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Exploring the macrofungal community of Ajmer, Rajasthan: Taxonomy, abundance, and new distribution records

Shruti Ojha[1], Renu Jangid[2]*, Surbhi Agarwal[3], Arvind Pareek[4]

ABSTRACT

Mushrooms are known to play an important role due to their diverse aspects in nature. The diversity of mushrooms belonging to the phyla *Basidiomycota* and *Ascomycota* has been investigated in the present study from Ajmer, Rajasthan, India. The city with a wide range of ecosystems has been highlighted in the past for several studies related to flora and fauna biodiversity. However, the study on the diversity and abundance of the mushrooms from Ajmer city, specifically, Maharshi Dayanand Saraswati University, Ajmer, Rajasthan, India, has been neglected in past research investigations. The monsoon season, ranging from June to September 2025, was assessed, which showed a total of 71 wild macrofungal species belonging to 32 families. The results revealed higher species richness in June-July compared to the later monsoon months. *Psathyrellaceae* and *Agaricaceae* phylum *Basidiomycota* showed the highest number of species, with 10 and 9 each, respectively. However, only a single species of *Xylaria* belonging to *Ascomycota* was reported from the study. Moreover, the study reported 1 (*Amanita ocreata*), 3 (*Itajahya galerculata, Mutinus caninus,* and *Geastrum saccatum*) and 65 wild mushroom species for the first time from the country India, state Rajasthan, and city Ajmer, respectively. This present investigation displays a broad taxonomic study of the macrofungal community, which could play an important role in various economic sectors, including agriculture, medicinal, and industrial. Beneficial mushrooms consumed as food products and various other industrial and food sectors emphasise the need for detailed investigation of mushrooms.

Keywords: Abundance, Ajmer, *Ascomycota, Basidiomycota*, Diversity, Mushrooms.

1. INTRODUCTION

Mushrooms are macro fungi that occupy diverse niches in nature. The term "Mushroom" is broadly applied to the fleshy, spore-producing structures of certain fungi, especially those in the phylum *Basidiomycota* and some in the *Ascomycota* (Passari and Sánchez, 2020). They predominantly occur during the monsoon or rainy season. They are mostly found under the dense canopy shade of trees, which provides a moist atmosphere and decomposing organic material, facilitating the germination and growth of mushrooms (Lakhanpal, 2014; Phillips, 2013).

There are approximately 140,000 mushroom species worldwide, with about 14,000 known. Over 2,000 species are recognized as safe to eat, and around 700 have notable medicinal properties (Fang et al., 2023; Jo et al., 2014). Mushrooms play essential roles in decomposition, nutrient recycling, and soil formation. Diversity and abundance of mushroom species serve as a biological indicator of ecosystem health. Data on the diversity of mushrooms is crucial for maintaining and managing the ecosystem (Pushpa and Purushothama, 2012). They are economically important and serve as food, medicine, biocontrol agents, chemical producers of bioactive compounds used in the pharmaceutical and many other industries (Fang et al., 2023). Several mushrooms form mycorrhizal associations with higher plants' roots. These partnerships improve plant nutrient and water absorption, while fungi receive sugars from the plant, creating a mutualistic relationship that bolsters ecosystem resilience and productivity (Egli, 2011; Primicia et al., 2016).

Several mushroom species are edible and rich in proteins, vitamins, minerals, and antioxidants. They are often called "poor man's meat" and provide food security and income for rural communities (Dzomeku et al., 2023). Mushrooms are embedded in local traditions, indigenous knowledge, and cultural heritage. Their collection and use are often passed down through generations, and they contribute to the socio-economic status of rural populations (Fang et al., 2023; Ullah et al., 2022). The diversity of mushrooms is threatened by habitat destruction and climate change. Conservation efforts, such as community forestry and sustainable harvesting practices, are vital for maintaining both mushroom diversity and the ecosystems they support (Benchawattananon, 2016).

Many mushroom species produce toxic compounds, including *Amanita phalloides, Gyromitra, Clitocybe, Inocybe, Psilocybe, Panaeolus,* and *Coprinus atramentarius.* Poisoning often results from misidentification, leading to accidental ingestion of toxic species (Bertelsen, 2013). Effects range from mild gastrointestinal distress (nausea, vomiting, diarrhoea) to severe outcomes such as liver failure, kidney failure, seizures, confusion, and even death. Symptoms can also include sweating, cramps, hallucinations, and mental disturbances (Bertelsen, 2013; Lima et al., 2012).

The present study investigates the morphological identification, biodiversity and abundance of wild mushrooms in Ajmer city, Rajasthan (India). The research closely studies the different mushrooms based on diverse characteristics, including habitats, medicinal and edible values, and taxonomic classifications. The macrofungal species have been collected, examined, identified, studied, and preserved for future studies and detailed analysis.

