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Diversity and Nutraceutical Potential of Wild Edible Mushrooms in Amravati District, Maharashtra: A Comprehensive Review

Deshmukh A.M [1], Hande D.V [2*]

[1]*Department of Botany, Shri Shivaji Science College, Amravati (MS), India.*
[2]*Mahatma Fule Arts, Commerce and Sitaramji Chaudhari Science Mahavidyalaya Warud, Amravati (MS), India.*
**Corresponding author Email: dvhande@gmail.com*

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ABSTRACT

Wild Macromycetes are among the many mineral treasures that India has to offer. There are 27,000 fungal species in India overall. Because of its delicious flavor and texture, humans have been eating them since prehistoric times. Extensive research conducted on the variety of mushrooms found in Maharashtra in the Vidarbha region, whereas some mycologists focused on the western region. The mushrooms are fungal fruiting bodies, namely belonging to the Ascomycetes and Basidiomycetes. In recent decades, several researchers have released reports on edible mushrooms. Amravati is one of the major district of Maharashtra, has a rich history. There are hills, valleys, and thick green forests throughout the entire district. Chikhaldara and Dharni talukas are located in the Satrupa range's deep forest, which is home to several teak and bamboo plantations, Located beneath the hilly terrain. A tropical wet and dry climate prevails across the district. Here, temperatures can fluctuate greatly throughout the year, with scorching summers and very freezing winters. Approximately sixty lamellate macrofungi were collected and identified from various locations across the Amravati district.

Keywords: Macromycetes, Maharashtra, Vidarbha, Ascomycetes, Basidiomycetes, Chikhaldara, Dharni, Satpura, Amravati

INTRODUCTION

Edible mushrooms have been an integral part of human diets for centuries, valued not only for their rich texture and distinctive flavor but also for their medicinal and health-enhancing properties. Over time, they have been recognized for their nutritional benefits and therapeutic potential, making them a cherished ingredient in various culinary traditions. (Manzi *et al.*, 2001). Found in diverse habitats across the globe, these mushrooms exhibit an incredible variety in shape, color, and size, reflecting the rich biodiversity of fungal species. Beyond their gastronomic appeal, wild edible mushrooms are packed with essential nutrients and bioactive compounds that contribute to their significant nutraceutical properties. These natural compounds, including vitamins, minerals, polysaccharides, and antioxidants, play crucial roles in promoting health and preventing diseases. This review explores the diversity of wild edible mushrooms and delves into their nutraceutical properties, highlighting their potential to enhance human health and well-being.

Mushrooms, the fruiting bodies of macrofungi, can be categorized as edible, medicinal, or poisonous. Historically, the term “mushroom” referred specifically to edible macrofungi**,** while “toadstools” described the poisonous gilled varieties. Unlike higher plants, mushrooms lack chlorophyll**,** the pigment responsible for photosynthesis. As a result, they are unable to produce their own food and instead depend on external organic sources for sustenance. These fungi derive nutrients from decomposing organic materials**,** including straw, dead wood, manure, and dung**,** playing a crucial role in ecosystem balance and nutrient recycling. (Rahi & Malik, 2016). Mushrooms serve as essential ecological contributors, functioning as decomposers, mutualists, and pathogens that influence ecosystem dynamics. They provide significant nutritional and medicinal benefits**,** serve as a valuable livelihood resource, and contribute to sustainable environmental practices. (Martins, 2016).

The study of Agaricales (gilled mushroom) diversity in Maharashtra has been extensively documented, beginning with Trivedi (1972) in the Vidarbha region and followed by Sathe & Rahalkar (1975) **a**nd Sathe & Deshpande (1980) in the western region. However, there has been a lack of updated reports on Maharashtra’s agaricales diversity for the past two decades, despite foundational research dating back to Massee (1901)

and subsequent studies concluding two decades ago. More recently, Hedawoo & Mohite (2008) and Hedawoo (2010) conducted studies focusing on the edible, non-edible, and medicinal mushrooms of Amravati and the Melghat regions, contributing to the ongoing exploration of fungal biodiversity in the state.

Antioxidant compounds have been successfully extracted from different parts of mushrooms, including their fruiting bodies, mycelium, and broth (Kozarski *et al.*, 2015). Among these bioactive components, polysaccharides are now widely acknowledged as the primary medicinal agents, contributing significantly to their therapeutic potential (Mingyi *et al.*, 2019; Weis *et al.*, 1999).

Lamellate mushrooms, sometimes called Agaricales, are a type of Basidiomycetous fungus that is a member of the Agaricomycetes class (Kirk *et al.*, 2008). The creation and spread of spores are the main functions of the fleshy sporophores they create. a, Lamellate mushroom most likely originated in the middle Cretaceous epoch Hibbett *et al.*, (1997).

Over the past two decades, the concept of functional foods has gained significant attention, emphasizing the role of bioactive compounds beyond basic nutrition (Sadler & Saltmarsh, 1998). In response to this growing demand, countries such as the United States**,** those within the European Union**,** and Asian nations including Japan and South Korea have established and periodically refined regulatory frameworks governing functional foods and their associated health claims (Hasler, 1996).

