Biodiversity inventory of macrofungi at Sungkai Wildlife Reserve, Perak, Malaysia

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ABSTRACT

A biodiversity inventory was conducted from 28 February 2009 till 05 March 2009 at Sungkai Wildlife Reserve, Perak. This inventory was done to investigate the macrofungal distribution along the trail A and B that was allocated for this study by the DWNP. There were 61 species belonging to 31 genera in 15 families were recorded. Trail B has the highest number of macrofungi compared to trail A. Macrofungi was mostly found on dead trees and dead branches. The least occurrence of macrofungi was on leaf litters which are only about 8.2%. Two edible mushrooms, Calostorna insignius and Auricularia sp. 1 were found.

Keywords: Macrofungi, Edible, Bracket Fungi, Substrates

INTRODUCTION

Mushrooms belong to the group of organisms known as macrofungi under the phylum Basidiomycotina and Ascomycotina. Mushroom is the fleshy and spore-bearing organ of the fungi that called as fruiting body. Macrofungi have fruiting bodies large enough to be seen with the naked eye and to be picked up by hand (Chang and Miles, 1987; Anon, 2005). There is a great number and variations in mushrooms. The variation in size, color, texture and shape of the cap and stalk are the obvious characters and important in identifying mushrooms (Chang and Miles, 1987). The big difference in mushroom is that some are edible and some are poisonous (Smith and Weber, 1996). Taxonomic description of macrofungi is well documented by mycologists worldwide (Klan, 1981; Chin, 1988; Ellis and Ellis, 1990; Janardhanan et al., 1997).

Macrofungi can be classified into three basic ecological groups which are mycorrhizal, parasitic and saprophytic. Most of the edible fungi or gourmet mushrooms are saprophytic, wood-decomposing fungi (Anon, 2005). The ability of fungi to colonize wood and wood wastes and produce edible reproductive structures has been exploited for centuries in Asia for the production of mushrooms like Shiitake (Lentinus edodes), Cantha rellus cibarius, Boletus edulis, Tricholoma magnivelare and the Oyster mushroom (Pleurotus ostreatus) (Guin, 1997; Redhead, 1997). Basidiomycetes in particular have attracted considerable attention as a source of new and novel metabolites with antioxidants, antibiotic, antiviral, phytotoxic and cytostatic activity (Lindequist et al., 2005). Macrofungi are also utilized for advancement of biotechnological industries such as bioremediation. Members of the genus Trametes,
in particular *T. versicolor*, have been reported as very efficient in dye decolourisation (Amaral et al., 2004; Libra et al., 2003; Liu et al., 2004). Thus, bioprospecting of macrofungi usually gives benefit to human in different aspects.

Tropical countries like India has recorded approximately 850 mushroom species (Deshmukh, 2004). Thailand has recorded 103 genera and 51 species of macrofungi (Boonpratung et al., 2002). Distributions of basidiomycetes in Borneo were studied by Pegler (1973, 1997, 2001 and 2002) and she reported that *Ganoderma, Microporus, Favolus, Amauroderma, Lignosus, Rigidoporus, Trametes, Nigroporus, Daedalea* and *Hexagonia* are widely found in Sarawak. Chin (1988) recorded that twenty species of edible and poisonous mushrooms were also collected from forests in Sarawak. There is no information or documentation on the diversity of macrofungi at wildlife sanctuaries in Malaysia. Thus, the aim of this study was to generate a baseline data on macrofungal distribution in the Sungkai Wildlife Sanctuary.

**METHODOLOGY**

**Study area**

The present study was conducted at two trails at Sungkai Wildlife Reserve were gazetted in 1931. It covers about 2,468 ha; 4°0’N to 4°3’N and 101°20’E to 101°24’ (X: 374825 Y: 446588). This area was known as lowland dipterocarp forest up to hill dipterocarp forest. It reaches from 100m asl up to maximum point 831m of Chenduai Mountain. The main rivers of this forest were Milo, Seluang, Ped, Menderang and Suak. There was an inventory study done for flora and fauna previously in 1986, 1997, 1997, 2000, 2004 and 2007 but no fungi was recorded from this area. Two new trails were made for this inventory by the wildlife department. Trail A was from the base camp to west side of total 593 m. The starting point was about (X: 374703; Y: 446625) at elevation 98m; whereas the ending point was at (X: 374709; Y: 446090); elevation 77m. Basically, this trail was swampy area leading to the main stream of Suau River. Then, Trail B was from the base camp to east side of 910m. The starting point was about (X: 375586; Y: 446156); elevation; 106m; whereas the ending point was at (X: 375158; Y: 446692); elevation 116m.
Samples Collection

