

Ethnomedicinal Plants in Bayabas, Sablan, Benguet Province, Luzon, Philippines

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Abstract

The traditional knowledge on medicinal plants is inherent in indigenous communities and important in the development of drugs and plant-based medicine as it lays down the foundation of drug discovery. Ethnobotanical survey using interviews and focused group discussions in the local community of Sablan, Benguet province revealed that there are 75 plants that belong to 68 genera and 43 families to have medicinal value. The leaves are predominantly used for the treatment of the various ailments. Decoction is the major mode of preparation for the cure of cough, kidney ailments, and stomach disorders such as diarrhea, ulcers and related ailments. In Benguet province, documentation of the claimed medicinal plants by local communities will not only provide a baseline data but also unlock opportunities for the discovery and development of new and less expensive plant-based medicines.

Keywords: Bayabas; Sablan; Ethnobotany; *Ibaloi* Tribe; Plant-Based Medicine; Traditional Knowledge.

1. Introduction

In many parts of the world, traditional uses of plants by local communities for the treatment of various ailments are valuable in the development of present-day medicines. In fact, most plant-based medicines that were developed by pharmaceutical companies have their beginnings in ethno-medicine [1-5]. In Africa, medicinal and aromatic plants are reservoirs of curative elements in the treatment of various diseases such as malaria, diabetes and many more [6-10]. In the Philippines, there is rich ethnomedicinal knowledge among local communities however; this knowledge is only transferred to the next generation through verbal means and personal experience. Earlier documentation of this knowledge that has been published has been focused on selected indigenous tribes [11-15]. Recently, however, piecemeal documentation of ethnomedicinal knowledge of some additional indigenous groups has been conducted [16-20].

Lately, the value of traditional knowledge on medicinal plants is recognized worldwide such that at present, finding solutions to emerging diseases and

health problems had led to a plethora of published related materials [21-25]. India, a country that is very rich in traditional knowledge on plants has published numerous related studies [26-29]. In recent years, the Philippine government through the Department of Science and Technology and related agencies are taking a lead in initiating researches on drug discovery from the plants that are being used by local communities. Academic and research institutions are currently being funded by the Philippine government for drug discovery researches.

Conversely, with the emerging diseases and the need for more affordable medicine, documentation of the claimed medicinal plants by local communities is very important because it will unlock opportunities for the discovery and development of new and less expensive plant-based medicines. In Benguet province and the Cordillera region, Luzon, Philippines, the traditional knowledge on plant use is usually trapped in the older generation hence there is danger that the ethnobotanical knowledge will be irretrievably lost if not immediately documented. Cognizant of this problem, this study aimed to establish and document the medicinal plants and the traditional knowledge that is associated with the plants such as plant part used, manner of preparation, ailments cured and the like among local residents of Bayabas, Sablan, Benguet. Bayabas, Sablan is one of six municipalities in the province of Benguet and is predominantly inhabited by the *Ibaloi*, one of the indigenous groups in the Cordillera Administrative Region (CAR), Luzon Island, Philippines. With the scarcity of literature about traditional knowledge on plant use specifically in the CAR, the result of this study will be a great contribution most especially in future researches on plant drug discovery.

2. Methodology

2.1 The study area

Bayabas is one of eight barangays in Sablan, a municipality of Benguet Province. Sablan is a 5th class municipality with a population of 9,652 people in 1,873 households based on the 2000 census. Sablan covers an estimated area of 91.68 sq.km or roughly 9,168 hectares, which roughly represents 3.45 percent of the land area of Benguet province. There

are two public elementary schools in Bayabas; Talete Elementary School and Bayabas Central Elementary School. Bayabas, Geographically, Sablan is located at 16°27'640" latitude and 120°29'908" longitude (Figure 1). It has a predominantly dipterocarp type of forest and the biodiversity of flora and fauna are relatively intact.

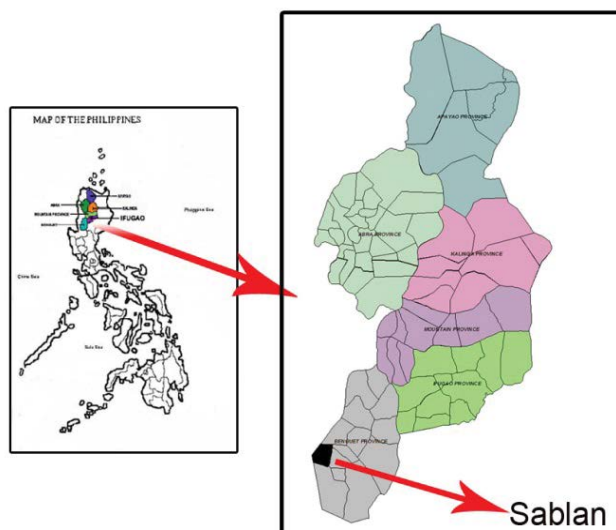


Figure 1. Location map of the study area.

