



Ethnomycological Survey of Macrofungi Utilized by Gaddang Communities in Nueva Vizcaya, Philippines

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Abstract

A questionnaire and interview approach was used to determine the indigenous beliefs and the species of macrofungi utilized by Gaddang communities in Nueva Vizcaya, Philippines. Ten species were utilized by the Gaddangs; however, only seven species of fungi were collected and identified based on their morphological characteristics. These were *Auricularia auricula*, *Auricularia fuscosuccinea*, *Schizophyllum commune*, *Volvariella volvacea*, *Lentinus* sp., *Pleurotus* sp., and *Polyporus* sp. The Gaddang communities also have indigenous beliefs regarding the growing and collection of macrofungi, such as the occurrence of spontaneous lightning induces mushroom growth and asking permission of spirits before collecting. Their medicinal practices were also documented in this study.

Key words – Gaddang communities – indigenous beliefs – mushroom – “tarulok”

Introduction

The Gaddang indigenous communities formerly comprised a large group in the Cagayan Valley region and are found mostly in Central Isabela, Nueva Vizcaya, Quirino, and Cagayan. Most of them can speak Ilocano, the lingua franca of Northern Luzon (NCIP 2009). They acquire their food mostly through hunting, fishing, and gathering. They also utilize rice, corn, mushrooms and other plant crops to supplement their diet (Lumicao-Lora 1984).

Wild edible mushrooms are traditionally used by many Asian countries as food and medicine (Manzi et al. 1999). They can also provide source of income to households through selling mushrooms in the market (Yongabi et al. 2004). According to the Food and Agriculture Organization (2006), there has been an increasing attention on the use of wild edible fungi worldwide. In the Philippines, utilization of mushroom is also increasing. Many studies (i.e., Dulay et al. 2015, Bustillos et al. 2014, Eguchi et al. 2014) have reported on the health benefits that can be attained in the consumption of mushrooms. The different indigenous people are also aware of the use of different mushroom species. For instance, the Aeta communities in Pampanga, Tarlac and Zambales, Philippines, are known to collect and utilize mushrooms for several purposes (De Leon et al. 2012). However, information and documentation of these mushrooms is both limited and poor. Little knowledge is available relating to their use by indigenous people and how they fully benefit from these species of mushrooms. In line with this, study described herein was conducted to determine the species utilized by Gaddang

communities in selected localities in Nueva Vizcaya and document the utilization of macrofungi by the Gaddang communities.

Materials & Methods

Study Sites and Respondents

The survey was conducted in the municipalities of Solano, Bayombong and Bagabag in Nueva Vizcaya, Philippines. The sites were chosen based on the presence of Gaddang community in the area and their accessibility. The respondents are the Gaddangs which are one of the earliest inhabitants of the Philippines.

Survey Questionnaire and Actual Interview

The survey questionnaire used was adapted from De Leon et al. (2012) with minor revisions to suit the study. The questionnaire was prepared in Filipino since the respondents are fluent in the language aside from their native dialect. The questionnaire was designed to generate information regarding the ethnomycological importance of macrofungi in the aspects of their lives. Actual interview of respondents was also conducted to obtain additional information. Survey was carried out through formatted interviews with the respondents of the different communities.

Collection and Identification of Specimens

Collection of macrofungi was conducted during the rainy season (September–October 2014) to gather the species that are commonly use by the Gaddang communities. The mushrooms were collected with the help of the head of the communities who is the most familiar with the species of mushrooms utilized by the community. The fruiting bodies of the macrofungi were collected, photographed on site and the important information were all recorded. After which, the fruiting bodies were dug carefully so as not to damage their bases. Wood rotting mushrooms were scraped from the bark where they are attached. The specimens were then coded and wrapped in brown paper in order to avoid excess humidity. All the collected specimens were brought to the laboratory for identification. Identification was based on their morphological characteristics such as spore shape, color, and size, size of the pileus and stipe size, shape, margin and attachment.

Data Analysis

The data on the socio-demographic characteristics were summarized and tabulated to provide basic information regarding the three Gaddang communities. The number of identified macrofungi recorded in the survey questionnaire was determined. The macrofungi reported in the questionnaires were correlated and compared with the collected specimens.

