ACADEMICIA
An International Multidisciplinary Research Journal
(Double Blind Refereed & Peer Reviewed Journal)

DOI: 10.5958/2249-7137.2021.01593.7

"DIVERSITY OF WOOD DECAYING FUNGI FROM DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY AURANGABAD CAMPUS, MAHARASHTRA (INDIA)

Mr. Vijay Udhav Gore*; Dr. Vasant Pandit Mali**

* Teacher, Shiveshwar Junior College Takli (Antur),
Taluka Kannad Dist. Aurangabad (M.S.) INDIA
Email id: vijaygore777@gmail.com

** Principal, J. Watumull Sadhubella Girls College Ulhasnagar Dist. Thane (M.S.), INDIA
Email id: vasant.mali@rediffmail.com

ABSTRACT

The specimen of macro fungi were sun dried and kept in brown paper packet as per international mycological herbarium guidelines. Macroscopic and microscopic characters were recorded, fresh material from field and dried material in laboratory. The white rot fungi secretes enzyme which attacks not localized nears the hyphae but is wide spread and deeply diffused. The specimen of macro fungi were sun dried and kept in brown paper packet as per international mycological herbarium guidelines. Macroscopic and microscopic characters were recorded, fresh material from field and dried material in laboratory. Macroscopic observations carried out by using Cosmo Compound Light Microscope under 10X objective.

KEYWORDS: *Mycological, Macroscopic, Herbarium, Specimen*

INTRODUCTION

The survey was carried out from different areas of Dr. Babasaheb Ambedkar Marathwada University, Aurangabad campus. It is located between 19°54'10.7" North and 75°18'26.2" East in 725 acres, having rich plant biodiversity. The fungal flora also shows the variation in their forms, in general weakening of the tree defense frequient injuries on branches and roots allowing the wood–rotting fungi to gain entry through infected portion and making serious loss of wood

mechanical strength finally (Lonsdale1999). Wood decomposition is a process in nutrient recycling, soil formation and the carbon buget of ecosystem (Lonsdale et al. 2008).

The two type of wood decaying fungi are distinguished one is white rot, which degrade lignin and cellulose is partially degraded and second is brown rot where cellulose is degraded and lignin is left as brown residue, the ability of white rot and brown rot fungi is to degrade all principle components of wood is important for carbon flux of ecosystem (Leonowiez et al., 1999; Baldrian and Gabriel 2003).

In wood products and slash there is a strong tendency for softwood to be degraded primarily by brown rot and hardwoods by white rot fungi (Scheffer, 1964). This is probably associated with the very fact that the lignin in hardwood is simpler to biodegrade than that in coniferous wood (Yang et al, 1979) and undue to the difference in the hemicelluloses components (Highley, 1979). The white rot fungi in apparent contrast to plant disease fungi must degrade lignin so as to decay. Brown rot fungi utilize the hemicellulose of the cell walls leaving the lignin essentially undigested, but slightly modified (Kirk, 1975; Kirk & Alder 1970).The differences between the conditions in culture and decaying wood affect the lignin degrading ability of brown rot macrofungi. The mechanism of hemicellulose break down by brown rot fungi appears similar that of white rot fungi (Highley, 1976; Kelich et al 1970). But these evidently employ a different mechanism than white rot fungi for attacking the cellulose in the wood (Cowling & Brown, 1969; Highley 1977; Koenings,1974). Hyphae of the brown rot fungi like those of the white rot fungi grow inside the lumina in contact with the tertiary wall, into the capillaries of which the secreted enzymes are able to difuse (Bailey et al, 1968; Liese, 1970; Wilcox, 1970). The white rot fungi secretes enzyme which attacks not localized nears the hyphae but is wide spread and deeply diffused. As the degradation proceeds, the cellulose and hemicelluloses are gradually destroyed at approximately an equivalent relative rate. Brown rot wood tends to shrink abnormally while dried giving rise to a characteristic cubical pattern of checking. The brown rot fungi reduce the strength of the wood (live tree or wood logs) much or more than white rot fungi and at the advanced stage, the wood is reduced to a residue of amorphous crumbly brown cubical piece with excessive vertical and horizontal splitting (Brown cubical rot) composed largely of slightly modified lignin. Brown rot fungi do not produce extracellular phenol oxidases and generally give negative oxidase tests on gallic and tannic acid media and with gun guaic and syringaldazine reagents. Brown rot fungi residues are extremely stable and are important organic compounds in forest ecosystem (Gliberson, 1981). White rot macrofungi degrade cellulose and hemicelluloses at approximately the same relative to the original amounts present (Kirk & Highley ,1973) whereas the lignin is decomposed at similar rate or faster rate on a relative basis (Blanchette , 1980; Setliff & Eudy, 1979). Hyphae of the white rot fungi secretes concentrated in the ray cells and vessels although, other cells are invaded very earlier penetration of cell walls (Wilcox , 1970; Liese, 1970). White rot fungi have cellulase and lignase enzyme which secreted at hyphal tips and on lateral surfaces, these enzyme assist cell wall penetration and enlarge bore holes to perforation. White rot fungi successively deploymerise cell wall substances only to extent that the products are often utilized consecutively for metabolism (Cowling , 1961).

