

Diversity of Wood-Inhabiting Macrofungi from District Ayodhya, Uttar Pradesh, India

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ABSTRACT

Mushroom mycoflora belong to kingdom Mycota (Fungi), which harbors the most diverse group of organisms after insects on earth. Since the beginning of time, macrofungi have drawn the attention of humans due to their peculiar and startling characteristics, such as their varied color, form, and size as well as the existence of gills and pores. Macrofungi also shows great diversity in their inhabiting behaviors encompassing saprobic and parasitic. In the present study, diversity of wood inhabiting macrofungi was surveyed in study area (Ayodhya). Findings exposed a total number of 30 macrofungal species belonging to 14 families. Morphological, microscopic, and macroscopic characters were recorded. Wood inhabiting macrofungi play important role in the biogeochemical cycle of ecosystems. It helps degrade the ligno-cellulosic waste materials and release nutrient back into the ecosystem. In addition to softening wood tissues, the degradation process of wood-growing macrofungi demonstrates collaboration with other micro-organisms.

Keywords: Ayodhya, Diversity, Macrofungi, Mushroom, Wood-decomposer

INTRODUCTION

Macrofungi (mushroom) belong to a separate kingdom Fungi which is a group of heterotrophic organisms (mycoflora). Mushrooms are the most diverse group on the earth after insects (Pala *et al.*, 2011; Singh *et al.*, 2016; Singh *et al.*, 2017; Vishwakarma *et al.*, 2017a; Vishwakarma *et al.*, 2017b; Singh and Singh, 2022). About 1.5 million species are thought to exist in nature, although only about 50% of them have been identified to date (Manoharachary *et al.*, 2005). Around 41,000 types of mushrooms have been recorded worldwide, with 850 of those species coming from India (Deshmukh, 2004). Macrofungi have a key function in the ecosystem starting with human civilisation. They draw the attention of humans due to their remarkable morphological characteristics, such as variety in color, form, size, occurrence, habitat, and presence of pores and gills (Vishwakarma *et al.*, 2017a).

Wood inhabiting macrofungi play important role in ecosystem due to their parasitic and saprobic activities (Kuffer *et al.*, 2004). In Asia, a high species richness of wood inhabiting macrofungi has been recorded and the reason of high diversity is to the availability of host with favorable environmental conditions (Dai and Penttila, 2006). A total number of 2700 species of fungi has been recorded only from India (Manoharachary *et al.*, 2005). Macrofungi is used as the major natural food and medicine from early the civilization. The Macrofungi are act as scavengers and also play an important role in ecological system as well as in biogeochemical cycles (Paliwal *et al.*, 2013). They

perform an active role in biodegradation of organic matters like dead and decaying woods, litters, straws, leaves etc (Sultana and Quresh, 2007).

Northeastern part of Uttar Pradesh is endowed with a rich biodiversity. Geographically, it is in Terai region of Himalaya and hence, provide suitable environmental and climate condition for successful establishment of diversity of flora especially macrofungi. Ayodhya is situated in the bank of river Saryu with Holistic approach and widely known for the birthplace of Godes Rama. The present study state the brief description of diversity of wood inhabiting macrofungi in District Ayodhya, Uttar Pradesh, India.

MATERIALS AND METHODS

The collection of macrofungi was done periodically from different sites of Ayodhya district between 2020-2023. The study area was located at between 26°47'N and 82°13'E with elevations of 93 meters at sea level (Mobile GPS App- Geographical Information System). The study area was divided into 5 tehsils and 11 blocks, whereas study site was randomly selected from every block. Macroscopic and ecological characters of surveyed sample were recorded and photography (Oppo Neo-7: 8MP Mobile Camera) of macrofungi were also done in their natural habitat. The samples were brought in laboratory for further studies. Microscopic studies were done by slide preparation of spores. Spore mounting were done by Melzer's reagent (0.5 g Iodine and 1.5 g Potassium iodide to 20 ml. Chloral hydrate) and examine with oil immersion under microscope (OMX- XM82ESC02 40X-2000X Digital Lab LED Binocular Compound

Microscope) and spore's morphology such as shape and size were recorded. Spore prints were also observed (Singer, 1986; Vishwakarma *et al.*, 2017a; Wang, 2011). The colour code examines based on standard notation of Methuen Handbook of Colour (Kornerup and Wanscher, 1978). Macrofungal specimens were identified by using relevant literatures (Money, 2004, 2016; Monika, 2022; Singh *et al.*, 2016, 2017, 2019; Singh and Singh, 2023a, 2023b; Vishwakarma *et al.*, 2017a, 2017b) and confirmed by myco-keys (www.mushroomexpert.com, www.messiah.edu, www.inaturalist.org, www.mycobank.org and www.myckeys.com). Finally, the samples were preserved as wet or dry preservation methods (Ainsworth, 1971). Most of studied specimens were air-dried (at 40-60 °C) with the help of a commercial dryer (Ezidri, Hydraflow Inds. Ltd.). Dried specimens kept in air-tight polythene bags or bottles. Wet preservation follows the alcohol (15 ml), formalin (25 ml) and distilled water (100 ml) for macrofungal fruiting bodies. All preserved specimens were deposited in college laboratory collections.