Results and Discussion

Socio-demographic profiles

Most of the respondents (56.67%) in the three study sites were 46-65 years old. In Bayombong, the respondents were mostly female (60%) because the interview was conducted in the mid morning where males were already out of their houses for work. However, in Solano, the respondents were mostly males since the interview was conducted near the barangay hall, police station and public market where a lot of males are working. In Bagabag, the number of male and female respondents was the same. Since most of the respondents are middle age, majority were already married with Roman Catholic as their main religion (Table 1). They were influenced by the Ilongot in the resettlement who were mostly Christians (Abriza 1984, Lumicao-Lora 1984).

Their spouses are predominantly Ilocanos which attests that Gaddang indigenous people are no longer affiliated to their tribes. The family usually composed of 5–10 members. Based on national statistics, the average family size in the Philippines is 4-6 (NSO 2003). This finding indicates that the family size of the Gaddangs is larger than the national average. Many poor families believed that having many children could possibly help them earn additional income for the family.

Typically, the elders have a considerable knowledge on utilization of mushroom in the communities. The Bini-speaking people in Nigeria with ages 36-40 years old consume the highest number of mushrooms, 46 years old below shows no knowledge on the ethnomedicinal uses of mushroom and ages above 71 years old had lost knowledge on the uses of mushroom for curing some ailments (Akpaja et al., 2005). Many of the respondents reached high school and college level in their education. This shows that the Gaddangs have adjusted to the urban community. This situation is contrary to Aeta communities in Central Luzon and most of the indigenous communities in the Philippines. Indigenous people reached elementary and high school level due to poverty (De Leon et al. 2012, NCIP 2009).

Majority (71.67%) have blue collar jobs (farmer, vendor, laborer and Brgy, officials) with an average annual income of P20,000-40,000. This income is considered as below the poverty line based on Family Income and Expenditure Survey (2012). The National Statistics Office (NSO, 2012) reported that the annual income of an ordinary family is about P200,000 for them to have a decent living.

Indigenous Knowledge on Mushrooms and their Utilization

Most of the Gaddang respondents knew about mushrooms (Table 2a) and they locally called it “tarulok” and “uong” in Ilocano. De Leon et al. (2012) reported that Aeta communities locally called mushroom, “kuwat”. In addition, the generic name of all mushrooms in Igala, Nigeria is “oru” (Ayodele et al. 2011) and “tit” in India (Das et al. 2014). In most cases the name given to mushrooms are usually associated with the features of the mushrooms and the substrates on which they are found (De Leon et al. 2012, Ayodele et al. 2011). They believed that mushrooms appear when it rain which is congruent to the report of De Leon et al. (2012), Kuhmar & Sharma (2011), Adhikari, (2005), Garcia et al. (2004), Tayamen et al. (2004), and Reyes et al. (2003). Some believed that mushrooms also appear during cold month which is parallel to the observation of Gogoi & Sarma (2012). They also reported that mushrooms grow in soil, dried leaves of plants and decaying logs (Table 2b). Moreover, mushrooms also proliferate in dead or decaying plants or animal remains (Ram et al. 2010).

The Gaddangs usually collect mushrooms primarily for food and medicine. They cook the edible mushrooms by boiling or sautéing with meat, fermented fish sauce and vegetables. This method of preparation is the same with the other communities in the Philippines as reported by De Leon et al. (2012). In Khasi tribe of India, mushrooms are use in preparing soup in which mushrooms are cut into small pieces and water is removed by applying pressure. The mushrooms are then fried with salt and butter, black pepper, chilli and a little garlic paste. When it is half cooked, hot water was added and boiled for a few minutes till the mixture becomes thick. Moreover, several tribes in India cook mushrooms with bamboo shoots and red hot chilli (Khaund & Joshi 2013). In Jammu and Kashmir (India), mushrooms are consumed as fresh vegetables. They are usually cooked with tomatoes and onions while others are dried and consume during winter months during which availability of vegetables are scarce (Kuhmar & Sharma 2011).

