



RESEARCH PAPER

OPEN ACCESS

Ethnomycological survey of wild mushroom species utilized by the Subanen tribes in selected Barangays in Tangub city, Misamis Occidental, Philippines

Airene C. Despe¹, March Ivan E. Japos¹, Luigi A. Niez¹, Sheila Marie Y. Plimaco^{*2}, Cesar G. Demayo^{3,4,5,6}

¹College of Mathematics and Natural Sciences, Northwestern Mindanao State College of Science and Technology, Labuyo, Tangub City, Misamis Occidental, Philippines

²College of Agriculture and Environmental Studies, Northwestern Mindanao State College of Science and Technology, Labuyo, Tangub City, Misamis Occidental, Philippines

³Department of Biological Sciences, College of Science and Mathematics, Mindanao State University-Iligan Institute of Technology, Andres Bonifacio Ave., Iligan City, Lanao del Norte, Philippines

⁴Center of Integrative Health, Premier Research Institute of Science and Mathematics, Mindanao State University-Iligan Institute of Technology, Tibanga, Iligan City, Philippines

⁵Institute of Peace and Development in Mindanao, Mindanao State University-Iligan Institute of Technology, Tibanga, Iligan City, Philippines

⁶School of Interdisciplinary Studies, Mindanao State University-Iligan Institute of Technology, Tibanga, Iligan City, Philippines

Article published on September 06, 2024

Key words: Ethnomycology, Subanen tribe, Traditional knowledge, Wild mushrooms

Abstract

Since prehistoric times, ethnic cultures have used wild mushrooms as food and medicine. Despite the extensive use of these important resources in ethnomycology, little is known about them, and the documentation that does exist is insufficient. The goal of the current study was to record the traditional knowledge of the Subanen populations regarding the use of different types of wild mushrooms. Field walks to collect the indicated mushroom species were undertaken after an actual interview utilizing a semi-structured questionnaire. To support diverse therapeutic claims, the local name, specific usage, method of preparation, and range of uses for wild mushrooms are described. In the ten barangays of Matugnaw, Uwayan, Sicot, Paiton, Taguite, Katagan, Kimat, Baluc, Salimpuno, and Caniangan, the study discovered various naturally occurring mushrooms. Leaf litter, soil, and rotting logs were used to identify the ten different mushroom species. *Termitomyces cartilaginous*, *Auricularia auricularia-judae*, *Volvariella volvacea*, *Schizophyllum commune*, *Auricularia polytricha*, *Ganoderma applanatum*, *Trametes polyzona*, *Pycnoporus sanguineus*, *Trametes elegans* and *Lenzites betulinus* were the species of wild mushrooms that the Subanen tribe used for food and medicine, respectively. These precious mushrooms were used by some ethnic tribes in the Philippines and other nations as well, and their broad use may support their therapeutic claims.

*Corresponding Author: Sheila Marie Y. Plimaco ✉ sheilamarie.yap@nmsc.edu.ph

Introduction

Ethnomycology is the study of wild macrofungi, which are used by many indigenous people around the world for food as well as ceremonial, medicinal, and other therapeutic purposes (Comandini and Rinaldi, 2020). For some time, people have relied on macrofungi, sometimes known as mushrooms, as a source of food and medicine because it has long been believed that they have positive benefits on human health (De Silva *et al.*, 2012; Figueiredo and Régis, 2017). Mushrooms have a long and fascinating history with humanity, and they have been useful both biologically and economically. Because mushrooms have been found in fossilized wood that is supposed to be 300 million years old, it is assumed that prehistoric Man eaten mushrooms that were foraged from the wild (Singh *et al.*, 2015). As the main decomposer of dead and fallen wood, they serve a critical part in the forest's nutrient recycling system (Kinge *et al.*, 2014).

As functional meals, mushrooms have recently become more well-liked due to their health advantages. According to Nacua *et al.* (2018), mushrooms are a natural food source that is a good source of fiber, protein, vitamins, minerals, and bioactive phytochemicals. They are used directly as a primary food source because of their distinctive flavor and well-known nutritional content. They play a key role in maintaining the protein shortage of rural native populations (Wani *et al.*, 2010). These mushrooms have become a staple of the diet of the locals due to their high nutritional content as well as their accessibility in the garden. Approximately 650 species of mushrooms have medicinal characteristics, while about 2000 species of mushrooms exhibit varying degrees of edibility and are thought to be safe for consumption by humans (Toshinungla *et al.*, 2016).

