JOURNAL OF PURE AND APPLIED MICROBIOLOGY, April 2009. Vol. **3**(1), p. 319-324

Macrofungal Diversity in Megamalai Forest, Westernghats, Tamilnadu, India

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(Received: 18 January 2009; accepted: 21 February 2009)

The present study is concentrated in the Megamalai forest, Westernghats, Tamilnadu. The average rainfall is about 1300 mm, temperature is average 27°C and relative humidity is 50-75 %. Due to high humidity and humus accmulation, provides the luxuriant growth of macrofungi. Macrofungi collected from the 3000 ha of moist deciduous of Megamalai forest. Total of 68 macrofungi from June 2007 to February 2008 were collected. About 21 were identified to genus level many of them were poisonous and some are edible fungi. The characterization of these macrofungi was done based on their morphological structure and the habitats. Currently identified macrofungi in Genus level are *Albetrellus*, *Amanita*, *Clavaria*, *Cordyceps*, *Leucocoprinus*, *Lycoperidon*, *Microporus*, *Polyporus*, *Ramaria*, *Xylaria*, *Cholorophyllum*, *Pleurotus*, *Stereum* and *Dictyophora*.

Keywords: Macrofungi, Westernghats, *Amanita*, Pileus, Ascomycetes and Basidiomycetes.

There are many thousand of species are all unique, each species are beautiful in its own way. It is usual for a particular fungus to produce a visible fruiting body only under a precise combination of conditions, including geographic locations, elevation, temperature, humidity, light level and surrounding flora. Macrofungi spread through an area via underground hyphal growth or by any decayed material. Macrofungi are a collective term for fungi that form conspicuous sporocarps, mostly members of agaricales, tremellales and ascomycetes.

Fungal mycelia occur in a wide variety of substrates. If the mycelium grows in the soil, the substrate is said to be terrestrial; if it grows in wood, it is called lignicolous; if in dung, it is called coprophilous; occasioally, mushroom mycelia grow in other mushrooms, and this is known as a fungicolous substrate. The mycelium obtains food from the organic products present in these various substrates by liberating enzymes that breakdown complex compound, such as cellulose and Lignin,

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into soluble products. The soluble products are then absorbed and used by the hyphae as food, resulting in growth of the mycelium (David Largent, 1986).

The mycelium continues to grow as long as the combination of various environmental factors (Such as moisture, temperature, pH, C/N ratio) remains favorable. (David Largent, 1986). Fungi form a major part, of the biodiversity, 10-20% of the total number of species. The total number of fungal species is globally estimated to be around 1,50,00,00 of which only around 1,00,000 yet are identified and described (Hawks worth, 2001).

MATERIAL AND METHODS

The present study area was located in moist deciduous of Megamalai Forest, Western Ghats, Tamilnadu, India. The average rainfall is about 1300 mm, and average temperature is of 27°C and relative humidity is 50-75%. Macrofungi were collected from the 3000 ha of Megamalai forest. The soil is most fertile due to the litter decomposition. Due to high humidity and humus accumulation, provides the luxuriant growth of micro and macrofungal diversity.

Survey

Survey studies are particularly sensitive to timing and location of observations. Survey is best just after the period of rain. But some macrofungi can be found any time in some locations. Hence repeated survey was done with the eyes on the ground as well as on trees and logs. Survey was done by walking through the sites by collecting sporocarps encounted and analysed for it's identify (Gary Lincoff, 1981). Survey was done during June 2007 to February 2008 in its specified area of moist deciduous forest in the Megamalai, Western Ghats. Samples were collected using an axe, sharp knife, forceps, measuring tape, hand lens, pen, books, labels, camera and container.

Collection and preservation

The collected specimens were transported to laboratory in the plastic bags (or) boxes for further identification. The collected specimens were wrapped by using aluminium foil, which prevents dehydration and give protection. Small plastic boxes were used for woody basidiomycetes and ascomycetes. Care must be taken to avoid distortion of fleshy fungi and labelled the specimen. Then the collected fleshy fungi materials were preserved.

Characterization of macrofungi

The collected sporocarps were characterized for their morphological characters like colour, size, shape, odour, texture according to Phillips (1981), Walting (1982), Moser (1983), Pegler (1987), Pacioni (1983) and Pace (1998).

RESULTS

This present investigation about 21 Genus of Macrofungi were collected and identified from Megamalai forest situated at Westernghats Tamilnadu, India. Macrofungi were diversified according with different geographical location, environmental factors etc. The Macrofungi were characterized based on their morphological characters, size of their fruiting body, colour, shape of pileus and growth habitat. The individual characteristics of each macrofungi summarized follows

***Albetrellus* sp**

Habitat	:	In drier region.
Fungus colour	:	Light Brown to brown.
Height	:	10-15cms.
Pileus	:	Cap 4-10cms, irregular, hard, surface rough, colour brown, gills brown and flesh thick.
Stipe	:	6-10cms, long, large, rough, hard, brown, thick and irregular.
Edibility	:	Non-edible.
Medicinal uses	:	Not known.

