

Ethnobotanical Evaluation of Medicinally-Important Forest Plants Used by Coconut Farmers along Ulot Watershed, Can-avid, Eastern Samar, Philippines

Jean C. Afable¹, Dennis C. Afable², Cristita O. Subere³

^{1,2} Faculty of Education-Science, Agriculture-Biotechnology

³ Faculty of Agriculture-Forestry

Abstract:- The prevalence of ethnobotanical study alongside indigenous knowledge in healing ailments using organic ingredients has instigated the authors to conduct this study in these upstream barangays; Salvacion, Pandol, Boco, and Balagon being near the vast rainforest of Ulot Watershed of Can-avid, Eastern Samar, Philippines. A total of 25 identified farmers interviewed with indigenous knowledge from each study area. The study has registered 19,21,18,18 variety of forest plant species perceived and claimed to have medical uses. The most common ailments cited by the farmer healers are *diarrhea* and *stomachache (ulcer/gas pain/indigestion)*, *bughat (relapse)*, *diarrhea*, *allergies (poisonous animal bites)*, and *toothache* which have the higher number of cited forest plants used for treatment. The most common method of preparation is decoction either from the freshly prepared chopped and scrapped or ground/ pounded and sun-dried bark, roots, leaves, and vines of forest plant. The mode of administration generally through oral intake either by drinking the decocted bark, trunk, roots and leaves or freshly-raw eating the bark, leaves, and roots generally in amounts or reasonable quantities/dosage as needed or until the illnesses/ailments or diseases get well. The effectiveness of these medicinal forest plants used by the farmer healers varies from each study area according to the claimed efficacy of each forest plants used based on the proximity of the source from rainforest. The medicinally-important forest plants claimed by the farmer healers from the four barangays historically cited to be very useful in treating illnesses/diseases/ailments are *sandigan* (2 variant species) [identification in progress] in Salvacion, *nagsumpay* [*calyphranthera sp.*] in Pandol, *manongal* [identification in progress] in Boco, and *dabo-dabo* [identification in progress] in Balagon.

Keywords: indigenous knowledge, farmer healers, medicinal/medical use, forest plants, Ulot River Watershed, illness/disease or ailment.

1. Introduction

The study of indigenous knowledge in ecology [5] has been prevalent recently, and research into traditional knowledge is very valuable in some fields, for example, in agriculture, pharmacology, and, more recently, ethnobotany [7]. In the latter few decades of the nineteenth (19th) century, there was a worldwide trend of interest in the conventional system of drug manufacture and use. Forest plants are becoming the emerging market basis for developing modern drugs and medicinal plants that have been utilized for many decades in treating various diseases worldwide [2]. Ethnobotanical studies have become increasingly significant in developing modern healthcare and conservation programs in different parts of the globe. It is timely then that the world biotechnological campaign is mostly "going back to basics," meaning more on organic foods and medicines. Samar Island Rainforest is still considered a virgin forest because its biodiversity holds several unidentified/unrecorded species. Cultural medicine has been successfully practiced for many generations in Eastern Samar Province, particularly among those living in upstream barangays, and there have been anecdotal recordings of unpublished stories that sought to catalog the expertise of these coconut growers. Even in recent days, when

essential medical services are available to the rural communities but because of the length of travel time to reach rural health, these traditional healers from these upstream barangays of the Ulot River watershed have adhered to and relied on the use of immediate cure by using what they considered as medicinally-important plants near their coconut farm. The need to recognize and describe wildlife plants has always been especially pressing because of their use for food and medicinal purposes: the most typical, showiest, or most useful wildlife plants are given common names but usually vary from country to country, province to province, and from barangay to barangay.

Locally, along the Ulot River watershed, *Can-avid*, Eastern Samar thrives in some unrecorded uses of plants, roots, and vines used as effective medicine by the local people handed down from generation to generation. Roots and vines can cure mostly stomach illnesses and internal wounds/bleeding. Hence, this study will be conducted to assess and document the different wild forest plants that have medicinal importance and aimed to answer the following objectives:

1. To assess the different medicinally-important plants used by the farmers in treating ailments.
2. To determine the variations of knowledge in traditional healing practices [9] among coconut farmer healers along Ulot River Watershed (Barangays' age-based and gender-based)
3. To Determine informants' perceptions of the effectiveness [9] and reasons for using these medicinal forest plants.

The study will focus on identifying and evaluating the indigenous knowledge of farmer healers in traditional healing using what they considered medicinally important plants aside from the common herbal plants. Data collection through an informal interview with survey instruments and the scientific group of the specimen will be limited to upstream barangays with coconut farms near the vast rainforest of Barangay Balagon, Boco, Pandol, and Salvacion.

2. Review of Related Literature and Studies

In recent years, ethnobotany studies have been linked to searching for novel medications and other plant-derived goods. Ethnobotanical-based collection of plants gained popularity as a way of identifying which plants (of the estimated 250,000-500,000 existing species) contain relevant compounds for exploitation [5]. This approach to biological prospecting employs indigenous cultures' plant knowledge, either directly (via ethnobotanical research) or indirectly (via access to published ethnobotanical data), to pre-screen plants for medicinal or other properties of interest, increasing the likelihood of discovering marketable products. Drug discovery projects have cited possible social advantages in medical, economic growth, and conservation.

Ethnobotany's involvement in this pursuit has caught public attention and has principally polarized the discipline [4]. According to anthropologist Richard Ford [18], ethnobotany is "the study of direct interrelations between humans and plants." He characterizes the subject as focused on understanding the cultural significance of plants. Many ethnobotanists would argue that biological prospecting for plant products useful to another minority (typically mainstream society) is a form of economic botany rather than ethnobotany and that it is motivated by goals that may contradict the ethnobotanical objectives of promoting and protecting biological and cultural diversity. Indigenous groups are under growing pressure to use intellectual property rights to safeguard these resources, frequently to prevent others from doing so first.

It was found that 70% of the 34 peer-reviewed ethnobotanical research published between 1986 and 2005 occurred in Latin America, 21% in Africa, and 9% in Asia [19]. Long before the advent of Western therapeutic practices, it was reported that ancient Filipinos employed indigenous plants and herbal items to treat various diseases. For example, indigenous knowledge has been acknowledged for contributing to the sustainability of industrial systems, and numerous researchers have proven its technical and scientific soundness [7]. Some of the significant fields in where ethnobotany is employed in the Philippines are: (1) for understanding agricultural evolution in the different regions like Bontoc [6] and Mt. Arayat [3], and (2) agroforestry where interviewed farmers maintain a comprehensive list of ethnobotanical knowledge [14]. An ethnobotanical inventory suggested (10) identifying species with documented industrial and cultural applications and (2) recording the methodologies and use

practices of these plants, which include collecting voucher specimens, conducting interviews, and seeing actual activities by people [15]. The ethnobotanical survey was conducted among farmers in the province of Leyte [18]. Local uses of wild plant species were recorded to (1) document farmers' knowledge of identifying recorded species in the study area and (2) evaluate farmers' experience in comparison to that of other Philippine indigenous groups [18]. The Subanen village in Lakewood, western Mindanao, Philippines, also underwent ethnobotany documentation. Similar studies are being conducted in Zamboanga del Sur as an urgent response to the rapid loss of plant biodiversity and genetic resources, as well as the loss of ethnobotanical knowledge.

