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Characteristics of Wild Edible Mushroom Knowledge of Mushroom Foragers in Indonesia

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ABSTRACT

Edible wild mushrooms (EWM) are food sources which have high nutritional value. Although they are not the main choice of daily foods in Indonesia, various local communities and mushroom foragers have been consuming EWM for decades, yet without proper documentation. This study aimed to preserve the knowledge of EWM consumption to increase the popularity and public awareness of EWM as alternative food in Indonesia. Data was collected via a structural survey to 50 mushroom hobbyists with range of 18–50 years old and representing several ethnic groups in Indonesia: Javanese, Malay, Sundanese, Banten, and Bugis. Most of the respondents have consumed EWM for more than 5 years, with a frequency of consuming more than once per month, and the knowledge of foraging was obtained from their families. The edible mushrooms were collected mostly after every January and usually consumed by themselves. The location for mushroom seeking and species of EWM mostly were the forests around residence area and *Termitomyces* spp. (local names: 'jamur barat', 'jamur bulan', 'jamur rayap', 'jamur trucuk', 'jamur sempagi', respectively). The taste of mushroom was the main reason for forage activity among the hobbyists. They generally consumed all parts of basidiomata and preferred the soft texture of fruiting body. The soup dish was the most preferred by foragers, in contrast to fried cooking type. Most of them distinguish EWM from poisonous mushrooms by observing certain structures basidiomata, however, cases of wild mushroom poisoning have occurred among foragers with low occurrence of frequency.

Keywords: Indonesia; edible wild mushrooms; characteristics; mushroom foragers

INTRODUCTION

Mushrooms are macroscopic fungi that grow above and below ground (Kirk *et al*. 2008), can be found in a range of habitats, including jungle woods, campus forests (Putra *et al*. 2019, 2020), residential areas (Putra and Astuti 2021), and tourist sites (Putra *et al*. 2018). Of the estimated 1.5 million fungus (macro and microscopic) that exist (Blackwell 2011), some wild mushrooms are recognized to be an edible group that is widely consumed around the world (Boa 2004). This is due to its bioactive content, which promotes health through anticancer, antibacterial, antioxidant, and anti-inflammatory properties (Lima *et al*. 2012).

Edible wild mushrooms (EWM) are an important food source for rural communities around the world (Boa 2004), including Indonesia (Putra 2020; Putra and Hafazallah 2020). In addition to being consumed, EWM is one of the non-timber forest products that has the potential to become an economic driver for various Indonesian indigenous peoples, and some are known to be high value with a distinct flavor and health advantages (Putra 2020a). According to Boa (2004), public awareness of the potential of EWM has grown, particularly among those who live near forests.

Although many indigenous peoples in Indonesia have used EWM for generations, it has not become the public's preferred daily food menu. This is due to lack of popularity because of the slow development of mycology and the lack of well-documented information on its use in Indonesia. Mushroom activists and indigenous peoples are among those who are aware of the usage of EWM as an alternative food ingredient (Putra and Hafazallah 2020), but the public is unaware of this. As a result, the purpose of this study was to improve mushroom activists' and indigenous people's local knowledge of existing EWM to boost the popularity of wild mushrooms for food in Indonesia.

METHODS

Data was collected online in January 2021 through a survey of 50 mushroom activists (local communities) who are members of the Indonesian mushroom hunting community, ranging in age from 18 to 50 years (with the

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highest being 30–40 years) and representing several tribes in Indonesia, including Javanese, Malay, Sundanese, Banten, and Bugis. Survey methodologies and respondent characteristics were based on Sholichah and Alfidhdhoh (2020), with some alterations to the retrieval media (online). Local awareness regarding EWM was assessed using questionnaires and structured interviews with 15 questions (Table 1). The fungus's fruiting body (basidiomata) was then completely recorded with the help of the respondent, who provided photographs with permission. The mushroom was described using numerous macroscopic features based on Putra *et al*. (2018) and Putra (2021), with some alterations. Macroscopic characteristics documented include where it grew, how it grew, the form of the fruit body, color, shape, surface, and wetness level. The EWM test results were then utilized as a reference for the fungal identification key, which was validated to the genus or species level (if possible). Some of the identifying sources used include Arora (1986), Largent (1977), and Rokuya *et al*. (2011). EWM's current taxonomic position and identity (scientific name) are consistent with the provisions of Index Fungorum. Furthermore, the taxonomic data and results from the characterization of local knowledge of mushroom activists were processed and presented in the form of a graph. The description includes comments about EWM as a medium for disseminating mycological knowledge to the general population.

RESULTS AND DISCUSSION

Termitomyces spp. (local names: *jamur bulan*, *jamur rayap*, *jamur trucuk*, *jamur sempagi*), *Volvariella* sp. (*jamur sagu*, *jamur sawit*), *Schizophyllum commune* (*jamur gerigit*), *Auricularia* spp. (*supa lember*), *Tremella* spp. (*jamur putih*), and *Hygrocybe* cf. *conica* (*kulat tiung*, *kulat tiong*). *Termitomyces* spp. was the most popular EWM among local communities and mushroom activists in this study. The following is a short description of the EWM discussed in this article.

Termitomyces spp.

This mushroom category consists of 99 species, subspecies, and varieties (http://www.indexfungorum.org/Names.asp). Our respondents found *Termitomyces* fruit bodies in a variety of environments, including trash, fertile soil, and grass. This fungus's stalk was attached to termite nests of varying depths for each species (Pegler and Vanhaecke 1994). This features a fruiting body shape, a cap of varying sizes and colors, and an *umbo* (Figure 1A, B). As it matures and ages, the cap cracks, revealing apertures that differ between species. This fungus is also known locally as *jamur barat*, *jamur bulan*, *jamur rayap*, *jamur kidang*, *jamur trucuk*, and *jamur sempagi*. This is the preferred mushroom of choice among the activists in this study due to its wonderful flavor in a variety of dishes ranging from wet/soupy to dry (Figure 1C).

Volvariella sp.

