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Diversity of lignicolous fungi in Sahyadri science college campus, Shivamogga, Karnataka

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Abstract
A study was conducted in Sahyadri science college campus to identify the lignicolous fungi that degrades wood logs in campus. During the studies we documented diversity of lignicolous fungi occurring in this locality. lignicolous fungi degrade the lignin and cellulose in wood logs, fallen branches, seed coat and litters. The collected specimens were examined on the basis of morphological and microscopic characters. The species, *Daedalea confragosa, Daldinia concentrica, Ganoderma applanatum, Hexagonia tenuis, Hypoxylon brevisporum, H. cercidicola, H. crocopeplum, H. fragiforme, Lentinus squarrosulus, Lenzites betulina, Microporus xanthopus, Polyporus alveolaris, Schizophyllum commune, Xylaria minuta and X. polymorpha* were documented.

Keywords: Saprophytic, diversity, documentation, biodegradation

Introduction
Macro fungi belong to a separate kingdom of fungi, which is a group of heterotrophic organisms (mycoflora). Mushrooms are the most diverse group on Earth after insects (Begam *et al*., 2022). Macrofungi produce large, visible fruiting bodies that can be observed with the naked eye. They are commonly known as mushrooms, toadstools, puffballs, and brackets. Most macrofungi belong to the group "*Basidiomycetes"* and some *"Ascomycetes*". Macrofungi during the rainy season, they grow on soil, wood, leaf litter, and decaying organic matter. Some macrofungi are edible and nutritious, whereas others are poisonous. (Gourish and Krihnappa 2022)
Wood-inhabiting macrofungi play an important role in ecosystems because of their parasitic and saprobic activities (Arya 2014) [1]. In Asia a high species The richness of wood inhabiting macrofungi has been recorded, and the reason for the high diversity is the availability of hosts with favorable environmental conditions. A total of 2700 species of fungi have been recorded in India (Pushpa and Purushothama 2012) [5]. Macrofungi have been used as a major natural food source and medicine since early civilization. Macrofungi act as scavengers and play an important role in ecological systems as well as in biogeochemical cycles (Horisawa *et al*. 2017). They play an active role in the biodegradation of organic matter, such as dead and decaying wood, litter, straw, and leaves (Swapna *et al*. 2008) [6].

Materials and methods
Study Area
The present study was carried out at the Sahyadri Science College campus, Shivamogga, Karnataka. The campus consists of a variety of microhabitats, including garden areas, patches of vegetation, decaying wood, and leaf litter, which support the growth of macrofungi. Geographically, the area is situated at approximately 13.8922247° N latitude and 75.3964127° E longitude. The region receives an average annual rainfall ranging from 1200 to 1800 mm, mainly during the monsoon season. Since the occurrence of macrofungi is highly dependent on environmental conditions, especially rainfall, surveys were carried out to maximize specimen collection. Multiple visits were made to the study sites to ensure comprehensive documentation, as many macrofungi exhibit short-lived fruiting bodies and may not be visible during a single visit.

Collection
The field survey was conducted during the period from December 2025 to February 2026. Although this period falls outside the peak monsoon season, residual moisture, organic matter accumulation, and shaded conditions within the campus provide suitable environments for the growth of certain macrofungi. Macrofungal diversity in this area is influenced by substratum availability, microclimatic conditions, and the presence of organic debris such as leaf litter and decaying wood. The continuous decomposition process and humus formation further contribute to the occurrence and distribution of macrofungi within the study area.
Sampling sites were selected randomly decaying wood, leaf litter, and living trees. Macrofungal fruiting bodies (sporocarps) were carefully collected using basic field tools such as a small hand axe, knife, scissors, and forceps to minimize damage to the specimens and their substrata.
The collected specimens were brought to the laboratory for detailed examination. Each specimen was studied for its morphological and anatomical characteristics. Identification of macrofungi was performed using standard taxonomic keys, relevant literature, and comparison with previously documented species. The specimens were then classified up to genus and species level wherever possible.

