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**CHARACTERISTICS OF MACROSCOPIC FUNGI IN PULAU MAS POPAYA
RAJA NATURAL RESERVE OF GORONTALO UTARA**

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Abstract

*The study aims at identifying the properties and number of macroscopic fungi species from the Ascomycetes and Basidiomycetes divisions within the Mas Popaya Raja Natural Reserve Island of Dunu Village, Monano Sub-district of Gorontalo Utara. Information on the results of this research can be used as fungi inventory data for the Agency for the Conservation of Natural Resources Conservation Section II of Gorontalo. This research employs an explorative survey method to directly observe the existence of macroscopic fungi within the natural reserve. The study is implemented in sequence, initial observation within the natural reserve to determine the sampling points, followed by identification of those macroscopic fungi based on the morphology of those fungi. Qualitative descriptive method is used to analyze the data by describing the properties of those macroscopic fungi in their habitats. This study has shed light on ten types of macroscopic fungi available in this natural reserve namely: *Aleuria aurantia*, *Xylaria papyrifera*, *Microporus xanthopus*, *Lentinus sajor-caju*, *Ganoderma lucidium*, *Ganoderma applanatum*, *Rigidoporus* sp, *Maramius androcaseus*, *Lichenomphalia umbellifera*, *Scleroderma sinnamariense*. The fungi found were dominated by the Basidiomycota division of the Agariomycetes class.*

Keywords: *Characteristics; Macroscopic Fungi; Pulau Mas Popaya Raja*

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INTRODUCTION

Conservation areas in Indonesia are classified into natural reserve and wildlife reserve. One of the natural reserves in Gorontalo is Mas Popaya Raja Natural Reserve Island in Gorontalo Utara Regency, located in Monano Sub-district, within the administrative area of Dunu Village. About 85% of this natural reserve is still a pristine primary forest. Raja island is one of the largest among the Popaya, and the Mas islands. It covers an area of ±158 Ha (Mahmud, 2019), in which one of its biodiversity is fungi.

Fungi is one of the organisms which has their own kingdom, thus its distribution within a habitat often consists of two divisions of Ascomycota and Basidiomycotas. The Basidiomycota division of fungi lives a saprophyte on living remains (Norfajrina et al., 2021; Mardin & Husain, 2023). Whereas Ascomycota is a group of high-grade fungi. Basidiomycota acts as parasite and saprophyte on wood plants and decomposing plants (Saptira et al., 2021). Fungi are divided into two types based on their size, macroscopic and microscopic fungi. Microscopic fungi are fungi which can only be seen under the microscope due to their small size (Odrina, 2023). Whereas macroscopic fungi can be seen

with the naked eye and can be held by hand due to their large size (Nurchalidah et al., 2021; Hendrik, et. al., 2022). Macroscopic fungi can grow in good moisture environment like tropical country, Indonesia. Indonesian tropical forests have high moisture level and less sun exposure, hence, fungi, which have negative phototropic property can widely grow (Rahma et al., 2019). Other factors that influence the growth of macroscopic fungi are temperature, soil temperature, pH, and light intensity (Roosheroe, et. al., 2006).

Macroscopic fungi play critical roles as decomposer and symbiont to animal and plants. In addition, macroscopic fungi also serve as food product and medicinal ingredients. Ascomycota and Basidiomycota divisions have different characteristics. About 65,000 species of Ascomycota and Basidiomycota divisions (Suryani & cahyanto, 2022).

Communities around the Mas Popaya Raja Island nature reserve area do not yet have information about the role of macroscopic fungi, so research on the characteristics of macroscopic fungi is carried out based on the background so that the community can know the role of macroscopic fungi based on the characteristics of macroscopic fungi.

