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A checklist of wild mushrooms in Mizoram, Northeast India

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Abstract

The association of fungi with higher plants enhances their resilience towards climate change by improving nutrient uptake and water retention, thereby playing an essential role in fostering healthy ecosystems and mitigating environmental impacts. This study documented 264 macrofungal taxa from 71 families and 23 orders from Mizoram, Northeast India, underlying in an Indo-Burma global biodiversity hotspot region. The meta-analysis of fungal diversity studies in Mizoram noted that the family Polyporaceae has the largest number of species, followed by Russulaceae, Boletaceae, Amanitaceae, Agaricaceae, and Hymenochaetaceae.

Keywords – Ascomycota – Basidiomycota – Biodiversity Hotspot – Fungi – Indo-Burma

Introduction

Fungi are capable of exerting both positive and negative effects on the environment. They have varied natural roles and beneficial human applications but can threaten human and animal health, plant well-being, and food safety (Hyde et al. 2019, Simões et al. 2023). They can endure harsh climatic circumstances and are found in terrestrial, marine, and aerial environments (Warnasuriya et al. 2023). Their contributions are essential for sustainable forestry practices and mitigating the impact of environmental stressors on plant survival (Field et al. 2020, Usman et al. 2021, Kržišnik & Gonçalves 2023). Globally, more than 19,000 fungi are known to cause diseases in crop plants and these pathogenic fungi can lead to a wide range of plant diseases, such as anthracnose, leaf spot, rust, wilt, blight, cankers, scabs, galls, damping-off, root rot, mildew, and dieback (Jain et al. 2019). Mushrooms are essential for humans and nature as they provide food and medicine and play a vital role in decomposition and nutrient recycling (Frąc et al. 2018, Karunarathna et al. 2024). The collection of wild edible mushrooms has proven to be a vital source of economic development and a means of sustenance for rural communities across various nations (Mortimer et al. 2012, Milenge-Kamalebo et al. 2018, Li et al. 2021, Ullah et al. 2022, Dasanthi et al. 2024).

Studies exploring the fungal species in Mizoram, Northeast (NE) India, have been limited due to scant research, especially their taxonomy. Nevertheless, the pioneer exploration of fungal diversity in Mizoram was initiated by Bisht (2011) and Zothanzama (2011), which was, in fact, pertinent for this region underlying an Indo-Burma global biodiversity hotspot. Past studies in Mizoram attempted to explore the diversity of fungi such as those on edible mushrooms

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(Zothanzama & Lalrinawmi 2015, Lalrinawmi et al. 2017, Ralte et al. 2020), poisonous mushrooms (Zothanzama et al. 2018), soil macrofungi and the diversity of wood-rotting fungi (Lalrinawmi & Zothanzama 2016, Vabeikhokhei et al. 2019). A taxonomic study combining morphological identification with molecular techniques has shown significant progress, and Zothanzama et al. (2016) documented over 30 species of wild mushrooms across various districts in Mizoram, followed by the first description of *Ganoderma mizoramense* as a new species in the region (Crous et al. 2017). Morphological and molecular methods have also been employed in other studies, further improving the reliability of species identification (Lallawmsanga et al. 2016, Zohmangaiha et al. 2019, Chawngthu et al. 2021). Recently, Chawngthu (2024) identified over 50 species of wood-rotting fungi from protected areas in Mizoram.

The nutritional properties, mineral content, and antioxidant capabilities of various wild edible mushrooms were documented (Zohmangaiha et al. 2023, Thachunglura et al. 2023b, Malsawmtluanga et al. 2023), thereby revealing their status as a rich source of nutrients with potential health benefits for the indigenous people of Mizoram. Henceforth, the fungal diversity in Mizoram is inextricably linked with the socio-economy of rural indigenous people. However, there is a growing necessity for more in-depth studies on fungi in Mizoram to achieve a comprehensive understanding and advancement in the field of taxonomical exploration. Mizoram is a NE Indian state known for its rich biodiversity. The region has a diverse range of plant species. However, it has been observed that macrofungi, especially mushrooms, have received little attention in research studies. These edible fungi are also crucial for various ecological functions, including nutrient cycling and symbiosis with plants, making it imperative to study their diversity in the NE Himalayan region. Therefore, increasing research focus and collaboration is essential to fill this knowledge gap and facilitate conservation efforts in Mizoram. Unfortunately, to our knowledge, no comprehensive reports exist on the total number of fungal species in Mizoram. Therefore, the present study aims to systematically document fungal species in the region to gather relevant information and expand the horizon of fungal research in this NE Indian state of extreme ecological and socio-economic relevance.

Materials & Methods

Collection of materials

The present study was prepared based on available published literature and the doctoral thesis up to 28th April 2024. To ensure accuracy in taxonomic position and nomenclatural integrity, the Index Fungorum (http://indexfungorum.org) database was consulted. Names of the taxa not reported earlier up to the species level in the literature are excluded. In the checklist, order, family, genus, and species are arranged alphabetically for ease of reference and retrieval.

Results

A total of 264 macrofungal taxa from 71 families and 23 orders were documented from Mizoram (Table 1). The fruiting bodies of some wild mushrooms are illustrated in Fig. 1. The 264 species comprise 148 genera. Of the different families represented, Polyporaceae has the largest number of species (26 genera: 64 species), followed by Russulaceae (3 genera: 22 species), Boletaceae (7 genera: 11 species), Amanitaceae (1 genera: 10 species), Agaricaceae (7 genera: 9 species) and Hymenochaetaceae (5 genera: 9 species). A list of families, genera, and number of species is presented in Table 2. Of the 264 reported species, Polyporales comprise 36%, Agaricales 27%, Russulales 10%, and Hymenochaetales and Boletales 5%. Most of the species were reported from Aizawl, Champhai, and Mamit districts. This study provides merely an initial view, exposing only a portion of the total fungal diversity within the state.

