Diversity of Higher Fungi on University of Ibadan Campus (3)

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ABSTRACT

In our first report, twenty-four (24) wild higher fungi from Ibadan University Botanical Gardens were collected; characterized and reported .Our second published article investigated the diversity, distribution, and ecological significance of twenty-one (21) additional macro- fungi from University of Ibadan campus. Findings from previous studies emphasized the ecological importance of these fungi in relation to nutrient cycling, decomposition, and soil enrichment. In this present study, additional fungal collections within the University of Ibadan campus were reported Higher fungi used for this research study were collected between April and October 2024 (during the rainy season). .These were randomly obtained from 18 different locations on the main campus. The samples were hunted for in wet places that contained decaying plant materials such as richly loamy soil, agro-industrial wastes, decomposing litters and decaying wood. The GPS was used to measure, temperature, humidity and habitat environment of each sampling locations. Our investigation revealed that the myco-organisms collected belong to fourteen (14) families and twenty-four (24) genera. Results showed that Ibadan University Botanical Gardens has the highest macro-fungal population of 14,298 , while Uwba dam and Botany Nursery had 10,122 and 8,936 population which ranked second and third highest populations respectively .The least population (1,787) was recorded in Abadina. The most frequently occurred fungus was Tyromyces chioneus (Polyporaceae) with 2,227 population, while Hydnum repandum, an Hydnaceae, had the least occurrence (20 collections). Out of 24new genera collected, only 11 were found to be edible. The significance of these findings were discussed.

Keywords: diversity, macro-fungi, campus, Ibadan University, Botanical Gardens

INTRODUCTION

University of Ibadan, the first University in Nigeria, was established in 1948.The campus site is located in the South-Western Nigeria and situated on 7.4433° N, 3 .9003° .The campus covers over 1,032 hectares of land which was leased out by the chiefs of Ibadan for 999 years.

University of Ibadan can be found in the tropical rain forest belt of Nigeria which supports luxuriant growth of different macro-fungi (Gbolagade et al.,2006 [a,b].).There are many species of higher fungi in the forest belt of Nigeria .These may include the following majour groups-

agarics,auricularias,boletes,cantharellas,clavarias,hydnums.lycoperdons,morels,pezizas,xylarias and polypores (Jonathan et al.,2025 [a,b,c,d]).These fungi usually grow on soil or on different types of substrates within their natural habitats (Atri et al.,2019; Aminuzzaman et al.,2024). Cells of fungi do not exhibit cellular differentiation and therefore lack roots, stems, leaves, flowers, bark etc like green plants (Das et al.,2021; Darshan et al.,2024).

Generally, most microscopic fungi grow as hyphae, which are cylindrical, thread-like structures that are 2 -10 micrometers (μm) in diameter and up to several centimeters in length . On the average, the size of most fungi hyphae are between 5 - 50 μm in length (Agbaje et al.,2024; Okpewho et al,2024; Omotayo et al.,2025). Macro fungi on the other hands could be much larger. The part that is visible to the eyes is called basidiocarp,fruiting body, carpophore or sporophore (Alexopulous et al.,1996).Higher fungi basidiocarps may range between 0.5–25 cm in diameter and heights of 0.5–30 cm. Some larger fungi may also exist. for example bracket fungi, can attain diameter of up to 40 cm while some puff balls may be up to 150 cm (5 feet) in diameter. (Otunla et al.,2018; Oyebanji et al.,2018; Omojola et al.,2025).

The largest organism on the earth have been described to be an humongous fungus called Armillaria ostoyae .It is a sprawling fungus which was discovered in Malheur National Forest, Oregon in 1998 . This fungus covers 2, 385 acres or 10 square kilometers which is equal to 1665 football fields. Armillaria ostoyae weighs about 605 matric tons. The large clumps of yellow-brown basidiocarps that appear above ground are the fruiting bodies of very large fungus. They consist mainly of black bootlace-like rhizomorphs that spread out below surface in search of new hosts, and underground networks of tubular filaments called mycelia (Jonathan,2019).

Fungi could exist in a variety of shapes and sizes and different types. They may range from single cells to enormous chains of cells that can stretch for miles. Fungi include single-celled living things that exist individually, such as yeast, and multicellular clusters, such as molds or mushrooms. Fungi usually grow best in environments that are slightly acidic. They can grow on substances with very low moisture. Fungi are present in the soil,air,water body, and available substrate. A single teaspoon of topsoil in a garden contains about 120,000 fungi(Jonathan,2019).

Fungi are basically stationary. But they can spread either by forming reproductive spores that are carried on wind and rain or by growing and extending their hyphae. Hyphae grow as new cells form at the tips, creating even longer chains of cells. Fungi absorb nutrients from living or dead organic matter that they grow on. They absorb simple, easily dissolved nutrients, such as sugars, through their cell walls. They give off special digestive enzymes to break down complex nutrients into simpler forms that they can absorb (Baldrian ,2017; Jonathan et al.,2024).

Macrofungi are an important component of Kingdom Fungi, and they play significant roles in natural ecosystems. Many of these fungi act both as key decomposers and as food sources for animals. Most macrofungi produce fleshy and colloidal fruiting bodies representing sexual reproductive structures; however, some visible structures, such as sclerotia, represent the asexual reproductive stage. Most macrofungi belong to Basidiomycota or Ascomycota while a few are Zygomycota(Gbolagade et al.,2006a; González et al.,2020;Anakaa et al.,2025).

The economically important species are found mostly in Hymenogastrales (Basidiomycetes) and Tuberales (Ascomycetes) (Jonathan ,2019). The black truffle belongs to Tuberales and is often referred to as the “black jewel” of European dining tables (Guan et al.,2021). As a result, the ascocarps of the genus Tuber (true truffle) have been studied extensively for their genetic structure and fungi–animal interactions (Jonathan,2019). Tuber is the monophyletic truffle genus in Tuberaceae that includes truffle and non-truffle species (Liao et al., 2016). The genus evolved from an epigeous ancestor and dispersed with host plants’ migration (Benoit et al., 2015). Currently, there are over 200 species in this genus (Vargas et al., 2015).

Similar to other hypogenous macrofungi, Tuber truffles require and recruit mycetophagous mammals to disperse their spores (Mueller and Schmit, 2006). Generally, mycetophagous animals are attracted by truffle volatiles, which then consume sporocarps and disseminate spores in their fecal pellets (Cejudo et al., 2016). In

the case of truffles, the dispersing distance is determined by two factors: (i) the gut-retention time of spores in mycetophagous mammals, which generally might be more than 20 hours, and (ii) the travel distance of the mammals within that time span, which may cover dozens of hectares (Jonathan,2019). The mycetophagous mammals help Tuber species to disperse and, by association, increase the health and productivity of host plants (Andrew et. al.,2013). Tuber melanosporum and Tuber magnatum are two highly prized truffles in Europe. They are the favorites of gastronomers and businessmen and can be cultivated semi-artificially by inoculation of young trees and plantations (Jonathan,2019).

They form large fruiting bodies, visible without the aid of a microscope and include fruiting bodies, such as gilled fungi, cup fungi, jelly fungi, flask fungi, entomogenous fungi, tongue fungi, coral fungi, stinkhorns, bracket fungi, puffballs and bird's nest fungi (Mueller and Schmit, 2006). There are many thousands of species which are unique and each species beautiful in its own way. Since the dawn of civilizations, macro-fungi have been fascinating to man due to their unusual characters like sudden appearance in isolated places in groups, rings and in different geometrical shapes. Macrofungi grow prolifically and are found in many parts of the world. They intermingle and participate or compete with other micro-organisms behavior and predators (Andew et al., 2013).

