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Ethnomicological Study of Macrofungi in Sesaot Forest of West Lombok

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Abstract: Communities living near forested areas play a crucial role in preserving forest biodiversity. Ethnomycological studies are an important first step in identifying the variety and potential of macrofungi used by people in a region. This study aims to document the use of macrofungi by the local community around Sesaot forest. The collection and identification of macrofungi samples were carried out using opportunistic sampling. Data on the use of macrofungi was obtained from semi-structured interviews with residents around Sesaot Forest. A total of 26 respondents from the Sesaot community participated in the survey. The people usually collected macrofungi for consumption and occasionally for medicinal purposes. The results identified 12 species of macrofungi from 10 families (*Pezizaceae, Auriculariaceae, Sarcoscyphaceae, Gomphaaceae, Pleurotaceae, Ganodermataceae, Psathyrellaceae, Polyporaceae, Agaricaceae,* and *Nidulariaceae*) in Sesaot forest. *Auricularia* sp. and *Pleurotus* sp. were used as food, while *Lignosus* sp. was used as medicine by the local people in Sesaot.

Keywords: Ethnomycology; Food; Local community; Macrofungi; Medicine

Introduction

Fungi are one of the constituent components of biodiversity in Indonesia (Nurdiyanti et al., 2020). Hawksworth et al. (2017) estimated the number of fungi approximately 2.2 to 3.8 million species worldwide. According to Gandjar et al. (2006), there are 200,000 species of fungi found in Indonesia. Macrofungi are a group of fungi with easily observed spore-bearing structures called fruiting bodies. They grow in various forms of fruiting bodies such as gilled fungi, boletes, polypore fungi, puffballs, bracket fungi, jelly fungi, cup fungi, stinkhorn, morels, and bird's nest fungi (Mueller et al., 2007). They are commonly found as saprobes or mycorrhiza in soil, leaf litter, dead organic matter, decaying wood, and logs. While some of the species are pathogens of plants and other fungi (Teke et al., 2018). These fungi have a significant role in the natural ecosystem as decomposers and food for animals (Tang et al., 2015). The majority of the macrofungi are members of Basidiomycota or Ascomycota, while a small number belong to Zygomycota (Mueller et al., 2007).

Various types of macrofungi have been used as a food source since ancient times, probably for their taste and appealing flavor (Das, 2010). There are around 1,069 species of macrofungi that have been reported to be used as food ingredients (Boa, 2004). They have high content of proteins, fiber, minerals, fibers, trace elements, and low fats (Bilal et al., 2010). Macrofungi is also traditionally utilized for medical purposes. Some studies reported that several species of macrofungi contain bioactive and antioxidants (Adeoye-Isijola et al., 2018; Herawati et al., 2021).

The ecological knowledge of the local community is crucial for understanding the dynamics of the environment. Etnomycology, a field of science that studies the cultural importance and uses of macrofungi in everyday life (Brown, 2019), sheds light on the significance of macrofungi in cultural traditions across the world. However, macrofungi are not as extensively studied as plants and animals. More data on the

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utilization of macrofungi by the local community is needed to comprehend the relationship between humans and natural resources in the ecosystem (Hamzah et al., 2023).

Ethnomycology is the study of how local communities use fungi (Santosa et al., 2021; Has et al., 2023). According to Sawitri et al. (2011), communities residing in forested areas play a pivotal role in safeguarding forest biodiversity. These communities possess a deep understanding of which macrofungi are suitable for consumption, which are toxic, and which have medicinal properties. This valuable knowledge is transmitted across generations, shaped by the accumulated experiences of individuals within their environment (Metananda et al., 2012).

Ethnomycological studies are a crucial first step in identifying the diversity and potential of macrofungi used by people in a specific region (Nurdiyanti et al., 2020). Many local communities possess valuable local knowledge and wisdom that should be researched, documented, and preserved (Sitanggang et al., 2022; Zulharman & Noeryoko, 2023). References containing information about organism diversity, especially macrofungi, are essential for safeguarding this knowledge (Saridewi et al., 2022). It is important to gather data on their utilization to prevent the loss of this knowledge among the younger generation.

Lombok Island is surrounded by forest areas with climatic conditions, topography, and humidity that provide habitats for fungi. The increase in population in areas around the forest, followed by increased activities to meet daily needs, has had a significant impact on the forest ecosystem on the island of Lombok. According to Mukhtar et al. (2010), the ecological condition of the Sesaot forest area has decreased due to activities carried out by communities around the forest. If this condition is left unchecked and occurs in the long term, it will have an impact on reducing biodiversity, especially macrofungi.