Table 1 List of species documented from different districts in Mizoram, India

Species	Order	Family	Distribution	References
Agaricus silvaticus	Agaricales	Agaricaceae	AZ	Lalrinawmi (2019)
Agaricus trisulphuratus	Agaricales	Agaricaceae	AZ	Lalrinawmi (2019)
Chlorophyllum molybdites	Agaricales	Agaricaceae	AZ	Lalrinawmi (2019)
Cyathus striatus	Agaricales	Agaricaceae	MM, AZ, SH	Vabeikhokhei (2019)
Lepiota echinella	Agaricales	Agaricaceae	AZ	Lalrinawmi (2019)
Leucocoprinus birnbaumii	Agaricales	Agaricaceae	AZ	Lalrinawmi (2019)
Macrolepiota dolichaula	Agaricales	Agaricaceae	AZ, CP, CP	Zothanzama et al. (2016), Lalrinawmi et al. (2017), Malsawmtluanga et al. (2023)
Macrolepiota procera	Agaricales	Agaricaceae	AZ	Lalrinawmi et al. (2017)
Nidula niveotomentosa	Agaricales	Agaricaceae	CP	Zothanzama (2011)
Amanita crocea	Agaricales	Amanitaceae	AZ	Lalrinawmi (2019)
Amanita griseofolia	Agaricales	Amanitaceae	AZ	Zothanzama et al. (2016)
Amanita hemibapha	Agaricales	Amanitaceae	AZ	Lalrinawmi & Zothanzama (2016)
Amanita jacksonii	Agaricales	Amanitaceae	AZ, AZ	Lalrinawmi (2019), Renthlei et al. (2023)
Amanita pachycolea	Agaricales	Amanitaceae	AZ	Lalrinawmi & Zothanzama (2016)
Amanita pantherina	Agaricales	Amanitaceae	AZ	Lalrinawmi (2019)
Amanita phalloides	Agaricales	Amanitaceae	AZ	Lalrinawmi (2019)
Amanita spissacea	Agaricales	Amanitaceae	AZ	Lalrinawmi et al. (2018)
Amanita vaginata	Agaricales	Amanitaceae	AZ	Lalrinawmi (2019)
Amanita virosa	Agaricales	Amanitaceae	AZ	Lalrinawmi & Zothanzama (2016)
Macrocybe gigantea	Agaricales	Callistosporiaceae	CP	Zothanzama et al. (2018)
Clavulinopsis corallinorosacea	Agaricales	Clavariaceae	AZ	Lalrinawmi (2019)
Clavulinopsis laeticolor	Agaricales	Clavariaceae	MM, CP, AZ	Lallawmsanga et al. (2019), Lalrinawmi (2019)
Ramariopsis kunzei	Agaricales	Clavariaceae	AZ	Lalrinawmi (2019)
Cortinarius claricolor	Agaricales	Cortinariaceae	MM	Zothanzama et al. (2018)
Cortinarius croceus	Agaricales	Cortinariaceae	AZ	Lalrinawmi (2019)
Cortinarius helvolus	Agaricales	Cortinariaceae	AZ	Zothanzama et al. (2018)
Cortinarius smithii	Agaricales	Cortinariaceae	AZ	Lalrinawmi (2019)
Entoloma hainanense	Agaricales	Entolomataceae	AZ	Lalrinawmi (2019)
Fistulina hepatica	Agaricales	Fistulinaceae	CP, AZ, MM, CP	Zothanzama (2011), Lalrinawmi et al. (2017), Zothanzama et al. (2018), Vabeikhokhei (2021)
Laccaria vinaceoavellanea	Agaricales	Hydnangiaceae	AZ	Lalrinawmi (2019)

Table 1 Continued

Species	Order	Family	Distribution	References
Laccaria yunnanensis	Agaricales	Hydnangiaceae	AZ	Zothanzama et al. (2018), Lalrinawmi (2019)
Gymnopilus junonius	Agaricales	Hymenogastraceae	CP, SH	Vabeikhokhei (2021)
Gymnopilus subearlei	Agaricales	Hymenogastraceae	HT	Zothanzama et al. (2018)
Hebeloma victoriense	Agaricales	Hymenogastraceae	AZ	Lalrinawmi (2019)
Lycoperdon excipuliforme	Agaricales	Lycoperdaceae	AZ	Lalrinawmi (2019)
Lycoperdon perlatum	Agaricales	Lycoperdaceae	AZ	Lalrinawmi et al. (2017)
Hypsizygus tessulatus	Agaricales	Lyophyllaceae	CP	Ralte et al. (2020)
Termitomyces clypeatus	Agaricales	Lyophyllaceae	AZ	Lalrinawmi (2019)
Termitomyces heimii	Agaricales	Lyophyllaceae	MM, LT, CP, AZ, SH, KLS, ST	Zothanzama et al. (2018), Lalrinawmi et al. (2017)
Termitomyces robustus	Agaricales	Lyophyllaceae	AZ	Lalrinawmi (2019)
Paramarasmius palmivorus	Agaricales	Marasmiaceae	CP, MM	Lallawmsanga et al. (2016)
Xeromphalina campanella	Agaricales	Marasmiaceae	CP, MM	Lallawmsanga et al. (2019)
Favolaschia cyatheae	Agaricales	Mycenaceae	CP, MM	Lallawmsanga et al. (2019)
Favolaschia pustulosa	Agaricales	Mycenaceae	MM	Vabeikhokhei (2021)
Filoboletus manipularis	Agaricales	Mycenaceae	CP, CP	Zothanzama et al. (2016), Vabeikhokhei (2021)
Mycena acicula	Agaricales	Mycenaceae	KLS	Lalbiakmawia (2022)
Xeromphalina tenuipes	Agaricales	Mycenaceae	KLS	Lalbiakmawia (2022)
Cyathus stercoreus	Agaricales	Nidulariaceae	AZ	Ralte & Vanlalhluna (2016)
Collybiopsis menehune	Agaricales	Omphalotaceae	CP, MM	Lallawmsanga et al. (2016)
Gymnopus androsaceus	Agaricales	Omphalotaceae	CP, MM	Lallawmsanga et al. (2019)
Gymnopus foetidus	Agaricales	Omphalotaceae	AZ, MM, CP, SH	Vabeikhokhei (2021)
Lentinula edodes	Agaricales	Omphalotaceae	AZ, CP, MM	Zothanzama et al. (2018), Vabeikhokhei (2021), Zohmangaiha et al. (2023)
Lentinula lateritia	Agaricales	Omphalotaceae	AZ, CP, MM, SH, CP, MM	Lalrinawmi et al. (2017), Vabeikhokhei (2021), Thachunglura et al. (2024)
Hymenopellis furfuracea	Agaricales	Physalacriaceae	AZ	Lalrinawmi (2019)
Hymenopellis raphanipes	Agaricales	Physalacriaceae	CP, MM	Lallawmsanga et al. (2016)
Mucidula mucida	Agaricales	Physalacriaceae	CP, MM	Lallawmsanga et al. (2019)
Pleurotus giganteus	Agaricales	Pleurotaceae	CP, MM, MM	Lallawmsanga et al. (2016), Thachunglura et al. (2023b)

