

Macrofungi Diversity in Wisdom Park UGM, Yogyakarta

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ABSTRACT

Indonesia's warm and humid tropical climate provides an ideal setting for the flourishing of fungi. Fungi are pivotal in the intricate balance of nutrient cycles and soil fertility within forest ecosystems. They can be broadly categorized into two types: microscopic fungi, which are minuscule and require observation under a microscope, and macroscopic fungi, which can be identified based on visible morphological features without additional tools. Forests, with their limited sunlight and high humidity due to the dense canopy of trees, serve as fertile grounds for a myriad of fungal species. This research aims to analyze fungal diversity using the exploratory survey method, involving direct search and observation of macrofungi. The sampling was conducted in May 2023 within the Wisdom Park UGM area, covering an area of 3,762.12 m² with coordinates 7° 46'09"S 110°22'59"E. The findings revealed a commendable diversity in terms of shape and size. However, the color palette of fungi in the area exhibited limited variation, primarily consisting of subdued white and brown hues. Some identified fungal species include *Ganoderma* sp., *Mycena* sp., *Trametes* sp., *Lepiota cristata*, and *Panaeolus fimicola*. These fungi predominantly thrived on substrates such as trees, soil, leaf litter, and decaying wood.

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1. Introduction

Indonesia is a country that is abundant in biodiversity, including fungal diversity. With its warm and humid tropical climate, Indonesia provides ideal conditions for the growth of fungi. There are currently 2,273 identified species of fungi in Indonesia (Putra et al., 2021). Unlike plants, fungi cannot carry out photosynthesis because they are heterotrophs and lack chlorophyll (Nasution & Susilo, 2022). Despite this, fungi play an essential role in the material cycle and are crucial to forest ecosystems. They help regulate nutrient cycles that support soil fertility, making them an essential ecosystem component. Fungi have the ability to break down organic materials such as cellulose, hemicellulose, lignin, proteins, and starch compounds. These materials are used by fungi for their growth and development. Additionally, fungi play a crucial role in breaking down or removing toxic substances from the environment, participating in the carbon, nitrogen, phosphorus, and sulfur cycles, stimulating plant growth, and influencing vegetation (Wati et al., 2019). There are two types



of fungi: microscopic and macroscopic fungi. Microscopic fungi are too small to be seen with the naked eye and require a microscope, while macroscopic fungi can be seen directly without any tools. Macroscopic fungi exhibit a wide range of variations in terms of color, shape, and size (Nurhayati, 2021).

Forests are ideal locations for the growth of various fungal species. Forested areas, which have reduced sunlight exposure, lower temperatures, and higher humidity due to the density of trees, provide an optimal environment for fungal growth due to their phototropic nature or aversion to light (Rahma, et al., 2018). Wisdom Park Universitas Gadjah Mada (UGM), is one of the urban forests in Yogyakarta. Encompassing an area of approximately 6 hectares, this space is frequently utilized by the local community for recreational activities and relaxation amid lush greenery. The park features various amenities, including a greenhouse, a vertical garden, and a forest walk around Lake Wisdom Park. This urban forest has a high density of trees that create moist and shady micro-conditions, making it favorable for fungal growth. This study aims to observe and document the diversity of macrofungi found in the Wisdom Park UGM urban forest.

2. Methods

The research methodology adopted for this study involves an exploratory survey, which means actively searching and directly observing macrofungi in their natural habitat. The survey focused on the Wisdom Park UGM area. Sampling activities were conducted during May 2023 to collect specimens and information about the macrofungi present. The Wisdom Park UGM area selected for sampling covers a substantial 3,762.12 square meters, with specific geographical coordinates located at $7^{\circ} 46'13''\text{S}$ latitude and $110^{\circ}22'55''\text{E}$ longitude (Figure 1.). Various data points related to the identified macrofungi were documented during the sampling process. This data included observations of their morphological characteristics, such as shape, size, and color. A comparative approach was employed to analyze the collected data. Relevant literature on fungi served as a reference to understand and classify the observed macrofungi based on their morphological features. The results of this analysis were then organized and presented in tabular form, providing a structured overview of the diversity and characteristics of the macrofungi found in the Wisdom Park UGM area.



Figure 1. Sampling Area Map at Wisdom Park UGM, Yogyakarta (Source: Google Earth Pro)

3. Results and Discussion

An urban forest is a green area situated within a city. It typically comprises city parks, forests, and other open spaces that have tree and plant vegetation. The diversity of fungi present in the urban forest is influenced by various factors, such as the types of planted vegetation, air humidity, and other environmental conditions. Additionally, human activities, including park maintenance, waste management, and environmental alterations, have an impact on the unique conditions that shape the types of fungi present. The urban forest provides a unique habitat for fungi, with substrates like leaf

litter, decaying wood, and soil that support their growth.

The diversity of fungi in the urban forest holds significant ecological value, as fungi play a role in decomposing organic matter, aiding in nutrient recycling, and contributing to the overall ecosystem. Therefore, studying the macrofungi diversity in the urban forest can provide valuable insights into the health of the environment and the urban ecosystem. Additionally, the microclimatic conditions within urban forests, influenced by the structure and density of vegetation, play a significant role in shaping the growth and diversity of macrofungi.

