

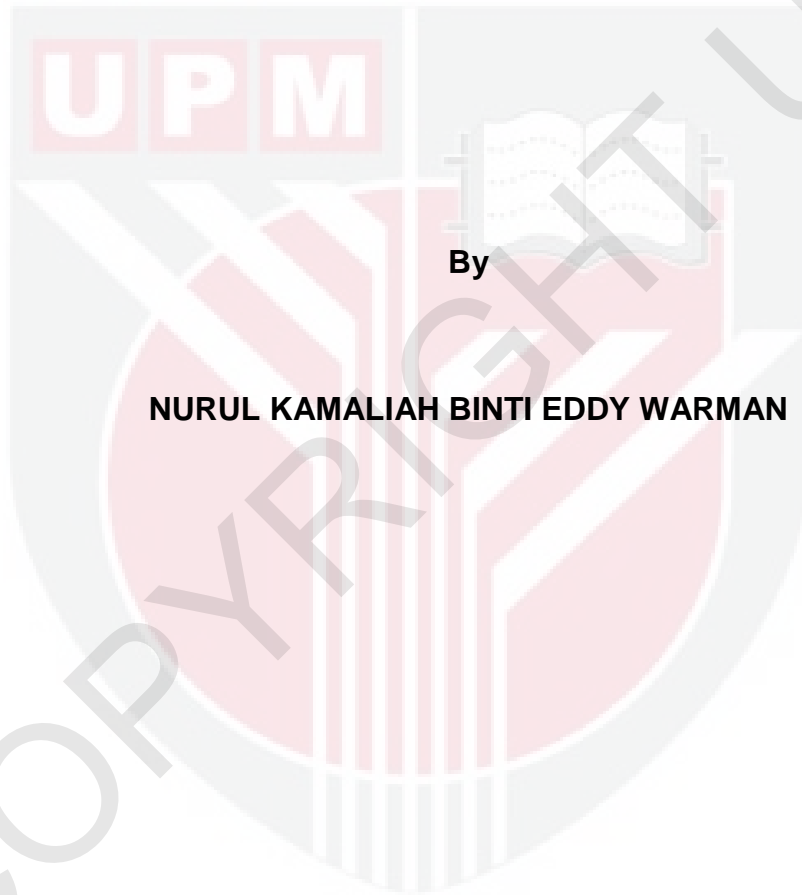


***DEAD WOOD CHARACTERISTICS INFLUENCING MACROFUNGAL
DIVERSITY IN FRAGMENTED FOREST***

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**DEAD WOOD CHARACTERISTICS INFLUENCING MACROFUNGAL
DIVERSITY IN FRAGMENTED FOREST**



By

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**A Project Report Submitted in Partial Fulfillment of the Requirements
for the Degree of Bachelor of Wood Science and Technology in the
Faculty of Forestry
Universiti Putra Malaysia**

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DEDICATION

For my beloved family:

Eddy Warman bin Nurdin

Kamsiah binti Yaacob

Also my siblings.

To my supervisor,

Thank you for your encouragements and supports

And the sacrifices that you have given.

Thank you for everything.

ABSTRACT

Macrofungi have a significant role in forest ecosystems by decomposing wood and organic matter. This study was done to examine the abundance and richness of macrofungal substrates, size of dead wood and position of dead wood that influence macrofungal diversity in four fragmented and contiguous forests: Ayer Hitam Forest Reserve (AHFR), Bukit Cherakah Forest Reserve (BCFR), Bangi Forest Reserve (BFR) and Sungai Lalang Forest Reserve (SLFR). Macrofungal identification using macrofungal identification guidelines was used to identify macrofungal specimens. ANOVA one-way test, SIMPER and ANOSIM were used for statistical analysis. It was found that, in all study areas, there were 13 types of substrates namely branch, dead trunk, fallen dead tree, fallen leaves, fauna's habitat, fruit shell, living tree, palm frond, soil, standing dead tree, stump, twig and wood debris. All study areas did not show significant results of substrate abundance and richness on macrofungal diversity. Size and position of dead wood are important factors to measure macrofungal diversity. Size of dead wood is classified under three classes; Class 1 (diameter of dead wood less than 2.5 cm), Class 2 (diameter of dead wood between 2.5 cm to 15 cm) and Class 3 (diameter of dead wood more than 15 cm). Other than size of dead wood, position of dead wood such as vertical position and horizontal position is also used in measuring macrofungal abundance and richness in four study areas. It was concluded that, fragmented and contiguous forests are similar in terms of their substrate abundance and substrate richness to different study areas.