Table 1 Continued

Species	Order	Family	Distribution	References
Pleurotus ostreatus	Agaricales	Pleurotaceae	AZ, LT, AZ, AZ	Zothanzama (2011), Lalrinawmi et al. (2017), Vabeikhokhei (2021)
Pleurotus pulmonarius	Agaricales	Pleurotaceae	CP, MM	Lallawmsanga et al. (2016)
Volvariella taylorii	Agaricales	Pluteaceae	AZ, LT, CP, MM	Lalrinawmi et al. (2017), Thachunglura et al. (2024)
Coprinellus disseminatus	Agaricales	Psathyrellaceae	CP, MM. AZ, CP, MM, SH, KLS	Lallawmsanga et al. (2019), Vabeikhokhei (2021), Lalbiakmawia (2022)
Coprinopsis cinerea	Agaricales	Psathyrellaceae	MM	Zothanzama et al. (2016)
Cerocorticium molle	Agaricales	Pterulaceae	AZ	Ralte & Vanlalhluna (2016)
Radulomyces molaris	Agaricales	Radulomycetaceae	AZ	Ralte & Vanlalhluna (2016)
Schizophyllum commune	Agaricales	Schizophyllaceae	AZ, CP, LL, LT, ST, MM, KZ, KLS, SH, SC, HT, AZ	Zothanzama (2011), Lallawmsanga et al. (2016), Lalrinawmi et al. (2017), Vabeikhokhei (2021), Renthlei et al. (2023)
Hypholoma fasciculare	Agaricales	Strophariaceae	AZ	Zothanzama (2011)
Pholiota squarrosa	Agaricales	Strophariaceae	MM, CP	Lallawmsanga et al. (2019)
Stropharia rugosoannulata	Agaricales	Strophariaceae	AZ	Zothanzama et al. (2016)
Collybia cookei	Agaricales	Tricholomataceae	CP, MM	Lallawmsanga et al. (2016)
Auricularia auricula-judae	Auriculariales	Auriculariaceae	AZ, MM, SH, AZ, CP, MM	Bisht (2011), Zothanzama (2011), Lallawmsanga et al. (2019)
Auricularia cornea	Auriculariales	Auriculariaceae	AZ	Vabeikhokhei et al. (2019)
Auricularia delicata	Auriculariales	Auriculariaceae	AZ, CP, MM SH, KLS	Vabeikhokhei et al. (2019), Lalbiakmawia (2022)
Auricularia mesenterica	Auriculariales	Auriculariaceae	HT, KZ, AZ, AZ	Zothanzama et al. (2018), Vabeikhokhei et al. (2019)
Auricularia nigricans	Auriculariales	Auriculariaceae	CP, MM, CP, MM	Lallawmsanga et al. (2016), Vabeikhokhei (2021)
Elmerina cladophora	Auriculariales	Auriculariaceae	CP, MM	Chawngthu, (2024)
Aporpium strigosum	Auriculariales	Aporpiaceae	MM	Vabeikhokhei (2021)
Exidia recisa	Auriculariales	Exidiaceae	CP	Ralte et al. (2020)
Aureoboletus auriflammeus	Boletales	Boletaceae	AZ	Lalrinawmi (2019)

Table 1 Continued

Species	Order	Family	Distribution	References
Aureoboletus mirabilis	Boletales	Boletaceae	AZ	Lalrinawmi & Zothanzama (2016)
Aureoboletus moravicus	Boletales	Boletaceae	AZ	Lalrinawmi (2019)
Boletus carpinaceus	Boletales	Boletaceae	AZ	Lalrinawmi (2019)
Boletus edulis	Boletales	Boletaceae	CP	Ralte et al. (2020)
Boletus subvelutipes	Boletales	Boletaceae	AZ	Lalrinawmi & Zothanzama (2016)
Buglossoporus pulvinus	Boletales	Boletaceae	AZ	Zothanzama et al. (2016)
Hourangia nigropunctata	Boletales	Boletaceae	CP	Zothanzama et al. (2018)
Strobilomyces verruculosus	Boletales	Boletaceae	AZ	Zothanzama et al. (2016)
Tylopilus balloui	Boletales	Boletaceae	MM	Zothanzama et al. (2018)
Xerocomus subtomentosus	Boletales	Boletaceae	AZ	Lalrinawmi (2019)
Pisolithus albus	Boletales	Sclerodermataceae	AZ	Lalrinawmi (2019)
Scleroderma citrinum	Boletales	Sclerodermataceae	CP, CP, MM	Zothanzama et al. (2018), Lallawmsanga et al. (2019)
Scleroderma verrucosum	Boletales	Sclerodermataceae	AZ	Zothanzama et al. (2018)
Craterellus cornucopioides	Cantharellales	Cantharellaceae	AZ	Lalrinawmi et al. (2017)
Cantharellus cibarius	Cantharellales	Hydnaceae	AZ, CP, MM	Lalrinawmi (2019), Thachunglura et al. (2024)
Lyomyces sambuci	Corticiales	Corticiaceae	AZ	Ralte & Vanlalhluna (2016)
Calocera cornea	Dacrymycetales	Dacrymycetaceae	AZ	Zothanzama et al. (2018)
Dacryopinax spathularia	Dacrymycetales	Dacrymycetaceae	AZ, CP, CP	Bisht (2011), Zothanzama (2011)
Elaphomyces anthracinus	Elaphomycetales	Elaphomycetaceae	CP	Ralte et al. (2020)
Geastrum morganii	Geastrales	Geastraceae	AZ	Lalrinawmi (2019)
Geoglossum cookeanum	Geoglossales	Geoglossaceae	AZ, CP	Lallawmsanga et al. (2019)
Gloeophyllum carbonarium	Gloeophyllales	Gloeophyllaceae	CP	Bisht (2011)
Gloeophyllum striatum	Gloeophyllales	Gloeophyllaceae	CP	Zothanzama (2011)
Gloeophyllum subferrugineum	Gloeophyllales	Gloeophyllaceae	CP	Bisht (2011)
Ramaria cystidiophora	Gomphales	Gomphaceae	AZ	Lalrinawmi (2019)
Chlorociboria aeruginascens	Helotiales	Chlorociboriaceae	MM, AZ, MM, CP	Zothanzama (2011), Lallawmsanga et al. (2019)
Calycina citrina	Helotiales	Pezizellaceae	CP, MM, SH	Vabeikhokhei (2021)
Coltricia perennis	Hymenochaetales	Hymenochaetaceae	CP, MM	Lallawmsanga et al. (2019)
Fuscoporia gilva	Hymenochaetales	Hymenochaetaceae	SH, CP, KLS	Bisht (2011)

