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An Exploration of Macrofungal Diversity of Changsari Area in North Guwahati, Assam, India

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Abstract:
North Guwahati is a part of the Kamrup district in Assam, and lies in a zone of high ecological and climatic heterogeneity, bordering the Brahmaputra riverine system, hill slopes, and patches of semi-evergreen to moist deciduous forests. This geographical setting supports a rich assemblage of plant life, both in number of taxa and in functional/ecological variety. The riparian zones along the Brahmaputra contribute hydrophytic and semi-aquatic plants, while the upland slopes and hills carry moist deciduous or semi-evergreen forest patches, with canopy trees, understorey shrubs, climbers, and epiphytes. The anthropogenic areas (villages, roadsides, fallows) support herbs, grasses and early successional species. This region is also known for its macrofungal richness. The present study is a combination of field survey and photographic documentation of the macrofungal species spotted at the Changsari area of Guwahati, Assam.

Keywords: Macrofungi, North Guwahati, Assam.

Introduction

Macrofungi are a diverse group of fungi characterized by large, conspicuous fruiting bodies that can be easily observed with the naked eye. They are essential component of terrestrial ecosystems, playing critical roles in nutrient cycling, decomposition, and symbiotic associations. The term "*macrofungi"* generally refers to members of the phyla **Basidiomycota** and **Ascomycota** that produce visible sporocarps (fruiting bodies), such as mushrooms, puffballs, boletes, morels, and bracket fungi. Macrofungi are fungi that produce macroscopic spore-bearing structures visible without the aid of a microscope (Chang & Miles, 2004). These fruiting bodies, or sporocarps, arise from a network of mycelium (hyphae) that grows within the substrate (soil, wood, or litter). Many of them are saprotrophs or decomposers which contribute significantly to nutrient cycling as primary producers, as well as play a significant role in food web (Lodge *et al*., 2004, cited in Cavalacante *et al*., 2021). They are best grown in rainy season and can flourish in all kinds of substrates such as rotten wood, decaying organic matter, grassy ground, etc. (Lopez-Quintero *et al*., 2012, cited in DeLeon, 2021). Macrofungi are a/ big part of the forest ecosystem. They provide a wide variety of ecosystem services such as medicinal, ecological, and biotechnical applications (Hyde *et al*., 2019; Kinge *et al*., 2020). They are known to participate in nutrient cycling and act as decomposers and mutualistic symbionts, which are essential in humans' needs (Yadav *et al*., 2021).

The area selected for this study was Changsari area of Assam. Changsari (26.2537° N, 91.6922° E) lies on the northern bank of the Brahmaputra river (Figure 1). The area is characterized by a subtropical humid

climate with hot summers and heavy rainfall. The average annual temperatures range from 12-38°C. Winter temperatures range from 15-25°C during the day and 8-15°C at night. Summer temperatures range from 25 to 38°C during the day and 15 to 25°C at night. The area witnesses an average annual rainfall of around 1752 mm to 2125.4 mm annually. The vegetation in the area includes a variety of flowering plants, vegetables, herbs, shrubs, fruit-bearing trees, and native plants. This area is also known for its rich biodiversity. Systematic and periodic survey of different forests, gardens and other habitats were undertaken during February 2025 to May 2025.

Figure 1: GPS Map of Changsari area, Guwahati, Assam.

