

Ethnobotanical Study of Traditional Medicinal Plants Used By Indigenous Sambal-Bolinao of Pangasinan, Philippines

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Abstract — Traditional knowledge of medicinal plants and their uses by indigenous peoples are not only significant for conservation of biodiversity and cultural traditions but also for communal healthcare and drug development in the present and future. The Philippines is one of the world's 17 mega-biodiverse countries which collectively claim two-thirds of the earth's biological diversity within its boundaries. Thus, the country has high potential for the development of its own alternative medicines specifically those plant derived sources.

One of its largest provinces is Pangasinan wherein its people is considered as the ninth largest Filipino ethnic group. Furthermore, it is labelled as one melting pots of mixed-cultures in the country. Its western part has two towns having their distinct dialect-Bolinao which are found in the towns of Anda and Bolinao only. They were claimed initially to be highly superstitious and worshiped the spirits of their ancestors. Today, the Sambal-Bolinao are largely Roman Catholic, though possibly still superstitious. The study aimed to reveal the various plants used by the herbalists or managtambal in Bolinao and the associated cultural and plant conservation practices associated with the healing.

In the study, 13 out of 32 barangays of Bolinao, Pangasinan were identified with managtambal. Furthermore, 17 key informants who used plants in their healing practices were interviewed using a semi-structured questionnaire and focus group discussions. The research revealed that 50 plants were used in the healing which are locally available in the community. These belong to families of Amaryllidaceae, Anacardiaceae, Anonaceae, Araceae, Arecaceae, Asteraceae, Bixaceae, Boraginaceae, Caricaceae, Compositae, Cucurbitaceae, Euphorbiaceae, Fabaceae, Labiateae, Lamiaceae, Leguminosae, Liliaceae, Lythraceae, Malvaceae, Menispermaceae, Musaceae, Myrtaceae, Oxalidaceae, Piperacea, Poaceae, Rutaceae, Solanaceae, Verbenaceae, Zingiberaceae,

Moreover, most of the managtambal practiced paras and pulsuan in the identification of the location of fracture and sprain and illnesses of their patients using rice grains and palpation of radial pulse respectively. Also, some required their patients to offer atang to appease with spirit which caused the illness. In addition, conservation practices were observed such as avoiding excessive harvesting, backyard planting and establishment of a plant nursery.

Keywords — *Ethnobotanical; Managtambal; Pangasinan; Sambal-Bolinao; Paras; Pulsuan; Conservation Practices*

I. INTRODUCTION

Most indigenous communities largely depend on plants for medicine. Traditional knowledge of medicinal plants and their use by indigenous healers are not only important for conservation of cultural traditions and biodiversity but also for communal healthcare and drug development in the present and

future. In fact, plant-based medicines are elevated in a respectable position nowadays, especially in the developing countries, where modern health services are limited and inaccessible (Abbasi et al. 2010). The World Health Organization approximated that 65-80% of the world's population in developing countries depends mainly on plants for their medical

care due to their economic positions and lack of access to modern medicine (Mesfin *et al.* 2013).

Traditional remedies done by indigenous people which are claimed to be more effective, safe and inexpensive are gaining acceptance among both rural and urban areas. Ethnobotanical studies which deal with the interactions between plants and people, with particular emphasis on traditional or ethnic cultures are some of the bases for commercially produced plant product supplements and developed medical drugs in the market today. In addition, scientific validation of the use of these medicinal plants has become the center of scientific discussions and approximately 20% of all plants found in the world have undergone preliminary screening for biological activities and potential drug use (Coopoosamy and Naidoo 2012). Furthermore, due to the high demand for natural products, scientists are investigating various plant species for possible cures which come initially from ethnobotanical studies to determine the most frequently used plant species and to further validate their use scientifically (Igoli *et al.* 2005).

The Philippines, with its more than 20,000 endemic species of plants and animals, is one of the world's 17 "mega-biodiversity areas which collectively claim two-thirds of the earth's biological diversity. With the country's richness in organismic diversity, it has an indispensable part in the development of its own alternative medicines particularly those derived from plant sources (Conservation International, DENR –PAWB, Haribon Foundation .n.d). Also, Philippines manifests cultural diversity with 110 indigenous communities and 175 ethnolinguistic groups (Sia, 2011).