Among the most recognized functional foods, mushrooms stand out due to their rich nutritional and medicinal benefits. Their collection and cultivation date back centuries in Asian countries, particularly China and Japan (Zhanga *et al.*, 2007). With a longstanding history of health-enhancing properties, mushrooms have been widely utilized for their role in supporting wellness and disease prevention (Zaidman *et al.*, 2005). Mushroom collection and identification is an age-old science, as they were originally harvested largely for culinary use. To begin, fungi have traditionally been classified based on their morphological characteristics, which have evolved in parallel. The phenotypic plasticity of these macrofungi above-ground reproductive structures has resulted in the artificial taxonomy of mushrooms, with several completely unrelated taxa grouped together, causing a great deal of confusion. Some examples include works by Mattioli (1560), Clausius (1601), Bauhin (1623, 1651), Ray (1686), Magnol (1689), and Micheli (1729).

Expanding on the dietary implications of edible mushrooms, their high crude protein content makes them an excellent alternative protein source, especially for populations seeking nutrient-dense**,** plant-based options. The variation in protein levels—ranging between 10.0% and 40% w/w—is influenced by factors such as **s**pecies diversity, growth environment, and developmental stage (Barros *et al.*, 2008; Longvah & Deosthale, 1998; Diez & Alvarez, 2001).

The porous hymenophores of poroid mushrooms, a unique genus of fungus, take the place of the conventional gills seen in many other mushrooms. Mostly found growing on decaying wood, they are members of the Polypore family (Polyporaceae), which aids in the cycling of nutrients in forest ecosystems. Known for their therapeutic qualities, notable species include *Ganoderma lucidum* (reishi) and *Fomes fomentarius* (tinder fungus). Some species of these fungi are perennial, and their fruiting bodies frequently have a shelf-like or bracket-like structure Watling (1970, 1982). The harsh, woody nature of some poroid mushrooms makes them inedible, but others, like Grifola frondosa (hen-of-the-woods), are edible. Because they break down the cellulose and lignin in wood, wood decaying fungi are important to the environment.

Despite the vast fungal diversity in India, most recent studies in Maharashtra have focused on the Western Ghats, leaving the Vidarbha region, and specifically the Amravati district, underexplored for over two decades. This review addresses this gap by synthesizing current data on sixty lamellate macrofungi from the Satpura range, providing an updated taxonomic and nutraceutical profile that advances our understanding of regional biodiversity compared to older, broader surveys.

The criteria for region selection, species verification methods, and edibility differentiation are detailed in the following section.

SCOPE AND METHODOLOGY OF THE REVIEW

The geographical focus of this review is the Amravati district, specifically the Teak (*Tectona*

grandis) and Bamboo (*Dendrocalamus strictus*) ecosystems of the Satpura range (Chikhaldara and Dharni). These regions were selected due to their unique tropical microclimates and the lack of updated mycological records over the last two decades to ensure scientific accuracy, all species names and taxonomic ranks were verified using the **Index Fungorum** and **MycoBank** databases. The edibility of the discussed macrofungi was differentiated by cross-referencing ethnomycological data from local tribal communities with establihed toxicological literature and morphological keys.

Geographic Distribution and Ecological Niches

Wild mushrooms are ubiquitous, found in diverse habitats ranging from tropical rainforests to arid deserts, temperate forests, and boreal regions. Each habitat hosts unique species adapted to specific ecological niches **(Figure 1.1)**. Research indicates that humidity, precipitation, and temperature are the key environmental factors influencing the fruiting and diversity of macromycetes in both temperate and tropical forests (Lodge *et al.*, 2005). Additionally, studies have identified temperature and humidity as the most reliable predictors of fungal richness**,** highlighting their crucial role in shaping fungal distribution and biodiversity (Talley *et al.*, 2002).

