

# Diversity of macrofungi on wood in forest nature reserve of bojonglarang jayanti cianjur west java

## Abstract

This study was conducted to determine the Diversity of macrofungi growing on wood substrates in Block Cisela Lowland Forest Nature Reserve Bojonglarang Jayanti, Cianjur, West Java. Fungi is a nucleated organisms, sporated, lacking chlorophyll and its cell wall composed of cellulose or chitin. Wood is a good habitat for mold growth. This research was conducted in may 2015 using roaming method by exploring the entire region along 300-meter transect line, left to right along 5meter and 5meter length. Field data capture was done by establishing 5 stations. The results of the research which has been conducted provided 19 types of fungi that grow on timber substrate, namely, *Auricularia polytricha*, *Boletinellus meruloides*, *Campanella junghuhnii*, *Favolaschia cyathae*, *Ganoderma lucidum*, *Marasmiellus Candidus*, *Marasmiellus ramealis*, *Marasmiellus sp.*, *Microporus xanthopus*, *Phellinus noxious*, *Polyporus alveolar*, *Polyporus, arcularius Polyporus melanopus*, *tenuiculus Polyporus*, *Schizophyllum sp.*, *Trametes sp.*, *Trametes versicolor*, *Tyromyces chioneus*, *xylaria apiculata*, *xylaria hypoxylon*, *Trametes versicolor* mushrooms were found most often at every station.

**Keywords:** macrofungi, wood substrates, nature reserve bojonglarang Jayanti, diversity

## Introduction

Astronomically, Indonesia is an archipelago located between 6°LU-11°LS and 95°BT-141°BT. Based on the location, Indonesia has a tropical climate, the characteristics of which has high rainfall, the sun shines throughout the year, humidity is quite high and has a large tropical rain forests. One area in West Java which have tropical rain forest vegetation is Bojonglarang Jayanti reserve nature forests.

Geographically, Bojonglarang Jayanti Preserve Forest is in South Cianjur of West Java Province, precisely between: 7° 29 '12 - 7° 30 ' 11 "LS and 107° 25 '13 107° 25 ' 12" BT. Natural boundaries to the length of 2.65km, 13.63km length of artificial boundaries, administratively located in two villages namely Cidamar and Karang Wangi, Kecamatan Cidaun, in the north, east and part of the west bordering with Karang Wangi village, the west partially borders with Cidamar village District of Cianjur Regency Cidaun, the south borders with the Indonesian Ocean (BKSDA, 2012). Topography of this area is relatively flat with a height of 0-7meters above sea level. The climate according to Scamidt and Ferguson, include in type B with an average rainfall of 2,645mm per year.

Bojonglarang Jayanti Nature Forest Reserve is a tropical rain forest where the forest is dominated by large trees that form a canopy layers (layering) solid and tight. Canopy that so dense and tight will prevent the entry of sunlight so that the intensity of the sunlight can reach the forest floor slightly, consequently the forest become moist. The more solid and dense canopy, the less intensity of light that received by forest floor and humidity levels will be higher. Humid forest conditions supported by many wood had rotted, providing good opportunities for species that do not require much sunlight can thrive. Species that can tolerate with these conditions is the fungus, it is according to the opinion of Alexopoulos & Mims<sup>1</sup> Environmental conditions like this is very suitable for the growth of fungus.

Fungus is a nucleated organisms, spore, lacking chlorophyll and its cell wall composed of cellulose or chitin.<sup>2</sup> The fungus is one class of organisms that helped enrich the biodiversity of forests in

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Indonesia, and has many important functions in the biogeochemical cycles, nutrient cycling, decomposer, symbiosis with trees and other plants, and as the causative agent of disease in plants and animals Barnes et al.;<sup>3</sup> Banerjee D.<sup>4</sup> In addition, there are also fungi that are beneficial to humans for example, as a food ingredient (edible mushroom) for example *Pleurotus ostreatus*, *Auricularia polytricha*, *Lentinus edodes*, as a medicinal ingredient example *Ganoderma lucidum*, poisonous fungus group for example *Amanita muscaria* and some fungus of unknown function examples *Agaricus deserticola* seen from the size, consisting of macroscopic and microscopic fungus Mueller GM et al.,<sup>5</sup> Ostry et al.<sup>6</sup>

Macro fungi or macroscopic fungi are fungus which has the body of a large-sized fruit. This fungus is often found in the trees that were uprooted, sersah or on rotten wood.<sup>2</sup> Weathered wood is a good habitat for fungi to grow considering the timber can retain moisture and contains lignocellulose rich in nutrients for the fungus that allows the fungus to grow on wood habitats. Kim et al.,<sup>7</sup> given vegetation Forest Cisela Nature Reserve Bojonglarang Jayanti West Java has the potential to overgrown macro fungi while the presence of the fungus macroscopic especially fungi that have potential in the area of Cisela Forest, Nature Reserve Bojonglarang Jayanti West Java has not received attention, therefore, research variety of fungi macroscopic grow on wood as well as potentially in the field of Pharmaceutical Industry and health needs to be done.