Human activities have pushed some plant species to the brink of extinction. Over 6,500 blooming plants and ferns were mostly employed as traditional therapeutic components in Ethiopia. The National Herbarium [23] believes that creating, extending, and upgrading herbaria is the first and most critical step in preserving plant collections.

A herbarium is a collection of dried plants or plant specimens organized methodically, geographically, or alphabetically for reference purposes [23]. Plants not kept fresh are conserved for botanical comparison and research purposes. Plant specimens are pressed and dried between sheets of smooth, hefty paper. A herbarium is a collection of dried plants or plant specimens organized methodically, geographically, or alphabetically for reference purposes [23]. Plants not kept fresh are conserved for botanical comparison and research purposes. The plant specimens are pressed and dried between sheets of smooth, hefty paper using sticky glue for longer preservation. Small pieces of plant material, such as fruits and seeds, are put in an envelope linked to the herbarium sheet. Each page is tagged with the collector's name and other relevant information. Herbarium Essentials [23] is an illustrated guidebook for herbarium professionals that provides information about maintaining a functioning collection. Given its many characteristics, it offers a substantial theoretical foundation for complete approaches to managing a specimen collection herbarium. These include plant collection, mounting, scientific and physical preservation, and computerization. Small pieces of plant material, such as fruits and seeds, are put in an envelope linked to the herbarium sheet. Each page is tagged with the collector's name and other relevant information. Herbarium Essentials [23] is an illustrated guidebook for herbarium professionals that provides information about maintaining a functioning collection. Given its many characteristics, it offers a substantial theoretical foundation for complete approaches to managing a specimen collection herbarium. These include plant collection, mounting, scientific and physical preservation, and computerization.

3. Materials and Methods

The research used a descriptive strategy, including surveys and basic questions in informal interviews. Samar Island is situated in the eastern section of the Eastern Visayan group of islands, home to some of the Philippines' few surviving virgin forests. Samar Island was proclaimed a natural park under Republic Act 11038. Given its physical and ecological qualities and its socio-cultural and economic significance, it plays an important role as a life support system for the people who live on and around the island. The Samar Island Natural Park (SINP) and its buffer zone include land parcels in Can-Avid, Eastern Samar, comprising 28 barangays. The top four far-flung barangays where the study areas are the barangays of Salvacion, Pandol, Boco, and Balagon, found along the Ulot watershed, considered to be the last frontier of native biodiversity in the world due to its highly endemic and critically denuded rainforest with few small and isolated kaingin system activity patches. These respondents were specifically picked from upstream barangays based on anecdotes and frequency of practice of traditional healing practices, as well as the fact that there are numerous coconut plantation owners along the Ulot river line and mountain bases.

Methods for sampling and conducting ethnobotanical surveys

The research used a snowball approach, with the barangay chairman identifying the first few responders. These responders were asked to identify more farmer healers who are important research participants. All responders were then divided into six groups depending on their age (21-30, 31-40, 41-50, 51-60, and 61 or older) and gender. With each group, these subgroups of groups are combined to generate a random sample, which may then be used to choose the various puroks/sitios where farmer healers are most prevalent. From December 2017 to January 2018, the first and initial data gathering or collection trip was made in the four study areas. The follow-up and final collection trip will be in August 2018, Boco & Balagon, September and October 2018, and Pandol &

Salvacion. Standardization of the survey questionnaires used during the preliminary data collection was pilot-tested and subjected to experts (Cronbach's $\alpha = 0.861$) before final data collection.

Data on Indigenous knowledge were obtained from informal but semi-structured interviews from coconut farmer healers aside from traditional folk healers who were known to possess ethnobotanical knowledge about forest plants, table conversations with practitioners, and personal observations on methods of forest plant leaves, barks, vines, and root extract preparation as described by Etkin[8]. *Binisaya/waray-waray*, the native dialect of the respondents, was used in all interviews. All respondents provided informed consent, including permission for data publishing, before the actual talks — 25 farmer healers from each research location were selected using Martin's methodology [16], [17]. A questionnaire was used to obtain more information. All treatments used to cure a certain disease/illness/ailment were cross-checked and counted to determine the most often utilized medicinal forest plant species. Using the guidelines in a research interview, the IRB (International et al. facilitate the protection of human subjects in the study and *ensure the rights and welfare of human subjects protected during their participation*) only individuals 21 years old and older were interviewed.

Field collections of forest plant's leaf, root, vine, and bark specimens

Following the interview, several respondents offered the researchers a guided tour of regions where plant roots were harvested, pointing out the plants identified during the discussion [13], [14]. These assessed respondents' indigenous knowledge to see whether they could identify plants in the wild. Interviews were done concurrently with the collection of specimens in the region. During the collection, researchers took note of environmental characteristics based on the Wildlife Act (R.A. 9147) and information about the type of plants recorded and collected. Researchers identified and named gathered plants based on their taxonomic classification, and dried specimens were conserved and stored securely for future reference. They also saved unnamed wild species for further identification at the National Museum in Manila, where botanical curators are readily available.

Field collections of forest plant's leaf, root, vine, and bark specimens

The office went to the Community Environment and Natural Resources Office (CENRO) office to obtain a gratuitous permit. The elders of the indigenous and tenured migrant communities gave the permit to the researchers.

4. Results and Discussion

Profile of Respondents

Several of the activities that the researchers observed involve tending to and growing their coconut farm and lands for upland vegetable and rice cultivation (in most cases, due to the distance coming from the barangay place of residence, both males and females work together, with the male tilting land and the female planting crops). The readily available respondents are those who are 51-60 and 61 above who are left behind to take care and act as nannies to their children's grandchildren who are not yet within the age range of 18-28 (some are downstream at the town proper attending school. Meanwhile, the ages 21-30 (with the fewest respondents) mostly work in metropolitan cities like Manila. Ages 31-40 and 41-50 are those who left for work together with children strong enough to do menial work. These age groups include potential responders devoted to securing work to meet the demands of their families.

