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Full Length Article

Diversity of wood decay fungi at Mantha, Jalna (MS) India

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ABSTRACT

Fungi are the major decomposers of nature. They break down organic matter which would otherwise not be recycled. Some elements, such as nitrogen and phosphorus, are required in large quantities by biological systems and they are not abundant in the environment. The action of fungi releases these elements from decaying matter, making them available to other living organisms. In present investigation, diversity of wood rotting fungi was studied at Mantha village and at the Swami Vivekanand College campus. Morphological study of twelve macrofungi was carried out with respect to thallus dimension, spore dimension, spore colour, substrate, edibility, botanical name and common name.

Key words: Macrofungi, decomposers, ecosystem cleaner and morphological study.

INTRODUCTION

Wood decay fungi are commonly associated with woody host or humus rich soil. In the forest, fungi decay and recycle carbon and nitrogen and convert plant and animal debris into humus (Rossman *et al.,* 1998). Large molecules are broken down into small molecules, which are transported into the fungal cell. After decomposing organic matter by fungi, enzymes are released to break down the decaying material, after which they absorb the nutrients by hyphae in the decaying material. Some fungi invade living trees while others attack dead or down timber and grow on the forest floor. Brown-rot fungi preferentially attack and rapidly depolymerize structural carbohydrates (celluloses and hemicelluloses) in the cell wall leaving the modified lignin behind. The fungus, mostly basidiomycetes are the most efficient lignin degraders in nature (Eriksson *et al.,* 1990). White-rot fungi can progressively utilize all major cell wall components, including both carbohydrates and lignin (Jasalavich *et al.,* 2000).

Fungi are an important part of ecosystem cycles, without which the food web would be incomplete. Though some elements, like nitrogen and phosphorus, are required in large quantities by biological systems, they are not abundant in the environment. The action of fungi releases these elements from decaying matter, making them available to other living organisms. Some bracket fungi growing on the side of a tree are the fruiting structures of a basidiomycete. They receive their nutrients through their hyphae, which invade and decay the tree trunk. Some fungi grow on trees in a stack, called Shelf fungi which attack and digest the trunk or branches of a tree. Pani (2011) studied effects of different spawing methods on sporophore production of *Calocybe indica.*

While some shelf fungi are found only on dead trees, others can parasitize living trees, causing eventual death. Fungi not only have potential of bioremediation of distillery effluent (Maygaonkar *et al.,* 2012) but they are considered serious tree pathogens (Hoff, 2004). Trace elements present in low amounts in many habitats are essential for growth, but would remain tied up in rotting organic matter if fungi did not return them to the environment via their metabolic activity. Some wild edible mushrooms have been reported from South-West India by Sathe and Kulkarni (1987).

Manoharachary and Gopal (1991) reported many Agaricus from Andhra Pradesh. From several biogeographical regions of India at least 2000 macrofungi were reported. But, the central India region has not been investigated extensively for mushroom flora (Kaul 1999).

Such a valuable untouched wealth of Marathwada remains neglected. As yet, this remains unexplored. Therefore, there is need to study such ecosystem cleaner. Hence, in present investigation emphasis has been given on collection of macrofungi and their detail lab study.

MATERIALS AND METHODS

Collection of wood rotting macrofungi

Twelve wood rotting fungi were collected from different sites of Mantha village as well as Swami Vivekanand Senior College Campus, Mantha. Samples were collected from damp places, wood logs and trees. The specimens were conveniently collected in the paper bags, noting the host, locality, colour of the material and date of the collection as suggested by Gilbertson and Ryvarden (1986).

Morphological and microscopical study of macrofungi

Detail morphological study of macrofungi was done with the help of lenses. Dimension of fruiting bodies were taken by scale. Spore colour and spore dimension were studied by research microscope and ocular micrometer. The type of host and season were recorded when the sites were visited for a period of one year. Detailed microscopic examinations were made and were identified with the help of the relevant literature (Rattan 1977; Ryvarden and Johansen 1980; Natrajan and Kolandavelu 1998; Lim *et al.,* 2001; Zmitrovich *et al.,* 2006; Ostry 2011).

RESULTS

All fourteen specimens collected from different sites were critically examined with respect to their external and internal characters of basidiocarp and spores. Morphological and microscopical study of macrofungi has been summarized in table 1.

