

# Practices of Entomophagy and Entomotherapy in Cebu Island, Philippines

<sup>1</sup>Jake Joshua C. Garces, <sup>2</sup>Zandra O. Jarito, <sup>3</sup>Leslie Ann T. Barriga, <sup>4</sup>Froilen C. Domicillo and <sup>4</sup>Nimfa R. Pansit

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## **Abstract**

*The different features of entomophagy and entomotherapy practiced by the key informants and local villagers in Cebu Island, Philippines were documented. A survey was conducted in remote areas of Barangay Alambijud, Argao and Barangay Lusaran, Cebu City, Cebu from June–October, 2012 to discover the medicinal and edible uses of different insect species in these sites. Fourteen key informants were identified with the aid of two sampling methods- snowball technique and purposive sampling. Open-ended questionnaires were employed to obtain authentic and significant information from the key informants. An inventory on the knowledge on the wild edible and medicinal insects in the study areas is presented here. Results showed that these key informants profusely utilized wide range of biological resources in diverse ways, and thus contribute to their daily activities. As a whole, the factors that influenced their entomological practices include their socio-demographic and educational background, accessibility to urban societies and the open availability of certain resources particularly the insects they use and the influence brought about by their family and community. Moreover, these informants had different insects used in their practices, and they had their ways of preparing and administering these as medicines and food. Regardless of these differences, all of them were able to perceive that the insects used as medicine and food were equally beneficial to them. Traditional knowledge regarding entomotherapy and entomophagy in Cebu is very essential since folk medicine is still one of the most important resources for food and discovery of unknown natural drug resources. It is indicated that these medicinal and edible insects are comparable with other conventional food commodities by incorporating scientific validation to the traditional knowledge.*

*Keywords: entomophagy, entomotherapy, entomology, key informants (KI), Mt. Manunggal*

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## **1.0 Introduction**

Insects represent a traditional food category in different parts of the world (Chakravorty et al., 2011). These organisms show enormous biodiversity, and thus heralded as the most species-rich taxon among all animals in the kingdom of life. According to Bodenheimer (1951), insects play an important role in providing food and medicine in

Latin America, Africa and Asia. Literatures compiled by De Foliart (2002), Nonaka (2005) and Mitsuhashi (2008) emphasize detailed information concerning the ecological and economic uses of insects to humanity. Furthermore, these literatures reported that there were approximately 250 highly-nutritious, edible and medicinal insects, where majority of them are found in sub-Saharan Africa and Mexico.

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<sup>1</sup>University of San Jose Recoletos,

<sup>2</sup>Cebu Institute of Medicine, Velez College

<sup>3</sup>Southwestern University

<sup>4</sup>Cebu Normal University

Historically, insects had been subject to deprecating views. Being a worldwide pest in crops, there has also been minimal account of its uses and benefits (Chakravorty et al., 2011). Unfortunately speaking, people also used to think that these insects can bring disadvantages, even disasters (Chen 2008). As a result, their existence and abundance have been neglected due to the ignorance of many people regarding the probable uses that they possess. Since the Hispanic culture, extensive attribution on insects were based on practices, customs and knowledge of our predecessors and successors to entomophagy (the practice of eating insects) and entomotherapy (the use of insects as medicine) which eventually provided significant contribution to most people who highly depend on these biological resources (Costa-Neto, 2005).

However, as we advance into greater complexity with insect's usages in our society, its socio-cultural contexts become revealed and understood. Consumption of these organisms as cooked or raw, as well as ingestion being direct (e.g. utilization through its larvae or adult stage) or indirect (e.g. varieties derived from these insects), are widely considered being evident when it comes to its remarkable benefits toward the human and society. Insect preference is also based on the insect's palatability, availability and nutritional content as well as its local traditions and customs. Alongside with its edibility, these insects possess health-enhancing properties, making it beneficial to local communities. In the study of Yamakawa (1998), insects were shown to have antibacterial, anesthetic, diuretic and anti-rheumatic properties- all of which can be regarded as a source for drug development. Immediate innovations toward insect usages such as its preparation, administration

and its specified procedures opened entryways in emphasizing its worth for all.