Table I lists the local and scientific names of Forest plants, leaves, barks, trunks, vines, and roots used by coconut farmers in treating various health-related problems or illnesses /diseases from 4 upstream barangays. As seen in the same table, coconut Farmer healers in the four barangays use the abundant natural flora in their region. It is clear from the forest plants reported by farmer healers, as seen by the diversity of forest plants listed from the four research locations. One of the variables leading to this variance is the diverse distribution of forest plant species within each research location. One alternative explanation is that forest plants are only found in Salvacion and not in Pandol or that forest plants exist in both Boco and Balagon. However, the knowledge has only been exercised in the former, not Pandol, since it was unknown later.

Table I. List of Forest plants leaves, barks & roots (with local and scientific names) used by coconut farmers in treating various health-related problems or illnesses/diseases from 4 upstream barangays along Ulot river watershed of Can-avid, Eastern Samar, Philippines.

Salvacion		Pandol		Boco		Balagon	
Scientific Name	Local Name	Scientific Name	Local Name	Scientific Name	Local Name	Scientific Name	Local Name
				() akupar		() agutay	
<i>Pueraria phasaloides</i>	albotra(Kudzo)					<i>Pueraria phasaloides</i>	albotra(kudzo)
<i>Bauhinia acuminata</i>	alibangbangan(pula)					<i>Bauhinia acuminata</i>	alibangbangan(pula)
				<i>Deinostochia pubiramea</i>	balukawi	<i>Deinostochia pubiramea</i>	balukawi
<i>Lagerstroemia speciosa</i>	banaba	<i>Lagerstroemia speciosa</i>	banaba	<i>Lagerstroemia speciosa</i>	banaba	<i>Lagerstroemia speciosa</i>	banaba
<i>Radimuchaca pinnata</i>	banay(dagko)	<i>Radimuchaca pinnata</i>	banay(dagko)				
<i>Atzelia rhomboidea</i> Vid.	barayong/tindalo	<i>Atzelia rhomboidea</i> Vid.	barayong/tindalo	<i>Atzelia rhomboidea</i> Vid.	barayong/tindalo	<i>Atzelia rhomboidea</i> Vid.	barayong/tindalo
() burakan		() burakan					
						() dabo-dabo	
<i>Panax quinquefolius</i>	ginseng-guba	<i>Panax quinquefolius</i>	ginseng-guba				
		<i>Dipterocarpus warbugii</i>	hagakhak(lumot)			<i>Dipterocarpus warbugii</i>	hagakhak(lumot)
<i>Stenochaena polastris</i>	hagnaya	<i>Stenochaena polastris</i>	hagnaya				
<i>Roikilos permum</i>	hagonoy/hanoob-tubig	<i>Roikilos permum</i>	hagonoy	<i>Roikilos permum</i>	hagonoy	<i>Roikilos permum</i>	hagonoy
<i>Leucosyke capitellata</i>	hanagasi(alagasi)	<i>Leucosyke capitellata</i>	hanagasi(alagasi)	<i>Leucosyke capitellata</i>	hanagasi(alagasi)	<i>Leucosyke capitellata</i>	hanagasi(alagasi)
				() hanagdon		() hanagdon	
		<i>Ficus ulmifolia</i>	is-is (var. A & B)				
<i>Nauclea coadunata</i>	kabak(guba)	<i>Nauclea coadunata</i>	kabak(guba)	<i>Nauclea coadunata</i>	kabak(guba)		
<i>Astronia purpuriflora</i>	kaningag	<i>Astronia purpuriflora</i>	kaningag	<i>Astronia purpuriflora</i>	kaningag		
() kawilan		() kawilan		() kawilan		() kawilan	
() kutikot		() kutikot		() kutikot		() kutikot	
<i>Laportea brunnea</i>	lingaton	<i>Laportea brunnea</i>	lingaton	<i>Laportea brunnea</i>	lingaton	<i>Laportea brunnea</i>	lingaton
		<i>Calyptanthura sp.</i>	magsumpay(nagsumpay)				
		<i>Pterocarpus indicus</i>	naga(narra)	<i>Pterocarpus indicus</i>	naga(narra)		
		() palikpikan		() palikpikan		() palikpikan	
<i>Ficus latsoni</i>	pangagwason(tangisang-layagan)	<i>Ficus latsoni</i>	pangagwason(tangisang-layagan)	<i>Ficus latsoni</i>	pangagwason(tangisang-layagan)	<i>Ficus latsoni</i>	pangagwason(tangisang-layagan)
<i>Connarus semicandrus</i>	polipog	<i>Connarus semicandrus</i>	polipog	<i>Connarus semicandrus</i>	polipog	<i>Connarus semicandrus</i>	polipog
() sandigan(species A&B)							
<i>Clarodendron minahassae</i>	tabayag	<i>Clarodendron minahassae</i>	tabayag			<i>Clarodendron minahassae</i>	tabayag
				<i>Voacanga globosa</i>	tambalagisa(bayag'-usa)		

Table II. Number of medicinally-important forest plants used for various forms of illnesses/diseases or ailments as reported by the respondents from the 4 barangays of Can-avid, Eastern Samar, Philippines

Ailments Illnesses Diseases	Total number of plants cited			
	Salvacion	Pandol	Boco	Balagon
antibiotic for wound	1	2	1	2
allergies	1		1	2
asthma	1	1	1	2
cholera			1	
clotting/anti-blood profusing		1		1
body pain	1	1	1	1
cough/bronchitis	1	1	1	1
bughat(relapse)	3	3	3	3
Diarrhea	5	5	5	5
dizziness			1	1
food poisoning	1	1	1	
Gas pain/stomachache	5	5	5	4
hemorrhoids, internal bleeding/hemorraghe, internal wounds	2	2	2	2
liver problem(cirrhosis)	1	1		
migraine				1
mouth sores		1	1	
pacifier of hungriness			2	2
poisonous animal bites	2	2	1	1
skin asthma/skin diseases	1			1
stomach cleansing	1	2		
toothache	3	2	3	3
ulcer	2	2	2	2
urinary tract infection(UTI)	1	1	1	1

Table II depicts the inter-barangay differences in medicinally essential forest plants used to cure health issues, particular illnesses/diseases, or ailments/symptoms. The illness/disease/infirmity with the greatest number of plants used for its treatment are "diarrhea" and "stomachache/gas pain," which are prominently reported in the four study areas, with a total number of forest plant citations of 5,5,5,5 for diarrhea and 5,5,5,4 for stomachache

in the four barangays of Salvacion, Pandol, Boco, and Balagon, respectively. The relative abundance of forest plants used to cure diarrhea and indigestion does not always imply that farmer healers employ these plants individually. The farmer healers from the four research locations said they employ a combination of two or more medicinal forest plants, roots, vines, leaves, and barks to treat "diarrhea" and "stomachache." As they study and learn about the individual effectiveness of these herbs, they know that the combination has a considerably higher potential for outcomes and, therefore, a quick recovery from the sickness. Also shown in the same table are the ailment "hemorrhoids" (*bughat*), "relapse," "poisonous animal bites," and "ulcer" (*duros*), with only one and two forest plants, which are treated locally by using the forest plant roots of *hagonoy*, *hanagasi* (*alagasi*), *kawilan*, and *burakan*. This commonality of forest plant employed (*hagonoy*, *hanagasi* (*alagasi*), *kawilan*, and *burakan*) may have been practiced in each studied region, but only on a limited scale. Another potential explanation for this commonality is the exchange of indigenous knowledge among nearby barangays.