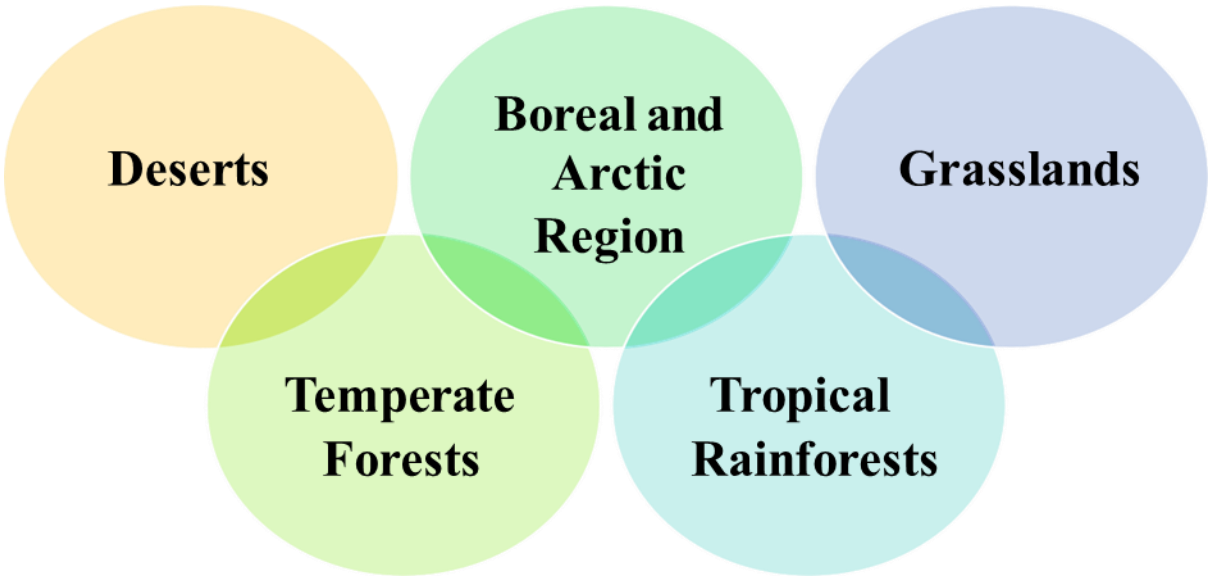


Figure 1.1: Different geographic distribution and ecological niches.

Tropical Rainforests:

These biodiverse regions, such as the Amazon Basin and Southeast Asia, are home to numerous fungi, including many non-edible and poisonous species. For instance, *Amanita phalloides* (Death Cap), a deadly poisonous mushroom, is found in tropical and temperate regions and is notorious for its potent toxins (Boa, 2004). Mushrooms have been extensively researched in Western countries, while tropical regions, including India, remain **relatively underexplored**. In general, **fungal diversity** is significantly higher in tropical ecosystems compared to temperate regions. Studies by Dutta and Acharya (2014) have documented traditional and ethno-medicinal knowledge of mushrooms in West Bengal**,** emphasizing their cultural and medicinal importance. Additionally, Lakhanpa**l** identified 11 species of edible mushrooms in the upper hilly regions of Shimla, contributing to the growing knowledge of fungal biodiversity in mountainous habitats. Further**,** Kumar and Manimohan discovered a new species of *Leucocoprinus* in the state of Kerala, adding to the expanding fungal taxonomy of India.

The Basidiomycota division, which comprises many edible, medicinal, and decomposer fungi, includes approximately 30,000 documented species, accounting for 37% of the total described true fungi (Kirk *et al.*, 2001). These findings underscore the rich fungal biodiversity in tropical regions and highlight the need for further systematic exploration and conservation efforts in India.

Temperate Forests:

Temperate regions in North America, Europe, and parts of Asia support a rich diversity of mycorrhizal fungi, many of which are non-edible.

Species like *Amanita muscaria* (Fly Agaric) and *Inocybe* spp. are well-known for their toxic properties (Wasser, 2010).

Boreal and Arctic Regions: Despite harsh conditions, these regions support fungi adapted to cold climates. *Cortinarius* spp. and *Galerina* spp., both containing toxic species, are examples of the diverse fungi in these areas (Hawksworth & Lücking, 2017).

Deserts and Grasslands: Arid regions host unique fungi adapted to extreme conditions. Desert truffles (*Terfezia* and *Tirmania* spp.), while some are edible, many species in these environments remain poorly studied and potentially hazardous (Chang & Wasser, 2017).

Challenges in Studying and Conserving Wild Mushrooms

The study and conservation of wild mushrooms face several challenges, including taxonomic complexity, cryptic species, and environmental threats **(Figure 1.2)**.

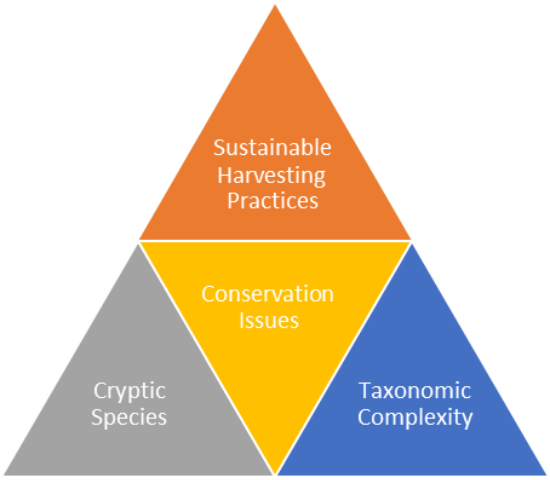


Figure 1.2: Different challenges in studying and conserving wild mushrooms

Taxonomic Complexity: The morphological similarities and variations within fungal species pose significant challenges for accurate identification and classification. Molecular techniques, such as DNA sequencing, have become essential tools for overcoming these challenges (Blackwell, 2011).

Cryptic Species: Many fungi exist in forms that are difficult to detect or differentiate without genetic analysis. This cryptic diversity often requires advanced molecular techniques to uncover, making comprehensive biodiversity assessments challenging (Hawksworth & Lücking, 2017).