Results and discussion
The lignicolous species are saprophytic in nature. Campus having rich and varied flora which provide the source as substrata for their luxuriant growth. In the present study lignicolous fungi present in the Sahyadri Science college campus, Shivamogga were collected, characterized on the basis of morphological characters. Characterization was done by comparing all the characters with standard

monographs and relevant journal. http://www.mycobank.org and http://www.indexfungorum.org/names/names.asp. was fallowed in order to classify each taxon. In the present study 15 species belonging to 11 genera of 5 families were collected and described (Table I). Among collected species Family Polyporaceae is dominant comprises 6 species fallowed by Hypoxylaceae with five species, Xylariaceae shared two species, rest of the families Fomitopsidaceae and Schizophyllaceae shared one species each. Among collected species genus *Hypoxylon* belonging to family Hypoxylaceae shared four species fallowed by genus *Xylaria* belonging to family Xylariaceae with two species. rest of the genus *Daedalea, Daldinia, Ganoderma, Hexagonia, Lentinus, Lenzites, Microporus, Polyporus, And Schizophyllum* shared one species each. Macrofungi and their natural beauty occupy prime place in the ecosystem. In the recent years forest biodiversity gained importance, dead wood fungi have a key role in the ecosystem health management, nutrient recycling. Lignicolous fungi together with insects are the main agents to degrade wood in their natural habitats. Polypores, basidiomycetes and Xylariaceae members are important decomposers of woody materials in forest ecosystems. Previously these species were reported in this locality (Swapna *et al*. 2008) [6] and it proves that these species retained their existence in various environmental conditions.

Sl. No	Name of the species	Family
1.	*Daedalea confragosa* f. anceps	Fomitopsidaceae
2.	*Daldinia concentrica f. clavata*	Hypoxylaceae
3.	*Ganoderma applanatum* (Pers.) Pat.	Polyporaceae
4.	*Hexagonia tenuis* (hook.) Fr.	Polyporaceae
5.	*Hypoxylon brevisporum*	Hypoxylaceae
6.	*Hypoxylon cercidicola*	Hypoxylaceae
7.	*Hypoxylon crocopeplum*	Hypoxylaceae
8.	*Hypoxylon fragiforme*	Hypoxylaceae
9.	*Lentinus squarrosulus Mont.*	Polyporaceae
10.	*Lenzites betulina L. ex Fries*	Polyporaceae
11.	*Microporus xanthopus (Fr.) Kunt.*	Polyporaceae
12.	*Polyporus alveolaris* (DC.: Fr.) Bondartzev & Singer,	Polyporaceae
13.	*Schizophyllum commune* Fries	Schizophyllaceae
14.	*Xylaria minuta* Panwar,	Xylariaceae
15.	*Xylaria polymorpha* (Pers.) Grev.,	Xylariaceae

1. *Daedalea confragosa* f. anceps (Plate I A, B)

Saprophytic; growing alone or gregariously on decaying hardwood logs, partial to birch, willow, and many other hardwoods. Cap: 5-10 cm; broadly convex to more or less flat; fan-shaped or nearly round in outline; dry; smooth or minutely hairy; pale grayish to brown or reddish brown; typically with zones of color. Pore Surface: White, becoming dingy brownish in age.

2. *Daldinia concentrica f. clavate* (Plate I C)

Saprobic on decaying hardwood logs and, infrequently, conifer logs; but the tough fruiting bodies often last over winter. Fruiting Body: 7–32 mm across; 10–20 mm tall; shaped more or less like a ball, cushion, or pear; sometimes featuring a poorly defined pseudostem; surface hard, smooth at first, becoming pimply, pinkish brown, reddish brown, dark brown or, eventually, nearly black; interior with concentric zones of blackish and whitish or grayish, carbon-like flesh; outer layer at maturity with embedded black perithecia.