The aim of this study is to comprehensively document the biodiversity and the utilization of macrofungi by the local community residing in the vicinity of the Sesaot forest. This exploration is underpinned by the recognition that ethnomycological knowledge can serve as a valuable tool for assessing fungal diversity within a specific geographic area.

Method

This study was conducted between March-August 2023 in forest area of Sesaot Village, located in the sub-district of Narmada, West Lombok Regency, West Nusa Tenggara. Sesaot village is located within the coordinates 8°30'-8°33'S and 116°13'-116°18'E.

Macrofungi samples were collected and identified using opportunistic sampling methods. The macrofungi samples were photographed, placed in a sample box, and labeled. Macrofungi that grow in soil are collected by plucking or digging at the base of the stipe to obtain the complete sporocarp. Macrofungi that grow on wood are removed with a knife, along with the bark from which they grow. Identification is carried out by examining the fungus' morphology (pileus, stipe, lamella, annulus, volva, and spores), environmental condition, and matching it with reference book and various journal articles.

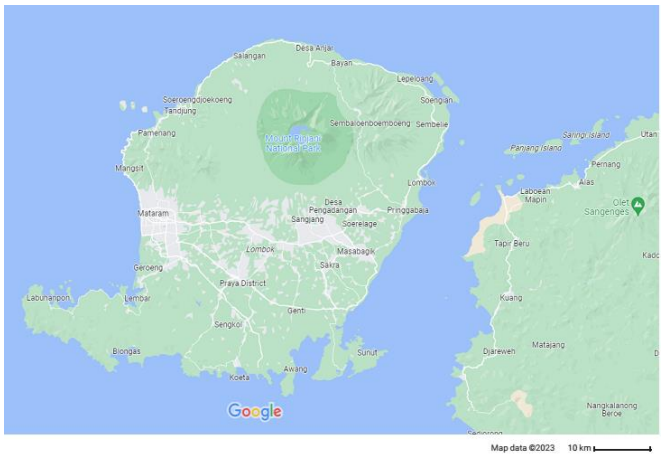

Figure 1. Sesaot forest located in the Sesaot Village as the study area

Data about the utilization of the macrofungi obtained from semi-structured interview with the local people reside around Sesaot Forest. The interview was composed of question designed to gather information about the importance of macrofungi in their everyday life. The question was adapted and modified from De Leon et al. (2012), De Leon et al. (2016) and Lazo (2015). The data was presented using table.

Result and Discussion

A total of 26 respondents from the Sesaot community participated in the survey. Most of the respondents (42.3%) were between 26 and 45 years old (see Table 1), with the majority being men (61.5%) as the interviews were conducted in the morning near the forest area where many men work. The majority of the respondents had only completed high school (69.2%). All respondents are Muslim (100%), reflecting the majority religion in West Nusa Tenggara.

All of the respondents (100%) were aware of mushrooms (Table 3), which belong to the well-known group of macrofungi. The local people refer to macrofungi as *tengkong*. Most macrofungi names are based on the characteristics of the mushrooms and the

substrates on which they grow (De Leon, 2012). The majority of the respondents believed that macrofungi grow in the rainy season (92.3%), while few believed that macrofungi also grow in the dry season. They reported that macrofungi grow in soil, leaf litter, and decaying logs (Table 3). The people usually collect macrofungi for consumption and rarely for medicine or rituals. Since the primary use of macrofungi was for food, the respondents preferred to process the macrofungi by boiling or frying it with other food ingredients (Table 4). Most of the respondents believed that macrofungi are not dangerous (96%). A study by Yusran et al. (2020) in Lore Lindu National Park, Central Sulawesi describes how the residents can distinguish poisonous fungi based on its features. Residents describe poisonous fungus as having a brightly colored fruiting body that is not eaten by insects or rodents (such as mice and squirrels). The fungus that is safe to consume usually has a white or dark fruit body and is visited by insects or other animals.