Conservation Issues: Habitat destruction, climate change, and pollution threaten fungal diversity. Conservation efforts are often hampered by a lack of public awareness and the complexity of fungal ecosystems. Overharvesting for culinary and medicinal uses also poses a significant threat (Chang & Wasser, 2017; Boa, 2004).

Sustainable Harvesting Practices: Promoting sustainable harvesting practices is crucial for the conservation of wild mushrooms. Guidelines and regulations need to be established to ensure that mushroom foraging does not harm natural populations and ecosystems (Wachtel- Galor & Benzie, 2011).

Opportunities for Research and Conservation

Habitat Protection: Preserving forests, wetlands, and other natural habitats is crucial for maintaining fungal diversity. Protected areas and nature reserves play a significant role in this effort **(Figure 1.3)** (Blackwell, 2011).

Research and Education: Increasing research funding and public awareness about the importance of fungi can drive conservation efforts. Educational programs and citizen science projects can engage the public in mushroom conservation (Hawksworth & Lücking, 2017).

Sustainable Practices: Promoting sustainable land-use practices, such as reducing deforestation and limiting pesticide use, can help protect fungal habitats (Kalac, 2013).

Cultivation and Domestication: Research into the cultivation and domestication of wild mushrooms can help reduce pressure on natural populations.

Cultivating popular wild species, such as *Boletus edulis* and *Cantharellus cibarius*, can provide an alternative to foraging (Chang & Wasser, 2017).

The biodiversity of wild mushrooms encompasses a wide range of non-edible, poisonous, and taxonomically significant species. These mushrooms play crucial ecological roles, contribute to scientific knowledge, and pose both opportunities and challenges for conservation. Understanding and preserving this diversity is essential for maintaining healthy ecosystems and advancing mycological research. As our knowledge of fungal biodiversity grows, so too does our ability to appreciate and protect these remarkable organisms.

Panda *et al.*, (2019) estimate that there are over 1,200 species of mushrooms known to exist in India, of which 300 to 315 species are edible. 60 genera from the Agaricales, Polyporales, and Russulales orders, totalling 132 species from India, were reported by Meena *et al.*, in 2020. In India, it is observed that the families Auriculariaceae, Boletaceae, Fomitopsidaceae, Mycenaceae, Tremellaceae, and Tricholomataceae exhibit less diversity, the families Ganodermataceae, Agaricaceae, Lycophyllaceae, Schizophyllaceae, Xylariaceae, Polyporaceae, Marasmiaceae, Psathyrellaceae, and Stromatoniaceae exhibit rich diversity. Numerous species from the Agaricaceae family, primarily represented by the genus Agaricus, are reported by Indian mycologists to have originated in different Indian states (Meena *et al.*, 2020).

This study aims to **document the diversity of wild edible mushrooms** in select regions of **Amravati District, Maharashtra**, recognizing their **ecological, nutritional, and medicinal importance**. Given their **significance** and the growing need for **systematic documentation**, this effort seeks to contribute to the preservation and sustainable utilization of these valuable fungal resources.



Figure 1.3: Various opportunities for research and conservation while studying mushrooms.

The Biodiversity of Wild Edible Mushrooms of the World: Ecological Significance and Culinary Value

Mushrooms, the fruiting bodies of certain fungi, are a diverse group of organisms that have captivated humans for centuries. Among them, wild edible mushrooms stand out due to their unique flavors, nutritional benefits, and ecological roles. This review delves into the biodiversity of wild edible mushrooms, highlighting their geographic distribution, ecological significance, nutritional and medicinal values, and the challenges and opportunities associated with their conservation and sustainable use.

Geographic Distribution and Ecological Niches of Wild Edible Mushrooms

Wild edible mushrooms are found across various biomes, each region hosting distinct species that

contribute to local biodiversity.

Tropical Rainforests: The lush and humid conditions of tropical rainforests in regions such as the Amazon Basin, Southeast Asia, and Central Africa support an incredible diversity of fungi. Species like *Termitomyces* spp., known for their large fruiting bodies

and symbiotic relationship with termites, are highly prized in these areas (Boa, 2004). *Lentinula edodes* (Shiitake), native to East Asia, thrives in these environments and is both a culinary and medicinal staple.

Temperate Forests: Temperate regions in North America, Europe, and parts of Asia are rich in mycorrhizal fungi, which form symbiotic relationships with trees. Species such as *Boletus edulis* (Porcini), *Cantharellus cibarius* (Chanterelle), and *Amanita caesarea* (Caesar's Mushroom) are among the most sought-after wild edibles in these forests (Wasser, 2010).

Boreal and Arctic Regions: Despite the harsh conditions, these regions support a variety of cold-adapted fungi. Notable edible species include *Leccinum scabrum* (Brown Birch Bolete) and *Sarcodon imbricatus* (Hawk's Wing), which are adapted to the short growing seasons and cold climates (Hawksworth & Lücking, 2017).

Deserts and Grasslands: Even arid regions host unique fungi adapted to extreme conditions. *Terfezia* and *Tirmania* spp., known as desert truffles, are found in the Middle East and North Africa and are considered delicacies (Chang & Wasser, 2017).

