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RESEARCH ARTICLE

CHARACTERIZATION OF WOOD ROTTING FUNGI AT MANTHA, DISTRICT JALNA (MAHARASHTRA) INDIA

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ABSTRACT

Occurrence of various shapes, size and colours of macrofungi reveals that the climatic conditions together with forest and garden waste provide favorable environment to these macrofungi. During the period of study from July 2014 to August 2014, many mushrooms were collected from Mantha village and at the Swami Vivekanand College campus. Study of only ten macrofungi has been emphasized on the basis of their dominance of occurrence. These are *Coprinellus micaceus, Guepinia spathularia, Irpex lacteus, Macrolepiota phaeodisca, Mycena ascendens, Parasola leiocephala, Phellinus robustus, Scleroderma citrinum, Schizopora paradoxa* and *Xylaria hypoxylon*. Morphological study of these ten wood rotting fungi was done with botanical name, common name, thallus dimension, spore dimension, spore colour, substrate and edibility.

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INTRODUCTION

Various organisms utilize wood, of which fungi play a major role (Boddy and Watkinson 1995). As a result, wood-decaying fungi play vital role in soil formation (McFee and Stone 1966) and nutrient cycling (Dighton 1997). Some fungi invade living trees while others attack dead or down timber and grow on the forest floor. Wood rotting fungi are associated with woody host or humus rich soil. Fungi decompose wood by rotting process (Schwarze *et al.,* 2000 and Martínez *et al.,* 2005). There are three main types rots caused by fungi are white, brown and soft rot. In white rot all major constituents of wood hemicelluloses, cellulose and lignin are decomposed by fungi. On the other hand, brown rot fungi decompose hemicelluloses and cellulose and modify lignin but do not metabolise it. Yelle *et al*. (2011) reported that brown rot by *Postia placenta* results in ligninolysis, but lignin oligomers remain in wood. Soft rot fungi decompose lignin to a lesser extent than white rot fungi; wood of conifers is very resistant to soft rot (Schwarze *et al.,* 2000). In the forest, fungi decay and convert plant and animal debris into humus also carbon and nitrogen are recycled (Rossman *et al.,* 1998). Complex molecules are broken down into simple molecules, which are transported into the fungal cell.

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In ecosystem cycles fungi are important element, without which the food web would not be considered. Nitrogen and phosphorus are required in large quantities to biological systems, but they are not present in abundant form in the environment. Fungal action releases these elements from decaying matter and makes them available to other living organisms. Some wild edible mushrooms have been reported from South-West India (Sathe and Kulkarni, 1987). Many Agaricus from Andhra Pradesh have also been reported (Manoharachary and Gopal, 1991). Report of 2000 macrofungi is available from several biogeographical regions of India. 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 wood rotting fungi

From different sites of Mantha village and Swami Vivekanand Senior College Campus, ten wood rotting fungi were collected during Rainy 2014 season. Damp places, wood logs and trees were preferred for the collection of wood rotting fungi.

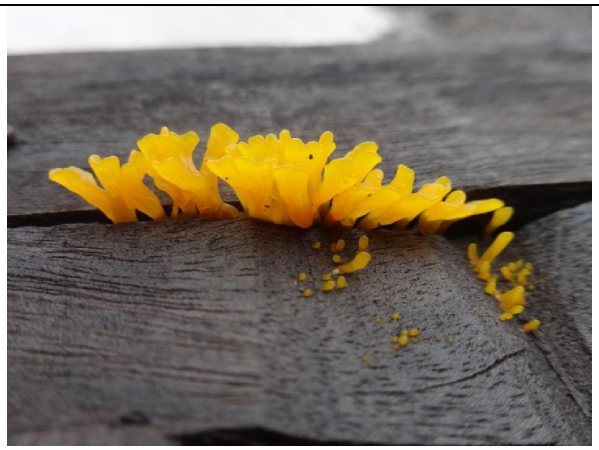
For collection, the paper bags were used on which the host, locality, colour of the material and date of the collection were recorded as suggested by Gilbertson and Ryvarden (1986).

Morphological and microscopical study of macrofungi

With the help of lenses detail morphological study of macrofungi was carried out. Fruiting bodies dimensions were taken by scale.

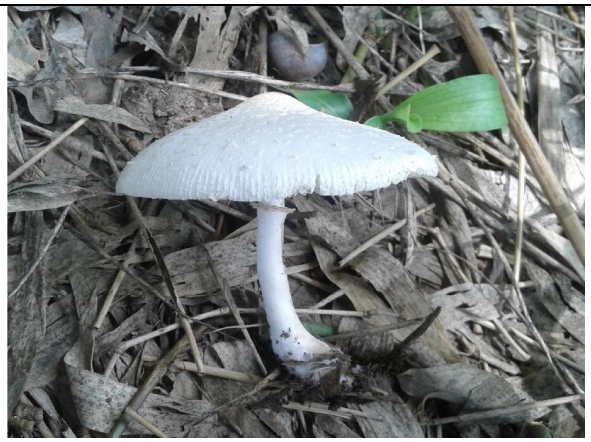
With research microscope and ocular micrometer spore colour and spore dimension were study was carried out. The type of host and season were recorded when the sites were visited for a period of one year. Detailed microscopic examinations were made and were identified with the help of the relevant literature (Rattan, 1977; Ryvarden and Johansen, 1980; Natrajan and Kolandavelu, 1998; Lim *et al.,* 2001; Zmitrovich *et al.,* 2006; Ostry 2011).