Table 1. Socio Demographic Profile of the Respondents

Number of respondents	Age		
	16-25	26-45	> 46
26	6	11	9

Table 2. Additional Information on the Socio Demographic Profile of the Respondents

Number of respondents	Gender		Educational attainment				Job					Religion	
	Man	Woman	College	High school	Elementa-ry	Not attending school	Stude-nt	Employee	Housew-ives	Farmers	Entreprene-ur	Islam	Non-Islam
26	16	10	2	18	4	2	1	9	2	2	12	26	0

Table 3. Knowledge on Mushroom of the Respondents

Number of respondents	Do you know mushroom?		When does mushroom appear?		Where do mushroom appear		
	Yes	No	Dry season	Rainy season	Leaf litter	Soil	Decaying log
26	25	0	3	24	5	21	8

Table 4. Survey of the Indigenous Beliefs of the Respondents on Mushroom Utilization

Number of respondents	How do you use mushroom			How do you cook it?			Are there any harmful fungi?	
	Food	Medicine	Rituals	Boiled	Grilled	Stir fried	Yes	No
26	25	5	2	15	7	18	25	1

Table 5. Macrofungi Collected in the Sesaot Forest

Species	Family	Substrate	Division	Traditional Uses
Peziza sp.	Pezizaceae	Decaying log	Ascomycota	
Auricularia sp.	Auriculariaceae	Decaying log	Ascomycota	Food
Cookeina sp.	Sarcoscyphaceae	Soil	Ascomycota	
Ramaria sp.	Gomphaceaae	Soil	Basidiomycota	
Pleurotus sp.	Pleurotaceae	Decaying log	Basidiomycota	Food
Ganoderma sp. 1	Ganodermataceae	Decaying log	Basidiomycota	
Ganoderma sp. 2	Ganodermataceae	Decaying log	Basidiomycota	
Ganoderma sp. 3	Ganodermataceae	Decaying log	Basidiomycota	
Parasola sp.	Psathyrellaceae	Decaying log	Basidiomycota	
Lignosus sp.	Polyporaceae	Soil	Basidiomycota	Medicine
Coprinus sp	Agaricaceae	Decaying log	Basidiomycota	
Cyathus sp.	Nidulariaceae	Decaying log	Basidiomycota	

This study identified 12 species of macrofungi from 10 families (*Pezizaceae, Auriculariaceae, Sarcoscyphaceae, Gomphaceaae, Pleurotaceae, Ganodermataceae, Psathyrellaceae, Polyporaceae, Agaricaceae,* and *Nidulariaceae*) in Sesaot forest. The macrofungi collected belong to the division of Ascomycota and Basidiomycota. Only 3 species of macrofungi collected during the study were used by the local community in Sesaot forest as a source of food and medicine. Macrofungi species were used by many local

communities as source of food and medicine in Philipines (Lazo, 2015; De Leon, 2016; Tantengco, 2018), Africa (Teke et al., 2018), and Indonesia (Khastini et al., 2018; Yusran et al., 2020; Santosa et al., 2021).

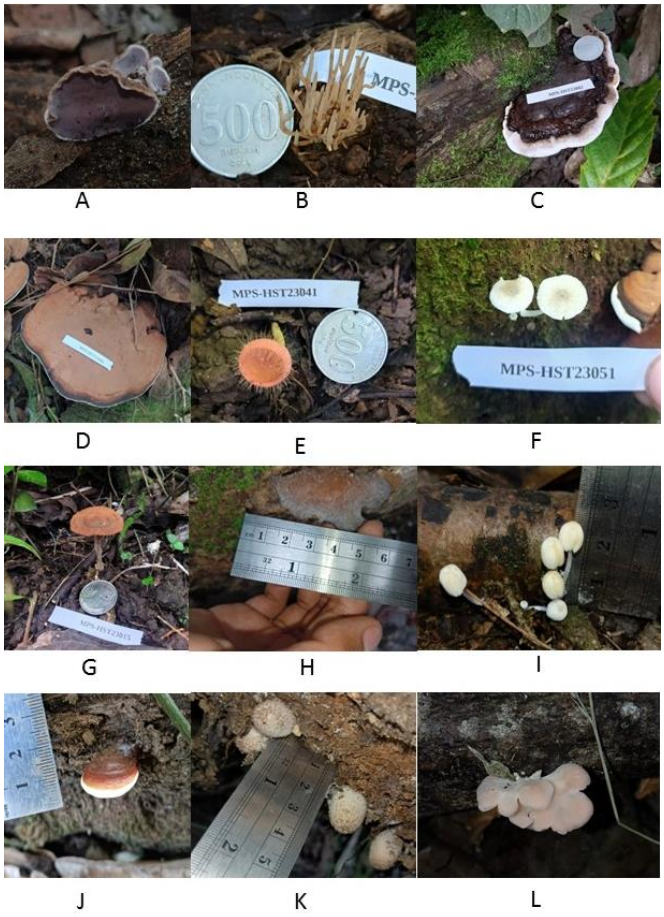

Figure 2. A. *Peziza* sp., B. *Ramaria* sp., C. *Ganoderma* sp.1, D. *Ganoderma* sp.2, E. *Cookeina* sp., F. *Parasola* sp., G. *Lignosus* sp., H. *Auricularia* sp., I. *Coprinus* sp., J. *Ganoderma* sp.3, K. *Cyathus* sp., L. *Pleurotus* sp.

