p-ISSN 0854-9028 e-ISSN 2549-9343
AGRIC
ejournal.uksw.edu/agric
Vol. 36, No.2, December 2024
Page: 309 - 328

Biodiversity Analysis of Ectomycorrhiza Based on Slope in Sorong Nature Park

Ponisri[1*], Anif Farida[2]
[1] Department of Forestry, Faculty of Agriculture, Universitas Muhammadiyah Sorong, Indonesia
[2]Department of Environmental Engineering Faculty of Engineering,
Universitas Muhammadiyah Sorong, Indonesia
*email Correspondence: ponisri@um-sorong.ac.id

ARTICLE INFO

Article history:
Received: 1 August 2024
Revised: 14 September 2024
Accepted: 25 December 2024

Keywords:
diversity; dominance; ectomycorrhiza; evenness

ABSTRACT

This study aims to identify and analyze the composition and distribution of ectomycorrhizal fungi in Sorong Nature Tourism Park. The method used was field observation or direct observation divided into five plots, namely in a special block of seed sources (where Agathis labelardieri trees are planted as parent trees), tourism blocks, mixed gardens, sloping area protection blocks, and steep area protection blocks. Each plot measured 100 m x 100 m with a total research area of 50,000 m^2 (5 ha). The data collected were analyzed based on each parameter and presented qualitatively and quantitatively in tables and figures. The results showed the presence of 52 species of ectomycorrhizal fungi with 2,577 individuals. The most common species was Marasmiellus candidus, with 188 individuals; the least common species was Tramelia sp2, with only 10 individuals. These findings indicate that environmental factors such as light, temperature, humidity, and vegetation type significantly influence the growth and distribution of ectomycorrhizal fungi. The species diversity index was in the medium category (1.6) with a low dominance index (0.03), indicating that no fungi species dominated significantly. The high evenness index (0.93) also showed that the distribution of ectomycorrhizal fungi was relatively even in the area, reflecting the stability of the fungal community.

INTRODUCTION

Indonesia is a country rich in natural resources and has a high level of biodiversity. Biodiversity includes variations in form, appearance, number, and traits found in living things, including various types of fungi. In addition, macroscopic groups significantly affect food webs, survival, and overall forest health (Priskila et al., 2018). Sumarmono et al. (2023) reported that Indonesia is one of 17 countries with mega biodiversity. Forests in Papua have very high biodiversity, including plant-associated fungi called mycorrhizae (Suharno et al., 2022). Fungal diversity is second only to insects, with around 69,000 fungi being discovered out of an estimated 1,500,000 fungi worldwide (Wahyudi et al., 2016).

Fungi are heterotrophic organisms (Hindersah et al., 2014). Organisms that do not photosynthesize can explore large areas, so these organisms can be found in various types of habitats, ranging from natural environments to areas that have experienced the impact of human activities(Putra et al., 2017; Putra et al., 2018; Putra et al., 2019a; Putra et al., 2019b). Fungi are organisms with a high level of diversity, but their taxonomic identity is still little known (Wu et al.,2019; Hyde et al., 2020)

Fungi play a significant role in ecosystems for biotic and abiotic components. These organisms play an active role in soil formation and fertility by decomposing dead plants and animals, contributing to nutrient cycling (Dighton & White, 2017). Ectomycorrhizal-forming fungi are organisms that play an important role in terrestrial habitats. Most of these fungi are symbiotic with forest plants and are one of the indicators of forest health (Putra dan Nurhayat, 2022). Ectomycorrhizas, with thousands of species distributed worldwide, are highly diverse organisms, yet their taxonomic identity is still little known(Wu et al., 2023; Hyde et al., 2020).

The Sorong Nature Park conservation area is designated as a land conservation area in Sorong City with an area of approximately 945.9 ha based on the Minister of Agriculture Decree no. 397 / Kpts / Um / 5/1981 dated 7 May 1981. This area is essential for the community, especially those in the vicinity, because they depend on forest functions to obtain non-timber forest products such as fruits, medicines, and firewood. These community activities can disturb the biodiversity in the area (Anonim, 2019).

Sorong Nature Park is a forest area with high biodiversity, both for higher and lower plants, as well as ectomycorrhiza. The landscape of this area is very diverse, ranging from secondary dryland forests to mixed gardens; special blocks used are field observations or direct observations divided into five plots, namely in special blocks of seed sources (where *Agathis labelardieri* trees are planted as parent trees), tourism blocks, protection blocks, to conservation

village blocks, steep and sloping areas. Changes in landscape and environmental factors such as humidity and rainy season will affect spore growth. According to previous research, dormant spores during the dry season will grow and germinate to form fungi bodies called fungi fruiting bodies when the rainy season arrives. The rainy season is optimal for fungi growth (Ponisri et al., 2022). Therefore, it is necessary to analyze and determine the distribution of composition, the diversity, dominance, and evenness of ectomycorrhiza, and factors affecting growth on various types of slopes in Sorong Nature Park. Information on ectomycorrhizal diversity in this area can be used for sustainable forest management and restoration of disturbed ecosystems.

METHODS

This research was conducted in the forest of Sorong Nature Park during March-May 2024. The method used was field observation or direct observation divided into 5 research location plots, namely a special block of seed sources (where *Agathis labelardieri* trees are planted as parent trees), tourism blocks, mixed gardens, sloping area protection blocks and steep area protection blocks. Each plot measured 100 m x100 m so that the total area was 50,000 m2 (5 ha).

