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Ethnomycology Study: Mushrooms Traditionally Utilized by the Malay Tribe in Lorong Village, Sambas Regency, West Kalimantan

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Abstract: Mushrooms play a role in human life. People generally utilize mushrooms traditionally as food and medicine. This particular ethnomycology study aims to determine the species of mushrooms used by the Malay Tribe in Lorong Village, specifically as food and medicine, with the background that it is necessary to invent and document the mushrooms used by the community, and the lack of research related to ethnomycology has been conducted. The study was conducted in May 2022. Descriptive qualitative research was utilized using interview techniques based on snowball sampling and cruise methods to search the mushrooms. Interviews were conducted with ten critical informants aged 33 to 85 years old. The results show that the Malay Tribe in Lorong Village used seven mushroom species for consumption and as medicines. The seven mushrooms were from Marasmiaceae, Physalacriaceae, Schizophyllaceae, Auriculariaceae, Dacrymycetaceae, Sarcoscyphaceae, and Xylariaceae. Mushroom species used for food are *Marasmiellus* sp., *Oudemansiella* sp., *Schizophyllum* sp., *Auricularia* sp., *Dacrymyces* sp., and *Cookeina* sp., while the mushroom species used for medicine are *Daldinia* sp. Mushroom species utilized as food are generally made as food mixtures, such as soup, *pepes*, *bubur pedas*, stir-fry, and *bakwan*. Mushroom species that are utilized as medicines are used to treat boil.

Keywords: Ethnomycology; Lorong Village; Mushroom; Sambas Regency.

Introduction

Fungi play a significant role in biological balance. They influence the survival of other organisms because they produce bioactive compounds that are fundamental to health and agriculture [1-2] and can become biological control agents even though they can also become harmful pathogens [3-4]. The involvement of fungi in the process of soil formation and the fertility of the soil it contains is by decomposing dead organisms and recycling the nutrients obtained from them, so it can be said that fungi are an essential structural and functional component of the ecosystems on earth.

Mushrooms are a form of local biodiversity residents use [5-7]. Although the development of mycology in Indonesia is more towards the utilization of microscopic fungi in the food industry, the development of mushroom species as a consumable commodity is still limited [8], so the diversity and potential of various macroscopic mushroom species is an exciting thing to study. Mushrooms are organisms that contain multiple nutrients, such as protein, minerals, fiber, vitamins, and essential elements. Of the total number of mushroom species, 1.5 million spread worldwide, it is estimated that about 2,000 species are mushrooms that people use for food and medical purposes [9]. The use of mushrooms in human life must be documented and inventoried so that this knowledge is not lost.

Ethnomycology is a study that identifies and records indigenous knowledge about using wild mushrooms as food, medicine, or in certain cultural customs [10]. Simply put, ethnomycology is a study that examines the interaction between humans and mushrooms. Local communities in Indonesia are accustomed to using mushrooms for consumption and medicinal purposes [11-12]. This activity is one of the sources of ethnomycological information in Indonesia. The study of ethnomycology has great significance as it incorporates the study of the interaction between humans and fungi in a cultural context. The utilization of mushrooms is found in various regions in Indonesia, one of which is Lorong Village.

Lorong is a village in West Kalimantan Province, precisely in Sambas District, Sambas Regency. Lorong Village has an area of 7.92 km^2 and is the eighth smallest village out of 18 villages located in the Sambas District [13]. Lorong Village is passed by the Turusan River, which empties into the Sambas Besar River upstream and the Kartiasa River downstream. Lorong Village consists of four hamlets: Turusan Hamlet, Batangan Hamlet, Siapat Hamlet, and Betung Hamlet. Based on population data as of 2024, Lorong Village has a total population of 3,887 [14]. The majority of the villagers work as farmers and planters. The presence of the Malay Tribe dominates Lorong Village as a permanent resident. The Malay Tribe is the largest tribe after the Dayak Tribe in West Kalimantan, with a relatively broad distribution in coastal areas, including the Sambas Regency.

The Malay Tribe is known for its distinctive local wisdom. This wisdom is essential to maintaining authenticity in forest utilization and conservation. This is also an effort to meet food needs and overcome health problems [15]. These mushrooms' utilization is based on their ancestors' traditional knowledge. The community utilizes mushrooms to meet their needs, and this knowledge

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has been passed down continuously until now. This is supported by the natural conditions in Lorong Village, which are still sustainable, and the appropriate climate that allows mushrooms to proliferate. The utilization of mushrooms by the Malay Tribe in Lorong Village shows that ancestors passed much knowledge to meet their needs without relying on one particular commodity. This specific traditional knowledge of mushrooms used by the Malay Tribe in Lorong Village has yet to be documented.

