Original Research Paper

**The Diversity of Macrofungi in TWA Gunung Tunak, Central Lombok**

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| **Article History**Received : February 25th, 2025Revised : March 10th, 2025Accepted : March 18th, 2025\*Corresponding Author: **Meilinda Pahriana Sulastri**, Department of Biology, Faculty of Mathematics and Natural Science, Universitas Islam Al-Azhar, IndonesiaEmail: meilindapahriana@unizar.ac.id  | Abstract: Nature Tourism Parks (TWA) Gunung Tunak primarily serves the purpose of nature conservation, emphasizing ecotourism due to its stunning coastal landscapes. Currently, there is a significant lack of documented information regarding the diversity and potential of macrofungi in this protected area. This study aims to assess the diversity of macrofungi found within TWA Gunung Tunak and explore their potential applications. The research was conducted using the line transect and plot method, with samples collected along three transect lines in the study area. Each transect comprised ten plots, each measuring 10 x 10 meters and spaced 10 meters apart. The data collected were analyzed using the Shannon Wiener Diversity Index (H'). A total of 11 species of macrofungi from six families were identified: *Polyporaceae*, *Irpicaceae*, *Hymenochaetaceae*, *Gloeophyllaceae*, *Stereaceae*, and Xylariaceae. The family *Polyporaceae* had the highest representation, with five species (*Hexagonia* sp., *Trametes* sp., *Microporus* sp., *Daedalopsis* sp., and *Podofomes* sp.), followed by *Hymenochaetaceae*, which included the species *Phylloporia* sp. and *Phellinus* sp. The remaining families were represented by only one species each, including *Irpicaceae* (*Irpex* sp.), *Gloeophyllaceae* (*Gloeophyllum* sp.), *Stereaceae* (*Stereum* sp.), and *Xylariaceae* (*Xylaria* sp.). The diversity index indicates a moderate level of macrofungal diversity from all the trails in the study area, influenced by environmental factors such as temperature, seasonal changes, moisture, and rainfall. Furthermore, the study highlights the potential of these macrofungal species as sources of medicinal and nutritional value.**Keywords:** Diversity, identification, macrofungi, TWA Gunung Tuna.  |
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**Introduction**

Biodiversity is a crucial aspecy in maintaining global ecosystem balance. Indonesia as one of the countries with the highest biological richness, heavily relies on comprehensive biodiversity data to formulate effective resource conservation strategies (Putra et al., 2018). Efforts to protect the country's natural biodiversity depend significantly on a deep understanding of various organism groups, including fungi.

Fungi, especially the macrofungi group which comprises mushrooms and other noticeable fungal forms, are a significant yet often overlooked component of Indonesia's biodiversity (Nurdiyanti et al., 2020). With an estimated number of fungal species in Indonesia reaching approximately 200,000 (Gandjar et al., 2006) out of 3.8 million species that exist worldwide (Hawksworth & Lücking, 2017), their role in the ecosystems is significant. They function as decomposers, nutrient cyclers, and symbiotic partners with plants. Additionally, fungi have considerable economic value, with potential applications as sources of food, medicinal compounds, and enzymes crucial for various biotechnological applications.

Despite their ecological and economic significance, the understanding of fungal species and their potential in Indonesia remains limited. Although there is an increasing number of studies focused on identifying fungi in their natural habitats, the biodiversity of fungi has not been fully documented. This knowledge gap poses challenges for effective conservation efforts and the sustainable utilization of fungal resources. Lombok Island, with its diverse ecosystems and climatic conditions, provides an ideal environment for fungal growth. However, particularly in Gunung Tunak Natural Park (TWA), a conservation area with an ecotourism focus, information on the diversity and potential of macrofungi is very scarce.

Gunung Tunak is designated as one of eleven Nature Tourism Parks (TWA) and among seventeen conservation areas managed by the Balai Konservasi Sumber Daya Alam (BKSDA) in West Nusa Tenggara [(Hasanah et al., 2020)](https://www.zotero.org/google-docs/?AC7I2D). Geographically, TWA Gunung Tunak located at the southern tip of Lombok Island and directly bordering the Indian Ocean in Central Lombok (Pratama et al., 2023). The topography of the Mount Tunak TWA varies from gentle to steep elevation ranging from 0-105 meters above sea level, and consisting of gentle coastal plains to rows of hills (Elina & Mayana, 2019). Its primary function is nature conservation, with an emphasis on ecotourism due to its picturesque coastal landscapes. The strategic location of TWA Gunung Tunak, situated within the Special Economic Zone (KEK) of Mandalika, underscores its importance as a complementary destination, supporting the sustainability of tourism on Lombok Island (Pratama et al., 2023).