Deadwood is an important substrate for a large number of forest-dwelling Basidiomycota—Aphyllophorales species, viz., polypores (Stahl et al., 2010). Wood-inhabiting fungi release the carbon fixed during photosynthesis and stored in the form of cellulose, hemicellulose, and lignin, and return other nutrients from the woody debris back to the soil (Purahong et al., 2018). The bracket fungi are the main wood decayers (Andew et al., 2013).. Wood-decaying polypores play important roles in forest ecosystems. They decompose woody debris and provide microhabitats for others. In addition, they produce long-lasting fruiting bodies that are easily monitored in the field (Mueller et al., 2004).

Macrofungi studies have long been of interest to scientists and the public due to their significant roles in human welfare, the food industry, medicinal applications, and biodegradation (Gupta et al., 2020). Macrofungi are considered ideal for evaluation as biosorbents because many fungal species exhibit high biosorptive potentials (Wu et al., 2019). Research has been conducted on the antimicrobial activities of lower fungi, but edible mushrooms have not been adequately explored (Jonathan,et. al.,2003;Chikwem et al., 2018; Chikwem et al., 2019;Wu et al., 2019;). The visible macroscopic fruit bodies have economic value as aesthetic components of the natural environment and as a food crop in the case of edible species (Gbolagade et al., 2005b).

Macrofungi are also important components of the diet of many animals, including soil invertebrates and small mammals (Otunla et al.,2018).Many saprophytic macrofungi play an important role as soil aggregators. Basidiomycetes are the main decomposers of recalcitrant components of plant litter through the production of lignin-modifying enzymes such as lignin peroxidases, manganese-dependent peroxidases, and laccases (Omeonu et al.,2022;). The majority (>95%) of boreal forest tree root tips are colonized by symbiotic ectomycorrhizal fungi. Macrofungi play an extraordinarily important role in the catalysis of the nutrient cycle in deciduous and coniferous forests, increasing their fitness by enhancing nutrient uptake, which is crucial for tree health and balancing soil pH (Jonathan, 2019).

MATERIALS AND METHODS

Study Area

The study area was the University of Ibadan campus.(Latitude N 7° 22' 39.1296" and Longitude E 3° 56' 49.344").The sites covered under this study were the Botanical Gardens, Teaching and Research Farm, The Heritage Park, Botany Nursery, Uwba dam, Sokoto Cresents, Benue Road, Niger Road, Abadina, Staff School, Vet. Medicine, Ijeoma Road, Sankore, and Crowder Lane. University of Ibadan is situated within the Tropical rain forest that enhanced the growth of different types of macro fungi during the rainy season

Collection and preparation of samples

Higher fungi used for this research study were collected between April and October 2024 (during the rainy

season) .They were randomly obtained from the above listed locations within the University of Ibadan campus. Wild higher fungi samples were hunted for in wet places that contained decaying plant materials such as richly loamy soil, agro-industrial wastes, decomposing litters decaying wood . (Jonathan et al.,2025a). Necessary precautions were taken not to destroy any part of the specimen. The GPS was used to measure, temperature, humidity and habitat environment of each sampling locations. Humidometer and thermometer were used in each of these locations to take the humidity and temperature respectively. Compass software was also used to take GPS readings . fruitbodies of each fungus were collected randomly from each location using the methods of Jonathan et. al.,(2025a) . Preliminary identification of the specimens were carried out done by observing their morphology (pileus color, stipe morphology, presence of annular ring, arrangement of gills and volva (Jonathan , 2019) Digital photographs were taken for each collected. Chemicals tests and spore prints were also carried out (Bassette et al.,2019).Micro-morphological features were observed under the X60 objective of the light microscope for the completed identification(Alexopolous et al,1996) .

Spore prints

These were carried out according to the methods described by Jonathan,et al.,(2025a)

RESULTS

Plates of collected Fungi

Plate 1: Antrodia serialis (Fr.) Donk

Kingdom: Fungi

Phylum: Basidiomycota

Class: Agaricomycetes

Order: Polyporales

Family: Fomitopsidaceae

Genus: Neoantrodia

Species: Neoantrodia serialis

Edibility: Inedible

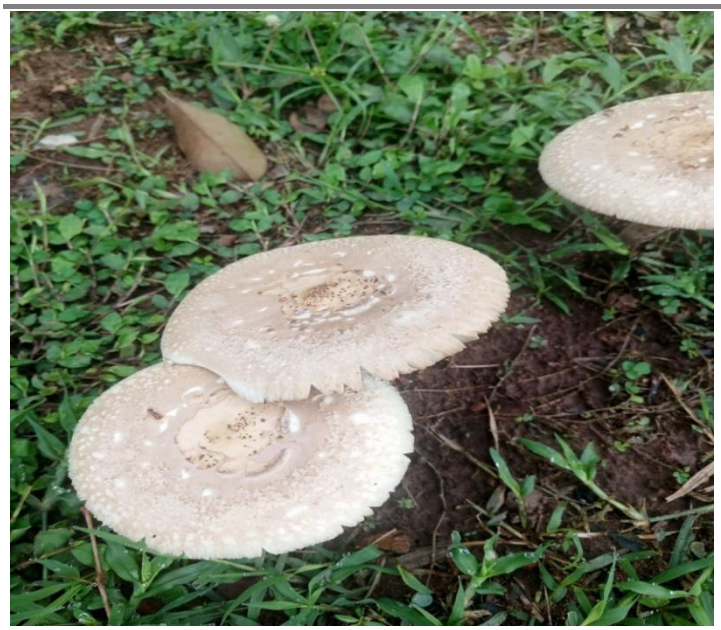

Plate 2: Chlorophyllum molybdites (G. Mey.) Massee

Kingdom: Fungi

Phylum: Basidiomycota

Class: Agaricomycetes

Order: Agaricales

Family: Agaricaceae

Genus: *Chlorophyllum*

Species: *Chlorophyllum molybdites*

Edibility: Inedible

Plate 3: Apioperdon pyriforme (Schaeff.) Vizzini

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Kingdom: Fungi

Phylum: Basidiomycota

Class: Agaricomycetes

Order: Agaricales

Family: Agaricaceae

Genus: Apioperdon

Species: Apioperdon pyriforme

Edibility: Inedibe

Plate 4: Fomes fomentarius (L.) Fr.

Kingdom: Fungi

Phylum: Basidiomycota

Class: Agaricomycetes

Order: Polyporales

Family: Fomitopsidaceae

Genus: Fomes

Species: *Fomes fomentarius*

Edibility: Inedible

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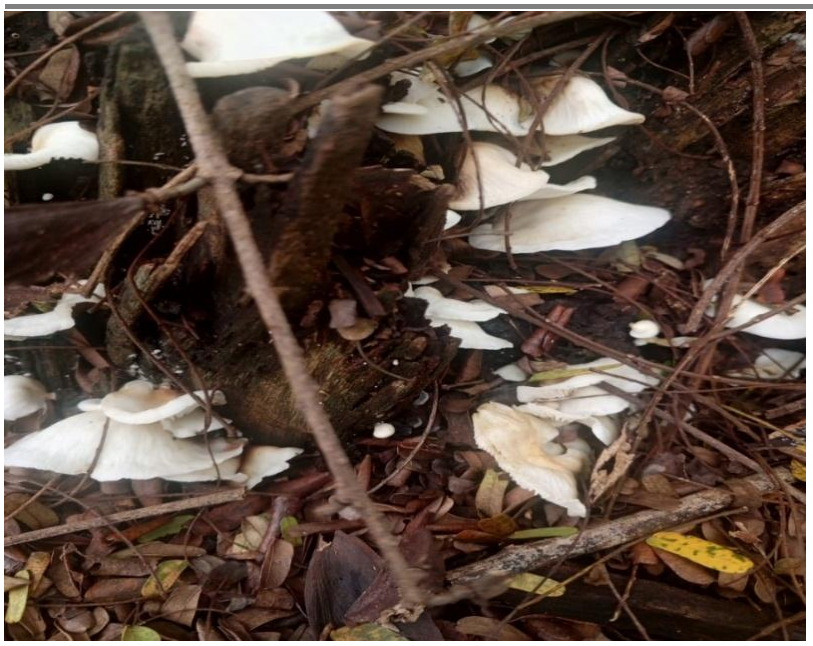