In some countries, insects are the frequently consumed as food. According to Rastogi (2011), edible insects are an essential part of the traditional food systems in some Asian countries like India, Nepal, Thailand, China, and Japan. These are also a regular hit on the diet of certain Australian aborigines, hunter-gatherers of Africa and subsistence farmers of Mexico. Traditional ethnobiological practices and its acceptance as food has been traditionally accepted in some communities since they have not yet experienced "westernization", thus retaining its culture and tradition in the use of insects as food and medicine. Information on this aspect in some parts of the Philippines remain to be fragmentary and for the Philippines has only quite recently become an issue of its scientific relevance (Chakravorty et al., 2011). Despite those records on the usage of insects as food and medicine in some countries, it is known that in the Philippines, insects have little importance to people. Although it is said that there has been a custom of insect-eating in some parts of Northern Luzon as mentioned by Starr (1993), utilization of insects as medicine in the country has no recorded evidence at all. Additionally, the practice of insect-eating is not widespread and is only limited to some parts of the country which is mentioned in Northern Luzon. Hence, the researchers of this study came up with an idea of obtaining necessary explanation on the practice of entomophagy and entomotherapy as well as their reasons and their perceptions why they indulge into such practices here in Cebu Island, Philippines. These claims were supported by some who testified that these two uses of insects (as food and medicine) were acknowledged in several areas in Cebu.

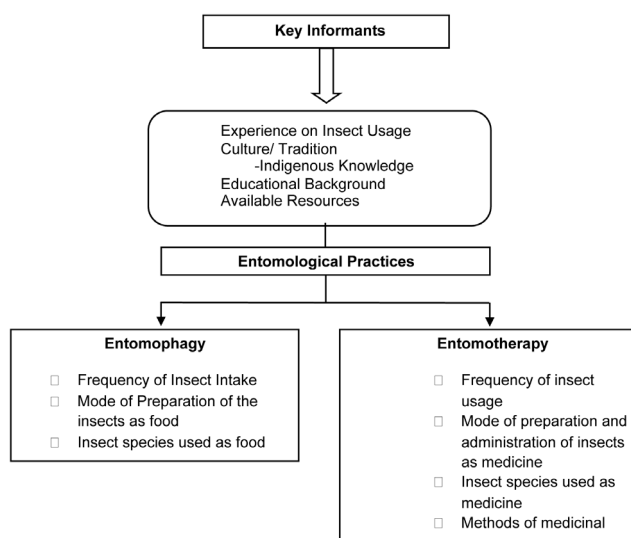
### Objectives of the study

This study was conducted to (1) to identify the socio-demographic background of the key informants who practice entomophagy and entomotherapy, (2) to identify insects with therapeutic benefits that are frequently used by the key informants in terms of their dosage, treatment, procedure, and methods of administration, (3) to evaluate the informant's perception on the edibility and medicinal use of insects; (4) to explain the causative factors (e.g. traditions, culture and family history) of why these people engage in such entomological practices. These objectives are necessary in order to expand the earlier research on the edibility and therapeutic potential that these insects possess.

### Conceptual Framework

The following framework was formulated to show the dependence of the different aspects of the two entomological practices on the

characteristics that the key informants possess. Fig. 1 showed the key informants' experiences on insect usage, their culture or tradition and educational background, as well as the available resources are factors which influence their decision to indulge into entomophagy and entomotherapy. For entomophagy, the insect species is an initial factor that influences entomophagic practices in the study area. In turn, it affects the frequency of insect intake, which is also highly dependent on proximity of the key informants to the available resources. This then affects the mode of preparation of the insects used as food in the site. Insect species used as medicine, its methods, dosage and treatment procedure, mode of preparation and administration of insects as medicine are also considered to be indicative factors that affect or influence the prevalence of entomotherapeutic practices in Cebu Island, Philippines. Environmental factors were also used as an influential feature on these practices and this is the availability of the insects to the informants.



**Figure 1.** Conceptual framework on the relationship of the key informant's background and entomological practices in Barangay Alambijud, Argao and Barangay Lusaran, Cebu City, Cebu Island, Philippines.