RESULTS

Every weekend (Saturday and Sunday), a general survey is conducted for research sites. Throughout the years 2020-2023, various research locations were surveyed for the collection and identification of macrofungi. Thirty species of mycoflora were reported for identification at the 27 sites that we visited in total. Maximum species of macrofungi reported more than one sites but first reporting site were mentioned. In the present study, a total number of 30 species (**Figure A**) of wood inhabiting macrofungi belonging to 14 families were recorded. Polyporaceae family was found to be dominant and followed by Fomitopsidaceae family. Whereas in 9 families, only single species per families were recorded (**Graph 1**). In microscopic study, image of spores was taken with the help of microscope in the laboratory and some of the clear images exposed here in (**Figure B**).

DESCRIPTION OF COLLECTED WOOD INHABITING MACROFUNGI

Artomyces pyxidatus (Pers.) Julich

Sample ID: Saket111 (**Figure A1**)

Family: Auriscalpiaceae

Description: Fruiting body 4-10 cm tall, branched, branches culminate crown-like tips, white to yellow coloured.

Habitat: Saprobic, solitary or clustered, on wood of deciduous tree.

Edibility: Edible

Collection Date: 18.07.2021

Collection Site: Village-Chandpur, Block- Bikapur, Tahsil-Bikapur

Verified from: Henrici and Mahler, 2012; Zheng *et al.*, 2008.

Auricularia auricula judae (Bull.) Schrat.

Sample ID: Saket047 (**Figure A2**)

Family: Auriculariaceae

Description: Fruiting body floppy ear shaped or cup shaped, gelatinous, elastic, smooth, reddish-brown coloured; stipe absent; gill absent; spore thick walled dark, sausage shaped, 15-22µm × 5-7µm (**Figure B1**).

Habitat: Parasitic, solitary or in group, on healthy trees.

Edibility: Edible

Collection Date: 19.07.2020

Collection Site: Village-Deokali, Block- Pura Bazar, Tahsil-Sadar

Verified from: Wu *et al.*, 2014; Vishwakarma *et al.*, 2017b; Singh *et al.*, 2016

Cerioporus squamosus (Huds.) Quel.

Sample ID: Saket109 (**Figure A3**)

Family: Polyporaceae

Description: Pileus 5-25 cm. wide, flattened, large concentric scales, creamy white to yellow-brown coloured; stipe 2-7 cm. long, 1-3 cm. thick, lateral or eccentric, black at base; gill absent; porous, white or yellowish coloured, large, regular, 0.3-1 pore per mm; Spore transparent, large, cylindrical (**Figure B2**).

Habitat: Parasitic and saprobic, solitary or grouped, overlapping, clustered, on living or dead stem of deciduous tree.

Edibility: Edible (Young); Inedible (Mature).

Collection Date: 30.05.2021

Collection Site: Village-Manjha, Block- Maya Bazar, Tahsil-Bikapur

Verified from: Spahr, 2009

Dacrymyces spathularia (Schwein.) Martin

Sample ID: Saket091 (**Figure A4**)

Family: Dacrymycetaceae

Description: Fruiting body 1-3 cm. tall, fan shaped or spatula shaped, rounded stalk at base, upward flattened, gelatinous, yellow to orange coloured.

Habitat: Saprobic, grouped, clustered, on decaying woods.

Edibility: Unknown

Collection Date: 05.09.2021

Collection Site: Village-Deokali, Block- Harington Ganj, Tahsil-Bikapur

Verified from: Zamora and Ekman, 2020.

Daldinia concentric Bolton

Sample ID: Saket008 (**Figure A5**)

Family: Xylariaceae

Description: No distinct cap, Pileus 5 cm. wide, hemispherical to sub globose, shiny, brown to black coloured; stipe absent; gills absent; spore fusiform to elliptical, black coloured, 12.80 µm × 7.15 µm (**Figure B3**).

Habitat: Saprobic, solitary or grouped, on dead and decaying woods and logs.

Edibility: Inedible

Collection Date: 07.11.2021

Collection Site: Village-Dwarikapuri, Block- Pura Bazar, Tahsil-Sadar

Verified from: Singh *et al.*, 2016; Vishwakarma *et al.*, 2017b

Exidia foliacea (Pers.) P. Karst.

Sample ID: Saket094 (**Figure A6**)

Family: Phaeotremellaceae

Description: Fruiting body 3-5 cm. wide, gelatinous, seaweed like, brown to dark brown coloured; stipe absent; gill absent; porous; spore ellipsoid, smooth, 5-9 μm \times 3-7.5 μm , white (**Figure B4**).

Habitat: Saprobic, on dead woods.

Edibility: Inedible

Collection Date: 23.08.2020

Collection Site: Village-Rauza Gaon, Block-Rudauli, Tahsil-Rudauli

Verified from: Spirin *et al.*, 2018

Ganoderma curtisii (Berk.) Murrill

Sample ID: Saket062 (**Figure A7**)

Family: Ganodermataceae

Description: Cap 8-11 cm. wide, shiny, yellow-orange to reddish-brown coloured with whitish margin; stipe typically present, short-tiny, lateral, pronounced to the pileus (cap), reddish-brown coloured; gill absent; porous, whitish to brownish, pore 5-7 per mm.

Habitat: Saprobic and parasitic, solitary or grouped, on dead or living hard wood trees.

Edibility: Inedible

Collection Date: 12.06.2022

Collection Site: Village-Gopinathpur, Block-Sohawal, Tahsil-Sohawal

Verified from: Nagadesi and Arya, 2012; Rebekah and Estelle, 2000.

Ganoderma leucidum Karst.

Sample ID: Saket010 (**Figure A8**)

Family: Ganodermataceae

Description: Pileus 7-16 cm. wide, dark reddish to brown, margin yellowish; stipe present; gill absent; porous, 4-5 pore per mm.; spore yellowish to brown, 9-10 μm \times 5-6 μm (**Figure B5**).