Plate 5: Omphalotus nidiformis (Berk.) O.K. Mill

Kingdom: Fungi

Phylum: Basidiomycota

Class: Agaricomycetes

Order: Agaricales

Family: Omphalotaceae

Genus: Omphalotus

Species: Omphalotus nidiformis

Edibility: Inedible

Plate 6: Trametes cubensis (E. Cooke) Ryvarden

Kingdom: Fungi

Phylum: Basidiomycota

Class: Agaricomycetes

Order: Polyporales

Family: Polyporaceae

Genus: *Trametes*

Species: *Trametes cubensis*

Edibility: Inedible.

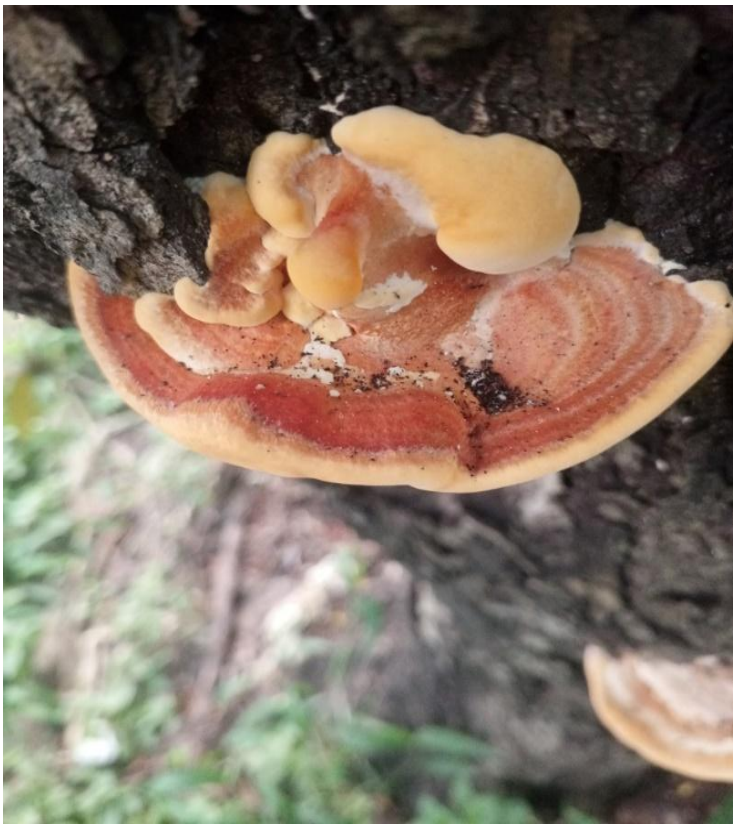

Plate 7: Fomitopsis pinicola (Sw.) P. Karst.

Kingdom: Fungi

Phylum: Basidiomycota

Class: Agaricomycetes

Order: Polyporales

Family: Fomitopsidaceae

Genus: Fomitopsis

Species: Fomitopsis pinicola

Edibility: Inedible

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Plate 8: Daldinia concentrica (Bolton) Ces. & De Not.

Kingdom: Fungi

Phylum: Ascomycota

Class: Sordariomycetes

Order: Xylariales

Family: Amphisphaeriaceae

Genus: Daldinia

Species: Daldinia concentrica

Edibility: Inedible

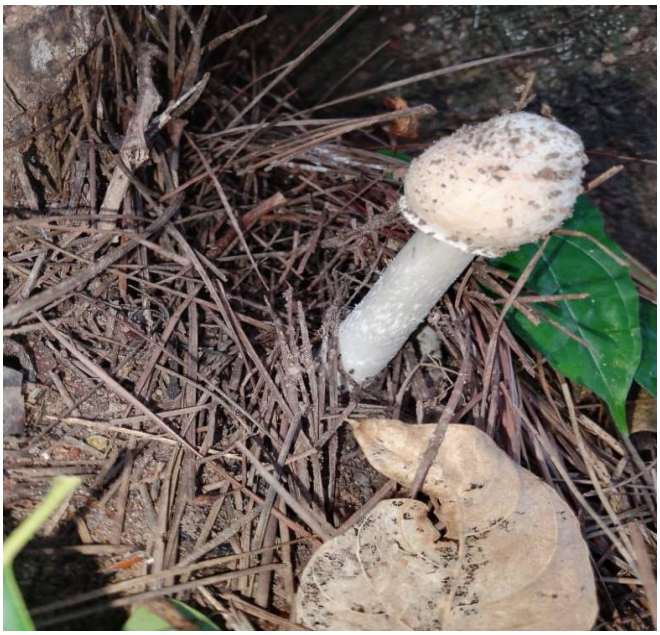

Plate 9: Amanita muscaria (L.) Lam.

Kingdom: Fungi

Phylum: Basidiomycota

Class: Agaricomycetes

Order: Agaricales

Family: Amanitaceae

Genus: Amanita

Species: Amanita muscaria

Edibility: Inedible and Toxic

Plate 10: Ganoderma lucidum (Curtis) P. Karst.

Kingdom: Fungi

Phylum: Basidiomycota

Class: Agaricomycetes

Order: Polyporales

Family: Ganodermataceae

Genus: Ganoderma

Species: Ganoderma lucidum

Edibility: Inedible

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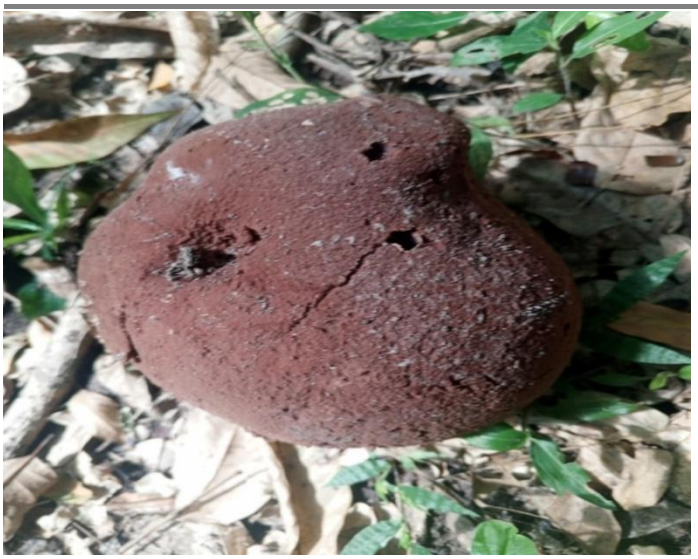

Plate 11: Calvatia gigantea (Batsch) Lloyd

Kingdom: Fungi

Phylum: Basidiomycota

Class: Agaricomycetes

Order: Agaricales

Family: **Agaricaceae**.