Research Implementation includes preparation, data collection, and data analysis. In the preparation stage, field orientation was conducted to get an overview of the research location in preparation for the research implementation. The data in this study consisted of primary data and secondary data. The primary data include types of ectomycorrhizal fungi that found in the observation plot were identified. The fungi taken were ectomycorrhizal fungi with large fruiting bodies (macrofungi/mushroom) with hoods at least 0.5 cm in diameter. Fungal fruiting bodies that were too small were not recorded due to difficulties in the identification process. Found fungi were labeled, photographed, and placed in plastic bags containing tissue and camphor, then placed in a cool box and brought to the laboratory for identification. Data collected included:

a. Types of fungi encountered or found were identified directly in the field and the laboratory
b. Number of fungi species and number of individuals of each fungi species
c. Morphological characteristics of the fruiting body of fungi described by fungi (Indriyanto, 2006) are as follows: (1) Hood (cap, pileus) and stalk (stipe): size, color shape, and moisture/freedom; (2) Gills (gills, lamellae): color, additional tools; (3) Ring (annulus, cortina): presence or absence and shape 4; (4) Meat (flesh): color, texture; (5) Cup (volva): presence or absence and shape 5; (6) Odor: pungent, termite odor, foul odor, unpleasant and pleasant.

Secondary data was collected directly in the field, and data on the condition of the Sorong Nature Park forest based on previous research results, literature, reports, and writings from relevant parties or agencies were also used. These data include the research location's general condition, climatic conditions, soil, land, vegetation, and other relevant data.

The data taken were analyzed according to each parameter and described qualitatively and quantitatively and presented in the form of tables and figures. Data analysis for parameters, species diversity of ectomycorrhizal fungi are as follows:

1. Species Diversity of Ectomycorrhizal Fungi

To determine the species diversity of ectomycorrhizal fungi as an indicator of the quality of each forest condition, the species diversity index (H′) is used with the equation of Shanon and Wiener in Indriyanto, (2006):

$$H' = -\Sigma \left[\frac{ni}{N}\right] \log \left[\frac{ni}{N}\right] \text{.....(1)}$$

Description:

H′ = Diversity Index (Shanon Index)
ni = Number of individuals of a species
N = Number of individuals of all species

Diversity index criteria according to Fahrul (2007) as follows:

Value H′ > 3 High species diversity
Value H′= 1 d"H d"3 Medium species diversity
H′ value < 1 Low species diversity

2. Domination of Ectomycorrhizal Fungi Species

To determine whether ectomycorrhizal fungi individuals are more concentrated in one or several types of fungi, the Dominance Index (C) in Indriyanto (2006) is used as follows:

$$C = \sum \left[\frac{ni}{N}\right]^2 \text{.....(2)}$$

Description:

C = Dominance index
ni = Number of individuals of a species
N = Number of individuals of all species

Analysis was also carried out by tabulating the density of individuals of each type of ectomycorrhizal fungi in each forest condition studied. The results of the analysis are expressed in the number of individuals to describe the dominance of each type of ectomycorrhizal fungi identified.

The criteria for the Dominance Index in Indriyanto (2006) are as follows:

0.00 < C d" 0.30 low dominance,
0.30 < C d" 0.60 moderate dominance,
0.60 < C d" 1.00 high dominance.

3. Evenness of Ectomycorrhizal Fungi Species

To determine the evenness of ectomycorrhizal fungi species in the research plot, an analysis was conducted using the species evenness index (e) of Pielou (1966) in Indriyanto (2006):

e=H/Log S.....(3)

Description:

e = Species evenness index
H = Species diversity index
S = Number of species

The criteria for the evenness index according to Krebs (1978) in Odum (1996) that the value of high evenness when e => 0.6, moderate evenness e = 0.4 < e d" 0.6 and low evenness when e = 0 < e d" 0.4.

RESULTS AND DISCUSSIONS

A. Composition and Distribution of Ectomycorrhizal Fungi in Sorong Nature Park

The results of field observations showed that the composition of fungi found in the 5 research plots were 52 species with a total of 2,577 individuals with each slope condition can be seen in the Table 1.

Based on the table, there are 577 individuals with 15 species, the most is Trametes ochracea with 65 individuals (11.27%), while the least is Lactarius corrugatus with 12 individuals (2.08%). This area is dominated by Vatica papuana and Pometia pinnata trees, with a slope of 45% which is classified as steep, thus affecting the growth of ectomycorrhizal fungi, apart from the vegetation that grows there. According Yunida dan Syamswisna (2014), environmental light intensity greatly affects the number of fungi species, and this difference occurs due to the condition of the research location and the type of vegetation in the Sorong Nature Tourism Park area.

Table 1. Species of Ectomycorrhizal Fungi in the Seed Source Block (*Agathis labillardieri* Plant Block)

No	Species of ectomycorrhiza	Total	Percentage (%)
1	*Scleroderma citrinium*	8	1,14
2	*Hygrocybe miniate*	12	1,71
3	*Earliella scabrosa*	16	2,29
4	*Crepidotus fusisporus*	37	5,29
5	*Ganoderma lucidium*	26	3,71
6	*Hirchioporus abietinus*	21	3,00
7	*Cookeina sulcipes*	57	8,14
8	*Lentinus squarrosulus*	28	4,00
9	*Marasmius androsaceu*	47	6,71
10	*Ganoderma sp.*	28	4,00
11	*Marasmiellus candidus*	65	9,29
12	*Tremella globisporai*	29	4,14
13	*Trametes hirsute*	47	6,71
14	*Cariolus pubescens*	57	8,14
15	*Ramaria sp[1]*	14	2,00
16	*Pynocorpus sp.*	63	9,00
17	*Crepidotus mollis*	76	10,86
18	*Pycnoporus sanguineus*	69	9,86
	Total	700	100,00

Table 3. Species of Ectomycorrhizal Fungi in Tourism Blocks

No	Species of ectomycorrhiza	Total	Percentage %)
1	*Crepidotus mollis*	65	18,57
2	*Dacryopinax spathularia*	17	4,86
3	*Coltricia perennes*	55	15,71
4	*Coprinus sp[1]*	21	6,00
5	*Collybia aurea*	37	10,57
6	*Oudemansiella radicata*	32	9,14
7	*Rigidoporus microporus*	27	7,71
8	*Crepidotus fusisporus*	39	11,14
9	*Microporus sp.[1]*	28	8,00
10	*Fomitopsis durescens*	29	8,29
11	*Crepidotus mollis*	65	18,57
	Total	350	100,00

Based on the Table 3, there are 11 species and 350 individuals in the tourism area. The largest species is Crepidotus mollis with 65 individuals (18.57%), while the least is Coprinus sp1 with 17 individuals (4.86%). This area has a slope of 25% and is dominated by Vatica papuana and Agathis labillardieri vegetation, with a rather open canopy cover, thus affecting the number of fungi that grow. According to Arief et al. (2007) in (Putri, 2020), light intensity is very influential on fungal reproduction, where differences in light intensity in each location are caused by uneven canopy closure.