Volvariella currently has 142 species, subspecies, and varieties worldwide (http://www.indexfungorum.org/Names/Names.asp). The respondents frequently report finding this fungus in rice straw, rotting wood, and palm kernels. *Volvariella*'s fruit body has a convex cap when young, with tiny stripes on all regions (Figure 2 A; B). This fungus bears a hymnophore in the shape of pinkish-brown lamellas when young (Figure 2B), which turn purplish brown with age. One of the peculiarities is that the lower section of its stalk has a big volva. The majority of produced *Volvariella* sold on the market is still in the egg phase and has a round form, which might be perplexing for people who are unfamiliar with mushroom growing (Putra and Hafazallah 2020). This fungus is known by

Table 1 List of questions on characterization of knowledge of mushroom activists in Indonesia

Question
Name:
Gender:
Age:
Tribe:
How long have you been consuming wild mushrooms:
Name the wild mushrooms (local name) consumed that you know of (can be more than 1):
Name your favorite locations to look for wild mushrooms for consumption (choose):
Name the texture of the wild mushroom you like (choose one):
(9) Name 1 wild mushroom of the most preferred consumed:
Why do you like mushroom number 9:
Name the most liked parts of mushroom no 9:
Name your favorite type of dish for mushrooms no 9:
Mention the sources of knowledge looking for wild mushrooms:
How do you distinguish between edible and toxic mushrooms
How many times a month do you consume wild mushrooms:
Have you ever experienced wild mushroom poisoning:
When is the best time to look for mushrooms:
Whether the mushrooms found are consumed or sold:

Figure 1 Several types of *Termitomyces* consumed by respondents. A: *Termitomyces* sp. (Doc: Rafie O). B: *T. microcarpus* (Doc: Aisha K). C: Dishes of *Termitomyces* sp. (Doc: Ferry A).

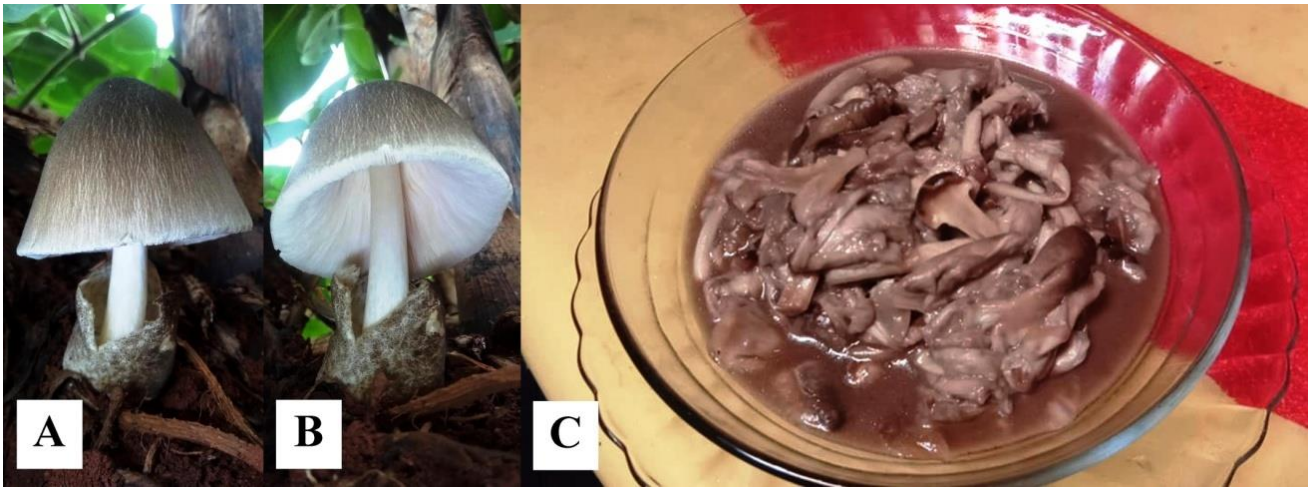

Figure 2 A: The fruit body of the wild *jamur merang* is seen sideways with a stalk that has grown from a volva (Doc: Agus SA). B: The lamellar part that is pinkish-brown when young (Doc: Agus SA). C: Dishes of *jamur merang* (Doc: Hari G).

numerous local names, including *jamur merang* and *jamur sawit*. Some activists and local communities in our study prepared *Volvariella* by stir-frying it with onion and garlic seasonings and a small amount of water (Figure 2C). According to Putra (2020a), this fungus is among the wild mushrooms traded by local populations on Belitong Island, Bangka Belitung Province, and this is among the most extensively farmed EWM (Apetorgbor *et al*. 2015).

Schizophyllum commune

This fungus has seven species, subspecies, and varieties (http://www.indexfungorum.org/Names/Names.asp); the fruiting bodies frequently form clusters on decaying wood (Figure 3A). The fungus has a fan-like shape, a velvety surface, and a bright brown hue when young (Figure 3A), which fades to grayish-brown when old (Figure 3B). It also has a crack at the tip. This mushroom cap's borders are often brighter in color than other regions. The lower section of the cap consists of lamellas that descend to the pseudo-stalk. One of the distinguishing features of *S. commune* is its stipe, which is located on the lateral side of the cap. Some locals sauté this mushroom with dragon fruit (Figure 3C). This fungus is also known locally as *jamur gerigit*, *jamur gigi*, and *supa beas*. According to Putra and Hafazallah (2020), *S. commune* is a popular EWM among Indonesian indigenous peoples. In addition, Chen *et al*. (2020) discovered that this mushroom is strong in antioxidants.

***Auricularia* spp.**

The genus *Auricularia* includes 177 species, subspecies, and varieties ((*http://www.indexfungorum.org/Names/Names.asp,*), typically grows solitary or in clusters over a short distance or near rotting wood. The fruit body has a chewy feel, with one part rough and one part silky. The *jamur kuping* fruit body border is covered with hairs ranging from fine to quite coarse. Some fruit bodies are reported to cling to substrates using secil or resupinate patterns (Rokuya *et al*. 2011). *Auricularia* come in a variety of hues (Figure 4A), and the lower half of the cap has limited or extensive indentations (Figure 4B). Some mushroom activists pick the fruit bodies from household wood, particularly in humid conditions following rain. The fruit body is usually stir-fried (see

Figure 3 A: The fruiting body *of S. commune* in the young phase grows in clusters on dead wood (Doc: Aswad A). B: Mature and dried fruit bodies (Doc: Hari G). C: Fruit bodies cooked with dragon fruit (Doc: Ratna N).

Figure 4 A: Several types of *Auricularia* collected from adjacent growing locations (Doc: Aisha K). B: Large fruit bodies (Doc: Day G). C: Dishes of *jamur merang* (Doc: Cip S).

Figure 4C). According to Miao *et al*. (2020), this mushroom contains a variety of polysaccharides that have beneficial effects on the body.