Genus: Calvatia

Species: Calvatia gigantea

Edibility: Edible

Plate 12:Auricularia polytricha (Mont.) Sacc

Kingdom: Fungi

Phylum: Basidiomycota

Class: Agaricomycetes

Order: Auriculariales

Family: Auriculariaceae

Genus: Auricularia

Species: Auricularia polytricha

Edibility: Edible.

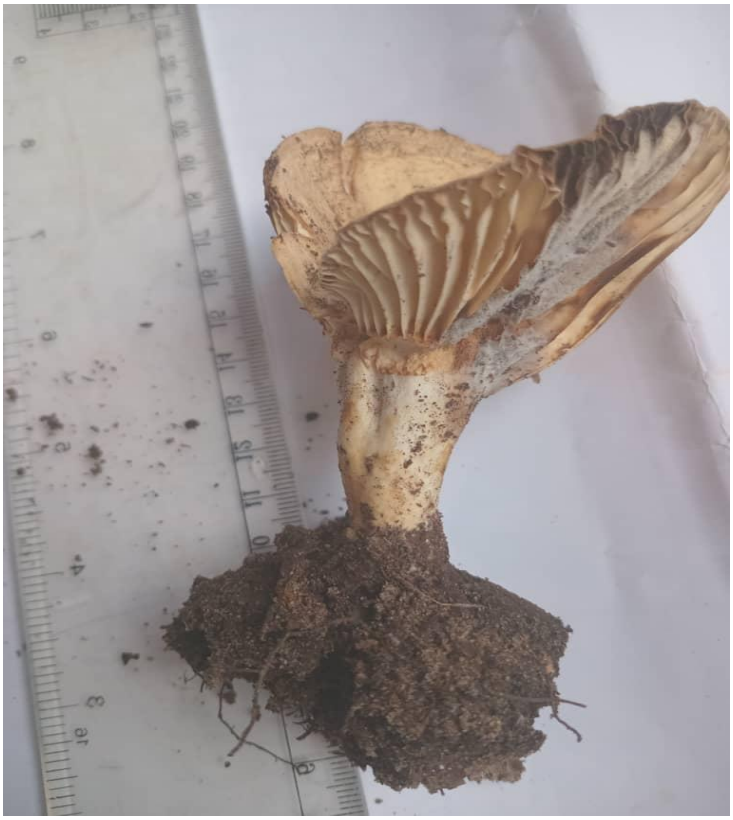

Plate 13: Cantharellus cibarius Fr.

Kingdom: Fungi

Phylum: Basidiomycota

Class: Agaricomycetes

Order: Cantharellales

Family: Cantharellaceae

Genus: Cantharellus

Species: Cantharellus cibarius

Edibility: Edible

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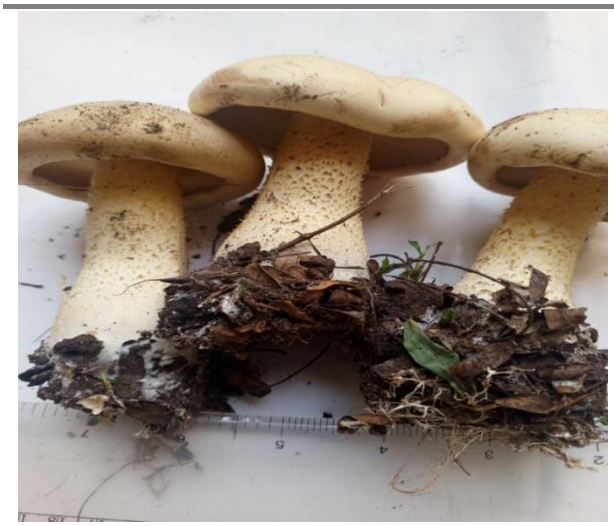

Plate 14: Boletus barrowsii Thiers & A.H. Smith

Kingdom: Fungi

Phylum: Basidiomycota

Class: Agaricomycetes

Order: Boletales

Family: Boletaceae

Genus: Boletus

Species: Boletus barrowsii

Edibility: Edible

Plate 15: Xylaria poitei (Lepr.) Fr

Kingdom: Fungi

Phylum: Ascomycota

Class: Sordariomycetes

Order: Xylariales

Family: Xylariaceae

Genus: Xylaria

Species: Xylaria poitei

Edibility: Edible

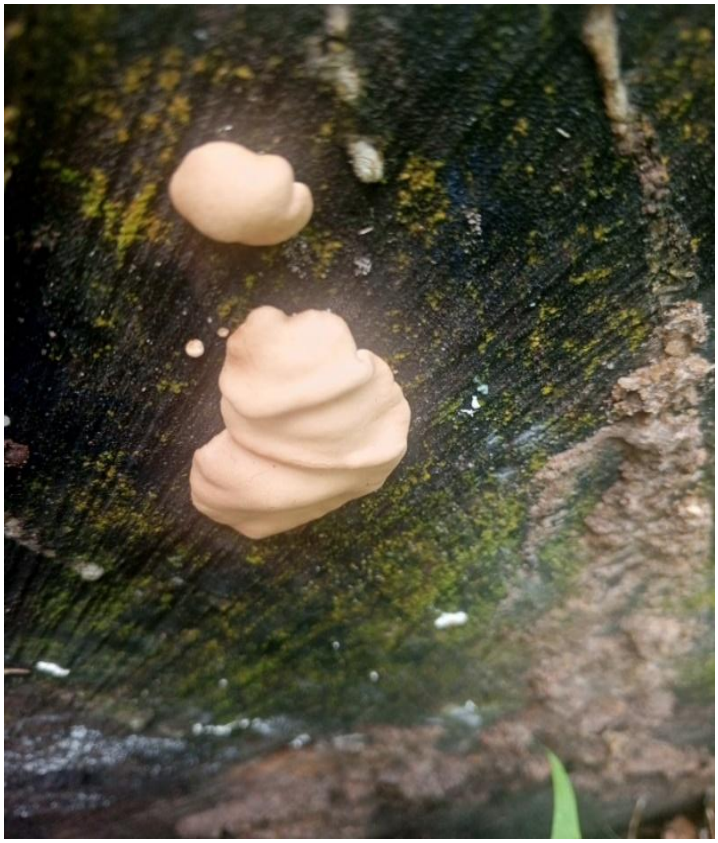

Plate 16: Tyromyces chioneus (Fr.) P. Karst.

Kingdom: Fungi

Phylum: Basidiomycota

Class: Agaricomycetes

Order: Polyporales

Family: Meruliaceae

Genus: Tyromyces

Species: Tyromyces chioneus

Edibility: Inedible

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Plate 17: Hypomyces macrosporus Rogerson & Simms

Kingdom: Fungi

Phylum: Ascomycota

Class: Sordariomycetes

Order: Hypocreales

Family: Hypocreaceae

Genus: Hypomyces

Species: Hypomyces macrosporus

Edibility: Inedible

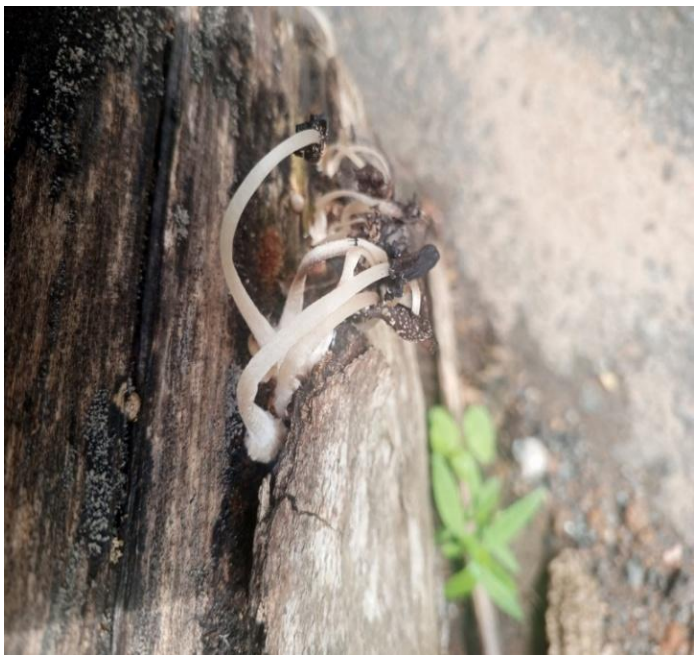

Plate 18: Coprinus fimetarius (L.) Fr.

