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# DIVERSITY OF MUSHROOMS IN THE FOOTHILL OF WESTERN GHATS – A STUDY FROM THE EASTERN PART OF MALAPPURAM, KERALA.

Botany

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## ABSTRACT

Fungi include many common forms such as mushroom, toadstools, puffballs, shelf fungi, moulds, rusts, and smuts etc. The present study is an attempt to analyze the macrofungal diversity of the eastern part of Mlappuram district. Survey work was carried out from June to october 2016.. Opportunistic sampling of macrofungi was carried out from as many habitats in the areas as possible. On basis of morphological and microscopic studies macrofungal species were identified. A total of 90 macrofungi belonging to 30 families were observed. The occurrence of maximum number of species was found to be greater in July to October, during the humid season. Fruit bodies were obtained from different habitats like soil, fresh bark, decaying wood, animal dung, humus, burned leaf litter, compost etc. Some of them were edible but the majority was inedible. The order Aphyllophorales was represented by 22 families. Tricholomataceae was the predominant family having maximum number (12) of members. Polyporaceae and Ganodermataceae were represented by 8 members each in the total accession. The largest genus represented was Ganoderma with 8 species.

## KEYWORDS:

Macrofungi, mushroom, habitat.

## INTRODUCTION

The fungi are usually grown in diverse habitats rich in rotting vegetation such as wood land, greenland, compost heaps, sawdust piles, on dung or manure heaps and on burnt ground colonized by moss. Many occur in the soil which abundant in dead, decaying, organic materials. Fungi include many common forms such as mushroom, toadstools, puffballs, shelf fungi, moulds, rusts, and smuts etc. Fungi are important organisms that serve many vital functions in forest ecosystems including decomposition, nutrient cycling, symbiotic relationships with trees and other plants, biological control of other fungi, and as the causal agents of diseases in plants and animals. They are involved in innumerable interactions with other organisms. (Maria Florence & Yesodharan, 2000). Macrofungi are distinguished from other fungi by their fruiting structures (fruit bodies bearing spores) that we know as mushrooms.

## MATERIALS AND METHODS

### Study area

The study was conducted in the eastern part of malappuram district, lying on the foothill of western ghats. Malappuram district forms part of Malabar region of Kerala, which is predominantly a land of hills and valleys. The district lies between North latitudes 10o 40' and 11o 32' and East longitude 75 o 50' and 76 o 36'.

### Survey and Sampling

Survey work was carried out from June to October 2016 in comparatively less inhabited areas in the study area Opportunistic sampling of macrofungi was carried out from as many habitats in the areas as possible. The full bloomed and complete sporocarps of fresh specimens were photographed and collected from their natural habitats. They were kept in sterilized polyethylene packets separately, sealed with staples. Month and locality of fungi collection, nature of substrate, odor, color of fresh specimen and nature of latex, if present were noted. Their ecological habitats and occurrence in solitary or groups were recorded. Quantitative data on macrofungi were also recorded from the sample plots periodically for biodiversity analyses. The specimens were brought to the laboratory for further observations and identification. The morphological investigation of macrofungi fructification were done visually with respect to size, diameter and length of cap (pileus)/ stalk (stipe), colour and its variation during maturity, color of gills and its mode of attachment to stem and other details of ascocarp/basidiocarp.

### Anatomical studies

Thin sections of gill/hymenium layer was cut, stained in cotton blue and mounted in lactophenol for microscopic studies of collected specimens. Microscopic observations included size, color & nature of basidium / ascus, size, color & number of spores, color of spore mass, presence/absence of cystidia.

### Identification

On basis of morphological and microscopic studies macrofungal species were identified with the help of literature and identification keys. (Atkinson, 1961; Natarajan, 1978; Sathe & Daniel 1980; Sathe et al 1980; Atri & Saini, 1989; Jordan, 1995; Mohanan 2011; 2014). Specimens were preserved in the herbarium of the Department of Botany, Providence Women's College Kozhikode.

### Preservation

Finally the specimens were preserved separately in solution of distilled water (70): alcohol (25): formaldehyde (5) and deposited in the museum of the Department of Botany, Providence Women's College.

## RESULTS

### Macrofungal Diversity Assessment:

A total of 90 macrofungi belonging to 30 families were observed The occurrence of maximum number of species was found to be greater in July to October , during the humid season. Fruit bodies were obtained from different habitats like soil, fresh bark, decaying wood, animal dung, humus, burned leaf litter, compost etc. Some of them were edible but the majority was inedible (Tables 1-2). The order Aphyllophorales was represented by 22 families. Tricholomataceae was the predominant family having maximum number (12) of members. Polyporaceae and Ganodermataceae were represented by 8 members each in the total accession. The largest genus represented was Ganoderma with 8 species. The genus *Marasmius* and *Pleurotus* contained 6 species each and the genera *Mycena and Tremella* were represented by 3 species each.