Coprinellus micaceus (Bull.) Vilgalys, Hopple & Jacq. Johnson



Guepinia spathularia (Schweinitz)

Irpex lacteus (Fr.) Fr.



Macrolepiota phaeodisca Bellù

Mycena ascendus (Lasch) M. Geest.

Parasola leiocephala (P. D. Orton) Redhead, Vilgalys & Hopple

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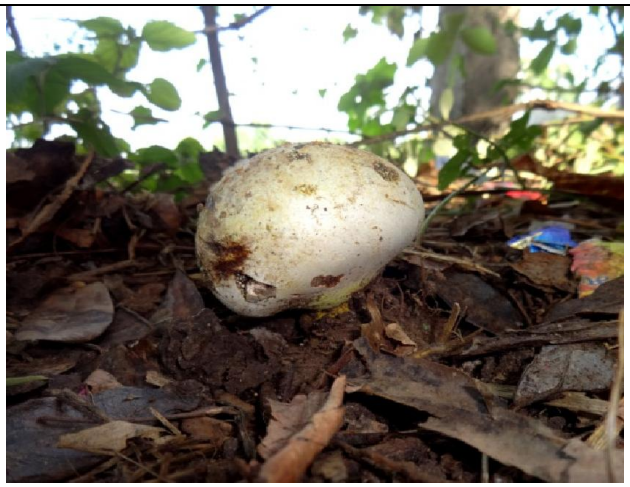
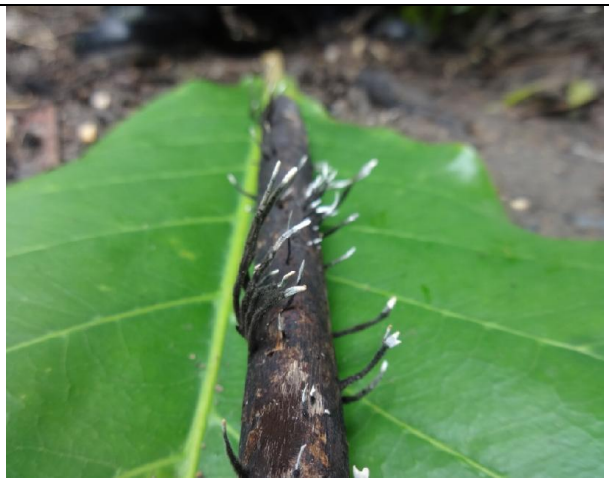
Phellinus robustus (L.) Quel.

Schizopora paradoxa (Schrad. : Fr.) Donk



Scleroderma citrinum Pers.



Xyleria hypoxylon (L.) Grev.

Table 1. Morphological and microscopical study of wood rotting fungi

Botanical name	Common name	Thallus Dimension	Substrate/ Host	Season	Edible	Spore dimension	Spore color
Coprinellus micaceus (Bull.) Vilgalys, Hopple & Jacq. Johnson -	Glistening inkcap	Cap: Covered at first in tiny white granules, the egg-shaped caps become bell shaped and lose their salt-like grains of velum as they age. The caps are typically 3 to 5cm tall and of similar diameter when they open out. The cap colour is ochre-brown, hygrophanous. Gills: The gills are white, turning purple-brown and then blackening. Stem: The white stem is brownish at the base, typically 3 to 6mm in diameter and 5 to 9cm tall.	Debris of Agriculture wastes	Rainy 2014	Yes (those grown at only natural sites)	Ellipsoidal to shield-shaped, smooth, 8-10 x 3.5-6µm; with a central germ pore.	Dark brown
Guepinia spathularia (Schweinitz)	Fan shaped jelly fungus	Fruit body: Gelatinous and rubbery; yellow; greasy, with curved, blunt or pointed horns rarely forked at the tips; 2 to 12mm tall and typically 1 to 2mm dia.	Babool door slit	Rainy 2014	Yes	Ellipsoidal to sausage-shaped, smooth, 7-10 x 2.5-4um;	white or very pale yellow coloured.