***Tremella* spp.**

Tremella are a type of fungi with a chewy texture like ear mushrooms. This fungus comprises 632 species, subspecies, and varieties (http://www.indexfungorum.org/Names/Names.asp). This fungus is a parasite fungus on other fungi (Dobbeler 2019), and the respondents reported that it is typically gathered from fruit bodies that develop on dead wood. The fruit body ranges in color from white to beige (Figure 5A), yellow, and orange (Figure 5B), which is a hallmark of its species. The fruiting body originates from the same basalt, made of notched gelatin. *T. fuciformis*, which ranges from dazzling white to beige, is a commonly by mushroom activists in Indonesia. The fruit bodies are typically prepared as soups or stir-fries (Figure 5C), together with a variety of other wild mushrooms. According to respondents, wild *Tremella* was known as jelly mushroom or *jamur putih*. Zhou *et al*. (2015) indicated that this is a nutritious 'natural' meal that should be consumed on a regular basis.

Hygrocybe* cf. *conica

This fungus has 23 species, subspecies, and varieties found all over the world (http://www.indexfungorum.org/Names/Names.asp,), typically develops in groups in litter mixed with dirt, and responders frequently found it near rubber plants. The fruit body is like a convex cap or an inverted half bowl, with sap or wax on top. The cap is brilliant red when young (Figure 6A), fades to orange as it develops (Figure 6B), and is followed by pileus that cracks. The fruit body features a cap with a lamellar bottom and a creamy white stem. The activists typically picked these mushrooms in their own backyards or forests. The fruit body was prepared into a traditional dish in each

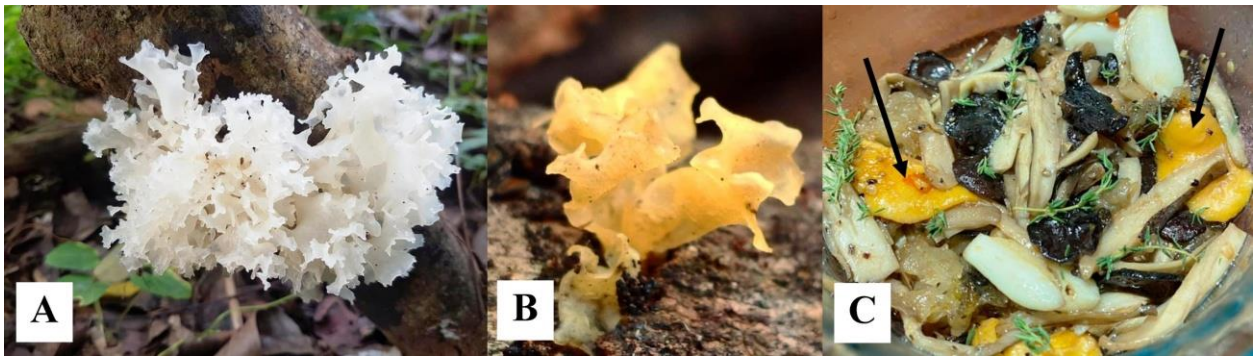

Figure 5 A: The fruit body of *the Tremella* is creamy white (Doc: G. Setiawan). B: The fruit body with orange color (Doc: Phungki). C: Dishes of *Tremella* fruit body (arrow) mixed with other wild mushrooms (Doc: Aisha K).

Figure 6 A: The young fruit body of the *tiung* mushroom is still red orange. B: The fruit body with a color that begins to fade as it develops. C: Dishes prepared by the respondent. A–C (Doc: Hari G).

activist area (Figure 6C). According to Putra (2020a), this mushroom was among the EWM consumed and traded by the local community on Belitong Island, Bangka Belitung Islands Province. Furthermore, Santosa *et al*. (2021) stated that this fungus is known as the *kulat siau* and is consumed as food by indigenous peoples in Central Kalimantan.

The mushrooms consumed by the respondents were often found in the forest and surrounding the yard of their home. The percentage of respondents preferring EWM varied (Figure 7). *Termitomyces* spp. was the most popular EWM, accounting for more than 50%. They preferred mushrooms with larger and denser fruit bodies. Small-sized mushrooms (Figure 7) such as *Tremella* spp. (3%) and *Hygrocybe* cf. *conica* (3%) were not popular among local people or mushroom activists in this study. *Termitomyces* have previously been reported as popular EWM among Indonesians (Putra and Hafazallah 2020) and local communities in other regions of the world (Sitotaw *et al*. 2020). The majority of *Termitomyces* are EWM with huge shapes and sizes, making them appropriate for usage as food by the participants or their families. Furthermore, the texture of the flesh, as well as its high fiber content, makes this mushroom a viable option to low-fat meat.

Meanwhile, respondents chose EWM to seek for was primarily based on mushroom taste (72.73%). Other factors given by the respondents included the form (12.99%), ease of finding (11.69%), rarity (1.3%), and medicinal value (1.3%) (Figure 8). Some mushrooms, such as *Termitomyces*, have a characteristic taste and aroma that is caused by both ambient conditions and the development level of the fruit bodies. This appears to be closely related to *Termitomyces*' metabolite action. According to Ghorai *et al*. (2009), *T. clypeatus* contains many enzymes in its fruit body. The enzymes are pectinase, cellulase, hemicellulase, arabinase, and xylanase. These enzyme components are suggested to provide the *Termitomyces* its flavor and aroma, making it appealing to eat. Furthermore, Hsieh and Ju (2018) revealed that numerous *Termitomyces* species have antioxidant, immunomodulator, anticancer, and antibacterial properties. So far, there has been little information on analyzing the nutritional content and potential of EWM in Indonesia. Although the consumption of EWM as a food ingredient is not widely practiced in Indonesia, certain local populations have for generations

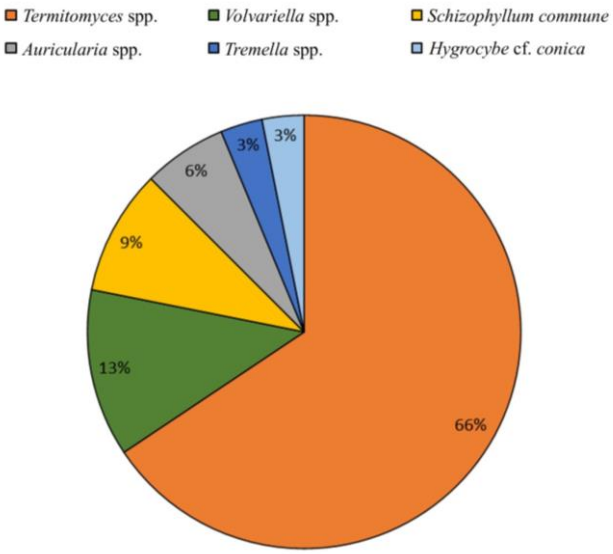

Figure 7 Percentage of EWM that the respondents strongly liked for consumption.

