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Ethnomycological Studies on the Bugkalot Indigenous Community in Alfonso Castañeda, Nueva Vizcaya, Philippines

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ABSTRACT

The Philippines is a multi-ethnic country with a very rich and diverse species of macrofungi. Bugkalots, a well-known ethnic group in Northern Luzon, Philippines, are believed to use various species of mushrooms as part of their daily lives. To document the ethnomycological knowledge, belief, practices, and utilization of macrofungi by the Bugkalot indigenous community in Alfonso Castañeda, Nueva Vizcaya, a survey and interview approach were used. The result of the study showed that a total of 50 species of macrofungi has been reported by the Bugkalots. However, only 45 species were collected and identified morphologically. Out of these macrofungi, only 17 species were used as food (Auricularia auricula-judae, Auricularia polytricha, Boletus sp., Clitocybe sp., Coprinopsis atramentaria, Coprinopsis lagopus, Coprinus cinereus, Lentinus tigrinus, Lentinus sp. 1, Lentinus sp. 2, Mycena sp., Panaeolus sp., Pleurotus dryinus, Polyporus sp. 2, Polyporus sp. 3, Schizophyllum commune, and Stereum lobatum) and 7 species were used as medicine (Fomitopsis sp., Ganoderma applanatum, 3 species of Ganoderma lucidum, Polyporus picipes and Polyporus sp. 5). Their local names, specific use, mode of preparation, and administration is documented in this paper. This is the first ethnomycological study conducted on the Bugkalot indigenous people in the Philippines.

Key words: *Bugkalot indigenous people, ethnomycology, macrofungi, edible fungi, medicinal fungi.*

INTRODUCTION

The Philippines is a tropical, multi-ethnic country with a very rich and diverse species of macrofungi [1, 2]. According to Republic Act 8371 of the Philippine Constitution (also known as the Indigenous Peoples' Right Act of 1997), indigenous peoples (IPs) is partly defined as the group of people sharing common bonds of language, customs, traditions and other distinctive cultural traits [3]. In the Philippines, the estimated population of IPs lies between 10% and 20% (14–17 million) of the country's national population as of 2015, which has been projected to currently lie at 102.9 million [4]. They are classified under 8 major groups subdivided into 110 ethnolinguistic groups dispersed to over 60 provinces. Most of the IPs are found in Mindanao (61%), one-third (33%) are in Northern Luzon, particularly in Cordillera Administrative Region and some other groups are in the Visayas area (6%) [5]. The Lumads of Mindanao are considered to be the largest group while the Igorots of Northern Luzon still account for a significant portion of the IPs population. Other major groups of IPs include the Agta and Aeta/Negrito most widely distributed in Central Luzon, the Mangyans of Mindoro, the Visayas IP groups, and the

Islamic IP groups of Mindanao. Even smaller groups are scattered in some part Luzon, including several groups of hunter-gatherers in transition.

One of the well-known indigenous groups in Northern Luzon is the Bugkalots (also known as Ilongots). The Bugkalots are recognized for being elite headhunters which were considered as a part of their tradition [6]. They were also known to give great importance to the environment especially the forests since it is their source of food. As such, similar to other indigenous groups in the Philippines, the Bugkalots are believed to use various mushroom species as part of their daily lives. Hence, knowing the indigenous knowledge of these IPs on the locally available mushrooms is of great importance in improving the quality of life of these people [7, 8]. In the Philippines, complete documentation of such indigenous knowledge of IPs is very scarce [9]. Thus, this necessitates further ethnomycological studies on the different IPs including the Bugkalots in the country.

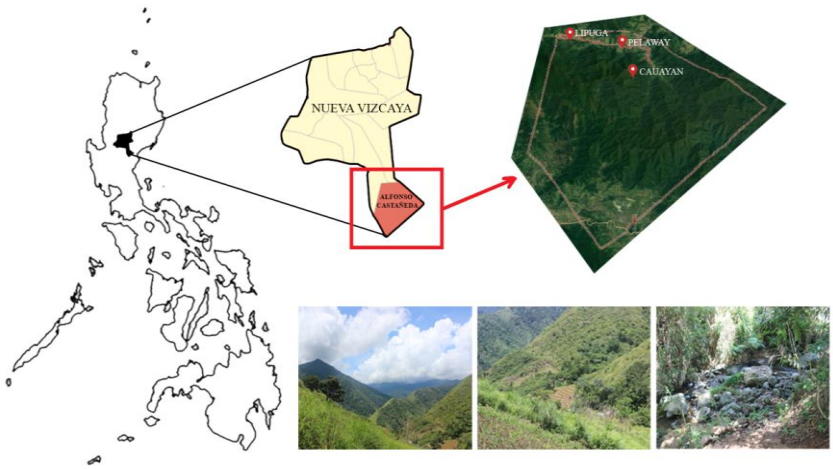
Ethnomycology is the study of the cultural aspects affecting the use, belief, and knowledge about fungi (such as mushrooms) within the community [10]. Documenting the indigenous knowledge about the use of edible and inedible mushrooms for their nutritional and medicinal value are important aspects of this field [11]. Our country has a contrastingly few and poor data on ethnomycology considering its multi-ethnicity [12]. With the increasing threat of extinction of this precious ethnomycological knowledge in the indigenous communities in the Philippines, there is a pressing need to report these data for the benefit of the future generations and the continuity of culture in these IPs.