It is a common practice in many nations to regularly gather and consume different therapeutic mushrooms. Modern pharmacological research mostly concurs with traditional knowledge regarding the therapeutic effects of mushrooms due to their

anti-fungal, antibacterial, antioxidant, and antiviral properties (Wani *et al.*, 2010). According to Singh and Bhagawati (2017), therapeutically active chemicals with significant health advantages can be found in both edible and certain non-edible mushrooms.

Only 10% of the estimated 140,000 species of mushrooms on earth have reportedly been examined, according to reports (Wasser, 2014). According to this information, there may be a massive mushroom species out there just waiting to be studied and found that could help humanity in the future. Indigenous people in the Philippines use a variety of mushroom species for a variety of uses (Tantengco and Ragragio, 2018).

Despite the extensive use of these important resources in ethnomycology, little is known about them, and the documentation that does exist is insufficient. Little is known about how these species of mushrooms are used by native peoples or how they can best utilize them. Traditional applications of mushrooms for food and medicine have received little attention, are infrequent, and are primarily limited to a tiny population of old people. Traditional knowledge of wild edible and medicinal mushrooms may have been lost internationally due to a lack of documentation (Debnath *et al.*, 2019). This traditional knowledge must be accurately recorded in order to preserve it. Accordingly, the current study was carried out to identify the macrofungi species that the Subanen populations in the chosen barangays of Tangub City, Philippines, use as food and medicinal.

Materials and methods

Description of the study area

Tangub City, with its tropical environment, is governed by the province of Misamis Occidental and is situated at 8.07 N and 123.75 E. According to the City Government of Tangub (2012), the topography is roughly 40% plain along the Panguil Bay coast and 6% rolling and hilly, increasing progressively to the Mt. Malindang National Forest Reservation Area. Due to the presence of Subanen settlements nearby, ten

barangays from Tangub City—namely, Matugnaw, Uwayan, Sicot, Paiton, Taguite, Katagan, Kimat, Baluc, Salimpuno, and Caniangan—were chosen as the sampling location.

Survey and interview

A total of 200 Subanen respondents—20 from each barangay—who consumed mushrooms were chosen on purpose. They included both males and women who were at least 18 years old. The respondents were interviewed one-on-one. The semi-structured questionnaire was used in the current study and was adapted from earlier surveys (Mgbekem *et al.*, 2019; Alduhisa and Demayo, 2019) with a few minor adjustments. The local vernacular was used to translate the English questionnaire. During the interviews with the respondents, questions regarding the regional names of edible and medicinal mushrooms, the quantities used, the preparation method, the sorts of ailments treated, and the applications for medicinal mushrooms were all asked. In order to learn more, the tribe chieftain and other elders were actually interviewed.

Before the study was conducted, letters requesting approval were sent to a number of offices, including the chairman and local governing bodies including municipal mayors, barangay captains, and tribal chieftains (Timu-ay). Prior to doing the survey, the real interview, and the mushroom collection, this is done to obtain permission from them.

Collection of edible and medicinal mushrooms

The researchers went on field walks with some of the responders to the areas where they gather their mushrooms. Only those responders who agreed to go with the researchers were contacted. The respondents were asked to identify the common edible and medicinal mushrooms they utilize while out on the walks. For scientific id, representative samples were obtained. Tribal chiefs and other tribe members were asked for their cooperation to ensure safety. All macrofungi that could be seen and that the Subanen tribes were known to use were gathered. The University of the Philippines-Los Banos' Dr. Jennifer

M. Niem, curator of the mycological herbarium, received the properly recorded mushroom samples and forwarded them to her for identification.

Results and discussion

A total of 200 respondents from the Subanen communities participated in the survey. In Table 1, the sociodemographic profile is summarized, fifty percent of the respondents are over the age of forty-six, forty-three percent are between the ages of 26 and forty-five, and seven percent are between the ages of sixteen and twenty-five. There were 47% fewer men and 53% more women among these responders.