3. *Ganoderma applanatum* (Pers.) Pat. (Plate- I D)

Sporocarp perennial, sessile, dimidiate, flabelliform, usually flat, 20-30 mm thick at the middle but thickening at the base, sometimes effuso-reflexed, generally simple, but sometimes staged-imbricate becoming a mass, 150-200 mm thick. Upper surface flat, concentrically ridged and somewhat radially folded, generally velvety when young, smooth with age, dull tawny-olive but powdered over by brownish spore deposit, margin white when in the growing stage. Cutis hard, less than 0,5 mm thick, usually non-brittle, shiny, olivaceous-black, context 5-20 mm thick, up to 200 mm thick in the common base when several basidiomata are staged-imbricate.

4. *Hexagonia tenuis* (hook.) Fr. (Plate - I E,F)

This mushroom Growing alone or in groups on dead branches. It is distinguished by its hexagonal pores on the underside and thin edge of the cap. Fruiting body is stemless or with short resupinate foot, sometimes rather lying flat on substrate with narrow cap. Cap is yellow-brown, to pale snuff-brown, semi-circular, 2 to 10 cm broad and wide and 1 to 3 mm thick, flat when fresh, bent when dry, glabrous, concentrically zoned. Pore surface is hazel to milky-coffee with a greyish tint and irregularly arranged hexagonal pores, with 10 to 12 pores per cm. Spores are colorless, cylindrical, smooth, 11 to 13.5 µm long × 4 to 4.5 µm wide.

5. *Hypoxylon brevisporum* Y.M. Ju & J.D. Rogers, (Plate- I, G)

Stromata pulvinate, with inconspicuous to conspicuous perithecial mounds, up to 1 mm thick; surface dark brown or black granules immediately beneath surface and KOH-extractable pigments olivaceous and the tissue below the perithecial layer inconspicuous. Perithecia tubular, 0.2×0.3-0.6 µm in size. Ostioles lower than the surface, Asci measures 75-95×3.6-5 µm in size, 8-spored. Ascospores brown, ellipsoid-inequilateral, unicellular, with narrowly rounded ends, measures 6-8×2.6-3 µm in size.

6. *Hypoxylon cercidicola* (Berk. & M.A. Curtis) Y.M. Ju & J.D. Rogers (Plate- I H)

Stromata erumpent, discoid, with perithecial mount, wrinkled between ostioles, brown coloured, orange brown granules present just below the outer cover, releases orange pigment in 10% KOH solution, Perithecia obovoid, 0.3-0.5mm diam × 0.4-0.6 mm high, ostiole lower than stromatal surface. Asci 8-spored, long, messures 140-160 × 8-10 µm. Ascospores brown, unicellular, ellipsoid, with

brodly rounded ends and atrenged inequilateral manner, messures 10-11×5-6 µm in size.

7. *Hypoxylon crocopeplum* Berk. & M.A. Curtis, (Plate II- I)

Stromata pulvinate-effused, with inconspicuous to conspicuous perithecial mound, 2-35×2-13 mm in size, 0.5-2 mm thick; surface, orange coloured stroma turns brown on maturity, orange red granules immediately beneath surface, KOH extractable pigments orange, perithecial layer inconspicuous to 1 mm thick, back. Perithecia spherical, long tubular, 0.1-0.2 ×0.2-1.5 µm in size. Ostioles present lower than the surface stroma, Asci measures 125-195×6-8 µm in size, 8-spored. Ascospores brown coloured, ellipsoid-ineqilateral, unicellular, measures 10-14×4-6.3µm in size, with sigmoid germ slit.

8. *Hypoxylon fragiforme* (Pers.) J. Kickx f., (Plate II- J)

Stromata hemispherical, sessile sometimes and characterized by conspicuous perithecial mounds, 2-13 mm x 2-5 mm thick, surface orange red or dark brick coloured, black coloured granules present just below the surface and white granules in between perithecia, with KOH-extractable pigment orange, Perithecia obovoid, 0.2-0.4 mm x 0.5-0.6 mm in size. Ostioles lower than or at the same level of stroma. Asci measures 160-178×6.5-8 µm in size, 8-spored. Ascospores dark brown in colour, ellipsoid-inequilateral, with narrowly rounded ends, 11-14×5-6.5 µm in size.