Sablan is predominantly peopled by the *Ibalois*, one of the tribes or indigenous groups in the Cordillera Administrative Region, Luzon, Philippines. The major source of income comes from farming although most of the younger generation has sought employment outside of the barangay. Generally, the *Ibalois*, just like other tribes in the Philippines, are closely entwined with their surrounding environment from where they obtain their basic needs like food, medicine, sources of building materials for their houses and furniture, and many other needs. Because they are always closely in contact with the natural environment, specifically the adjoin dipterocarp forests, they hold a traditional knowledge on plant uses including medicinal plants. To date, no documentation has been prepared of the ethnomedicinal knowledge of the *Ibalois* in Bayabas, Sablan. Consequently, it is imperative that efforts to document this knowledge should be done before it will be irretrievably lost. This study focused on the ethnobotanical survey of medicinal plants in the study area and rests on the belief that the traditional knowledge on plants can only be recognized if documented and shared.

2.1 Ethnobotanical survey

Prior to the conduct of the study, a prior informed consent was sought from the local community of Bayabas, Sablan, Benguet Province. Ethnomedicinal knowledge was gathered through interviews and focused group discussions with the local residents

using a semi-structured questionnaire as guide. Most of the conversations were performed in *Ilocano* or sometimes in the local dialect. Specifically, face to face interviews and focused group discussions, mostly with key informants. The choice of the key informants was based on recommendations from the local government officials which include mostly the older generation and the members of the households. The ages of the informants ranged from 13 to 89 years old and have been a resident in the barangay from one to 89 years (Table 1). The interviews were focused on the medicinal plants that are being used by the local community. The ethnobotanical survey was conducted for one year. A list of plants that were identified by the local residents as medicinal are presented and summarized in Table 2. The data were analyzed using Statistical Package for the Social Sciences (SPSS) software. Variables used to characterize and summarize the data were; parts of the plant used, ailments cured, how the plants were used and citation frequency. The Use Value (UV) was also computed following the formula, $UV = \sum U_i / n$ where: U_i = the number of uses mentioned by each informant for a given species, n = the total number of informants [30].

2.3 Collection of voucher plant specimens

Plants that were mentioned by the respondents to have medicinal value were collected. Each of the specimens were pressed between newspapers that were sandwiched between wooden pressers, dried in an oven and mounted on herbarium sheets following herbarium techniques. These specimens served as vouchers of the plants identified as medicinal plants by the respondents. Identification of the specimen were done by comparing them with the herbarium collections of the University of the Philippines Baguio Herbarium and keying them using a taxonomic key [31]. The use of phyto images and the list of plant names in the International Plant Name Index (IPNI) were very useful references for the scientific names. The preserved specimens are deposited in the University of the Philippines Baguio Herbarium.

3. Results

3.1 The profile of the respondents

In this study, documentation of the traditional knowledge in Bayabas, Sablan was participated in by 80 respondents or informants. Most of the respondents are farmers. As farmers, the ethnobotanical knowledge that they keep is a response to their local needs and had been tested for generations. Similarly, the advantage of farmer's knowledge is that it is driven by local needs and is based on socio-cultural norms [32]. Based on the survey, it was observed that the older generation is

Table 1. Demographic profile of the respondents in Bayabas, Sablan, Benguet Province.