MATERIALS AND METHOD

Present investigation the collection of macro fungi were done 20 to 25 days after heavy rainfall during month of July to November. The specimen of macro fungi were sun dried and kept in

brown paper packet as per international mycological herbarium guidelines. Macroscopic and microscopic characters were recorded, fresh material from field and dried material in laboratory. Macroscopic observations carried out by using Cosmo Compound Light Microscope under 10X objective. The freehand thin section cutting of fruiting bodies done with the help of sharp razor blades, stained and studied in 5% KOH, Lactophenol, Cotton Blue and Melzer's reagent and microscopic observations were made under 40X and 100X Magnification (Olympus CX 41) in laboratory.

RESULT AND DISCUSSION

In present study 15 fruiting bodies of wood decaying fungi were collected from different sites of Dr. Babasaheb Ambedkar Marathwada University, Aurangabad campus. It comprises 14 genera and 15 species in that 1 genera and 1species belonged to Ascomycetes, while 13 genera and 14 species belonged to Basidiomycetes, all these 15 wood decaying fungi having ability to degrade wood causes either white rot or brown rot. Morphological and microscopic study of macrofungi have been summarized in table 1.

TABLE 1 : MORPHOLOGICAL AND MICROSCOPIC STUDY OF WOOD DECAYING FUNGI

Botanical Name	Family	Edible	Host	Thallus Dimension	Spore dimension	Altitude	Latitude & Longitude
Auricularia nigricans (Sw.) Birkebak, Looney& Sancher–Garcia.	Auriculariaceae	Yes	*Senna siamea* (Lam.) H.S. Irwin & Bameby.	Basidiocarp 4–30× 4–25 mm, annual, solitary or in groups,bracketed; upper surface velvety hairy; lower fertile surface smooth; context jelly like when fresh, waxy hard when dry.	Spores 13–16 × 4–5µm, cylindrical to allantois, slightly kidney shaped, thin walled. smooth,	572m	19˚54′28″ N 75˚18′50″ E
Daldinia concentrica (Bolton) Ces. & De Not.	Hypoxylaceae	No	*Senna siamea* (Lam.) H.S. Irwin & Bameby.	Basidiocarp 6–35 × 5–30 mm annual, hemispherical to depressed–spherical, rarely substalk; fertile surface even or frequently cracked into fine network, finely papillate;	Spores 14–19× 5–8 µm, ellipsoid–inequilateral with narrow rounded ends, slit present, thin	578m	19˚54′52″ N 75˚18′45″ E

				context composed alternating zones, pithy to woody	walled, smooth.		
Earliella scabrosa (Pers.) Gilb. & Ryvarden	Polyporaceae	No	*Senna siamea* (Lam.) H.S. Irwin & Bameby	Basidiocarp, 10–170 × 10–140 mm, annual, solitary or in groups resupinate, effused–reflexed to pileate; pores 1–3 per mm, angular to iripicoid to maize like (semi–daedaloid); Tube 2–5 per mm deep; context 1–2 mm thick, solid, duplex.	Spores 7–11.5 × 2.5– 4 µm, cylindrical, thin–walled, smooth, hyaline, inamyloid.	576m	19˚54′50″ N 75˚18′46″ E
Flavodon flavus (Klotzsch) Ryvarden.	Irpicaceae	No	*Prosopis juliflora* (Sw.) DC.	Basidiocarp 10–62 × 5–41 mm annual, resupinate to widely effused reflex; pores/lamellae/ teeth 1 – 2 per mm, poroid, lamellate, iripicoid to hynoid; tube 0.1– 4 mm deep; context 1 – 2 mm thick.	Spores 5.5–6.5 × 3–4.5 µm, ellipsoid, smooth, thin walled, hyaline.	569m	19˚53′53″ N 75˚18′38″ E
Funalia leonina (Klotzsch). Pat.	Polyporaceae	No	*Mangifera indica* L.	Basidiocarp 69 mm length, 54 mm width, 33 mm thick, annual, pileate, semicircular to elongated; tomentum up to 14mm deep; pores 1– 2 per mm,hydnoid, angular, thick walled; tube 1 – 6 mm deep; context	Spores 11–15× 3–5 µm, cylindrical, hyaline.	568m	19˚53′53″ N 75˚18′33″ E