Ecological Roles of Wild Edible Mushrooms

Wild edible mushrooms play critical roles in their ecosystems, contributing to nutrient cycling, plant health, and overall biodiversity.

Decomposers: Species like *Agaricus bisporus* (Button Mushroom) and *Pleurotus ostreatus* (Oyster Mushroom) decompose organic matter, recycling nutrients back into the soil and supporting plant growth (Kalac, 2013).

Mycorrhizal Fungi: These fungi, including *Boletus*, *Cantharellus*, and *Lactarius* species, form mutualistic relationships with plants, enhancing nutrient uptake and improving plant health. This symbiosis is crucial for forest ecosystems, particularly in nutrient-poor soils (Wachtel-Galor & Benzie, 2011).

Pathogens and Parasites: While some mushrooms are pathogenic to plants, their presence can regulate plant populations and maintain ecological balance. Understanding these interactions is essential for forest management and conservation (Blackwell, 2011).

Nutritional and Medicinal Benefits

Wild edible mushrooms are not only culinary delights but also offer substantial nutritional and medicinal benefits.

Nutritional Value: Mushrooms are an excellent source of proteins, vitamins (such as B vitamins and vitamin D), minerals (including selenium, potassium, and copper), and dietary fiber. For instance, *Lentinula edodes* (Shiitake) and *Pleurotus ostreatus* (Oyster Mushroom) are known for their high protein content and essential amino acids (Kalac, 2013).

Medicinal Properties: Many wild mushrooms have been used in traditional medicine for their therapeutic properties. Compounds such as beta-glucans, polysaccharides, and triterpenes found in mushrooms like *Ganoderma lucidum* (Reishi) and *Grifola frondosa* (Maitake) exhibit immunomodulatory, anti-inflammatory, and anticancer activities (Wasser, 2010; Atila & Ozkaya, 2017).

Antioxidant and Antimicrobial Activity: Mushrooms such as *Pleurotus ostreatus* and *Agaricus bisporus* contain bioactive compounds that demonstrate significant antioxidant and antimicrobial properties, which help protect the body against oxidative stress and infections (Chang & Wasser, 2017).

Challenges in Studying and Conserving Wild Edible Mushrooms

Despite their importance, wild edible mushrooms face several challenges related to their study and conservation.

Taxonomic Complexity: The diversity and subtle morphological differences between species pose significant challenges for taxonomic classification. Molecular techniques like DNA sequencing have become essential tools for accurate identification and classification (Blackwell, 2011).

Cryptic Species: Many fungi are cryptic, existing in forms that are difficult to detect or differentiate.

This cryptic diversity often requires advanced genetic analysis to uncover, making comprehensive biodiversity assessments challenging (Hawksworth & Lücking, 2017).

Conservation Issues: Habitat destruction, climate change, and pollution threaten fungal diversity. Conservation efforts are often hampered by a lack of public awareness and the complexity of fungal ecosystems. Overharvesting for culinary and medicinal uses also poses a significant threat (Chang & Wasser, 2017; Boa, 2004).

Sustainable Harvesting Practices: Promoting sustainable harvesting practices is crucial for the conservation of wild edible mushrooms. Guidelines and regulations need to be established to ensure that mushroom foraging does not harm natural populations and ecosystems (Wachtel-Galor & Benzie, 2011).

Opportunities for Research and Conservation in Studying Wild Edible Mushrooms

Habitat Protection: Preserving forests, wetlands, and other natural habitats is crucial for maintaining fungal diversity. Protected areas and nature reserves play a significant role in this effort (Blackwell, 2011).

Research and Education: Increasing research funding and public awareness about the importance of fungi can drive conservation efforts. Educational programs and citizen science projects can engage the public in mushroom conservation (Hawksworth & Lücking, 2017).

Sustainable Practices: Promoting sustainable land-use practices, such as reducing deforestation and limiting pesticide use, can help protect fungal habitats (Kalac, 2013).

Cultivation and Domestication: Research into the cultivation and domestication of wild edible mushrooms can help reduce pressure on natural populations. Cultivating popular wild species, such as *Boletus edulis* and *Cantharellus cibarius*, can provide an alternative to foraging (Chang & Wasser, 2017).

Nutraceuticals and Pharmaceuticals from Wild Edible Mushrooms of the World

Wild edible mushrooms have long been revered not only as a culinary delicacy but also for their remarkable medicinal properties. They are a rich source of bioactive compounds that contribute to their nutraceutical and pharmaceutical potential. This review explores the diverse nutraceutical and pharmaceutical benefits of wild edible mushrooms, highlighting their bioactive compounds, health benefits, and potential applications in modern medicine.