Information on ethnomycology in West Kalimantan has yet to be widely reported. Information on mushroom utilization comes from local community knowledge. Widespread use of wild mushrooms combined with population growth, deforestation, and agricultural land expansion jeopardize the area's understanding of ethnomycology and fungal diversity [16]. Therefore, researchers are interested in researching ethnomycology, which is specialized in utilizing mushrooms by the Malay Tribe in Lorong Village, Sambas Regency, West Kalimantan Province. This research aims to collect data on various types of mushrooms used by the Malay Tribe in Lorong Village. The urgency related to this research is the need for data in the form of inventory and documentation of mushrooms used by the Malay Tribe in Lorong Village to preserve knowledge about these mushrooms.

Research Methods

This research was conducted in May 2022. The research was conducted in Lorong Village, Sambas Regency, West Kalimantan Province. The tools and materials used in this study were a camera, books, stationery, interview guidelines, and samples of mushrooms obtained. The local community was involved in this study as an informant of the mushroom species they use to explore in-depth information on mushroom species and their benefits known to the Malay Tribe in Lorong Village.

The research method used is qualitative, with interviews conducted using snowball sampling and roaming methods to search for mushrooms. Qualitative research shows data or results related to history, life, community interactions, character, social movements, functionalism, and kinship [17]. It is descriptive and tends to use an inductive approach to analysis, so the process and meaning based on the subject's perspective are highlighted in this qualitative research [18].

Information related to the types of mushrooms used and their benefits was obtained from informants consisting of ten key informants. The informants interviewed in this study were the Malay Tribe, who lived in Lorong Village, Sambas Regency. Data collection techniques in the form of interviews are used because researchers want to know in-depth information from respondents, and this technique is based on the informant's knowledge [19]. Of the ten informants, 9 were women (90%), while the rest were men (10%). The age of the informants ranged from 33-85 years old. The determination of these informants was based on the snowball sampling technique. Snowball sampling involves one interviewee providing the researcher with the name of at least one additional possible interviewee. If more than one referral is given per interviewee, the sample grows like a rolling snowball. That interviewee then supplies the name of at least one more possible interviewee, and so on [20]. The snowball sampling technique is used in ethnomycological studies because it relies on critical informants who can provide references or recommendations to researchers to find other informants related to the specific information under study. In this study, snowball sampling began with interviews with the researcher's relatives who are Malay in Lorong Village. After conducting interviews with them, researchers asked for information related to other people who did know information related to the use of mushrooms, especially as food and medicine.

Searching for mushroom samples at the research site uses the cruise method, which is a method for searching for samples by exploring every corner of the location that can represent the type of ecosystem or vegetation in the research area [21]. Before the exploration, researchers and informants obtained permission from the landowners to be studied and sampled. The exploration was accompanied by participant observation because the researcher played a direct role in observation activities in the field [11]. The search for mushroom samples was also conducted with informants because the people interviewed knew more about the mushrooms in question. The mushrooms obtained will be observed and documented.

Mushroom identification is done by matching the morphological characteristics of each mushroom with various sources. The identification and description of the mushrooms were referred to in various literature obtained [22], with additional information from morphological observations and interview results.

Data were presented in tabulated and descriptive. Data are presented in tabulated form to summarize mushroom samples and the benefits obtained from the explorations that have been carried out. The tabulation model uses a row and column structure to make organizing more accessible for researchers [17]. After tabulation, the data was described to explain the character of each mushroom obtained and adjusted back to the answers received from the interview.

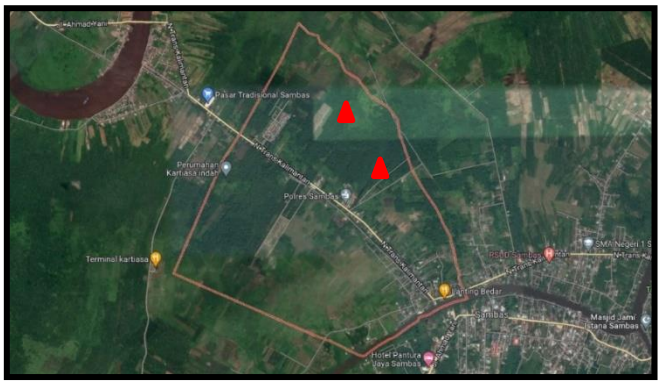

Figure 1. Research location (Source: Google Maps)