The Gaddangs often eat mushrooms once a week particularly when mushrooms in their community are abundant. They usually consumed less than half kilo because mushroom is relatively expensive. Some of the Gaddangs utilize mushroom for medicinal purposes. They believed that mushrooms can cure several diseases such as cough and cold, arthritis, stomachache and headache.

Several studies have reported that mushrooms are utilized for treatment of skin diseases (Aryal & Budathoki 2013, Yongabi et al. 2004), yellow fever, constipation, mumps, measles, ear pain, cut wounds, muscular pain and stomach pain (Aryal & Budathoki 2012). Mushrooms are prepared as medicine by boiling with water. They drink or eat the mushroom together with their meal.

Gaddangs are aware of the edible or poisonous species of mushrooms found in their area. Visual and smell method were used in determining whether the mushroom is edible or poisonous. They believed that mushrooms with rings in the stipe and bad odor are poisonous while those without rings are edible. They collect the edible mushrooms and ignore the poisonous species. This method of identification was inherited from their parents and grandparents. This technique is similar to those used by Khasi tribe in India (Das et al. 2014).

Table 1 The Demographic profiles of the surveyed Gaddang communities in Nueva Vizcaya, Philippines.

Municipality	No. of Respondent	Age			Gender		Civil Status		Educational Attainment				Religion		Job		Ethnicity of Spouse		No. of Family member		
		16-25	26-45	46-up	Male	Female	S	M	E	H	V	C	Catholic	Non-Catholic	BC	WC	G	I	1-4	5-10	11-up
Bayombong	20	1	5	14	8	12	2	18	3	5	0	12	20	0	11	9	6	14	14	3	3
Solano	20	3	9	8	14	6	7	13	0	10	2	8	18	2	18	2	9	11	2	15	3
Bagabag	20	1	7	12	10	10	5	15	1	9	0	10	20	0	14	6	6	14	1	16	3

S-Single, M-Married, E-Elementary, H-High School, C-College, BC-Blue collar, WC-White collar, G-Gaddang, I-Ilocano

Table 2a Survey on the Knowledge of Mushroom by the Gaddang Communities in Nueva Vizcaya, Philippines.

Municipality	No. of Respondents	Local term for mushroom?		Indigenous knowledge about mushroom?		Do you have rituals before collecting mushroom?		Rituals performed		Did you know that mushroom can be cultivated?		
		Tarulok	Uong	Yes	No	Yes	No	Ask permission to spirits	No Ans.	Yes	No	No Ans.
Bayombong	20	18	3	8	12	2	18	2	18	15	2	2
Solano	20	16	5	4	4	0	20	0	20	19	1	0
Bagabag	20	17	7	6	6	2	18	2	18	18	0	2

Table 2b Survey on the Knowledge of Mushroom by the Gaddang Communities in Nueva Vizcaya, Philippines.

Municipality	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 cold	When it's hot	Decaying logs	Dried leaves	Soil	Food	Medicine	
Bayombong	20	20		20	1	0	12	5	14	20	3	
Solano	20	20		19	3	0	18	5	10	20	0	
Bagabag	20	20		20	0	1	15	14	13	20	0	

Listing of Mushrooms Utilized by the Gaddangs

Ten species of mushrooms are utilized as food by Gaddang communities in Nueva Vizcaya (Table 3). However, during the collection period (September to October 2014), only seven species were encountered, collected and identified (Table 4), namely: *Auricularia auricula*, *Auricularia fuscusuccinea*, *Schizophyllum commune*, *Volvariella volvacea*, *Lentinus* sp., *Pleurotus* sp., and *Polyporus* sp. Mushrooms are also utilized as food by Aeta indigenous tribe in the Philippines (De Leon et al. 2012), India (Khaund & Joshi 2013) and Mexico (Montoya et al. 2004). The species consumed as food in Nigeria include *Agaricus* spp., *A. auricula*, *Collybia butyracea*, *Coprinus atramentarius*, *C. picaceus*, *Lactarius trivialis*, *Lentinus squarrosulus*, *Pleurotus pulmonarius*, *P. ostreatus*, *Macrolepiota* sp., *Psathyrella atroumbonata*, *S. commune*, *Termitomyces clypeatus*, *T. globules*, *T. mammiformis*, *T. microcarpus*, *T. robustus*, *Tricholoma* sp., *V. volvacea* and *V. esculenta* (Okhuoya et al. 2010). *Lentinus* sp., *S. commune* and *V. volvacea* were also eaten by the Gaddang communities (Table 4). In Malaysia, *Auricularia* spp. *Agaricus bisporus*, *Flammulina velutipes*, *Ganoderma lucidum*, *Pleurotus* sp., *S. commune* and *V. volvacea* were sold in the market (Chang & Lee 2004). Aside from utilizing mushrooms as food, other species were also used as medicine. However, Gaddangs did not mention the species used for medicinal purposes.