The Pangasinan people or the Pangasinense are the ninth largest Filipino ethnic group. Several ethnic and indigenous groups live in Pangasinan enriching the cultural heritage of the province. About half of the people are Pangasinenses, a distinct ethnolinguistic group found along the central coast and interior plains of the province. The rest of the province's people are descendants of Ilocano migrants who settled the eastern and western parts of Pangasinan. Thus, making Pangasinan a melting pot of mixed-cultures and culturally diverse area (Maganes, 2012). However, its western part has two towns having their own dialect-Bolinao and this is found in the towns of Anda and Bolinao. They were also highly superstitious and worshiped the spirits of their ancestors. Today, the Sambal-Bolinao are predominantly Roman Catholic, though possibly still superstitious (Ethnic Group of the Philippines, Sambal-Bolinao)

With the ethnicity of Sambal-Bolinao from the rest of Pangasinan, the study aims to determine the various ethnomedicinal plants used by these people including the various parts and their uses. Furthermore, the study documented healing practices associated with plant and plant parts which was the first attempt to record ethnocultural practices in Bolinao, if not for the province of Pangasinan.

II. METHODOLOGY

A. STUDY AREA

Selected barangays of Bolinao, Pangasinan were identified based on the results of the initial meeting with the Local Government officials of Bolinao. Barangay secretaries of Bolinao were convened to identify the presence and number of herbalists or "*managtambal*" in their respective area. Barangay secretaries and *kagawad* served as guide in the identification of the location of the *managtambal* and translating some Bolinao terms essential for the identification of the plants and their medicinal uses.

B. SAMPLING AND INTERVIEW

The researchers used purposive sampling of *managtambal* which were pre-identified by the Barangay *Kagawad* and secretaries.

The interview with the *managtambal* was done using an interview guide and the schedule for a cognitive ethnographic collection was conducted. The data on indigenous or local use of plants collected and identified including pertinent information on the methods of collection, preparation, storage and utilization of plants were taken from key informants. The gatherers, elderly herbalist or *managtambal* of the community leaders were the key informants. Focus or small group discussions were used to validate information collected from the interview.

C. COLLECTION AND IDENTIFICATION OF PLANTS

Since most of the natives provided local names only of the plants being used, plant samples and plant parts that collected during the survey were preserved as herbarium and voucher specimens. Prior to collection of specimens, permit to collect was secured first from the local government office of Bolinao. Scientific names were validated in Biology Laboratory of Pangasinan State University-Lingayen Campus with the aid of the published literatures.

TABLE 1. MEDICINAL PLANTS USED BY BOLINAO-SAMBAL OF PANGASINAN

Local Name	Scientific Name	Family	Parts Used	Preparation/ Utilization/ Administration	Illness
Ampalaya	<i>Momordica charantia</i> L. Amargoso	Cucurbitaceae	Leaves	Boil 2 leaves in 1 cup of water then the decoction is to be drank by the patient.	Diabetes
Azuate	<i>Bixa orellana</i> L.	Bixaceae	Leaves	Rub the coconut oil on the leaves then place it on the painful body part.	Arthritis
Bakari	<i>Eleusine indica</i> (L.) Gaertn.	Poaceae	Roots	Remove the first layer of the roots, wash then boil same roots with water. The juice is to be drank by the patient.	Abnormal Menstruation
Balikotkot	<i>Heliotropium indicum</i> Linn.	Boraginaceae	Leaves	Soak the washed leaves with warm water for few minutes. Then squeeze and mix with one teaspoon of honey to be drank by the patient. One teaspoon and 1 tablespoon for children and adults respectively.	Cough/ <i>Subi –subbing</i> bata
Balisanga	<i>Cyperus rotundus</i> L	Cyperaceae	Leaves	Pound the leaves well. Such will be eaten with rice.	Dyspepsia
Banaba	<i>Lagerstroemia speciosa</i> (L.) Pers.	Lythraceae	Leaves	Decoction of an ample amount leaves of banaba. Then it will be drank by the patient.	Urinary Tract Infection/ Kidney Trouble
Bani	<i>Pongamia pinnata</i> (L.) Pierre	Fabaceae	Leaves	Boil the leaves of tanubong, bani, inwad, kasoy, lagundi together with lazona. Decoction will be bathed by the patient.	<i>Pasma</i>
Baranoy	<i>Cymbopogon citratus</i> L.	Poaceae	Leaves	Decoction of clean baranoy leaves. Then add calamansi juice into the decoction to be drank by the patient as a tea.	Diabetes or for cleansing
Bugayong	<i>Abrus precatorius</i> Linn.	Fabaceae	Leaves	Wash ample amount of leaves then squeeze to extract the juice. Mix it with the extracted juice from dalayap juice to be drank by the adult patient. However, if the patient is a child, the juice of bugayong is added only with few drops of dalayap juice.	Colds
Calamansi	<i>Citrofortunella microcarpa</i>	Rutaceae	Leaves	The gumamela flowers with calamansi leaves will be used with insenso which will be smelled by the patient.	<i>Akigtot</i> (Fear caused by the unknown)
Coconut	<i>Cocos nucifera</i> L.	Arecaceae	Coconut seed	Oil is extracted then will be rubbed in the affected area	Fracture