The urban forest of Wisdom Park UGM boasts a diverse range of fungi, as depicted in Figure 2. These fungi offer valuable insights into the local ecosystem. A *Ganoderma* sp. mushroom was discovered growing on a tree trunk. It has a diameter of about 10 cm and a length of 36 cm. The fungus has a complex and woody surface with soft edges and a fan-shaped hood, typical features of the *Ganoderma* genus. *Ganoderma* has been found to have many potential uses in traditional medicine (Panjaitan et al., 2022). In addition, the *Mycena* genus was also found at Wisdom Park UGM. These mushrooms grew near trees and in soil of varying sizes, measuring about 4 cm in diameter and 7 cm in length. The *Mycena* mushrooms have a unique white color, serrated edges, and an umbrella-shaped hood. While some species of mushrooms in this genus are safe for consumption, it is important to note that others may contain toxins (Mumpuni et al., 2018).

Trametes sp. is another fungus found in Wisdom Park UGM. This fungus grows on decaying wood and typically thrives on dead trees. It has a complex and thick texture, often displaying concentric lines. The measured size of this fungus is around 6 cm in length and 4 cm in width. Unlike other fungi, *Trametes* sp. has no stalk and typically thrives on dead or decaying trees (Sulastri & Basri, 2020). However, not all fungi found in urban forests are beneficial. For instance, *Lepiota cristata* is a mushroom that grows on the ground, measuring about 2.5 cm in height, and usually has a beige to brown color. Unfortunately, this mushroom contains toxins that make it unsafe for consumption and can even cause liver damage (Sari et al., 2022). *Panaeolus fimicola* was also a typical fungus found in Wisdom Park UGM's urban forest. This fungus has a diameter of about 2-2.5 cm and a height of 4 cm, grows on the ground, and has a brown color with an umbrella-shaped hood and a smooth surface. Although it is generally saprobic and can be found on various substrates, including soil and manure, it is not recommended for consumption due to its toxicity (Mumpuni et al., 2018).

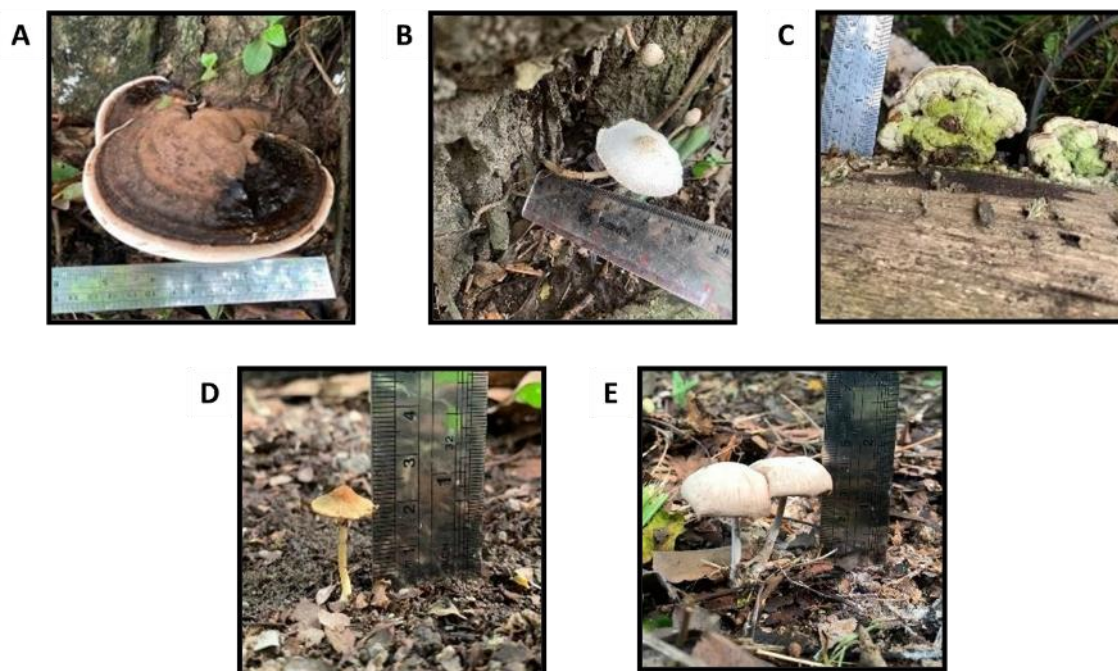


Figure 2. The fungi found in Wisdom Park UGM include (a) *Ganoderma* sp.; (b) *Mycena* sp.; (c) *Trametes* sp.; (d) *Lepiota cristata*; (e) *Panaeolus fimicola*.

Mushrooms in urban forests Wisdom Park UGM showed remarkable diversity, especially in shape and color. Some types of fungi may have unique shapes. It is visually appealing, and fungi in urban

forests also have different benefits. Some types of mushrooms may be edible and even have medicinal benefits. However, not all mushrooms in urban forests can be safely consumed. Some, such as *Lepiota cristata*, contain toxins and can cause damage to organs, especially the liver. Therefore, it is important to understand mushroom identification well before consuming them. While some mushrooms may not be safe for human consumption, they still play an important role in the ecosystem. *Trametes* sp., for example, grows on rotting wood and plays a role in the decomposition of organic matter. The diversity of fungi in urban forests reflects the complexity of ecosystem interactions. Although some species may be potentially harmful to humans, they still play an essential role in maintaining the balance of nature and contributing to nutrient cycling and ecosystem sustainability. Therefore, in-depth study and understanding of the role of each fungal species in the urban forest ecosystem is needed to maintain its sustainability and biodiversity.

4. Conclusion

The research conducted in Wisdom Park UGM area, Yogyakarta, has discovered significant variation in macrofungi. A total of six different types of fungi have been identified, including *Ganoderma* sp., the genus *Mycena*, *Trametes* sp., *Lepiota cristata*, and *Panaeolus fimicola*. This finding highlights the crucial biodiversity present in the environment. The analysis of macrofungi growth indicates that their development occurs on various substrates, such as trees, soil, leaf litter, and decaying wood, on average.

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