Habitat: Saprobic, solitary or grouped or fewer, on dead woods.

Edibility: Medicinal

Collection Date: 21.11.2021

Collection Site: Village-Ranopali, Block- Pura Bazar, Tahsil-Sadar

Verified from: Loyd *et al.*, 2018; Vishwakarma *et al.*, 2017b; Singh *et al.*, 2017

Ganoderma sessile Murrill

Sample ID: Saket067 (**Figure A9**)

Family: Ganodermataceae

Description: Cap 6-13 cm. wide, shiny, reddish-brown to orange-red coloured with white margin; stipe typically present, short, thick, centrally attached with under pileus (cap), 3-5 cm. long, 1-2 cm. thick; gill absent; porous, whitish to brownish, pore 5-7 per mm.

Habitat: Saprobic and parasitic, solitary or clustered, overlapping, on base of deciduous trees.

Edibility: Inedible

Collection Date: 03.07.2022

Collection Site: Village-Adhiyari, Block- Milkipur, Tahsil-Milkipur

Verified from: Zhou *et al.*, 2015

Inonotus hispidus (Bull.) P. Karst.

Sample ID: Saket105 (**Figure A10**)

Family: Hymenochaetaceae

Description: Fruiting body 16-27 cm. wide, thick, without distinct cap, shaggy bracket, rust-brown coloured; stipe absent; gill absent; porous, pore 18 mm. deep, brown coloured, 2-3 pore per mm.; spore print yellowish-white, broadly ellipsoid, smooth, 6-9.5 μm \times 4-8 μm (**Figure B6**).

Habitat: Saprobic, on dead or dried trees.

Edibility: Inedible

Collection Date: 08.11.2020

Collection Site: Village-Shanawa, Block-Pura Bazar, Tahsil-Sadar

Verified from: Zan *et al.*, 2011

Lacrymaria lacrymabunda (Bull.) Pat.

Sample ID: Saket114 (**Figure A11**)

Family: Psathyrellaceae

Description: Cap 4-10 cm. wide, campanulate, bell shaped, convex, reddish to brown coloured; stipe 5-10 cm. long, 0.5-1 cm. diameter, russet towards the base, fibrous, ring zone present, yellow-brown coloured; gill Adnet to free, brown to dark brown coloured; spore print brownish, ellipsoid to lemon shaped, warty, 7-10 μm \times 4-7 μm (**Figure B7**).

Habitat: Saprobic, on dead or dried trees.

Edibility: Unknown

Collection Date: 14.08.2022

Collection Site: Village-Sarraiya, Block-Maya Bazar, Tahsil-Bikapur

Verified from: Bas, 1983

Laetiporus cincinnatus Morgan

Sample ID: Saket068 (**Figure A12**)

Family: Fomitopsidaceae

Description: Pileus 2-20 cm. wide, clustered, wrinkled surface, velvety densely matted, dry, pinkish-orange to pinkish-brown coloured; stipe absent; gill absent; porous, whitish.

Habitat: Parasitic, grouped, on base of hard wood trees.

Edibility: Edible on choice

Collection Date: 11.09.2022

Collection Site: Village-Ahirauli, Block- Tarun, Tahsil-Bikapur

Verified from: Money, 2004; Money, 2016

Laetiporus conifericola Burds. and Banik

Sample ID: Saket015 (**Figure A13**)

Family: Fomitopsidaceae

Description: Pileus 25-42 cm. wide, 1-3 cm. thick, overlapping plates, bright orange to dark orange coloured; Stipe small, underside, orange coloured; gill absent; porous; spore oval, smooth, hyaline, 6-8 $\mu\text{m} \times 3-5 \mu\text{m}$.

Habitat: Parasitic, on trees.

Edibility: Edible

Collection Date: 12.12.2021

Collection Site: Village-Ballipur, Block-Masodha, Tahsil-Sadar

Verified from: Burdsall and Banik, 2001

Laetiporus persicinus (Berk and Curtis) Gilb.

Sample ID: Saket004 (**Figure A14**)

Family: Fomitopsidaceae

Description: Pileus 5-22 cm. wide, flattish, firm, spongy, globous shaped, whitish-pink to brown-orange coloured; stipe 3-8 cm. long, stocky, central, brown coloured; porous, white to brown; spore print white, oval to elliptic, clear, smooth, 6-8 $\mu\text{m} \times 3-5 \mu\text{m}$.

Habitat: Parasitic and Saprobic, on living and dead hard and soft woods.

Edibility: Edible

Collection Date: 10.10.2021

Collection Site: Village-Gaura, Block-Sohawal, Tahsil-Sohawal

Verified from: Berkeley and Curtis, 1853.

Laetiporus sulphureus (Bull.) Murrill.

Sample ID: Saket014 (**Figure A15**)

Family: Fomitopsidaceae

Description: Cap 5-27 cm wide, 1-2 cm. thick, radially wrinkled, roughened, velvety, bright to yellow orange coloured; stipe absent; gill absent; porous, sulphur-yellow coloured, pore 3-4 per mm., Spore smooth, elliptical to ovoid, 5-7 $\mu\text{m} \times 3-4 \mu\text{m}$, greenish-white (**Figure B8**).

Habitat: Parasitic and Saprobic, solitary or clustered, rosette, on living and dead deciduous hard wood trees.