Continuation of Table 1...

Local Name	Scientific Name	Family	Parts Used	Preparation/ Utilization/ Administration	Illness
Dalayap	<i>Citrus aurantifolia</i> (Christm. et Panz.) Swingle	Rutaceae	Fruit	Ample amount of leaves of herbabuena, add 3 bulbs of lazona, 1 piece of sliced dalayap and 3 pieces of gawed leaves will be wrapped in a clean cloth and pounded. Suc mixture will be wrapped again using banana leaves, then heat over the flame. Apply the heated mixture on the back, forehead, ankle, wrist, joints and back of the neck.	Fever/ Cough
Duhat	<i>Syzygium cumini</i> (L.) Skeels	Myrtaceae	Leaves	Pound the leaves of duhat, kamoteng kahoy and eggplant and place the mixture to the wound.	Snake bite
Duhat	<i>Syzygium cumini</i> (L.) Skeels	Myrtaceae	Stem	Boil the bark with 1 cup of water then the decoction is drank by the patient.	Ulcer
Eggplant	<i>Solanum melongena</i> L.	Solanaceae	Leaves	Pound the various leaves of duhat, kamoteng kahoy and eggplant and place the mixture to the wound.	Snake bite
Gagabutin	<i>Paspalum conjugatum</i> Berg.	Poaceae	Roots	Grind the roots and add small amount of beaten white egg then place the mixture on the temples of the patient	Headache
Gawed	<i>Piper betle</i> L.	Piperaceae	Leaves	Ample amount of leaves of herbabuena, add 3 bulbs of lazona, 1 piece of sliced dalayap and 3 pieces of gawed leaves will be wrapped in a clean cloth and pounded. Such mixture will be wrapped again using banana leaves, then heat over the flame. Apply the heated mixture on the back, forehead, ankle, wrist, joints and back of the neck.	Fever/ Cough
Ginger	<i>Zingiber officinale</i> L.	Zingiberaceae	Rhizome	Concoction of pepper leaves and ginger rhizome	<i>Pasma</i>
Guava	<i>Psidium guajava</i> L	Myrtaceae	Leaves	Boil the leaves of guava and ginger in three glasses of water until one glass of water is left. The juice is drank by the patient	Loose Bowel Movement with Vomiting
Gumamela	<i>Hibiscus rosa-sinensis</i> Linn.	Malvaceae	Small flowers	The gumamela flowers with calamansi leaves will be used with insenso which will be smelled by the patient	Unexplainable Fear

Continuation of Table 1...