Methods and Materials

The sampling method involved walking throughout the entire study region and collecting macrofungi covering up to 80% of the area. Sampling of the ground-dwelling macrofungi involved careful extraction of the fruiting body from the soil and leaf litter, ensuring that the basal surface was intact. Tree-dwelling macrofungi were sampled by cutting off the basidiomata from the trees without disturbing the spore surfaces present below. The survey and collection of macrofungi were conducted in 14 different village locations of Changsari (Assam) viz. Sila, Karaibari, Kalipahar, Gouripur, Katamur, Jalah, Borka, North Guwahati, Banglagarh, Ketekijhar, Boragog, Baregaon, Bhetamukh and Baka under different agro-climatic conditions, during the month of February to May, 2025. The map of the survey sites along with their GPS coordinates is provided in Table 1. The collections were performed in different seasons, like the end of winter, spring and summer. The opportunistic sampling method of collection of macrofungi described by Mueller *et al*. (2004) was used for collection of macrofungi. This method involves carefully walking through a study site and collecting conspicuous sporocarps. Soft macrofungi were carefully collected by using forceps/free hand, while the macrofungi growing on wood were collected along with small part of wood. All collected samples were carefully wrapped in aluminum foil, placed in an air-tight zip-lock bag and labelled with the collection number, location, date, and other data. Photographs of the mushroom were taken in their natural habitat. Field labels were attached to every specimen which included a date, location, habitat, a brief note on distinguishing macroscopic features, collection number,

microhabitat and the collectors code (Swapna *et al*., 2008) and deposited in the Department of Botany, North Gauhati College. The macrofungi were identified by studying the micro morphological features (Roy and De,1996; Gilbertson and Ryvarden,1987) and also by studying the macro morphological features.

Results

During the study conducted from February to May 2025, a total of 21 species of macrofungi were recorded. The collected data reflects a wide range of macrofungal diversity growing on different substrates such as soil, dead wood, termite mounds, and leaf litter. Field observations revealed variation in colour, shape, size, and habitat preference among the recorded specimens. Some of the detailed observation of the macrofungal species collected, have been presented in Table 1, as presented below:

Table 1: Names of macrofungi collected from the study area and their characteristics:

Sl. No.	Scientific Name	Common Name	Family	Habitat	Key Features	Edibility & other uses
1	*Heliocybe sulcata*	Heliocybe	Porotheleaceae	Typically found in woodland areas, especially under broadleaf trees like oak or beech.	Cap: Small to medium size, sulcate (grooved) margin (which gives it the species name sulcata).	No known culinary or medicinal uses.
2	*Amanita muscaria*	Fly agaric	Amanitaceae	Commonly found in temperate and boreal forests throughout the Northern Hemisphere	Cap: Bright red or orange with distinctive white warts; convex when young, flattens with age.	Used in Siberian shamanism for its hallucinogenic effects. Employed in certain ritualistic and spiritual practices.
3	*Gomphus* sp.	Pig's Ear Fungus	Gomphaceae	Found in coniferous forests, especially in association with spruce and fir trees	Forms mycorrhizal associations, aiding nutrient exchange between fungi and trees, thus contributing to	Edible, but not widely consumed due to its rarity and sometimes tough texture

				Grows on soil in mossy, shaded woodland areas Appears in late summer to autumn	forest ecosystem Health.	Historically collected as a wild food in some European regions
4	*Tyromyces chioneus*	White Cheese Polypore	Incrustoporiaceae	Commonly found on dead hardwood trees, especially birch, but occasionally on conifers. Grows in temperate forests, often in cool, moist environments .	Soft, velvety, white to cream-coloured; semicircular or fan- shaped. Most often found from late summer to fall, but can persist in winter.	Saprophytic fungus – plays a key role in decomposing wood and recycling forest nutrients.
5	*Armillaria mellea*	Honey Fungus	Physalacriaceae	Found in woodlands, especially on deciduous trees. Grows in clusters at the base of living or dead trees, stumps, or buried wood.	Honey-coloured, 3–10 cm in diameter, often with darker scales.	Edible when cooked thoroughly (can be toxic if undercooked or eaten raw). Some people may experience gastrointestinal upset. Contains compounds with antimicrobial and antioxidant activity.