In the Table 4 above, there are 3 species with a total of 68 individuals growing in sandy habitat conditions and low humidity because they are in mixed gardens planted by the community. This shows that these three species are able to adapt to extreme areas even though habitat conditions are not favorable for their growth. This is because the location is a mixed garden with open canopy conditions. In accordance with the opinion of Putri (2020), several types of fungi are able to adapt to environmental conditions that are less supportive of their growth.

In the Table 5 above there are 26 species with a total of 915 individuals. the highest number is *Crepidotus versutus* and *Marasmiellus candidus,* which is 65 individuals (7.10%). The dominant vegetation is *Artocarpus champeden* which has a fairly dense crown

Table 4. Species of Ectomycorrhizal Fungi in Mixed Gardens

No	Species of ectomycorrhiza	Total	Percentage %)
1	*Ramaria sp[2]*	17	25,00
2	*Hygrocybe miniate*	29	42,65
3	*Phaeollus schweinitzil*	22	32,35
	Total	68	100,00

closure, thus causing good spore dispersal due to humid conditions on a 20% slope. This is also caused by differences in environmental factors in each region, both biotic and abiotic environments, which affect the growth of fungi (Myasari et al., 2015). The highest number found in the five research plots was the species *Marasmiellus candidus*, which was 188 individuals showing high adaptability to the environment.Rikardo et al., (2021) also reported that fungi usually grow in various types of habitats such as soil, wood, litter, and others. One ecosystem that is often overgrown with fungi is the forest, because the high humidity makes fungi easily adapt. While the least is *Tramelia sp*[2] 10 individuals, it may be influenced by the type of dominant vegetation and land slope.

B. Index of Diversity, Dominance and Evenness of Ectomycorrhizal Fungi Species

The level of diversity, dominance and evenness of ectomycorrhizal fungi species in the Nature Tourism Park area is presented in Figure 1.

Figure 1 shows that the level of species diversity is 1.6 and is included in the medium category. This is because it is influenced by habitat conditions and different slope levels, which are between 20-45%. Wahyuni (2002) in Kasongat et al., (2019) reported that species richness is an indicator of diversity which is influenced by the number of species and individuals of macro fungi in each observation plot. Suza et al., (2017) reported that variations in environmental factors affect the taxonomy and functional composition of ectomycorrhiza in various types of stands.

The dominance index of 0.03, which is in the low category, shows that there are no ectomycorrhizal fungi that dominate the area, which is influenced by temperature, humidity, sunlight and land conditions. Rahmadani (2019) reported that most fungi grow at temperatures between 0-35°C. The

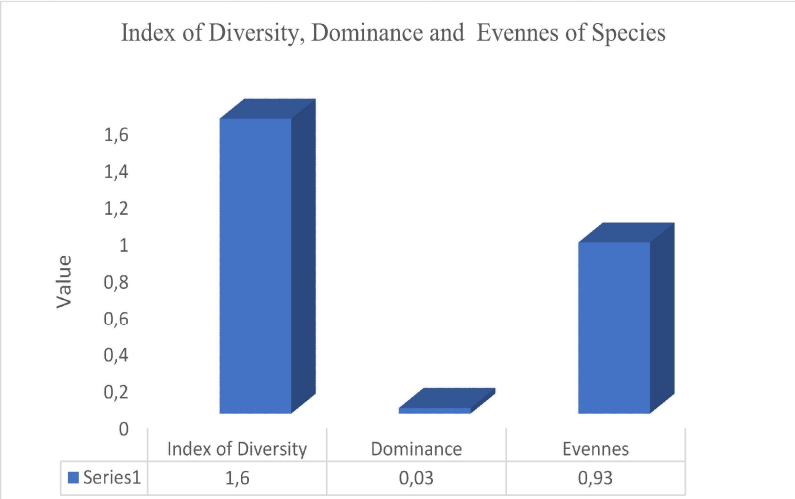


Figure 1. Diversity, dominance and evenness of species

optimal temperature for fungal growth is 20-30°C, so fungi are very suitable to live in shady, cool, and humid areas, such as those found in tropical rainforests with temperatures around 30°C.

The species evenness index of 0.93 and classified as high indicates that the distribution of ectomycorrhizal fungi in the area tends to be evenly distributed Baderan et al., (2021) state that a high species evenness index in a plant community indicates that the distribution of each plant species in the area is quite even. In other words, no plant species dominates and all species have almost the same number of individuals. This situation reflects the stability of the plant community. Priskila et al., (2018) stated that the habitat of fungi in the forest lies in wood and litter rich in organic matter. Forests provide an ideal ecosystem for fungi because the environmental conditions, both biotic and abiotic factors, are adequate. In addition, the humidity of the forest supports the growth of fungal spores there.

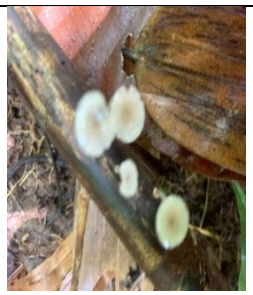
C. Morphology of Ectomycorrhizal Fungi

The types of ectomycorrhizal fungi found in the forest of Sorong Nature Tourism Park are as follows:



1.Earliella scabrosa

The *Earliella scabrosa* fungus found by researchers is semicircular. The color is blackish brown and the edges are white. The edge shape is horizontal with a wavy surface. The top is dull in color and the bottom has fine pores. The texture of the fungi body is hard like wood. But when it is



2.Crepidotus fusisporus

Crepidotus fungi are small fungi that usually only measure 0.5- 2 centimeters. The hood is initially white and the surface is smooth, but as it ages, the hood becomes more beige-brown in color and gets rougher and drier. The fruiting body is small and pure white in color. This fungus has a thin



3.Cariolus pubescens

The fruit body is aplanate with varying colors of yellow, brown, dark brown, and white edges. It has circular lines like annual circles, the surface is smooth and dry. It has a diameter of 10-11 centimeters. The surface of this fungus is slippery and smooth and thin. This fungus grows on barren wood daha.