The designation of TWA Gunung Tunak as an ecotourism area raises concerns about potential impacts on the local organisms. Currently, there is a significant lack of documented information regarding the diversity and potential of macrofungi within this protected area. Consequently, this study aims to determine the diversity of macrofungi and assess the potential application of macrofungi found in TWA Gunung Tunak.

**Material and Method**

**Sampling Method**

This study was conducted in TWA Gunung Tunak from June to November 2024. Sampling was carried out using line transect and plot method in the TWA Gunung Tunak. Samples were collected along 3 trails within the study area. Each trail consisted of 10 plots measuring 10 x 10 m with and spaced 10 meters apart.



**Figure 1.** Study area of TWA Gunung Tunak

**Macrofungal Identification**

Within the designated plot, all observed macrofungi were documented through photographs taken in their natural habitats, along with the number of individuals of each species present. Representative samples of macrofungi were collected by extracting the entire fruiting body with a small portion of the substrate. The collected specimens were then placed in specimen boxes for further identification. The identification of the macrofungal samples based on morphological features of the pileus, stipe, lamellae, annulus, and volva. The collected fruiting bodies were subjected to a drying process for herbarium. The identification was achieved by comparing the observed morphological characteristics with published taxonomic descriptions and illustrations found in relevant scientific journals and confirmed through Species Fungorum website.

**Data Analysis**

The collected data was analyzed using the Shannon Wiener Diversity Index (H’). The Shannon-Wiener Index was calculated using the formula proposed by (Margalef, 1964).

H’ is the Shannon-Wiener diversity index. Pi (∑ni/N) is the total number of all species, n is the number of individuals of the species, and N is the total number of individuals of all species. s. The interpretation of the diversity index value as follows: H’ ≤ 1= Low diversity; 1< H’ ≤ 3= Moderate diversity, and H’ ≥ 3 = High diversity. The index provides a measure of macrofungal richness as an indicator of the overall macrofungal diversity in TWA Gunung Tunak.

**Results and Discussions**

**The Diversity of Macrofungi**

The study of macrofungal species in TWA Gunung Tunak revealed a total of 11 species belonging to the divisions Basidiomycota and Ascomycota (see Table 1). The majority of the identified macrofungi are from the Basidiomycota division, represented by families such as *Polyporaceae, Irpicaceae, Hymenochaetaceae, Gloeophyllaceae, and Stereaceae*. Only one species from the Ascomycota division was found, belonging to the family *Xylariaceae*.

**Table 1.** Macrofungi found in the TWA Gunung Tunak, Central Lombok, Indonesia

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| --- | --- | --- | --- |
| **Phylum** | **Family** | **Species** | **Substrates** |
| Basidiomycota | Polyporaceae | Hexagonia sp. | Wood |
| Basidiomycota | Polyporaceae | Trametes sp. | Wood |
| Basidiomycota | Polyporaceae | Microporus sp. | Twig |
| Basidiomycota | Polyporaceae | Daedaleopsis sp. | Wood |
| Basidiomycota | Irpicaceae | Irpex sp | Twigs |
| Basidiomycota | Polyporaceae | Podofomes sp, | Wood |
| Basidiomycota | Hymenochaetaceae | Phylloporia sp. | Wood |
| Basidiomycota | Gloeophyllaceae | Gloeophyllum sp.  | Twigs  |
| Basidiomycota | Hymenochaetaceae | Phellinus sp.  | Wood |
| Basidiomycota | Stereaceae | Stereum sp. | Wood |
| Ascomycota | Xylariaceae | Xylaria sp. | Wood |

The most abundant family among the macrofungi is *Polyporaceae*, which includes five species: *Hexagonia* sp., *Trametes* sp., *Microporus* sp., *Daedalopsis* sp., and *Podofomes* sp. This is followed by *Hymenochaetaceae*, which includes two species: *Phylloporia* sp. and *Phellinus* sp. The remaining families each contributed to one species, including Irpicaceae (Irpex sp.), *Gloeophyllaceae* (*Gloeophyllum* sp.), *Stereaceae* (*Stereum* sp.), and *Xylariaceae* (*Xylaria* sp.). All macrofungi were found growing on wood or decaying logs. This study aligns with previous research by Rahayu et al. (2020), which highlighted the prevalence of wood-inhabiting fungi in coastal forest ecosystems. TWA Gunung Tunak qualifies as a coastal forest since it is bordered with the Indian Ocean in Central Lombok.