Results and Discussion

Sambas Regency is a region in the West Kalimantan Province located in the northernmost part. Sambas Regency borders Serawak and the Natuna Sea to the north, Singkawang City and Bengkayang Regency to the south, Bengkayang Regency and Serawak to the east, and the Natuna Sea to the west. The total area of Sambas Regency is 6,395.70 km^2 or about 4.26% of the total area of West Kalimantan Province. Most Sambas Regency is relatively flat, with slopes ranging from <8 to 8 to 15% [23]. The research was conducted in Lorong Village, which has an area of 7.92 km^2 and is part of Sambas District.

Based on the interviews and explorations conducted, seven species of mushrooms were obtained. Mushrooms used for food amount to six species, namely *Marasmiellus* sp. from the Marasmiaceae family, *Oudemansiella* sp. from the Physalacriaceae family, and *Schizophyllum* sp. from the Schizophyllaceae family, which comes from the Agaricales order; *Auricularia* sp. from the family Auriculariaceae which comes from the order Auriculariales; *Dacrymyces* sp. from the family Dacrymycetaceae which comes from the order Dacrymycetales; and *Cookeina* sp. from the family Sarcoscyphaceae which comes from the order Pezizales. Mushrooms utilized for medicine amount to one species, namely *Daldinia* sp. from the Xylariaceae family from the Xylariales order.

Table 1. Mushrooms utilized by the Malay Tribe in Lorong Village

Order	Family	Species	Local Name	Utilization
Agaricales	Marasmiaceae	*Marasmiellus* sp.	Kulat mukut	Food
	Physalacriaceae	*Oudemansiella* sp.	Kulat Kelapa	Food
	Schizophyllaceae	*Schizophyllum* sp.	Kulat Karang	Food
Auriculariales	Auriculariaceae	*Auricularia* sp.	Kulat kuping	Food
Dacrymycetes	Dacrymycetaceae	*Dacrymyces* sp.	Kulat tembibir	Food
Pezizales	Sarcoscyphaceae	*Cookeina* sp.	Kulat mangkok	Food
Xylariales	Xylariaceae	*Daldinia* sp.	Kulat areh	Medicine

The types of mushrooms utilized by the Malay Tribe in Lorong Village are all found on substrates in the form of weathered wood with a humid climate. Based on the data presented in the Regional Medium-term Development Plan by [23], the air temperature in the Sambas Regency in 2020 ranges from 26.3°C to 28.0°C. The area's highest number of rainy days amounted to a maximum of 23 rainy days. The high level of rainfall supported by the research location, which is still in the form of a dense forest, makes the climate very humid, thus encouraging mushroom growth. Mushrooms are easier to find in a moist environment [24-27]. Environmental conditions with vegetation types that are evenly distributed, with the development of tall trees, have become suitable places for mushrooms to grow [28].

The research location also shows that the incoming light intensity is low. Light has a significant influence on mushroom reproduction [25, 29]. Low light intensity causes environmental conditions at the research site to be humid so that mushrooms can grow. Still, the light intensity can dry the soil and leaf litter, so mushrooms can only be found on various weathered wood shaded by forest canopies.

Marasmiellus sp. is a mushroom species that can grow solitary or in large numbers in groups. This mushroom is found on weathered wood. The fruiting body of this type of mushroom is a fluted cap with a short stalk. The cap of this mushroom is pure white. *Marasmiellus* sp. has a cap with a half-bowl shape that is inverted to flat. The edges of the cap are flat with slightly wavy margins. The hymenophores of this type of mushroom are lamellae with a white to cream color, with the lamellae narrowly attached to the stalk with a collar structure. The stalk of this mushroom is cylindrical with a smooth surface and lacks a ring. The stalk of this mushroom is attached to the cap at a central position, with the base of the stalk directly connected to the substrate. This mushroom is utilized by the Malay Tribe in Lorong Village as food, generally made of *oseng*. They use this mushroom by washing it first, then cutting it in half because the size of this mushroom is not too large. Mushrooms that have been cut are immediately cooked.

Figure 2. *Marasmiellus* sp.

These mushrooms are often found in forests and have the potential to be decomposers [30]. *Marasmiellus ramealis* can be an alternative food with high protein and low fat content [31-32]. *Marasmiellus palmivorus* can play a role in environmental remediation because it can produce the enzyme laccase to remove crude oil contamination [33].