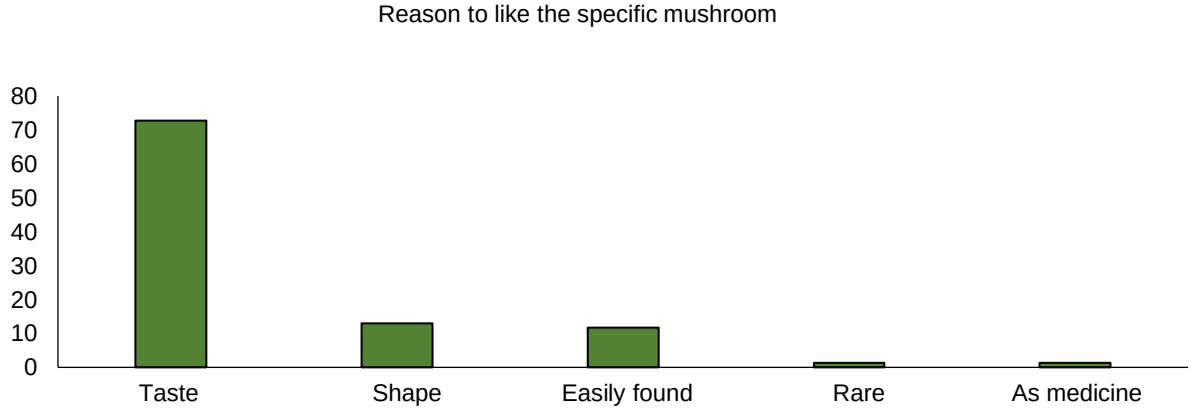

Figure 8 Percentage of reasons for preference for EWM by respondents to consume.

incorporated and used EWM into their everyday lives (Putra 2020a; Putra and Hafazallah 2020).

The two alternatives with the lowest percentage from participants were the reason EWM is rare and its use as medicine. This is related to the knowledge acquired by the participants. When they searched for EWM, most of them merely considered it a pastime or a fun activity. According to Putra (2020a), numerous varieties of EWM have potential economic value and can help move the economy on Belitong Island, Bangka Belitung Islands Province. One of the EWMs, *kulat pelawan* (*Heimioporus* sp.), has a selling price of IDR 1–4 million/kg. Another reason responders choose to pick is the fungus' shape and easily identifiable fruit bodies. These two variables are heavily influenced by environmental influences. When environmental variables promote the growth of EWM, the fungus will be seen more abundantly.

The texture and portion of the fruit body consumed have an impact on respondents' choice of taste as the most important factor. The data revealed that respondents favored soft textures (78.26%) over chewy (15.22%) and harsh (6.52%) textures (Figure 9). Because of their similar texture, mushrooms are widely regarded as an alternative source of protein and a substitute for certain types of meat. As a result, the processing of mushrooms is very similar to that of meat dishes in general. Wild mushrooms with a soft texture are thought to absorb spices more effectively, hence enhancing the flavor (Putra and Hafazallah 2020). Furthermore, soft textures encourage more respondents to consume EWM. The soft or sensitive texture also conveys the taste of the mushroom meals prepared. This appears to be related to the customs of native Indonesians, who frequently consume main dishes in the soft or soft category. A small fraction of responders who opt for a chewy and tough texture are most likely motivated by personal preferences and the type of meal to be prepared. For example, some mushroom advocates produce a drink from the body of

a chewy fruit, such as *Auricularia* and *Tremella*. However, most responders take EWM as a main meal, and the soft texture is preferred due to its ease of cooking. The respondents used EWM parts from the fruit body (70.59%), cap (23.53%), and stalk (5.88%) (Figure 10). Respondents preferred the cap part above the stalk part. The cap is likely to have a broader form and a higher proportion of volume than the stalk. However, some people favor the stalk's texture, which is neither too hard nor too soft. Until now, there has been no investigation on changes in the distribution of fungal nutrient content throughout the fruit body. Most respondents preferred to use all portions of the EWM fruit body to maximize the biomass used in the meal.

In addition to the nutrient composition and aroma that draw people to EWM (Boa 2004), the method by which EWM are processed is a significant aspect in their presentation. Soupy dishes (45.10%) and mushroom soup were the favored EWM processing methods among participants (Figure 11). Furthermore, 37.25% of the respondents preferred dishes in the form of stir-fried or minimally oily dishes. The choice of *pepes* (an Indonesian cooking method using banana leaves as food wrappings) (13.73%) and fried mushrooms (3.92%) were not particularly appealing to the respondents. Cooking in the form of broth, stir-frying, or slightly oily intensifies the mushroom flavor and blends it with the spices. Meanwhile, if the mushrooms are cooked into dry meals like fried mushrooms, their flavor will disappear slightly. The composition of vital elements in mushrooms will become increasingly depleted because of structural damage caused by the frying process, particularly protein and vitamin content.

The findings of the respondents' favorite sites when foraging mushrooms revealed that the most desired locations were forests (52%), yards (32%), rice fields (8%), gardens (6%), and bamboo tree litter (2%) (Figure 12). Forests are known to provide growing conditions that are more conducive to the composition of biotic and abiotic components that fungus seek for growth and development (Arora 1986; Boa 2004). This increases the variety of mushrooms in forests compared to other growth areas, despite earlier study demonstrating that wild mushrooms may thrive in a variety of ecosystems in Indonesia (Putra *et al*. 2018;