Edibility: Edible at Choice

Collection Date: 12.10.2021

Collection Site: Village-Ahirauli, Block- Tarun, Tahsil-Bikapur

Verified from: Singh *et al.*, 2019; Vishwakarma *et al.*, 2017b

Lentinellus ursinus (Fr.) Kuhner

Sample ID: Saket088 (**Figure A16**)

Family: Auriscalpiaceae

Description: Pileus 2-10 cm. wide, margin paler, surface covered with dark-brown hairs, reddish-brown coloured; stipe absent; gill radiating from point of attachment to substrate, edges coarsely

serrated, white to pinkish-brown coloured; spore print dark brown to blackish, amyloid (**Figure B9**).

Habitat: Saprobic, solitary or grouped, overlapping, clustered, on decaying deciduous woods.

Edibility: Inedible

Collection Date: 22.05.2022

Collection Site: Village-Shanawa, Block- Pura Bazar, Tahsil-Sadar

Verified from: Miller and Miller, 2006

Lentinus levis (Berk. and Curtis) Murrill

Sample ID: Saket066 (**Figure A17**)

Family: Polyporaceae

Description: Pileus 8-36 cm. wide, smooth, matted coarse hairs on surface, white to creamy-yellowish coloured; stipe 2-12 cm. long, 2-3 cm. thick, central or eccentric, lateral, densely coated with hairs, white to brown coloured; gill decurrent, edges entire, white to yellow coloured; spore print white.

Habitat: Saprobic and parasitic, solitary or grouped, growing on wound of living trees and dead wood.

Edibility: Edible on choice

Collection Date: 26.06.2022

Collection Site: Village-Bhitaura, Block-Mayabazar, Tahsil-Bikapur

Verified from: Haro-Luna *et al.*, 2019

Lenzite sepiaria (Fr.) Wulfen

Sample ID: Saket001 (**Figure A18**)

Family: Polyporaceae

Description: Pileus 2-10 cm. wide, fan shaped, brown to dark brown coloured, upper surface rust brown with concentric tinged zone, pallid margin; stipe absent; gill absent; porous or gill like radial arrangement, brown coloured; spore print white to brown, smooth, cylindrical, 7-8 $\mu\text{m} \times 2-3 \mu\text{m}$ (**Figure B10**).

Habitat: Saprobic, grouped, on decaying woods.

Edibility: Inedible

Collection Date: 06.06.2021

Collection Site: Village-Ganeshpur, Block- Mawai, Tahsil-Rudauli

Verified from: Vishwakarma *et al.*, 2017a; Vishwakarma *et al.*, 2017b; Singh *et al.*, 2019

Microporus affinis (Blume and Nees) Kuntze

Sample ID: Saket009 (**Figure A19**)

Family: Polyporaceae

Description: Fruiting body 2-7 cm. wide, fan shaped, velvety, ridged, brown concentric zones, saucer shaped depression in cap, leathery bracket, brown, grey to black coloured with white margin; stipe 1-2.5 cm. long, small disc like, grey, brown to black coloured; gill absent; porous, pore thick walled, oval shaped, white to yellow-pink coloured, 7-10 pore per mm.; spore print white, ellipsoid, hyaline, thin walled, 5.5 $\mu\text{m} \times 2.5 \mu\text{m}$.

Habitat: Saprobic, solitary or in group, on dead branches and logs.

Edibility: Unknown

Collection Date: 14.11.2021
Collection Site: Village-Itaunja, Block-Amanigunj, Tahsil-Milkipur
Verified from: Nagadesi and Arya, 2012; Lee, 2017.

Microporus verniceps (Berk.) Kuntze
Sample ID: Saket011 (**Figure A20**)
Family: Polyporaceae
Description: Fruiting body 3-7 cm. wide, flabelliform, upper surface covered with spreading striae, margin smooth, woody and dried, reddish brown to golden brown coloured; stipe short, laterally, 3-6 mm. long, 2-4 mm. diameter; gill absent; porous, pore angular, 3 mm. thick, white, 4-5 pore per mm.; spore cylindrical, smooth, hyaline, thin walled.
Habitat: Saprobic, solitary or in group, on dead branches and logs.
Edibility: Unknown
Collection Date: 28.11.2021
Collection Site: Village-Jainabad, Block-Mawai, Tahsil-Rudauli
Verified from: Saha *et al.*, 2018

Microporus xanthopus (Fr.) Kuntze
Sample ID: Saket005 (**Figure A21**)
Family: Polyporaceae
Description: Pileus 4-10 cm. wide, 1-2 mm. thick, glabrous, margin wavy, concentric zone on upper surface, fan shaped, brownish coloured; stipe 2-5 cm. long, 3-6 mm. diameter, narrow toward base, glabrous, white coloured; gill absent; porous, grey coloured, pore 7-8 per mm.; spore print brown, smooth, cylindrical, hyaline, 4-6 $\mu\text{m} \times 1-2 \mu\text{m}$.
Habitat: Saprobic, grouped, on hard dead woods.
Edibility: Inedible
Collection Date: 16.10.2021
Collection Site: Village-Akbara, Block- Pura Bazar, Tahsil-Sadar
Verified from: Vishwakarma *et al.*, 2017a; Vishwakarma *et al.*, 2017b

Phyllotopsis nidulans (Pers.) Singer
Sample ID: Saket120 (**Figure A22**)
Family: Tricholomataceae
Description: Pileus 2-7 cm. wide, oyster shaped, densely covered with hair, dry, orange to yellow coloured; stipe absent; gills radiating from point of attachment, orange to yellow coloured; spore print yellow-pink (**Figure B11**).
Habitat: Saprobic, solitary or overlapping clustered, on deciduous wood.
Edibility: Inedible
Collection Date: 01.10.2022
Collection Site: Village-Ghatampur, Block-Harington Ganj, Tahsil-Bikapur
Verified from: Jang *et al.*, 2013; Davis *et al.*, 2012