The next table below, **Table IIIa** and **Table IIIb** shows that farmer healers use some of the forest plant species in the four barangays to treat similar illnesses/diseases or ailments. The researchers found that many forest plants were used to treat single and multiple types of illnesses/diseases or ailments like the *dabo-dabo* of Brgy. Balagon, *magsumpay* of Brgy. Pandol, *manongal* of Brgy. Boco and *sandigan* of Brgy. Salvacion. It depicts the inter-barangay variances of forest plants used to cure a variety of illnesses, diseases, or afflictions. For example, the plants used to cure illnesses/diseases or ailments varied from the condition "stomachache" stated in the four barangays. However, there are few of them, which are present in either two barangays like *albotra*, *banaba*, *barayong*, *hagakhak*, *banay*(*dagko*), *burakan*, *ginseng*(*guba*), *hagnaya*, *is-is*, *kabak*(*guba*), *lingaton* and *tambalagisa*; in the three barangays like *hagonoy*, *hanagasi*, and *kaninag*; and in all four barangays like *kawilan*, *kutikot*, *pangagwason*, and *polipog* in all four barangays. Another prominent forest plant, the *parapanambal* used to treat the same ailment, "ulcer," and polio. The four research areas demonstrate illnesses that are distinct or discussed exclusively within the study region. For instance, the *Bocohanons* mentioned pacifying hungriness, asthma, allergies, and internal bleeding; the *Salvacionanons* and *Pandolanons* mentioned dizziness/a headache, liver problems, and stomach/colon cleansing; the *Balagonons* mentioned allergies, skin asthma, and hemorrhoids. The similarities and variances in the forest plants utilized by the *parapanambal* in the four barangays may be attributed to the availability and richness of forest plants in the nearby rainforest.

The discovery of the medicinal necessities of these plants to be used as medications would be feasible since many native people and long-term migrant communities have established an understanding and use of the rain forest as an intact ecosystem [10] as an outcome of the absence of easy accessibility to modern amenities for treating various ailments[11], [12].

Table IIIa. List of various forest plants utilized in the four barangays in treating different forms of illness/diseases or ailments.

Ailments Diseases	Total number of plants cited			
	Salvacion	Pandol	Boco	Balagon
antibiotic for wound	polipog ^a	magsumpay, polipog ^a	polipog ^a	dabo-dabo, polipog ^a
allergies	albotra ^c		barayong ^a	albotra, barayong
asthma	barayong ^a	barayong ^a	barayong ^a	albotra ^c , barayong ^a
cholera			akupar ^d	
clotting/anti-blood profusing		hagakhak(lumot) ^c		hagakhak (lumot) ^c
body pain	banaba (pamalawagon) ^a	banaba (pamalawagon) ^a	banaba (pamalawagon) ^a	banaba (pamalawagon) ^a
bronchitis	barayong ^a	barayong ^a	barayong ^a	barayong ^a
bughat(relapse)	kutikot ^d , pangagwason ^a , banaba (pamalawagon) ^a	kutikot ^d , pangagwason ^a , banaba (pamalawagon) ^a	kutikot ^d , pangagwason ^a , banaba (pamalawagon) ^a	kutikot ^d , pangagwason ^a , banaba (pamalawagon) ^a
Diarrhea	burakan ^c , kawilan ^a , hagonoy ^a , hanagasi ^d , kaninag ^b	burakan ^c , kawilan ^a , hagonoy ^a , hanagasi ^d , kaninag	kawilan ^a , hanagasi ^a , kaninag ^b , hagonoy ^a	dabo-dabo ^d , kawilan ^a , hagonoy ^a , hanagasi ^d , agutay ^d
dizziness			tambalagisa ^d	dabo-dabo ^d
food poisoning	hagnaya ^c	hagnaya ^c	tambalagisa ^d	
Gas pain/stomachache	burakan ^c , kawilan ^a , hagnaya ^c , kaninag ^b , tabayag ^c	burakan ^c , kawilan ^a , hagnaya ^c , kaninag ^b , tabayag ^c	kabak(guba) ^c , kawilan ^a , tambalagisa ^d , tabayag ^c , hanagdon ^c	dabo-dabo ^d , tabayag ^c , hanagdon ^c , agutay ^d

(Forest plants utilized to cure illnesses, disorders, or diseases in all four research regions are denoted by "a." Those that are only accessible in three of the four research regions are denoted with a "b." Those accessible in just two of the four research regions are denoted with a "c." Furthermore, forest plants superscripted with "d" demonstrate that these plants are exclusively present in each research location and are used to cure several health-related disorders.

Table IIIb. List of various forest plants utilized in the four barangays in treating different forms of illness/diseases or ailments.

hemorrhoids, internal bleeding/hemorrhage, internal wounds	sandigan(A&B) ^d , polipog ^a	magsumpay ^d , polipog ^a	manongal ^d , polipog ^a	dabo-dabo ^d , polipog ^a
liver problem(cirrhosis)	banay(dagko) ^c	banay(dagko) ^c		
migraine				dabo-dabo
mouth sore		naga(narra) ^c	naga(narra) ^c	
pacifier of hungriness			kutikot ^a , pangagwason ^a	kutikot ^a , pangagwason ^a
poisonous animal bites	sandigan(A&B) ^d , hagnaya ^c	hagnaya ^c , palikpikan ^b	palikpikan ^b	palikpikan ^b
rheuma/athritis	ginseng(guba) ^c	ginseng(guba) ^c , is-is ^d		
skin asthma/diseases	albotra ^c			albotra ^c
stomach cleansing	ginseng(guba) ^c	ginseng(guba) ^c , is-is ^d		
toothache	kabak(guba) ^b , alibangbangan(pula) ^c , lingaton ^a	kabak(guba) ^b , lingaton ^a	kabak(guba) ^b , lingaton ^a , balukawi ^c	lingaton ^a , balukawi ^c , alibangbangan(pula) ^c
ulcer	polipog ^a , sandigan(A&B) ^d	polipog ^a , magsumpay ^d	polipog ^a , manonga ^{ld}	polipog ^a , dabo-dabo ^d
urinary tract infection(UTI)	banaba (pamalawagon) ^a	banaba (pamalawagon) ^a	banaba (pamalawagon) ^a	banaba (pamalawagon) ^a

(Forest plants utilized to cure illnesses, disorders, or diseases in all four research regions are denoted by "a." Those that are only accessible in three of the four research regions are denoted with a "b." Those accessible in just two of the four research regions are denoted with a "c." Furthermore, forest plants superscripted with "d" demonstrate that these plants are exclusively present in each research location and are used to cure several health-related disorders.