Figure 3. *Oudemansiella* sp.

Oudemansiella sp. is a mushroom that grows individually, does not colonize, and is scattered. The cap measures ±44 mm and is round. The stalk is attached to the mushroom cap at the center. The species obtained has a white cap color with gray tones and patterns resembling brown scales in the middle of the cap. The stalk of this mushroom is white, smooth textured, and has no rings. The mushroom lamellae are white and large. The margins of this mushroom are pileus. This mushroom is utilized by the Malay Tribe in Lorong Village as food, generally made of *oseng* and *pepes*. They use this mushroom by washing it clean first, then slicing it into several parts. The sliced mushrooms are then added to the ongoing cooking process.

Some species of *Oudemansiella* can be consumed and are often cultivated, but several species cannot [34]. *Oudemansiella canarii* is consumed by the people of Gunungkidul District, Yogyakarta, and processed into clear soup [35]. *Oudemansiella canarii* is reported to contain amino acids and nutritional content that is good for humans [36]. *Oudemansiella* sp. is one type of mushroom commonly consumed by people around Sebangau National Park, Katingan Regency, Central Kalimantan [37].

Figure 4. *Schizophyllum* sp.

Schizophyllum sp. is a fruiting body fungus that grows solitary. The substrate it occupies is weathered wood. The shape of the fruiting body of the *Schizophyllum* sp. is in the form of a cap with lamellae equipped with a short stalk. The cap of this mushroom is light brown to cream in color. The cap is up to ±27 mm in diameter with a flat top and an oyster-like bottom. The surface of the cap has a texture resembling flour or fur, especially at the tip. The edges of the mushroom cap are wavy and split with slightly curved margins. The color of the lamellae ranges from bright brown to brown, with a slight touch of pink. This mushroom is utilized by the Malay Tribe in Lorong Village as food, most often processed into *bakwan*. They use this mushroom by washing it thoroughly and placing it on the *bakwan* dough before frying.

Schizophyllum commune is a mushroom commonly consumed as food by local communities [12, 38]. *Schizophyllum commune* can be a source of antioxidants [39]. The nutritional content of *Schizophyllum commune* includes carbohydrates, proteins, and β-carotene [40]. The people of Central Kalimantan can obtain high protein and mineral content at affordable prices because this mushroom grows naturally in forest areas [41].

Figure 5. *Auricularia* sp.

Auricularia sp. is a mushroom with a fruiting body whose base is directly attached to the substrate without a stalk. The fruiting body of this mushroom resembles jelly with a smooth, soft, and slightly transparent surface and is light brown to dark brown. The edges of the *Auricularia* sp. fruiting body are smooth, silky, concave, and light brown to cream in color. The shape of the fruiting body of this mushroom strongly resembles a human ear with a size that can reach ±10 cm. This mushroom is utilized by the Malay Tribe in Lorong Village as food, generally made as a soup ingredient. They use this mushroom by washing it thoroughly first; then, large mushrooms will be sliced smaller, while small mushrooms will not be cut. The mushrooms are put into the soup stew.

Indonesians commonly consume *Auricularia* mushrooms as food [38, 42]. *Auricularia* is one type of mushroom utilized by local communities in Kantuk Indigenous Forest, West Kalimantan [43]. In addition, *Auricularia* has potential medicinal properties [44]. *Auricularia* contains pharmacological and biological properties, such as antioxidant, antidiabetic, anti-inflammatory, anti-obesity, anticancer, immunomodulatory, hypolipidemic, antimicrobial, and coagulant activities [45].

Figure 6. *Dacrymyces* sp.

Dacrymyces sp. is a mushroom that grows on substrates like rotten wood and tends to group (colony) in vast quantities. The texture of this mushroom is very chewy. This mushroom has a shape resembling a thick fan or spatula. This mushroom species is easily recognizable because it is bright yellow; even some individuals are found in bright orange, so it is very striking and easy to find. This mushroom has a slippery, fruiting body layer. The stalk cannot be identified, so it is concluded that this mushroom attaches directly to the substrate. This mushroom is utilized by the Malay Tribe in Lorong Village as food, generally

made as a mixture of *bubur pedas*, soup, and *oseng*. They use these mushrooms by washing the mushrooms found until clean; then, the mushrooms are cut into parts with smaller sizes to make them easier to eat. The cut mushrooms are added directly during the cooking process.