## 2.0 Materials and Methods

Cebu (Fig. 2) is located in the central region of the Philippines and is known to be the Queen City of the South (Cebu Daily News, 2010). With a total land area of 5, 072 per kilometers, Cebu supports over 3.85 million people with 759 persons per square kilometers. There are 6 districts with 48 municipalities and 1, 207 barangays. The climate is tropical with relatively moderate with wet and dry season all throughout the year. Cebu has a mean temperature range of 26.49°C to 28.79°C. Average rainfall is 1, 638.20 mm annually.

Barangay Alambijud (Fig. 2) lies 10° 19' 0" N latitude and 123° 55' 0" E longitude and biogeographically situated in the mountainous region of Cebu Island, Philippines (Philippine Island, 2013; Maplandia.com, 2005). Based on its geographical position, its forests are rich in evergreen trees, with temperature and alpine vegetation, which makes it a state with high biodiversity and is also regarded as a global biodiversity hotspot in the whole world. Barangay Alambijud had a total population of 1,328 in 2012 (NSCB, 2013). On the other hand, Barangay Lusaran, Cebu City Fig. 1) is located in the mountainous part of Cebu city. Barangay Lusaran is surrounded by towns of Tayong, Kamputhaw, Tanay and Taptap. The closest major cities include Mandaue, Cebu, Lapu-Lapu and Bacolod (Go Mapper, 2013). As of May 1, 2010, Barangay Lusaran had 2427 residents (NSCB, 2010). It takes one and a half hour of travel from the city going to the said barangay by motorcycle or "habal-habal." These barangays have vast agricultural area for farming and taming animals are their means of living.

Based on ground-truthing activities conducted by the researchers, these two study areas have been identified with the highest frequencies of

entomophagic and entomotherapeutic practices. These various communities have profound understanding on ethnobiological knowledge because of its close proximity to local biological resources. Also, these communities have total dependence to their livelihood on forests such as collection of plants and animals for food and for medicinal practices. With the advent of technological advancements in the major cities of Cebu, these study areas possess the remaining groups of people who practice the use of insects as food and medicine. Initial focus on these groups was necessary for the fear that long before information on the edible and therapeutic uses of insects might no longer be available in the future.

An ethnographic study on the practices of using insects as food and medicine was undertaken from June-October, 2012. All data were analyzed according to conventional qualitative methods (Mason, 1996; Silvermann, 2006). A combination of snowball technique and purposive sampling was employed to obtain necessary information and evaluate the vast knowledge on the practices of medicinal and edible potentialities of insects in the two chosen localities of Cebu Island, Philippines. These techniques were also employed since only few respondents remain in the remote areas of Cebu and practice the use of insects as food and medicine. As an important criterion, only those who have lived for >20 years were included as key informants in the study areas. A modified, semi-structured and open-ended questionnaire was employed to identify the socio-demographic background of the key informants, frequency of insect intake and usage, mode of preparation and dosage and treatment procedure perceived by the key informants. Entomophagic and entomotherapeutic practices of the study have

been obtained from faith healers, quack doctors and local villagers using key informants' consensus. The survey included wild and domesticated species of insects in the study areas. Specimens identified by the key informants were collected from various habitats such as grasslands, fresh water bodies, and their gardens. Taxonomic identification of insects used by the key informants was based on the entomological book by Ghosh and Sengupta (1982), as well as databases such as the Catalogue of Life and IUCN Red List. Data analysis was then conducted and presented in four themes to assess the different entomophagy and entomotherapy practices of the informants: (a) socio-demographic background (b) available resources, (c) culture and tradition and (d) experience on insect usage. Daily analysis of the responses from the key informants

were recorded and organized into themes (Atkinson & Coffey, 2004) as well as sorted and interpreted into central themes and were identified based on different voices apparent in each interview. Analysis of the interviews focused mainly on themes which were relevant to the research. Field notes included detailed information and interpretations of the themes analyzed. Furthermore, data analyses were initially performed on overt content which was recorded during observations and interviews based in the social context. In cases where interpretations are not aligned, thorough discussions were conducted (Atkinson & Coffey, 2004). Validity and reliability through member checks (presentation of interpretations to participants) were further conducted for the researchers to derive to final coding themes.