Table IVa. Utilization , method of preparation, mode of administration, parts of the forest plants used and types of health-related problems or illnesses/diseases/ailments claimed to be cured by different medicinally-important forest plants from Barangay Pandol

Local Name	Ailments or Illnesses/Diseases	Parts of the Forest Plant Used	Method of Preparation	Mode of Administration
<i>banaba</i> (<i>pamalawagon</i>)	urinary tract infection(UTI)	bark, leaves	decoction, pound & extract juice fresh/raw , brewed, & prepared daily	Oral, fresh/raw eaten, once a day until well or drink lukewarm
<i>banay(dagko)</i>	liver problem(cirrhosis)	whole body	chopped, ground/pound, sun-dried, & decoction	oral, prepared daily, twice a day until well
<i>barayong</i>	asthma	trunk,roots	chopped, ground/pound, sun-dried, & decoction	oral, once a day until well
<i>burakan</i>	Diarrhea	trunk,roots	decoction, & prepared once,	oral, once a day until well
<i>ginseng(guba)</i>	stomach cleansing	roots	concoction, prepared once	oral, once a day
<i>hagakhak</i>	blood clotting (anti-blood profusing)	bark, trunk	chopped,ground/fine-pound, sun-dried,	patch over the affected area
<i>hagnaya</i>	Gas pain/ stomachache poisonous animal bites	bark trunk & bark	chopped, ground/pound, sun-dried, & decoction grilled, ground/pound, scrape & freshly prepared	oral, twice a day until well patch over the affected area(topical), thrice a day until well
<i>hagonoy</i>	Diarrhea	roots	decoction, prepared daily	oral, once a day until well
<i>hanagasi</i>	Diarrhea	bark, leaves, roots	decoction, prepared daily	oral, once a day until well
<i>is-is</i>	stomach cleansing	roots	concoction, prepared once	oral, twice a day
<i>kabak(guba)</i>	toothache	bark, roots	decoction, prepared daily	Fresh,Raw & Orally-taken until well
<i>kaningag</i>	Diarrhea	bark	decoction, prepared daily	oral, once a day until well
<i>kawilan</i>	Gas pain/ stomachache	leaves	decoction, prepared daily	oral, twice a day until well
<i>kutikot</i>	bughat(relapse)	bark, leaves, roots	grilled,pound, & prepared once,	topically applied and once a day until well
<i>lingaton</i>	toothache	trunk,bark,roots	freshly prepared for each intake,decoction	fresh,Raw & Orally-taken until well
<i>magsumpay</i>	antibiotic for wounds	vines, roots	chopped, ground/pound, & decoction	drink lukewarm, thrice a day until well
	hemorrhoids, internal bleeding/hemorraghe, internal wounds	leaves, roots	freshly prepared for each intake,decoction	drink lukewarm, thrice a day until well
	ulcer	vines, roots	ground/pound & decoction, prepared daily	drink lukewarm, thrice a day until well
<i>naga(narra)</i>	mouth sore	roots, bark	ground/pound & prepared daily	patch or applied on the affected area
<i>palikpikan</i>	poisonous animal bites	trunk, roots	grilled,ground/pound & prepared daily	patch over the affected area(topical), thrice a day until well
<i>pangagwason</i>	bughat(relapse)	roots	decoction, & prepared once,	oral, 3 times for only 1 day
<i>polipog</i>	ulcer	vines, roots	ground/pound ,decoction prepared daily	drink lukewarm, thrice a day until well
<i>tabayag</i>	Gas pain/stomachache	bark,leaves,roots	decoction, & prepared once, or brewed	oral, once a day until well

Table IVb. Utilization , method of Preparation, mode of administration, parts of the plants used and types of health-related problems or illnesses/diseases/ailments claimed to be cured by different medicinally-important forest plants from **Barangay Salvacion**

Local Name	Ailments or Illnesses/Diseases	Parts of the Forest Plant Used	Method of Preparation	Mode of Administration
<i>albotra</i>	<i>allergies</i>	bark, leaves, roots	grilled, pound	Prepared once, once a day until well
<i>alibangbangan(pula)</i>	<i>toothache</i>	trunk,roots,leaves	decoction	Prepared daily, 3 times a day until well
<i>banaba</i> (<i>pamalawagon</i>)	urinary tract infection(UTI)	bark, leaves	decoction, pound & extract juice fresh/raw , brewed, & prepared daily	Oral, fresh/raw eaten, once a day until well or drink lukewarm
<i>banay(dagko)</i>	<i>liver problem(cirrhosis)</i>	whole body	chopped, ground/pound, sun-dried, & decoction	Prepared daily, 3 times a day until well
<i>barayong</i>	asthma	trunk,roots	chopped, ground/pound, sun-dried, & decoction	oral, once a day until well
<i>burakan</i>	<i>Diarrhea</i> <i>Gas pain/</i> <i>stomachache</i>	trunk,roots	decoction decoction	Prepared once, once a day until well Brewed and drink lukewarm Prepared once, once a day until well
<i>ginseng(guba)</i> <i>hagnaya</i>	stomach cleansing <i>Gas pain/stomachache</i>	roots bark	concoction, prepared once chopped, ground/pound, sun-dried, & decoction	oral, once a day Prepared once, once a day until well
<i>hagonoy</i>	<i>Diarrhea</i>	roots	decoction	Prepared once, once a day until well
<i>hanagasi</i>	<i>Diarrhea</i>	bark, leaves, roots	decoction	Prepared once, once a day until well
<i>kabak(guba)</i> <i>kaningag</i>	<i>toothache</i> <i>Diarrhea</i>	bark, roots bark bark	decoction decoction decoction	Fresh,Raw & Orally-taken Prepared once, once a day until well Brewed and drink lukewarm
<i>kawilan</i>	<i>Diarrhea</i> <i>Gas pain/</i> <i>stomachache</i> <i>pacify hungriness</i>	leaves	decoction warm heating of the leaves over the fire	1 prep., 3 times for only 1 day Patch leaves over the affected area(topical)Prepared once, once a day until well
<i>kutikot</i>	<i>allergies</i>	bark, leaves, roots	grilled, pound	Prepared once, once a day until well
<i>lingaton</i>	<i>toothache</i>	trunk,bark,roots	freshly prepared for each intake,decoction	fresh,Raw & Orally-taken until well
<i>pangagwason</i>	<i>bughat(relapse)</i> <i>pacify hungriness</i>	roots	decoction	1 prep., 3 times for only 1 day
<i>polipog</i>	<i>ulcer</i>	vines, roots	Drinking after squeezing juice from the bark/vine	Brewed and drink lukewarm
<i>sandigan</i> (<i>var. A & B</i>)	<i>hemorrhoids, internal bleeding/hemorraghe,</i> <i>internal wounds</i> <i>poisonous animal bites</i> <i>skin asthma/diseases</i> <i>stomach cleansing</i>	leaves, roots leaves, roots bark, leaves roots	decoction decoction grilled,pound decoction	Brewed and drink lukewarm Prepared daily, 3 times a day until well Prepared once, once a day until well Brewed and drink lukewarm
<i>tabayag</i>	<i>Gas pain/stomachache</i>	bark,leaves,roots	decoction, & prepared once, or brewed	oral, once a day until well