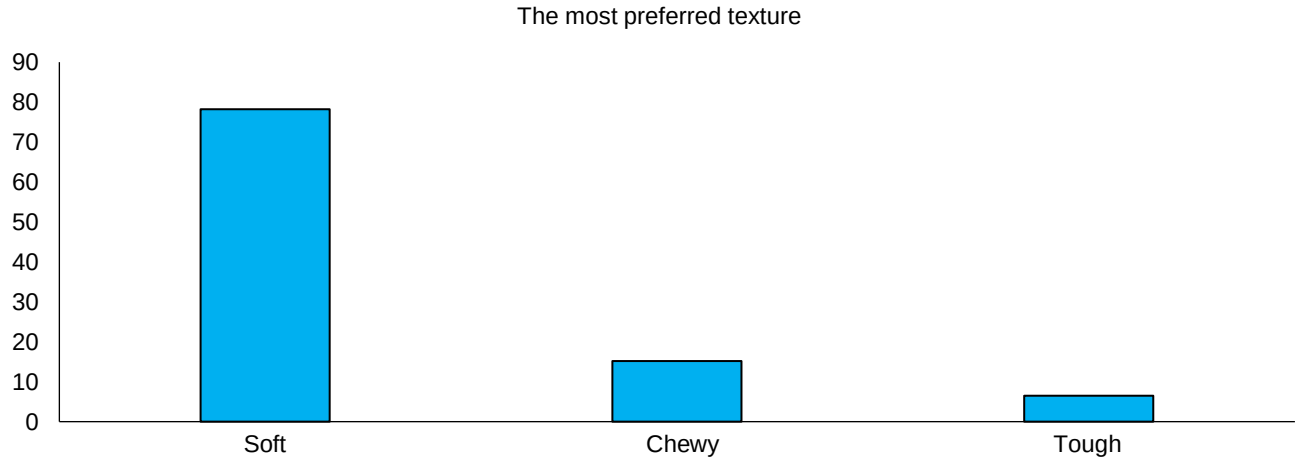

Figure 9 Percentage of EWM textures preferred by respondents for consumption.

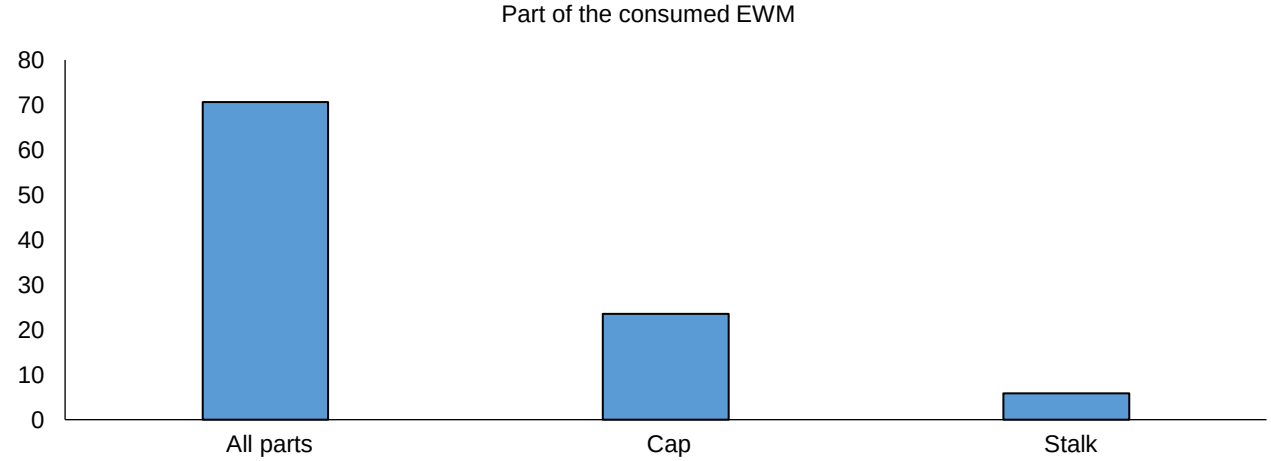

Figure 10 Percentage of the share of EWM that is preferred for consumption.

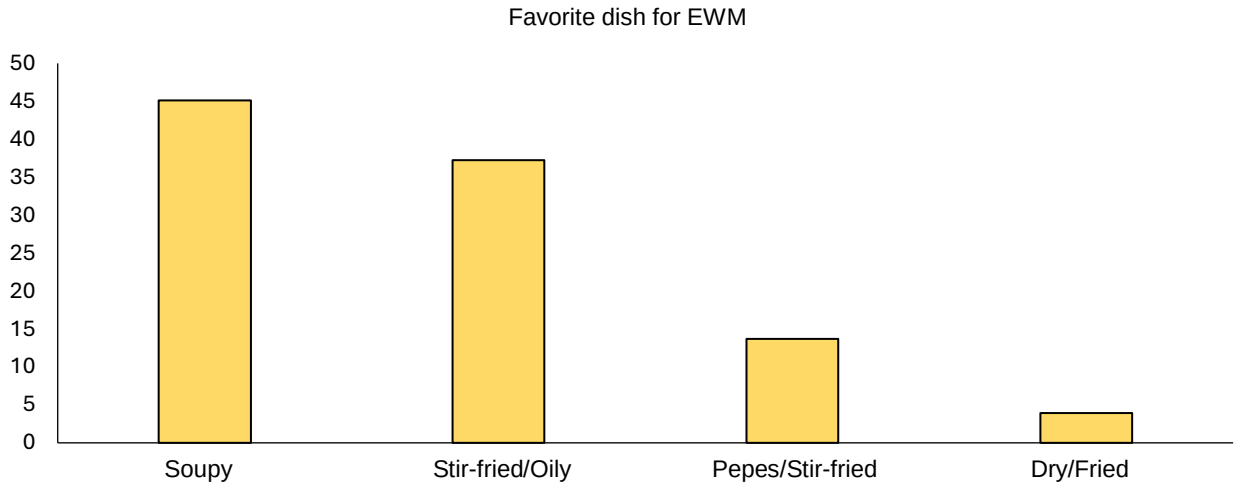

Figure 11 Percentage of EWM processing method.

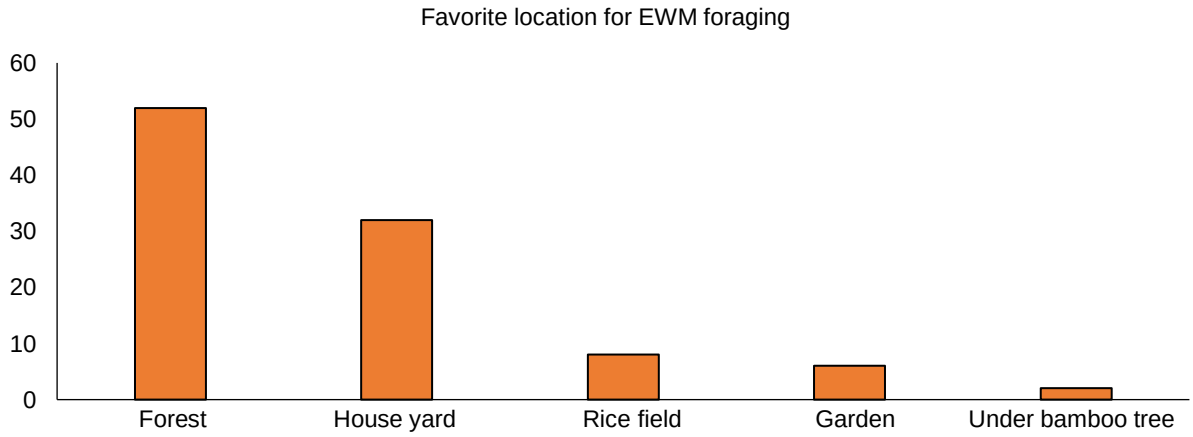

Figure 12 Percentage of preferred locations when searching for EWM.