Local Name	Scientific Name	Family	Parts Used	Preparation/ Utilization/ Administration	Illness
Herbabuena	<i>Mentha arvensis</i> Linn.	Labiataeae	Leaves	Ample amount of leaves of herbabuena, add 3 bulbs of lazona, 1 piece of sliced dalayap and 3 pieces of gawed leaves will be wrapped in a clean cloth and pounded. Such mixture will be wrapped again using banana leaves, then heat over the flame. Apply the heated mixture on the back, forehead, ankle, wrist, joints and back of the neck	Fever/ Cough
Herbaca or Stamadia	<i>Parthenium hysterophorus</i> L.	Astereaceae	Leaves	Pound and grind the leaves then wrap them with banana leaves. Place ample amount of coconut oil then place it on the stomach for one hour.	Ulcer/ Dyspepsia/ Diarrhea with Vomiting
Ikmo	<i>Piper betel</i> L	Piperacea	Leaves	Clean 5 leaves of ikmo using clean cloth. Apply oil and a little amount of salt. Heat the leaf and then rub it on the body of the patient.	Jaundice
Inwad	<i>Aegilops cylindrica</i> Host	Poaceae	Leaves	Boil the leaves of tanubong, bani, inwad, kasoy, lagundi together with lazona. Decoction will be bathed by the patient	Pasma
Kamias	<i>Averrhoa bilimbi</i> L	Oxalidaceae	Leaves	Leaves will be boiled in chamber pots. The patient is allowed to sit on the pot until the mixture becomes cold.	Hemorrhoids
Kamiing	<i>Semecarpus cuneiformis</i> Blanco	Anacardiaceae	Leaves	Using kamiing and mangga, <i>suob</i> iwill be performed. Coconut oil will be used as an <i>atang</i> . <i>Gaton</i> is performed by the <i>managtambal</i> which will be performed about 6 to 7 pm. Coconut oil used in the <i>atang</i> will be applied to the affected body	Scabies
Kamoteng kahoy	<i>Manihot esculenta</i> Crantz	Euphorbiaceae	Leaves	Pound the various leaves of duhat, kamoteng kahoy and eggplant and place the mixture to the bitten body part	Snake bite
Kasuy	<i>Anacardium occidentale</i>	Anacardiaceae	Leaves	Boil the leaves of tanubong, bani, inwad, kasoy, lagundi together with lazona. Decoction will be bathed by the patient	Pasma
Kusay	<i>Allium tuberosum</i> Rottler ex Spreng.	Amaryllidaceae	Leaves	Prepare enough amount of leaves of each then place the mixture in banana leaves then heat it and place on the stomach and tie it around the waist	Stomachache/ Bloatness

Continuation of Table 1...

Local Name	Scientific Name	Family	Parts Used	Preparation/ Utilization/ Administration	Illness
Lagundi	<i>Vitex negundo</i> L.	Lamiaceae	Leaves	Boil the leaves of tanubong, bani, inwad, kasoy, lagundi together with lazona. Decoction will be bathed by the patient	<i>Pasma</i>
Lazona	<i>Allium ascalonicum</i> L.	Liliaceae	Bulb	Ample amount of leaves of herbabuena, add 3 bulbs of lazona, 1 piece of sliced dalayap and 3 pieces of gawed leaves will be wrapped in a clean cloth and pounded. Suc mixture will be wrapped again using banana leaves, then heat over the flame. Apply the heated mixture on the back, forehead, ankle, wrist, joints and back of the neck.	Fever/ Cough
Lubigan	<i>Acorus calamus</i> L.	Araceae	Roots	Wash the roots then scrape its upper layer. Add enough amount of coconut oil. Wrap it in a clean cloth then place over the stomach	Flatulence; Stomachache
Madre kakaw	<i>Gliricidia sepium</i>	Leguminosae	Leaves	Grind the leaves then add oil. Heat the mixture using open flame and apply it to affected area.	Itchy skin
Makabuhay	<i>Tinospora rumphii</i> Boerl	Menispermaceae	Stem	Boil 3 inch-stem of makabuhay then the decoction is to be drank by the patient	Cancer
Mangga	<i>Mangifera indica</i> L.	Anacardiaceae	Leaves	Using kamiing and mangga, suob is performed. Coconut oil is used as an <i>atang</i> . <i>Gaton</i> is performed by the <i>managtambal</i> which is performed about 6 to 7 pm. Coconut oil used in the <i>atang</i> is applied to the affected body	Scabies
Manzanilla	<i>Chrysanthemum indicum</i> L.	Asteraceae	Leaves	Prepare enough amount of leaves of each then place the mixture in banana leaves then heat it and place on the stomach are and tie it around the waist	Stomachache/ Bloated
Oregano	<i>Coleus aromaticus</i> Benth.	Lamiaceae	Leaves	Using 4 leaves, wash and soak with warm water squeeze to extract the juice to be drank by the patient every 6 hours	Colds/ Cough

Continuation of Table 1...