Pleurotus dryinus (Pers.) P. Kumm.
Sample ID: Saket106 (**Figure A23**)
Family: Pleurotaceae
Description: Pileus 2-10 cm. diameter, fan or oyster shaped, convex, hairy, circular outline, yellowish

coloured; gills close, running down to stipe, white to yellowish coloured; stipe 4-6cm. length and 1-2cm. thick, tough, off centric, whitish to yellow coloured; spore print greyish-white, cylindric-ellipsoid, smooth, 8-11 $\mu\text{m} \times 2-3 \mu\text{m}$ (**Figure B12**).
Habitat: Parasitic, grouped, on living deciduous tree
Status: Inedible
Collection Date: 22.01.2023
Collection Site: Village-Bisnoharpur, Block-Bikapur, Tahsil-Bikapur
Verified from: Vishwakarma *et al.*, 2017a

Pleurotus ostriatus (Fr.) P. Kumm.
Sample ID: Saket065 (**Figure A24**)
Family: Pleurotaceae
Description: Pileus 4-27 cm. diameter, fan or oyster shaped, white or grey to dark brown coloured; gills descend on stipe, white to grey coloured; stipe off-centre, 1-4 cm. length and 1-2cm. thick, lateral attachment with substrate (wood); spore print white to yellowish, cylindric-ellipsoid, smooth, 7-11 $\mu\text{m} \times 2-4 \mu\text{m}$ (**Figure B13**).
Habitat: Saprobic, grow on dead woods.
Status: Edible and Cultivable
Collection Date: 25.06.2022
Collection Site: Village-Datauli, Block- Poora Bajar, Tahsil-Sadar
Verified from: Singh and Singh, 2023a

Pleurocybella porrigens (Pers.) Singer
Sample ID: Saket095 (**Figure A25**)
Family: Marasmiaceae
Description: Pileus 2-10 cm. wide, thin flesh, smooth, white coloured; stipe generally absent (present as narrowed, stubby, white coloured); gills crowded, narrow, decurrent, white coloured, spore print white.
Habitat: Saprobic, solitary, clustered, on dead woods or logs.
Edibility: Unknown
Collection Date: 13.09.2020
Collection Site: Village-Janaura, Block- Masodha, Tahsil-Sadar
Verified from: Holmberg and Marklund, 2013

Schizophyllum commune Fr.
Sample ID: Saket016 (**Figure A26**)
Family: Schizophyllaceae
Description: Fruiting body 1-5 cm. wide, fan shaped when lateral attached, saucer shaped when centrally attached, white to grey coloured; stipe absent; gill folds hairy, split lengthwise, white to grey coloured; spore print white.
Habitat: Saprobic, solitary, scattered or overlapping, clustered, on decaying hard woods.
Edibility: Inedible
Collection Date: 12.12.2021
Collection Site: Village-Rasulpur, Block-Bikapur, Tahsil-Bikapur
Verified from: Guarro *et al.*, 1999; Monika, 2022; Singh and Singh, 2023b