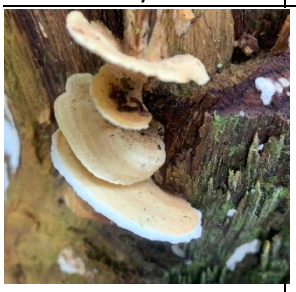


4.Ramaria sp[1]

Body Shape: The fruiting body is shaped like a coral reef, with branching and widening branches. Color: The color of the fruiting body varies, such as yellowish white, yellowish pink, orange, reddish, or even purplish. Habitat: This fungus grows on moist dead wood or live logs, especially on hardwood trees such as

mature, this fungus will be blackish with white edges. This fungus has no stipe (stalk), no annalus and volva. It can be found living in groups and sometimes overlapping. It can be found in rotting wood or dead logs	and long stem according to the size of the hood. The larger the hood, the larger the stem. This fungus is categorized into fungi that cannot be consumed	Coriolus fungi usually form large groups, overlapping each other, but there are also those that grow individually on logs. The surface of Coriolus is smooth like velvet and some are smooth. The color varies greatly, greenish black, grayish blue, brownish gray or brownish yellow, mixed with whitish cream. Taste and odor are nothing special. The fruiting body is sharply rounded, white, yellowish light or brown. The spores are yellowish and ellipsoid. Habitat on wood leaves and live throughout the year.	Acacia spp., Fagus spp., Quercus spp., and some species of the Juglandaceae family. Distribution: This fungus is found in all parts of the world, including Indonesia, with a wide habitat covering the southeastern to northern parts of the Americas, eastern Africa, Malaysia, the Australian continent, and Indonesia. Morphological Characteristics: The fruit body has a rather flat surface and curled edges, with a rather hard pulp that gets thinner towards the edges.
			
13.Lentinus Squarrosulus, Belonging to the family *Polyporaceae* and order *Agaricales*, these fungi have tough, white flesh. They are commonly found on dead wood, typically in forests or open areas, where they grow as decomposers.	***14. Pynocorpus sp*** This fungus is found attached to dead wood and has an orange coloration. It grows either solitarily or in clusters and possesses a hard body structure. *Pycnoporus* sp. features a smooth, shiny surface and a kidney-shaped pileus	***15.Schizophyllum sp*** Shaped like a flower, this fungus has fine, soft hairs and a creamy-gray coloration, with a diameter ranging from 0 to 5.4 cm. It grows on decayed wood and can be found across three different land cover types.	***16.Coltricia Perennes*** This fungus has a funnel-shaped fruiting body that is thin and leathery in texture, with a velvety surface marked by concentric rings in white and brown hues. Its natural habitat is decayed wood, where it anchors with pseudoroots. It lacks a ring and volva and has a short,

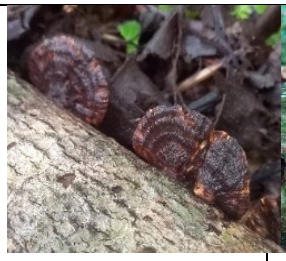
	with smooth edges, measuring up to 10 cm in size.		cylindrical stalk that is white and measures 1–2 cm in length.
			
17.Trametes hirsute	***18.Pycnoporus sanguineus***	***19.Ganoderma multipileum***	***20.Coprinus sp[1]***
The fungus identified by researchers has a fan-shaped or kidney-shaped appearance. The surface of the fruiting body is ridged with a hard, leathery texture. Its coloration is light brown, and the surface features fine hairs. It lacks a fruiting stalk, attaching directly to the substrate through rhizoid-like pseudoroots. This fungus often grows solitarily or in colonies, with overlapping growth patterns commonly observed. Its natural habitat is decayed wood, where it plays a saprophytic role by contributing to wood decomposition. According to (Zulpitasari et al., 2019), fungi found in habitats such as soil, leaf litter, tree trunks, decayed wood, and deadwood function as	Color: The fruiting body is strikingly red-orange, with slight yellow and orange hues. Shape: The fruiting body is shell-like, with a short stalk, almost sessile or very short-stemmed. It grows in clusters and is often layered. Habitat: This fungus thrives on dead or living moist wood, particularly on hardwood trees such as *Acacia* spp., *Fagus* spp., *Quercus* spp., and some species from the *Juglandaceae* family. Morphological characteristics: The fruiting body has a somewhat flat surface with curled edges. The flesh is relatively tough and becomes thinner toward the margins.	Shape: The fruiting body is fan-shaped, with varying sizes. Color: The fruiting body color ranges from purple-brown at the center to yellowish-white at the edges. Habitat: This fungus grows on dead or living moist wood, particularly on hardwood trees such as *Acacia* spp., *Fagus* spp., *Quercus* spp., and some species from the *Juglandaceae* family.Distribution: This fungus is found worldwide, including in Indonesia. Morphological Characteristics: The fruiting body has a smooth, shiny surface, with flesh that is somewhat tough and thins toward the edges.	*Coprinus* is found in colonies on dead tree trunks. The fungus has a brownish pileus with a scaly ornamentation on its surface, making it slightly rough. The pileus has a rounded, smooth (entire) margin. Its hymenophore is of the gill type and is black in color. The fungus has a white, smooth, and fleshy stipe (Figure 19). The diameter of the pileus ranges from 0.3 to 1.3 cm, with a stipe length of about 2 cm. *Coprinus* is a saprotrophic fungus with a short lifespan, and its fruiting body is easily disintegrated. Typically, the spores produced by this fungus are black to dark brown. *Coprinus* is commonly found in various habitats such as soil, wood, leaf litter, and manure

saprophytes in the environment. This fungus is non-edible but is ecologically significant for nutrient recycling in forest ecosystems.			
			