***Albetrellus* sp**

Habitat	:	In drier region.
Fungus colour	:	Brown to reddish brown.
Height	:	10-15cms.
Pileus	:	Cap 6-8cms, irregular, hard, surface rough, colour brown, flesh hard and thick.
Stipe	:	3.5-5cms, thick, rough, hard, dark brown and irregular.
Edibility	:	Non-edible.

Medicinal uses : Not known.

***Amanita* sp**

Habitat : In moist soil.
Fungus colour : Brown with cream dots.
Height : 2-6cms.
Pileus : Cap 2-4cms, surface smooth, colour varying from light brown to dark brown, gills brown and flesh thin.
Stipe : 1.5-5cms long, white, thin, cylindrical and volva at the base.
Edibility : Poisonous.
Medicinal uses : Not known.

Clavaria sp

Habitat : In highly moist soil.
Fungus colour : Orange.
Sporocarp : Fruiting body 3-6cms tall, 2-4mm thick, branches rounded to flattened, tapering to a round or pointed tip, surface smooth, becoming yellowish in age especially at the tips.
Edibility : Not known.
Medicinal uses : Not known.

***Cordyceps* sp**

Habitat : In dry soil.
Fungus colour : Orange to Brown.
Height : 3-5cms.
Pileus : Cap 0.5-1cms, surface smooth, colour orange, never blossoms, and gills brown.
Stipe : 2.5-3.5cms long, cream, thick and cylindrical.
Edibility : Edible.
Medicinal uses : To cure cough and asthma.

***Geastrum* sp**

Habitat : Solitary or scattered in deep forest.
Fungus colour : Light brown to brown.
Sporocarp : Fruiting body 1-2 cms at young, then 5-7 rays are formed with final diameter of 5-6cms, brown, with a central spore sac.
Edibility : Non-edible.
Medicinal uses : Not known.

***Ganoderma* sp**

Habitat : On logs of hardwood and also on living trees.
Fungus colour : Brown to reddish orange.
Sporocarp : Fruiting body perennial, sessile, broad 5-10cms, hard, irregular with pores on underside surface.
Edibility : Non-edible.
Medicinal uses : Antiallergic, blood pressure stabilizer.

***Ganoderma* sp**

Habitat : On logs of hardwood.
Fungus colour : light Brown to brown.
Sporocarp : Fruiting body perennial, large, sessile, broad 25-40cms, hard, irregular with pores on underside surface.
Edibility : Non-edible.
Medicinal uses : Not known.

***Hypholoma* sp**

Habitat : In dry soil.
Fungus colour : Dark Brown to light brown.
Height : 3-8cms.
Pileus : Cap 1.5-4cms, surface smooth, colour varying from dark brown to light brown, gills dark brown to black.
Stipe : 2-6cms long, brown, thick and cylindrical.
Edibility : Not known.
Medicinal uses : Antitumerous.

***Lepista* sp**

Habitat : In moist soil or in open ground.
Fungus colour : Purple.
Height : 6-10cms.
Pileus : Cap 6-12cms, surface smooth, colour purple with darker at the margins, gills purple.
Stipe : 5-9cms short, purple, thick and cylindrical.
Edibility : Poisonous.

Medicinal uses : Antimicrobial.

***Leucocoprinus* sp**

Habitat : In dry soil.
Fungus colour : Orange.
Height : 2.5-4cms.
Pileus : Cap 3-6cms, matted hairs, colour orange, gills dark brown.
Stipe : 2-5cms long, orange, thick, and cylindrical with matted hairs
Edibility : Not known.
Medicinal uses : Not known.

***Lycoperedon* sp**

Habitat : In moist soil.
Fungus colour : White to brown.
Sporocarp : Fruiting body 4-10 cms tall, 3-7 cms broad, globose to elongated, white in younger stage, becoming darker with age,Surface somewhat rough, soft in younger condition.
Edibility : Edible in immature condition.
Medicinal uses : Not known.

***Microporus* sp**

Habitat : On tree stumps.
Fungus colour : Brown to reddish brown
Sporocarp : Fruiting body 4-8 cms broad, funnel shaped, elongated, brown in upper surface, white on lower side, Glabrous, surface smooth, shiny, pores underneath surface.
Edibility : Non-edible, tough.
Medicinal uses : Not known.

***Polyporus* sp**

Habitat : On rotting logs.
Fungus colour : White to dark brown.
Sporocarp : Fruiting body 2-6cms, surface hairy, stipe short producing flattened, spherical apical growth having pores on the underside surface.
Edibility : Inedible.
Medicinal uses : Not known.

***Ramaria* sp**

Habitat : In moist soil
Fungus colour : White to cream.
Sporocarp : Fruiting body 2 to 3 cms tall, rounded to fan shaped, branches thin, tough, divided, irregularly, rhizomorphs are found at the base.
Edibility : Non-edible.
Medicinal uses : Not known.