2020; Putra and Astuti 2021). However, the condition of the soil in which EWM grows is a vital factor to examine before consuming it. This is because wild fungi can absorb metals and other substances from their environment (Stihi *et al*. 2009), particularly in contaminated areas (Hermawan *et al*. 2020a). In the forest, EWM frequently grows as saprob on decaying wood (Hermawan 2020; Hermawan *et al.* 2020b; Hermawan and Maulana 2020), or as ectomycorrhiza (Putra 2020a).

Most responders have been consuming EWM for an extended length of time (Figure 13). As many as 64.71% of respondents have been involved in this activity for more than 5 years. Then, 11.76% of respondents consumed EWM within 1–5 years, while the remaining 23.53% had only known EWM for less than a year. The duration of mushroom consumption is also associated with EWM-related sources of knowledge (Figure 14) and general knowledge of poisonous wild mushrooms (Figure 15). Respondents' main sources of knowledge were family inherited information (49.15%) and social media (42.37%). Other sources were friends (5.08%), the internet (1.69%), and personal experiences (1.69%). This supports the reports of Putra and Hafazallah (2020) and Putra (2020a), who said that some local populations in Indonesia have reliable information on the use of wild mushrooms (ethnomycology) that needs to be adequately recapped. Some respondents stated that EWM has become part of their culture through traditional events, regional cuisine, and alternative traditional medicine. Along with technological advancements, several respondents sought information about EWM via social media, particularly mushroom activists in Indonesia. Knowledge about EWM has also been widely shared on social media in the form of photographs, identifying information, and benefits, and it has even been a key topic in various mass media outlets. Furthermore, Putra (2020c) noted that mushroom activists who share rare mushroom knowledge have helped to rediscover uncommon

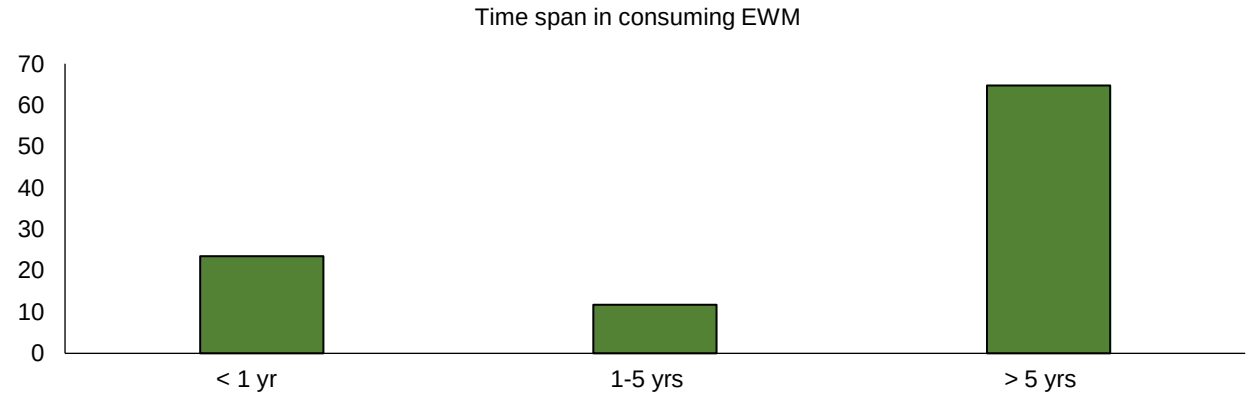

Figure 13 Percentage of the timespan of study respondents consuming EWM.

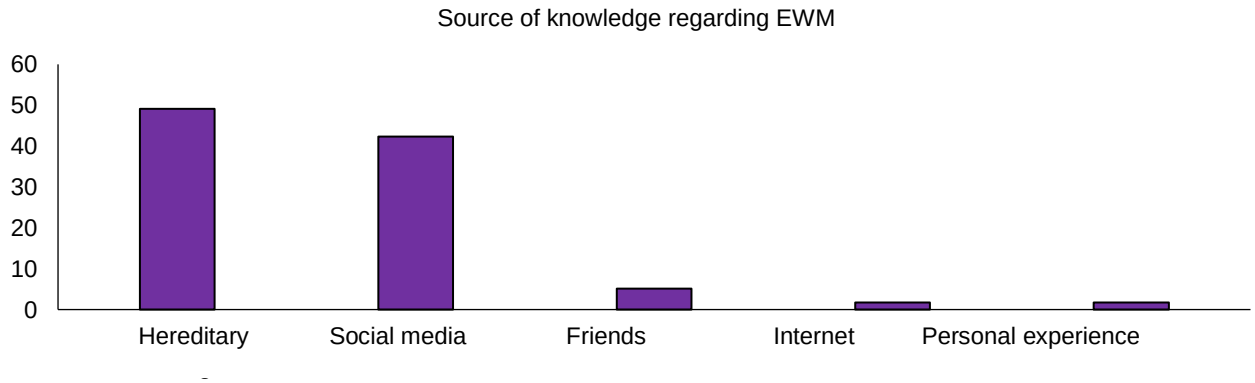

Figure 14 Percentage of respondents' knowledge sources about EWM.

