V. diplasia* was discovered to contain essential amino acids which play a crucial role in building the proteins necessary for the proper functioning of our bodies (Ghosh et al. 2008). The nutritional composition of *V. diplasia* mainly contains carbohydrates (57.40%), protein (28.50%), lipid/fat (2.60%), ash (11.50%) and fiber (17.40%) (Ghosh 2020).

5.33.2. *Volvariella glandiformis* (Berk. & Broome) Pegler, Kew Bull., Addit. Ser. 12: 228 (1986)

Volvariella glandiformis is an edible wild mushroom and is used to cure wounds and lower hypertension. It can be found and cultivated on rotting paddy straw and fruits from June to November in Odisha, India (Panda and Tayung 2015). Initially, pileus is convex becoming applanate and subumbonate. The surface of the pileus is white to greyish at the disc and sometimes pinkish close to the margin. The pileus margin is entire, straight, weakly striate, and appendiculate with easily vanishing white silky hairs. The stipe is cylindrical, central, and solid. Stipe surface is white and glabrous. Volva is white and 3–5 lobed. *Volvariella glandiformis* has a pleasant mild odour. They may grow solitary to scattered in pairs (Pradeep et al. 1998).

5.33.3. *Volvariella terastia* (Berk. & Broome) Singer, Mushrooms and Truffles: Botany, Cultivation, and Utilization: 114 (1961)

Volvariella terastia is an edible mushroom reported in India (ENVIS Centre: Kerala 2022) that grows on litter (Manoharachary and Nagaraju 2017). Pileus is broad appearing convex to plano-convex and broadly umbonate. The pileus surface is white, with brownish beige to brown appressed scales, more concentrated in the middle. The margin of the pileus is regular, fimbriate, and splitting at maturity. Context is up to 1.0 cm thick, white, and unchanging. Possesses mild taste and odour. Lamellae appear white, free, close, broad, and unequal. Gill edges are serrated and white with truncated lamellulae. The spore print is orange-grey. The stipe is white, central, scaly, and narrowing upward with a bulbous base. Volva up to 5.3 cm,

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3–5 lobed, saccate, large, fleshy, aerolate, greyish brown to yellowish brown. They grow solitary in humicolous soil (Kaur and Singh 2014).

Fig. 1. A. *Auricularia auricula-judae* (Photo credit: Urga Motiejūnaitė, https://www.inaturalist.org/) **B.** *Boletellus emodensis* (Photo credit: Attilio Demicheli, https://www.inaturalist.org/) **C.** *Lentinus connatus* (Photo credit: Zachary Hunter, https://www.inaturalist.org/) **D.** *Lentinus polychrous* (Photo credit: Jacky Cudon, https://www.inaturalist.org/) **E.** *Lentinus sajor-caju* **F.** *Lentinus squarrosulus* (Photo credit: Roshan M. Perera) **G.** *Phlebopus portentosus* (Photo credit: Steve Axford); **H.** *Pleurotus djamor* (Photo credit: Dschigel, https://www.inaturalist.org/) **I.** *Pleurotus giganteus* (Photo credit: Win Paing Oo, https://www.inaturalist.org/) **J.** *Termitomyces microcarpus* (Photo credit: Lizziepop, https://www.inaturalist.org/) **K.** *Schizophyllum commune* (Photo credit: Purplecloud1, https://www.inaturalist.org/) **L.** *Tremella fuciformis* (Photo credit: Mati Aristeguieta P., https://www.inaturalist.org/)

6. Conclusion

Exploring the wild mushrooms in Sri Lanka has unveiled a treasure trove of diverse species, each with unique characteristics and potential applications. This comprehensive review not only highlights their current role as sources of nutrition and traditional medicine but also highlights their untapped potential as resources for the biotechnological and pharmaceutical industries. The careful documentation of information about these mushrooms, such as their nutritional content, medicinal uses, and industrial applications, paves the way for future studies, conservation initiatives, and sustainable use, offering a promising future for these natural wonders.

However, there are challenges to overcome. The habitats of these mushrooms are under threat due to factors like deforestation and climate change. Unregulated harvesting practices can also harm mushroom populations. Moreover, many people are unaware of the importance of these mushrooms. To ensure the long-term sustainability of wild mushrooms, it is crucial to urgently establish efficient conservation plans and implement sustainable harvesting methods. Equally important is the need to promote awareness programs that highlight the ecological and economic significance of these species. Through these concerted efforts, Sri Lanka can fully realize the potential of its wild mushrooms while promoting conservation and sustainable development practices.

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