2. MATERIAL AND METHODS

Site of study

Ajmer city, better known as the heart of Rajasthan, is due to its location and significant contribution to tourism, cultural richness, and the vast biodiversity of flora and fauna. The city lies at 26°26' N and 74°36' E latitude and longitude, respectively, with two beautiful artificial lakes, namely AnaSagar and Varun Sagar (earlier known as Foy Sagar), at different locations in the city.

The location of the sample collection was the campus of Maharshi Dayanand Saraswati University (MDSU), Ajmer, Rajasthan, India, with 26°30′ N latitude and 74°40′ E longitude. The university has been established since 1987 on the outskirts of Ajmer city, near the Ghooghra village. The location was selected based on the large campus area of 766 acres with rich biodiversity and abundant. The city of Ajmer experiences an average temperature of 12-30° C, with the highest average during the months of April-June (40°C) and the lowest average during the months of October-February (20°C). Ajmer receives an average rainfall of 450-600 mm and 15-20 inches per year. The maximum rainfall period every year ranges from June to August. The average annual relative humidity of Ajmer city during the different seasons ranges from 45% to 70% (World Weather Online). Four sample collection sites in the university campus were selected based on the rich diversity of flora and habitats.

Collection and identification of Mushrooms

The mushrooms were collected using random sampling methods in the monsoon months from June to September 2025 from MDSU, Ajmer, Rajasthan, India. The collections were made based on morphological characters, including habitat, cap colour and size, stipe colour and size, and gills colour. The samples collected were further analysed for identification based on macroscopic and morphological characters, with overall photography of the mushroom samples taken in the natural habitat. The collected samples were stored and preserved in airtight glass containers for preservation at the Plant Pathology laboratory, Department of Botany, MDSU, Ajmer, Rajasthan, India. The conditions when individual mushroom species were not abundant, the samples were subjected to identification only. The samples were preserved in FAA (Fomalin-Acetic-Alcohol) (Kladnik, 2013). The caps were cut from the stipe end and placed on plain paper for three days for spore printing and preserved in the laboratory for future study.

Different factors like colour, texture, habitat, ecology, edibility, and smell were considered as primary identification criteria of wild mushrooms. The identification process was conducted by various modes, including books (Roy, 1973; Roy, 2016; Bessy, 2015; Sethi and Walia, 2018; Verma et al., 2019), published articles, identification keys, and internet website sources such as mykoweb.com, indexfungorum.org.

Statistical analysis

The data analysis of species frequency was studied by the following formula (Simpson, 1949; Pushpa and Purushothama, 2012).

$$\text{Occurrence frequency of taxon A} = \frac{\text{Occurrence of taxon A}}{\text{Total number of all species}} \times 10$$

$$H = -(n/N) \log_e (n/N)$$

H= the diversity index

N= the total number of individuals of all the species

n= the total number of individuals of the individual species.

Simpson Index of Diversity =1-D

$$\mathbf{D = \frac{\Sigma n (n-1)}{N (N-1)}}$$

n = The total number of organisms of a particular species

N = The total number of organisms of all species

D = Simpson's index

The diversity indices of the collected mushroom species were analysed using various statistical parameters, including species richness/evenness, Shannon-Wiener Index (H'), Simpson's Similarity Index (SI), and species dominance using PAST 4.03 statistics software (Pielou, 1996).

3. RESULTS

Enumeration and identification

The macrofungal community was collected and identified based on morphological characters. A total of 71 species belonging to 32 families of *Basidiomycota* and *Ascomycota* were identified. However, only one species of *Ascomycota* was reported from the total collection. *Psathyrellaceae* and *Agaricaceae* were dominated by 10 and 9 species, respectively, followed by *Amanitaceae* and *Bolbitiaceae* with 4 species each. The other families, including *Fomitopsidaceae*, *Hymenogasteraceae*, *Marasmiaceae*, *Ganodermataceae*, and *Pluteaceae* have been recorded with 3 species each. However, the other remaining families reported only 1 or 2 species from the site study.

The wild mushroom species surveyed belong to 48 genera which mainly include *Agaricus, Amanita, Amylosporus, Auricularia, Candolleomyces, Cantharellus, Climacocystis, Coniophora, Conocybe, Contumyces, Coprinellus, Coprinopsis, Crepidotus, Cyphellostereum, Cystoderma, Dacryopinax, Deconia, Entoloma, Fuscopostia, Gandoderma, Geastrum, Gymnopus, Irpex, Itajahya, Lactorius, Lepiota, Letinus, Leucocoprinus, Lycoperdon, Marasmius, Mutinus, Mycena, Panaeolus, Parasola, Pholiotina, Phyllotopsis, Pleurotus, Pluteus, Postia, Psathyrella, Psilocybe, Retiboletus, Schizophyllum, Sparassis, Termitomyces, Tulosesus, Volvariella*, and *Xylaria* (Table 1, Fig. 3-7).

Table 1. Description of mushrooms based on morphological characters. The detailed study of mushrooms showing the cap, stipe, and gills color. The measurements were taken in centimeters (cm) of the cap diameter and stipe size in length.