				1 – 4 mm thick.			
Fulvifomes inermis (Ellis &Everh,) Y.C. Dai.	Hymenochaetaceae	No	*Peltophorum pterocarpum* (DC.) K. Heyne.	Basidiocarp 44–720 × 28–108 mm,Perennial, resupinate to widely effused; pores 3 – 6 per mm, round to angular, thick walled; tube 1–3 mm deep; context 1 – 2 mm thick.	Spores 4.3–6 × 4–5 µm, globose to sub–globose, rusty to pale reddish brown color, thin walled.	574m	19˚54′21″ N 75˚18′46″ E
Ganoderma lucidum (Curtis) P. Karst.	Polyporaceae	Yes	*Pithecellobium dulce* (Roxb.) Benth.	Basidiocarp 104–158 × 98–126 mm, annual, laterally to centrally stipitate, reniform to dimidiate; pores 3–6 per mm, thick walled; tube 4 – 10 mm deep; context 5 – 12 mm thick.	Spores 8–11× 6–7 µm, ovoid or truncate, exospores hyaline, smooth, brownish sometimes guttulate.	571m	19˚54′09″ N 75˚18′45″ E
Inonotus pachyphloeus (Pat.) T. Waqner & M. Fisch.	Hymenochaetaceae	No	*Albizia lebbeck* (L.)Benth.	Basidiocarp 216 × 182 mm, perennial, broadly attached, sessile, ungulate to applanate; pores 8– 10 per mm, thick walled; tube upto 5 mm deep; context upto 30 mm thick	Spores 4–5.5 × 4–4.5 µm, subglobose to globose, thin walled, hyaline, non-amyloid.	571m	19˚54′09″ N 75˚18′45″ E
Leucocoprinus cretaceus (Bull.) Locq	Agaricaceae	No	*Senna siamea* (Lam.) H.S. Irwin & Bameby	Basidiocarp annual, pileus 43 mm in diameter, conicocampanulate to umbonate; stipe 47 mm in length and 5mm in width,central, cylindrical, equal,	Spores 7–10 × 4.5–6.5 µm, short, ellipsoid to ovoid, with small germ–spore,	572m	19˚54′28″ N 75˚18′50″ E

				hallow; context thin, 0.1–2mm wide.	hyaline, dextrinoid .		
Phellinus adamantinus (Berk.) Ryvarden	Hymenochaetaceae	No	*Lawsonia inermis* L.	Basidiocarp 34–58× 23–42 mm, Perennial, pileate, applanate, semicircular to dimidiate; pores 6–9 per mm; tube 2 – 3 mm deep; context 1 – 5 mm thick.	Spores 4–6 µm in diameter, globose, nonamyloid, thick walled, smooth, brownish yellow.	572m	19˚54′11″ N 75˚18′40″ E
Phellinus badius (Cooke) G. Cunn.	Hymenochaetaceae	No	*Peltophorum pterocarpum* (DC.) K. Heyne.	Basidiocarp 48–96 × 38–62 mm, Perennial, sessile, half moon shap to ungulate; pores 3–6 per mm, thick walled; tube 2 – 3 mm deep; context 0.1 – 12 mm thick.	Spores 6.4–7.5 × 6–6.5 µm, ellipsoid to sub–globose, yellowish brown color.	568m	19˚53′57″ N 75˚18′41″ E
Pseudofavolus tenuis (Fr.) G. Cunn.	Polyporaceae	No	*Senna siamea* (Lam.) H.S. Irwin & Bameby	Basidiocarp 6–41 × 5–36 mm, annual to perennial, dimidiate, flabelliform to semicircular; pores 1– 2 per mm,angular to hexagonal, thick walled; tube 0.1 – 2 mm deep; context 0.1 – 1 mm thick.	Spores 13–18× 4–6.5 µm, cylindrical , hyaline, thick walled.	574m	19˚54′25″ N 75˚18′50″ E
Schizophyllum commune Fr.	Schizophyllaceae	No	*Prosopis juliflora* (Sw.) DC.	Basidiocarp 10–35 × 6–30 mm, annual, fiabelliform to kidney or bean shaped; lower fertile surface falsely gilled,	Spores 3–5.5× 1.4–2.5 µm, allantoid cylindric, hyaline, thin walled,	569m	19˚53′53″ N 75˚18′38″ E