Nutraceutical Potential of Wild Edible Mushrooms

The diversity of macromycetes in the Amravati district is not merely a list of species but a reflection of the specific ecological niches provided by the Satpura range. Our synthesis of the data indicates that the interplay between the teak-dominant canopy and the tropical wet-and-dry soil cycles creates a unique 'chemical laboratory' in the wild. For instance, the high prevalence of saprotrophic species documented in this review suggests a highly efficient nutrient recycling system that directly contributes to the concentrated mineral profiles and bioactive polysaccharides found in these mushrooms. By synthesizing these ecological observations with pharmacological data, we can conclude that the wild mushrooms of Vidarbha represent a distinct nutraceutical resource compared to those found in the Western Ghats."

Nutraceuticals, a blend of nutrition and pharmaceuticals, refer to food products that provide health and medical benefits. Wild edible mushrooms are packed with essential nutrients and bioactive compounds that offer significant health advantages.

It is important to distinguish that while cultivated species like *Agaricus bisporus* offer consistent nutritional profiles, the wild edible species of Amravati (such as *Termitomyces* and *Pleurotus* spp. found in the Satpura range) often exhibit higher mineral content and unique bioactive compounds due to their symbiotic relationships and specific forest substrates

Nutritional Composition

Wild edible mushrooms are low in calories and fats but high in essential nutrients such as proteins, vitamins, minerals, and dietary fibers **(Figure 1.4)**. They are particularly rich in:

Proteins: Mushrooms contain all essential amino acids, making them a valuable source of high-quality protein, especially for vegetarians (Kalac, 2013).

Vitamins: They are abundant in B-vitamins (B1,

B2, B3, B5, B6, and B12) and vitamin D. Mushrooms are one of the few non-animal sources of vitamin D (Mattila *et al.*, 2002).

Minerals: Essential minerals like selenium, potassium, copper, and zinc are found in significant amounts in mushrooms (Chang & Wasser, 2017).



Figure 1.4: General nutritional composition of mushrooms.

Dietary Fibers: They contain both soluble and insoluble fibers that aid in digestion and promote gut health (Cheung, 2013).

Bioactive Compounds

Wild edible mushrooms are a treasure trove of bioactive compounds with diverse health benefits (**Figure 1.5**)

Polysaccharides: Beta-glucans are well-known for their immunomodulatory and anti- cancer properties (Wasser, 2010).

Phenolic Compounds: These possess antioxidant properties that protect against oxidative stress and inflammation (Ferreira *et al.*, 2010).

Terpenoids: Compounds like ganoderic acids exhibit anti-tumor and hepatoprotective activities (Gao *et al.*, 2003).

Steroids: Ergosterol, a precursor of vitamin D2, has been found to possess anti-inflammatory properties (Mattila *et al.*, 2002).

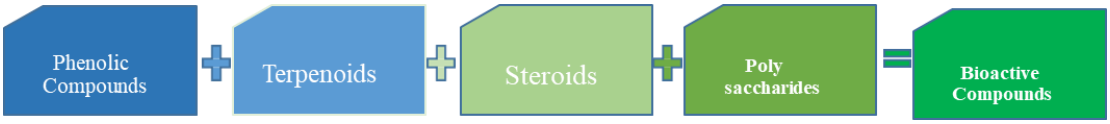


Figure 1.5: Bioactive compounds isolated from various mushrooms for human benefit

Pharmaceutical Potential of Wild Edible Mushrooms

The pharmaceutical applications of wild edible mushrooms are extensive, owing to their bioactive compounds that exhibit a wide range of therapeutic properties.

Anti-Cancer Properties

Several wild edible mushrooms have demonstrated potent anti-cancer activities. For instance:

***Ganoderma lucidum* (Reishi)**: Known for its polysaccharides and triterpenoids, Reishi mushrooms have shown efficacy against various cancers by modulating immune responses and inducing apoptosis in cancer cells (Wasser, 2011).

***Lentinula edodes* (Shiitake)**: The lentinan polysaccharide from Shiitake mushrooms has been approved as an anti-cancer drug in Japan and is used as an adjuvant therapy for gastric cancer (Zhang *et al.*, 2011).

***Grifola frondosa* (Maitake)**: The D-fraction polysaccharide from Maitake mushrooms has exhibited anti-tumor activity in both preclinical and clinical studies (Kodama *et al.*, 2002).

Anti-Inflammatory and Immunomodulatory Effects

Mushrooms like Reishi, Shiitake, and Maitake are known for their immunomodulatory effects, which can help in managing autoimmune diseases and inflammatory conditions (Wasser, 2010).

Antimicrobial and Antiviral Activities

Many wild edible mushrooms possess antimicrobial properties. For example:

***Pleurotus ostreatus* (Oyster Mushroom)**: Exhibits antibacterial activity against pathogens like *Escherichia coli* and *Staphylococcus aureus* (El Enshasy & Hatti-Kaul, 2013).

Cordyceps sinensis: Known for its antiviral properties, it has been used in traditional Chinese medicine to treat respiratory diseases (Zhou *et al.*, 2009).

Cardiovascular Health

Bioactive compounds in mushrooms can benefit cardiovascular health **(Figure 1.6)**

Ergosterol: This compound has been shown to lower cholesterol levels (Mattila *et al.*, 2002).

Polysaccharides: Beta-glucans from mushrooms help in reducing blood pressure and improving lipid profiles (Cheung, 2013).