						A pathogenic fungus that causes root rot in trees; important in forest nutrient cycling.
6	*Polyporus alveolaris*	Hexagonal Polypore	Polyporaceae	Found on decaying hardwood logs, stumps, and fallen branches.	Orange to reddish-brown; flat to funnel- shaped; up to 10 cm in diameter.	Acts as a saprobe, decomposing dead wood and recycling nutrients in forest ecosystems.
7	*Dacrymyces spathularia*	Fan- shaped Jelly Fungus	Dacrymycetaceae	Grows on dead coniferous wood, especially decaying logs and stumps.	Bright yellow to orange; shaped like a fan, spatula, or tongue.	Generally non- toxic, but not considered edible due to its small size, texture, and lack of flavour.
8	*Calyptella capula*	Cup Fungus	Marasmiaceae	Often appears in clusters, sometimes on mossy surfaces or among leaf litter.	Small, delicate, bell- shaped or cup-like, often hanging like tiny bells.	Not edible — too small and insubstantial, and not known for culinary use.
9	*Marasmiellus candidus*	White Marasmiellus	Omphalotaceae	Found in moist environments	Small, white to off-white, convex to flat,	Not considered edible —

				, including tropical, subtropical, and temperate forests.	sometimes with a slight central depression	too small and insignificant for culinary use.
10	*Fomitopsis pinicola*	Red- Belted Conk	Fomitopsidaceae	Grows on dead or dying coniferous and hardwood trees, especially pine, spruce, fir, and birch.	Zoned coloration, typically dark red to orange belt near the edge, with white, grey, or blackish upper zones.	Decomposer: Breaks down dead wood, especially in coniferous forests. Helps in nutrient cycling and forest regeneration. Used in folk medicine for its antimicrobial and anti-inflammatory properties (though less studied than Ganoderma or Trametes).
11	*Schizophyllum commune*	Split Gill Mushroom	Schizophyllaceae	Can grow in moist or dry conditions and is often one of the first fungi to colonize newly dead wood.	Small (1–4 cm wide), fan-shaped, grey to whitish, often with fine hairs on the upper surface.	Edible in some cultures (especially in Asia), though tough — used in soups or dried and rehydrated.

						Known as "khamir chhatu" in India and used in traditional medicine for respiratory ailments in some regions.
12	*Cryptoporus volvatus*	Veiled Polypore	Polyporaceae	Found primarily on dead or dying coniferous trees, especially pine and Douglas fir.	Round to oval, covered by a thick, veil-like membrane (volva), which partially or completely encloses the pore surface — hence the name Cryptoporus ("hidden pores").	Inedible: Woody texture, and no culinary
13	*Cerrena hydnoides*	Hairy Bracket Fungus	Polyporaceae	Substrate: Found on dead or decaying hardwood, especially oak, maple, and other broadleaf trees.	Bracket-shaped (shelf-like) and sessile (without a stem).	Inedible due to its tough, woody texture.
14	*Gloeophyllum trabeum*	Brown Rot Fungus	Gloeophyllaceae	Substrate: Grows on dead coniferous wood	Bracket- or shelf-shaped, often thin and crust- like, sometimes	Major decomposer of softwood in forests. Plays an

				(especially pine, fir, and spruce), sometimes on hardwood.	resupinate (flattened against substrate).	essential role in nutrient recycling by breaking down cellulose in dead trees.
15	*Neofavolus suavissimus*	Panus suavissimus	Polyporaceae	Saprotrophic on dead or decaying hardwood, especially willow (Salix) and alder (Alnus)	Size: 3–6.5 cm diameter, broadly funnel- to shell-shaped	Not edible Texture and odour are unsuitable for consumption; no known culinary use
16	*Mycena*	Bonnets	Mycenaceae	Leaf litter, wood, moss in moist forests	Small bell-shaped caps, fragile stems, white spores	Mostly inedible or insignificant
17	*Trametes versicolor*	Turkey Tail	Polyporaceae	Dead hardwood in forests worldwide	Fan-shaped, zoned in many colours, velvety surface	Immune support, anti-cancer adjunct, bioremediation.
18	*Coprinellus micaceu*	Mica Cap	Psathyrellaceae	On decaying wood, stumps, and buried roots	Bell-shaped, tan, mica- like granules when young	Edible when young; avoid alcohol Uses: Decomposer, minor culinary interest, some antioxidant studies