Meanwhile, there are no available in-depth studies on the knowledge and culture of the Bugkalots when it comes to utilizing macrofungi such as mushrooms. Thus, this study is significant since it provided initial data on the ethnomycological background of the Bugkalots. Furthermore, the results of this study can also be used as a basis in identifying the beneficial mushroom species that can address the nutritional needs and even economical aspects within this indigenous group. By documenting the indigenous knowledge, beliefs, and practices of the Bugkalots, this study will also help in ensuring that this part of the culture of these IPs will be preserved in the new generation despite the advancements and modernization in their community. The study will also increase awareness and appreciation of the scientific and urban community in the locally acceptable knowledge, beliefs, and practices that our IPs can share with the rest of the world.

MATERIALS AND METHODS

Ethics requirements

In regards to the ancestral domain of the Bugkalot indigenous community in Alfonso Castañeda, Nueva Vizcaya, letters of the request were distributed to different offices including the chairman, and regional director of the National Commission on Indigenous People and local government units such as municipal mayors, barangay captains, and tribal chieftains. This is to secure permits from them before proceeding with the survey, actual interview, and collection of macrofungi.



(A) (B) (C) (D)

Figure 1. (A) Map of the study sites (obtained from Google, edited using Adobe Photoshop ver. CS6). **(B, C, and D)** Representative pictures of the collection site.

Study sites and respondents

Three barangays in Alfonso Castañeda, Nueva Vizcaya where the majority of the Bugkalot indigenous people are situated served as the study site. These include Brgy. Cauayan, Brgy. Lipuga and Brgy. Pelaway.

Survey and interview

At least 60 respondents (20 from each barangay) aging from 18 years old and above were asked to answer the survey questionnaire adopted from De Leon et al. (2012) with minor modifications. The information asked in the questionnaire includes indigenous knowledge, beliefs, and practices about macrofungi. Actual interview for the tribal chieftain and other elders was also done to gain more information.

Collection and preservation of macrofungal Specimens

Purposive sampling was done in the collection of different species of macrofungi available in the area. The collection was conducted during the rainy season of the year (June 2019) which favors the growth of most macrofungi. To secure safety, assistance from tribal chieftains and other tribe members was requested. All visibly present macrofungi which with known and unknown utilization by the Bugkalots are collected. Specimens were initially photographed in their substrates, collected, placed in containers, and labeled before immediate transport to the laboratory for further identification. Dried macrofungi were air-dried and prepared as herbarium specimen. Fleshy macrofungi were preserved using 95% ethanol.

Identification and characterization of the collected macrofungal specimen

The identification of the collected macrofungi was based on their macromorphological (fruiting body) features. Morphometric data collected for each specimen were the different features of the pileus, gills/pores, and stipe. The specimens were identified by comparing the morphological features with published pieces of literature and relevant websites e.g. Ostry et al. (2011), Tadiosa et al., (2011), Arenas et al. (2015), De Castro and Dulay (2015), Liwanag et al. (2017), Arenas et al. (2018) and Kuo (2019) [13-19]. The authenticity of each specimen was verified in Botany and Herbarium Division, National Museum of Natural History in Manila, Philippines.

Data analysis

The indigenous knowledge, beliefs, and practices of the Bugkalots on macrofungi were summarized using a table. The macrofungi reported from the survey and interview were compared with the collected specimen. The list of all macrofungal species with their local names, substrates, and uses was also tabulated.

RESULTS AND DISCUSSION

Indigenous knowledge, beliefs, and practices on mushroom

All Bugkalot respondents knew about mushroom and they believe that this only grows during the rainy season and not so much in summertime (Table 1.1). This is parallel with the reports from other indigenous groups that mushrooms are abundant during the wet season of the year [20-22]. They also said that mushroom can be found in different substrates such as decaying log, leaf litter, and soil which is similarly reported by the Ifugaos [22] and Gaddangs [20] (Table 1.1). This claim could also be supported by the statement of Kalaw and Albinto (2014) that many species of macrofungi are naturally appearing on different substrates such as leaf litter, decaying plant residues, and decomposing logs of trees, especially during the rainy season [23]. They also mentioned that edible species of mushrooms can be distinguished from inedible ones based on the appearance, smell, and its origin (Table 1.2). Mushroom bright color, pungent smell, and presence of ring in the stipe of the fruiting body are some of their basis that mushrooms are poisonous and the Bugkalots ignore them. A similar technique is also used by the Ifugaos [22] and Gaddangs [20], Khasi tribe in Meghalaya, India [24] and local IPs in Sabah, Malaysia [25]. Moreover, insects perching on the mushroom fruiting body is an indication that it is edible. A similar observation was reported in another country that mushrooms being eaten by the insects and other animals are also safe for human consumption [25-27]. On the other hand, Bugkalots emphasize that the names of mushrooms they used are derived depending on their appearance and substrate where they are found growing. This is in congruence with the study of Teke et al. (2018) wherein the vernacular names of the local mushrooms were associated with its features or the substrates on which they proliferate [26].

Table 1.1. Survey on the knowledge, beliefs, and practices on mushroom by the Bugkalots in three barangays in Alfonso Castañeda, Nueva Vizcaya.