Table 1: Morphological and microscopical study of macrofungi

Botanical name	Common name	Thallus Dimension	Substrate / Host	Season	Edible	Spore dimension	Spore color
Amanita vaginata(Bull. ex Fr.)	Grisette	**Fruiting Body:** **Cap:** 3-10 cm; convex with a central bump; gray to grayish brown; margin prominently lined **Gills:** Free from the stem or slightly attached to it; white; close or crowded; short-gills present. **Stem:** 7-15 cm long; 0.5-2 cm thick; slightly tapering to apex	Damp soil	Rainy 2012	Yes (but avoid due to confusion with the deadly Amanitas)	Spores 8-12µ; subglobose; smooth; inamyloid. Basidia 4-spored; unclamped.	White
Armillaria gallica Marxm. & Romagn. Bulbous	Honey fungus	**Cap:** 4 to 12cm, gray to brown coloured, white and firm cap flesh **Gills:** Adnate, crowded, yellowish brown **Stem:** 5-9cm long, thick at apex and swollen at base	Wet, humus rich soil	Rainy 2012	Yes	Smooth, ellipsoidal, 8-9 x 4-6µm,	Amyloid
Auricularia cornea (Mont.) Sacc.	Wood ear	**Fruiting Body:** Soft pliable gelatinous body, densely covered with short hairs on outside, inside brown with whitish-grey bloom. Ear-	Woody debris of *Acacia nilotica*	Rainy 2012	Yes	Sausage shaped; 16-18 x 6-8µm	Transparent

		like about 10 cm long, Width: 4cm, body appears pinched into the short stalk (about 7 mm long).					
Calocera cornea - (Batsch) Fr.	Jelly fungus	**Fruiting Body:** Cylindric, with rounded to sharpened tips; occasionally shallowly forked near the tip; to about 2 cm high and 3 mm thick; smooth and slick; firm but gelatinous; orangish yellow	Woody debris of *Acacia nilotica*	Rainy 2012	No	Ellipsoidal to sausage-shaped, smooth, 7-10 x 2.5-4 µm, curved-cylindric, smooth, aseptate	Yellow, greasy and viscid
Coprinopsis lagopus var. lagopus (Fr.) Redhead, Vilgalys & Moncalvo, Johnson & Hopple	Hare's foot Inkcap	**Fruiting Body:** **Cap:** 1 to 3cm across; egg-shaped, becoming conical and then flat, the edges turning upwards when old; covered in ephemeral hairy white scales; short lived. **Gills:** Free and crowded, the gills are white, turning slightly reddish and then black. **Stem:** 4 to 10cm long and 3 to 6mm dia.; white with ephemeral white scales; no ring.	Grows on humus-rich soil, leaf litter, and increasing ly on woodchip mulch.	Rainy 2012	No	Ellipsoidal to ovoid, smooth, 11-13 x 6-8µm; nonamyloid	Violaceous black
Cyathus novaezelandia e Tul. & C. Tul	Nest fungus	**Fruiting Body:** Small nest like fungus with small balck 'eggs' called peridioles (packets containing spores) growing in clusters of a few. Approximately 12mm diameter. Striated insides with brown to chocolate colours. Height: 20 mm Width: 8 mm	Woody debris of *Bambosa* sp.	Rainy 2012	No	Ellipsoidal to ovoid, smooth, 10-14 x 6-8µm	Grey peridiola
Cerrena unicolor (Bull.) Murrill	Mossy maze	**Fruiting Body:** **Cap:** Kidney-shaped to fan-shaped cap 3-10 cm across; upper surface velvety to hairy, whitish to brownish but often appearing green from algae; usually with concentric zones of texture **Pore Surface:** Whitish when young, becoming gray; pores maze-like or slot-like, becoming tooth-like with age; tubes to 4 mm deep.	Woody debris of *Azadirecht a indica*	Rainy 2012	No	**Spores**: 5-7 x 2.5-4 µ; smooth; long-elliptical; inamyloid; hyaline in KOH.	White
Daldinia concentrica (Bolton) Ces. & De Not.	King Alfred's Cake	**Fruiting Body:** Brown at young stage but turn balck and dry out. Stipe absent, the fruitbody attached to the host wood by a broad, flat area underneath the cushion-shaped fruitbody. 2 to 8 cm length and 1 to 2 cm height.	Woody debris of *Annona squamosa*	Rainy 2012	No	Ellipsoidal to fusiform, 12-17 x 6- 9µm	Black
Ganoderma lucidum (Curtis) P.	Lacquere d Bracket	**Fruiting Body:** **Cap:** Up to 25cm across; to 4cm	*At the base of Azadirecht*	Rainy 2012	Yes	Ellipsoidal to ovoid with one end flattened,	Reddish-brown