S. No.	Scientific Name	Habitat	Cap color and size (cm)	Stipe color and size (cm)	Gills color/ spores
1	*Agaricus arvensis*	Soil	White 0.5	White 6.5	Light pink
2	*Agaricus augustus*	Soil	White 7	White 5	Pink
3	*Agaricus bisporus*	Soil	Dark brown 7.2	Light brown 6.3	Brown

4	*Agaricus subrufescens*	Saprophytic	Dark brown 7.5	Light brown 6	Brown
5	*Amanita farinosa*	Soil	White 3.5	white 5	White
6	*Amanita ocreata*	Saprophytic	Off-white 4-10	Off-white 8-25	Cream
7	*Amanita pantherina*	Soil	Light brown 6	Off-white 6-12	White
8	*Amanita rubescens*	Saprophytic	Brown 1.5	Light brown 3.5	Light Pink
9	*Amylosporus compbelli*	Saprophytic	White cream 5	White 8	Greyish white
10	*Auricularia sp.*	Wood Log	Reddish brown to dark brown 6	True stipe absent	Absent
11	*Candolleomyces candolleanus*	Saprophytic	Dark brown 2.5	Off-white 3.5	Brown
12	*Cantharellus cibarius*	Soil	Golden yellow 5	Light yellow 6	Pale yellow
13	*Cantharellus sp.*	Soil	Golden yellow 4	Light yellow 6.5	Yellow
14	*Climacocystis borealis*	Saprophytic	Off-white 7	Absent	true gills absent
15	*Coniophora puteana*	Other substrate	Cream color 1.8	Brown 2	Light brown
16	*Conocybe apala*	Saprophytic	Cream 3	White 6	Light brown
17	*Conocybe tenera*	Soil	Yellow brown 4.5	Light brown 14	Light brown
18	*Contumyces rosellus*	Soil			
19	*Contumyces vesuvianus*	Soil	Reddish brown 0.2	Dark brown 1	Cream
20	*Coprinellus domesticus*	Soil	Brown 1.3	Cream brown 3	Grey
21	*Coprinopsis nivea*	Soil	White 2.1	White 5	Black
22	*Crepidotus applanatus*	Wood log	Cream 4	Absent	Pale brown
23	*Cyphellostereum*	Other substrate	White 1	Absent	Absent
24	*Cystoderma carcharias*	Soil	Off-white 2.5	Peach white 3	Pale pink
25	*Dacryopinax spathularia*	Wood log	Bright orange 1	Absent	Absent
26	*Deconia coprophila*	Coprophilous	Red brown 1.5	Yellow brown 3	Greyish brown
27	*Entoloma serrulatum*	Soil	Blue white 2.5	Light blue 3.5	Light pink

28	*Fuscopostia fragilis*	Saprophytic	Whitish yellow 8	Absent	Yellow
29	*Gandoderma curtisii*	Soil	Yellowish brown 8.9	Brown 5.3	Creamy white
30	*Ganoderma lucidum*	Wood log and Soil	White edges, Brown red 1.5	White red 3.5	Pale yellow
31	*Ganoderma applanatum*	Wood log	brown to cinnamon brown 8.5	Absent	Reddish brown
32	*Geastrum saccatum*	Saprophytic	Brown 2.5	Absent	Absent
33	*Gymnopus iocephalus*	Soil	Violet 2	Purple 4	Cream
34	*Irpex rosettiformis*	Saprophytic	Yellowish white 8	Yellow White	Absent
35	*Itajahya galericulata*	Soil	White Brown 3.5	Yellow 7	Absent
36	*Lactorius psammicola*	Soil	White yellow 3.5	White 4	Cream
37	*Lepiota cristata*	Soil	Cream 4	White 5	Cream
38	*Letinus flexipes*	Soil	Light brown 2.5	Brown 4	Pale cream
39	*Leucocoprinus brebissonii*	Saprophytic	White 2	Pinkish white 4.5	White
40	*Leucocoprinus cepistipes*	Saprophytic	White 3	White 6	Light pink
41	*Lycoperdon perlatum*	Saprophytic	White 3	White 3	Absent
42	*Marasmius calhouniae*	Tree	Pale gray 1.5	Brown 2.5	Pale grey
43	*Marasmius siccus*	Saprophytic	Light orange 5	Light yellow 6	White
44	*Marasmius sullivantii*	Soil	Reddish orange 1	Black 1.5	White
45	*Mutinus caninus*	Soil	Pale orange 1.5	Light orange 9	Absent
46	*Mycena chlorophos*	Other substrate	Greyish brown 2	White 4	Pale green
47	*Mycena inclinata*	Soil and Wood log	Dark brown 2.5	Light brown 4	Pale cream
48	*Panaeolus cyanescens*	Soil	White 2.3	White 4	Dark brown
49	*Panaeolus semiovatus*	Saprophytic	Light brown 3.5	White 6.5	Dark brown
50	*Parasola conopilea*	Saprophytic	Grey brown	Pale gray	Gray