21.Fomitopsis durescens *Fomitopsis durescens* is found growing laterally on the trunk of decayed trees. It has a characteristic morphology with a flat, fan-shaped (flabelliform) or semicircular cap, and it lacks a true stalk. The texture of the fruiting body is hard, with a cap diameter of 4-6 cm. The cap color ranges from light brownish-white to cream. The hymenial surface is porous, colored white to cream, and the margin is anticline. This fungus grows in clustered, layered formations, with a thickness of 1-2 cm	***22.Microporus sp[1]*** Shape: The fruiting body is fan-shaped, with a size of 2-4 cm. Color: The fruiting body is reddish-brown, with white edges. Habitat: This fungus grows on decayed wood branches and soil. Morphological Characteristics: The fruiting body has a smooth, shiny surface, with flesh that is somewhat tough and thins toward the edges. Root Type: The fungus has rhizoid-like pseudoroots. Distribution: This fungus is found in various regions, including Indonesia.	***23.Rigidoporus microporus*** This fungus is known as the "white root fungus." Its color varies, ranging from purple-yellow, red, cream, to white. The edges are slightly serrated, and its surface is rough and somewhat jagged. *Rigidoporus* is a harmful fungus to plants, affecting crops like rubber, quinine, and pine. When infected by this fungus, the plants will eventually die. *Rigidoporus* has an aplanate (flattened) fruiting body with a varied color, including brown, dark brown, and white. Its edges are uneven (serrated), and its surface has a semicircular shape. It typically grows on the trunks of living trees.	***24.Collybia aurea*** This fungus is yellow in color, with a convex cap that features a central point. The surface of the fungus is shiny, as if coated with wax, and the edges are smooth and even. It has a cylindrical stem that is yellow-brown. The fungus is odorless. *Collybia* fungi typically produce strikingly colored spore prints, such as yellowish, red, and reddish-yellow. The cap is bell-shaped (clok) and supported by a stem. This fungus is commonly found growing in clusters on living or decaying wood. While some species are edible, others can be toxic. Its spores are white, ellipsoid, smooth, and inamyloid..



25.Marasmiellus sp.

Marasmiellus has a pileus that is yellowish-white in color, measuring 1-2.5 cm in diameter. The pileus has a smooth texture with crenated edges. The hymenophore is of the gill type, with widely spaced lobes. This fungus has a short stipe, colored from cream to brownish.



26.Trichaptum sp

Family: *Polyporaceae*
Genus: *Trichaptum*
The cap is semicircular or fan-shaped, with concentric grooves in a brown color. The margin is wavy and curved. The fungus has a tough flesh, and the gills become split at the edges as it ages. This species is found growing on dead trees and does not have a volva or ring on the stem.



27.Pycnoporus sp[1]

The fruiting body is fan-shaped, hard, and glossy, with a reddish-brown color. The edges are wavy, and there are black, fibrous streaks on the cap surface. It grows in colonies on decayed wood.



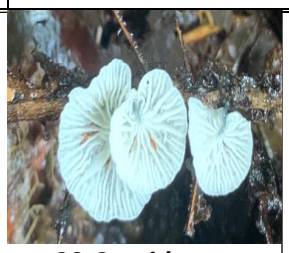
28. *Tramelia sp[2]*

The fungus cap is coral-shaped, pink and white in color, with a gel-like texture. It is round in shape, resembling the flower of the *Mimosa pudica* plant (sensitive plant).



29.Coprinopsis sp

The hymenium is gill-shaped, meaning that the spores are formed on a surface with pores. The cap is egg-shaped, which is characteristic of the *Coprinopsis* genus. Its hymenium is free, indicating that the spores are not



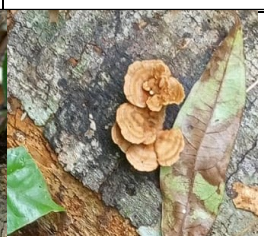
30.Crepidotus versutus

The pileus typically has a diameter of 5-14 mm. Initially, it is resupinate (flattened) but later becomes inverted. The pileus attaches to the dorsal or lateral part of the substrate. It is fan-shaped or kidney-



31.Marasmius androsaceus

This fungus can dry out under certain conditions, but it can regain moisture when the environment stabilizes. *Marasmius* fungi generally have long stems and small caps. The shape of the cap can be convex or flat, with a wrinkled



32.Trametes ochracea

Family and Order: *Trametes ochracea* belongs to the *Polyporaceae* family and the *Polyporales* order.
Habitat: This fungus grows on dead standing or fallen wood, especially on trees.
Shape: The fruiting

. attached to a specific structure like the stipe (stem) or cap. The fungus has a bare stalk, meaning it lacks any supporting or structural elements beneath the fruiting body. The spore print is black, resulting from rapid spore formation and the dissolution of the fruiting body into black liquid	shaped, dry, white, and covered with fine, soft hairs that may be tangled or not. The outer edge is slightly curled inward. The context is thin, soft, and white. Both the odor and taste of this fungus are mild. The gills radiate from an eccentric or lateral attachment point, are somewhat wide, and tend to swell at the center. The gills are closely spaced, with many short gills (lamellulae) that do not reach the attachment point. Initially, the gills are white but later turn rusty brown. The spore print is cinnamon-brown in color.	surface, in colors such as pinkish-white, cream, or brownish, and the apex is distinguishable by a different color. The stem is black, with hair-like structures, stiff, and somewhat hard. The flesh can be thin or thick, depending on the cap, and the spore print is white. This fungus is typically found on dead twigs and leaves, where it anchors its mycelium. *Marasmius* fungi are inedible because they contain toxins.	body is fan-shaped, ranging from 1.5 to 5 cm in size, often overlapping. Color: The fruiting body is dark brown in the center and light brownish-white at the edges, with consistent coloration throughout. Morphological Characteristics: The fruiting body has concentric ring-like lines, resembling annual growth rings, with varying colors. Bark: The fungus has a smooth bark and is often found overlapping other fruiting bodies.