Kingdom: Fungi

Phylum: Basidiomycota

Class: Agaricomycetes

Order: Agaricales

Family: Psathyrellaceae

Genus: Coprinus

Species: Coprinus fimetarius

Edibility: Inedible.

Plate 19: Coprinus disseminatus (Pers.) J.E. Lange

Kingdom: Fungi

Phylum: Basidiomycota

Class: Agaricomycetes

Order: Agaricales

Family: Psathyrellaceae

Genus: Coprinus

Species: Coprinus disseminatus

Edibility: Inedible

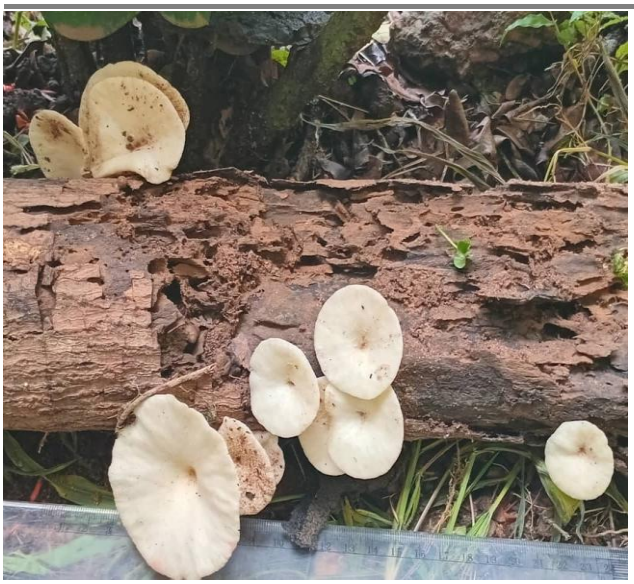

Plate 20: Lentinus squarrosulos Mont.

Kingdom: Fungi

Phylum: Basidiomycota

Class: Agaricomycetes

Order: Polyporales

Family: Polyporacea

Genus: Lentinus

Species: Lentinus squarrosulus

Edibility: Inedible

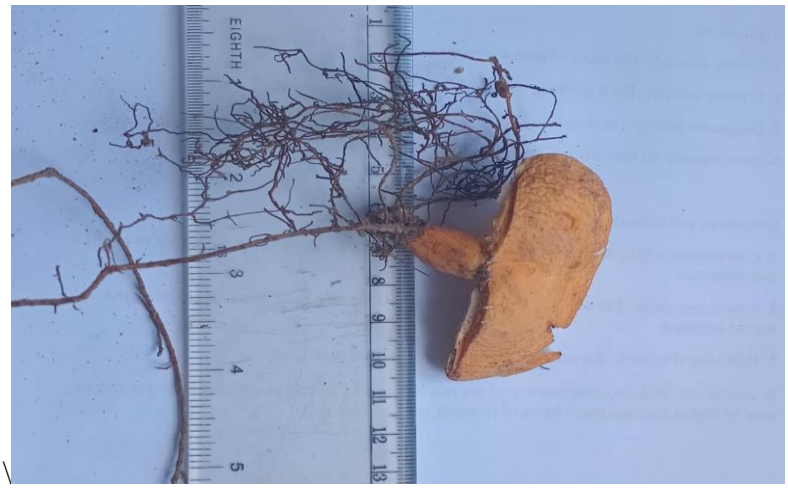

Plate 21: Hydnum-repandum L.

Kingdom: Fungi

Phylum: Basidiomycota

Class: Agaricomycetes

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Order: Cantharellales

Family: Hydnaceae

Genus: Hydnum

Species: Hydnum repandum

Edibility: Edible

Plate 22: Termitomyces globulus (Van der Byl) R. Heim

Kingdom: Fungi

Phylum: Basidiomycota

Class: Agaricomycetes

Order: Agaricales

Family: Lyophyllaceae

Genus: Termitomyces

Species: Termitomyces globulus

Edibility: Edible

Plate 24: Coprinopsis radiata (Bolton) Redhead, Vilgalys & Moncalvo

Kingdom: Fungi

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Phylum: Basidiomycota

Class: Agaricomycetes

Order: Auriculariales

Family: Auriculariaceae

Genus: Auricularia

Species: Auricularia angiospermarum

Edibility: Edible

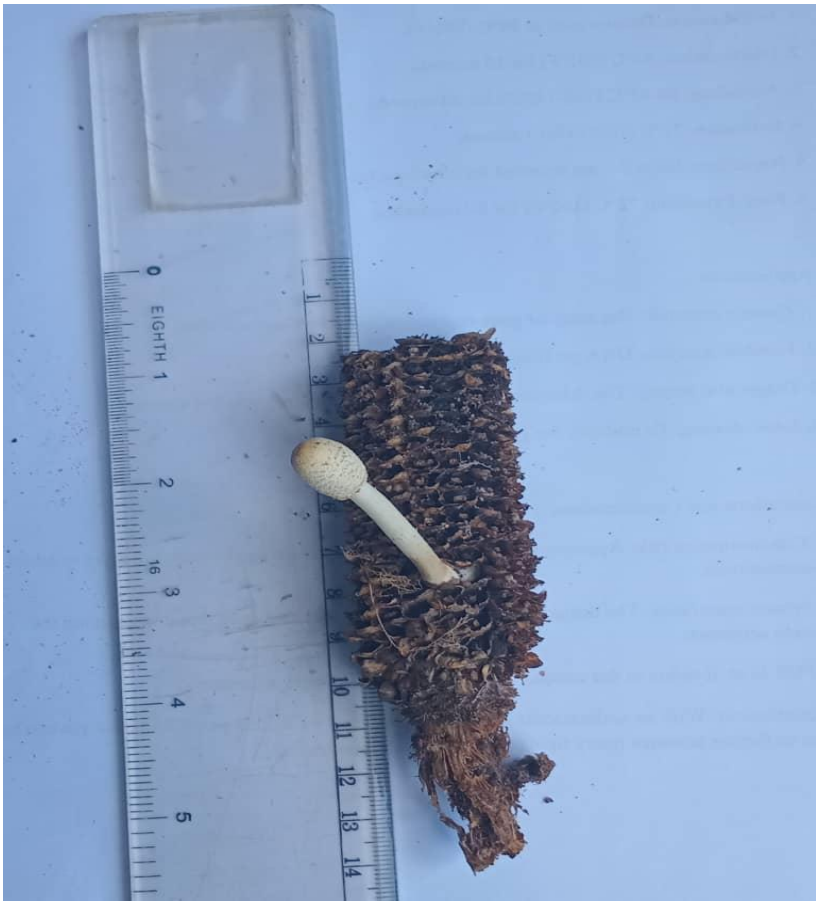

Plate 23: Auricularia angiospermarum (Pat.) Leelav.