Table 1 Continued

Species	Order	Family	Distribution	References
Calycina citrina	Helotiales	Pezizellaceae	CP, MM, SH	Vabeikhokhei (2021)
Coltricia perennis	Hymenochaetales	Hymenochaetaceae	CP, MM	Lallawmsanga et al. (2019)
Fuscoporia gilva	Hymenochaetales	Hymenochaetaceae	SH, CP, KLS	Bisht (2011)
Hymenochaete microcycla	Hymenochaetales	Hymenochaetaceae	MM, AZ, CP, MM, SH	Bisht (2011), Vabeikhokhei (2021)
Hymenochaete villosa	Hymenochaetales	Hymenochaetaceae	CP, MM	Vabeikhokhei (2021)
Hymenochaete microcycla	Hymenochaetales	Hymenochaetaceae	MM, HT	Zothanzama (2011), Zothanzama et al. (2018)
Phellinus allardii	Hymenochaetales	Hymenochaetaceae	AZ, MM, AZ	Bisht (2011), Zothanzama (2011)
Phellinus chrysoloma	Hymenochaetales	Hymenochaetaceae	AZ	Ralte & Vanlalhluna (2016)
Fuscoporia gilva	Hymenochaetales	Hymenochaetaceae	MM	Zothanzama (2011)
Pseudoinonotus dryadeus	Hymenochaetales	Hymenochaetaceae	SH	Zothanzama (2011)
Oxyporus ravidus	Hymenochaetales	Schizoporaceae	SH, KLS	Bisht (2011), Zothanzama (2011)
Pallidohirschioporus biformis	Hymenochaetales	Hirschioporaceae	AZ, CP, MM, CP, AZ, MM, MM	Bisht (2011), Vabeikhokhei (2021), Chawngthu et al. (2023), Chawngthu et al. (2024)
Trichaptum byssogenum	Hymenochaetales	Trichaptaceae	CP, LT, MM	Zothanzama (2011), Bisht (2011)
Hypomyces aurantius	Hypocreales	Hypocreaceae	AZ	Ralte & Vanlalhluna (2016)
Trichoderma peltatum	Hypocreales	Hypocreaceae	AZ, MM, CP, MM	Zothanzama et al. (2016), Chawngthu, (2024)
Ophiocordyceps mizoramensis^	Hypocreales	Ophiocordycipitaceae	MM	Chawngthu et al. (2021)
Scutellinia scutellata	Pezizales	Pyronemataceae	AZ, CP	Zothanzama (2011), Vabeikhokhei (2021)
Helvella ephippium	Pezizales	Helvellaceae	AZ	Lalrinawmi (2019)
Helvella macropus	Pezizales	Helvellaceae	AZ, AZ	Lalrinawmi & Zothanzama (2016), Lalrinawmi (2019)
Cookeina tricholoma	Pezizales	Sarcoscyphaceae	HT, MM, CP, MM	Zothanzama et al. (2018), Lallawmsanga et al. (2019), Vabeikhokhei (2021)
Bulgaria inquinans	Phacidiales	Phacidiaceae	CP	Zothanzama (2011)
Mutinus caninus	Phallales	Phallaceae	AZ	Lalrinawmi (2019)
Phallus indusiatus	Phallales	Phallaceae	AZ	Lalrinawmi & Zothanzama (2016)
Antrodia rhizomorpha	Polyporales	Fomitopsidaceae	MM, MM	Bisht (2011), Zothanzama (2011)
Daedalea circularis	Polyporales	Fomitopsidaceae	MM, AZ, CP, MM, SH	Zothanzama et al. (2016), Vabeikhokhei (2021)
Daedalea incana	Polyporales	Fomitopsidaceae	CP, LT, CP	Bisht (2011), Zothanzama (2011)