Barangay	No. of respondents	Do you know mushroom?		When do mushrooms appear?		Where do mushrooms appear?			How mushrooms are utilized?	
		Yes	No	When it's raining	When it's hot	Decaying logs	Leaf litter	Soil	Food	Medicine
Cauayan	20	20	0	20	0	20	3	19	20	0
Lipuga	20	20	0	20	0	18	9	12	20	6
Pelaway	20	20	0	20	0	17	7	13	20	8

Bugkalots primarily collect mushrooms as part of their diet (Table 1.1). The usual cooking method they do for all edible mushrooms is by boiling, grilling, or sautéing, depending on the quantity collected, with other vegetables, meats, or kinds of seafood. Their mushroom consumption depends on the season of the year wherein from June to July, they usually consume mushroom at least twice a week and at least once a week every March to April, while for the rest of the months is indefinite. They usually collect lower than ½ kg of mushrooms (approximately ¼ kg) most of the time. On the other hand, few of them sell mushrooms that they collect as it can be an additional source of income for the family (Table 1.3). They sell it with other fellow Bugkalots and to other people living in the lowland for ₱100.00 and above per kilogram.

Table 1.2. Survey on the knowledge, beliefs, and practices on mushroom by the Bugkalots in three barangays in Alfonso Castañeda, Nueva Vizcaya.

Barangay	No. of respondents	How do you recognize edible mushrooms?			Do you have indigenous knowledge about mushrooms?		Do you know that edible mushrooms could be cultivated?		Have you tried cultivating mushrooms?	
		Appearance	Smell	Substrate	Yes	No	Yes	No	Yes	No
Cauayan	20	20	1	10	0	20	20	0	0	20
Lipuga	20	16	17	6	5	15	15	5	12	8
Pelaway	20	19	6	6	0	20	18	2	5	15

They also used mushroom for medicinal purposes (Table 1.1). They believe that it can be used as a remedy for arthritis, cough, and colds, fever, headache, hypertension, skin diseases, stomachache, and toothache. They usually boil or grind the mushroom to obtain the extract and take it by drinking the broth or putting the mushroom directly to infected body parts.

Table 1.3. Survey on the knowledge, beliefs, and practices on mushroom by the Bugkalots in three barangays in Alfonso Castañeda, Nueva Vizcaya.

Barangay	No. of respondents	Do you sell mushroom you've collected?		Do you perform rituals before collecting mushrooms?		Can mushroom cultivation be your occupation?		If given a chance, do you want to be trained on proper mushroom cultivation?	
		Yes	No	Yes	No	Yes	No	Yes	No
Cauayan	20	1	19	0	20	20	0	20	0
Lipuga	20	15	5	3	17	20	0	20	0
Pelaway	20	7	13	0	20	20	0	20	0

Bugkalots are also aware that edible mushrooms could be cultivated (Table 1.2). Several groups of LGUs and soldiers have already visited their tribe to conduct training and seminar on proper mushroom domestication. However, due to insufficient information shared and lack of resources, they were discouraged to proceed. The current cultivation method they are doing to have an abundant supply of edible mushroom in their community is through "kaingin" or swidden farming (slash and burn). This farming method used by the Bugkalots was unique and distinctly different from other ethnic groups [28]. This is being done every January to June. After searching for a perfect flat forest area for the purpose, they will begin slashing the trees, bamboos, vines, and shrubs and left until debris turned dried. This is performed from January to March. By April, dried logs will be burnt followed by the clearing process upon entering the month of May. Finally, after waiting for heavy rainfall, the sowing of rice seeds in the burnt field is done by June, the start of the rainy season. This is the time wherein different species

of edible of mushrooms such as "kulat awang" (*Paneolus* sp.), "kulat bitkalan" (*Lentinus* spp.), "kulat guko-guko" (*Coprinopsis* spp.), "kulat kalansepay" (*Mycena* sp.), "kulat kidedep" (*Schizophyllum commune*) and "kulat pungkulan" (*Boletus* sp.) will arise (Table 2). The abundant mushroom proliferation is expected by July. However, this technique is time-consuming and can only be done at a specific time of the year. They want to learn the latest technology on proper mushroom cultivation from the experts in the country as it would become a livelihood in their community.

At present, Bugkalots do not have many indigenous beliefs about mushrooms (Table 1.2). Some still have mentioned that small creatures called "dwende" were living under the cap of the mushrooms but it is already considered as a belief in the past. However, such belief is prevailing to other indigenous groups such as Ifugaos [22] and it is very common even to lowlanders. They also performed rituals such as praying to pagan gods before mushroom collection but since Christianity revolutionized in their tribe, they began to realize that this doing is evil and already stop doing them. Another belief is that during rain accompanied by spontaneous lightning stimulates mushrooms growth which was also previously reported by other IPs in the Philippines [12, 20] and even in other countries [26].