Table IVc. Utilization , method of Preparation, mode of administration, parts of the plants used and types of health-related problems or illnesses/diseases/ailments claimed to be cured by different medicinally-important forest plants from **Barangay Boco**

Local Name	Ailments or Illnesses/Diseases	Parts of the Forest Plant Used	Method of Preparation	Mode of Administration
<i>akupar</i>	cholera	roots	decoction	freshly prepared, thrice a day, until well
<i>balukawi</i>	toothache	young shoots	decoction freshly prepared(raw)	Oral, fresh/raw eaten, once a day until well or drink lukewarm
<i>banaba</i> (<i>pamalawagon</i>)	urinary tract infection(UTI)	bark, leaves	decoction, pound & extract juice fresh/raw , brewed, & prepared daily	Oral, fresh/raw eaten, once a day until well or drink lukewarm
<i>barayong</i>	asthma	trunk,roots	chopped, ground/pound, sun-dried, & decoction	oral, once a day until well
<i>hagonoy</i>	Diarrhea	roots	decoction, prepared daily	oral, once a day until well
<i>hanagasi</i>	Diarrhea	bark, leaves, roots	decoction, prepared daily	oral, once a day until well
<i>hanagdon</i>	stomachache	trunk, young shoots, whole body	decoction, prepared daily	oral, twice a day until well
<i>kabak(guba)</i>	toothache	bark, roots	decoction, prepared daily	Fresh,Raw & Orally-taken until well
<i>kaningag</i>	Diarrhea	bark	decoction, prepared daily	oral, once a day until well
<i>kawilan</i>	Gas pain/ stomachache	leaves	decoction, prepared daily	oral, twice a day until well
<i>kutikot</i>	bughat(relapse)	bark, leaves, roots	grilled,pound, & prepared once,	topically applied and once a day until well
<i>lingaton</i>	toothache	trunk,bark,roots	freshly prepared for each intake,decoction	fresh,Raw & Orally-taken until well
<i>manongal</i>	antibiotic for wounds	vines, roots	chopped, ground/pound, & decoction	drink lukewarm, thrice a day until well
	hemorrhoids, internal bleeding/hemorraghe, internal wounds	leaves, roots	freshly prepared for each intake,decoction	drink lukewarm, thrice a day until well
	ulcer	vines, roots	ground/pound & decoction, prepared daily	drink lukewarm, thrice a day until well
<i>narra</i>	mouth sore	roots, bark	ground/pound & prepared daily	patch or applied on the affected area
<i>palikpikan</i>	poisonous animal bites	trunk, roots	grilled,ground/pound & prepared daily	patch over the affected area(topical), thrice a day until well
<i>pangagwason</i>	bughat(relapse)	roots	decoction, & prepared once,	oral, 3 times for only 1 day
<i>polipog</i>	ulcer	vines, roots	ground/pound ,decoction prepared daily	drink lukewarm, thrice a day until well
<i>tambalagisa</i>	food poisoning stomachache	seeds,roots,	freshly prepared for each intake,decoction	oral, twice a day until well

Table IVd. Utilization , method of Preparation, mode of administration, parts of the plants used and types of health-related problems or illnesses/diseases/ailments claimed to be cured by different medicinally-important forest plants from Barangay Balagon

Local Name	Ailments or Illnesses/Diseases	Parts of the Forest Plant Used	Method of Preparation	Mode of Administration
agutay	stomachache	trunk, young shoots, whole body	fresh(raw) decoction, prepared daily	oral, twice a day until well
albotra	allergies	bark, leaves, roots	grilled, pound	Prepared once, once a day until well
alibangbangan (pula)	toothache	trunk,roots,leaves	decoction	Prepared daily, 3 times a day until well
akupar	cholera	roots	decoction	freshly prepared, thrice a day, until well
balukawi	toothache	young shoots	decoction freshly prepared(raw)	Oral, fresh/raw eaten, once a day until well or drink lukewarm
banaba (pamalawagon)	urinary tract infection(UTI)	bark, leaves	decoction, pound & extract juice fresh/raw , brewed. & prepared daily	Oral, fresh/raw eaten, once a day until well or drink lukewarm
barayong	asthma	trunk,roots	chopped, ground/pound, sun-dried, & decoction	oral, once a day until well
dabo-dabo	Gas pain/ stomachache	leaves	decoction, prepared daily	oral, twice a day until well
	hemorrhoids, internal	leaves, roots	freshly prepared for each intake,decoction	drink lukewarm, thrice a day until well
	bleeding/hemorrhage, internal wounds	whole body	chopped, ground/pound, sun-dried, & decoction	Prepared daily, 3 times a day until well
	liver problem(cirrhosis)			
	migraine, antibiotic, diarrhea			
hagakhak	blood clotting (anti-hemorrhage)	bark, trunk	chopped,ground/fine-pound, sun-dried,	patch over the affected area
hagonoy	Diarrhea	roots	decoction, prepared daily	oral, once a day until well
hanagasi	Diarrhea	bark, leaves, roots	decoction, prepared daily	oral, once a day until well
hanagdon	stomachache	trunk, young shoots, whole body	decoction, prepared daily	oral, twice a day until well
kawilan	Gas pain/ stomachache	leaves	decoction, prepared daily	oral, twice a day until well
kutikot	bughat(relapse)	bark, leaves, roots	grilled,pound, & prepared once,	topically applied and once a day until well
lingaton	toothache	trunk,bark,roots	freshly prepared for each intake,decoction	fresh,Raw & Orally-taken until well
palikpikan	poisonous animal bites	trunk, roots	grilled,ground/pound & prepared daily	patch over the affected area(topical), thrice a day until well
pangagwason	bughat(relapse)	roots	decoction, & prepared once,	oral, 3 times for only 1 day
polipog	ulcer	vines, roots	ground/pound ,decoction prepared daily	drink lukewarm, thrice a day until well
tabayag	Gas pain/stomachache	bark,leaves,roots	decoction, & prepared once, or brewed	oral, once a day until well