The aim of study are classifying the characteristics of the macroscopic fungi from the Ascomycota and Basidiomycota divisions and identifying the number of macroscopic fungi from Ascomycota, and Basidiomycota divisions that exist within Mas Popaya Raja Natural Reserve Islands. The study will also benefit stakeholders in: 1) enriching information on the characteristic of macroscopic fungi that can be used for the Agency for the Conservation of Natural Resources Conservation Section II of Gorontalo; 2.) contributing as further reference for fungi research; 3.) enriching the local community knowledge on the characteristic of macroscopic fungi that exist within the Mas Popaya Raja Natural Reserve Islands of Gorontalo Utara Regency; and 4.) finding out the different characteristics between the Ascomycota and Basidiomycota divisions of macroscopic fungi.

RESEARCH METHODS

This study utilizes an explorative survey with purposive sampling hence, the location has been predetermined. Further, the data are analyzed using descriptive qualitative analysis to compare the habitats of each species of these macroscopic fungi. This study was carried out from June to August 2022 at

the Mas Popaya Raja Natural Reserve Islands of Gorontalo Utara Regency. The tools used for this study were writing equipment, GPS, ruler, soil tester, thermometer, moisture meter, lux meter, termohigrometer, and several books of macroscopic fungi identification. The materials for this study were macroscopic fungi that exist within the Mas Popaya Raja Natural Reserve.

Research instruments are tools that are selected and used by researchers in data collection activities. The researcher acts as an observer and acts as a data collector. The data collection instrument in this study was an observation sheet. The observation sheet for macroscopic fungi characteristics contained cap shape, cap color, cap surface, presence or absence of fungi fruit, body length, cap diameter, and fungi color. The observation table for environmental parameters contains light intensity, soil temperature, soil pH, air humidity, and soil temperature then identify macroscopic fungi using several book references, namely: Complete Guide to Fungi (Roosheroe, et. al., 2006; Arora, 2022). The research location is in the Mas Popaya Raja Island Nature Reserve, Raja Island, Dunu Village, Monano District, North Gorontalo Regency, presented in Figure 1 below.

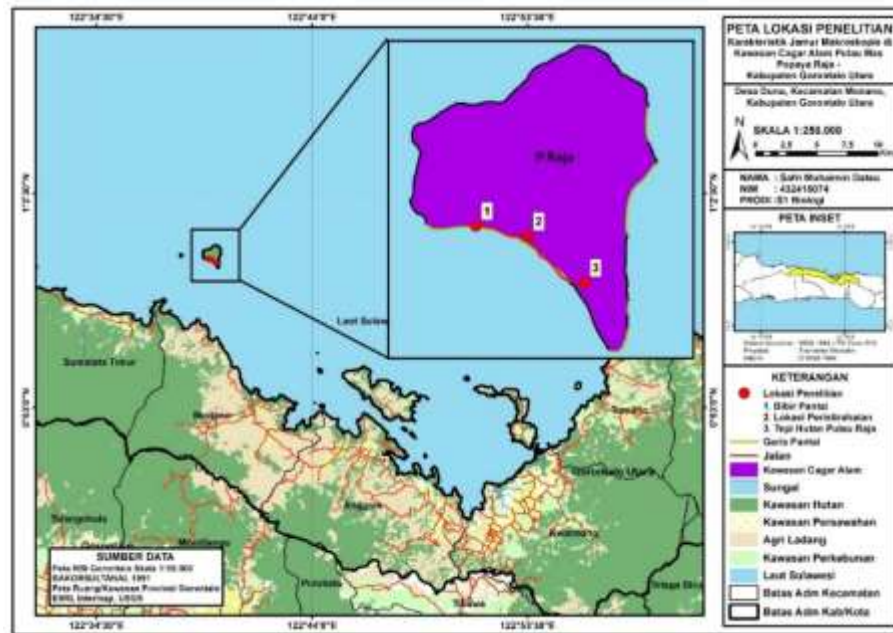


Figure 1. Research Locations

RESULTS AND DISCUSSION

The field study has revealed that there are 10 types of fungi classified as belonging to the Ascomycota and Basidiomycota division of fungi. There are two species from the *Ascomycota* division namely *Aleuria aurantia*, and *Xylaria papyrifera*. Meanwhile, eight species namely *Microporus xanthopus*, *Lentinus sajor-caju*, *Ganoderma lucidium*, *Ganoderma applanatum*, *Rigidoporus sp.*, *Maramius androcaseus*, *Lichenomphalia umbellifera*, and *Scleroderma sinnamariense* are identified as part of the Basidiomycota division. These fungi were also identified based on the characteristic of each species' habitats. The dominant cap found is the round cap fungi that grow within the moist log and the dominant color