			
33.Lactarius gerardii	***34.Lactarius corrugatus***	**35.*<u>Trametes nivosa</u>***	***36.Phaeollus schweinitzil***
Lactarius is derived from the word "lac" (latex), which is why this fungus is often referred to as "latex cap" due to its ability to release a milky sap when the fruiting body is damaged. The genus *Lactarius* is easy to recognize. To identify which of the approximately 400 species belong to the *Lactarius* genus, one typically looks at the shape of the cap, whether it is smooth, velvety, or rough at the edges, especially in young specimens. The color of the cap, which can be white, cream, orange, or light yellow, is another characteristic used for identification, as well as the spacing between the caps..	This fungus grows in limited groups and has a fruiting body consisting of a cap, gills, and a stem (stipe). The cap is dark brown when young and becomes lighter as it matures. Its surface is smooth and wrinkled, with a flat edge and margin. The fungus has a gill-type hymenophore, with attachment ranging from adnate to decurrent. The gills secrete creamy latex. The stem is cylindrical, with consistent thickness from top to base. The stem is brown, with the basal part being white to cream, without a ring, smooth surface, attaching to the cap centrally. The attachment to the substrate is via rhizomorphs, and the stem is solid (not hollow).	Shape: *Trametes nivosa* has a fan-shaped fruiting body. Color: The fruiting body is dark brown to black in the center and light brown to white at the edges. Habitat: This fungus is found on dead or decaying tree trunks. Morphological Characteristics: The fruiting body features concentric ring-like lines resembling annual growth rings, with varying colors. Function: This fungus plays a role in the decomposition process of wood.	The species identified is *Phaeolus schweinitzii*. This fungus has a semi-circular fruiting body, with a somewhat firm texture and wavy edges. The cap is yellowish-white, while the underside of the cap is white. The stem is short. This fungus typically grows on decaying wood. It is not edible and occurs as a single species. According to Suryani et al. (2022), *Phaeolus schweinitzii* has a fan-shaped body, with a surface that is brown to black, while the base is brownish or orange. It is found on decaying wood and is not suitable for consumption.



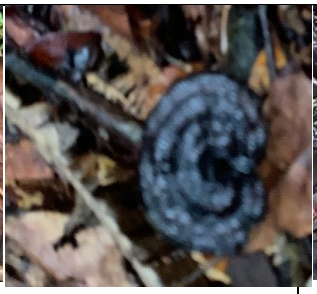
37. Ganoderma tornatum

This fungus has a rigid and hard texture, with a rack-like appearance. Its upper surface is dark brown, and it has a lighter appearance overall. It features a thin, shiny layer resembling horn, which distinguishes it from *G. applanatum*. This fungus does not have a long and thin stem like *G. cochlea*.



38. Phellinus sp

The cap of this fungus is half-circle or claw-shaped, with a dark gray, almost black color and thick margins. The flesh and cap are hard, with a rust-brown color. It can grow on living host trees for many years. This species is found on dead trees and is parasitic on a variety of deciduous trees.



39.Amauroderma rugosum

Amauroderma rugosum (Torrend is a black-colored fungus. The fruiting body is kidney-shaped, with a wrinkled surface and a margin attachment. This fungus has a stipe (stem), but lacks a defined cap, cap surface, lamella, and annulus. Its habitat is on wood. The diameter of the cap is approximately 2-5.3 cm.



40.Microporus sp[2]

This fungus is semi-circular or fan-shaped with a soft texture. The body surface is wrinkled, and it has a combination of yellowish-white colors. It features a short stipe located at the end of the cap. This fungus thrives on decaying wood and is represented by 5 species.



41.*Tramella globisporai*

The fruiting body of this fungus is gelatinous, hyaline, and pustule-shaped, with a diameter up to 0.5 cm, though it can occasionally grow larger (up to 1 cm) when merging. They emerge from the



42.Dacryopinax spathularia

The fungus identified as Dacryopinax spathularia easily recognizable when it grows in the surrounding environment, even though it is small in size. This type of fungus is saprophytic



43.Trametes versicolor

Body Shape: The fruiting body has a fan-like shape, with varying sizes.
Color: The fruiting body color varies, including pale yellowish-white, yellowish-pink, orange, reddish, or even



44.Trametes sanguinea

Habitat: This fungus grows on standing or fallen dead wood, especially on coniferous trees.
Body Shape: The fruiting body is fan-shaped, ranging in size from 1.5 to 5 cm.
Color: The fruiting body

perithecia of their host. Microscopically, the basidia are tremeloid (ellipsoid, with oblique septa), containing 4 cells, and measure 10 to 18 x 9 to 13 µm. The basidiospores are subglobose, smooth, and measure 6 to 8 x 6 to 7 µm.

and lives by attaching directly to its substrate. It typically grows in large clusters and is usually found on decaying or dead wood.

purplish.
Habitat: This fungus grows on decaying wood or damp living tree trunks, particularly on hardwoods such as *Acacia spp.*, *Fagus spp.*, *Quercus spp.*, and some species from the *Juglandaceae* family.
Distribution: This fungus is found worldwide, including in Indonesia.
Morphological Characteristics: The fruiting body has a smooth and glossy surface, with firm flesh that becomes thinner at the edges.

is reddish-brown in the center and pale brown at the edges.
Morphological Characteristics: The fruiting body features concentric ring-like lines with varying colors, resembling growth rings.



45.Ganoderma sp

The fruiting body color is reddish-brown or dark brown on the upper surface, with the underside being pale yellowish-white. It inhabits decayed wood and has the potential to infect the root tissues of its host plants.