**Figure 2.** The Study site: Brgy. Alambijud, Argao, and Brgy. Lusaran, Cebu City, Philippines.

### 3.0 Results and Discussions

Details on the socio-demographic profile, available insects used as food and medicine, culture and tradition and insect usage were given by each key informant in Barangay Alambijud, Argao and Barangay Lusaran, Cebu City, Philippines. This is also in congruence with the study conducted by Chakravorty et al. (2013), Costa-Neto (2005) and Shantibala et al. (2012). The information generated on its edibility and therapeutic potentiality were considered only reliable based from longevity of the key informants' residency and profound knowledge on entomological practices (Narzari & Sarmah, 2015). These precautions were emphasized since we considered this study to be qualitative in nature and is the first of its kind to be conducted in Cebu Island, Philippines. An inventory is presented in Tables 1,2,3 and 4 below based on the socio-demographic background, available resources, culture and tradition and experience on insect usage. The present study documented 14 key informants which vary in terms of their socio-demographic background, culture and traditions and experience on insect usage towards entomophagic and entomotherapeutic practices in Cebu Island, Philippines.

#### **Socio-demographic background**

All the identified key informants of Barangay Alambijud, Argao have limited educational background. All of them were not able to finish their studies, and they started working at a young age. Key informant 3 have the highest educational attainment which is 3<sup>rd</sup> year level of college. Despite this, his entomotherapeutic practice is still analogous to those of the other key informants who have lower educational attainment. Key informant 2 and key informant 5 graduated from

high school and elementary, respectively. On the other hand, only key informants 1 and 4 were not able to graduate from any of the three educational attainment—elementary, high school and college. This limit has influenced their perspectives towards the identity of insects and their possible benefits to society (Chakravorty et al., 2011). In turn, such perspectives have molded their entomological practices.

“For me, these insects that I have mixed with oil (*lana*) are really good because their toxins heal the stings of other insects.”

The statement of key informant one above affirmed his limited understanding of its medicinal value, regardless if these are mixed with another substance or not. He just practiced the method even though no prior scientific evidence on such cases is established. Since based on his experience, people seem to attest the curative properties of this entomological way, he has formulated his explanation as to why and how these people have been healed. This case was also for key informant 2, 3 and 4 in which their usage of honey as medicine was claimed to be very effective. Although they seem to lack knowledge of the composition of honey, they still confirmed the effectiveness of it. In the study of Manyi-Loh (2011), honeybees of the genera *Apis* and *Meliponini* have been credited to its antimicrobial, anti-inflammatory and antioxidant potential. Moreover, these honeybees are an active killer against antibiotic-sensitive and antibiotic-resistant strains of microorganisms and has the potential to select for further resistant strains (Shantibala et al., 2012; Chakravorty et al., 2013). Even though these key informants lack of knowledge on the chemical components of honey, it was deduced by the researchers because they did not provide any claims of it when they have

been asked why they use it as medicine.

As for key informant 5, his educational attainment also has an effect on his entomophagic practice. When he eats white grubs, he doesn't have any concern if it will have any adverse effect to his body. Xiaoming et al. (2010) evaluated the protein content of 100 species from a number of different insect species which included white grubs. It showed that its protein content ranged between 13-77% dry matter. However, it is still recommended that careful selection is to be conducted to protect the health of the people (FAO, 2013). On the contrary, this doesn't have any effect on the last key informant, thus, proving how his limited knowledge influenced his practice. For the key informants of Barangay Lusaran, Cebu City, all of them were also not able to finish their studies just like the identified key informants of Barangay Alambijud. Most of them were only up to the elementary level. Thus, all of them also have limited knowledge particularly on scientific discoveries regarding the insects they use. Moreover, aside from their ignorance on certain scientific aspects of their practices, they likewise lacked awareness on the possible reasons why people get well from incorporating insects in their traditional medicine (Yen, 2010). As a result, they tend to formulate baseless notions which shaped their practices (Yen, 2012).