			2.3	6	
51	*Parasola plicatilis*	Wood log and soil	White 3	White 4	Brown
52	*Pholiotina rugosa*	Coprophilous	Dark orangish brown	Pale brown 4.5	Cinnamon
53	*Phyllotopsis nidulans*	Wood Log	Yellow orange 3	Yellow orange 0.5	Yellow
54	*Pleurotus citrinopileatus*	Soil	Bright yellow 3.5	Pale yellow 3	White
55	*Pleurotus ostreatus*	Tree	Off-white 1	White 1.5	White
56	*Pluteus cervinus*	Saprophytic	Dark brown 4.5	White 6	White
57	*Postia tephroleuca*	Wood log	Greyish brown 6	Absent	Absent
58	*Psathyrella candolleana*	Coprophilous	Cream 4.5	White 5.5	Dark brown
59	*Psathyrella corrugis*	Saprophytic	Dark brown 1.5	Light brown 2.5	Black
60	*Psathyrella piluliformis*	Tree	Dark brown 4	Cream 5	Dark brown
61	*Psilocybe sp.*	Saprophytic	Off-white 3.5	Off-white 3	Black
62	*Psilocybe cubensis*	Soil	Orange 1.3	Brown 5	White
63	*Psilocybe semilanceata*	Saprophytic	Brown 2.5	White 5	Black
64	*Retiboletus griseus*	Wood log and Soil	Grey 2.5	White 3.5	Absent
65	*Schizophyllum commune*	Wood Log	Gray white	Absent	Grey
66	*Sparassis sp.*	Tree	Off-white	Light yellow	Absent
67	*Termitomyces sp.*	Soil	Off-white 9.5	White 14.5	White to pale pink
68	*Tulosesus impatiens*	Saprophytic	Off-white 3	White 4	Brown
69	*Volvariella sp.*	Tree	White 1.5	White 3.5	Light pink
70	*Volvariella volvacea*	Soil	Brown 2.5	Off-white 0.5	Pink
71	*Xylaria nigripes*	Saprophytic	Absent	Absent	Absent

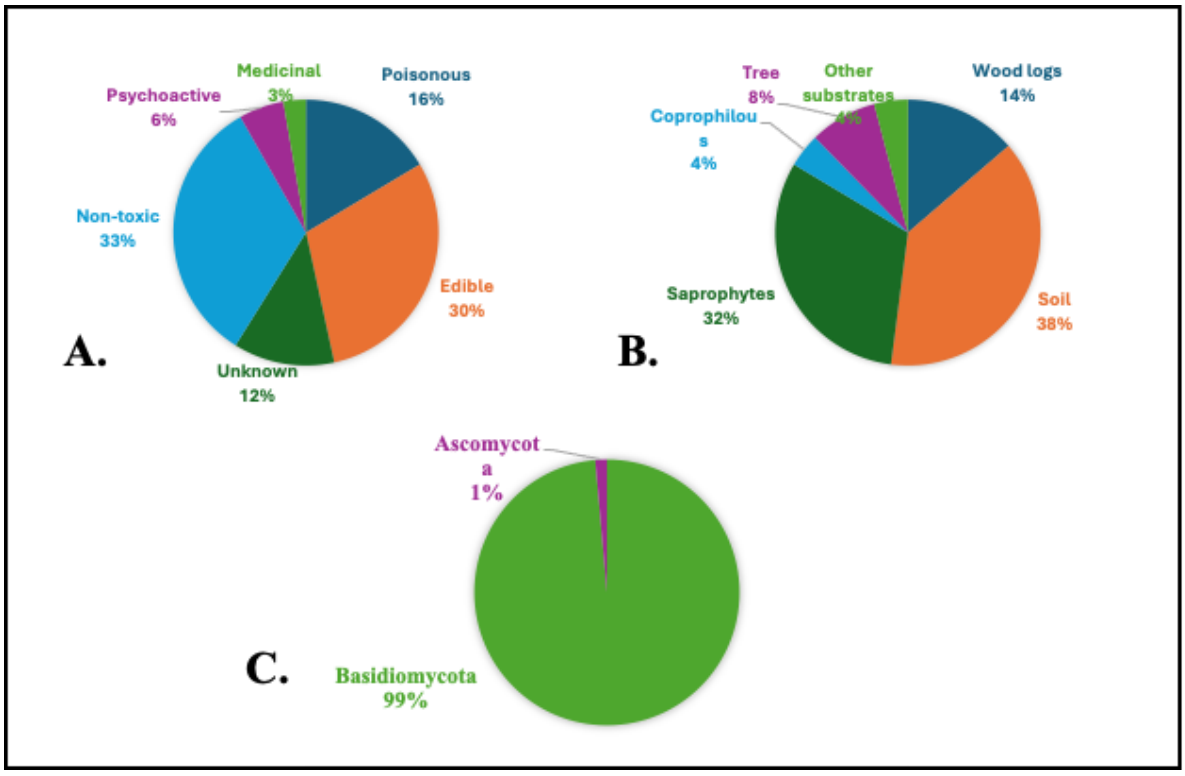

Figure 1. Study of mushrooms based on different factors. A. The wild mushrooms were studied according to their edibility and medicinal properties. B. The total number of species was counted based on the collection of mushrooms from all habitats. The percentage was calculated from the total number of species in each habitat. C. The collected mushrooms belonged to two major phyla: Basidiomycota and Ascomycota, and were studied accordingly.