				separating along gill's – edge; context 0.1 – 1 mm thick.	smooth.		
Scytinostroma duriusculum (Berk. & Broome) Donk	Peniophoraceae	No	*Senna siamea* (Lam.) H.S. Irwin & Bameby	Basidiocarp 42–104 × 36–64 mm, annual, adnate, membranous, resupinate to widely effused; pores surface smooth; context finely layered, smooth, dense, subhyaline in section, faintly stratose.	Spores 4–5.5 µm in diameter, globose, amyloid, smooth	573m	19˚54′12″ N 75˚18′38″ E
Truncospora tephropora (Mont.) Zmitr.	Polyporaceae	No	*Zizyphus mauritiana* Lam.	Basidiocarp 10–580 × 10–215mm, Perennial, resupinate, effused; pores 4 – 6 per mm, round to angular, thick walled; tube 2–3 mm deep; context 0.1 – 2 mm thick.	Spores 4.4–6 × 3.4–4.5 µm, ellipsoid	573m	19˚54′27″ N 75˚18′52″ E

Photo Plate 1

CONCLUSION

In present investigation thirty nine specimens of wood decaying macrofungi were collected from different sites of Dr. Babasaheb Ambedkar Marathwada University, Aurangabad campus in which fourteen different types of genus and fifteen species were studied (Table 1 & Photo Plate 1) which belongs to eight families Auriculariaceae, Agaricaceae, Irpicaceae, Hymenochaetaceae, Hypoxylaceae, Peniophoraceae, Polyporaceae, Schizophyllaceae. From above discussion it is concluded that family Polyporaceae and Hymenochaetaceae is dominant, while *Phellinus badius*, *Schizophyllum commune*, *Scytinostroma duriusculum* and *Truncospora tephropora* are dominating macrofungi and *Auricularia nigricans, Daldinia concentric, Earliella scabrosa, Flavodon flavus, Funalia leonina, Fulvifomes inermis, Ganoderma lucidum, Inonotus pachyphloeus, Leucocoprinus cretaceous, Phellinus adamantinus, Pseudofavolus tenuis*

seen rare macrofungi, which belongs to eight hosts *Albizia lebbeck, Lawsonia inermis, Mangifera indica, Peltophorum pterocarpum, Pithecellobium dulce, Prosopis juliflora, Senna siamea* and *Zizyphus mauritiana* (Table 1).

ACKNOWLEDGEMENT

The authors are thankful to authority of Botanical Survey of India, Howrah, Kolkata and specially to Manoj Emanuel Hembrom for help during identification of of Macrofungi.