Dacrymyces are not commonly utilized in other regional communities. *Dacrymyces stillatus* is a non-consumable species [46]. *Dacrymyces chrysospermus* is alternately mentioned as consumable [47] and non-consumable [46]. *Dacrymyces capitatus* is not consumable [48].

Figure 7. *Cookeina* sp.

Cookeina sp. is a mushroom characterized by a bowl-shaped cap. This mushroom lives on weathered wood substrates and in groups, although this mushroom has also been found several times growing solitarily (alone) without forming colonies. The cap of this mushroom varies in diameter, generally found in the size of 3-4 cm. This mushroom species has a cap color ranging from orange to hot pink. The stipe is directly attached to the substrate, white in color, and cylindrical in shape. The fruiting body of *Cookeina* sp. has a chewy texture with a moist wetness level. This mushroom is utilized by the Malay Tribe in Lorong Village as a food ingredient, generally made as *oseng* and *bubur pedas*. They use this mushroom by washing it clean and putting it directly into the dish with the removed stalk.

Cookeina speciosa is one type of mushroom that can be consumed [49] and cultivated [32]. *Cookeina sulcipes* and *Cookeina tricholoma* can be used as food and medicine [50]. People in Ensaid Panjang Village use *Cookeina tricholoma* as a medicine for toddlers who often urinate at midnight [51]. *Cookeina tricholoma* can be an antinociceptive and immunomodulator [52].

Figure 8. *Daldinia* sp.

Daldinia sp. is a mushroom characterized by an irregular round fruiting body shape. This mushroom is known to grow on substrates as rotten wood in colonies. The body color of *Daldinia* sp. is light brown, which grades into a purplish color as it gets closer to the substrate. The fruiting body of this mushroom has a size of ±2-4 cm with a tough texture. This mushroom has no stalk, so the fruiting body sticks directly to the substrate. This mushroom is used by the Malay Tribe in Lorong Village as medicine, precisely as a medicine for boils. They first use this mushroom by rubbing it on a flat surface. The surface that has been rubbed is then given water and applied to the boil.

Daldinia concentrica can be a source of alkaloids, phenols, flavonoids, tannins, and glycosides [53]. *Daldinia concentrica* is used by the people of North Tidore District as a medicine for boils or skin itching [54]. *Daldinia childiae* has the potential to be an anti-inflammatory [55]. *Daldinia* contains pharmacological properties, such as antibacterial, antioxidant, and α-glucosidase inhibition [56].

Some of the uses of mushrooms found in this study are also similar to the use of mushrooms by other communities. The genera *Marasmiellus* and *Oudemansiella* are utilized by people in Kamojang Nature Park as food [57]. The genus *Schizophyllum*, specifically *Schizophyllum commune*, is one of the species that is very commonly used as food by communities, such as in Udapi Hilir Village, West Papua [40] and Saktu Island, Kepulauan Seribu, North Jakarta [58]. The genus *Auricularia* is very commonly utilized as food by communities, such as around Saktu Island, Kepulauan Seribu [58], Gunung Gede Pangrango National Park, West Java [59], and Mekarsari Tourism Park, West Java [22].

Literature related to the traditional use of *Dacrymyces* by communities in Indonesia could not be found. The *Cookeina* genus is utilized as food by the people of Rejosari Village, Megang Sakti District [60]. The *Daldinia* genus was used by the Malay Tribe in Lorong Village and the people in North Tidore District as a medicine for boils [54]. The utilization of *Daldinia* as a medicine was also found in the community of Saktu Island, Kepulauan Seribu [58], and Toro Village, Sigi Regency [61].

Conclusion

The study results concluded that the Malay Tribe in Lorong Village, Sambas Regency, West Kalimantan Province, uses six mushroom species for food and one for medicine. Mushroom species used for food are *Marasmiellus* sp., *Oudemansiella* sp., *Schizophyllum* sp., *Auricularia* sp., *Dacrymyces* sp., and *Cookeina* sp., while the mushroom species used for medicine are *Daldinia* sp. Mushroom species utilized as food are generally made as food mixtures, such as soup, *pepes*, *bubur pedas*, stir-fry, and *bakwan*. Mushroom species that are utilized as medicines are used to treat boil. Further research related to the ethnomycology of mushrooms by the Malay Tribe in Lorong Village is recommended in other possible aspects, such as crafts or traditional rituals. In addition, similar ethnomycological studies can be conducted on other tribes living in Lorong Village.

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