The *Pezizaceae* and *Sarcoscyphaceae* are both families of cup fungi that belong to the order *Pezizales* and the phylum *Ascomycota*. These fungi are ecologically significant as they fulfill various roles, including acting as parasites, saprotrophs, and ectomycorrhiza. However, despite their ecological significance, the edibility of these fungi is still unknown (Cannon & Kirk, 2007; Hibbett & Thorn, 1994).

Auriculariaceae is a family of fungi classified under the Basidiomycota group. These fungi are characterized by their gelatinous basidiocarps and are commonly referred to as jelly fungi. They are saprotrophic, meaning they obtain nutrients by decomposing dead wood (Hyde et al., 2020). Some species within this family are not only edible but also cultivated on a commercial scale for use as a food source (Regis & Geösel, 2023). The *Gomphaceae* family comprises mycorrhizal fungi that produce coral-like fruiting bodies. Among these fungi, several species of *Ramaria*, such as *Ramaria flava*, are edible. However, it's important to note that they share morphological similarities with *R. formosa* and *R. pallida*, both of which are mildly poisonous (Braeuer et al., 2018).

Pleurotus Pleurotus is a gilled fungus belonging to the Pleurotaceae family. These fungi are known for their saprophytic and parasitic nature, causing white-rot on trees (Hibbett & Thorn, 1994; Cohen et al., 2002). Among the Pleurotus species, P. ostreatus, also known as the oyster mushroom, is widely consumed and cultivated worldwide (Chang et al., 2004). These fungi have also been utilized in the bioremediation of pollutants (Cohen et al., 2002; Stamets, 2005). *Ganoderma*, a polypore fungus of the *Ganodermataceae* family, is commonly found in tropical regions. Among its various species, *G. lucidum* is widely utilized in traditional medicine, particularly in Asian countries (Benzie & Wachtel-Galor, 2011; Du et al., 2023).

Lignosus is a polypore fungus belonging to the *Polyporaceae* family. The species *L. rhinocerus* is utilized in traditional Southeast Asian medicine to address a range of health issues, including enhancing immunity, improving antioxidant status, and promoting respiratory health (Tan et al., 2021). *Parasola* is a species of saprotrophic fungi in the family *Psathyrellaceae*. This species functions as a decomposer and is typically found growing sporadically or in small clusters within grassy habitats. It is worth noting that Parasola is generally classified as non-edible (Elkhateeb & Daba, 2021).

Coprinus is an agaric fungus belonging to the *Agaricaceae* family, characterized by its dark spores. Several species of *Coprinus*, such as *C. comatus*, have been documented for their potential applications in food and medicine (Cao et al., 2020). However, it is important to note that while some species of *Coprinus* offer benefits, several wild species are poisonous. The poisonous species are often mistaken for *Volvariella volvaceae*, an edible fungus that typically grows on straw. The morphological similarity between these species often leads to poisoning incidents when consumed (Amelya et al., 2023).

Cyathus is a genus of bird's nest fungi in the family *Nidulariaceae*. Species of *Cyathus* are saprobic, obtaining nutrients through the decomposition of organic material. These fungi are generally considered non-edible; however, some species produce bioactive compounds that have potential applications as antibiotics (Allbutt et al., 1971), antioxidant (Kang et al., 2008), and can be developed into medicinal compounds.

Conclusion

The collected macrofungi from Sesaot forest were 12 species from 10 families (*Pezizaceae, Auriculariaceae,*

Sarcoscyphaceae, Gomphaaceaae, Pleurotaceae, Ganodermataceae, Psathyrellaceae, Polyporaceae, Agaricaceae, and *Nidulariaceae*) in Sesaot forest which belong to Ascomycota and Basidiomycota division. The local community utilized *Auricularia* sp. and *Pleurotus* sp. as food. While *Lignosus* sp. is used as medicine. The result of this study can be used as basic data on fungal diversity in Sesaot forest.

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Author Contributions
Conceptualization, M.P.S, H.B, A.S.A; Methodology, M.P.S; data analysis, H.B; writing, M.P.S and A.S.A. All authors have agreed to the published version of the manuscript.

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Conflict of Interest
All authors have declared no conflicts of interest.

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