Listing of mushrooms utilized by the Bugkalots

There were 50 species of macrofungi reported by the Bugkalots (21 species are used as food; 8 species are used as medicine; 21 species are not utilized). However, only 45 species were collected and identified morphologically (Table 2). Out of these macrofungi, only 17 species were used as food: *Auricularia auricula-judae*, *Auricularia polytricha*, *Boletus* sp., *Clitocybe* sp., *Coprinopsis atramentaria*, *Coprinopsis lagopus*, *Coprinus cinereus, Lentinus tigrinus, Lentinus* sp. 1, *Lentinus* sp. 2, *Mycena* sp., *Panaeolus* sp., *Pleurotus dryinus*, *Polyporus* sp. 2, *Polyporus* sp. 3, *Schizophyllum commune* and *Stereum lobatum* (Table 3). Other IPs in the Luzon have been reported to consume some of the similar macrofungal species listed [12, 20-22, 29]. Bugkalots usually prepared *A. auricula-judae* and *A. polytricha* by grilling using a "padpad" (*Neonauclea reticulata* (Havil.) Merr.) leaves while *S. commune* is cooked with coconut milk or fermented shrimp paste combined with chili pepper that brings a spicy flavor to the delicacy. *P. dryinus* was reported to enhance vision. Edible mushrooms such as *Pleurotus citrinopileatus* and *Pleurotus ostreatus* contain vitamin A (retinol), which is essential for good eyesight and prevents blindness [30, 31]. *P. pulmonarius* was also found out to synthesize retinol when cultivated using a deciduous log substrate [32]. The group of inky cap mushrooms, *C. atramentaria*, *C. lagopus,* and *C. cinereus* are also edible species for the Bugkalots. Several reports claimed that these mushrooms exhibited antibacterial activity and contain anticancer compounds [33-37]. *Lentinus* spp. seems to be the most common edible mushroom among the Bugkalots as they knew many of its species by naming a specific local name for each. However, for the local people of the Rupandehi District in Nepal, *L. tigrinus* is not popularly used [38]. This variation could be because the popularity of a certain mushroom depends on their distribution and species richness in every region. On the other hand, to the best of our knowledge, this was the first report of *S. lobatum* being an edible species by the tribal group. Meanwhile, 7 species of macrofungi were used as medicine: *Fomiptosis* sp., *Ganoderma applanatum*, 3 species of *Ganoderma lucidum*, *Polyporus picipes,* and *Polyporus* sp. 5 (Table 3). *G. lucidum* is used by the Bugkalots as a treatment for a skin infection which is similar to the IPs of Cameroon in Central Africa [39]. Other studies also reported that *Ganoderma* mushroom has been used to prevent several illnesses like gastric cancer, hypertension, hepatitis, chronic bronchitis, and hypercholesterolemia [40]. On the other hand, *P. picipes* is used as a remedy for stomachache while *Polyporus* sp. 5 is used to treat ulcers as well. *Polyporus dictyopus* was reported to treat ailments like stomachaches and headaches by the local people of Cameroon [26] and various species *Polyporus* was used by the Gbagbyi people of Nigeria as a treatment of piles, fever, diarrhea, dysentery and fertility problems among women [41]. This shows that many *Polyporus* species had a wide range of medicinal benefits. It is also worth noting that species *Lenzites elegans* is not utilized by the tribal community. However, this is an edible species for Ifugaos [22]. On the other hand, *G. applanatum* is a medicinal species for Bugkalots but not for the Aetas [42]. This only indicates differences in the knowledge and practices among different ethnic groups in the country.

Table 2. Mushrooms reported by the Bugkalots in Alfonso Castañeda, Nueva Vizcaya based on the survey-questionnaires, interviews, and collected specimen.

Local Names	Scientific Name	Use	Substrate
Kulat adang 1	*Marasmius* sp. 1	none	decaying twig
Kulat adang 2	*Marasmius* sp. 2	none	decaying log