Tables IVa to IVd listed the many forest plant species, the illnesses/ailments or diseases they are thought to treat, the technique of preparation, and the manner of administration of their dose throughout the four barangays. In the Barangay of Salvacion, for example, the *Salvacionanons* mentioned three of the most commonly treated illnesses/ailments or diseases in the barangay (ranking was based on the number of plants cited for a specific illness/ailment or disease, namely, diarrhea, stomachache, and bughat (relapse), with the reported number of forest plants utilized as 5, 5, and 3, respectively. The said barangay was even reported for food poisoning, *poisonous*

animal bites, and *ulcers* (including for the rare liver problem “*cirrhosis*”). The *Pandolanons* mentioned the same illnesses/ailments or diseases with a reported number of plants utilized as 5, 5, and 3, respectively (including for the rare *liver problem “cirrhosis”*). The *Bocohanons* mentioned the same top three illnesses/ailments or diseases with a reported number of 5, 5, and 3, respectively. As mentioned earlier, the distinction between the barangays has mentioned some rare ways of treating, such as to pacify hungriness and *cholera*. Finally, the *Balagonons* mentioned the same top three illnesses/ailments or diseases but with a lower reported number in treating stomachache/gas pain. They mentioned similar reported forest plants with Bocohanons as unusual ways of *relieving* or *pacifying hungriness*, but Bocohanons reported rare treatment for *allergies*, *asthma*, and *migraine*. The four barangays mentioned treatment for *internal bleeding*, *hemorrhage*, or antibiotic for internal wounds, although it registered a single plant for each barangay as specified in **Table III**, namely *sandigan* for Barangay Salvacion, *magsumpay* for Barangay Pandol, *manongal* for Barangay Boco, and *dabo-dabo* for Barangay Balagon.

Stomachache /gas pain and *bought (relapse)* are the most common illnesses/ailments or diseases suffered by men and women of the four barangays, registered a weighted mean of 19.75. *Bughat*, as locally known, is suffered by women directly after giving birth, usually experienced one to two weeks after giving birth due to stress or over-fatigue. The following reasons are the common reasons for the top ailments being mentioned in the four barangays regarding *bughat*(relapse) and gas pain/stomachache. (1) hiking every day to their coconut farm tends to miss the usual meal time; (2) with their eagerness and focus to finish and complete the farm work, they skip regular mealtime; (3) municipal hospital downstream (town proper) lack access to modern facilities in treating the various ailment. Other reasons are (4) the available doctor/midwives, especially if, in this case, the woman giving birth is a “prime”(first time giving birth), (5) people resort to these forest plants because they can cure, (6) distrust of physicians who utilize a medical system aimed at combating sickness by using treatments (such as medications or surgery). The health care that every pregnant woman should get immediately after giving birth is not provided via modern medical practices but rather in a traditional manner, leaving both the mother and the newborn infant vulnerable.

Decoction (boiling) of the medicinally significant forest plant utilized by coconut farmer healers in the four research locations is widespread. These are supplied orally by drinking or raw eating fresh leaves or bark and patching over the diseased region once, twice, or thrice a day as required. Another preparation method before extraction is scraping, chopping, drying, pounding/grinding, or freshly grounding and squeezing the bark juice, after which the extracts are applied to the affected area.

The *Salvacionanons*, *Bocohanons*, and *Balagonons* perceived the medicinal forest plants in their nearby rainforest to have not changed through time as more of the ancestor's healer's children and their lineage have migrated from the barangay to rural areas because of economic reasons. These are evident with their weighted mean of 0.79, 0.80, and 0.82, respectively. *Pandolanons*, on the other hand, believed that medicinal forest plants had evolved as people saw that certain illnesses/ailments or diseases were quickly treated. Some have gained knowledge regarding the benefits and thus found that medicinal forest plants are increasingly utilized, with a weighted mean of 0.96. These data of responses of the forefathers or ancestors are based thereof on their observations on the rainforest near their tilled coconut farm and the rate of how fast and easy the medicinal forest plants are available once somebody gets sick. *The kainging system is seldom practiced* because they worry that it might be challenging and far to get this medicine once it gets burned.

Primary Reasons for the Coconut Farmer Healers on Healing Practices

The following reasons constrain the Coconut Farmer Healers: why they resort to indigenous knowledge on the use of medicinal forest plants for healing. From the least to most frequently recorded according to the respondents' knowledge and choices: (a) has been used by their ancestors/forefathers over many generations, with a weighted mean of 22.75, passed down from one generation of people to the next and by then preserving and developing the knowledge even more for the future lineage, (b) these forest plant sources are abundant, with a weighted mean of 21, being just a kilometer away from the vast rainforest, (c) can easily cure/heals, with a mean weighted score of 20.75; because of its efficiency in managing and treating illnesses/ailments or diseases, there are no known

negative effects (c) easily accessible since it is close to their coconut-cultivated land, with a calculated mean of 19.75. Almost all respondent farmer healers have similar responses that they can never tell when they have been practicing medicinal forest plants. The only thing they remembered and asserted is that when they gain consciousness, they are already a patient, and once healed of their ailments using the said medicinal plants; they keep using the said healing practices.

The coconut farmer healers also mentioned and asserted that the DENR does not directly participate in preserving the rainforest[20]. However, they partnered with some coconut farmers associations regarding reforestation in all four barangays. Commonly, the plants that they provided were *mahogany*. With no more *kainging* system practiced and they purposively advised each other regarding the disadvantage of such a method[22], preserving the abundance of the source of medicinal forest plants is maintained.