19	*Coprinellus disseminatus*	Fairy Inkcap	Psathyrellaceae	Deadwood (stumps, roots, logs), often in large clusters	Small, grey, bell-shaped, striate, no mica particles	Inedible – too small and delicate
20	*Laetiporus sulphureus*	Chicken of woods	Laetiporaceae	On hardwoods (live or dead), especially oak	Bright orange/ yellow, shelf-like, overlapping clusters	Edible when young (avoid conifer-grown or old specimens) Uses: Culinary, ecological decomposer, medicinal potential
21	*Rhodotus palmatus*	Wrinkled Peach	Physalacriaceae	On decaying hardwood in damp forests.	Peach-pink, sticky, with net-like wrinkles	Not considered edible Uses: Decomposer, conservation indicator, valued in mycology

Discussion

Macrofungi hold special importance in the present-day scenario of exploration and studies related to mycology. They have considerable nutritional value and contain compounds of medicinal importance. Mushrooms are extensively consumed as they have low calorific value, serving as important source of vitamins, essential minerals, proteins, fats and carbohydrates. Many macrofungal species produce secondary metabolites that can be toxic, mind-altering, antibiotic, antiviral, antibacterial (Yoon *et al.* , 1997), anti-cancerous activity (Lee *et al*., 2009). Mushrooms with psychoactive properties play vital role in various native medicines. Some mushrooms are used in the treatment of diseases, dyeing wool and other natural fibres. Similar to yeasts and moulds, macrofungi also have immense biological and economic impact as they serve as food and medicine, biocontrol agents, and produce bioactive compounds such as

anti-oxidants, anti-diabetic, hypocholesterolemic, anti-tumor, anti-cancer, immunomodulatory, anti-allergic, nephroprotective, and anti-microbial agents (Patel *et al.,* 2022). Macrofungi are used in the bioremediation of industrial waste and the accumulation of heavy metals from the environment (Tuli *et al.,* 2014). There are approximately 2166 worldwide recognized edible species, including approximately 470 species with medicinal properties. Furthermore, macrofungi are useful indicators of health or age of an ecosystem (Boa *et al.,* 2004).

Macrofungi exhibit extraordinary diversity in form, function, habitat, and ecological relationships. Their presence is often a sign of a healthy ecosystem, while their absence can indicate ecological imbalance. One of the most striking aspects uncovered during this study is the vast number of undescribed or poorly understood macrofungal species, particularly in biodiverse regions like tropical forests. This underlines the urgent need for more field research, documentation, and conservation efforts. As many fungi are highly sensitive to environmental changes, habitat destruction, deforestation, and climate change pose significant threats to their survival. Therefore, protecting fungal habitats is not only about preserving species, but also about safeguarding the intricate web of life that depends on them. In addition to their ecological importance, macrofungi offer immense economic and medicinal value. Edible species are a vital part of local diets and global food industries, while medicinal fungi are at the forefront of modern and traditional therapies. With ongoing scientific discoveries, the potential for new antibiotics, anticancer agents, and immunomodulatory compounds from macrofungi is becoming increasingly recognized. The study has also underscored the importance of interdisciplinary approaches in mycological studies. Combining traditional field observation with modern molecular techniques allows for more accurate identification and understanding of species. Public awareness and education about macrofungi are equally vital, as misconceptions and lack of knowledge often hinder their appreciation and protection.