Table 1 Continued

Species	Order	Family	Distribution	References
Daedalea quercina	Polyporales	Fomitopsidaceae	MM, AZ, CP, MM, SH	Zothanzama et al. (2018), Vabeikhokhei (2021)
Daedalea dochmia	Polyporales	Fomitopsidaceae	AZ, CP, MM, SH	Chawngthu et al. (2023)
Fomitopsis pinicola	Polyporales	Fomitopsidaceae	CP	Zothanzama (2011)
Ranadivia modesta	Polyporales	Fomitopsidaceae	MM	Vabeikhokhei (2021)
Rhodofomitopsis feei	Polyporales	Fomitopsidaceae	CP, MM	Chawngthu et al. (2023)
Sanguinoderma rude	Polyporales	Ganodermataceae	MM, CP	Vabeikhokhei (2021)
Sanguinoderma rugosum	Polyporales	Ganodermataceae	AZ, CP, MM, SH	Vabeikhokhei (2021)
Grifola frondosa	Polyporales	Grifolaceae	AZ	Bisht (2011)
Byssomerulius corium	Polyporales	Irpicaceae	AZ	Ralte & Vanlalhluna (2016)
Irpex consors	Polyporales	Irpicaceae	AZ, CP	Bisht (2011), Zothanzama (2011)
Irpex lacteus	Polyporales	Irpicaceae	AZ	Ralte & Vanlalhluna (2016)
Vitreoporus dichrous	Polyporales	Irpicaceae	MM	Bisht (2011)
Laetiporus sulphureus	Polyporales	Laetiporaceae	AZ, MM, CP, AZ, AZ	Bisht (2011), Zothanzama (2011), Lalrinawmi et al. (2017), Zothanzama et al. (2018)
Phaeolus schweinitzii	Polyporales	Laetiporaceae	AZ	Bisht (2011)
Rigidoporus microporus	Polyporales	Meripilaceae	AZ	Zothanzama (2011)
Bjerkandera adusta	Polyporales	Phanerochaetaceae	AZ, CP, MM	Zothanzama (2011), Lallawmsanga et al. (2016)
Pseudophlebia semisupina	Polyporales	Meruliaceae	CP, MM	Chawngthu et al. (2023)
Coriolopsis telfairii	Polyporales	Polyporaceae	SH, SH	Bisht (2011), Zothanzama (2011)
Flavodon flavus	Polyporales	Irpicaceae	MM	Bisht (2011)
Funalia aspera	Polyporales	Polyporaceae	AZ, AZ, AZ	Bisht (2011), Zothanzama (2011), Vabeikhokhei (2021)
Phlebia tremellosa	Polyporales	Meruliaceae	SH, CP, AZ	Bisht (2011), Zothanzama (2011), Ralte & Vanlalhluna (2016)
Pseudospongipellis delectans	Polyporales	Cerrenaceae	MM	Chawngthu et al. (2023)
Cymatoderma dendriticum	Polyporales	Panaceae	AZ, HT, CP, MM	Zothanzama et al. (2018), Vabeikhokhei (2021)
Panus conchatus	Polyporales	Panaceae	MM	Chawngthu et al. (2023)
Panus neostrigosus	Polyporales	Panaceae	MM	Vabeikhokhei (2021)
Terana caerulea	Polyporales	Phanerochaetaceae	MM	Vabeikhokhei (2021)
Abundisporus fuscopurpureus	Polyporales	Polyporaceae	MM	Chawngthu et al. (2023)
Cellulariella acuta	Polyporales	Polyporaceae	AZ, AZ, CP, MM	Zothanzama (2011), Vabeikhokhei (2021)

Table 1 Continued

Species	Order	Family	Distribution	References
Cellulariella warnieri	Polyporales	Polyporaceae	HT, MM	Zothanzama et al. (2018), Chawngthu et al. (2023)
Podofomes mollis	Polyporales	Polyporaceae	AZ	Ralte & Vanlalhluna (2016)
Cerioporus squamosus	Polyporales	Polyporaceae	CP	Bisht (2011)
Daedaleopsis confragosa	Polyporales	Polyporaceae	AZ, CP, MM, SH, KLS	Vabeikhokhei (2021), Lalbiakmawia (2022)
Earliella scabrosa	Polyporales	Polyporaceae	AZ, SH, CP	Bisht (2011), Zothanzama (2011)
Favolus acervatus	Polyporales	Polyporaceae	CP	Zothanzama et al. (2018), Chawngthu et al. (2023)
Favolus glaber	Polyporales	Polyporaceae	AZ	Zothanzama et al. (2016)
Favolus philippinensis	Polyporales	Polyporaceae	AZ, CP, MM, MM	Chawngthu et al. (2023), Chawngthu et al. (2024)
Favolus tenuiculus	Polyporales	Polyporaceae	SC, AZ, SH	Bisht (2011), Zothanzama (2011), Vabeikhokhei (2021)
Fomes fomentarius	Polyporales	Polyporaceae	AZ	Zothanzama (2011)
Ganoderma applanatum	Polyporales	Polyporaceae	MM, AZ, KLS, AZ, CP, MM, SH.	Bisht (2011), Zothanzama (2011), Vabeikhokhei (2021)
Ganoderma australe	Polyporales	Polyporaceae	MM	Chawngthu et al. (2023)
Ganoderma fornicatum	Polyporales	Polyporaceae	AZ	Zothanzama et al. (2016)
Ganoderma lucidum	Polyporales	Polyporaceae	AZ, AZ, CP, MM, SH	Bisht (2011), Vabeikhokhei (2021)
Ganoderma mizoramense^	Polyporales	Polyporaceae	AZ, AZ, AZ	Vabeikhokhei et al. (2019), Zohmangaiha et al. (2019), Chawngthu et al. (2023)
Ganoderma multipileum	Polyporales	Polyporaceae	AZ	Zohmangaiha et al. (2019)
Ganoderma orbiforme	Polyporales	Polyporaceae	MM	Zohmangaiha et al. (2019)
Ganoderma sichuanense	Polyporales	Polyporaceae	AZ	Zohmangaiha et al. (2019)
Ganoderma subresinosum	Polyporales	Polyporaceae	AZ	Zohmangaiha et al. (2019), Chawngthu et al. (2023)
Ganoderma williamsianum	Polyporales	Polyporaceae	MM	Zohmangaiha et al. (2019)
Trametes apiaria	Polyporales	Polyporaceae	MM	Zothanzama (2011)
Cubamyces lactineus	Polyporales	Polyporaceae	MM	Zothanzama et al.(2016)
Cubamyces flavidus	Polyporales	Polyporaceae	MM	Chawngthu et al. (2023)
Lentinus arcularius	Polyporales	Polyporaceae	AZ, CP	Vabeikhokhei (2021)
Lentinus badius	Polyporales	Polyporaceae	MM, AZ, MM	Zothanzama et al. (2016), Vabeikhokhei (2021), Chawngthu et al. (2023)