**Table 1: Details on different groups of macrofungi**

| Sl no | Macrofungi | Total No. of collections made | Per cent to total accession |
|---|---|---|---|
| 1 | Lignicolous (wood) | 59 | 64.83% |
| 2 | Terricolous (soil) | 13 | 14.29% |
| 3 | Corticolous (bark) | 10 | 10.98% |
| 4 | Humicolous (humus, compost) | 6 | 6.59% |
| 5 | Carbophilous (burned wood/leaf ) | 2 | 1.4% |
| 6 | Coprophilous (dung) | 1 | 1.4% |
| **Total** | | **91** | **73** |

**Table 2 : Habitat Distribution of Macrofungi**

| Sl No | Species | Ecological habitat | Distribution | Edibility |
|---|---|---|---|---|
| 1 | *Daldinia concentrica* | Decaying wood | Common | Inedible |
| 2 | *Daldinia sp.* | Decaying wood | Rare | Inedible |
| 3 | *Peziza sp.* | Animal dung | Common | Inedible |
| 4 | *Cookenia tricholoma* | Decaying wood | Rare | Unknown |
| 5 | *Elaphomyces granulatus* | Soil | Rare | Inedible |
| 6 | *Schizophyllum commune* | Decaying wood | Common | Unknown |
| 7 | *Schizophyllum sp.* | Decaying wood | Common | Unknown |
| 8 | *Cantharellus cibarius* | Bark | Rare | Edible |
| 9 | *Cantharellus lateritus* | Bark | Common | Edible |
| 10 | *Cantharellus* | Bark | Common | Edible |
| 11 | *Daedalea flavida* | Decaying wood | Common | Unknown |
| 12 | *Daedalea sp.* | Decaying wood | Common | Unknown |
| 13 | *Daedalea sp.* | Decaying wood | Common | Unknown |
| 14 | *Hexagonia tennuis* | Decaying wood | Common | Inedible |
| 15 | *Trichaptum biforme* | Decaying wood | Common | Inedible |
| 16 | *Trichaptum sp.* | Decaying wood | Common | Inedible |
| 17 | *Trichaptum sp.* | Decaying wood | Common | Inedible |
| 18 | *Pycnoporus sp.* | Decaying wood | Common | Inedible |
| 19 | *Microporellus sp. violaceocinerescens* | Decaying wood | Rare | Inedible |
| 20 | *Microporellus sp.* | Decaying wood | Common | Inedible |
| 21 | *Microporellus sp.* | Decaying wood | Common | Inedible |
| 22 | *Panus similis* | Decaying wood | Common | Inedible |
| 23 | *Ganoderma sp.* | Decaying wood | Common | Inedible |
| 24 | *Ganoderma sp.* | Decaying wood | Common | Inedible |
| 25 | *Ganoderma sp.* | Decaying wood | Common | Inedible |
| 26 | *Ganoderma sp.* | Decaying wood | Common | Inedible |
| 27 | *Ganoderma sp.* | Decaying wood | Common | Inedible |
| 28 | *Ganoderma lucidum* | Decaying wood | Common | Inedible |
| 29 | *Ganoderma applanatum* | Decaying wood | Common | Inedible |
| 30 | *Ganoderma sp.* | Decaying wood | Common | Inedible |
| 31 | *Stereum sp.* | Decaying wood | Common | Inedible |
| 32 | *Stereum hirsutum* | Decaying wood | Common | Inedible |
| 33 | *Inonotus nothofagi* | Humus | Common | Unknown |
| 34 | *Russula hygrophytica* | Humus | Rare | Unknown |
| 35 | *Lactarius nebulosus* | Decaying wood | Common | Unknown |
| 36 | *Pleurotus flabellatus* | Bark | Common | Unknown |
| 37 | *Pleurotus sp.* | Decaying wood | Common | Edible |
| 38 | *Pleurotus sp* | Decaying wood | Common | Inedible |
| 39 | *Pleurotus sp* | Decaying wood | Common | Inedible |
| 40 | *Pleurotus ostreatus* | Decaying wood | Common | Edible |
| 41 | *Pleurotus hygrophanus* | Decaying wood | Common | Edible |
| 42 | *Hydnodon thelephorum* | Bark | Common | Unknown |
| 43 | *Marasmius atrorubens* | Bark | Common | Unknown |
| 44 | *Marasmius jalapensis* | Humus | Common | Unknown |
| 45 | *Marasmius sp* | Decaying wood | Common | Unknown |
| 46 | *Marasmius sp.* | Decaying wood | Common | Unknown |
| 47 | *Marasmius sp.* | Decaying wood | Common | Unknown |
| 48 | *Marasmius sp.* | Decaying wood | Common | Unknown |
| 49 | *Lactocollybia epia* | Soil | Common | Inedible |
| 50 | *Lactocollybia sp.* | Bark | Common | Inedible |
| 51 | *Lepista hyalodes* | Decaying wood | Common | Inedible |
| 52 | *Collybia chrysoropha* | Soil | Common | Inedible |
| 53 | *Collybia sp.* | Soil | Common | Inedible |
| 54 | *Termitomyces sp* | Soil | Common | Edible |
| 55 | *Termitomyces sp* | Soil | | |
| 56 | *Rhodocybe sp.* | Decaying wood | Common | Inedible |
| 57 | *Rhodocybe sp.* | Decaying wood | Common | Inedible |
| 58 | *Pluteus sp.* | Decaying wood | Common | Edible |
| 59 | *Pluteus sp* | Decaying wood | Common | Inedible |
| 60 | *Pluteus sp* | Decaying wood | Common | Inedible |
| 61 | *Pluteus conizates* | Soil | Common | Edible |
| 62 | *Gymnophilus crocias* | Soil | Common | Unknown |
| 63 | *Gymnophilus sp.* | Soil | Common | Unknown |
| 64 | *Stropharia semiglobata* | Decaying wood | Common | Unknown |
| 65 | *Stropharia sp.* | Decaying wood | Common | Inedible |
| 66 | *Stropharia sp.* | Decaying wood | Common | Inedible |
| 67 | *Agaricus endoxanthus* | Soil | Common Common | Edible |
| 68 | *Leucocoprinus cepistipes* | Compost | Common | Unknown |
| 69 | *Leucocoprinus sp.* | Compost | Common | Unknown |
| 70 | *Inocybe virosa* | Bark | Common | Unknown |
| 71 | *Porphyrellus sp.* | Soil | Common | Unknown |
| 72 | *Laccaria sp.* | Bark | Common | Unknown |
| 73 | *Crepidotus uber* | Bark | Common | Unknown |
| 74 | *Agrocybe sp.* | Decaying wood | Common | Unknown |
| 75 | *Agrocybe pediades* | Decaying wood | Common | Unknown |
| 76 | *Agrocybe sp.* | Decaying wood | Common | Unknown |
| 77 | *Mycena sp.* | Soil | Common | Unknown |
| 78 | *Mycena sp.* | Decaying wood | Common | Unknown |
| 79 | *Mycena sp.* | Decaying wood | Common | Unknown |
| 80 | *Coprinus sp.* | Decaying wood | Common | Unknown |
| 81 | *Coprinopsis sp.* | Burned leaves | Common | Unknown |
| 82 | *Coprinopsis sp.* | Burned twings | Common | Unknown |
| 83 | *Geastrum sp.* | Humus | Rare | Unknown |
| 84 | *Dictyophora cinnabarina* | Soil | Rare | Inedible |
| 85 | *Tremella mesenterica* | Decaying wood | Common | Unknown |
| 86 | *Tremella reticulata* | Decaying wood | Common | Unknown |
| 87 | *Tremella sp.* | Decaying wood | Common | Unknown |
| 88 | *Auricularia sp.* | Decaying wood | Common | Unknown |
| 89 | *Auricularia sp* | Decaying wood | Common | Unknown |
| 90 | *Auricularia sp* | Decaying wood | Common | Unknown |