Table 1. Socio-demographic profile of Subanen respondents

Variables	Respondents	(%)
Age		
16-25 yrs. old	14	7%
26-45 yrs. old	85	43%
46 yrs. old up	101	50%
Gender		
Male	93	47%
Female	107	53%
Civil Status		
Single	28	14%
Married	163	82%
Widow	9	4%
Educational Attainment		
Elementary level	54	27%
Elementary graduate	36	18%
High school level	45	22.5%
High school graduate	37	18.5%
Vocational	1	0.5%
College level	26	13%
College graduate	1	0.5%
Occupation		
Traditional health practitioner	40	20%
Farmer	83	41.5%
Others	77	38.5%
Annual income		
20,000-40,000	182	91%
50,000-60,000	18	9%

The majority of the respondents were married because they were in their middle age. Twenty-seven percent (54) and twenty-two percent (45) of the respondents, respectively, only completed elementary and high school. Farmers made up 41% of the respondents (83) while traditional health practitioners made up 20% (40). As shown below, nearly all respondents (91%) earn between PhP20,000 and PhP40,000 each year.

Table 2. Mushrooms utilized as food by the Subanen respondents

Questions	Respondents	(%)
1. Do you consume certain mushroom as food?		
Yes	200	100%
No	0	0%
2. Do you believe that each type of mushroom has its unique taste?		
Yes	198	99%
No	2	1%
3. Do you think that mushrooms contain good sources of vitamins and minerals?		
Yes	193	96.5%
No	7	3.5%
4. Do you think that mushrooms contain high proteins and oxidants?		
Yes	193	96.5%
No	7	3.5%
5. Do you think that mushrooms can be used as food supplement?		
Yes	190	95%
No	10	5%
6. Frequency of mushroom collection		
Weekly	0	0%
Monthly	1	0.5%
Seasonal	199	99.5%
7. Are those mushrooms readily available in your area?		
Yes	195	97.5%
No	5	2.5%

According to Table 2, every participant in the study knew about and ate mushrooms as a source of food. 193 respondents said that mushrooms contain good supplies of vitamins, minerals, high protein, and antioxidants; 198 respondents said that each variety of mushrooms has its own distinct flavor. 95% of respondents said that using mushrooms as a food supplement is possible. Mushrooms are an important part of the respondent's diet due to their year-round availability, ease of preparation, and high nutritional value.

The name "uhong" was used by all Subanen respondents to describe mushrooms, but "tarulok" and "uong" were used by other tribes (Lazo *et al.*, 2015). Five types of gathered and identified edible mushrooms were reported by the Subanen respondents as being used as food. According to Table 3, the edible mushrooms included "libgos" (*Termitomyces cartilaginous*), "dalunggan sa unggoy" (*Auricularia auricula-judae*), "kaupas" (*Volvariella volvacea*), "kujiji or kuyayi" (*Schizophyllum commune*), and "layat-layat" (*Auricularia polytricha*). According to earlier studies (Reyes *et al.*, 2013; De Leon *et al.*, 2016), the Subanen

respondents had a tendency to consume mushrooms during the rainy seasons when they are plentiful in the area with abundance of moisture.

Due to its distinctive flavor, "libgos" was one of the most frequently stated responses among the five edible mushroom species. One edible mushroom species that stands out from other species in terms of flavor is the genus *Termitomyces* (Kulkarni *et al.*, 2022). Because they grow in clusters in the soil, this fungus is also simple to discover and locate. Their yard, cornfield, rice field harvesting area, and hays are where you'll mostly find it. They added that they pick the local "libgos" during the growth season, then come back the next day to see if it has grown again. After picking it, they washed it before chopping it up and cooking it. Among the foods/dishes they produced were "guisa" (stew), "paisan" (grilled), "un-unan" (boiled pickled mushroom), "kamunggayan" (mushroom in malunggay soup), and "utanan" (mushroom in vegetable soup). Additionally, the respondents claimed that they did not season their food when cooking because their dishes already contained items that resembled seasonings. *Termitomyces* mushrooms are naturally endowed with significant nutritional qualities due to their high concentrations of a wide array of important minerals and non-replaceable amino acids. The "kaupas" that were gathered growing in the bottom portion of a banana tree's stem or in a banana tree's decomposing leaves were prepared using the same techniques.

The same techniques were used to prepare and cook the other edible mushroom species, including layat-layat, kujiji or kuyayi, and dalunggan sa unggoy. Due to their high protein content and vitamin content (including thiamine, riboflavin, niacin, biotin, cobalamin, ascorbic acid, and others) when ingested as food, mushrooms have health benefits (Lesa *et al.*, 2022). They learned that locals had a thorough understanding of local edible fungus. *Schizophyllum commune*, *Volvariella volvacea*, *Auricularia polytricha*, *Auricularia auricula-judae*, and *Termitomyces cartilaginous* were a few of the species that were eaten as food (Kinge *et al.*, 2014).