ABSTRAK

Makrofungi mempunyai peranan yang penting dalam ekosistem hutan dengan mengurai kayu dan bahan organik. Kajian ini dijalankan untuk mengkaji bilangan dan kepelbagaian makrofungal substrat, saiz kayu mati dan kedudukan kayu mati yang mempengaruhi kepelbagaian makrofungal di empat kawasan hutan pecahan dan bersempadan: Hutan Simpan Ayer Hitam (AHFR), Hutan Simpan Bukit Cherakah (BCFR), Hutan Simpan Bangi (BFR) dan Hutan Simpan Sungai Lalang (SLFR). Pengecaman makrofungal menggunakan garis panduan pengecaman makrofungal digunakan untuk mengenal pasti spesimen makrofungal. Ujian satu hala ANOVA, SIMPER dan ANOSIM digunakan untuk analisis statistik. Kajian mendapati bahawa dalam semua kawasan kajian, terdapat 13 jenis substrat iaitu dahan, batang kayu mati, pokok mati yang tumbang, daun gugur, habitat fauna, kulit buah, pokok hidup, daun palma, tanah, pokok berdiri mati, tunggul, ranting dan serpihan kayu. Semua kawasan kajian ini tidak menunjukkan kesan yang signifikan kepada bilangan dan kepelbagaian substrat terhadap makrofungal. Saiz dan kedudukan kayu mati merupakan faktor penting dalam mengukur kepelbagaian makrofungal. Saiz kayu mati dikelaskan kepada tiga kelas; Kelas 1 (kayu mati diameter kurang dari 2.5 cm), Kelas 2 (kayu mati diameter 2.5 cm hingga 15 cm) dan Kelas 3 (kayu mati diameter lebih dari 15 cm). Selain saiz kayu mati, kedudukan kayu mati seperti kedudukan menegak dan kedudukan melintang juga diambil kira untuk mengukur bilangan dan kepelbagaian makrofungal di dalam kajian ini. Kesimpulannya, hutan pecahan dan bersempadan adalah serupa dari segi bilangan dan kepelbagaian substrat kepada tempat kajian yang berbeza.

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APPROVAL SHEET

I certify that this research project report entitled “Dead Wood Characteristics Influencing Macrofungal Diversity in Fragmented Forest” by Nurul Kamaliah binti Eddy Warman has been examined and approved as a partial fulfillment of the requirements for the Degree of Bachelor of Wood Science and Technology in the Faculty of Forestry, Universiti Putra Malaysia.

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LIST OF ABBREVIATIONS

AHFR	Ayer Hitam Forest Reserve
ANOSIM	Analysis of Similarity
ANOVA	Analysis of Variance
BCFR	Bukit Cherakah Forest Reserve
BFR	Bangi Forest Reserve
SIMPER	Similarity Percentage
SLFR	Sungai Lalang Forest Reserve

CHAPTER 1

INTRODUCTION

1.1 Background of Study

Numerous studies showed that, macrofungal has a significant role in forest ecosystem. The role of macrofungal is not only keeping our forest healthy by decomposing wood and other living matter, but it also maintain the suitable temperature by giving out carbon dioxide to the surrounding. The fruiting body structure present on macrofungi export nutrients such as Ca, Fe, K, Mn, N, P, and Zn from the dead wood. These nutrients return to the forest floor by insects and animal ingesting them or by the decaying of wood which occur for most of the fungal species which takes few weeks to several weeks (Harmon *et al.*, 1986). *Hygrocybe* spp. contain Fe in their structure making them comes in vibrant and variety of colours. Conservationist and forestry managers have recently realized, some forest flourish through mycorrhizal associations that dead decaying wood which is mostly facilitated by fungi, forms an important source of biodiversity and integral part of the recycling of carbon and other nutrients (Gates *et al.*, 2009). Most macrofungal in Malaysia are rich and abundant in unmanaged forest due to the undisturbed state. The most important environmental factors related to macrofungi species richness and abundance are canopy cover, humidity and temperature (Engola *et al.*, 2007). Forest fragmentation is one of the disturbance that can cause lower level of species richness and species abundance in forest.

Long ago, people had realized the importance of dead wood in stabilizing and maintaining forest health. Not only dead wood decompose and return to the soil, but it is also function in maintaining healthy forest ecosystem. Decomposition is done with the aid of macrofungal especially saprophytic fungi due to its natural role; live and feeds on dead or decomposing matter.

Some studies revealed that, dead wood characteristics consist of type of substrates such as branch, twig and wood debris affect macrofungal diversity (Dvořák *et al.*, 2017). Study revealed by Sefidi and Etemad (2015) on size and position of dead wood also affect macrofungal diversity in forested areas. For example, Polyporus fungi usually grow on dead trees (Penttilä. *et al.*, 2006). There were also study reported that, position of logs either downed logs, leaning snags or standing snags influence macrofungal diversity in forested areas.

1.2 Problem Statement

Dead wood characteristics have been discovered as one of the main factors affecting macrofungal diversity. In temperate countries many studies were done especially dead wood characteristics such as size and position dead wood that affect macrofungal abundance and richness (Sefidi and Etemad, 2015). Meanwhile, in tropical countries especially in Malaysia, it is found that few studies of macrofungi done in Perak, in terms of its macrofungal distribution (Seelan *et al.*, 2014). However, there is still lacking of information about dead wood

characteristics such as type of substrates, size and position of dead wood that influence macrofungal diversity in tropical forested areas. Other than that, some studies focused only on one tropical forested areas, but least studies were done in comparing fragmented and contiguous forests area and the documentation on conservation value of macrofungal in the forest is still understudied.

1.3 Objectives

The objectives of this study are:

- 1) To compare the substrate abundance and substrate richness on fragmented and contiguous forests.
- 2) To determine dead wood characteristics in fragmented forest that influenced macrofungal diversity.

1.4 Hypothesis

The hypothesis of this study are:

- 1) Substrate abundance and substrate richness are different between fragmented and contiguous forests.
- 2) Dead wood characteristics such as type of substrates, size and position (fallen dead tree, standing dead tree) give different macrofungal diversity.

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