The diversity of the macrofungi serve as an important indicator of ecosystem quality (Yusran et al., 2020). The variety of macrofungal species present is closely linked to the dominant tree species that comprise the forest vegetation (Kutszegi et al., 2021; Collado et al., 2021). Additionally, the diversity and distribution of the macrofungal community are influenced by microclimatic conditions, including temperature, humidity, light, decomposed organic matter, and soil characteristics (Alem et al., 2021; Santos-Silva et al., 2011; Conn & Dighton, 2000).

**Table 2.** The results of the Shannon-Wiener Diversity Indeks

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| --- | --- | --- |
| **Trail** | **Index Value** | **Category** |
| Trail 1 | 1,976 | Moderate |
| Trail 2 | 2,003 | Moderate |
| Trail 3 | 1,290 | Moderate |

The Shannon Wienner Diversity Index for the macrofungi in TWA Gunung Tunak has a value of indicating a moderate level of biodiversity. This assessment is estimated because sampling was conducted during the dry season, when the environment conditions are not optimal for the macrofungal growth. The diversity of the macrofungi is influenced by suitable habitat conditions, such as optimal substrate and canopy cover, which help maintain moisture levels (Trudell & Edmonds, 2004). According to Priyamvada et al., (2017) and Li et al., (2018), larger numbers of macrofungal species can thrive under optimal environmental conditions regarding season, temperature, and rainfall. The diversity index might reflect even higher values if the study were conducted under ideal environmental condition for the growth of macrofungi, emphasizing the need for survey at various times and seasons throughout the year (Yusran et al., 2020).

**The Macrofungi Potential from TWA Gunung Tunak**

The study of the macrofungi has revealed that many species have potential use as food and medicine. For instance, *Hexagonia* species such as *H. glabra* can be valuable source of anticancer agents (Ghosh et al., 2020). A study into traditional medicine within Northeastern Brazilian communities indicates that *H. hydnoides* is used as a remedy for digestive system, with further analysis demonstrating its antibacterial properties against *Bacillus* *cereus* (Rosa et al., 2003). The genus *Trametes* is known for its medicinal properties. Notably, *T.* *versicolor* has been employed for its anti-inflammatory, antibacterial, antioxidant and anticancer (Lodi et al., 2025; Ajibola et al., 2024). *Microporus* species contain antimicrobial compound against gram positive bacteria and inhibit the biofilm formation of Staphylococcus aureus (Chepkirui et al., 2018). The fruit bodies of *Daedaleopsis* are utilized in the production of ornamental paper (Roberts & Evans, 2011). *Irpex* *lacteus* shows potential as a medicine agent, demonstrating diuretic, antiinflammatory, and antimicrobial properties (Chen et al., 2020). The fermented mycelia of *Phylloporia* have been approved as a food supplement (Cheng et al., 2023). *Phellinus* *linteus* are employed in traditional Chinese medicine and is known for a range pharmacological applications, including anticancer, anti-inflammatory, immunomodulatory, antioxidative, and antifungal activities, as well as antidiabetic, hepatoprotective, and neuroprotective effects (Chen et al., 2019; Sliva, 2010). *Stereum ostrea* exhibits both antimicrobial and antifungal activitity (Imtiaj et al., 2007). Lastly, *Xyaria* fungi are producers of diverse biologically active compouns with 245 bioactive compouds comprising of a wide range biological activities including antibacterial, antifungal, anticancer, antimalarial, anti-inflammatory, and α-glucosidase inhibitory activities (Chen et al., 2024).

**Conclusion**

TWA Gunung Tunak harbors a diverse community of macrofungi with potential applications in various fields. A total of 11 species of macrofungi from 6 families namely *Polyporaceae, Irpicaceae, Hymenochaetaceae, Gloeophyllacaeae, Stereaceae,* and *Xylariaceae* have been identified in TWA Gunung Tunak. The diversity index of the marcrofungi is considered moderate, which is affected by the environmental conditions such as temperature, season, moisture, and rainfall. The macrofungal species found have the potential as medicinal source and food. The species number of macrofungi found in this area is certainly not the final data. Therefore, further study should be conducted to explore the diversity of macrofungi throughout the forest and accross different seasons each year, aiming for more comprehensive data and information. Additionally molecular identification is necessary for the possibility of discovering new species or records in this forest.

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