Table 3. Mushrooms utilized as food

Local name	Scientific name	How is the mushroom cooked?	
		Parts used	Methods of preparation
Libgos	<i>Termitomyces cartilaginous</i>	All parts	Tear in small pieces and then cooked; roasted
Layat-layat	<i>Auricularia polytricha</i>	All parts	Boil until soften then cooked
Kujiji/Kuyayi	<i>Schizophyllum commune</i>	All parts	Boil until soften then cooked
DalunggansaUnggoy	<i>Auricularia auricula-judae</i>	All parts	Boil until soften then cooked
Kaupas	<i>Volvariella volvacea</i>	All parts	Tear in small pieces and then cooked; roasted

Table 4. Mushrooms utilized as medicine

Local name	Scientific name	Ailments treated	How is the mushroom used?		
			Parts used	Methods of preparation	Methods of application
Libgos	<i>Termitomyces cartilaginous</i>	Anti-cancer; cure uric acid, wounds, and blisters	All parts	-Boil; -Dried or soaked in natural oil or "lana"	-Drink; -Apply on infected area
Altar-altar	<i>Pycnoporus sanguine</i>	Stomachache; kidney problems; Fever	All parts	-Boil; -Mixed in natural oil or "lana"	-Drink; -Rubbed
Tayubo	<i>Trametes polyzona</i>	"Ugahip" (cold sore)	All parts	-Grind	-Poultice for injuries, chest pains or other body aches
Talikop	<i>Ganoderma applanatum</i>	Stomachache	All parts	-Boil; -Roast	-Drink -Used as coffee
Sasandok	<i>Trametes elegans</i>	"Talimughat" or (relapse)	All parts	-Washed and soaked in alcoholic beverages (eg. Kulafu)	-Drink
Lapay	<i>Lenzites betulinus</i>	Fever	All parts	-Boil	-Drink

A small number of respondents also reported using mushrooms as medicine, naming six different species, including "libgos" (*Termitomyces cartilaginous*), "altar-altar" (*Pycnoporus sanguineus* (L.) Murill), "tayubo" (*Trametes polyzona*), "talikop" (*Ganoderma applanatum*), "sasandok" (*Trametes elegans*), and "lapay" (*Lenzites betulinus*) as listed in Table 4. They mentioned employing these mushrooms as natural cures for a variety of ailments.

Some native tribes also use different kinds of mushrooms as medicines because they think they can treat a variety of illnesses, including as colds and coughs, arthritis, stomachaches, and headaches (Sitotaw *et al.*, 2020; Undan *et al.*, 2022). The "libgos" was allegedly utilized as an anti-cancer to treat uric acid, wounds, and blisters, according to Subanen responses. Others dried the species and soaked it in a natural oil or "lana" before applying it to affected areas. Some respondents boiled the species with water and consumed it. According to Nhi *et al.*, 2022, the methanol extract of *Termitomyces*

mycelial biomass exhibited antioxidant activity and potent effectiveness against both Gram-positive (*Bacillus cereus*) and Gram-negative (*Escherichia coli*, *Pseudomonas aeruginosa*, and *Salmonella typhimurium*) bacteria. The extract also showed anti-fungal action that inhibits the growth of *Candida albicans* without being harmful. Kumari *et al.* (2022) also documented *Termitomyces'* ethnomycological use in India.

They used "altar-altar" to treat fevers, kidney disorders, and stomachaches. They applied the mixture to their bodies as a painkiller after mixing it with the natural oil known as "lana" and using all parts of the mushroom species. Some of the respondents used the "tayubo" to treat "ugahip" or cold sores. For wounds, chest pain, or other body ailments, they ground and then applied poultices. Numerous studies (Borderes *et al.*, 2011; Juliette-Ornelly *et al.*, 2019) have shown that *P. sanguineus* and *T. polyzona* can act as a natural source of antioxidant, antibacterial, and antifungal chemicals.

Other respondents employed all parts of the fungus "sasadok" to treat "talinughat" (relapse). Before consumption, the mushrooms were cleaned and steeped in alcohol. Fever was treated with the "lapay". Some survey participants utilized "talikop" as a remedy for stomachaches. Coffee has been brewed using the roasted mushroom. Numerous *Ganoderma* species contain large amounts of novel "mycochemicals," which have been linked to immunomodulatory, anti-fungal, immunodeficiency, anti-inflammatory, antitumor, high antioxidant, immunoregulatory, and antimicrobial activity (Osiska-Jaroszuk *et al.*, 2014; Hossain *et al.*, 2021; Galappaththi *et al.*, 2022).