Karst.		thick, sessile, kidney shape, concentrically grooved yellow, orange, red and with a whitish growing edge **Pores:** 5 to 20mm deep and typically spaced at 4 to 6 pores per mm	*a indica*			twin walled, 7-13 x 6-8µm	
Marasmius rotula (Scop.) Fr.	Collared Parachute	**Fruiting Body:** **Cap**: Radially wrinkled at the margin; 0.5 to 1.5cm across. **Stem**: Darker brown towards the base; shiny; 4 to 7cm long and often less than 1mm diameter	*Acacia arabica*	Rainy 2012	No	Ellipsoidal to pip-shaped, smooth, 7-9 x 3.5-4.5µm; hyaline.	White
Pleurotus dryinus (Pers.) P. Kumm.	Veiled Oyster	**Fruiting Body:** **Cap**: White or cream; convex and usually bracket-like with either radial or eccentric Stem; convex, gradually flattening; 5 to 15cm across; **Gills**: White, decurrent. **Stem**: White or cream; up to 3cm long and 1 to 2cm dia.; tapering towards base	*Ficus recemosa*	Rainy 2012	Yes	Elongated ellipsoidal to cylindrical, smooth, 10-14 x 3.5-4µm	White
Polyporus alveolaris (DC.) Bondartsev & Singer	hexagonal-pored polypore	**Fruiting Body:** 1-10 cm broad; variable in shape but generally semicircular or kidney shaped; reddish yellow to orangish; pore surface descending the stem, whitish to yellowish white; pores diamond-shaped or "honeycombed," usually radially arranged; flesh to 2 mm thick, white.	*Acacia nilotica*	Rainy 2012	Yes	Spores 9-11 x 4-5 µm; smooth; cylindrical	Hyaline
Schizophyllum commune Fr.	Split Gill	**Fruiting Body:** **Cap** Gray and hairy, 1 to 3cm across and 0.3 to 1cm thick **Gills** Pinkish grey, radiating from the attachment point. The 'gills' are split lengthways and they curl back to protect the fertile surfaces (hymenium) Stem is very short	*Acacia arabica*	Rainy 2012	No	Cylindrical to ellipsoidal; smooth, 4-6 x 1.5-2.5µm.	White
Tremella mesenterica Retz.	Yellow Brain	**Fruiting Body:** Golden yellow and gelatinous when damp, turning orange and shriveling to a tiny fraction of its former size during very dry weather; 2-8cm across	*Annona reticulata*	Rainy 2012	Yes	Broadly ellipsoidal, smooth, 7-16 x 6-10µm	White

Several workers have studied macrofungi diversity. Příhoda (1950) reported occurrence of *Armillaria* sp. through root and *Fomitopsis pinicola* start decay to trunk. Rypáček (1957) explains a possible mechanism of succession from *Fomitopsis pinicola* to *Gloeophyllum odoratum* on spruce tree. Renvall (1995) found *Calocera viscosa* causing brown rot to spruce tree. Hedawoo and Mohite (2008) from Melghat and Amravati region of Maharashtra have reported wild edible mushroom genera like, *Auricularia, Calocybe, Calvatia, Coprinus, Lycoperdon, Macrolepiota, Termitomyces* and Podaxis. In present study, *Ganoderma lucidum* was grown on Neem tree but Sharma and Thakur (2010) cultivated it on bajra grains, wheat grains, sorghum grains and sugarcane baggase. From Amravati region of Maharashtra Hadawoo (2010) reported some edible mushrooms from genera like *Agaricus, Coprinus, Cyathus,*

Amanita vaginata (Bull.) Fr.

Armillaria gallica Marxm. & Romagn. Bulbous

Auricularia cornea (Mont.) Sacc

Calocera cornea (Batsch) Fr

Coprinopsis lagopus var. lagopus (Fr.) Redhead, Vilgalys & Moncalvo, Johnson & Hopple.

Cyathus novaezelandiae Lloyd

Cerrena unicolor (Bull.) Murrill

Daldinia concentrica (Bolton) Ces. & De Not

Ganoderma lucidum (Curtis) P. Karst.

Marasmius rotula (Scop.) Fr.

Pleurotus dryinus (Pers.) P. Kumm. -

Polyporus alveolaris (DC.) Bondartsev & Singer

Schizophyllum commune Fr.

Tremella mesenterica Retz

Lycoperdon, Schizophyllum, Daldinia, Polyporus and *Ganoderma* which are also found during this study. Bässler and Müller (2010) have studied the succession of bark beetles and *Fomitopsis pinicola* on spruce tree. Hostwise fungal study like on fern – *Athyrium distentifolium*, on grass – *Avenella flexuosa*, *Luzula sylvatica*, *Calamagrostis villosa*, on blueberry – *Vaccinium myrtillus*, and on moss – *Polytrichastrum formosum*, *Dicranum* spp. was carried out by Svoboda and Pouska (2008).

Tiwari *et al.,* (2010) added three wood rotting fungi of India viz., *Australohydnum dregeanum, Hjortstamia friesii* and *Schizopora flavipora*. White rot fungi have been widely studied for their ability to degrade variety of environmental soil pollutants (Akhtar *et al.,* 1992; Turner *et al.,* 1992). Pani (2011) observed the growth of milky mushroom, *Calocybe indica* on straw of ten popular paddy varieties of Orissa. Patil (2012) studied capacity of *Pleurotus sajor-caju* to grow on different agro wastes viz. soybean straw, paddy straw, wheat straw, groundnut straw, sunflower stalk and pigeon pea stalk to determine the suitability of these agro waste.

The results of this preliminary study will be helpful for the evidence that, all the twelve fungal species studied are having ability to degrade wood, causing either white or brown rot, which means that these fungi have important role in forest conservation, in terms of wood and litter decomposition. It also reveals that many wood rotting fungi from a small part of Maharashtra, have high potential for remediating contaminated soil and water along with lignin degradation.

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