Kulat agang	*Stereum ostrea* (Bl. & T. Nees) Fr.	none	dead log
Kulat alenga baboy	*Auricularia polytricha* (Mont.) Sacc.	food	decaying twig
Kulat alenga buki	*Coprinellus disseminatus* (Pers.) J. E. Lange	none	soil
Kulat alengi	*Microporus affinis* 1 (Bl. & T. Nees) Kuntze	none	decaying log
Kulat awang	*Panaeolus* sp.	food	soil
Kulat baklag 1	*Ganoderma lucidum* 1 (Curtis) P. Karst.	medicine	tree trunk
Kulat baklag 2	*Ganoderma lucidum* 2 (Curtis) P. Karst.	medicine	decaying log
Kulat bangkal	*Fomes* sp. 1	none	tree bark
Kulat belang	*Hymenochaete tenuissima* (Berk.) Berk.	none	decaying log
Kulat betang	*Ganoderma lucidum* 3 (Curtis) P. Karst.	medicine	tree bark
Kulat bitakan	*Microporus affinis* 1 (Bl. & T. Nees) Kuntze	none	decaying log
Kulat bitang	nc	medicine	soil
Kulat bitkalan anoy	*Lentinus* sp. 1	food	decaying log
Kulat bitkalan lukong	*Lentinus* sp. 2	food	dead log
Kulat bitkalan sipsip	*Lentinus tigrinus* (Bull.) Fr.	food	dead log
Kulat bungkog 1	*Fomes* sp. 2	none	decaying twig
Kulat bungkog 2	*Fomitopsis* sp.	medicine	tree bark
Kulat bungkog 3	*Ganoderma applanatum* (Pers.) Pat.	medicine	tree bark
Kulat dayami/saging	nc	food	banana leaf/rice straw
Kulat gekagek	*Pycnoporus sanguineus* (L.) Murrill	none	tree bark
Kulat gilengan	*Hexagonia tenuis* (Hook.) Fr.	none	dead tree trunk
Kulat guko-guko 1	*Coprinopsis atramentaria* (Bull.) Redhead	food	soil
Kulat guko-guko 2	*Coprinopsis lagopus* (Fr.) Redhead, Vilgalys & Moncalvo	food	soil
Kulat kagkagen	*Stereum lobatum* (Kunze ex Fr.) Fr.	food	decaying log
Kulat kalansepay	*Mycena* sp.	food	decaying tree trunk
Kulat kalaw	nc	food	soil
Kulat kaneg 1	*Polyporus picipes* Fr.	medicine	dead log
Kulat kaneg 2	*Polyporus* sp. 1	none	decaying tree trunk
Kulat kawayan	nc	food	decaying bamboo
Kulat kidedep 1	*Schizophyllum commune* Fr.	food	dead bamboo/log
Kulat kinegan	*Lactarius* sp.	none	soil
Kulat kolang-kolang/tainga ng daga	*Auricularia auricula-judae* (Bull.) Quél	food	dead log
Kulat kuyong 1	*Polyporus* sp. 2	food	dead log
Kulat kuyong 2	*Polyporus* sp. 3	food	decaying log
Kulat ladang	*Microporus xanthopus* (Fr.) Kuntze	none	dead log
Kulat lapsyaken	*Lenzites elegans* 1 (Spreng.) Pat.	none	decaying log
Kulat lukip	*Coriolus* sp.	none	decaying log
Kulat lukot-lukot	*Polyporus* sp. 4	none	decaying twig
Kulat paangaan	*Pleurotus dryinus* (Pers.) P. Kumm.	food	decaying tree trunk
Kulat pakat-pakat	*Stereum hirsutum* (Willd.) Pers.	none	decaying twig
Kulat pinkalan	*Coprinus cinereus* (Schaeff.) Gray	food	soil
Kulat pungkulan	*Boletus* sp.	food	soil
Kulat punso	nc	food	soil
Kulat simbed	*Polyporus* sp. 5	medicine	decaying log
Kulat simot-simot	*Crepidotus* sp.	none	decaying twig/leaf litter
Kulat sinangap	*Lenzites elegans* 2 (Spreng.) Pat.	none	decaying log
Kulat tegatan	*Clitocybe* sp.	food	dead log
Kulat tuto	*Marasmiellus* sp.	none	dead twig

nc – not collected

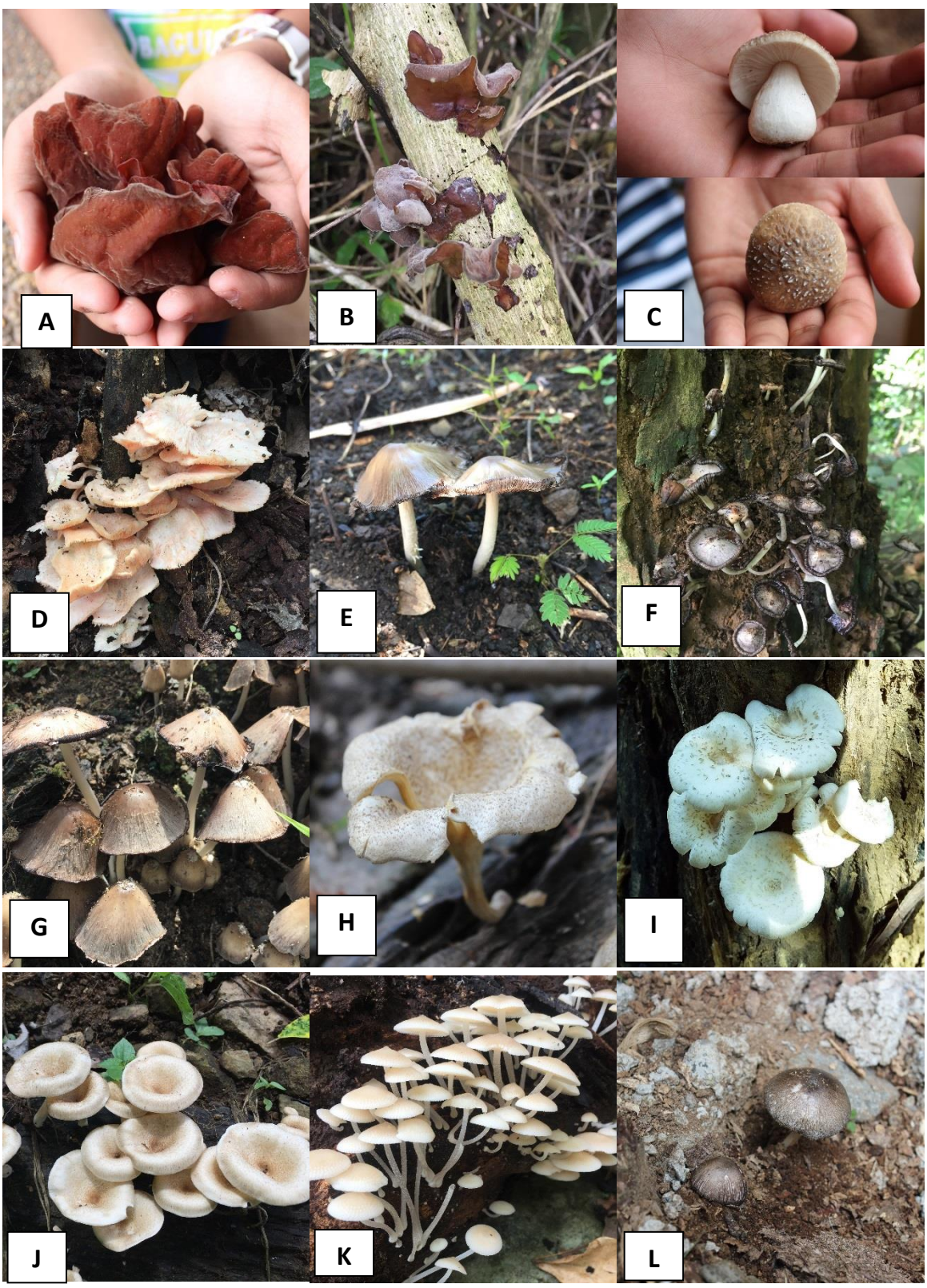
Generally, Bugkalots call mushrooms as “kulat” in their dialect and use it as a prefix in naming a particular species (Table 2). It is interesting to note that a similar prefix word is also used by the local IPs of Sabah, Malaysia [25]. It could be attributed to the fact that the Bugkalot dialect is classified under Malayo-Polynesian which is a similar language use by Malaysians [43]. Another indigenous group in the Philippines has also their general term for