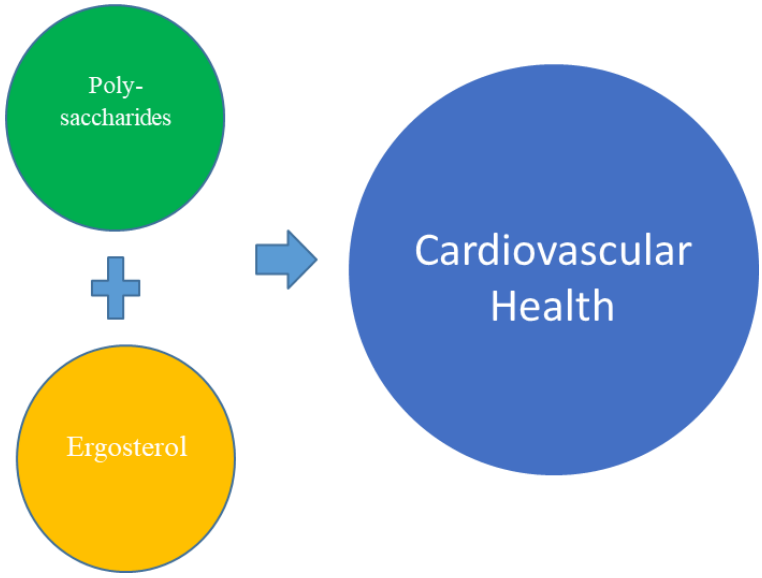


Figure 1.6: Benefits of mushrooms on cardiovascular health of human beings.

Specific Wild Edible Mushrooms and Their Health Benefits

Reishi (*Ganoderma lucidum*)

Reishi mushrooms, also known as Lingzhi, have been used for centuries in East Asian medicine. They are rich in polysaccharides, triterpenoids, and peptidoglycans, which contribute to their anti-cancer, anti-inflammatory, and immunomodulatory effects (Wachtel-Galor & Benzie, 2011).

Shiitake (*Lentinula edodes*)

Shiitake mushrooms are well-known for their immune-boosting and anti-cancer properties. Lentinan, a beta-glucan from Shiitake, is particularly effective in enhancing immune responses and inhibiting tumor growth (Zhang *et al.*, 2011).

Maitake (*Grifola frondosa*)

Maitake mushrooms are valued for their anti-tumor and immune-enhancing properties. The D- fraction polysaccharide from Maitake has shown promise in both preclinical and clinical studies for its anti-cancer effects (Kodama *et al.*, 2002).

Lion's Mane (*Hericium erinaceus*)

Lion's Mane mushrooms are known for their neuroprotective effects. Compounds like hericenones and erinacines promote nerve growth factor (NGF) synthesis, which supports brain health and cognitive function (Mori *et al*, 2009).

Turkey Tail (*Trametes versicolor*)

Turkey Tail mushrooms are rich in Polysaccharide-K (PSK) and polysaccharopeptide (PSP), which have shown efficacy in boosting the immune system and treating cancer (Ooi & Liu, 2000).

CHALLENGES AND FUTURE DIRECTIONS

Identification and Standardization

One of the major challenges in utilizing wild edible mushrooms for nutraceutical and pharmaceutical purposes is the accurate identification and standardization of bioactive compounds. Advances in molecular techniques and analytical methods are essential for overcoming these challenges (Hawksworth & Lücking, 2017).

Sustainable Harvesting and Conservation

The increasing demand for wild edible mushrooms can lead to overharvesting and habitat destruction. Sustainable harvesting practices and conservation efforts are crucial for preserving fungal biodiversity (Chang & Wasser, 2017).

Clinical Trials and Regulatory Approvals

While many mushrooms have shown promise in preclinical studies, more rigorous clinical trials are

needed to confirm their efficacy and safety. Regulatory approvals are also necessary to ensure that mushroom-based nutraceuticals and pharmaceuticals meet safety standards (Wasser, 2010).

Wild edible mushrooms are a rich source of nutraceuticals and pharmaceuticals, offering a wide range of health benefits due to their diverse bioactive compounds. Their potential in preventing and treating various diseases, including cancer, inflammation, infections, and cardiovascular conditions, makes them valuable for both traditional and modern medicine.

However, challenges such as accurate identification, sustainable harvesting, and rigorous clinical testing must be addressed to fully harness their potential. Continued research and conservation efforts are essential for the sustainable utilization of these remarkable organisms.

CONCLUSION

In this review, we distinguish between two types of data: (1) **Ethnomycological claims**, based on the traditional knowledge of local tribal communities in Chikhaldara and Dharni regarding edibility, and (2) **Experimental evidence**, derived from laboratory-based nutritional assays and pharmacological studies cited in the literature. Where experimental data is lacking for specific local species, claims are clearly labeled as traditional knowledge."

Wild edible mushrooms have long been an essential source of nutrition for rural and tribal communities. However, due to deforestation and evolving lifestyles, their consumption has significantly declined. Younger generations are gradually losing connection with the traditional foods of their region.