Kingdom: Fungi

Phylum: Basidiomycota

Class: Agaricomycetes

Order: Psathyrellaceae

Family: Lyophyllaceae

Genus: Coprinopsis

Species: Coprinopsis radiata

Edibility: Inedible

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Table 1: Number of collected fungal ,species, Locations of collection and Population

SN	Locations of Collection	No of Species Collected	Species collected in Percentage (%)	Population
1	Ibadan University Botanical Gardens	24	100	14,298
2	Teaching & Research Farm	10	41.7	5,962
3	Heritage Park	12	50.0	7,149
4	Uwba dam	17	70.8	10,122
5	Botany Nursery	15	62.5	8,936
6	Ijeoma Road	09	37.5	5361
7	Abadina	03	12.5	1,787
8	Sokoto Crescents	04	16.7	2.387
9	Benue Road	08	33.3	4.761
10	Niger Road	07	29.2	4,175
11	Vet. Medicine	06	25.0	3,574
12	Staff School	04	16.7	2,387
13	Crowder Lane	05	20.8	2.974
14	Sankore Road	08	33.3	4.761
15	Oduduwa Road	07	29.2	4,175
16	Liard Road	04	16.7	2,387
17	Jaja Avenue	05	20.8	2,974
18	Imo street	06	25.0	3,574

Table 2: Collected Higher fungi from University of Ibadan Campus

SN	Fungal species	Family	Organisms collected	Percentage (%)
1	Antrodia serialis	Polyporacea	1530	10.7
2	Chlorophyllum molybditis	Agaricaceae	123	0.86
3	Apioperdon pyriforme	Agaricaceae	559	3.90
4	Marasmius albuscorticis	Omphalotaceae	96	0.67
5	Omphalotus nidiformis	Omphalotaceae	134	0.93

6	Trametes cubensis	Polyporacea	2107	14.74
7	Fomes fomentarius	Polyporaceae	1965	13.74
8	Daldinia concentrica	Xylariaceae	815	5.70
9	Amanita muscaria	Amanitaceae	189	1.32
10	Ganoderma applantum	Polyporaceae	411	2.87
11	Calvatia gigantea	Agaricaceae	43	0.30
12	Auricularia polytricha	Auriculariaceae	615	4.30
13	Cantharellus cibarius	Cantharellaceae	530	3.71
14	Boletus barrowsii	Boletaceae	65	0.46
15	Xylaria poitei	. Xylariaceae	121	0.85
16	Tyromyces chioneus	Polyporaceae	2227	15.58
17	Hypomyces macrosporus	Hypocreaceae	405	2.83
18	Coprinus fimetarius	Psathyrellaceae	132	0.92
19	Coprinus disseminatus	Psathyrellaceae	430	3.01
20	Lentinus squarrosulos	**Polyporaceae**	1250	8.74
21	Hydnum repandum	**Hydnaceae**	20	0.14
22	Termitomyces globulus	Lyophyllaceae	105	0.73
23	Auricularia angiospermarum	Auriculariaceae	79	0.55
24	Coprinopsis radiata	**Psathyrellaceae**	347	2.43

Total=14298

Table 3: Site of collection, habitat, spore print and Edibility

SN	Fungal species	Sites of Collection	Habitat	Spore print	Edibility
1	Antrodia serialis	BG,UD,TRF,BR,AD,OR	Base of Cassia fistula	Hyaline	Edible
2	Chlorophyllum molybditis	BG,UD, BN ,BR, VM,AD,OR,JA,IS	Lawns, grow among leaf litters	Green	poisonous
3	Apioperdon pyriforme	BG, BN,TRF ,BR, VM,IS	Decaying wood and leaf litters	White	Edible
4	Marasmius albuscorticis	BG,UG,TRF ,BR, VM,OR	Decaying wood and organic litters	White	Not edible

5	Omphalotus nidiformis	BG, BN,TRF, VM,AD,IS	Dead or diseased wood	White	Poisonous
6	Trametes cubensis	BG,UD, BN,BR, VM,JA	Decaying wood	Hyaline	inedible
7	Fomes fomentarius	BG, BN,TRF , VM NR,IS	Dead wood	White	inedible
8	Daldinia concentrica	BG,UD, BN,BR, VM,LR	Decayed wood	Black	inedible
9	Amanita muscaria	BG, UD, BN,BR NR,OR	soil	White	poisonous
10	Ganoderma applantum	BG, UD, BN, ,IJ NR,SS	Both dead& living trees	brown	Inedible
11	Calvatia gigantea	BG, UD, BN,BR,SS,OR	Nutrient rich waste soil	Yellowish brown	Edible
12	Auricularia polytricha	BG, UD, BN,TRF,SS,JA	Decayed wood	Black/dark brown	Edible
13	Cantharellus cibarius	BG, UD,BN,HP NR,OR	Damped wet area under tress	Creamy white	Edible
14	Boletus barrowsii	BG, UD,HP,TRF NR,LR	Under damped tress	Olive brown	Edible
15	Xylaria poitei	BG, UD,HP,TRF,NR,OR	Decaying wood	. Dark brown	Not edible
16	Tyromyces chioneus	BG,, UD,HP,TRF,CL,JA	Dead hardwood (anti HIV)	White	inedible
17	Hypomyces macrosporus	BG, UD,HP,IJ, SR CL,LR	Parasite on Boletus	Pinkish -red	Poisonous
18	Coprinus fimetarius	BG, UD,HP,IJ, SR CL,LR	Coprophilous and leaf litters	**black**	Inedible
19	Coprinus disseminatus	BG, BN,HP,IJ, SR CL	Wastes materials	**Blackish - Brown**	Inedible
20	Lentinus squarrosulos	BG, BN,HP,IJ, SR,SC,IS	**Decayed wood**	White	**Edible**
21	Hydnum repandum	BG, UD,HP,IJ, SR,SC	**Decaying wood**	**White**	**Edible**
22	Termitomyces globulus	BG, BN,HP,IJ, SR,SC,IS	Termite nest	**Pink**	Edible
23	Auricularia angiospermarum	BG, BN,HP,IJ, SR,SC	Wood	**White**	Edible
24	Coprinopsis radiata	BG,BN,HP,IJ,SR,SS,JA	**Animal Dung/Leaf litters**	**Black**	**Edible**

Key: BG=Botanical Gardens,Uwba dam=UD,Botany Nursery+BN,Heritage Park,HP**,** Teaching & Research Farm=TRF, Ijeoma Road=IJ. Benue Road=BR, Sankore Road=SR, Vet. Medicine=VM, Niger Road=NR, Crowder Lane=CL, Sokoto Crescents=SC,Staff School=SS,Abadina=AD=,OR=Oduduwa Road.Liad