Assam is a constituent unit of the Eastern Himalayan Biodiversity Region. It is one of the two biodiversity hotspots in the country. The climatic conditions of Assam have resulted in creating a rich diversity of ecological habitats like forests, grasslands and wetlands, that harbour a wide range of floral species. This region has a subtropical monsoon climate with an average rainfall of around 1,500 mm per year. The daytime temperature in summer, the rainy season, rises to around 35°C and in winter cools to 25°C with a night time minimum of around 10°C which favours the growth of most of the macrofungal species (Das *et al.,* 2022). Although macrofungi are good resources for agro-industrial, medicinal (Veena *et al.,* 2012), and commercial purposes, very few studies have reported the macrofungal diversity of Northeast India (Khaund and Joshi 2014). Several varieties of macrofungi are consumed by the local tribes of Assam which are harvested from wild habitats but due to lack of enough credible documented data and phytochemical investigations, no efforts have been made to cultivate these macrofungi for commercial production. There are not enough scientific reports related to characteristics of wild edible macrofungi which are slowly disappearing due to habitat loss. Therefore, it is crucial to document the diversity and distribution and also, conduct relevant phytochemical studies of these macrofungi in Assam. The Changsari area of Assam is home to a diverse macrofungal community. Although documented data on the macrofungal diversity in Changsari area may be limited, studies conducted in the nearby areas and the state of Assam, as a whole, reveals a rich macrofungal landscape. In this study, we examined the diversity and distribution of macrofungi in the Changsari area of Guwahati, Assam.

A total of 21 species of macrofungi were collected as part of this study, which reflect the composition of the macrofungal diversity in Changsari area of Guwahati, Assam. These species belong to 20 different genera, all belonging to division Basidiomycota. The exploration of macrofungal diversity offers a

profound insight into the hidden yet essential components of terrestrial ecosystems. From this study, it is evident that macrofungi are not merely forest-floor dwellers or food sources, but critical organisms that play a multifaceted role in maintaining ecological balance, supporting biodiversity, and contributing to human well-being.

Conclusion

Macrofungi are indispensable to life on Earth. Their diversity, though often overlooked, holds the key to ecosystem stability, sustainable development, and potential biomedical breakthroughs. The findings of this project reinforce the need for continued research, documentation, and conservation of fungal species. By fostering greater awareness and scientific inquiry into macrofungi, we can better appreciate the complex, fascinating, and invaluable world of fungi that exists just beneath our feet.

PHOTOPLATES:

1. *Heliocybe sulcata*

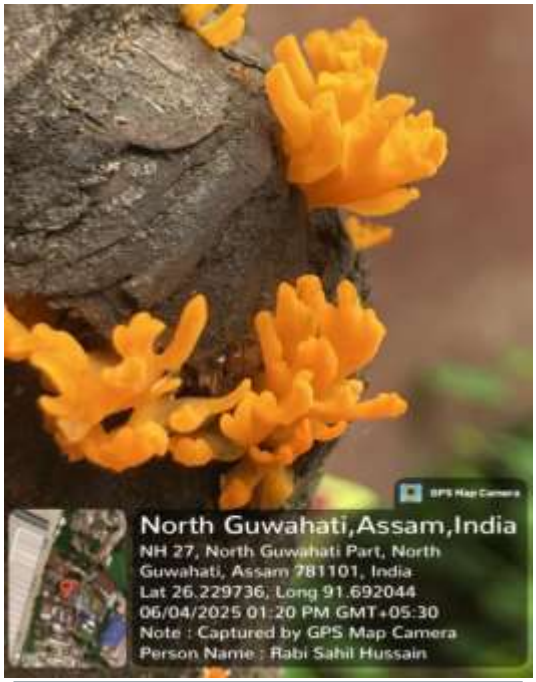
2. *Amanita muscaria*

3. *Gomphus* sp.