### **Available Resources**

All of the key informants of Barangay Alambijud depend on farming as a source of income. The only exception was key informant two who works as a motorcycle driver. With this information, it was said that all of them have easy access to insects given that they live in farms particularly in a mountain. This open availability of the insects

must be another contributing factor why these people practiced entomology (Gautam et al. 2004). This conclusion is supported by the second concept of the ninth law of ecology (Robert, 1998). Furthermore, it can also be deduced that the work of the key informants must have an impact on their practice. The last key informant has also supported this in which his other work as a tuba gatherer affected his entomophagic practice. Since white grubs or the larvae of June beetle were found in stems of over-ripe coconuts, it is easy for him to collect these insects for his practice especially during his tuba gathering. The case of the last key informant of Alambijud was similar to that of the key informants 1 and 4 of Barangay Lusaran. Just like the former, the latter were influenced by the work of the corresponding key informants. The key informant 1 is likewise a tuba gatherer, and he has easy access to white grubs. This served as an evidence for entomophagic practice. On the other hand, key informant 4 works as a honey seller aside from being a motorcycle driver. This has provided him with a sufficient source of the bee eggs which are the subject of his entomophagy. In his claim, key informant 4 stated:

"I do these all at once. When I collect honey, I also get bee eggs."

Nevertheless, for the remaining key informants 2, 3, 5, 6, 7, 8, 9 in Lusaran, their work doesn't have any impact, given that cockroaches are easy to find. The same case was for key informants 6, 7 and 9 in which the honey they use in their entomotherapeutic practice were bought from sellers. Another factor that contributed to the success of the entomological practices of those people in Lusaran was the location of their place which is a mountainous area. Mountains plays an important role in providing natural services and

resources, especially for foresters and villagers' daily consumption (Pearce & Turner, 1990). However, some of the disadvantages in geographical site in Lusaran, which was similar with that of Alambijud is that people were rendered incapable of having immediate access to urban regions where there are hospitals and pharmacies (Gautam et al., 2004; Chakravorty et al. 2013). This has also contributed to the existing entomological practices of these people in the two areas.

### **Culture and Tradition**

In Table 1, the entomotherapeutic practices of key informants 2, 3 and 4 in Barangay Alambijud were an influence of key informant 1. The latter is a known quack doctor of their area, and his entomological practices were imitated by some people of the area. Nevertheless, they have anecdotal purposes which made their practices different from that of the key informant 1. Key informant 2 uses the honey to cure asthma while key informant 3 and 4 use honey for fever and colds, respectively. This is similar in the study of Orhan et al. (2003) and Savithramma et al. (2007). Nonetheless, all of them had the same perception of its effectiveness which is very effective. On the other hand, key informant 5 has acquired his entomophagic practice from his uncle who according to him started eating white grubs out of curiosity. He was influenced by his uncle, but none of his other family members had been so. Despite this, he still continued practicing entomophagy particularly because he found white grubs to be tasty and also because of the easy access to these, particularly at times that he gathers coconut vinegar, also known as "tuba", from coconut trees. Our choices, in terms of food preference, can also be influenced by our ancestors as well as the availability of these resources in proximity to where we reside

(Burnham & Phelan, 2012). When resources are available in our environment, people find ways to make use of such resources and find alternative uses that would be beneficial to humankind (Godfray et al., 2010).

In Lusaran, all of the key informants were influenced by a family member except for the key informant 3 (Table 2). The latter's entomotherapeutic practice was an influence of her neighbor who turned out to be key informant 2. Among all these key informants, only key informant one does not consider his practice part of family tradition. Even though he and his uncle eat white grubs, no other family member welcomed the practice. His uncle who lived in South Cotabato, Mindanao learned the practice from the people who live there. It turned out that entomophagy is common in that place. The use of white grubs as food is common among members of tribes in India (Chakravorty et al., 2013). Honey is considered to soothe inflamed membranes of the upper respiratory tracts which then relieve such irritating symptoms. Honey is also considered as one of the components of Ayurvedic formulations, which is not only practiced in some tribes of India, but also evident here in Cebu Island, Philippines. On the other hand, the remaining family- influenced key informants 2,4,5,6,7 and 9 (Table 2) claimed that their practice was part of their family tradition. As shared by these key informants, they had witnessed the entomological methods even when they were still young and incorporated these in their therapeutic methods to counter different illnesses even until now that they already have a family of their own. As has been documented insects can be source of medicine, their medicinal values can also be beneficial because of its analgesic, antibacterial, diuretic, anesthetic, immunological and anti-rheumatic properties (Costa-Neto, 2005).