9. *Lentinus squarrosulus Mont.* (Plate II, K,L)

Sporocarp entirely white, becoming pale straw-colour to pale ochraceous, the scales on the pileus varying pale brownish or pale fuscous in some collections; gills cream-color. Pileus 1-12 cm wide, convex then plane and umbilicate to infundibuliform, dry, opaque, more or less furfuraceous-squamulose with small and often subrevolute scales, varying appressedly subsquamulose; margin often becoming lacerate. Stem 1-6 cm x 2.5-7 mm, more or less excentric, rarely lateral, subcylindric, fibrous, scurfy-squamulose downwards to the abrupt and often blackish base, in some cases with a slight floccose zone or short collar at the stem-apex.

10. *Lenzites betulina L. ex Fries* (Plate II, M)

Saprobic on the deadwood of hardwoods annual; growing alone or in overlapping clusters on logs and stumps. Cap: 1–10 cm across; semicircular, irregularly bracket-shaped, or kidney-shaped (or nearly circular when pendant from branches); flattened-convex; flexible; densely velvety-hairy, with concentric zones of texture; often radially bumpy or ridged; with zones of whitish, grayish, brown, and cinnamon colors—and sometimes developing greenish colors in old age as a result of algae. Gills: Well-spaced or fairly close; sharp; tough; short-gills frequent; whitish, becoming ivory with age; not bruising; up to 1 cm or more deep.

11. *Microporus xanthopus (Fr.) Kunt.* (Plate II, N)

Fruitbody annual, solitary or in small groups, centrally or laterally stipitate and usually infundibuliform, sometimes two or more fruitbodies may grow together to more complicated fruitbodies with several stipes and with imbricate pilei, margin wavy and lobed, often deeply incised, pileus may be irregularly developed and the fruitbody may appear almost flabelliform, but normally there is a poroid area surrounding the stipe even in the most irregular fruitbodies, in the peripheral parts often radially furrowed, consistency tough to coriaceous. PILEUS up to 10 cm in diameter and 1-3 mm thick, glabrous and shiny when fresh, more dull when dry, yellowish-brown to chestnut in numerous narrow concentric zones, often with alternating dark and light colours, margin thin and wavy.

12. *Polyporus alveolaris* (DC.: Fr.) Bondartzev & Singer, (Plate II O,P)

Basidiocarps annual, stipitate to sessile, circular to dimidiate, up to 7 cm wide and 5 mm thick; upper surface pale reddish-yellow, fibrillose to squamose with flattened, triangular squamules, with age becoming ivory to pale buff, azonate, glabrous, smooth, margin concolorous; pore surface white to tan, the pores diamond-shaped, radially elongated, 1-2 per mm tangentially, dissepiments lacerate with age, hyphal pegs frequent, 40-50 x 17-40 µm, tube layer continuous with the context, up to 5 mm thick; context pale tan to ivory, azonate, corky, up to 1 mm thick; stipe central to lateral, buff, glabrous, up to 1 cm long and 5 mm thick.

13. *Schizophyllum commune* Fries (Plate III, QR)

Saprobic; solitary, scattered or in overlapping clusters on decaying hardwoods; year-round. Dimensions: Caps 1-4.5 cm wide. White to gray; dry; densely hairy; fan to shell-shaped in lateral attachment, saucer-shaped when centrally attached. Gills: Gill-like folds are white to gray or pinkish-gray; hairy; split lengthwise. Spore print: White.Stipe: Absent or simply a narrow extension of the cap.Veil: Absent.