***Xylaria* sp**

Habitat : On rotting wood.
Fungus colour : Brown to black.
Sporocarp : Fruiting body 8cms tall, 0.5cms thick, tough, erect, often flattened, rounded below, some are branched near the top, tips pimpled with perithecial pores.
Edibility : Poisonous.
Medicinal uses : Not known.

***Cholorophyllum* sp**

Habitat : Scattered in rings in moist soil.
Fungus colour : White with yellow tinge in centre.
Height : 7-10cms.
Pileus : Cap 5-8cms, white, white patches with yellow tinge at the centre, surface rough, margin wavy, and gills white.
Stipe : 6-9cms long, large, white, thick and cylindrical.
Edibility : Poisonous.
Medicinal uses : cytotoxic, steroidal effect.

***Pleurotus* sp**

Habitat : Clustered on wood logs
Fungus colour : White to pinkish white.
Height : 5-12cms.
Pileus : Cap 5-10cms, surface smooth, fan shaped, margin wavy, colour varying from, White to pink crowded gills run down the stem, white or yellow.
Stipe : 3-5cms short, white, thick and cylindrical.

Edibility : Edible.
Medicinal uses : Antioxidant and Antitumerigenic.

***Stereum* sp**

Habitat : On logs and dead wood of hardwood.
Fungus colour : Orange with zones of colours.
Sporocarp : Fruiting body short lived perennial, 2-8cms broad, brackets forming singly or in overlapping clusters, shape thin flat or upturned, upper surface greyish and shiny brown zones, green coloration develop from epiphytic green alga living on the upper surface and under surface smooth.
Edibility : Non-edible, tough.
Medicinal uses : Not known.

***Xylaria* sp**

Habitat : On rotting wood.
Fungus colour : Grey to black.
Sporocarp : Fruiting body 8cms tall, 0.5cms thick, somewhat tough, erect and bending at the tip, often flattened, rounded below.
Edibility : Non-edible.
Medicinal uses : Not known.

***Dictyophora* sp**

Habitat : In dry soil.
Fungus colour : orange.
Sporocarp : Fruiting body9-12 cms tall, receptacle- white 1.5-2.5 cms thick, cylindrical, spongy, perforated and bulbous base. Gleba 1.5-2.5 cms, dark metallic green celled with an apical pore, sticky, gelatinous, odoriferous and decreasing with age. Inducium 5-9 cms in length, 6-29 cms diameter, orange, porous, margin-wavy, semielasic and increasing with age, volva-2-2.5 cms, white and thick.
Edibility : Poisonous.
Medicinal uses : Not known.

DISCUSSION

It is hard to predict (or) to give an accurate account of the diversity of macrofungus sp on a site. sporocarps of these organisms can be studied using similar methods as those used in botany. However, unlike plants, most fungal sporocarps do not persist in the environment for very long.It is necessary therefore to carryout repeated surveys of the same site inorder to obtain the full picture of it's mycobiota (Trofymow,2003).

As in higher plants and many animal groups the diversity of fungi in the Hymenomycetes (Basidomycotina, excluding rusts and sumusts) and the Ascomycotina overall appears to be greatest in the tropics and subtrpics.This pattern may not be directly related to the climatic correlates of latitude (Jeanlodge *et al*.,1995).

In this study 21 taxa of macrofungi belonging to 19 families were identified and reported from the megamalai forest in westernghats. Among them, 4 species (18%) belong to Ascomycetes and 18 species (82%) to Basidiomycetes. These figures are similar to those reported in earlier studies conducted in other areas. For instance in the Mediterranean region of Turkey, macrofungi species consist of 7.5% ascomycota and 92.5% basidiomycota (Isiloglu and Walting, 1992), 13% and 87% in Izmirprovince (Solak *et al*., 2000), 9% and 91% in the Antalaya region (Gezer, 2000), and 13% and 87% in the Bekilli district (Kose *et al.,* 2006).

The distribution of the 21 species is as follows: *Albetrellus* 2, *Amanita* 1, *Clavaria* 1, *Cordyceps* 1, *Leucocoprinus* 1, *Lycoperidon* 1, *Microporus* 1, *Polyporus* 1, *Ramaria* 1, *Xylaria* 2, *Cholorophyllum* 1, *Pleurotus* 1, *Stereum* 1 and Dictyophoras 1.The richest in Genus are *Albetrellus, Ganoderma, Polyporus* and *Xylaria* (10%). This may have been due to the similarities in vegetation, climate and flora.

Of the 21-macrofungi species, 4 are edible and 17 are poisonous. There are no reports of death from mushroom poisoning in this area because the local population collects only well known edible mushrooms. Most of these poisonous

species suffered extensive damage in the study area.

Two factors are most important in regulating fungal fruting: Temperature and soil moisture (Carrol and Wicklow, 1992). Usually, the best scenario for large crop of mushrooms involves below ground build up of mycelium during steady, warm and moist early fall followed by a rapid drop in temperature and abundant rain later in the season. More research is needed on these sits to obtain a better picture of mushroom survey

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