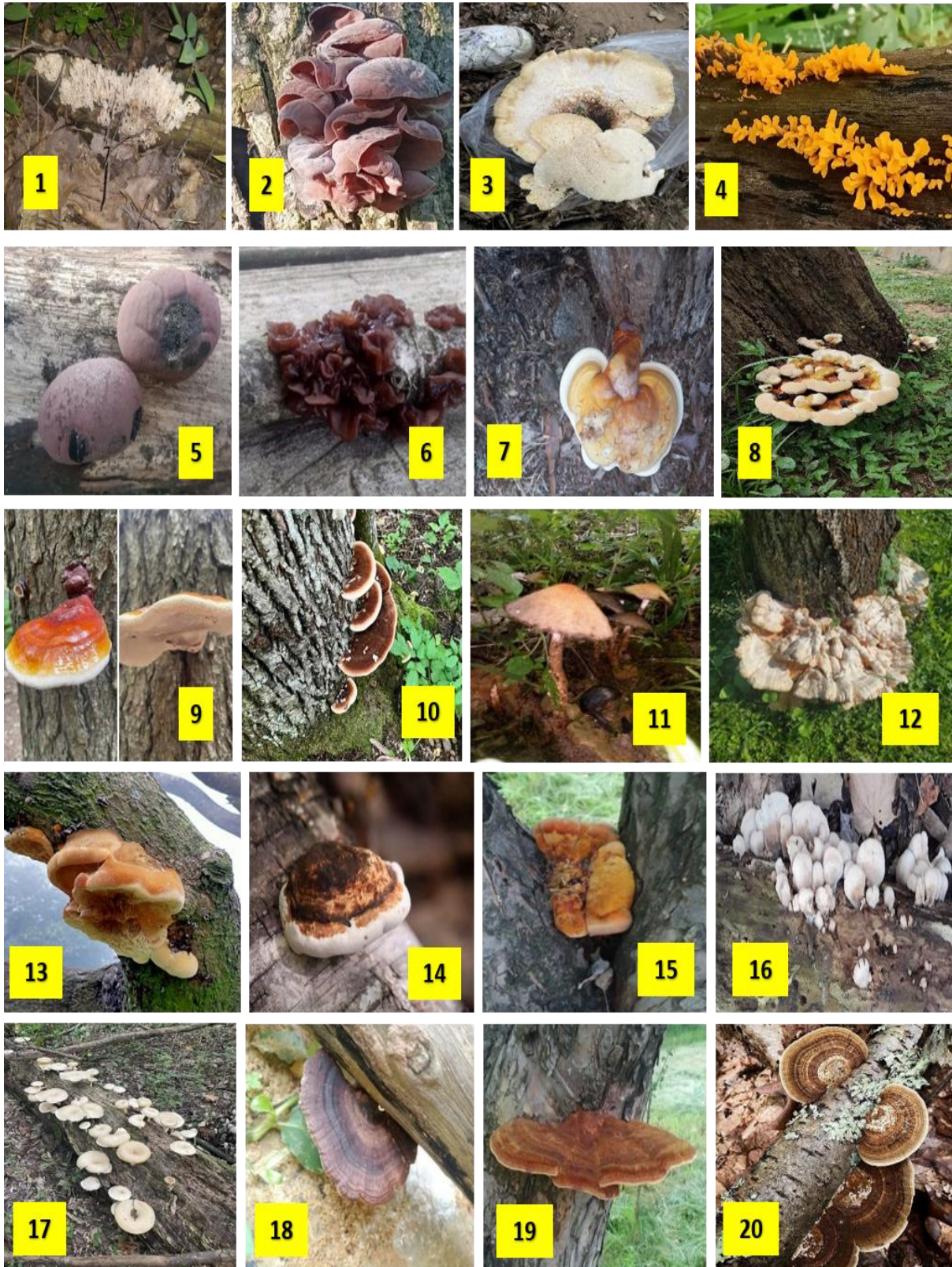


Figure A: Fruiting body of wood inhabiting macrofungi. 1, *Artomyces pyxidatus*; 2, *Auricularia auricula judae*; 3, *Cerioporus squamosus*; 4, *Dacrymyces spathularia*; 5, *Daldinia concentrica*; 6, *Exidia foliacea*; 7, *Ganoderma curtisii*; 8, *Ganoderma leucidum*; 9, *Ganoderma sessile*; 10, *Inonotus hispidus*; 11, *Lacrymaria lacrymabunda*; 12, *Laetiporus Cincinnatus*; 13, *Laetiporus conifericola*; 14, *Laetiporus persicinus*; 15, *Laetiporus sulphurous*; 16, *Lentinellus ursinus*; 17, *Lentinus levis*; 18, *Lenzite sepiaria*; 19, *Microporus affinis*; 20, *Microporus verniceps*.

