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ETHNOMYCOLOGY STUDIES OF EDIBLE AND MEDICINAL MACROSCOPIC FUNGI IN JEMBER INDONESIA

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ABSTRAK

Jamur makro merupakan komponen penting dalam ekosistem, selain pemanfaatannya di kehidupan masyarakat. Penelitian ini menjelaskan mengenai jenis jamur yang dapat dikonsumsi dan dimanfaatkan sebagai obat dari segi sosio-kultural. Kajian etnomikologi memuat pembahasan secara holistik mengenai kedua cabang ilmu tersebut, yaitu interaksi antara manusia dan jamur. Koleksi spesimen dan wawancara dilakukan dengan menggunakan purposif sampling di 5 kecamatan di Jember, untuk mengetahui keanekaragaman jamur makro dan pemanfaatannya di masyarakat. *Used value* (UV) diperoleh dengan menggunakan pendekatan kuantitatif. Hasil penelitian menunjukkan sembilan belas jenis jamur yang dapat dikonsumsi dan bermanfaat sebagai obat, yang termasuk dalam Basidiomycota dan Ascomycota. Nilai UV tertinggi yaitu pada *P. ostreatus and Termitomyces spp. yang biasa dikonsumsi oleh masyarakat. Pengetahuan mengenai jamur ditunkan hanya melalui oral history.*

Kata Kunci: Etnomikologi, makroskopik fungi

ABSTRACT

Macroscopic fungi are a critical component of the ecosystem, besides their use in human life. This study aimed to explain edible and medicinal macroscopic fungi in terms of socio-cultural. Ethnomycological studies were uses in holistically analysis between mycology and social science. Specimen collection and interviews were conducted using purposive sampling in 5 sampling stations in Jember to determine the diversity of macroscopic fungi and their cultural significance. Quantitative approaches were used to determine Use values (UV). This study found nineteen edible and medicinal macroscopic fungi included in Basidiomycota and Ascomycota. The highest UV was obtained by *P. ostreatus and Termitomyces spp. used for food. I*nformation about macroscopic fungi was obtained from oral history.

Keywords: Ethnomycology, macroscopic fungi

INTRODUCTION

Ethnobiology can be defined as a scientific evaluation of the population's knowledge of the scope of biological sciences, including animal science (zoology), plant science (botany), and the natural environment (ecology). Ethnobiology is a relatively new discipline, but it has become a distinctive and broad cross-disciplinary study, theoretically and practically. It makes this study is developing very rapidly. One of the branches of ethnobiology is ethnomicology, which broadly considers human engagement with the kingdom of fungi, inquiries into the cultural, ceremonial, and medicinal uses of mushrooms, besides their consumption as food.

The knowledge and use of mushrooms date back thousands of years. Many countries in Asia use wild mushrooms as food and medicine. In addition to their delicious taste, wild mushrooms also have significant nutrients such as vitamins, minerals, and high protein [1].

Fungi or fungi are eukaryotic organisms that are heterotrophs, which obtain organic compounds as a source of energy and a source of carbon skeletons used for cell synthesis [2]. Fungi are divide into yeast, mold, and mushroom. The difference between yeast, mold, and mushrooms lies in their body structure. Yeast is unicellular in shape with a round or oval shape under a microscope. Molds have filamentous fibrous structures called hyphae, some of which can produce antibiotics. While mushrooms, usually consisting of Basidiomycota and Ascomycota have fruiting bodies.

Based on the size and shape of the fruit body, fungi are divide into macro and micro. Macro fungi are fungi whose fruit bodies can be seen clearly without a tool (microscope), also known as mushrooms. Micro fungi are fungi with microscopic sizes and require devices to see their physical form [3]. Microscopic fungi are usually classified as molds and yeasts. Macro mushrooms have a fruiting body in the form of hyphae branching structures that produce spores. The shape of the mushroom fruiting body is like a cup, umbrella, board, cup, ear, and so on [2].

Fungi are critical components for the sustainability of an ecosystem [2]. They absorb and transfer nutrients to another organism, modifier the soil environment physically, and alteration of ecosystem function [4]. Fungi serve as a link between different biota and ecosystems, having the potential to influence their macroecology and evolution [5].

Fungi also have a crucial role in the history of human life and are used for various purposes, such as food, medicine, religious rituals, recent applications in biotechnology, and as biocontrol agents. The most apparent interaction between humans and fungi is their use as food. The fungi consumed are usually macro mushrooms because of their high nutritional value. People ordinarily know the fungi they eat as mushrooms.

Research on the biodiversity of macro mushrooms is still rarely done. Identification of the number and types of fungi is an important activity to do because of the lack of data and the close relationship of fungi in people's lives, in addition to the essential role of macro mushrooms as a supplier of nutrients for the ecosystem.

Mushroom's knowledge generally obtains from generation to generation and from community culture. An interesting fact is that people can distinguish between edible and non-edible mushrooms. They can also identify precisely when mushrooms will be easier to find or when mushrooms are rare. Only by relying on instinct, they know the potential places for mold to grow. An ethnomicological study has chosen to provide information on using mushrooms as food for the community.