Conclusion

In conclusion, in the selected Tangub City barangays, the Subanen tribe was using ten varieties of wild mushrooms that were known to exist. Six species of wild mushrooms were used as medicines: *Ganoderma applanatum*, *Trametes polyzona*, *Pycnoporus sanguines*, *Trametes elegans*, and *Lenzites betulinus*. Five of these were used as food, including *Termitomyces cartilaginous*, *Auricularia auricula-judae*, *Volvariella volvacea*, and *Auricularia polytricha*. The tribes of Subanen are more familiar with the names given to wild mushrooms found in the forest as well as their identification and traditional usage. Due to a lack of knowledge and incorrect perceptions about their usage and edibility among the populace, demand for wild edible mushrooms is also quite low. Tribal communities now view them as resources to be exploited for economic gain. Thus, it is essential to preserve and develop the indigenous knowledge system on using wild edible mushrooms for the benefit of humanity. The market demand for wild edible mushroom species may also increase as a result of scientific research on their nutritional value and bioactivities, which could aid tribal populations in making a living. In order to further assess the medical value of mushrooms in the future and to find novel medications made from bioactive chemicals, researchers examining how local people utilize mushrooms can use the baseline data from this study as a starting point.

References

- Alduhisa GU, Demayo CG.** 2019. Ethnomedicinal plants used by the Subanen tribe in two villages in Ozamis City, Mindanao, Philippines. *Pharmacophore* **10**(4), 28-42.
- Borderes J, Costa A, Guedes A, Tavares LBB.** 2011. Antioxidant activity of the extracts from *Pycnoporus sanguineus* mycelium. *Brazilian Archives of Biology and Technology* **54**, 1167-1174.
- Comandini O, Rinaldi AC.** 2020. Ethnomycology in Europe: The past, the present, and the future. Mushrooms, humans and nature in a changing world: Perspectives from ecological, agricultural and social sciences **341**, 341-364.
- De Leon AM, Kalaw SP, Dulay RM, Undan JR, Alfonzo DO, Undan JQ, Reyes RG.** 2016. Ethnomycological survey of the Kalanguya indigenous community in Caranglan, Nueva Ecija, Philippines. *Current Research in Environmental and Applied Mycology* **6**(2), 61-66.
- De Silva DD, Rapior S, Fons F, Bahkali AH, Hyde KD.** 2012. Medicinal mushrooms in supportive cancer therapies: an approach to anticancer effects and putative mechanisms of action. *Fungal Diversity* **55**(1), 1-35.
- Debnath S, Debnath B, Das P, Saha AK.** 2019. Review on ethnomedicinal practices of wild mushrooms by the local tribes of India. *Journal of Applied Pharmaceutical Science* **9**(8), 144-156.
- Figueiredo L, Régis WCB.** 2017. Medicinal mushrooms in adjuvant cancer therapies: an approach to anticancer effects and presumed mechanisms of action. *Nutrire* **42**(1).
- Galappaththi MC, Patabendige NM, Premarathne BM, Hapuarachchi KK, Tibpromma S, Dai DQ, Karunarathna SC.** 2022. A review of *Ganoderma* triterpenoids and their bioactivities. *Biomolecules* **13**(1), 24.