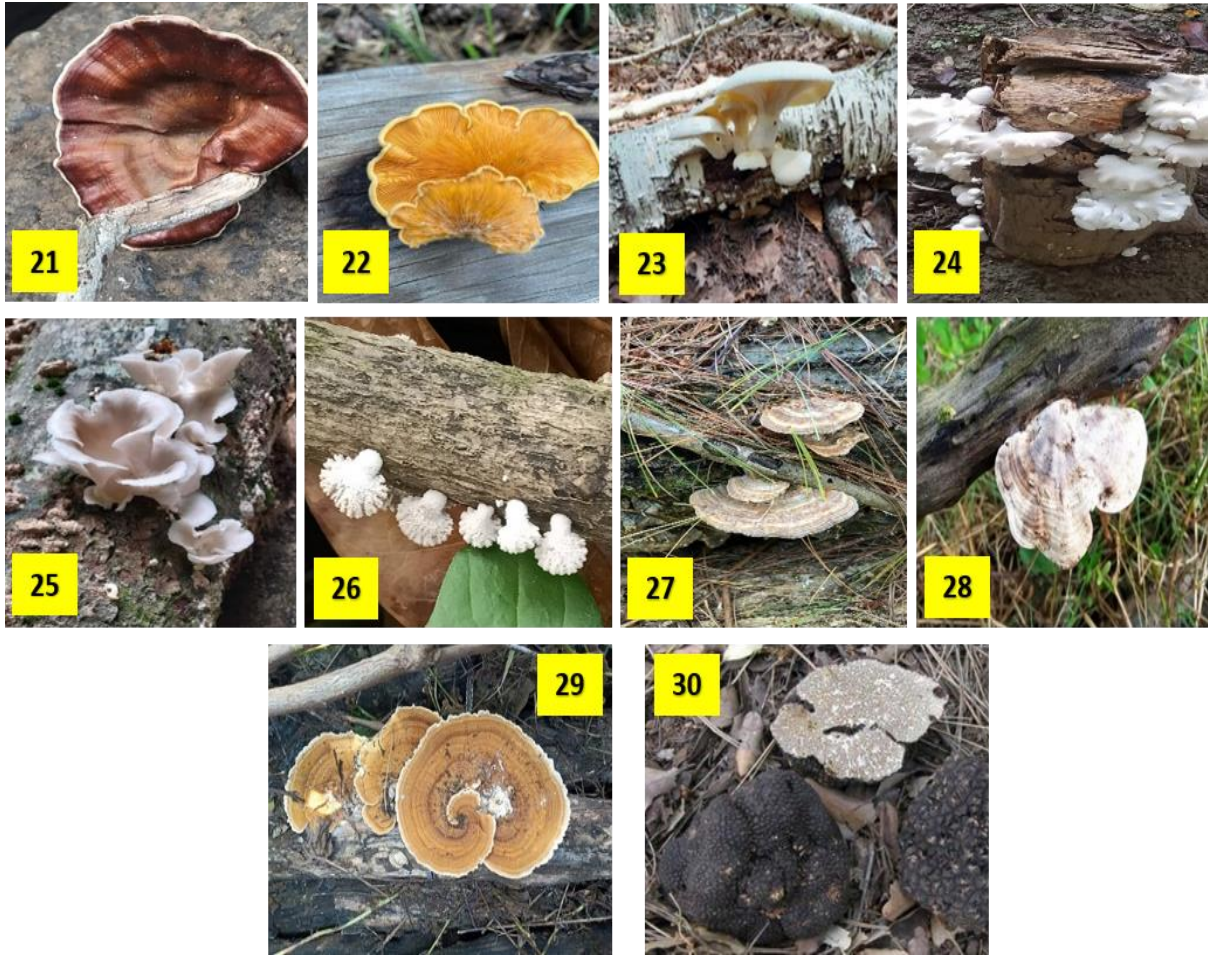
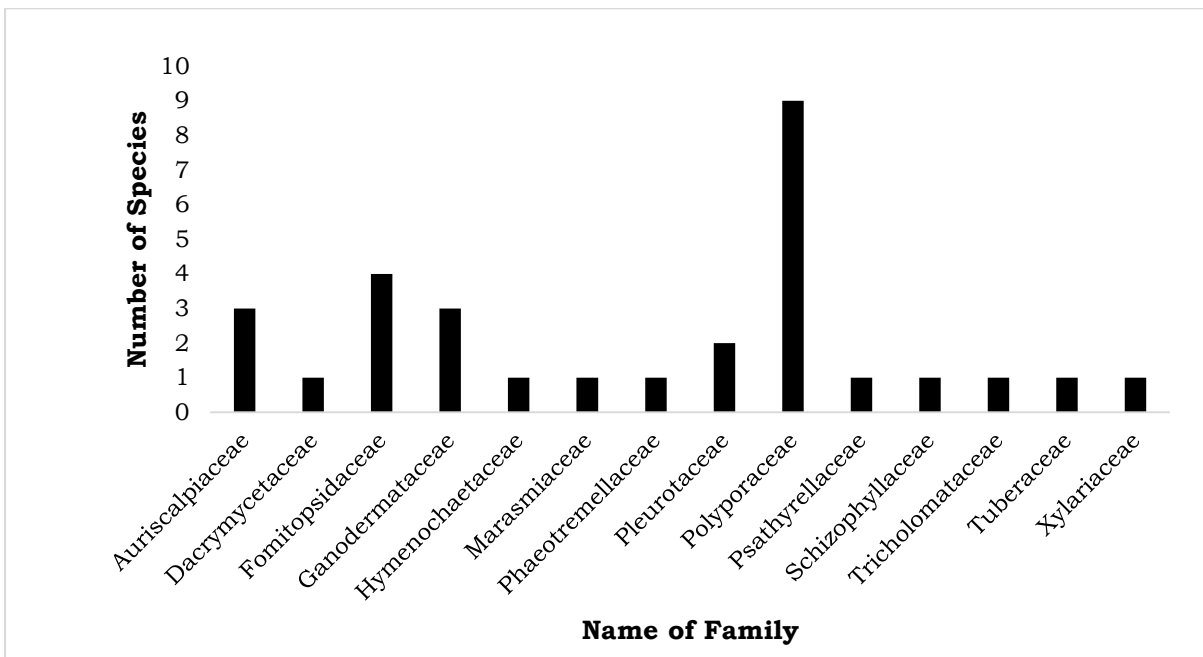


Figure A: Fruiting body of wood inhabiting macrofungi. 21, *Microporus xanthopus*; 22, *Phyllotopsis nidulans*; 23, *Pleurotus dryinus*; 24, *Pleurotus ostriatus*; 25, *Pleurocybella porrigens*; 26, *Schizophyllum commune*; 27, *Trametes betulina*; 28, *Trametes suaveolens*; 29, *Trametes versicolor*; 30, *Tuber aestivum*.



Graph 1: Family wise representation of macrofungal species.

Trametes betulina (L.) Pilat

Sample ID: Saket072 (**Figure A27**)

Family: Polyporaceae

Description: Cap 2-9 cm. wide, 1-2 cm. thick, fan shaped, tiered brackets or rosettes emanating from common base, cream or yellow buffed, yellow-brown to greyish-brown coloured; gills radiating from attachment base point, broad, tough, white to cream coloured; stipe absent; spore print white, smooth, cylindrical to bean shaped, 4-6 µm × 1-2 µm.

Habitat: Scattered to Clustered in overlapping on hardwoods.

Edibility: Inedible

Collection Date: 13.12.2020

Collection Site: Village-Sidhaura, Block- Harington Ganj, Tahsil-Bikapur

Verified from: Justo and Hibbett, 2011

Trametes suaveolens (L.) Fries.

Sample ID: Saket003 (**Figure A28**)

Family: Polyporaceae

Description: Cap 5-15 cm. wide, 1-3 cm. thick, finely hairy to glabrous, azonate, soft, whitish to brownish coloured; stipe absent; gill absent; porous, pore surface whitish to yellowish-brown.

Habitat: Saprobic and Parasitic, solitary, on living deciduous trees.

Edibility: Inedible

Collection Date: 03.10.2021

Collection Site: Village-Bisnoharpur, Block-Bikapur, Tahsil-Bikapur

Verified from: Justo and Hibbett, 2011

Trametes versicolor (L.) Lloyd.