Table 1 Continued

Species	Order	Family	Distribution	References
Lentinus brumalis	Polyporales	Polyporaceae	KLS	Zothanzama (2011)
Lentinus concavus	Polyporales	Polyporaceae	AZ	Vabeikhokhei (2021)
Lentinus crinitus	Polyporales	Polyporaceae	MM, AZ, SH	Vabeikhokhei (2021)
Lentinus fasciatus	Polyporales	Polyporaceae	MM, AZ, SH	Vabeikhokhei (2021)
Lentinus polychrous	Polyporales	Polyporaceae	AZ, CP, HT, CP, SH, ST, CP	Lalrinawmi et al. (2017), Vabeikhokhei (2021), Malsawmtluanga et al. (2023)
Panus roseus	Polyporales	Panaceae	SH	Vabeikhokhei (2021)
Lentinus sajor-caju	Polyporales	Polyporaceae	MM, MM, CP, AZ, SH	Lallawmsanga et al. (2016), Lalrinawmi et al. (2017), Vabeikhokhei (2021)
Lentinus squarrosulus	Polyporales	Polyporaceae	AZ, MM, AZ, MM, CP	Zothanzama et al. (2016), Vabeikhokhei (2021), Chawngthu et al. (2023)
Lentinus tigrinus	Polyporales	Polyporaceae	KLS, CP	Lalrinawmi et al. (2017), Vabeikhokhei (2021)
Lenzites betulinus	Polyporales	Polyporaceae	AZ, AZ, MM, SH	Bisht (2011), Zothanzama (2011), Vabeikhokhei (2021)
Lenzites vespacea	Polyporales	Polyporaceae	CP, AZ	Bisht (2011), Zothanzama (2011)
Microporus affinis	Polyporales	Polyporaceae	MM, KLS, CP, KLS, HT, AZ, CP, MM, AZ, SH	Bisht (2011), Zothanzama (2011), Zothanzama et al. (2018), Vabeikhokhei (2021)
Microporus ochrotinctus	Polyporales	Polyporaceae	AZ, MM	Vabeikhokhei (2021)
Microporus xanthopus	Polyporales	Polyporaceae	KLS, MM, SH, AZ, LL, ST, AZ, KLS, MM, LT, AZ, MM, CP, SH	Bisht (2011), Zothanzama (2011), Lallawmsanga et al. (2016), Vabeikhokhei (2021)
Neofavolus alveolaris	Polyporales	Polyporaceae	AZ, SH	Vabeikhokhei (2021)
Nigroporus vinosus	Polyporales	Polyporaceae	CP	Zothanzama et al. (2016)
Perenniporia contraria	Polyporales	Polyporaceae	LT	Bisht (2011)
Truncospora ochroleuca	Polyporales	Polyporaceae	AZ	Zothanzama (2011)
Picipes badius	Polyporales	Polyporaceae	CP	Vabeikhokhei (2021)
Picipes dictyopus	Polyporales	Polyporaceae	AZ, AZ, CP, MM, SH	Vabeikhokhei et al. (2019), Vabeikhokhei (2021)
Pseudofavolus tenuis	Polyporales	Polyporaceae	AZ, MM, CP, MM, AZ, CP, MM, SH, AZ	Bisht (2011), Zothanzama (2011), Vabeikhokhei et al. (2019), Chawngthu et al. (2023)

Table 1 Continued

Species	Order	Family	Distribution	References
Trametes cinnabarina	Polyporales	Polyporaceae	MM, CP, SH	Vabeikhokhei (2021)
Fabisporus sanguineus	Polyporales	Polyporaceae	KLS, MM, LL, AZ, ST, AZ, MM, CP, AZ, SH	Bisht (2011), Zothanzama (2011), Vabeikhokhei et al. (2019), Vabeikhokhei (2021)
Pyrofomes tricolor	Polyporales	Polyporaceae	AZ, MM	Bisht (2011)
Sarcodontia spumea	Polyporales	Meruliaceae	LT	Bisht (2011)
Trametes coccinea	Polyporales	Polyporaceae	AZ, CP, MM	Chawngthu et al. (2023)
Trametes cubensis	Polyporales	Polyporaceae	MM	Chawngthu et al. (2023)
Trametes elegans	Polyporales	Polyporaceae	KLS, AZ, SH, CP, MM, AZ, MM, AZ, CP	Bisht (2011), Lallawmsanga et al. (2016), Vabeikhokhei (2021), Chawngthu et al. (2023)
Trametes gibbosa	Polyporales	Polyporaceae	LT, AZ, CP, MM, SH	Bisht (2011), Vabeikhokhei (2021)
Trametes hirsuta	Polyporales	Polyporaceae	AZ, MM, CP, AZ, AZ, MM, CP, SH, MM	Bisht (2011), Zothanzama (2011), Lallawmsanga et al. (2016), Vabeikhokhei (2021), Chawngthu et al. (2023)
Trametes maxima	Polyporales	Polyporaceae	MM	Chawngthu et al. (2023)
Trametes tephroleuca	Polyporales	Polyporaceae	MM, AZ	Bisht (2011), Ralte & Vanlalhluna (2016)
Trametes trogii	Polyporales	Polyporaceae	MM, AZ, CP, MM, SH	Zothanzama et al. (2018), Vabeikhokhei (2021)
Trametes vernicipes	Polyporales	Polyporaceae	AZ, CP, MM, SH, MM, CP	Vabeikhokhei (2021), Chawngthu et al. (2023)
Trametes versicolor	Polyporales	Polyporaceae	CP, LT. CP, AZ	Zothanzama (2011), Vabeikhokhei (2021)
Trichaptum abietinum	Polyporales	Polyporaceae	CP, CP	Bisht (2011), Zothanzama (2011)
Truncospora ochroleuca	Polyporales	Polyporaceae	CP	Bisht (2011)
Junghuhnia nitida	Polyporales	Steccherinaceae	CP, AZ	Bisht (2011), Zothanzama (2011)
Lactarius rufus	Russulales	Russulaceae	MM	Thachunglura et al. (2023a)
Lactifluus corrugis	Russulales	Russulaceae	AZ, CP, SH, SC, MM, CP	Lalrinawmi et al. (2017), Thachunglura et al. (2023a), Malsawmtluanga et al. (2023)
Lactifluus piperatus	Russulales	Russulaceae	AZ, MM, MM, CP	Lalrinawmi et al. (2017), Thachunglura et al. (2023a), Malsawmtluanga et al. (2023)
Lactifluus subvellereus	Russulales	Russulaceae	MM	Thachunglura et al. (2023a)
Lactifluus volemus	Russulales	Russulaceae	MM, CP, MM	Thachunglura et al. (2023a), Thachunglura et al. (2024)