Local Name	Scientific Name	Family	Parts Used	Preparation/ Utilization/ Administration	Illness
Palay	<i>Oryza sativa</i> L.	Poaceae	Grains	Seed coats of palay grains will be removed and will be dropped into a bowl of water. Herbalist interprets the results based on the positions of the grains. The herbalists then pars and recommends what to do.	Unexplainable fear/ disease
Papaya	<i>Carica papaya</i> L.	Caricaceae	Young leaves	Extract the juice of papaya leaves and mix it with the milk to be drank by the patient	Dengue
Paper Tree	<i>Gmelina arborea</i> Roxb.	Verbenaceae	Leaves	Wipe the leaves with clean cloth, apply coconut oil on the leaves. Then wrap it with plastic and place it at the back of the patient. Repeat the procedure until healed.	Pneumonia
Saba	<i>Musa sapientum</i> Linn.	Musaceae	Peelings of saba fruit	Clean the peelings and then to be chewed by the patient	Diarrhea
Saluyot	<i>Corchorus oleritorius</i> L.	Malvaceae	Seeds	Pound the seeds then add ample warm water. Mix it with warm water to be drank by the patient	Diarrhea
Sambong	<i>Blumea balsamifera</i> L. DC	Compositae	Leaves	Decoction of leaves then will be drank by the patient.	Cough
Sili	<i>Capsicum frutescens</i> .L.	Solanaceae	Leaves	Concoction of pepper leaves and ginger rhizome	<i>Pasma</i>
Tagumbaw	<i>Jatropha curcas</i> L.	Euphorbiaceae	Leaves	Wipe the leaf with clean cloth. Then add salt and coconut oil to the leaves. Afterwards, place the leaves over the affected areas overnight.	Sprain
Tanobong	<i>Phragmites vulgaris</i> (Lam.) Trin.	Poaceae	Leaves	Boil the leaves of tanubong, bani, inwad, kasoy, lagundi together with lazona. Decoction will be bathed by the patient	<i>Pasma</i>
Tawa tawa	<i>Euphorbia hirta</i> Linn.	Euphorbiaceae	Leaves	Decoction of ample amount of tawa tawa leaves to be drank by the patient.	Dengue
Tsaang Gubat	<i>Carmona retusa</i> (Vahl) Masam.	Boraginaceae	Leaves	Place an ample amount of tsaang gubat leaves to 6 cups of water. Boil for about 1.5 hours. Then, drink before sleeping and early morning.	Urinary Tract Infection
Tubo	<i>Saccharum officinarum</i> L.	Graminaceae	Leaves	Boil 10 leaves of tubo in 1/2 liter of water. Decoction to be drank by the patient	Cough

The 50 species of plants mentioned by key informants and during focus group discussions were validated through a semi-structured interview with the patients of the *managtambal*. They used these medicinal plants as cure or first-aid for common illnesses such as dysentery, diarrhea, kidney problems, urinary tract infections, headache, cough and colds, ulcer, diabetes, sprains, dislocations, fractures, unexplainable fear, scabies, pneumonia, cancer and *pasma*. The plants belonged to the 19 families namely *Amaryllidaceae*, *Anacardiaceae*, *Anonaceae*, *Araceae*, *Arecaceae*, *Asteraceae*, *Bixaceae*, *Boraginaceae*, *Caricaceae*, *Compositae*, *Cucurbitaceae*, *Euphorbiaceae*, *Fabaceae*, *Labiteae*, *Lamiaceae*, *Leguminosae*, *Liliaceae*, *Lythraceae*, *Malvaceae*, *Menispermaceae*, *Musaceae*, *Myrtaceae*, *Oxalidaceae*, *Piperacea*, *Poaceae*, *Rutaceae*, *Solanaceae*, *Verbenaceae* and *Zingiberaceae*.