mushroom. Aetas of Central Luzon has been reported to call mushroom as "kuwat" [12], Ifugaos use the term "uong" in their province [22], Gaddangs of Nueva Vizcaya locally knew mushroom as "tarulok" [20] and Kalanguyas of Carangalan, Nueva Ecija used either "bagel" or "buo" [21].

Table 3. Mushrooms reported to be utilized by the Bugkalots in Alfonso Castañeda, Nueva Vizcaya.

Scientific Name	Uses/Remarks
As food	
Auricularia auricula-judae	cooked as a viand, sautéed with meats and vegetables, grilled using *Neonauclea reticulata* leaves
Auricularia polytricha	cooked as a viand, sautéed with meats and vegetables, grilled using *Neonauclea reticulata* leaves
Boletus sp.	cooked as a viand, sautéed with meats and vegetables
Clitocybe sp.	cooked as a viand, sautéed with meats and vegetables
Coprinopsis atramentaria	cooked as a viand, sautéed with meats and vegetables
Coprinopsis lagopus	cooked as a viand, sautéed with meats and vegetables
Coprinus cinereus	cooked as a viand, sautéed with meats and vegetables
Lentinus sp. 1	cooked as a viand, sautéed with meats and vegetables
Lentinus sp. 2	cooked as a viand, sautéed with meats and vegetables
Lentinus tigrinus	cooked as a viand, sautéed with meats and vegetables
Mycena sp.	cooked as viand, sautéed with meats and vegetables, can be a guide due to bioluminescent activity
Panaeolus sp.	cooked as a viand, sautéed with meats and vegetables
Pleurotus dryinus	cooked as a viand, sautéed with meats and vegetables, can enhance vision
Polyporus sp. 2	cooked as a viand, sautéed with meats and vegetables, can be a guide due to bioluminescent activity
Polyporus sp. 3	cooked as a viand, sautéed with meats and vegetables
Schizophyllum commune	cooked as a viand, sautéed with coconut milk or fermented shrimp paste and chili pepper
Stereum lobatum	cooked as a viand, sautéed with meats and vegetables
As medicine	
Fomitopsis sp.	treatment for arthritis and hepatitis, ground and boiled to drink the broth
Ganoderma applanatum	treatment for gastric ulcer, ground and boiled to drink the broth
Ganoderma lucidum 1	remedy for headache and skin disease/infection, ground, directly applied to the infected body part
Ganoderma lucidum 2	remedy for headache and skin disease/infection, ground, directly applied to the infected body part
Ganoderma lucidum 3	treatment for gastric ulcer and hepatitis, ground and boiled to drink the broth
Polyporus picipes	remedy for stomachache, ground and boiled to drink the broth, however, too much intake may cause overdosage
Polyporus sp. 5	treatment for ulcer, ground and boiled to drink the broth