## Objective

To know the diversity of macroscopic fungi that grows on decayed wood and fungi species that could potentially determine the Pharmaceutical Industry and Health.

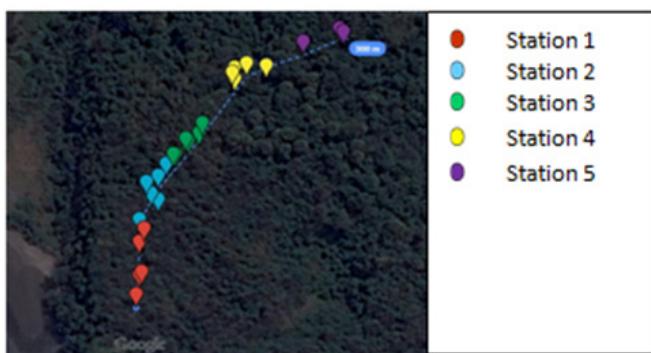
## Materials and methods

### Study area

The study was conducted at the Forest Nature Reserve Bojonglarang Jayanti West Java (Figure 1 & 2).



**Figure 1** Location Map of Observation Cisela Forest Nature Reserve Bojonglarang Jayanti, Cianjur, West Java.



**Figure 2** Macrofungi distribution map that grows on the wood substrate Cisela Forest Nature Reserve Bojonglarang Jayanti, Cianjur, West Java.

## Methods

Methods used in this study is the exploration method (roaming), assisted by the transect line along 300m, 15meters to the left and 15meters to the right of the transect line. The area of study is divided into 5 observation station, each width observation station (60mx30m) Ansori et al.<sup>8</sup>

## Materials

FAA (90ml of 96% alcohol solution, 5ml of glacial acetic acid, and 5ml formaldehyde) Melzer's solution, Congo Red, Potassium hydroxide (KOH 3-5%), Phloxine A.

## Procedures

- I. Determine areas that will be come to the location of the research.

- II. Creating transect line along 300m, observations were made along the transect line with a width of 15meters to the left and 15meters to the right. Divided into 5 observation stations.
- III. The Fungus that were found to be taken by repeat parts of the body as a whole fruit (pileus, stipe).
- IV. Observe and record the macroscopic characteristics include size, shape, color, texture of the main part of fungal bodies (pileus, stipe, volva, rings) found in each observation station, and documenting.
- V. Fungus are placed in the collection box and close it tightly so that evaporation does not occur.
- VI. The Fungus that were found being isolated, made dry kolesi, made wet collection.<sup>9</sup>

## Procedures fungal isolation

- A. The Fungus that were found to take the pileus.
- B. Cleaned of dirt with distilled water.
- C. Rinse with alcohol 70%.
- D. Rinse with sterile aquades.
- E. Put into petridish containing PDA (potato dextrose agar).
- F. Brood (Incubation) until mycelium grow.
- G. Repeat cultivation on PDA to obtain pure isolates.

## Procedures of wet collection

- i. Setting up the FAA solution (90ml of 96% alcohol solution, 5ml of glacial acetic acid, and 5ml formaldehyde).
- ii. Cleaning fungus that were found by means of rinsing with distilled water.
- iii. Cleaned Fungus inserted into the zam bottle already containing FAA solution, until the Fungus body submerged. close tightly.
- iv. Attach the label paper, write the name of the collector, the name of the species, sampling date and sampling locations.

## Procedures of dry collection

- i. The Fungus that were found being cleaned of dirt.
- ii. Being dried by oven dried until they actually dry. Drying process performed after record macroscopic characteristics.
- iii. To get a good drying results, Fungus dried using an oven until Fungus get dried.
- iv. The drying results Partially stored for dry collection of and partly to proceed to the identification step.
- v. Recording of the Microscopic characters can be done in laboratory using several solutions, among others Melzer's solution, Congo Red, Potassium hydroxide (KOH 3-5%), Phloxine A (1%), and Cotton Blue.