Sample ID: Saket002 (**Figure A29**)

Family: Polyporaceae

Description: Cap 3-8 cm. wide, 1-2 cm. thick, multicoloured, concentric-zone yellowish to brownish, velvety-zones hairy, outer-zone yellow coloured; stipe absent; gill absent; porous, pore 3-4 per mm, spore print blueish-white (**Figure B14**).

Habitat: Saprobic and Parasitic, clustered, overlapping or in fused rosette, on dead deciduous wood or dried trees.

Edibility: Inedible

Collection Date: 02.07.2021

Collection Site: Village-Bhelsar, Block- Rudauli, Tahsil-Rudauli

Verified from: Justo and Hibbett, 2011; Vishwakarma *et al.*, 2017b; Singh *et al.*, 2017

Tuber aestivum Vittad.

Sample ID: Saket071 (**Figure A30**)

Family: Tuberaceae

Description: Fruiting body globus, covered in pyramidal warts, brown to blackish coloured; stipe absent; gill absent; spore print blackish-brown, ovoid, reticulate, 7.16 µm × 7.10 µm (**Figure B15**).

Habitat: Saprobic, in group, gregariously on decaying woods and logs.

Edibility: Edible in choice

Collection Date: 29.05.2022

Collection Site: Village-Sidhauri Block- Rudauli, Tahsil- Rudauli

Verified from: Gryndler *et al.*, 2011; Vishwakarma *et al.*, 2017b; Singh *et al.*, 2016

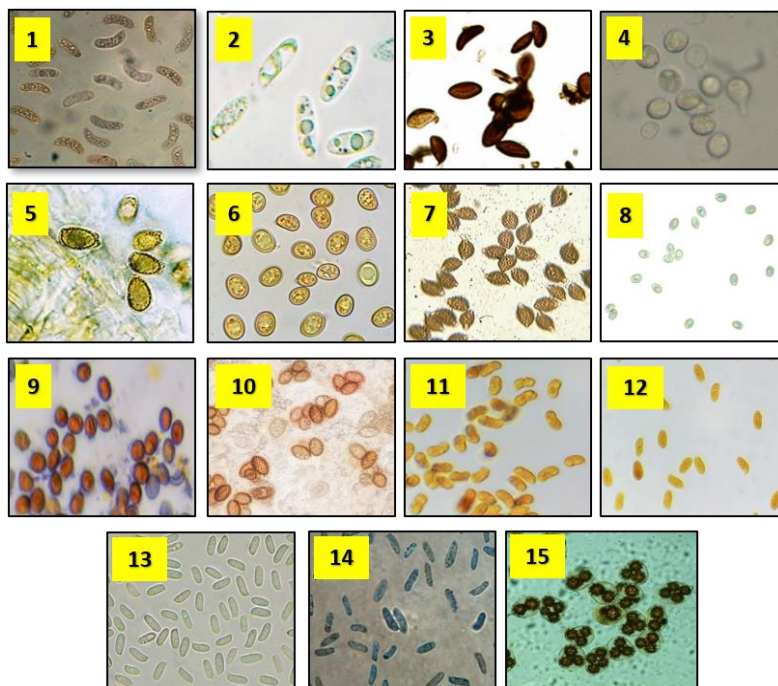


Figure B. Microscopic image of spores. 1, *Auricularia auricula judae*; 2, *Cerioporus squamosus*; 3, *Daldinia concentrica*; 4, *Exidia foliacea*; 5, *Ganoderma leucidum*; 6, *Inonotus hispidus*; 7, *Lacrymaria lacrymabunda*; 8, *Laetiporus sulphureus*; 9, *Lentinellus ursinus*; 10, *Lenzite sepiaria*; 11, *Phyllotopsis nidulans*; 12, *Pleurotus dryinus*; 13, *Pleurotus ostriatus*; 14, *Trametes versicolor*; 15, *Tuber aestivum*.

DISCUSSION

Mushrooms occupy diverse niches of nature in forest ecosystem as a seasonal fungus (Pushpa and Purushothama, 2012). They can live in symbiotic association with plant root as mycorrhiza or grow in soil and degrade plant woods as saprophytes (Vishwakarma *et al.*, 2017a). Establishment of seedling and their growth in forest ecosystem and nutrient cycling is the major important role of macrofungi. Some species of fungi also form parasitic association with plants and cause damage (Tapwal *et al.*, 2013). Dead woods play important role for maintaining fungal ecology in forest and other wild type areas (Wang *et al.*, 2011). Dead wood provides food and shelter for saprobic organisms especially macrofungi. They help in recycling matters and storage of nutrients. Macrofungi also have practical importance as food, medicine, and bioremediation resources for human beings (Hattori, 2005; Vishwakarma *et al.*, 2017a). Macrofungal species diversity is related to their particular habitats. Their growth and development are greatly influence by factors including temperature, humidity, light, elevation, geographical location, and surrounding floras (Tapwal *et al.*, 2013). In current research, Polyporaceae family of macrofungi represents high species richness. Whereas, the total diversification of wood growing macrofungi reported that the study area has a very clear and self-maintaining wild environment.

CONCLUSION

The performance of ecosystems' biogeochemical cycles is shown by macrofungi. It helps to degrade the lingo-cellulosic waste materials and release nutrients back in the ecosystem. The ecology of wood-growing macrofungi differs as they inhabit substrate which differs in their stage of decomposition, moisture content, etc. Macrofungi's role in the decomposition process aids in the wood's cooperation with other small organisms (decomposers) by weakening and softening the tissues.

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