Bugkalots mentioned 43 local words in the naming mushroom based on the survey questionnaire, interview, and collected specimen. Interestingly, they have a different style of giving local names for mushrooms. For example, although not all, they used similar local names for mushrooms belonging to the same genus such as *Marasmius* spp., *Ganoderma* spp., *Lentinus* spp., *Coprinopsis* spp., *Polyporus* spp (Table 2). In the case of *Lentinus* spp., they use a second local word that distinguished each species to one another e.g. "kulat bitkalan sipsip" (*Lentinus tigrinus*), "kulat bitkalan anoy" (*Lentinus* sp. 1) and "kulat bitkalan lukong" (*Lentinus* sp. 2). Moreover, it could also be noted that the same local name is used for mushrooms belonging to different genera. They based it on the features of the mushroom e.g. the name for *Fomes* sp. 2, *Fomiptosis* sp. and *Ganoderma applanatum* are all "kulat bungkog", which means "hard" in their local dialect since these mushrooms have a hard-fruiting body. Similarly, Bugkalots also named mushrooms based on their morphological appearance e.g. the local names for *Auricularia polytricha*, which is "kulat alenga baboy" and *Coprinellus disseminatus* is "kulet alenga buki", which looks like an ear of a pig and a small rodent for them, respectively. The word "alenga" means ear in the Bugkalot dialect. They also mentioned species that glow in the dark evening such as *Mycena* sp. and *Polyporus* sp. 2 (Table 3). These mushrooms become their typical guide to their way home when they took the night in the mountain. According to them, these species possessed a bioluminescent activity.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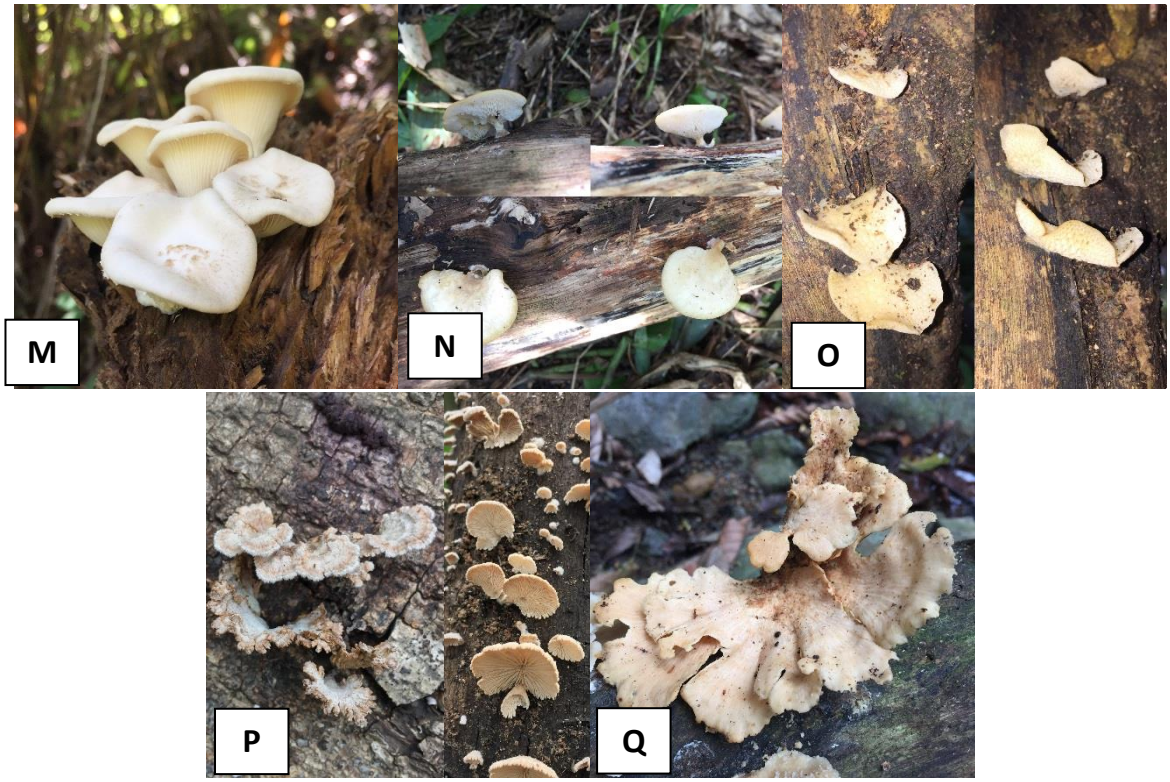
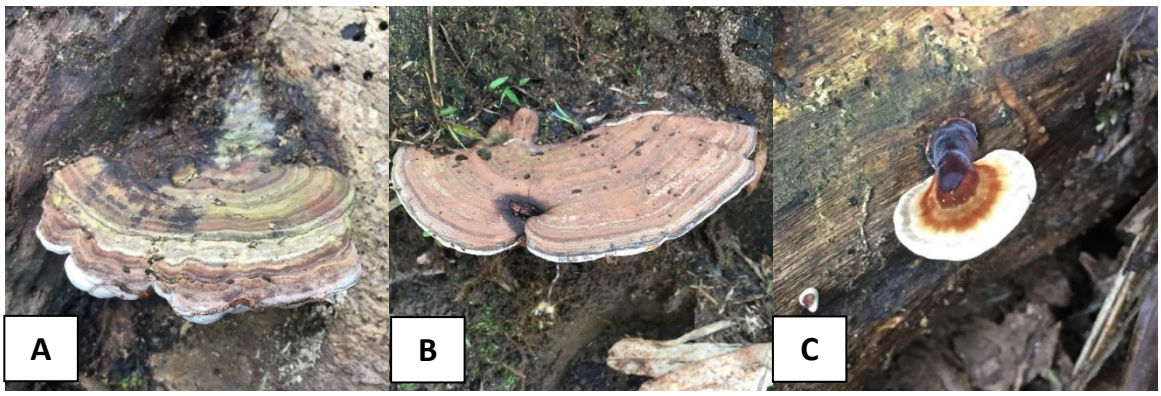


Figure 2. Mushrooms utilized as food by the Bugkalot Indigenous Community in Alfonso Castañeda, Nueva Vizcaya: (A) *Auricularia auricula-judae*, (B) *Auricularia polytricha*, (C) *Boletus* sp., (D) *Clitocybe* sp., (E) Coprinopis atramentaria, (F) Coprinopsis lagopus (G) *Coprinus cinereus*, (H) *Lentinus tigrinus*, (I) *Lentinus* sp. 1, (J) *Lentinus* sp. 2, (K) *Mycena* sp., (L) *Panaeolus* sp., (M) *Pleurotus dryinus*, (N) *Polyporus* sp. 2, (O) *Polyporus* sp. 3, (P) *Schizophyllum commune* and (Q) *Stereum lobatum*.