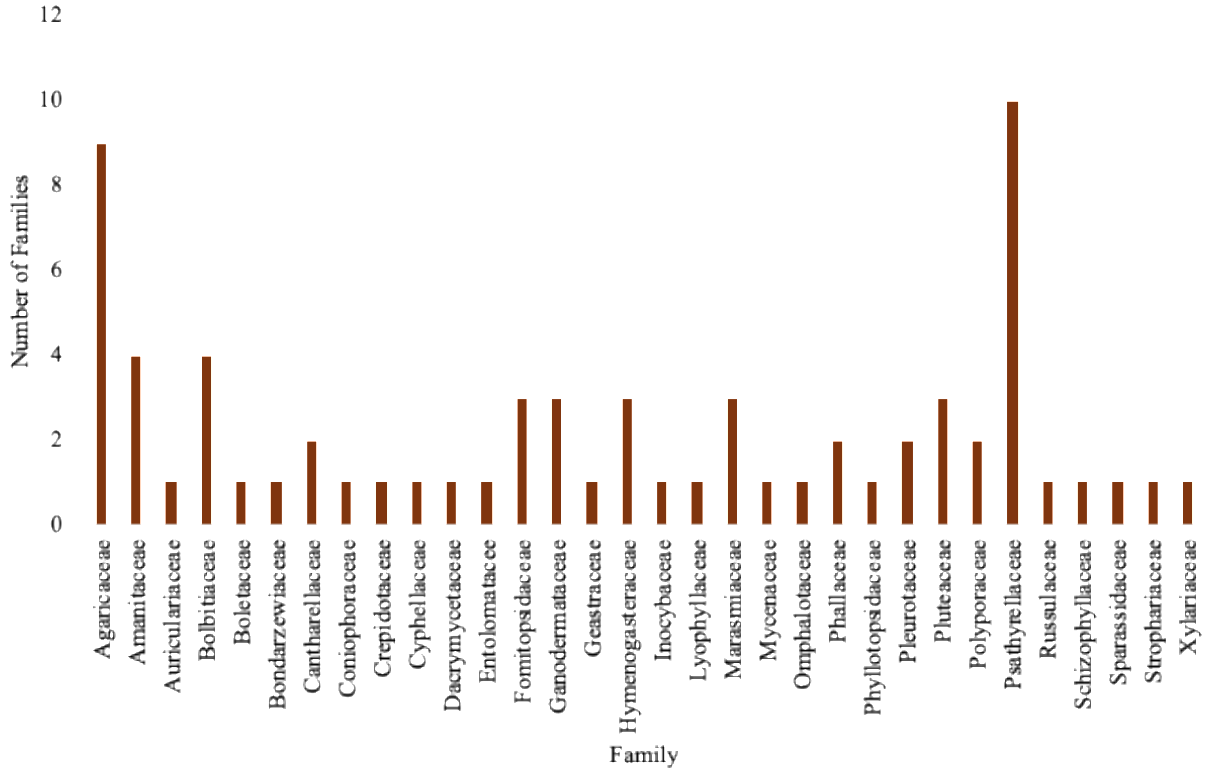

Figure 2. Diversity and abundance of different mushrooms based on families. 32 families belonging to Basidiomycota and Ascomycota were identified. The graph is based on the number of species collected and identified from each family.

Edibility and medicinal properties

The mushrooms were collected from diverse habitats and ecological conditions. However, the study also highlighted the edible properties of the wild mushrooms. The macrofungal species were studied under poisonous, edible, psychoactive, non-toxic (but not edible), medicinal, and unknown categories. The study was based on past research and a review of the literature of the mushroom samples collected and identified worldwide. The results revealed 24 non-toxic species that had no toxins present, but were not known for edible properties as well. The edible species were 22, followed by the poisonous, with 12 from the data collection. The unknown, psychoactive, and medicinal were 9, 4, and 2 species, respectively (Fig. 1A).

Figure 3. The study of wild mushrooms based on habitat. The mushrooms were collected from tree habitats. The species were collected either from the bark or the base of the trees.