In some cases, they used plants for the identification of the causation of illness such as the use of *Oryza sativa* L. seeds which were dropped in a bowl of water to be interpreted by the *managtambal* known as tawag. Instructions were given to the patient to appease with the spirits that caused the illness such as giving of *atang* to be offered at a specified time but often during dusk. Rituals were performed known as *gaton* mentioning the name of the patient while offering prayers.

Moreover, *paras* was used as the process for the identification of the location of sprain, fractures,

dislocations and other illnesses. Palpation of the radial pulse was done to know the exact location and related illness even without prior information was given by the patient. After the *paras*, the *managtambal* used plant products such as direct application of *Jatropha curcas* L. leaves to relieve pain and *Cocus nucifera* L. oils wherein the patients were massaged with the oils known as *kemkem*.

Also, in some cases where the *managtambal* perceived that the patient has large amount of *betel* or "cold", *suob* was performed wherein a basin of selected animal and plant parts were prepared and burned. The patient was covered by a blanket and the fumes were allowed to enter the blanket. Such exposure to smokes was claimed to reduce the *betel* in the body of the patient.

Moreover, *pasma* which was the most common diagnosed sickness however peculiar to Philippine folk medicine was believed to be brought about by exposure to "cold" and water in its varied presentations, was treated using several plants with different preparations. Signs and symptoms of *pasma* include tremors of the hands, excessive sweating and swelling of the hands and feet, numbness, pain in the distal extremities and knees, prominent veins in the hands and feet (Suart 2014). Bolinao-Sambal *managtambal* used concoction of various plants which were bathed by the patients to reduce or to eliminate the *betel*.



Figure 2. Plants collected in the municipality. (a) *Abrus precatorius* Linn.; (b) *Heliotropium indicum* Linn.; (c) *Euphorbia hirta* Linn.; (d) *Cymbopogon citratus* L.; (e) *Corypha utan* Lamelata; (f) *Paspalum conjugatum* Berg.; (g) *Gliricidia sepium*; (h) *Piper betel* L.; (i) *Aegilops cylindrica* Host



Fig.3. Semi-structured interviews and focus group discussions were done to reveal the ethnobotanical knowledge of Bolinao-Sambal of Pangasinan.

Conservation of plants commonly used were observed such as planting them in their backyard, avoiding excessive harvesting of plants and establishment of plant nursery with the help of their religious group. In the case of seasoned plants which were difficult to harvest because of its location and low number, an ample amount was to be collected and placed in a glass bottle immersed in alcohol, vinegar and water. Such mixture was used by getting small amount liquid from the bottle to be applied to their patients during the treatment. It was claimed that its effectivity lasts from 6 months to several years until all the liquids were consumed.

Furthermore, these ethnobotanical practices were claimed to be handed down by their forefathers

which were practiced by the chosen and willing *managtambal*. In addition, some *managtambal* claimed that they were selected by “spirits” who gave them the power to perform *paras*, *tawag*, and *gaton*. However, present *managtambal* have difficulty transferring the knowledge to the next generation because most of their immediate and distant relatives lack the interest to learn the knowledge and skill because of the presence of current medical practice nowadays wherein medical doctors are consulted in case of illness or disease. Such case was proven in a study indicating that education, exposure to urban setting and practices and decrease of plant population were some of the factors for the decline on the use of traditional medicine using plants (Assefa *et al.* 2010).

IV. CONCLUSION AND RECOMMENDATIONS

Plants (trees, shrubs, and herbs) play an important role in the lives of Bolinao-Sambal. Indigenous practices were influenced by the accessibility of resources, economic status, strong customary beliefs and practices and the diversity of plant species.

Rituals were still practiced by some Bolinao-Sambal people. However, this practiced is being threatened to vanish because of the influence of current medical practice and rural health units of Bolinao local government. Most of the illnesses were attributed to *pasma* which were treated using *Phragmites vulgaris* (Lam.) Trin., *Pongamia pinnata* (L.) Pieere, *Aegilops cylindrical*, *Anacardium occidentale*, *Vitex negundo* L. and *Zingiber officinale* L.

It is recommended that the indigenous practices or customary laws should be integrated in any government programs and projects for biodiversity conservation and management. These are useful to the indigenous people and should be documented, preserved, monitored, and protected from any exploitation.

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