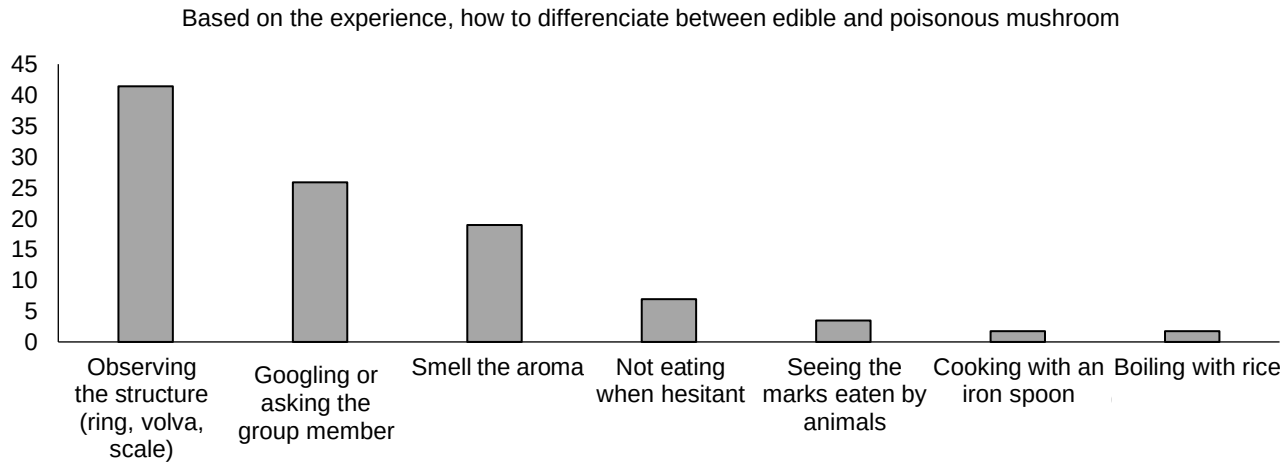

Figure 15 Percentage of respondents' knowledge about toxic and non-toxic wild mushrooms.

mushrooms that had not been documented in Indonesia in nearly a century.

There is no precise correlation or guarantee that the more time a person spends with EWM, the greater their knowledge and understanding of fungal toxicity (Arora 1986). The use of EWM does not obscure knowledge about the toxicity of fungus. This is because certain deadly wild mushrooms morphologically resemble EWM (Lima *et al*. 2012). Many respondents (41.38%) differentiate between edible and deadly wild mushrooms based on their morphological characteristics (Figure 15). Some respondents inquired about the mushroom community (25.86%), smelled the aroma (18.97%), questioned the place of its growth (6.90%), observed animal bite marks (3.45%), fried it with a metal spoon (1.72%), and boiled it with rice (1.72%). There is no standard reference or universal guide for identifying hazardous mushrooms. However,

the best way is to investigate the character of the fungus discovered. Without examining inside their caps, EWM like *Agaricus* resemble *Amanita*, *Chlorophyllum*, and *Macrolepiota* (Putra 2021c). Furthermore, there is no certainty that those who are thought to have an extensive understanding of EWM will get consistently accurate results. This is likewise true for the other alternatives in Figure 15, which cannot be used as a universal reference for all fungi and appears to be a myth without a scientific basis. Another example is the idea that brightly colored mushrooms are poisonous. Putra (2020a) demonstrated that the *kulat tiong* (*Hygrocybe* cf. *conica*), is an edible mushroom that is a brilliant red orange in color. Furthermore, Hermawan *et al*. (2020b) and Putra and Hafazallah (2020) revealed that mushrooms with unique morphologies, such as *Trichaleurina javanica*, are EWM in numerous Indonesian locales. Most of the responders had never been poisoned by wild mushrooms (Figure 16). This is consistent with respondents' efforts to observe the wild mushrooms found. Most responders were known to characterize fungal facts using ethnological expertise, scientific articles, and discussions with Indonesian mushroom experts.

Many respondents foraged on EWM in January (48.57%) and December (34.29%) (Figure 17). Other time alternatives include November (11.43%), October (2.86%), and May (2.86%). This is related to the abiotic factor that causes fungi to proliferate in nature, specifically during the rainy season or when there is high humidity. Humid conditions are recognized to be an ideal period to seek for EWM in Indonesia (Putra and Hafazallah 2020). Meanwhile, the frequency of respondents' EWM searches per month was varied (Figure 18).

The most picks were once (37.50%) and three times (37.50%) per month. In addition, some respondents chose twice (12.50%) and five times (12.50%). This EWM hunting activity was frequently scheduled to coincide with the respondent's everyday holiday activities. The goal of fungal foraging also influences the frequency of EWM searches (Figure 19). Almost all respondents (93.48%) consumed EWM themselves, while a minor number have sold it in the market or on other social media platforms. The respondents' major reason for this is that the EWM biomass obtained was not always large, thus they prefer to process it themselves into food for their families.

EWM are a plentiful food source that has yet to gain popularity and is best used in Indonesia. To achieve

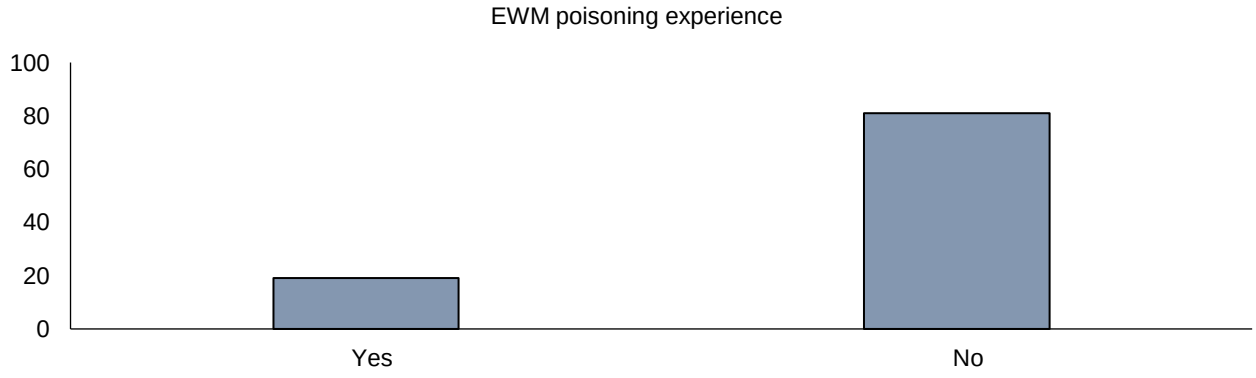

Figure 16 Percentage of respondents' experience of wild mushroom poisoning.