**Table 1.** Key informants' socio-demographic background, culture and tradition towards entomophagy and entomotherapeutic practices in Barangay Alambijud, Argao, Cebu Island, Philippines.

Key Informant	Age	Gender	Household Size	Role in the family	Educational Attainment	Sources/s of Family Income	Culture or Tradition
1	58	male	7	father	grade 2	farming; practice as quack doctor	entomological practice is an influence of his uncle
2	32	male	3	father	high school graduate	motorcycle driving	entomological practice is an influence of key informant 1
3	27	male	7	son	3 <sup>rd</sup> year college	farming	entomological practice is an influence of key informant 1
4	25	male	5	son	2 <sup>nd</sup> year high school	farming	entomological practice is an influence of key informant 1
5	40	male	4	father	elementary graduate	farming; tuba gathering	entomological practice is an influence of his uncle

**Table 2.** Key informants' socio-demographic background, culture and tradition towards entomophagy and entomotherapeutic practices in Barangay Lusaran, Cebu City, Cebu Island, Philippines.

Key Informant	Age	Gender	Household Size	Role in the family	Educational Attainment	Source/s of Family Income	Culture or Tradition
1	41	male	11	father	grade 4	farming; selling of charcoal; <i>tuba</i> gathering	entomological practice is an influence of his uncle
2	81	female	3	grandmother	grade 3	daughter's salary as barangay tanod; income from store in market	entomological practice is an influence of parents
3	48	female	6	mother	elementary graduate	farming	entomological practice is an influence of neighbor
4	30	male	4	father	high school graduate	motorcycle driving; selling of harvested honey	entomological practice is an influence of family
5	45	female	4	mother	grade 4	farming	entomological practice is an influence of parents
6	25	female	5	mother	grade 6	farming	entomological practice is an influence of father-in-law
7	52	female	14	mother	elementary graduate	farming; masseur	entomological practice is an influence of parents
8	53	male	5	father	grade 3	farming	entomological practices is an influence of parents
9	33	female	9	mother	3 <sup>rd</sup> year college	production worker	entomological practices is an influence of

## Experience on Insect Usage

### *Entomophagy*

The insect used in the entomophagic practice in Barangay Alambijud was the same with the insect species used in one of the entomophagic cases in Barangay Lusaran. There was only one key informant in Barangay Alambijud that practices insect-eating and this is key informant 5. He eats white grubs or June beetle larvae and just like key informant 1 of Barangay Lusaran who also eats the same insect; he was also influenced by his uncle. Nonetheless, one of the key informants varies in their development of the practice. The uncle of the key informant in Barangay Alambijud developed the practice out of curiosity. On the other hand, the uncle of the key informant in Barangay Lusaran developed the entomological practices through societal influence in Mindanao. Nonetheless, both key informants in the two study sites fry the white grub, and they also considered the taste of it to be tasty. As shared by key informant 1 of Barangay Lusaran:

"It's really delicious. It is like a fried pork skin or "chicharon" and it smells like a shrimp when it's cooked."

Likewise, key informant 5 of Alambijud claimed:

"I like its taste, it's flavorsome. That is why I don't feel disgusted when I eat it because it is delicious. Besides, nothing terrible has happened to me."

Aside from key informant 1, there was also another case of entomophagic practice in Barangay Lusaran and this is carried out by key informant 4.

Unlike the abovementioned cases, the informant eats bee eggs. Generally, this practice was learned by key informant 4 from his relatives. One causative factor of this was the easy access of beehives in their area. The key informant, just like his other relatives harvests honey and sell this. It is during harvest time that they also collect bee eggs. The method of cooking of key informant 4 in Barangay Alambijud is grilling (Table 2). Moreover, similar to the statements given by other key informants in the practice of entomophagy, this informant claimed that the bee eggs are also tasty.