.Road=,LR,Jaja Avenue=JA,Imo Street=IS

Table 4: Macroscopic and microscopic descriptions of collected higher fungi

SN	Fungal species	Macroscopic features	Microscopic Features
1	Antrodia serialis	This fungus has Leathery sporophore which is light-colored which usually grow flat against the wood	Spores are produced on the hymenium and are 5.8-8.2 by 2-3.5 µm in size
2	Chlorophyllum molybditis	Convex pileus which may become flat. The cap may be whitish or brown, Stem are slender with double ring forming fairy rings or clusters	Spores are ellipsoids It has pore and a slightly truncated end. are typically 9-13 by 6-9µm in size
3	Apioperdon pyriforme	They are pear shaped puffball and may be up to 3cm	Spores are ellipsoids It has pore and a slightly truncated end. are 3.5 to 4.5 µm in size
4	Marasmius albuscorticis	A tiny, delicate fungus with white or pale cream cap Less than 1mm, convex to flat, with a slightly wrinkled or smooth surface.	The spores are white and almond-shaped, ranging in size from 7.8-9 x 3.3-4.2 µm
5	Omphalotus nidiformis	It is white or cream gill fungus .It The stipe is up to 8 cm long.. Caps up to 15 cm or more in diameter	The spore-producing cells are slender and club-shaped. Cystidia are located in the gills and are club-shaped
6	Trametes cubensis	This fungus has fan-shaped, leathery, and sometimes reddish-brown to ochre-colored basidiocarp. which can be semicircular or fan-shaped,, with a pale yellow or white pore surface	Hyphae are thin, branched, and septate. The spores are , cylindrical to ellipsoid, and smooth-walled
7	Fomes fomentarius	Basidiocarp range from 5 to 45 cm in diameter and 2 to 25 cm in height	Mycelium is composed of a network of hyphae, which are thread-like structure
8	Daldinia concentrica	It is a dark-colored stroma which exhibits concentric layers . It is brown when young, but turns black when matures	It has spindle-shaped spores, measuring 4.74 - 5.54 µm in length and 2.74 to 3.40 µm in width. The flask-shaped perithecia are embedded in the outer layer of the stroma
9	Amanita muscaria	It has bright red cap with white spots which fades away with time.Gills free and white.It has a white stipe	Spores are ellipsoid, smooth, thin-walled, hyaline, and non-amyloid .Basida contained 4-sterigmate bearing four spores and clamped.
10	Ganoderma applantum	Basidiocarps are furrow and lumpy, with a white margin . The pores are initially white but turns s brown when injured. The sporocarps are brown and woody	The spores sizes 6-9 x 4-5 µm are ellipsoid and double walled. 3 types of hyphae fund were generative, binding, and skeletal. Clamp connections are also present.
11	Calvatia gigantea	Fruitbody is spherical or pear-shaped, with no stalk. White when young, becoming	Spores are thick walled,globuse and between 2.5and 4.0 µm in diameter

		yellowish or olive-brown when matures.	
12	Auricularia polytricha	It has gelatinous, rubbery, and ear-shaped basidiocarp which are brown in color.	The hyphae have medulla layer. Spores are sausage-shaped, 15-22 by 5-7 µm
13	Cantharellus cibarius	Fungus with a vibrant yellow color and a delicate, fruity aroma>it has a funnel shaped cap	The hyphae are typically hyaline and often branched
14	Boletus barrowsii	It is a fungus with a pale-colored cap.	Spindle-shaped spores to elliptic shape.
15	Xylaria poitei	Xylaria poitei has large distinctive stroma which are finger-like or club-shaped	The ascospores of Xylaria poitei are 8 inside each ascus and measure 24-28 x 6-8 µm
16	Tyromyces chioneus	Basidiocarp are semicircular or fan-shaped structure. The upper surface is white and turns to yellowish or grayish with age.	Spores are smooth, thin-walledand alleroid or ovoid in shape.
17	Hypomyces macrosporus	It has cottony growth that may be white, pink, or red, with dark red	The ascospores are usually ellipsoid, lanceolate, or fusiform, and can be septate
18	Coprinus fimetarius	The cap is initially white or but turns pale brown or greyish brown or black When matures .as the gills are deliquesce. The cap is initially closed but opens up when matures	Its spores are elliptica land smooth. Cheilocystidia are inflated clavate to globose-ellipsoidal, while pleurocystidia are abundant clavate, and hyaline
19	Coprinus disseminatus	Macroscopically, the cap starts as egg-shaped or bell-shaped but opens up as it matures	It has apical germ pore.Spores sizes ranges from 7-10 µm to 4-5.5 µm in.
20	Lentinus squarrosulos	The cap surface is covered in conspicuous, scale-like features.It is white	It has smooth, and hyaline basidiospores, which measure 6-8 × 1.5-2.5 µm
21	Hydnum repandum	The fungal cap are convex and may break on maturity.It has pale orange or reddish colur.	The basidia are 4-sterigmate and measure 29-34 by 5-6 µm
22	Termitomyces globulus	Cap are flat or slightly convex.Gills are white and stipe are cream coloured	Its basidiospores are ellipsoid or elongate, with oil droplet inside. The basidia are clavate and the cystidia, abundant and variable in shape
23	Auricularia angiospermarum	Basidiocarp are thin, brownish, rubbery-gelatinous and are ear-shaped. It can grow up to 8 cm across and 3 mm thick.	Hyphae has cross walls.Spores are 13-15 µm in length and 5-5.5 µm in width.
24	Coprinopsis radiata	This is a small and delicate fungus It has a narrow egg-shaped cap when young, but turns deliquescent bluish-grey, when matures .The stipe is generally white and fragile,	Spores are ellipsoida . They are smooth, inconspicuous hilar appendage

Table 5: Medicinal importance of the collected macro-fungi from University of Ibadan campus

SN	Fungal species	Medicinal Values/Properies
1	Antrodia serialis	Anti-hypertensive, immunomodulatory, anti-inflammatory and anti-cancer
2	Chlorophyllum molybditis	Non medicinal
3	Apioperdon pyriforme	Use to stop nose bleeding, wound healing ,antiseptic and analgesic:
4	Marasmius albuscorticis	Analgesic,Anticancer Antioxidant and Antimicrobial
5	Omphalotus nidiformis	Antioxidants,Use for the control of cervical cancer
6	Trametes cubensis	Anticancer,antiinflamatory and antimicrobial
7	Fomes fomentarius	Immunomodulatory and antimicrobial
8	Daldinia concentrica	Antimicrobial, anticancer and anti-inflammatory
9	Amanita muscaria	Psychoactive compounds,treatment of depression,sleep disorder,
10	Ganoderma applantum	antibacterial, antiviral, antitumor, antifibrotic, antiobesity
11	Calvatia gigantea	Antidiabetics, stop bleeding
12	Auricularia polytricha	Antitumor ,anti-demetial and antinflamatory
13	Cantharellus cibarius	Antimicrobial,antioxidant and inflamatory
14	Boletus barrowsii	Antioxidant and Anti-inflammatory,Immune supports
15	Xylaria poitei	Neuroprotective effects and anti –cancer properties
16	Tyromyces chioneus	Anti-HIV activity ,antiviral properties
17	Hypomyces macrosporus	potential anticancer, antimicrobial, and antioxidant
18	Coprinus fimetarius	Antioxidant,antidiabetic and Anti-inflammatory effects
19	Coprinus disseminatus	Antibacterial and antioxidant a
20	Lentinus squarrosulos	Gastro protective ,antioxidant ,anti cancer and antimicrobial
21	Hydnum repandum	Antioxidant,anticancer and antimicrobial
22	Termitomyces globulus	Immunomodulatory,antimicrobial and anti -hyperlipidemia
23	Auricularia angiospermarum	Antioxidant,anticancer,Immune boosting
24	Coprinopsis radiata	Myco-remediation, antimicrobial,anti-oxidant

DISCUSSION

Antrodia serialis (Plate 1) and Chlorophyllum molybdites (Plate 2) are both fungi with distinct characteristics and ecological roles. Antrodia serialis is a wood-decaying polypore with a pale, thin, and resupinate to bracket-like fruiting body, typically found on coniferous wood, where it contributes to brown rot decomposition. Chlorophyllum molybdites, commonly known as the green-spored parasol, has a large, white to brownish cap

with scales and is notorious for causing gastrointestinal poisoning if consumed. It is often found in lawns and open areas rather than decaying wood.