**Note:** Manufacture spore print and color can be done when the fungus in fresh condition and is done by cutting the hood pieces and placed on a black and white paper. Closure is done so that moisture of hood is maintained and spores will fall on black and white paper. The color of the spores can be seen after 5-24hours later.

## Data analysis

Data were analyzed with descriptive methods.

## Results and discussion

Result on the Diversity of Macro fungi on wood in Nature Forest Reserve of Bojonglarang Jayanti West Java in five observations station produced species of macro fungi that grow on timber substrate (Table 1), species of macro fungi are potentially in Pharmaceutical Industry and Health (Table 2), physical data location of the observation (Table 3).

**Table 1** Makrofungi Species that Growing on Wood Substrates on Five Observation Station Bojonglarang Jayanti Nature Forest Reserve, West Java

No	Species	Station				
		1	2	3	4	5
1	<i>Auricularia polytricha</i>				v	
2	<i>Boletinellus meruliodoides</i>	v				
3	<i>Campanella junghuhnii</i>			v		
4	<i>Favolaschia cyatheae</i>		v			
5	<i>Ganoderma lucidum</i>	v	v			
6	<i>Marasmiellus candidus</i>		v			
7	<i>Marasmiellus ramealis</i>			v		
8	<i>Microporus xanthopus</i>	v				
9	<i>Phellinus noxius</i>		v			
10	<i>Polyporus alveolaris</i>			v		
11	<i>Polyporus arcularius</i>			v		
12	<i>Polyporus melanopus</i>	v	v			
13	<i>Polyporus tenuiculus</i>			v		
14	<i>Schizophyllum sp.</i>		v	v		
15	<i>Trametes versicolor</i>	v	v	v	v	
16	<i>Trametes sp</i>	v	v			
17	<i>Tyromyces chioneus</i>		v			
18	<i>Xylaria apiculata</i>	v	v	v		
19	<i>Xylaria hypoxylon</i>			v		
Total Species on each station		5	6	8	6	3

**Table 2** Macrofungi Species that Potential in the Pharmaceutical Industry and Health that Grow On Wood Substrates on five observation station Cisela Nature Forest Reserve Bojonglarang Jayanti, West Java

No	Species	Station				
		1	2	3	4	5
1	<i>Auricularia polytricha</i>				v	
2	<i>Ganoderma lucidum</i>	v	v			
3	<i>Polyporus alveolaris</i>			v		
4	<i>Schizophyllum sp.</i>		v	v		
5	<i>Trametes versicolor</i>	v	v	v	v	

**Table 3** Physical Data Cisela Nature Forest Reserve Bojonglarang Jayanti western Java

Physical data	Station				
	1	2	3	4	5
Altitude (mdpl)	53.54	49.4	66.1	61	77.1
Air humidity %	80-82	78-80	78-83	79-85	80-88
Temperature (°C)	28.1-30.1	27.6-28.4	27-28.4	26.5-29.5	28.3-28.8

Based on result of observations Table 1 was found nineteen (19) types (species) of fungi which are *Auricularia polytricha*, *Boletinellus meruliodoides*, *Campanella junghuhnii*, *Favolaschia cyatheae*, *Ganoderma* sp, *Marasmiellus candidus*, *Marasmiellus ramealis*, *Microporus xanthopus*, *Phellinus noxius*, *Polyporus alveolaris*, *Polyporus arcularius*, *Polyporus melanopus*, *Polyporus tenuiculus*, *Schizophyllum* sp, *Trametes* sp, *Trametes versicolor*, *Tyromyces chioneus*, *Xylaria apiculata*, *Xylaria hypoxylon*, *Trametes versicolor* mushrooms were found most often at every station.

At Station 1 found five species of fungi, namely *Boletinellus meruliodoides*, *Trametes* sp, *Trametes versicolor*, *Microporus xanthopus* and *Polyporus melanopus*.

At Station 2 found six species of fungi, namely, *Trametes* sp *Tramete*, *versicolor*, *Schizophyllum*, *Ganoderma* sp, *Tyromyces chioneus* and *Xylaria apiculata*.

At Station 3 found 8 species of fungi, namely Yaitu *Trametes* sp., *Polyporus melanopus*, *Ganoderma*, *Xylaria apiculata*, *Schizophyllum* sp., *Marasmiellus candidus*, *Phellinus noxius* and *Favolaschia cyatheae*.