With the aforementioned cases above, all the key informants seem to deviate from the norm of society with regards to the usual food eaten. Eating exotic foods has been a product of curiosity of many, but this type of action has rarely developed into practices (Van Trijp & Steenkamp, 1992; Meiselman, 1996). What is more unusual especially for these mentioned key informants is the subject of their practice. Although many studies have emerged proving the existence of entomophagy in other countries, these recorded practices portrayed the usage of the adult form of the insects in practice (Chakravorty et al., 2013). However, for the insects used by the key informants of the study, the non-adult forms (egg, larva) are used. This is primarily because of the different insect forms which easily accessible than the adult ones (Meyer-Rochow, 2009).

**Table 3.** *Entomophagic Practices of Key Informant in Alambijud, Argao*

Key Informant	Frequency of Intake	Mode of Preparation	Insect Species Used	Perception
5	4 times a year	frying	June beetle larva	tasty

**Table 4.** Entomophagic Practices of Key Informants in Lusaran, Cebu City

Key Informant	Frequency of Intake	Mode of Preparation	Insect Species Used	Perception
5	4 times a year	frying	June beetle larva	tasty

### Entomotherapy

In the practices of entomotherapy in the two study sites, most of the medicines used are by-products derived from insects. Only one key informant among these people uses the body of an insect in his practice. This is evident in key informant 1 of Barangay Alambijud ((Table 4). In his practice, he makes use of migratory locusts and bees and mixes these with "lana" or coconut oil. This mixture is what he applies as ointment on bitten parts of animals and insects. Nonetheless, this key informant also utilizes honey in his practice which is similar with one of the two aforementioned by-products employed for entomological practices. Insect by-products are important, both as fold medicine and potential sources of drugs (Costa-Neto, 2005). Surgical wounds dehiscence after obstetric surgery and is used as antiseptic in major operations (Calderon-Espina, 1989). Moreover, In the entomological method of this key informant, his usage of honey also involved diluting it in water and taking it orally with the ratio of one tablespoon of honey is to one glass of water. This mixture is used to cure a cough, fever, and tonsillitis. In Barangay Alambijud, honey is also taken as a medical cure to certain diseases. These differences were based on how honey was taken by the informant and also the mode of preparation. Andary et al. (1996) have found medicinal properties of honeybees, as well as anticancer and anti-HIV activities in the

ethanolic-derived extracts from the propolis of *Apis mellifera* collected from the different sites of Brazil. Other informant also confessed that honey is used to heal asthma, fever, and colds (Molan, 2001). The mode of preparation of the key informant entails preparing a tablespoon of pure honey and taking it orally. This was similar in the study made by Antonio (1994). Despite the difference in concentration of the honey used, the effectiveness of it was perceived by all key informants to be very effective. According to key informant 1, it takes about one week for the person to recover, which was also a similar claim mentioned by the key informants. As shared by key informant 4:

"The effect of honey is fast. There is an immediate recovery for those who have colds. They recover for only about 5 to 7 days."

In addition, there were two insect derivatives that were used in the entomotherapeutic practice of the key informants in Lusaran, namely: cockroach feces and honey. The latter is similar to that utilized by the key informants of Barangay Alambijud. The key informants of Barangay Lusaran, likewise, consumed pure honey but the dosage varies depending on the person who takes it. For the usage of honey in Barangay Lusaran, most cases are intended for babies particularly for babies. According to key informant 7 (Table 2), honey is a vitamin supplement for babies and adults alike. In the study of Walker et al. (2006), honey has

immunological and antibacterial property that is good for the digestive system of infants. On the other hand, key informants 6 and 9 use honey to improve teeth growth of new born babies, but the former also applies honey to adults to heal fever and cough (Table 4). Eteraf-Oskouei & Najafi (2015) elaborated the natural contents of honey which included 200 substances, including amino acids, vitamins, minerals and enzymes, with its principal carbohydrate contents of fructose and glucose. These are excellent compounds in the creating strong teeth. For infants, the prescribed volume of honey is 5ml while for adults, one tablespoon is enough. These will be taken 3 times a day. Just like the claims of the key informants in Alambijud, the key informants in Lusaran also affirmed that honey is very efficient, despite the difference in the purpose of honey in these two study sites. Literatures and scientific evidence prove that honey has a very high potential in terms of curative properties. Furthermore, it also conveys the enormous benefits of honey in the medicinal field.