5. Summary, Conclusions and Recommendations

These specific conclusions are drawn from the results obtained;

In the four study areas, indigenous knowledge of the use of medicinal forest plants is observed. The researchers identified around 19, 21, 18, and 18 forest plant species of different medicinally important forest plants used by coconut farmer healers in the Salvacion, Pandol, Boco, and Balagon barangays, respectively. The researcher identified the three most commonly treated illnesses/ ailments or diseases in each study area. These are diarrhea, gas pain/ stomachache, and bugbat(relapse). Salvacionanons and Pandolanons mentioned rare diseases such as liver cirrhosis, while Bocohanons and Balagonons identified plants to pacify hungeriness and for asthma or allergies.

Varying indigenous knowledge on medicinal forest plant utilization was identified among the four study areas because the availability and adaptations of medicinally important forests depend on the geographical location of the four barangays and the proximity of the source from the vast rainforest.

The most common preparation method is *decocting the bark, trunk, roots, leaves, or even young shoots with water*. The mode of administration is generally through oral intake, either by drinking the decocted bark, trunk, or roots. It is commonly in reasonable quantities or regular dosage as needed or until the illnesses/ailments or diseases get well. Another preparation method is scraping/chopping the trunk, bark, roots, or leaves, then sun-drying or pounding/grinding until juice extracts result, and then either freshly eaten, decocted, or applied directly to the affected area.

The coconut farmer healer observed and practiced healing practices using medicinal forest plants. This indigenous knowledge is acquired from their forefathers/ ancestors. The barangay residents have never questioned the efficacy of the utilization of these plants. The generation-by-generation accumulation of indigenous knowledge through time has made the present people accept indigenous culture through the use of medicinal forest plants.

Therefore, in the next study to characterize possible bioactive compounds present in the medicinally important forest, it is recommended to prioritize the historically cited medicinal forest plants in all four barangays, especially the lone medicinal forest plant claimed for their efficacy for multiple treatments. These are *sandigan of Barangay Salvacion, magsumpay(nagsumpay) of Barangay Pandol, manongal of Barangay Boco, and dabo-dabo of Barangay Balagon*.

References

- [1] Adopt A Community Proposal: NAFCON. Retrieved from <http://nafconusa.org/adoptacommunity/> Adopt A Community Proposal
- [2] Ates A. and Erdogrul O. T. (2003). Antimicrobial activities of various medicinal and commercial plant extracts. Turk. J. Biol. 27: 157-162.
- [3] Bagunu(2006) Ethnobotany of Mt. Arayat and its environs. The Ethnobotany of Mt. Arayat and its environs. The Graduate School Pampanga Agriculture College.47p.28cm

- [4] Barret, C, Bannister, K. (2000) Challenging the Status Quo Challenging the Status Quo in Ethnobotany: A New Paradigm for Publication May Protect Cultural Knowledge and Traditional Resources Adopt A Community Proposal
- [5] Berkes, F., Colding, J., & Folke, C. (2000). Rediscovery of Traditional Ecological Knowledge as Adaptive Management. *Ecological Applications*, 10(5), 1251–1262. <https://doi.org/10.2307/2641280>
- [6] Bodner, C. C., & Gereau, R. E. (1988). A Contribution to Bontoc Ethnobotany. *Economic Botany*, 42(3), 307–369. <http://www.jstor.org/stable/4255087>
- [7] Camacho, L.D. M. Combalicer, Y. Yeo-Chang, E. Combalicer,(2010) A. Carandang, S. Camacho, C. de Luna, and L. Rebugio Traditional forest conservation knowledge technologies in the Cordillera, Northern Philippines.
- [8] Etkin, N.L., 1993. Anthropological methods in ethnopharmacology. *Journal of Ethnopharmacology*, 38: 93-104.
- [9] Alonso, C.A.G., Miano, R. S., Picardal, J. P.(2011) Ethnobotanical Inventory and Assessment of Medically-Important Plant Roots in Cebu Island, Philippines retrieved from <http://asianscientificjournals.com/new/publication/index.php/job/article/download/93/1614>
- [10] Gerritsen, K., & Benz, M. K. (n.d.). Environmental literacy in practice: education on tropical rainforests and climate change.
- [11] Heinrich et al.(1998) Soc. Sci. Med. Vol. 47, No. 11, pp. 1859±1871, 1998 # 1998 Elsevier Science Ltd. All rights reserved. Printed in Great Britain 0277-9536/98/\$ - see front matter
- [12] Hossan, M.S., A. Hanif, M. Khan, S. Bari, R. Jahan and M. Rahmatullah, (2009). Ethnobotanical survey of the Tripura tribe of Bangladesh. *American Eurasian Journal of Sustainable Agriculture*, 3: 253-261
- [13] Inglis, J.T. Traditional Eco-Knowledge: Concepts and Cases: (1993) International Program on Traditional Ecological Knowledge and International Development Research Center
- [14] Langeberger, M. (2008) Ethnobotanical knowledge of Philippine lowland farmers and its application in Agroforestry. *Agroforestry Systems* 76(1): 173-194
- [15] Madulid, D.A. Guidelines and policies on collection 1996 of biological specimens in the Philippines. *Journal of Ethnopharmacology* 51 (1996) 205-208
- [16] Martin, G. J., Ethnobotany: A method manual (2004). Ethnobotany: A method manual. WWF, UK, and USA.
- [17] Martin, G. J. Ethnobotany. A ‘people and plants’ conservation manual 1st ed. (1995) Great Britain at the University Press, Cambridge.
- [18] Prigge, V., Langenberger, G., & Martin, K. (2005). Ethnobotanical Survey among Farmers in Leyte, Philippines, and Comparison with Indigenous Filipino Plant Lore.
- [19] Reyes-García, V., Vadez, V., Huanca, T. *et al.* Economic Development and Local Ecological Knowledge: A Deadlock? Quantitative Research from a Native Amazonian Society. *Hum Ecol* 35, 371–377 (2007). <https://doi.org/10.1007/s10745-006-9069-2>
- [20] Technology Transfer Division, Ecosystem Research and Development Series, DENR RO8 Description, Habitat and Site Requirements of Some Indigenous Forest Tree Species. Technology Transfer Series Vol. 20 No.1
- [21] Technology Transfer Division, Ecosystem Research and Development Series, DENR RO8 Description,(2011) Habitat and Site Requirements of Some Indigenous Forest Tree Species. Technology.Transfer Series Vol. 19 No.1
- [22] The nature and status of ethnobotany (1994), Museum of Anthropology, University of Michigan in English - 2nd ed.
- [23] Wondafrash, Melaku (2008) A Preliminary Guide to Plant Collection, Identification and Herbarium Technique (2008) retrieved from <https://pages.wustl.edu/files/pages/imce/mnh/binderplantid.pdf>