Station 4 found six species of fungus, namely *Trametes* sp, *Xylaria apiculata*, *Polyporus arcularius*, *Polyporus alveolaris*, *Marasmiellus ramealis* and *Campanella junghuhnii*.

At Station 5 found three species of fungi, namely *Xylaria hypoxylon* sp. 21, *Auricularia polytricha* and *Polyporus tenuiculus*.

Based on the study literature from nine teen (19) types (species) fungi are found, there are 5 species of fungi are potentially in Pharmaceutical Industry and Health namely: *Auricularia polytricha*, *Ganoderma lucidum*, *Polyporus alveolaris*, *Schizophyllum* sp, *Trametes versicolor* species.

## Discussion

Each observation station ove rgrown Fungus species. The number of fungal species that are found in every observation stations have different numbers, depending on the environmental conditions at each observation station, especially habitat for fungi to grow. Station 3 is station most abundant species of fungi, ie 8 species, this is due to the station 3 are found rotten wood and fallen trees supported by temperature and humidity appropriate, whereas light intensity at station 3 exceeds the intensity optimum, this condition is the habitat relatively good for the growth of fungi according to opinion of Bills et al.,<sup>10</sup> decayed wood is one of the good habitat for fungi growth considering the wood can absorb water and maintain the moisture around it, and contains lignocellulose-rich nutrients for fungi. Station 5 is the least station discovered species of Fungus that is three (3) species. Temperature sampling sites ranged from 26,5°C-30,1°C, 93.4 to 442 lux light intensity and humidity ranges from 78% -87%, so

in fact the environmental conditions that favor the growth of fungi in that location, but because of habitat for the growth of fungi less available where environmental conditions station 5 is dominated by tall trees and shrubs were still alive, so it is not found rotted wood or wood from a fallen tree. Group macroscopic fungi can basically be grown in places with low light intensity and high humidity supported with suitable habitat Lincoff;<sup>11</sup> Sibounnavong et al.<sup>12</sup> (Table 4 & 5).

**Table 4** Classification of Makrofungi that Grow On Wood Substrates in Cisela Nature Forest Reserve Bojonglarang Jayanti

Division	Familia	Species
Division Ascomycota		<i>Xylaria apiculata</i>
Class Sordariomycetes	Xylariaceae	<i>Xylaria hypoxylon</i>
Order Xylariales		
Division Basidiomycota		<i>Trametes</i> sp.
Class Agaricomycetes		<i>Trametesversicolor</i>
		<i>Microporus xanthopus</i>
	Polyporaceae	<i>Polyporus melanopus</i>
		<i>Tyromyces chioneus</i>
Order Polypolares		<i>Polyporus arcularius</i>
		<i>Polyporus alveolaris</i>
		<i>Polyporus tenuiculus</i>
	Ganodermataceae	<i>Ganoderma lucidum</i>
	Schizophyllaceae	<i>Schizophyllum</i> sp
		<i>Marasmiellus candidus</i>
Order Agaricales	Marasmiaceae	<i>Marasmiellus ramealis</i>
		<i>Campanella junghuhnii</i>
	Mycenaceae	<i>Favolaschia cyathaea</i>
Order Hymenochaetales	Hymenochaetaceae	<i>Phellinus noxius</i>
Order Auriculariales	Auriculariaceae	<i>Auriculariapolyptricha</i>

**Table 5** Macrofungi Species that Grow On Wood Substrates on five observation station in the Nature Forest Preserve Bojonglarang Jayanti West Java that have potentiation in Pharmaceutical Industry and Health and usefulness

No	Species name	Description
1	<i>A. polytricha</i>	Fungus that can be consumed (edible mushroom) medicine for: sore throat, worming, lowering blood sugar, narrowing of the arteries, high blood pressure, lowering cholesterol levels and anti-bacterial, anti-oxidant, anti bat cardiovascular
2	<i>G. lucydum</i>	Ingredients anti breast, prostate cancer drug
3	<i>P.alveolaris</i>	Inhibit the growth of <i>Fusarium oxysporum</i> and <i>Botrytis cinerea</i>
4	<i>Schizophyllum</i>	Causing lung disease
5	<i>T. versicolor</i>	Anti cancer

## Conclusion

Diversity of macrofungi research results on wood decay in Nature Forest Reserve of Bojonglarang Jayanti Cianjur, West Java generate 23 species fungus that grows on decaying wood and 7 species of macro fungi useful in the field of Pharmaceutical Industry and Health.

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## Conflict of interest

The author declares no conflict of interest.

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