METHOD

This type of research is a descriptive exploratory approach using qualitative and quantitative research methods (mixed methods). Specimen collection and interviews have been conducted by purposive sampling in 5 sampling stations in Jember to determine the diversity of mushrooms

and their cultural significance. They were in Jelbuk, Silo, Patrang, Tempurejo, and Sumber Baru. Informants of this study are chosen by using the snowball throwing method by deciding the key informant first. At the qualitative research stage, the researcher conducted interviews and exploratory research.

Recognizing of macroscopic fungi was oriented to Hall, at. al (2003) "Edible and Poisonous Mushroom of The World" [6], Zoberi (1972) "Tropical Macro Fungi: Some Common Species" [7] and some relevant journals of macroscopic fungi. Quantitative approaches were used to determine Use values (UV).

$$UV = \frac{\sum u}{n} \quad \text{.....[8]}$$

The most important edible-macrofungi were assessed by calculating the use value. This was used to calculate the citation of mushroom during interviews. ∑u is the total number of use citations by all informant for a species and n was the total number of informants.

The biodiversity of macro mushrooms is the variability of macroscopic fungi found in the research area. Researchers conducted field exploration to find and identify wild mushrooms as food and medicine.

Macroscopic fungi or mushrooms in this study were included in edible and medicinal mushrooms. There were 21 kind of macroscopic fungi found during this research. But, based on the results of interviews with respondents, there are four types of mushrooms very familiar to the people of Jember Regency. These mushrooms are usually cooked or used as a topping on their food. They were *Pleurotus ostreatus* (oyster mushroom), *Termitomyces microcarpus* (jamur bintang), *Termitomyces* sp. (jamur bulan, jamur barat), and *Auricularia* spp. (*jamur kuping*).

The oyster mushroom (*Pleurotus ostreatus*) is an edible mushroom that grows on twigs and dead bark. 100gr of oyster mushroom contains 19-35% protein with nine kinds of amino acids; 1.7-2.2% fat consisting of 72% unsaturated fatty acids, carbohydrates, B vitamins riboflavin and niacin, vitamins D and

C, as well as minerals K, P, Na, Ca, Mg, also Zn, Fe, Mn, Co, and Pb. In addition, P. ostreatus can also inhibit the growth of *Candida albicans* [9] [10].

Table 1. Biodiversity of macroscopic fungi

Phyllum	**Class**	**Ordo**	**Family**	**Spesies**
Basidiomycetes	Agaricomycetes	Agaricales	Pleurotaceae	*Pleurotus ostreatus*
			Schizophyllaceae	*Schizophyllum commune*
			Plutaceae	*Volvariella volvacea*
			Lyophyllaceae	*Termitomyces sp.*
				Termitomyces microcarpus
			Agaricaceae	*Agaricus sp.*
				Coprinopsis sp.
				Calvatia sp.
			Psathyrellaceae	*Coprinellus disseminatus*
		Boletales	Sclerodermataceae	*Scleroderma sp.*
		Auriculariales	Auriculariae	*Auricularia auricula*
				Auricularia nigricans
				Auricularia delicata
		Polyporales	Polyporaceae	*Lentinus sp.*
				Pycnoporus sanguineus
			Ganodermataceae	*Ganoderma sp.*
	Dacrymycetes	Dacrymycetales	Dacrymycetaceae	*Dacryopynax spathularia*

Phyllum	Class	Ordo	Family	Spesies
	Phallomycetes	Phallales	Phallaceae	*Phallus duplicatus*
	Tremellomycetes	Tremellales	Tremellaceae	*Tremella* sp.
Ascomycetes	Pezizomycetes	Pezizales	Sarcoscyphaceae	*Cookeina speciosa*

Oyster mushroom was included in widely cultivated mushroom by the community, while the type of *Termitomyces* mushroom is still not. That is because the fungus *Termitomyces* requires association with termite nests as a place to grow [11]. The use of this fungus is still very dependent on its availability in nature [12]. Nevertheless, research on how to cultivate *Termitomyces* continues to be carried out, including by using the tissue separation method [13], spawn running cultivation [14], manipulation of growing conditions [15] and aeration on vegetative growth [16].

Auricularia grows on bark, containing higher minerals than beef, mutton, and other vegetables. *Auricularia* does not contain cholesterol [17]. The content of lentinon and retiran in this mushroom can prevent high blood pressure, lower cholesterol, increase vitality and endurance, and prevent tumors or cancer [10].

Picture 1. 1. *P. ostreatus* 2. *S. communee* 3. *A. auricular* 4. *A. delicata* 5. *A. nigricans* 6. *V. volvacea* 7. *Termitomyces sp.* 8. *Scleroderma sp.*, 9. *T. Microcarpus*,10. *Phallus* sp.

There is no specific marker that can distinguish whether it is edible or not. Not because of color, smell, or appearance that distinguishes the edibility of macro mushrooms. A safe way to determine the edibility of mushrooms accurately is by identifying the type of fungus and then compare it with relevant fungal identification books. If you are in doubt about the edibility of the mushrooms found, it is better not to consume [2].