## DISCUSSION

Fungi are found in almost every available habitat in earth where organic material is present. Macrofungal diversity, as with all other sub sects of biodiversity, exhibits distinct patterns in both space and time (Mohanan, 2014). Many macrofungal species are believed to fruit sporadically, with no consistent pattern of occurrence from year to year (Watling 1995). Furthermore, their sporocarps are ephemeral and, even when produced, may last only a few days before decomposing or being eaten. Many years of intensive surveys may be required to describe the macrofungal communities of a particular area adequately (Tofts & Orton 1998).

The water content of substrate and relative humidity of atmosphere are of prime importance in controlling the growth and reproduction of fungi. The 70% relative humidity is probably lowest limit for initiating fruit body formation and 80% relative humidity is needed for further development. Annual variation in the timing and production of the aboveground mushrooms is largely influenced by temperature and precipitation (Michael et al, 2010).Atmospheric humidity above 90% is detrimental for fruiting of mushroom species. Temperature has profound effect on growth and reproduction of fungi, the temp between 25-35oC or below is suitable for fruit body formation in several mushrooms.

The study area is very near to the Western Ghats and hence prone to landslides. Gradual abitat destruction has become a threat tothe fungal diversity of the study area. It is important that one should understand the consequences of habitat degradation and fragmentation for fungal assemblages if we are to devise successful conservation strategies.

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