Ecology and environment

The mushrooms were collected from different habitats and were analysed based on five categories, including dry wood logs, saprophytes, coprophilous, soil, and other substrates. The wood logs were mainly the dry fallen twigs, dry bark, and broken tree branches. The fallen leaves in dry and wet forms, along with other dead and decayed matter, were considered saprophytes. The dung forms of animals in dry and wet states were analysed in coprophilous mushroom species. The other substrates include the species collected from habitats such as rocks, building walls, tree barks, and other unusual sources. From the mentioned habitats, 10 species were collected from wood logs, 23 species from saprophytes, the soil mushroom species included 28, coprophilous with 3 species, trees with 6, and other substrates with 3 species (Fig. 1B, Fig. 3-7).

Diversity indices

The wild mushrooms were studied at different locations of the MDSU campus, Ajmer, Rajasthan, India. The locations were randomly selected based on different conditions of the habitats, like moisture, floral abundance, and temperature conditions (shade, sunlight). The diversity indices of the data show richness, evenness, and species diversity as in Table 2. Additionally, Shannon-Wiener Index (H') and Simpson's Similarity Index were also calculated and evaluated.

Out of 48 genera, 71 species, and 32 families, several species were significantly found abundant in the field survey (Fig. 2). *Amanita pantherina, Gandoderma lucidum, Gandoderma curtsii, Conocybe apala, Parasola conopilea, Parasola plicatilis*, and *Psathyrella corrugis* were found abundant in comparison to other genera during the study. These species showed higher frequency throughout the monsoon season, ranging from June to September 2025 (Fig. 8). However, some species, including *Amanita ocreata, Itajahya galerculata, Mutinus caninus, Geastrum saccatum, Lycoperdon perlatum*, and *Xylaria nigripes* showed their occurrence during the early monsoon or the first few rain periods only. The Shannon and Simpson's diversity indices were found to be 3.331 and 0.9439, respectively. The evenness of the analysed data reported 0.3938 of the total collected mushroom samples. This higher mushroom diversity may be attributed to favourable abiotic factors, such as soil, water, and saprophytic conditions. In addition, the university campus allows minimal human interference in high-biodiversity areas, which could contribute positively to the high abundance and frequency of wild mushrooms.

Figure 4. The study of mushrooms based on habitats. The mushrooms were collected under saprophytic conditions, which mainly included the dry and wet plant debris, soil accumulated with dead and decayed environmental components

4. DISCUSSION

Worldwide, estimates report around 140,000 species of mushrooms, with approximately 700 identified as either edible or medicinal (Jo et al., 2014). The greatest diversity of mushrooms is found in temperate and tropical forests, with families such as *Agaricaceae, Ganodermataceae, Polyporaceae*, and *Marasmiaceae* being prominent worldwide. A few portions of the world's mushroom diversity have been thoroughly documented, and new species are consistently being identified, especially as remote areas become accessible (Mueller et al., 2007; Royse et al., 2017). In India, approximately 850 species exhibit significant diversity of mushrooms. These species are found in various habitats, including common genera *Termitomyces, Volvariella, Agaricus, Pleurotus, Lentinula, Psilocybe,* and *Amanita* (Kumar and Gogoi, 2024; Singha et al., 2017).

Rajasthan is home to several unique wild mushroom species, many of which have only recently been discovered or reported in scientific literature. In India, Rajasthan is expected to become a major mushroom-producing state, capable of producing 8.4 million metric tons of mushrooms, which could generate 350 crores in revenue from the market and provide employment opportunities for

over 2 million individuals (Doshi and Sharma, 2007). Singh et al., (2006) collected eighteen speciality mushroom germplasm from western Rajasthan and molecularly characterized using ribosomal rRNA gene sequencing and DNA fingerprinting (Singh et al., 2006). Studies have reported the taxonomy of four taxa namely *Gymnopilus zenkeri* (Henn.) Singer, *Leucocoprinus birnbaumii* (Corda) Singer, *Leucocoprinus zeylanicus* (Berk.) Boedijn, and *Inocybe rimosa* (Bull.) P Kumm, for the first time from Rajasthan, Northwest India (Chouhan et al., 2021). Mount Abu, in particular, stands out for its diverse and colourful mushroom species due to its higher altitude, humidity, and rainfall compared to the desert surroundings. Chouhan et al. (2021) have described 6 species of *Volvariella*, coprophilous and lignicolous dark-spored macro fungi, and *Agaricus* from Mount Abu, the diversity of *Ganoderma* species and 6 species of *Gasteromycetes* from Rajasthan (Chouhan and Panwar 2021a & 2021b; Chouhan et al. 2021, Chouhan, 2022).

Figure 5. The wild mushrooms were studied based on habitat. The mushrooms were collected from soil habitat which mainly included soil in the fields, near the plants, and dense plant areas.