In the Amravati District of Maharashtra, studies have identified various wild edible mushrooms, including Calvatia species, which are known for their nutritional and medicinal properties. Research conducted in the Melghat forest region has also highlighted the diversity of macrofungi, emphasizing their ecological and economic importance

This study emphasizes the importance of these mushrooms not only as a food source but also for their medicinal properties and potential to support livelihoods. To restore their value, coordinated efforts from both government and non-government organizations are necessary, including awareness programs, sustainable practices, and market development.

In the Amravati district, several gilled mushrooms belonging to the order Agaricales have been documented. These mushrooms are characterized by their distinct gills under the cap, which play a crucial role in spore dispersal. Some notable edible gilled mushroom species include:

Agaricus campestris – Commonly known as the field mushroom, it is widely consumed and grows in humus-rich soils. It can be sautéed, fried, or used in sauces, and some even enjoy it raw in salads. However, caution is advised when foraging, as it can be mistaken for toxic species like *Amanita virosa* (destroying angel) or *Agaricus xanthodermus*, which causes gastrointestinal distress

Podaxis pistillaris – An edible mushroom often found in arid regions. also known as the desert shaggy mane, is considered edible but **is** not commonly consumed. It thrives in arid environments and is often found on termite mounds. While it is not poisonous, it is not widely used as food.

Calvatia fragilis – A puffball mushroom that is considered edible. It is considered edible and belongs to the puffball family. Studies indicate that it has been consumed in certain regions, including Amravati, Maharashtra, where local communities have confirmed its edibility. Like other puffballs, it is typically safe to eat when young, before the interior starts turning dark or powdery.

Lycoperdon muscorum – Another puffball species known for its edibility.There is limited information specifically on its edibility, However, proper identification is crucial, as some puffballs can be easily confused with toxic species.

Astreus hygrometricus – Also called the "barometer earthstar," it is consumed in some parts of India. Commonly known as the hygroscopic earthstar, has mixed reports on its edibility. Some sources classify it as inedible due to its tough texture and lack of culinary appeal2. However, in certain regions, local communities consume it as food, and it is even sold in markets.

Pleurotus djamor **-** commonly known as the pink oyster mushroom, is edible and considered a choice

mushroom. It has a meaty, slightly chewy texture and a nutty, umami flavor. When cooked until crispy, it can resemble the taste of bacon or ham. However, when raw, it has a sour taste**.** This mushroom is often used in sautéing, boiling, roasting, or frying, making it a versatile ingredient in various dishes.

Termitomyces heimii – It is an edible mushroom and is considered one of the most sought-after wild mushrooms. It has a symbiotic relationship with termites, growing in termite nests and forming large clusters. The fruiting bodies of this fungus are collected and sold in markets.

Termitomyces clypeatus - This mushroom is often collected and sold in markets, particularly in areas where wild mushrooms are valued for their culinary and health benefits.

Cantharellus **species** – Also known as chanterelles, these mushrooms are prized for their flavor. It is generally edible and highly prized for their culinary value. They have a mild, fruity aroma and a peppery taste, making them a favorite in gourmet dishes.

These gilled mushrooms contribute to the ecological balance of the region and hold potential for nutritional and medicinal applications. These mushrooms not only serve as food but also hold medicinal and economic value, making them an important resource for local communities

Furthermore, Wild edible mushrooms play a crucial role in the nutritional, medicinal, and economic aspects of rural and tribal communities. However, their usage has declined due to deforestation and shifting lifestyles, leading to a loss of traditional knowledge among younger generations. In Amravati district, various gilled mushrooms from the order Agaricales—including species such as *Pleurotus djamor*, *Termitomyces clypeatus*, and *Leucoagaricus rubrotinctus*—demonstrate significant ecological, nutritional, and medicinal potential.

To reintegrate these mushrooms into local diets and livelihoods, targeted efforts by government and non-government organizations are essential. Initiatives should focus on sustainable harvesting, awareness programs, and market development. Additionally, biochemical analysis and pharmacological studies of these mushrooms could uncover valuable health benefits, further enhancing their relevance in food security and traditional medicine.

This review synthesizes fragmented data to demonstrate that the biodiversity of Amravati is intrinsically linked to its geographical and climatic peculiarities. Rather than a simple compilation of species, this work bridges the gap between traditional ethnomycological use and modern scientific validation. The findings suggest that localized forest conservation is essential not just for biodiversity, but for preserving the specific genetic and nutraceutical lineages of wild macrofungi that are unique to this region of Maharashtra."

Preserving indigenous food knowledge is as vital as conserving biodiversity itself. Future research should continue to explore the nutritional profiles and medicinal properties of these fungi while promoting their economic viability for local communities.

While this review focuses heavily on the Amravati district of Maharashtra, the findings regarding habitat preference and nutraceutical value serve as a representative model for tropical wet and dry deciduous forests globally. However, the authors acknowledge that local ecological variations mean these findings should be interpreted as a regional case study contributing to the global database of macromycete diversity.

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