4. *Tyromyces chioneus*

5. *Armillaria mellea*

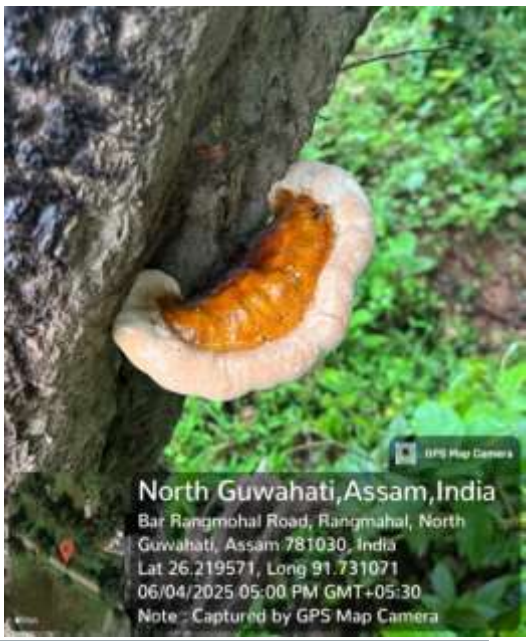
6. *Polyporus alveolaris*



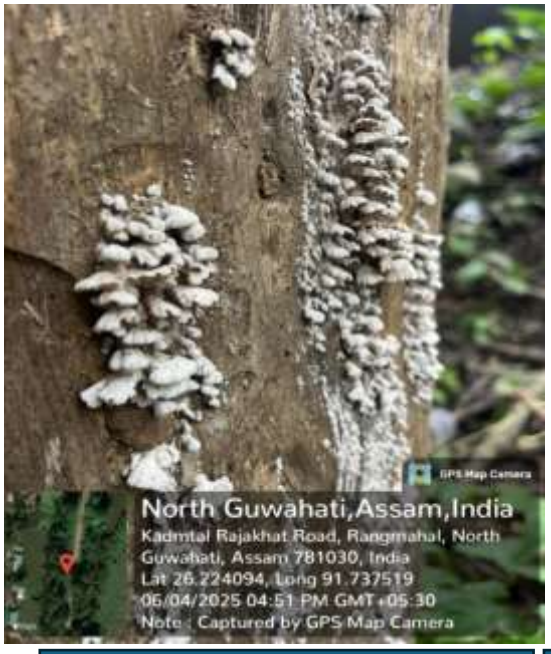
7. *Dacrymyces spathularia*

8. *Calyptella capula*

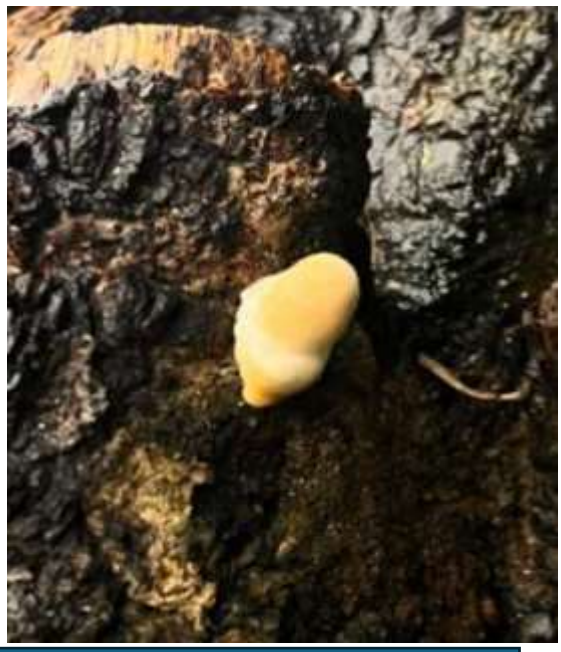
9. *Marasmiellus candidus*



10. *Fomitopsis pinicola*



11. *Schizophyllum commune*



12. *Cryptoporus volvatus*

13. *Cerrena hydnoides*

14. *Gloeophyllum trabeum*

15. *Neofavolus suavissimus*

16. *Coprinellus micaceu*

17. *Mycena* sp.

18. *Trametes versicolor*

19. *Coprinellus disseminatus*

20. *Laetiporus sulphureus`*

21. *Rhodotus palmatus*

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