Table 1 Continued

Species	Order	Family	Distribution	References
Russula adusta	Russulales	Russulaceae	AZ, CP	Lalrinawmi (2019), Malsawmtluanga et al. (2023)
Russula aurora	Russulales	Russulaceae	AZ	Lalrinawmi et al. (2017)
Russula brevipes	Russulales	Russulaceae	MM	Thachunglura et al. (2023a)
Russula compacta	Russulales	Russulaceae	AZ, MM	Lalrinawmi (2019), Thachunglura et al. (2023a)
Russula crustosa	Russulales	Russulaceae	MM	Thachunglura et al. (2023)
Russula cyanoxantha	Russulales	Russulaceae	AZ, AZ, MM, CP	Zothanzama et al. (2018), Lalrinawmi (2019), Thachunglura et al. (2023a), Thachunglura et al. (2024)
Russula earlei	Russulales	Russulaceae	MM	Lalrinawmi (2019)
Russula emetica	Russulales	Russulaceae	MM	Thachunglura et al. (2023a)
Russula foetens	Russulales	Russulaceae	MM	Thachunglura et al. (2023a)
Russula mutabilis	Russulales	Russulaceae	AZ	Lalrinawmi (2019)
Russula purpureoverrucosa	Russulales	Russulaceae	MM	Thachunglura et al. (2023a)
Russula queletii	Russulales	Russulaceae	AZ	Lalrinawmi (2019)
Russula rosea	Russulales	Russulaceae	AZ	Lalrinawmi (2019)
Russula sanguinea	Russulales	Russulaceae	MM	Thachunglura et al. (2023a)
Russula subfragiliformis	Russulales	Russulaceae	AZ, MM	Lalrinawmi et al. (2017), Thachunglura et al. (2023a)
Russula vesca	Russulales	Russulaceae	MM	Thachunglura et al. (2023a)
Russula virescens	Russulales	Russulaceae	CP	Ralte et al. (2020)
Stereum complicatum	Russulales	Stereaceae	CP	Zothanzama (2011)
Stereum hirsutum	Russulales	Stereaceae	HT, AZ, CP, MM, SH	Zothanzama et al. (2018), Vabeikhokhei (2021)
Stereum ostrea	Russulales	Stereaceae	CP, AZ, CP, MM, SH	Zothanzama (2011), Vabeikhokhei (2021)
Stereum rugosum	Russulales	Stereaceae	AZ	Vabeikhokhei et al. (2019)
Xylobolus subpileatus	Russulales	Stereaceae	AZ, CP, AZ, AZ, CP, MM, SH	Bisht (2011), Zothanzama (2011), Vabeikhokhei (2021)
Thelephora ganbajun	Thelephorales	Thelephoraceae	AZ	Zothanzama et al. (2018)
Trechispora mollusca	Trechisporales	Hydnodontaceae	AZ	Ralte & Vanlalhluna (2016)
Tremella fuciformis	Tremellales	Tremellaceae	AZ, MM, AZ, MM, MM, CP	Lalrinawmi et al. (2017), Vabeikhokhei (2021), Thachunglura et al. (2024)
Tremella mesenterica	Tremellales	Tremellaceae	MM, MM, AZ	Lalrinawmi et al. (2017), Vabeikhokhei (2021)
Peroneutypa scoparia	Xylariales	Diatrypaceae	AZ	Ralte & Vanlalhluna (2016)
Annulohypoxylon thouarsianum	Xylariales	Hypoxylaceae	AZ	Ralte & Vanlalhluna (2016)

Table 1 Continued

Species	Order	Family	Distribution	References
Daldinia concentrica	Xylariales	Hypoxylaceae	AZ, LT, AZ, MM, CP, AZ, SH	Bisht (2011), Zothanzama (2011), Vabeikhokhei (2021)
Hypoxylon fuscum	Xylariales	Hypoxylaceae	AZ	Ralte & Vanlalhluna (2016)
Jackrogersella multiformis	Xylariales	Hypoxylaceae	AZ	Ralte & Vanlalhluna (2016)
Xylaria bambusicola	Xylariales	Xylariaceae	KLS	Lalbiakmawia (2022)
Xylaria feejeensis	Xylariales	Xylariaceae	MM, CP	Lallawmsanga et al. (2016)
Xylaria grammica	Xylariales	Xylariaceae	MM, CP, SH	Vabeikhokhei (2021)
Xylaria hypoxylon	Xylariales	Xylariaceae	LT, CP, MM, CP, AZ, SH	Bisht (2011), Zothanzama (2011), Vabeikhokhei (2021)
Xylaria longipes	Xylariales	Xylariaceae	MM, KZ, MM, CP, AZ, SH	Bisht (2011), Zothanzama et al. (2018), Vabeikhokhei (2021)
Xylaria polymorpha	Xylariales	Xylariaceae	LT, SH, MM, CP, AZ, SH	Zothanzama (2011), Lallawmsanga et al. (2019), Vabeikhokhei (2021)

Notes: District of Mizoram: Aizawl (AZ), Champhai (CP), Hnahthial (HT), Khawzawl (KZ), Kolasib (KLS), Lunglei (LL), Lawngtlai (LT), Mamit (MM), Saitual (ST), Serchhip (SC), Siaha (SH). ^ Taxa described as new to science from Mizoram.

Discussion

The exploration of macrofungi in the Mizoram has been hindered by a lack of consistency and limited attention, leading to an incomplete understanding of the diversity of fungi. As a result, the current checklist is inadequate and represents only a fraction of the true macrofungal diversity in the region. While some researchers have conducted studies on the diversity of wild mushrooms, their research has been primarily concentrated in areas such as the Biodiversity Reserve (BR), and the number of studies is limited.