14. *Xylaria minuta* Panwar, (Plate III S)

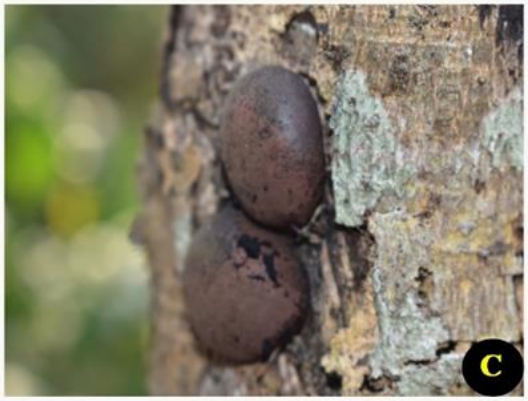
Stroma erect, slightly bent with pointed tips, stromatal size varies 15-20 mm long and 2 mm broad, black stroma with rough surface, stalked, with minute hairs. Fertile part bulged contains ascospores. Numerous Asci, cylindrical having 8-ascospores. Brown coloured ascospores measures 14-18×4-6 µm in size.

15. *Xylaria polymorpha* (Pers.) Grev., (Plate III,T)

Stromata solitary or in clusters, black, clavate to irregular or even lobed at the tip, 3-9 cm high or more and 1-5 cm wide, short-stalked, rounded at the apex; surface hard, crusty, smooth or cracking into minute ill-defined scales; internally composed of a white to pale buff, solid mass of indistinct fleshy structure; when dry the flesh becomes somewhat wrinkled; the young stromata covered with a layer of light brown conidia. Perithecia arranged immediately beneath the surface, 700-800 µm diam., with distinct papillate ostioles which project as conical tips on the surface; wall 20-25 µm thick, composed of few layers of brown cells 2 µm wide. Asci long-stalked, cylindrical, unitunicate, 8-spored, 170-220 x 5-12 µm,