Ten local names of mushrooms were used by the Gaddangs (Table 3). However, they generally called mushroom as “tarulok and “uong” in Ilocano, they used this prefix and the substrate where they found in naming the mushroom. For example, the local name of *V. volvacea* is “tarulok saging/ginikan” since this species is found growing in decaying banana leaves or decomposing rice straws (Table 3). In Nigeria, Yoruba people locally called *V. volvacea* as “origi agbe” meaning farmer’s spice. This naming of mushrooms is similar to the study of Ayodele et al. (2011) and De Leon et al. (2012).

Similar species of mushrooms were found in the three study sites, for instance, *S. commune* is present in Bayombong, Solano and Bagabag (Table 4). This indicates that *S. commune* is not location specific. On the contrary, *A. fuscusuccinea*, *Polyporus* sp. and *V. volvacea* were found only in Bagabag while *A. auricula* was observed only in Bayombong, moreover, *Lentinus* sp. and *Pleurotus* sp. were both present in Bayombong and Bagabag.

Indigenous Beliefs on Mushroom Cultivation and Utilization

The Gaddangs have several indigenous beliefs during mushroom collection and utilization. They ask permission from the spirits before collecting mushroom because, they believed that mushrooms are guarded by spirits and cannot be easily collected. They also believed that spontaneous lightning can stimulate the mushroom growth. This belief has a scientific basis since lightning induces nitrogen to be converted to nitrite which is important for the growth of macrofungi. As a proof, several Japanese researchers are electrocuting a variety of mushrooms in lab-based garden plots with artificially induced lightning to determine whether the electricity can stimulate fungal multiplication (Ryall 2010).

Table 3 Mushrooms reported by the Gaddang communities in Nueva Vizcaya, Philippines based on the survey-questionnaires, interview and collected specimens.

Local Names	Scientific name	Bayombong	Solano	Bagabag
Tarulok Kawayan	nc	+	+	+
Tarulok Punso	nc	+	+	+
Tarulok Maya	nc	+	-	+
Tarulok Ginikan/saging	<i>Volvariella volvacea</i>	+	+	+
Tarulok Kudit	<i>Schizophyllum commune</i>	+	+	+
Taingang Daga	<i>Auricularia auricula</i> <i>Auricularia fuscusuccinea</i>	+	+	+
Tarulok Kalaw	nc	-	-	+
Tarulok Lupa	nc	+	-	+
Tarulok Managadu	ni	-	-	+
Tarulok/Uong	<i>Lentinus</i> sp., <i>Pleurotus</i> sp., <i>Polyporus</i> sp.	+	+	+

(+) reported, (-) not reported, nc=mushrooms not present during the sampling period, ni=mushrooms not identified

Table 4 The presence of identified mushrooms in three selected Gaddang communities in Nueva Vizcaya, Philippines.

Scientific Name	Bayombong	Solano	Bagabag
<i>Auricularia auricula</i>	+	-	-
<i>Auricularia fuscosuccinea</i>	-	-	+
<i>Schizophyllum commune</i>	+	+	+
<i>Volvariella volvacea</i>	-	-	+
<i>Polyporus sp.</i>	-	-	+
<i>Pleurotus sp.</i>	+	-	+
<i>Lentinus sp.</i>	+	-	+

+ present, - absent

This condition is also recognized by Aeta communities in Central Luzon (De Leon et al. 2012). People in Nigeria on the other hand believed that mushrooms grow because of the miracles of God (Ayodele et al. 2011).

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