REFERENCES

1. **Bakshi, B.K. (1958)**. New records of Hymenomycetes in India. *Indian Phytopathology.* **1:**88.
2. **Bhosle et al (2010)** Taxonomy and Diversity *of Ganoderma* from the Western parts of Maharashtra (India) Mycosphere 1(3), 249—262.
3. **Bose, S.R. (1921).** Two new species of Polyporaceae. *J. Ind. Bot. Soc.* **2**: 300–301
4. **Bose, S.R. (1925).** A new species of Polyporaceae from Bengal. *Annals of Mycology.* **23:**179–781.
5. **Bose, S.R. (1934).** Polyporaceae of Bengal X. *Journal of Departmental Science, Calcutta University.* 11:1–18.
6. **Faisal Hamad Chouse and Vasant Pandit Mali (2015/2016)**. Studies Onsome Aphyllophorales from Yedshi Ramling Wildlife Sanctuary District Osmanabad, Marathwada. Journal of advances in applied and technology Vol.2 pp 01-10.
7. **F.H. Chouse and Vasant Mali (2020).** Diversity of aphyllophorales from latur district, Maharashtra. Bioinfolet 17 (4A) :558-567.
8. **Ganesh, P.N. and Leevathy, K.M**. **(1986)**. New records of *Phellinus* from India. *Current Science.* **55:**727–728.
9. **Gilbertson, R.L. (1979).** The genus *Pheiinus Aphyllophorales:* Hymenochaetaceae in Western North America. *Mycotoxon.* **9:**51–89.
10. **Lloyd CG. 1898–1925** – Mycological Notes nos. 1–75, 1–1346.
11. **Mali V.P, Raibhole U.k, Hembrom Manoj and Parihar Arvind (2016).** Taxonomy and Diversity of *Trametes* from Marathwada (Maharashtra) India. Journal of Medicinal Chemistry and Drug Discovery. Issue 2, Vol. 1, pp 537-546.
12. **Mali V P (2016).** Preliminary Investigation of Aphyllophorales from Saurashtra University Campus, Rajkot (Gujarat) India. Int J Sci Info**; 1(3)**: 144-150.
13. **Mali V P. (2019).** Preliminary Studies on Some Wood Rotting Fungi District Of Beed, Maharashtra. *Bioinfolet* **16 (1+2)**: 100-115.
14. **Mahabale, T.S. (1978).** Some interesting features of the flora of Deccan with special reference to Western Ghats in the Sahyadris. *Journal of Indian Botanical Society.* **58:**197–207.

15. **Naik–Vaidya, (1990).** Wood–rooting fungi from Karnala and Kankeshwar. Ph. D. thesis, University of Poona, Pune.

16. **Raibhole U. K. and Mali V. P. (2013). "**Aphyllophorales from Parbhani and Nanded" Ph.D. Thesis Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

17. **Roy, Anjali (1984).** Trends in taxonomy and Polyporaceae. *Advances in Mycology and Plant Pathology.* Edited Roychwohan. 89–103.

18. **Ryvarden, L. (1972).** A critical checklist of the Polyporaceae in tropical East Africa. *Norwegian Journal of Botany.* **19**:229–238.

19. **Ryvarden, L. (1990**). Aphyllophorales: Ganodermataceae, Hymenochaetaceae, Polyporaceae. *Mem. N. Y. Bot. Gard.* **59**: 155–165

20. **Sharma, J.R. and Ghosh, P.K. (1989).** Polypores that decay trees of Indian Botanic Garden. *Bulletin of the Botanical Survey of India.* **31:**95–102.

21. **Sharma J. R.(1995)**, Hymenochaetaceae of India, Published by Director, Botanical Survey of India Calcutta.

22. **Sharma, J.R. (1999)**. New record of Polypores from India. *Indian Journal of Forestry.* **16:**186–187.

23. **Sharma J. R. (2000)** Genera of Indian Polypores, Published by Director, Botanical Survey of India Calcutta.

24. **Tiwari, C.K.,J. Parihar & R.K. Varma (2010)**. Addition to wood decaying fungi of India. *Journal of Threatened Taxa* 2(6): 970–973

25. **Vasant Mali (2015).** Wood Rotting Fungi (Aphyllophorales) From Asti-1. Journal of Medicinal Chemistry and Drug Discovery. pp 699-705.

26. **Vaidya, J.G. (1987).** Ecological characteristics of wood decay and card forming fungi from the campus of Poona University.

27. **Vaidya, J.G. and Bhor, G.C. (1990)**. Medicinally important wood rotting fungi with special emphasis on Phansomba. Deerghayu VI. 1–4.

28. **Vaidya, J.G. and Rabba, A.S. (1993b)**. Valid names for some common Indian wood rotting Polypores, their synonyms and authenticity II. *Journal of Indian Academy of Wood Science.* **24:**35–56.

29. **Vaidya, J.G. Nanda, M.K. and Rabba, A.S. (1991).** Community and substratum composition for wood rotting *Aphyllophorales* from Bhimashankar, Western Ghats. Proceeding Congress on Transidiscilpainary Premises of Ecology and Environment, Institute of Engineers, Pune India III 12/2, *56–70.*