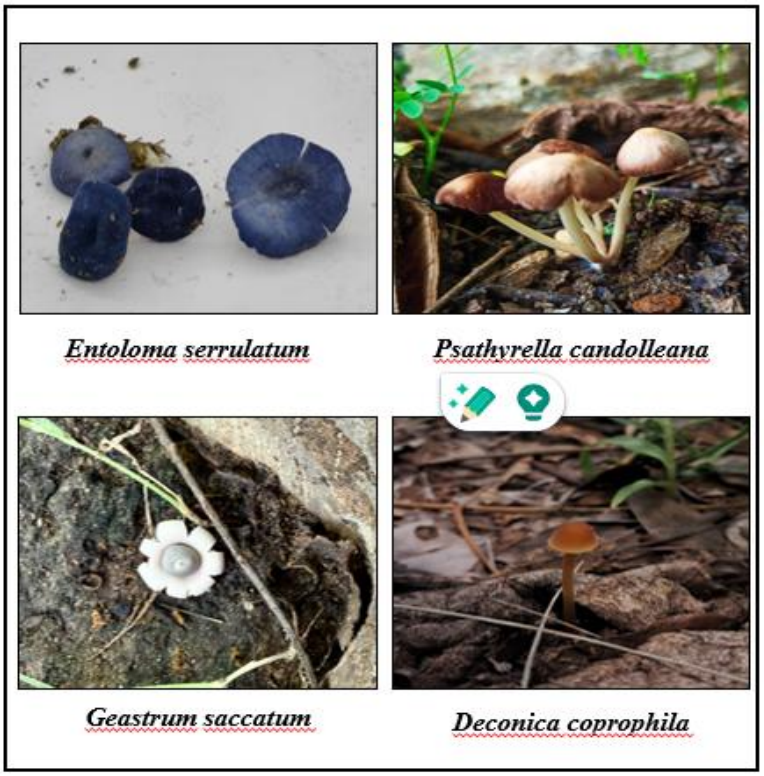

Figure 6. The study of macrofungal species from diverse habitats. The wild mushroom species includes substrates such as fields, road pavements, and mixed soil and saprophytic conditions

Figure 7. The study of wild mushrooms based on habitat. The mushrooms collected from wood logs, which mainly include the fallen twigs, bark, and dry tree branches

In the present investigation, a total of 71 mushroom species in 48 genera belonging to 32 families were noted. Among the mushroom species, 22 are edible, 12 are poisonous, and the remaining are medicinal, non-toxic, and psychoactive species. In this study it was found that family *Psathyrellaceae* (10 species) and *Agaricaceae* (9 species) were dominant followed by *Amanitaceae* and *Bolbitiaceae*

(4 species), *Fomitopsidaceae*, *Ganodermataceae*, *Hymenogasteraceae*, *Marasmiaceae*, and *Plutaceae* (3 species), *Cantharellaceae*, *Phallaceae*, *Pleurotaceae*, and *Polyporaceae* (2 species), *Auriculariaceae*, *Boletaceae*, *Bondarzewiaceae*, *Coniophoraceae*, *Crepidotaceae*, *Cyphellaceae*, *Dacrymycetaceae*, *Entolomataceae*, *Geastraceae*, *Inocybaceae*, *Lyophyllaceae*, *Omphalotaceae*, *Phyllotopsidaceae*, *Russulaceae*, *Schizophyllaceae*, *Sparassidaceae*, *Strophariaceae*, and *Xylariaceae* were represented only by 1 species each (Table 1). Similar results were observed in the study of frequency, density, abundance and diversity of wild mushrooms of the tropical mixed forest of Central India. A total of 52 species of wild mushrooms, belonging to 37 genera, 13 families, and 10 orders, were documented. This study revealed that the order *Agaricales* was the most dominant, comprising 26 species (Sandhya et al., 2017).

Table 2. Abundance diversity. The statistical tests are based on the abundance and frequency of the samples collected. The PAST 4.03 statistics software was used to analyze the study.

Factors	Values
Taxa	71
Individuals	451
Dominance_D	0.05611
Simpson_1-D	0.9439
Shannon_H	3.331
Evenness_e^H/S	0.3938
Brillouin	3.115
Menhinick	3.343
Margalef	11.45
Fisher_alpha	23.68
Berger-Parker	0.1109