found was white, followed by brown and orange colors. This diversity of colors and shape was due to the characteristic of macroscopic fungi that have conspicuous colors.

The habitat condition of the macroscopic fungi found within the Mas Popaya Raja reserve was stable with a light intensity of 221Lx, soil temperature 25°C pH 8,5, soil and air humidity of 60%, and temperature of 28°C. Environmental factor can influence the growth of macroscopic fungi, as it has the standard temperature of 40°C (Hasanudin, 2018).

The observation and measurement in the Mas Popaya Raja reserve of Dunu Village, Monano Sub-district of Gorontalo Regency have been able to identify the

characteristics of its macroscopic fungi as follows:

Table 1. Characteristics of Macroscopic Fungi

Based on the classification of the Basidiomycota division are: *Microporus*

No	Cap Shape	Cap Color	Cap Surface	Existence/ inexistence of spore	Stem length	Cap diameter	Fungi color	Species
1	Round	Brown	Soft	-	3,8 cm	9,5 cm	Brown	<i>Microporus xanthopus</i>
2	Round	Cream	Rough	-	1,2 cm	3,1 cm	White	<i>Ganoderma lucidum</i>
3	Tube	White	Rough	-	2,4 cm	1,5 cm	White	<i>Xylaria papyrifera</i>
4	Round	White	Rough	-	5 cm	7,7 cm	White	<i>Lichenomphalia umbellifera</i>
5	Round	Brown	Rough	-	0,8 cm	0,5 cm	Brown	<i>Maramius androcaseus</i>
6	Round	Cream	Soft	-	1,2 cm	5,4 cm	White	<i>Rigidoporus sp</i>
7	Ear shape	Orange	Soft	-	3,9 cm	3,5 cm	Orange	<i>Aleuria aurantia</i>
8	Round	Brown	Rough	-	6,5 cm	7 cm	Brown	<i>Scleroderma sinnamariense</i>
9	Round	White	Rough	-	4 cm	3,3 cm	White	<i>Ganoderma applanatum</i>
10	Bowl	White	Wavy	-	1,6 cm	13,5 cm	White	<i>Lentinus sajor-caju</i>

macroscopic fungi found in the Mas Popaya Raja natural reserve islands of Gorontalo Utara Regency, there are 10 types of species classified into two big divisions of Ascomycota dan Basidiomycota. From Ascomycota division are : *Aleuria aurantia*, and *Xylaria papyrifera* whereas from

xanthopus, *Lentinus sajor-caju*, *Ganoderma lucidium*, *Ganoderma applanatum*, *Rigidoporus sp*, *Maramius androcaseus*, *Lichenomphalia umbellifera*, and *Scleroderma sinnamariense*. Those species are described in detail as follows:

Table 2. Diversity of Macroscopic Fungi

Division	Class	Fungi Kingdom				Species
		Ordo	Family	Genus		
Ascomycota	Ascomycetes	Pezizales	Pyronemataceae	Aleuria	<i>Aleuria aurantia</i>	
		Xylariales	Xylariaceae	Xylaria	<i>Xylaria papyrifera</i>	
Basidiomycota	Eumycetes	Polyporales	Polyporaceae	Microporus	<i>Microporus xanthopus</i>	
	Agariomycetes		Ganodermataceae	Lentinus	<i>Lentinus sajor-caju</i>	
				Ganoderma	<i>Ganoderma lucidium</i>	
					<i>Ganoderma applanatum</i>	
		Homobasidiomycota		Rigidoporus	<i>Rigidoporus sp</i>	
		Agaricales	Marasmiaceae	Maramius	<i>Maramius androcaseus</i>	
			Hygrophoraceae	Lichenomphalia	<i>Lichenomphalia um umbellifera</i>	
		Boletales	Sclerodermataceae	Scleroderma	<i>Scleroderma sinnamariense</i>	