- Hossain MS, Barua A, Tanim MAH, Hasan MS, Islam MJ, Hossain MR, Hossen SM.** 2021. *Ganoderma applanatum* mushroom provides new insights into the management of diabetes mellitus, hyperlipidemia, and hepatic degeneration: A comprehensive analysis. *Food Science and Nutrition* **9**(8), 4364-4374.
- Juliette-Ornelly OB, Eyi NHC, Rick-Léonid NMM, Sima Obiang C, Yembiyé P, Ondo JP, Obame-Engonga LC.** 2019. Phytochemical screening, antioxidant and antiangiogenic activities of *Daedaleopsis nitida*, *Pycnoporus sanguineus* and *Phellinus gilvus* medicinal mushrooms from Gabon. *Pharm Chem J* **6**, 71-80.
- Kinge TR, Nji TM, Ndam LM, Mih AM.** 2014. Mushroom research, production and marketing in Cameroon: A review. *Journal Issues* **2350**, 1588.
- Kulkarni S, Joshi S, Thatoi H.** 2022. *Termitomyces heimii*—A nutritious and medicinally important wild edible mushroom of Similipal Forests, Odisha boosting tribal health and economy. *Asian Journal of Biology* **16**(2), 21-32.
- Kumari B, Kamal S, Singh R, Sharma VP, Sanspal V, Chand G.** 2022. Traditional knowledge of the wild edible mushrooms of Himachal Pradesh. *Studies in Fungi* **7**(1), 1-5.
- Lazo CRM, Kalaw SP, De Leon AM.** 2015. Ethnomycological survey of macrofungi utilized by Gaddang communities in Nueva Vizcaya, Philippines. *Current Research in Environmental and Applied Mycology* **5**(3), 256-262.
- Lesa KN, Khandaker MU, Mohammad Rashed Iqbal F, Sharma R, Islam F, Mitra S, Emran TB.** 2022. Nutritional value, medicinal importance, and health-promoting effects of dietary mushroom (*Pleurotus ostreatus*). *Journal of Food Quality* 2022.
- Mgbekem MA, Lukpata F, Ndukaku N, Armon M, Uka VK, Udosen GN, Pricilla AB.** 2019. Knowledge and utilization of mushroom as a food supplement among families in selected local government areas of Cross River State, Nigeria. *Food and Nutrition Sciences* **10**(11), 1287-1299.
- Nacua AE, Pacis HY, Manalo JR, Soriano CJ, Tosoc NR, Padirogao R, Deocarlis CC.** 2018. Short communication: Macrofungal diversity in Mt. Makiling Forest Reserve, Laguna, Philippines: With floristic update on roadside samples in Makiling Botanic Gardens (MBG). *Biodiversitas Journal of Biological Diversity* **19**(4), 1579-1585.
- Nhi NTN, Khang DT, Dung TN.** 2022. Termitomyces mushroom extracts and its biological activities. *Food Science and Technology* **42**.
- Osińska-Jaroszuk M, Jaszek M, Mizerska-Dudka M, Błachowicz A, Rejczak TP, Janusz G, Kandefers-Szerszeń M.** 2014. Exopolysaccharide from *Ganoderma applanatum* as a promising bioactive compound with cytostatic and antibacterial properties. *BioMed Research International* **2014**, 1-10.
- Reyes RG, Kalaw SP, Dulay RMR, Yoshimoto H, Miyazawa N, Seyama T, Eguchi F.** 2013. Philippine native and exotic species of edible mushrooms grown on rice-straw-based formulation exhibit nutraceutical properties. *The Philippine Agricultural Scientist* **96**(2).
- Singh R, Bhagawati R, Ngachan SV.** 2017. Ethnomycological studies and biodiversity of edible and medicinal mushrooms in West-Siang District of Arunachal Pradesh, India. *Environ Ecol* **35**(1), 102-105.
- Singh R, Bhagawati R, Sharma PK, Ramakrishna Y.** 2015. Wild edible fungal resources: an alternate source of food for Mizoram and Arunachal Pradesh. *Environ Ecol* **33**, 1936-1939.

Sitotaw R, Lulekal E, Abate D. 2020. Ethnomycological study of edible and medicinal mushrooms in Menge District, Asossa zone, Benshangul-Gumuz region, Ethiopia. *Journal of Ethnobiology and Ethnomedicine* **16**(1), 1-14.

Tantengco OAG, Ragragio EM. 2018. Ethnomycological survey of macrofungi utilized by Ayta communities in Bataan, Philippines. *Journal of Fungal Biology* **8**(1), 104-108.

Toshinungla AO, Deb CR, Neilazonuo K. 2016. Wild edible mushrooms of Nagaland, India: a potential food resource. *Journal of Experimental Biology and Agricultural Sciences* **4**(1), 59-65.

Undan JR, Fermin SMC, Pajarillaga LMA, Malonzo MAC, Kalaw SP, Reyes RG, De Leon AM. Ethnomycological survey and molecular identification of macrofungi utilized by Bicolano community in Camarines Sur, Southern Luzon, Philippines.

Wani BA, Bodha RH, Wani AH. 2010. Nutritional and medicinal importance of mushrooms. *Journal of Medicinal Plants Research* **4**(24), 2598-2604.

Wasser S. 2014. Medicinal mushroom science: Current perspectives, advances, evidences, and challenges. *Biomedical Journal* **37**(6).