At this time, the exact number of macrofungi utilized by the Bugkalots cannot be determined unless sampling will also be done on other seasons of the year. However, the obtained data could provide baseline information on the different species of macrofungi utilized by the Bugkalots. This is the first ethnomycological study conducted on the Bugkalot indigenous people in the Philippines.



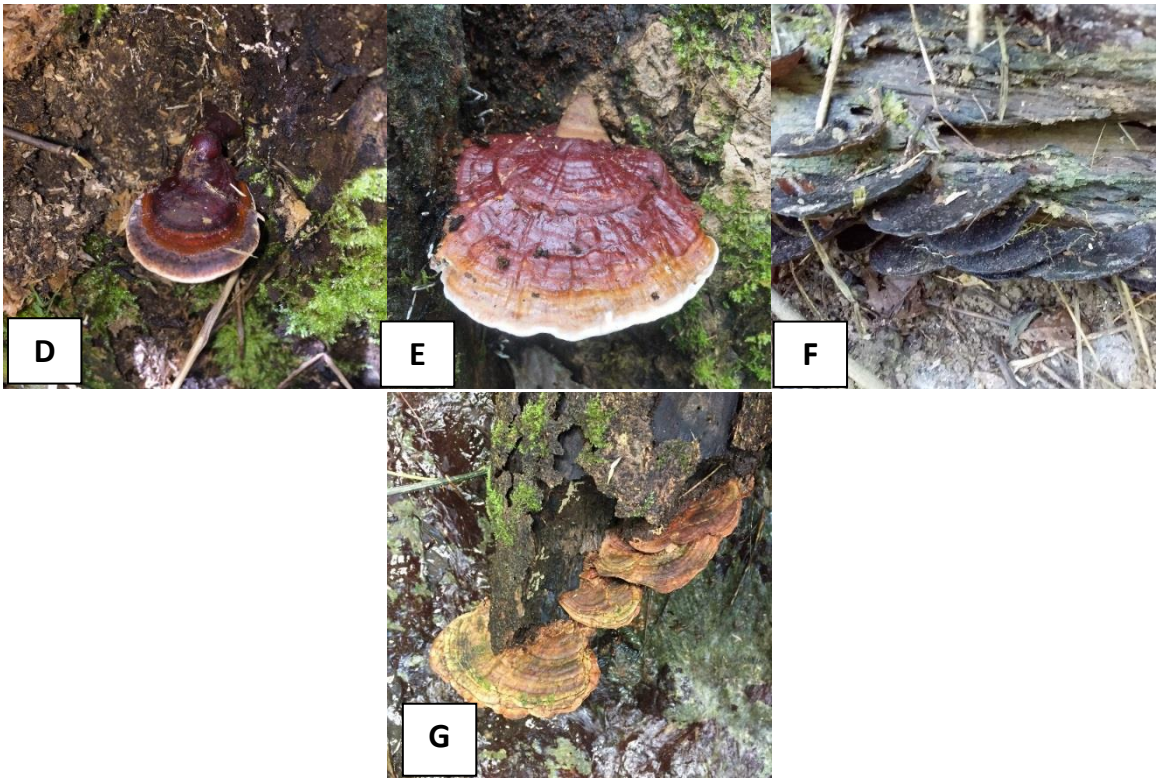


Figure 3. Mushrooms utilized as medicine by the Bugkalot Indigenous Community in Alfonso Castañeda, Nueva Vizcaya: (A) *Fomitopsis* sp., (B) *Ganoderma applanatum*, (C) *Ganoderma lucidum* 1, (D) *Ganoderma lucidum* 2 (E) *Ganoderma lucidum* 3, (F) *Polyporus picipes* and (G) *Polyporus* sp. 5.

CONCLUSION

In conclusion, a total of 50 local species of macrofungi has been reported by the Bugkalots wherein 45 species of which were collected and identified morphologically. Of these macrofungi, 29 species were either utilized as either food (*Auricularia auricula-judae*, *Auricularia polytricha*, *Boletus* sp., *Clitocybe* sp., *Coprinopsis atramentaria*, *Coprinopsis lagopus*, *Coprinus cinereus, Lentinus tigrinus, Lentinus* sp. 1, *Lentinus* sp. 2, *Mycena* sp., *Panaeolus* sp., *Pleurotus dryinus*, *Polyporus* sp. 2, *Polyporus* sp. 3, *Schizophyllum commune,* and *Stereum lobatum*) or medicine (*Fomitopsis* sp., *Ganoderma applanatum*, 3 species of *Ganoderma lucidum*, *Polyporus picipes* and *Polyporus* sp. 5). Also, Bugkalots still possessed a piece of great knowledge and practices on the utilization of many different mushroom species up to the present day. However, it is only restricted to elder members of the tribe in the community. Therefore, this paper highlighted the importance of conducting studies on ethnomycology to preserve such indigenous knowledge, beliefs, and practices which could also pave the way in passing this information to future generations despite the modernization. Moreover, these wild mushrooms including the inedible ones must be given attention in future studies for possible utilization not only by the Bugkalot tribe but also their neighboring community. The data gathered through this study can be used as a baseline for other researchers especially on the mushrooms utilized by the local inhabitants in further evaluation of medicinal value and discovery of new bioactive compounds.

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