46. Cantharellus sp[1]

The fruiting body is purple-white, with the center being brownish, and has a chewy texture. The surface of the fungus is wavy. It grows on dead bark.



47..Tramelia sp[1]

The fruiting body is gelatinous and gel-like, small in size (less than 5 mm in width), and pustular in shape. It has various forms such as lobes, cephaliform (brain-like with folds and ridges), or foliose (resembling leaves or fronds like seaweed).



48.Oudemansiella radicata

This fungus has a light brown to yellowish cap, with the center being darker brown. The surface is smooth, convex, and fragile. The edge of the cap is serrated, and the underside has closely spaced lamellae that are attached to the stipe. The stipe is cylindrical and yellowish-brown in color. This fungus is found on decaying trees and leaf litter.

			
49.Hygrocybe cantarellus	***50. Amanita phallloides***	***51.Ramaria sp[2]***	***52.Polyporus sp[1]***
The fungus has a round cap that is red in color, with a smooth surface. The fruiting body resembles an umbrella, with a smooth texture. The lamella (gills) are branched, with attachment at the center. The fungus has a stipe (stem) but lacks an annulus (ring). It grows in soil, and the diameter of the cap is around 0.8–1 cm.	The fungus is white in color, with a cap and stem that is cylindrical in shape. Its texture is smooth, resembling an umbrella, and the diameter of the cap ranges from 3 to 6 cm. It grows on dead trees or decaying organic matter (litter).	The fungus has a coral-like shape and is dark brown to black in color. It grows on sandy soil.	The fungus is yellowish-brown in color at the center, with a fan-like shape, and directly attaches to decayed trees.

CONCLUSIONS AND RECOMMENDATION

The composition and distribution of ectomycorrhizal fungi in the Sorong Nature Park area show the presence of 52 species with a total of 2,577 individuals spread across five research plots with varying slope conditions. The diversity index is moderate (1.6), the dominance index is low (0.03), and the evenness index is high (0.93), indicating a relatively even distribution of ectomycorrhizal fungi in the area, reflecting the stability of the fungal community. Environmental factors influencing this distribution include temperature, humidity, light intensity, and vegetation types, which vary due to differences in canopy cover and diverse habitat conditions. These factors also affect the number and species of fungi growing in each plot of the Sorong Nature Park.

REFERENCES

Anonim. 2019. *Statistik Direktorat Jenderal Konservasi Sumber Daya Alam dan Ekosistem Tahun 2018*. Kementerian Lingkungan Hidup dan Kehutanan Direktorat Jenderal Konservasi Sumber Daya Alam dan Ekosistem. Jakarta.

Annissa, I., Ekamawanti, H. A., & Wahdina. 2017. Keanekaragaman Jenis Jamur Makroskopis di Arboretum Sylva Universitas Tanjungpura. *Jurnal Hutan Lestari*, *5*(4), 969–977.

Baderan. D.W.K, Rahim.S, Angio.M, S. A. I. . 2021. Keanekaragaman, Kemerataan, Dan Kekayaan Spesies Tumbuhan Dari Geosite Potensial Benteng Otanaha Sebagai Rintisan Pengembangan Geopark Provinsi Gorontalo. *Available Online At AL-KAUNIYAH: Jurnal Biologi*, *14*(2), 264-274. Https://Doi.Org/Https://Doi.Org/10.15408/Kauniyah.V14i2.16746

Dighton, J. And White, J. 2017. *The Fungal Community: Its Organization And Role In The Ecosystem* (Ke-4 CRC).

Fahrul. 2007. *Metode Sampling Bioekologi*. Penerbit PT. Bumi Aksara. Cetakan Pertama. Jakarta.

Hindersah R.W. Rachman, B. N. F. Dan D. N. 2014. Populasi Bakteri Dan Jamur Pada Rizofer Caisim (Brassica Juncea) Yang Ditanam di Tanah Dikontaminasi Insektida Organoklosin Setelah Aplikasi Konsorsia Mikroba dan Kompos. *Agrologia*, *3*(2), 75–82.

Hyde, K. D., Chethana, K. W. T., Jayawardena, R. S., Luangharn, T., Calabon, M. S., Jones, E. B. G., Lumyong, S. 2020. The Rise of Mycology In Asia. *Scienceasia*, *465*(1), 1–11. Https://Doi.Org/Https://Doi.Org/10.1093/Oso/9780198849513. 003.0002

Indriyanto. 2006. *Ekologi Hutan*. Penerbit PT Bumi Aksara. Cetakan Pertama .Jakarta

Kabupaten Sorong Dalam Angka Tahun 2007. 2008. Badan Pusat Statistik.

Kasongat, H., Gafur, M. A., & Ponisri, P. 2019. Identifikasi dan Keanekaragaman Jenis Jamur Ektomikoriza Pada Hutan Jati di Seram Bagian Timur. *Median/: Jurnal Ilmu Ilmu Eksakta*, *11*(1), 39-46. Https://Doi.Org/10.33506/Md.V11i1.461

Myasari, IM, Linda, R, & K. 2015. Jenis-Jenis Jamur Basidiomycetes di Hutan Bukit Beluan Kecamatan Hulu Gurung Kabupaten Kapuas Hulu. *Jurnal Protobiont.*, *4*(1), 22-28.

Odum, E. 1996. *Dasar-Dasar Ekologi.* UGM Press. Yogyakarta.

Ponisri, P., Bleskadit, H., & Irnawati, I. 2022. Keanekaragaman Jenis Jamur Ektomikoriza di Taman Wisata Alam Bariat Kabupaten Sorong Selatan. *Agrifor*, *21*(1), 75. Https://Doi.Org/10.31293/Agrifor.V21i1.5868

Priskila., Ekamawanti, H, A., Herawatinigsih, R. 2018. Keanekaragaman Jenis Jamur Makroskopis di Kawasan Hutan Sekunder Areal Iuphhk-Hti Pt. Bhatara Alam Lestari Kabupaten Mempawah. *Jurnal Hutan Lestari*, *6*(3). Https://Doi.Org/DOI: Http://Dx.Doi.Org/10.26418/Jhl.V6i3.26953

Putra, I.P., Amelya, M.P., Nugara, N.H., & Zamia, H. 2019. Notes of Some Macroscopic Fungi At IPB University

Campus Forest. *Diversity and Potency. Biota*, *12*(2), 57-71. Https://Doi.Org/Https://Doi.Org/10.20414/Jb.V12i2.192.