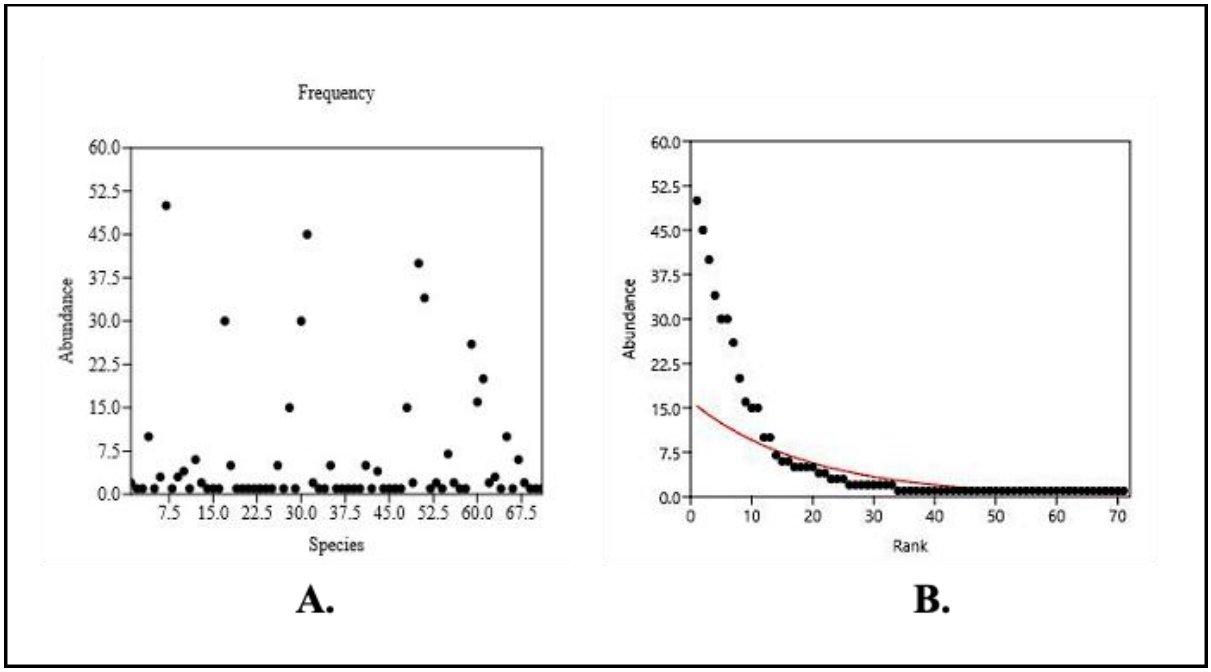

Figure 8. The study of the abundance and diversity of wild mushrooms. A. The frequency of species. B. The abundance studied with respect to the abundance diversity model (Geometric). PAST 4.03 statistics software was used to evaluate the data

The study of mushrooms in various parts of India has been conducted. A total of 71 species in 49 genera belonging to 24 families were recorded in and around West Bengal, India, and the Simpson and Shannon biodiversity index was found to be 0.92 and 2.206, respectively (Singha et al., 2017). Vyas et al., (2014) reported macro-fungal diversity in Madhya Pradesh (Vyas et al., 2014). Chouhan and Panwar (2021a) studied the diversity of Gasteromycetes in Rajasthan. In the present study, Shannon and Simpson's diversity index was found to be 3.331 and 0.9439, respectively.

India is home to a vast diversity of mushrooms, and recent research continues to increase the number of mushroom species known from the country. While many species have been documented over the decades, each year scientists report several as new records. In the present investigation taxonomic description of *Amanita ocreata* was reported as a new record from India, and *Itajahya galericulata, Mutinus canninus,* and *Geastrum saccatum* were reported as new records from Rajasthan (Ojha et al., 2025; Jangid et al., 2025; Ojha and Pareek, 2025).

5. CONCLUSION

In the present study, the abundance and diversity of wild mushrooms were found to be considerable, with over 71 species identified across various families and habitats. Dominant families included *Psathyrellaceae* and *Agaricaceae*, with Simpson and Shannon diversity indices indicating a relatively healthy ecosystem and diversity. Wild mushrooms not only contribute to ecological processes, such as nutrient cycling, but also have significant economic importance due to their use as food and medicine. Some mushrooms form symbiotic relationships (ectomycorrhizal or with termites), aiding tree and plant health. Rajasthan's wild mushrooms show remarkable adaptations to extreme climatic conditions. However, the loss of suitable habitats and non-selective harvesting pose threats to certain species, requiring sustainable conservation strategies. The abundance and diversity of wild mushrooms in Rajasthan are thus important for sustaining ecosystem processes, supporting local economies, and preserving biological heritage in adverse environmental conditions. Further research is recommended to explore the medicinal potential, nutrient content, and to develop local capacity for their sustainable utilisation.

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Author Contributions

The original manuscript draft, design, statistics, and figures were done by Shruti Ojha. The data analysis and content writing were done by Renu Jangid. The tables designing metadata evaluations were done by Surbhi Agarwal. The overall manuscript review, concept design, and field survey analysis were done by Arvind Pareek. The field survey, collection, and result evaluations were jointly conducted by all four authors.

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Conflict of Interest

The authors declare that they have no conflicts of interest, competing financial interests or personal relationships that could have influenced the work reported in this paper.

Informed consent

Not applicable.

Ethical approval & declaration

In this article, as per the fungus regulations followed in the Department of Botany, Maharshi Dayanand Saraswati University, Ajmer, Rajasthan, India.; the authors observed the macrofungal community (Taxonomy, abundance, and new distribution records) of Ajmer,

Rajasthan. The ethical guidelines for fungus & National Biodiversity Authority Guidelines are followed in the study for observation, identification & experimentation.

Data and materials availability

All data associated with this study are present in the paper.

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