Figure 2. Types of macroscopic fungi found within the area of Mas Popaya Raja Natural Reserve Islands of Gorontalo Utara Regency

In this study, the most commonly found macroscopic fungi were from Agaricales and Polyporales ordos. Hasan et al., (2022) noted that *Agaricales* is the most usual type of macroscopic fungus found as it can tolerate low moisture and dry condition, whereas in Mas Popaya Raja the habitat is of low temperature moisture and wet condition, thus, *Polyporales* ordo is also commonly found. This proves that there is a different microscopic fungus found due to the habitat difference.

Members of the order *Agaricales* are very widely distributed in habitats and complexes (Tampubolon, 2012) macroscopic fungi of the order *Agaricales* and *Polyporales* are the most common types of macroscopic fungi found because they have large fungi fruiting bodies and are able to adapt to unfavorable weather

for macroscopic fungi growth, this proves that there are differences in the types of macroscopic fungi between one habitat and another and the number of macroscopic fungi.

The macroscopic fungi from Polyporaceae family have the characteristic of fan like body, have pores, some are saprophytes, the shape is half-round, and mostly found in decaying or dead logs (Tambaru et al., 2016). Meanwhile, the Ganodermataceae family has half-round body, has no stem, white color, and lives in decaying log and soil border with mycelium.

Studies on macroscopic fungi have been carried out by (Putra & Astuti, 2021; Wahyudi, et al., 2016) also found that the *Agaricales* ordo lives in forest habitat with different characteristics from *Agaricales*

ordo found in Raja Island of Gorontalo Utara regency.

The diversity of macroscopic fungi in the Raja Island Nature Reserve area of North Gorontalo Regency is caused by environmental factors with the optimal scale for growing and developing macroscopic fungi. Environmental factors in the macroscopic fungi habitat are: sunlight intensity, soil temperature, soil pH, air humidity, and air temperature. Raja Island Nature Reserve Area, North Gorontalo Regency is the largest of the three islands which are in the Mas Popaya Raja Island Nature Reserve area and Raja Island is a primary forest area.

The most noticeable difference is on the substrate of the macroscopic fungi found in Raja Island of Gorontalo Utara has wet environment that is different from the dry environment found in (Putra & Astuti, 2021; Wahyudi, et al., 2016) where they found *Agaricales* in dry substrate. Based on these studies that, the *Agaricales* are dominantly found in Indonesia (Retnowati, et al., 2019). The *Agaricales* macroscopic fungi have very short life-cycle (Retnowati & Susan, 2017).

CONCLUSION

Based on the findings and discussion, the characteristic of

macroscopic fungi found in Mas Popaya Raja natural reserve islands have black, white, brown, and orange color with the shape of cap, tube, round, and ear shape. The habitat of the macroscopic fungi is stable for them to live and grow. The habitat in Mas Popaya Raja natural reserve is appropriate for macroscopic fungi development as it has high biodiversity and is still intact (minimum human activity found within the reserve).

There are ten types of macroscopic fungi found within the Mas Popaya Raja Natural Reserve Islands from two divisions of Ascomycota and Basidiomycota. Types of macroscopic fungi found within the area of the Mas Popaya Raja natural reserve islands are: *Aleuria aurantia*, *Xylaria papyrifera*, *Microporus xanthopus*, *Lentinus sajor-caju*, *Ganoderma lucidium*, *Ganoderma applanatum*, *Rigidoporus sp*, *Maramius androcaceus*, *Lichenomphalia umbellifera*, and *Scleroderma sinnamariense*. The fungi found were dominated by the Basidiomycota division of the Agariomycetes class.

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