Putra, I.P., Mardiyah, E., Amalia, N.S., & Mountara, A. 2017. Ragam Jamur Asal Serasah dan Tanah di Taman Nasional Ujung Kulon Indonesia. *Jurnal Sumberdaya Hayati*, *3*(1), 1–7. Https://Doi.Org/Https://Doi.Org/10.29244/Jsdh.3.1

Putra, I.P., Nasrullah, M.A., & Dinindaputri, T. A. 2019. Study on Diversity and Potency of Some Macro Mushroom at Gunung Gede Pangrango National Park. *Buletin Plasma Nutfah, 25*(2), 1-14.Https://Doi.Org/Http://Dx.Doi.Org/10.21082/Blpn.V25n2.2019.P1-14.

Putra, I.P., Sitompul, R., & Chalisya, N. 2018. Ragam Dan Potensi Jamur Makro Asal Taman Wisata Mekarsari Jawa Barat. *Al-Kauniyah: Jurnal Biologi*, *11*(2), 133–150. Https://Doi.Org/Http://Dx.Doi.Org/10.15408/Kauniyah.V11i2.6729.

Putra,I.P dan Nurhayat, O. 2022. Keragaman dan Potensi Jamur Ektomikoriza di Kawasan Hutan Penelitian Haurbentes Jawa Barat. *Researchgate.: Https://Www.Researchgate.Net/Publication/361808377.* Https://Doi.Org/DOI: 10.20886/Jped.2022.8.1.1-16.

Putri.T.A. 2020. Identifikasi Jamur Makroskopis Di Taman Wisata Alam Deleng Lancuk Kabupaten Karo Sumatera Utara. In *Program Studi Biologi Fakultas Sains dan Teknologi Universitas Islam Negeri Sumatera Utara Medan. Skripsi (Online)*.

Rahmadani, A. 2019. Karakteristik Jamur Makroskopis di Stasiun Penelitian Soraya Kawasan Ekosistem Leuser Sebagai Media Pembelajaran Pada Materi Fungi. In *(Doctoral Dissertation, UIN Ar-Raniry Banda Aceh).*

Rikardo.R, Ekyastuti.W, W. R. 2021. Keanekaragaman Jenis Jamur Makroskopis di Bukit Tungkur Desa Riam Mengelai Kecamatan Boyan Tanjung Kabupaten Kapuas Hulu. *Jurnal Hutan Lestari*, *9*(1), 55–66. Https://Doi.Org/Http://Dx.Doi.Org/10.26418/Jhl.V9i1.46024

Suharno, Rahayu, I., Tanjung, R. H. R., & Sufaati, S. 2022. New Record Of Arbuscular Mycorrhizal Fungi (AMF) Association With Kebar Grass (Biophytum Petersianum Klotzsch.) In The Grassland Area of Kebar, Tambrauw Regency, West Papua, Indonesia. *Journal of Tropical Biodiversity and Biotechnology*, *7*(2), 1–15. Https://Doi.Org/10.22146/Jtbb.70021

Sumarmono, J., Kusuma, R. J., Rahayu, N., Sukarno, A.S., & Wulansari, P. D. 2023. Metagenomic Analysis of The Microbial Community in Kefir Grains From Different Milk Sources. *Biodiversitas*, *24*(10), 5302–5308. Https://Doi.Org/10.13057/Biodiv/D241011

Suza, LM. Kallowb, S. Reedc, K. Bidartondoa, MI. Barsoum, N. 2017. Pine Mycorrhizal Communities in Pure and Mixed Pine-Oak Forests: Abiotic Environment Trumps Neighboring Oak Host Effects.

Forest Ecology and Management, *406*, 370–380.

Wahyudi, T.R, Rahayu, Dan A. 2016. *Keanekaragaman Jamur Basidiomycota di Hutan Tropis Dataran Rendah Sumatera, Indonesia (Studi Kasus di Arboretum Fakultas Kehutanan Universitas Lancang Kuning Pekanbaru.* Https://Doi.Org/DOI:Https://Doi.Org/10.31849/Forestra.V11i2.148

Wu, B., Hussain, M., Zhang, W., Stadler, M., Liu, X., & Xiang, M. 2019. Current Insights Into Fungal Species Diversity and Perspective on Naming The Environmental DNA Sequences of Fungi. *Mycology, 10*(3), 127–140. Https://Doi.Org/Https://Doi.Org/10.1080/21501203.2019.1614 106

Wu Wu R, Zhou L, Qu H, G. Z. 2023. Pembaruan Padaskleroderma: Empat Baru Spesies Bagiansklerodermadari Tiongkok Barat Daya. *Keanekaragaman.*, *15*(6), 775. Https://Doi.Org/Https://Doi.Org/DOI: 10.3390/D15060775;

Yunida.N, Syamswisna, Y. L. 2014. Inventarisasi Jamur di Gunung Senujuh Kabupaten Sambas dan Implementasinya Dalam Pembuatan Flash Card. *Jurnal Pendidikan dan Pembellajaran Khatulistiwa*, *3*(10).Https://Doi.Org/Http://Dx.Doi.Org/10.26418/Jppk.V3i10.7502

Zulpitasari, M., Ekyastuti, W., & Oramahi, H. A. 2019. Keanekaragaman Jenis Jamur Makroskopis di Bukit Wangkang Desa Sungai Ambawang Kabupaten Kubu Raya. *Jurnal Hutan Lestari*, *7*(3), 1147-1157.Https://Doi.Org/10.26418/Jhl.V7i3.37270

***