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Irpex lacteus (Fr.) Fr.	Toothed Polypore	Fruiting body: A spreading patch of creamish pore surface with 2-3 pores per mm, tooth-like rather than poroid, except at margin; develop shelflike edges or kidney-shaped caps.	Wood log of *Annona squamosa*	Rainy 2014	No	Spores 5-7 x 2-3 µ; smooth; elliptical to subcylindric	White
Macrolepiota phaeodisca Bellù	--	Cap: Convex and pale brown area near the crown that breaks into scales.The cap cuticle is floccose, covered with irregular concentric rings of flakes and most pronounced near the margin, diameter at maturity ranges between 4 and 8cm. Gills: The broad, crowded gills of this mushroom are white or pale cream and free, terminating close to the stipe.	Humus rich soil	Rainy 2014	Yes	Ellipsoidal, smooth, thick-walled; typically 10 x 5 µm; with a small germ pore.	White
Mycena ascendens (Lasch) M. Geest.	Frosty bonnet	Cap: 2-4.5 mm across, hemispherical, conical, translucent-striate, shallowly sulcate, white, glabrescent. *Stipe* 5-30 mm long, filiform, straight to flexuous, equal, greyish-hyaline, puberulous, glabrescent with age	Wood log of *Azadirechta indica*	Rainy 2014	Unknown	7.0-9.5 x 3.0-6.0 µm, broadly smooth, thin-walled, smooth,	Amyloid
Parasola leiocephala (P. D. Orton)	Pleated Inkcap	Cap: 1 to 2cm diam., heavily ribbed, convex and flat. A distinctive central 'eye' contrasts with the rest of the pale grey cap. Gills: The white gills turn grey and then black; they are free of the stem Stem: Up to 6cm long, but only 4 or 5mm in diameter, and very fragile; white.	Grown at crust of brick industry	Rainy 2014	No	Irregularly heart shaped and ellipsoidal, 8.0-11.5 x 7.0-10 x 5-7.5µm, with a small germ pore.	Black
Phellinus robustus (L.) Quel.	--	Fruit body: Woody, hoof-shaped, brown to black and crusty upper surface, rusty brown interior, firm and woody, attached by a broad lateral base, 60 cm wide, 5cm thick, margin entire, reddish brown. Pore surface plane, often creviced, with a sterile border 2–5 mm wide, reddish brown to dark brown; pores stratose, small, 5–7 per mm	On babool tree	Rainy 2014	Yes	Basidiospores globose to subglobose, 8 × 7 µm, smooth.	Hyaline
Schizopora paradoxa (Schrad. : Fr.) Donk	Split Porecrust	Fruit body: Patches are developed, ochraceous yellow with creamy-white margins, fertile surface covered in blunt teeth up to 4mm long.	Wood log of *Annona squamosa*	Rainy 2014	No	Cylindrical sausage-shaped, smooth, 8-10 x 3-3.5µm.	White
Scleroderma citrinum Pers.	Earthball	Fruit body: 7cm across and 6cm tall, rounded, Fruitbody stemless and attached to the ground by white mycelial threads. White. Inside the earthball the spore mass is present.	Humus rich soil	Rainy 2014	No	Spherical, spiny, 8-13µm diameter when fully mature.	Brownish
Xylaria hypoxylon (L.) Grev.	Candlesnuff Fungus	Fruit body: Small, upright 2 to 8mm in diameter at the base and typically 3 to 5cm tall. Spikes and antlers like. Initially black and finely downy near the sterile base and white with conidia towards the tips.	Dry woody stick of *Annona squamosa*	Rainy 2014	No	Bean shaped, smooth, 11-15 x 4-6µm. Black.	Black

RESULTS

All ten specimens collected were observed with their external and internal characters of basidiocarp and spores. Macroscopical and microscopical study of wood rotting fungi has been given in Table 1. Lakhanpal (1996) studied the occurrence of wood rotting fungi on substrate like, wood, litter and soil indicates that their vital role in ecosystem. Mushrooms from Waster Ghats were recorded by Pradeep *et al.* (1998). From Punjab plains, Atri *et al.* (2000) has carried out detail taxonomic study of *Agaricus* species. There are 41,000 species of Mushrooms in the world, of which 850 species occur in India (Deshmukh, 2004). Similarly, Sharma and Samota (2006) reported the growth of wood rotting fungi on humus, dung, saw dust, gardens, roadsides and deserts. Kakde and Gaikwad (2014) reported some polypores, puff fungi, bracket fungi and fleshy fungi, grown on humus rich soil, leaf litter and woody debris of *Annona squamosa, Annona reticulata* and *Azadirechta indica*. In present study puff fungus and bracket fungus are recorded from same substrates. Hadawoo (2010) reported some edible mushrooms from genera like *Agaricus, Coprinus, Cyathus, Lycoperdon, Schizophyllum, Daldinia, Polyporus* and *Ganoderma* from Amravati region of Maharashtra.

Through this study we are just reporting diversity of wood rotting fungi from our region for the first time. Many wood rotting fungi from Mantha region of Jalna district of Maharashtra, have high ability to remediate contaminated soil and leaf litter, wood logs with lignin degradation. Further study is required to explore the use of these organisms for the waste management and production of neutraceuticals and therapeuticals.

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