The other key informants 2, 3, 5 and 8 (Table 2) use cockroach feces in their entomotherapeutic practices. Key informants 2 and 3 have similar mode of preparation in which the feces are pulverized and immediately mixed with water or saliva. This mixture is used to cure illnesses like stomachache, stiff neck, epilepsy, and fever (Chakravorty et al., 2013). However, key informants 5 and 8 heat first the feces before pulverizing these and immediately apply it or mix it with "lana," respectively. The former uses it to increase resistance of children. Moreover, the "lana" is being applied directly on the palate of the children. The latter utilizes the mixture of lana and pulverized feces to cure stomachache. It is useful as an ointment on the stomach. According to biologist Richard Karp, cockroaches possess

antibodies that are much more effective than found in the human immune system (Karp, 1985). Although two of the key informants do not heat the feces, they have not shared any experiences portraying negative effects on their health. These medicinal potential is first of its kind in this study. On the contrary, they have stated that it is very effective. This claim is similar to that of the claim of the other key informants who exposed the feces with fire. Cockroaches are considered to be an excellent and even specific medicine against bronchial asthma (Noguiera et al., 1998). Other treatments and benefits of cockroach include intestinal colic, earache, bad sores (abscess), alcoholism, epilepsy, asthma, vomit, furuncle, hemorrhage, bronchitis, diarrhea and gonorrhea (Amorim, 1963; Conconi & Pino 1988; Costa-Neto, 2005).

#### **4.0 Conclusion**

From the results presented, it was identified that the consumption of edible insects and its therapeutic benefits remained to be undiminished over the years among the key informants and villagers in Barangay Alambijud, Argao and Barangay Lusaran, Cebu Island, Philippines. The fourteen key informants featured in the study belonged to those who continue to perform entomophagic and entomotherapeutic practices. These informants utilized wide range of biological resources in diverse ways, and thus contribute to their daily activities. Majority of the key informants have graduated from elementary and high school which affected their decision to indulge into entomophagy and entomotherapeutic practices. Their culture and tradition have also influenced most of the key informants when it comes to the use of insects as food and medicine.

As a whole, the factors that influenced their entomological practices include their socio-demographic and educational background, accessibility to urban societies and the open availability of certain resources particularly the insects they use and the influence brought about by their family and community. Moreover, these respondents had different insects used in their practices, and they had their ways of preparing and administering these as medicines and food. Regardless of these differences, all of them were able to perceive that the insects used as medicine were very helpful and those that the key informants eat were considered to be tasty and nutritious. Hence, with this study, we deduced that insects had great potential, specifically in its entomophagic and entomotherapeutic uses in different countries worldwide.

### Recommendations

To elucidate further studies in entomophagy and entomotherapy, it is recommended to conduct case studies to determine the perception of the key informants who are knowledgeable about practices of entomophagy and entomotherapy in the whole cities and municipalities of Cebu. Moreover, there is a need to tabulate all insects with edible and medicinal use in the island of Cebu as well as its nutritional content. The baseline data of this study is necessary to instill in the minds of the people, especially the residents of the localities, about the importance of insects as food and medicine which has been a forgotten culture and tradition by many Filipinos across the country. We see an urgent need to assess insect biodiversity in Cebu Island, Philippines and the role of ethno-entomological practices together and not separated from each other. To make sure that entomophagic and

entomotherapeutic practices do not disappear, it is necessary to protect the biodiversity of our forests and conserve beneficial insects in our locality. Prevention of over-exploitation, habitat fragmentation, pollution, as well as conservation of our indigenous practices must be maintained for the future development of our region.

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