Macrofungi samples were collected based on their occurrence of fruiting bodies on the substrates, mostly on fallen rotting branches, twigs, and dead trees. Photographs were taken for each specimen, including top view, side view, and bottom view of the fungi. Specimens were then cut or carefully dug out using a knife or a trowel to avoid damage. The habitat, substrate and morphological characteristics of the fungi were noted. All specimens were properly tagged and wrapped appropriately with aluminium foil in a plastic bag to avoid drying.

Fungi Identification

Spore prints were prepared and chemical reaction tests were done using potassium hydroxide (KOH). A small portion of the mushrooms tissues were kept in KOH for further study. The identification of macrofungi was accomplished with the aid of keys and descriptions based on Arora (1986), Breitenbach and Kräslin (1986), Ellis & Ellis (1990), and Pegler (1973, 1997). When specimens could not be matched to known species descriptions, they were assigned to a genus and given a species number, for example, Hyphodontia sp. No. 1 (Lindner et al., 2006). The taxonomic status and description of these species will be examined at later dates. The specimens were brought back and dried in an incubator or oven at 60°C for 24 hours. Moderate temperatures were used so that the fungi are not killed but dormant, where it can be used for culture isolation at any time. The dried specimens were deposited in BORNEENSIS Herbarium at the Institute for Tropical Biology and Conservation, Universiti Malaysia Sabah (BORH) for further study.
RESULTS AND DISCUSSION

A total of 61 species of macrofungi, belonging to 31 genera in 15 families were recorded in the two trails A and B. Forty-one species were enumerated in trail B and 20 species in trail A. The species richness was relatively higher in trail B than in trail A. From 61 species, 6 species (9.8%) including Gerronema spp., Mycena sp., Trametes spp., Xylaria spp., Marasmius spp., and Amouroderma spp. were common in both trails A and B. This could be due to the environment both sites have similar vegetation type influencing macrofungal species composition. This is similar with Runge (1964) where he stated that vegetation type influences the fungal species composition. However, the six species are unique in showing some morphological variation in terms of color and the types of substrates at each trail.

The species occurrence on different substrates varied considerably (Figure 2). Most of the macrofungal species were recorded from dead trees (42.6%), whereas only 8.2% of the species occurred in leaf litters. This poor representation of litter fungi could be due to a more open canopy of the forest consequently leading to higher light levels, higher temperatures and lower humidity. These environmental conditions may have contributed to low sporocarp production (Brown et al., 2006).

![Occurrence of macrofungi on different substratum](attachment:image)

Figure 2. Graph shows the occurrence of fungi in different substrates

In this study, selected sixteen species of macrofungi found at SWS is shown in Figure 3 & 4. There were only two edible mushrooms, Calostoma insignius and Auricularia sp. was found during this study. Gill mushrooms were less than the non-gilled mushrooms. Brackett fungi were the most abundant group in both trails. This might be due to the clearance of forest for rubber plantation. A caveat needs to be added here since the sites compared are not equal area and the number of sampling times is limited. There may be more macrofungi if the sampling time for survey is longer. Thus, gill mushroom easily can be damaged because of the fleshy structure. Raining may be one the factor why we did not encounter more gill mushroom in both trails.
Figure 3. Sample pictures of fungi collected at SWS
Figure 4. Sample pictures of fungi collected at SWR
CONCLUSION

In this study, Sungkai Wildlife Reserve has recorded 61 species from 31 genera belonging to 15 families. Trail B documented as the highest number of macrofungi. Most of the macrofungi was found in dead trees and branches compared to soil and leaf litter. Two edible mushrooms were reported. The edible mushroom has potential economical value for local people in Perak. Further study should be done in order to understand the diversity pattern, species abundance and the potential of these groups.

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REFERENCES