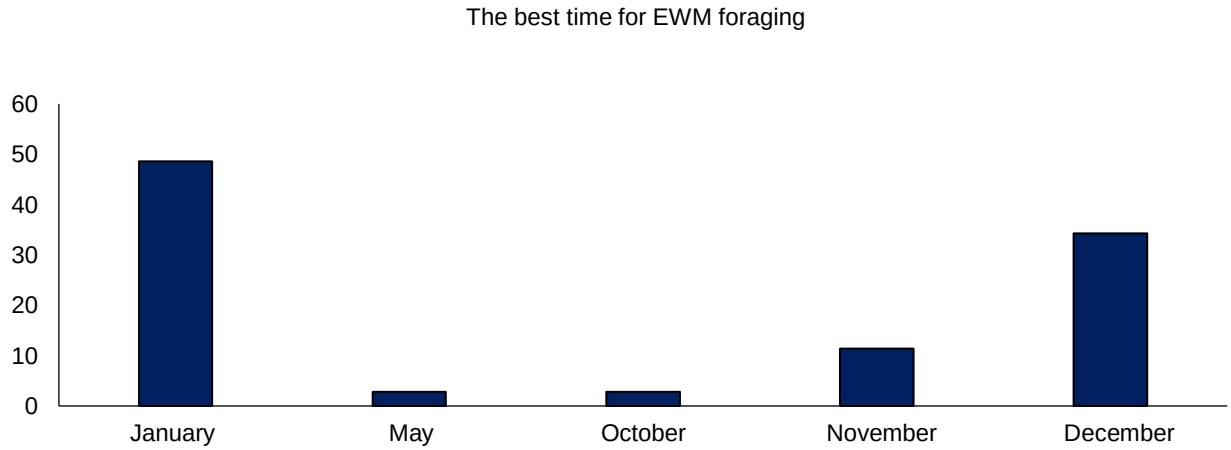

Figure 17 Time for EWM foraging.

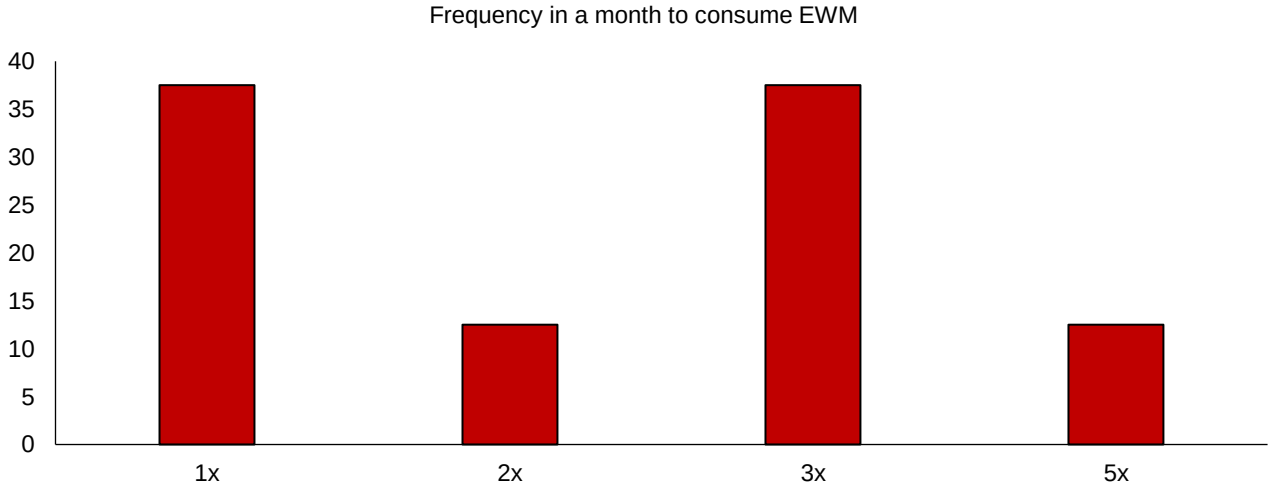

Figure 18 Percentage of respondents for EWM foraging/month.

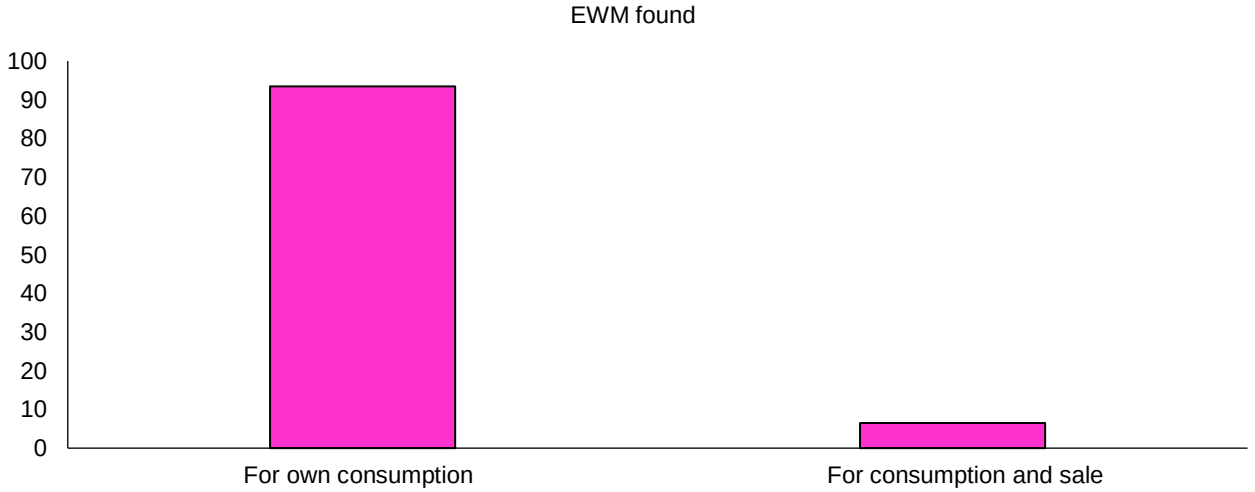

Figure 19 Percentage of EWM forage objectives.

food security in Indonesia, researchers and fungal activists must actively transfer mycological science to the population. However, precision, expertise, and a solid knowledge base are required when entering EWM because edible and deadly wild mushrooms can appear identical.

CONCLUSION

Edible wild mushrooms are a potential food alternative in Indonesia. Respondents searched the most for wild edible mushrooms in January, and they consume them almost completely on their own. The forest is the most popular area for fungal incursion, and mushroom activists prefer *Termitomyces* spp. as their EWM. The main reason mushroom activists want EWM is its flavor profile. Mushroom activists devour all portions of the body from EWM, with the soft texture being the most preferred for soup-based meals. Most mushroom enthusiasts or local communities identify EWM from toxic wild mushrooms by examining the mushrooms discovered. Even with a low incidence rate, respondents have reported cases of wild mushroom poisoning.

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