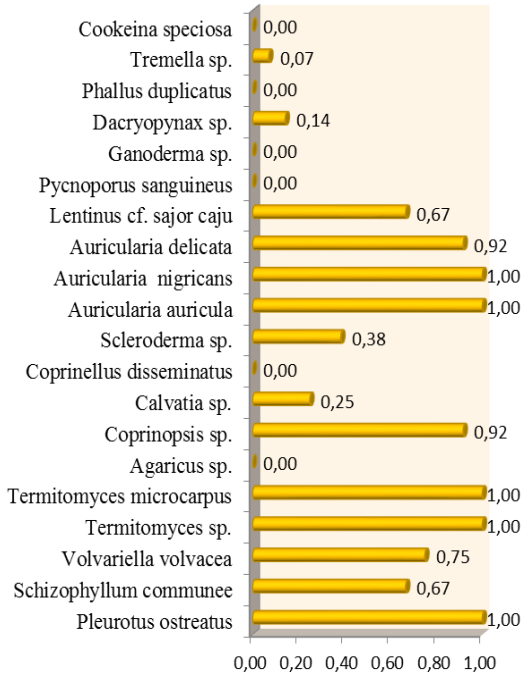
Other mushrooms are still not widely used or consumed because people consider them as poisonous mushrooms. The knowledge of the people of Jember about macro mushrooms is limited to common mushrooms, and the old mindset like mushrooms that have rings and are light in color are poisonous. Whereas mushrooms that have rings like Agaricus sp. and light-colored like *Dacropynax* sp. can be consumed. Agaricus sp. It has rings and pink spores when it is young and turns brown when it is old. Agaricus is known as *jamur kancing*, and has been cultivated, but people rarely consume wild Agaricus. This mushroom is edible, but it is better to consume it when it is still young.

Picture 2. 11. *C. speciosa* 12. *Dacropynax sp.* 13. *Lentinus sp.* 14. *P. sanguineus* 15. *Coprinopsis sp.* 16. *Tremella sp.* 17. *Agaricus* sp. 18. *Ganoderma* sp. 19. *Calvatia* sp. 20. *C. disseminatus*

V. volvacea is popular as a cultivated mushroom in the community. These mushrooms are generally rich in essential amino acids such as Leucine, Isoleucine, Valine, Tryptophan, Lysine, Threonine, Phenylalanine, Methionine, and Histidine [19] [20]. This mushroom also contains unsaturated fatty acids and can reduce low-density lipoprotein levels in the blood [21].

An interesting finding was that *S. commune* could be a wound treatment. S. community has been known for its edible mushrooms. People process it into *botok* or *gulai*, but very few people know that *S. commune* can also act as an anti-inflammatory. *S.commune* contains β -glucan which can accelerate wound closure [22].

Scleroderma sp. (Melinjo mushroom) is an ectomycorrhizal fungus on the roots of the Gnetum gnemon. According to research conducted by Putra, this mushroom is often a food ingredient for people who are familiar with mushrooms. Even though it was an edible mushroom, the mushroom poisoning rate caused by this mushroom in Indonesia is also the highest compared to other edible mushrooms [23].



Picture 3. Used Value

Information about macroscopic mushrooms obtained by the community is still in the form of knowledge and tradition. This type of knowledge is taught only orally, without being written or adapted. This kind of knowledge is known as oral history. Oral history is a record of information containing different knowledge, based on testimonies obtained from witnesses and presented from various perspectives [23].

In ethnic or cultural point of view research, the calculation of used values is crucial. Used values used to quantify the relative importance of macroscopic fungi.

Based on Picture 3. the highest used value is on *Auricularia*, *Termitomyces*, and *Pleurotus*. The range of values for the used value is 0-1. So if the species has 1.0 value of UV, it means that the species is widely known and used by the community for consumption. The lowest scores were *Cookeina*, *Phallus*, *Ganoderma*, *Pycnoporus*, *Coprinellus*, and *Agaricus*. The reasons were they did not know, did not have information, or because the morphology was not convincing enough to be consumed. For example, *Phallus* has a pungent smell and grows in cow dung, so people tend to stay away.

Indonesian people are familiar with some edible mushrooms, specially cultivated mushrooms, and sold in the market. There are still many types of mushrooms from nature that can be introduced and consumed by the people of Indonesia. Most of the edible mushrooms are ectomycorrhizal fungi, which are fungi in symbiosis with higher plants. This fungus is sensitive to climate change and pollution [24].

CONCLUSION

This research revealed 21 species of edible and medicinal macroscopic fungi were found in Jember, they are *P. ostreatus, Termitomyces sp., T. microcarpus, Auricularia spp., S. commune, V. volvacea, Lentinus spp., Coprinopsis sp., Scleroderma sp., Dacryopynax sp., C. speciosa, Agaricus sp., C. disseminatus, P. duplicatus, P. sanguineus, Calvatia sp., and Ganoderma sp*. Knowledge about the type and edibility of mushrooms was still in oral history. The used value (UV) calculation results prove that *P. ostreatus, Termitomyces sp.,* and *Auricularia* occupies the highest score.

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