Plate I

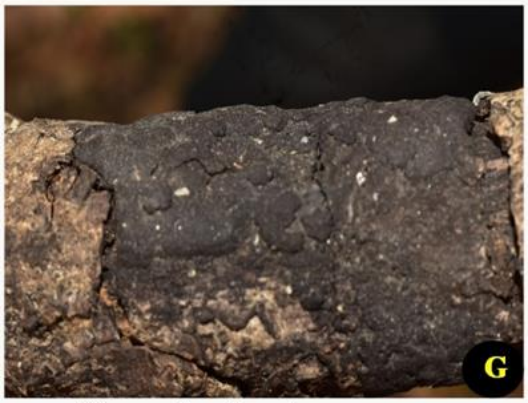
Daedalea confragosa



Daldinia concentrica

Ganoderma applanatum

Hexagonia tenuis



Hypoxylon brevisporum

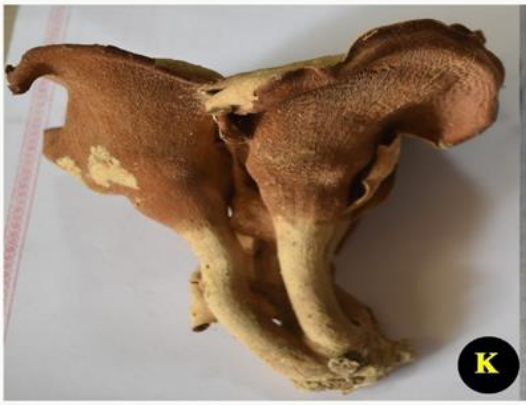
Hypoxylon cercidicola

Diversity of Lignicolous fungi

Plate II

Hypoxylon crocopeplum

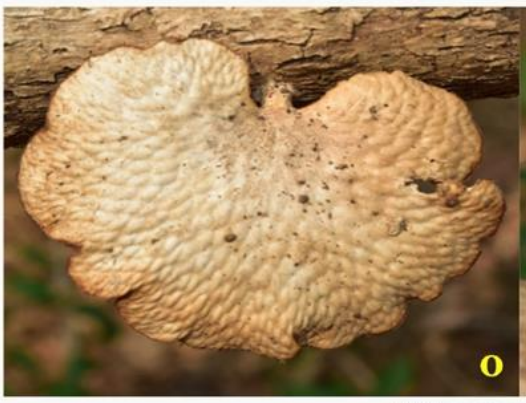
Hypoxylon fragiforme



Lentinus squarrosulus

Lenzites betulina

Microporus xanthopus

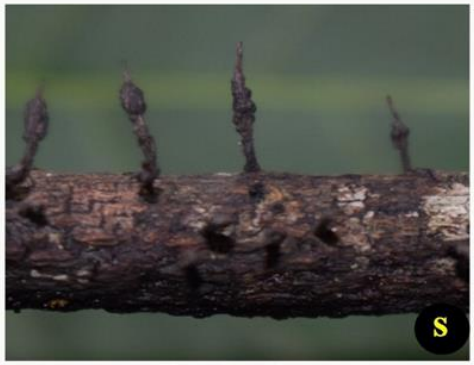


Polyporus alveolaris

Diversity of Lignicolous fungi

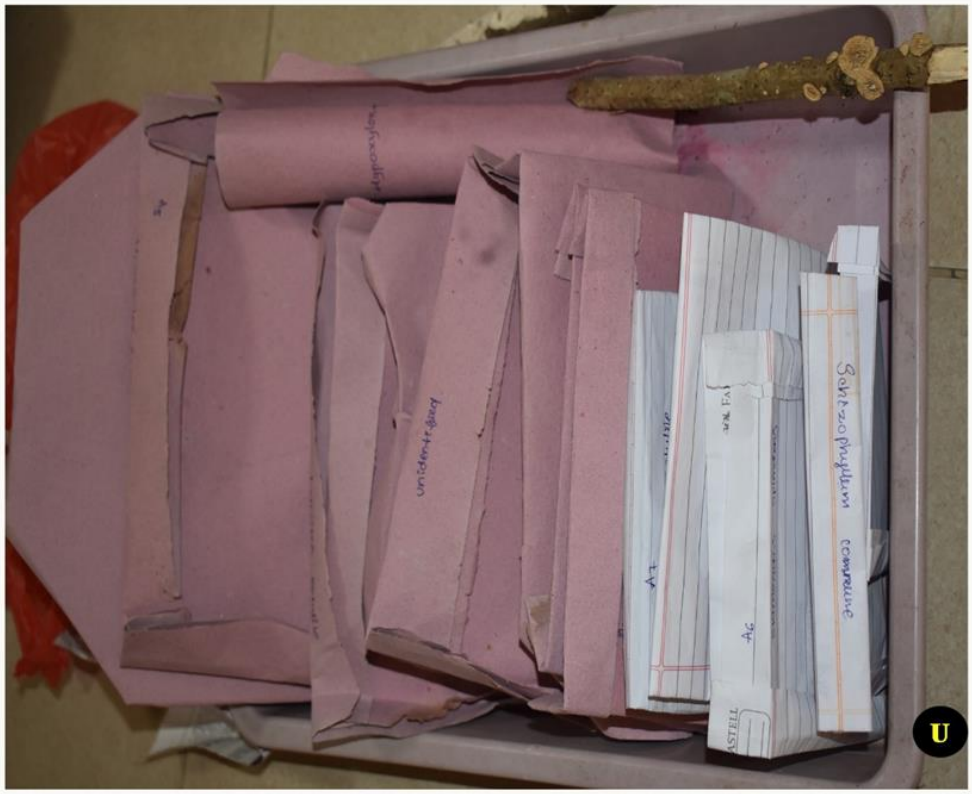
Plate III

Schizophyllum commune



Xylaria minuta

Xylaria polymorpha



Diversity of Lignicolous fungi

Conclusion

The occurrence and distribution of different saprophytic lignicolous fungi depends on the type of wood, availability of moisture, temperature, and sun light. Detailed fungal diversity study was started during December 2025 in Sahyadri science college campus to identify the lignicolous fungi that degrades wood logs in campus. During the studies we documented diversity of lignicolous fungi occurring in this locality. Apart from above study extensive Biodiversity study of lignicolous fungi are required in future. These group of fungi have prominent role in ecosystem by degrading dead wood debris. Literature suggests that these

fungi are promising source of bioactive compound further studies were required to know the bioprospecting of these fungi

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