Apioperdon pyriforme (Plate 3) and Fomes fomentarius (Plate 4) are both wood-associated fungi with distinct roles in decomposition. Apioperdon pyriforme, commonly known as the pear-shaped puffball, grows in clusters on decaying wood and releases spores through a central pore when mature, aiding in nutrient recycling. Fomes fomentarius, also called the tinder fungus, forms large, hoof-shaped, hard fruiting bodies on tree trunks, contributing to white rot decay and historically used as tinder for fire-starting. Both species play crucial roles in breaking down organic matter in forest ecosystems.

Omphalotus nidiformis (Plate5)and Trametes cubensis (Plate6)are both wood-associated fungi with unique characteristics. Omphalotus nidiformis, known as the ghost fungus, is a bioluminescent species with a funnel-shaped, cream to orange-brown cap that grows on decaying wood, primarily in Australia and surrounding regions. It is toxic if consumed. Trametes cubensis is a polypore fungus with a fan-shaped, velvety cap that varies in color from white to brownish and is found on decaying hardwoods, where it aids in lignin breakdown. Both species contribute to wood decomposition in their ecosystems.

Fomitopsis pinicola (Plate 7)and Daldinia concentrica (Plate 8)are both wood-decaying fungi with important ecological roles. Fomitopsis pinicola, known as the red-belted conk, is a perennial polypore with a hard, hoof-shaped fruiting body featuring a reddish margin, commonly found on coniferous and deciduous trees, where it causes brown rot. Daldinia concentrica, or King Alfred's cake, forms round, black fruiting bodies with concentric internal layers and typically grows on dead or dying hardwoods, particularly ash, aiding in wood decomposition. Both fungi contribute to nutrient cycling in forest ecosystems.

Amanita muscaria (Plate 9)and Ganoderma lucidum (Plate 10)are both well-known fungi with distinct characteristics. Amanita muscaria, commonly called the fly agaric, is a toxic and hallucinogenic mushroom with a bright red cap covered in white warts, often found in symbiotic association with trees in forests. Ganoderma lucidum, known as the reishi or lingzhi polypore, has a glossy, reddish-brown, kidney-shaped cap and grows on decaying hardwoods, valued for its medicinal properties. Amanita muscaria is infamous for its psychoactive effects, Ganoderma lucidum is widely used in traditional medicine for its various potential health benefits (Jonathan and Awotona,2010).

Calvatia gigantea (Plate 11)and Auricularia polytricha (Plate 12)are both fungi with unique appearances and ecological roles. Calvatia gigantea, known as the giant puffball, produces large, round, white fruiting bodies that release spores when mature and typically grow in grassy areas, contributing to organic matter decomposition. Auricularia polytricha, commonly called the hairy wood ear, has a dark brown, gelatinous, ear-shaped fruiting body and grows on decaying wood, aiding in lignin breakdown. While Calvatia gigantea is edible when young, Auricularia polytricha is widely consumed in Asian cuisine for its texture and medicinal properties

Cantharellus cibarius (Plate 13)and Boletus barrowsii (Plate 14)are both edible and highly prized mushrooms. Cantharellus cibarius, known as the golden chanterelle, has a bright yellow to orange, funnel-shaped cap with ridged, decurrent gills and is found in forests, forming mycorrhizal associations with trees. Boletus barrowsii, sometimes called the white king bolete, resembles Boletus edulis but has a pale cap and thick, white to tan stipe, growing in coniferous and mixed forests. Both species are sought after for their culinary value and play essential ecological roles in nutrient cycling and tree symbiosis

Xylaria poitei (Plate 15)and Tyromyces chioneus (Plate 16)are both wood-decaying fungi. Xylaria poitei, also known as the white-tipped fungus, has a distinctive black, club-shaped fruiting body with white tips and typically grows on decaying wood in tropical and subtropical forests, contributing to the breakdown of organic matter. Tyromyces chioneus, a member of the polypore family, features white to pale caps and often grows on dead hardwoods, playing a significant role in the decomposition of wood and nutrient recycling in forest ecosystems. Both species help maintain ecological balance by breaking down lignin and cellulose.

Hypomyces macrosporus (Plate 17)and Coprinus fimetarius (Plate 18)are both fungi with distinct ecological

roles. Hypomyces macrosporus is a parasitic fungus that typically affects mushrooms in the Boletaceae family, turning them into a yellow, rubbery mass as it grows on them. It plays a role in the natural regulation of other fungal populations. Coprinus fimetarius, commonly known as the dung-loving inkcap, grows in manure or nutrient-rich soil, producing small, bell-shaped caps that dissolve into black ink-like liquid as they mature, contributing to the decomposition of organic matter. Both fungi are important in nutrient cycling within their ecosystems

Coprinus disseminatus (Plate 19)and Lentinus squarrosulus (Plate 20)are both wood-decomposing fungi with distinct characteristics. Coprinus disseminatus, known as the widespread inkcap, has small, white to pale brown, bell-shaped caps that dissolve into black ink as they mature and typically grows on decaying wood and plant material, aiding in decomposition. Lentinus squarrosulus, or the scaly-lobed mushroom, features a tan to brown, scaly cap with a central stalk and is found on dead wood, particularly hardwoods, playing a role in breaking down lignin and cellulose. Both fungi contribute to nutrient cycling in forest ecosystems.

Hydnum repandum (Plate 21)and Termitomyces globulus (Plate 22)are both distinctive fungi with ecological significance. Hydnum repandum, known as the hedgehog mushroom, has a pale to orange-brown cap with spiny, tooth-like structures underneath instead of gills. It typically grows in forests, forming ectomycorrhizal associations with trees and contributing to nutrient cycling. Termitomyces globulus, often called the termite mushroom, is a symbiotic fungus cultivated by termites in their mounds. It features a large, white, umbrella-like cap and plays a crucial role in breaking down plant material in termite nests. Both species are important for their roles in decomposing organic matter and symbiotic relationships

Auricularia angiospermarum (Plate 23)and Coprinopsis radiata (Plate 24)are both fungi with notable ecological roles. Auricularia angiospermarum, commonly known as the wood ear, has a gelatinous, ear-shaped fruiting body that grows on decaying hardwoods, contributing to the breakdown of organic matter and playing a role in nutrient cycling. A. angiospermarum is known for its antioxidant,anticancer and Immune boosting abilities Coprinopsis radiata, also known as the clustered ink cap, features small, umbrella-shaped caps that mature into black, ink-like liquid and typically grows on decaying wood, contributing to the decomposition of plant material. Coprinopsis radiata have been employed for myco-remediation, antimicrobial,anti-oxidant activities Somdee et al.,(2021). Both species are important in forest ecosystems for their decomposition abilities (Jonathan ,2019).

Ibadan University Botanical Gardens recorded the highest number of macro-fungal collections(14,298)while Urbam dam and Botany Nursery has the second and third highest collections of 10,122 and 8,936 respectively. The high populations of higher fungi in these 3 locations may be linked to the reduced human activities which enhanced recycling process in the tropical rain forests (Jonathan et al,2025a).There are many decomposed plant debris and richly soils which are supportive to luxuriant growth of varieties of micro and macro-fungi. This finding is similar to the observations of Clark et al,(2005)which suggested that different layers of tree canopies in the tropical forests especially the fallen leaves, decaying wood and plant debris are highly supportive to the growth of different living organisms including microorganisms. The highest layers of canopy usually receive abundant sunlight and water, creating a rich environment for various organisms, including fungi. This top layer of the forest is a key site for biodiversity and plays a significant role in nutrient cycling (Clark et al,2005).Abadina has the lowest fungal population of 1,789 because of the increased human activities

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