Many species reported from Mizoram belong to the order Polyporales, with Polyporaceae being the most common family. Several polypore species have essential uses as food and medicine, while others are serious pathogens of plantation trees, significantly contributing to timber spoilage. Although most polypores act as saprotrophs, feeding on dead, fallen, or standing wood, some are necrotrophic parasites that infect and kill living sapwood. A distinct case involves heart-rot polypores, which decay the heartwood of living trees. Despite feeding on dead tissue, they are specifically adapted to infect living hosts, leading to major timber volume losses. These infections weaken trees structurally, making them susceptible to breaking or being felled by wind (Rajchenberg & Robledo 2013). Takács et al. (2020) studied 2,000 ancient Hungarian trees, comprising 29 native and 43 non-native species, and found that 12.2% of the 531 observed settlements were infected by polypores. Around 200 species of polypores are known to act as pathogens or facultative parasites on living trees, causing significant financial losses in commercial forestry (Zhao et al. 2024). Some common forest pathogen species, such as *Fomes fomentarius*, *Fomitopsis pinicola*, and *Ganoderma tsugae*, have also been reported in the state. Moreover, *Rigidoporus microporus* is a major plant pathogen known for its substantial impact on the global rubber industry. It causes white root rot disease, spreading through the host's roots via white, fibrous mycelia. The infection disrupts vascular function and leads to visible symptoms like leaf discoloration and dieback, especially in heavily infected trees (Saidi et al. 2023). There is a

significant research gap in understanding the specific impacts of polypore infections on trees in Mizoram. Despite the presence of various polypore species and their known effects on tree health globally, no detailed studies have been conducted in Mizoram to examine how these infections affect the physiological and structural health of local trees. This lack of research limits our understanding of the true impact of polypore pathogens in the region, highlighting the need for targeted investigations to develop effective management strategies and mitigate potential damage to local forest ecosystems and commercial forestry.

Fig. 1 – a *Auricularia auricula-judae*. b *Ganoderma mizoramense*. c *Termitomyces heimii*. d *Schizophyllum commune*. e *Auricularia delicata*. f *Cellulariella warnieri*. g *Russula purpureoverrucosa*. h *Fistulina hepatica*. i *Cantharellus cibarius*. j *Lactifluus volemus*. k *Dacryopinax spathularia*. l *Russula cyanoxantha*. m *Tremella fuciformis*. n *Ganoderma lucidum*. o *Ophiocordyceps mizoramensis*.

Table 2 List of family, genera, and number of species.

Family	Genera	No. of Species	Family	Genera	No. of Species
Agaricaceae	7	9	Lycoperdaceae	1	2
Amanitaceae	1	10	Lyophyllaceae	2	4
Aporpiaceae	1	1	Marasmiaceae	2	2
Auriculariaceae	2	6	Meripilaceae	1	1
Boletaceae	7	11	Meruliaceae	3	3
Callistosporiaceae	1	1	Mycenaceae	4	5
Cantharellaceae	1	1	Nidulariaceae	1	1
Cerrenaceae	1	1	Omphalotaceae	3	5
Chlorociboriaceae	1	1	Ophiocordycipitaceae	1	1
Clavariaceae	2	3	Panaceae	2	4
Entolomataceae	1	1	Pleurotaceae	1	4
Exidiaceae	1	1	Pluteaceae	1	1
Fistulinaceae	1	1	Polyporaceae	26	64
Fomitopsidaceae	5	8	Psathyrellaceae	2	2

Table 2 Continued

Family	Genera	No. of Species	Family	Genera	No. of Species
Ganodermataceae	1	2	Pterulaceae	1	1
Geastraceae	1	1	Pyronemataceae	1	1
Geoglossaceae	1	1	Radulomycetaceae	1	1
Gloeophyllaceae	1	3	Russulaceae	3	22
Gomphaceae	1	1	Sarcoscyphaceae	1	1
Grifolaceae	1	1	Schizophyllaceae	1	1
Hirschioporaceae	1	1	Schizoporaceae	1	1
Hydnaceae	1	1	Sclerodermataceae	2	3
Hydnangiaceae	1	2	Steccherinaceae	1	1
Hydnodontaceae	1	1	Stereaceae	2	5
Hymenochaetaceae	5	9	Strophariaceae	3	3
Hymenogastraceae	2	3	Thelephoraceae	1	1
Hypocreaceae	2	2	Tremellaceae	1	2
Helvellaceae	1	2	Trichaptaceae	1	1
Hypoxylaceae	4	4	Tricholomataceae	1	1
Irpicaceae	4	5	Xylariaceae	1	6
Laetiporaceae	2	2			

In the state of Mizoram, wild edible mushrooms are a crucial food source for many people living in rural areas who are struggling with poverty (Zothanzama et al. 2018, Thachunglura et al. 2023a). However, there is a growing concern that people are mistakenly identifying specific types of macrofungi, which can have fatal consequences. Our checklist shows that there are various wild edible mushrooms found in Mizoram. Yet, this information is not reaching the local population effectively. This lack of awareness leads to uncertainty about which mushrooms are safe for consumption. As a result, the people of Mizoram tend to consume the wild edible mushrooms they are familiar with over time, which can sometimes be unsafe. Due to this confusion, there has been a growing preference for cultivated mushrooms among the people of Mizoram in recent years. Misidentification of species, particularly *Amanita* species, has resulted in fatal incidents in recent years. However, some species, including *Auricularia auricula-judae, A. delicata, Lactifluus corrugis, Lf. piperatus, Lf. volemus, Lentinus polychrous, L. sajor-caju, L. tigrinus, Lentinula lateritia, Macrolepiota dolichaula, M. procera, Pleurotus djamor, P. pulmonarius, P. giganteus, Russula aurora, R. compacta, R. cyanoxantha, R. subfragiliformis, Schizophyllum commune, Termitomyces clypeatus, T. heimii, T. robustus,* and *Volvariella taylorii* are regularly consumed by the indigenous people of Mizoram. These species have also been categorized as E1 (edible – confirmed) according to the list of edible mushrooms by Li et al. (2021).

Conclusion

This paper provides crucial data for both present and future studies on the ecological importance of fungal diversity. However, some species may be missing from the checklist due to gaps in the available literature. Unfortunately, the current agricultural practices in Mizoram, which rely heavily on slash-and-burn techniques, pose a serious threat to the habitats and host plants of these fungi, leading to a depletion of diversity. Therefore, we must allocate resources toward investigating fungal diversity and implementing effective conservation measures to safeguard the invaluable ecosystems of Mizoram.

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