| Respondent | Age | Sex | Years of stay in Bayabas | Civil status | Respondent | Age | Sex | Years of stay in Bayabas | Civil status |
|--------------------------|-----|--------|--------------------------|--------------|------------|-----|--------|--------------------------|--------------|
| 1 | 87 | Male | 87 | Married | 41 | 49 | Male | 49 | Single |
| 2 | 68 | Female | 68 | Married | 42 | 89 | Male | 89 | Married |
| 3 | 55 | Female | 29 | Married | 43 | 83 | Female | 83 | Married |
| 4 | 40 | Female | 22 | Married | 44 | 16 | Male | 16 | Single |
| 5 | 48 | Female | 5 | Married | 45 | 20 | Male | 20 | Single |
| 6 | 41 | Female | 1 | Married | 46 | 45 | Male | 45 | Single |
| 7 | 16 | Male | 16 | Single | 47 | 33 | Male | 33 | Single |
| 8 | 16 | Male | 16 | Single | 48 | 64 | Male | 45 | Married |
| 9 | 16 | Male | 16 | Single | 49 | 55 | Female | 55 | Married |
| 10 | 61 | Male | 3 | Married | 50 | 84 | Male | 84 | Married |
| 11 | 32 | Female | 9 | Married | 51 | 62 | Female | 62 | Married |
| 12 | 15 | Female | 15 | Single | 52 | 77 | Female | 77 | Married |
| 13 | 54 | Female | 54 | Married | 53 | 61 | Male | 61 | Married |
| 14 | 75 | Male | 75 | Married | 54 | 20 | Female | 20 | Single |
| 15 | 62 | Female | 62 | Married | 55 | 31 | Female | 31 | Married |
| 16 | 50 | Female | 50 | Married | 56 | 64 | Female | 64 | Married |
| 17 | 23 | Female | 23 | Single | 57 | 72 | Male | 72 | Married |
| 18 | 51 | Female | 51 | Married | 58 | 30 | Female | 10 | Married |
| 19 | 67 | Male | 67 | Married | 59 | 63 | Male | 63 | Married |
| 20 | 25 | Male | 25 | Single | 60 | 29 | Male | 29 | Married |
| 21 | 64 | Female | 64 | Married | 61 | 39 | Male | 39 | Married |
| 22 | 45 | Male | 45 | Married | 62 | 37 | Female | 37 | Married |
| 23 | 76 | Female | 76 | Married | 63 | 47 | Male | 47 | Married |
| 24 | 80 | Male | 80 | Married | 64 | 51 | Female | 51 | Married |
| 25 | 24 | Male | 24 | Married | 65 | 46 | Female | 46 | Married |
| 26 | 32 | Male | 23 | Married | 66 | 50 | Male | 50 | Married |
| 27 | 59 | Female | 59 | Married | 67 | 24 | Female | 24 | Married |
| 28 | 28 | Male | 28 | Married | 68 | 51 | Male | 51 | Married |
| 29 | 56 | Male | 56 | Married | 69 | 64 | Male | 64 | Married |
| 30 | 25 | Female | 25 | Married | 70 | 47 | Male | 47 | Single |
| 31 | 21 | Female | 21 | Married | 71 | 48 | Male | 48 | Married |
| 32 | 29 | Male | 29 | Married | 72 | 61 | Male | 61 | Married |
| 33 | 44 | Female | 44 | Married | 73 | 53 | Male | 53 | Married |
| 34 | 40 | Female | 40 | Married | 74 | 72 | Male | 72 | Married |
| 35 | 18 | Male | 18 | Single | 75 | 24 | Male | 24 | Single |
| 36 | 45 | Male | 45 | Married | 76 | 24 | Female | 24 | Single |
| 37 | 32 | Female | 32 | Married | 77 | 13 | Female | 13 | Single |
| 38 | 23 | Male | 23 | Single | 78 | 34 | Female | 34 | Married |
| 39 | 30 | Male | 30 | Married | 79 | 28 | Female | 28 | Married |
| 40 | 28 | Female | 28 | Single | 80 | 69 | Female | 69 | Married |
| Total Respondents | | | | | 80 | | | | |

more knowledgeable about the traditional medicinal plants.

3.2 Ethnobotanical survey

Ethnobotanical survey showed that there are 75 species of plants that belong to 68 genera and 43 families that are used by the local community in Bayabas, for the treatment of various ailments. The ailments include cough, kidney problems, stomach ache, headache, boils, rheumatism, skin allergy, diarrhea, arthritis to mention a few. The medicinal

plants were either cultivated (60.91%) or collected from the wild (30.09%) or nearby forests (Figure 2).

Tables 2 lists a summary of the medicinal plants that are used to treat various ailments, local names, cultivated or taken from the wild, plant parts used, mode of preparation and claimed medicinal use.

As to citation or frequency, the top ten medicinal plants that are commonly used to treat various ailments include *bayabas* (*Psidium guajava*, 9.24%), lemon grass or *tanglad* (*Cymbopogon citratus*, 7.42%),

lagundi (*Vitex negundo*, 6.97%), oregano (*Origanum vulgare*, 5.15%), guyabano (*Annona muricata*, 4.55%), banaba (*Lagerstroemia speciosa*, 4.55%), marunggay (*Moringa oleifera*, 3.18%), laya (*Zingiber officinale*, 3.18%), bain-bain (*Mimosa pudica*, 3.03%), and kupkupit (*Centella asiatica*, 3.03%), in descending order. (Figure 3, Table 2).

Some of the ailments and diseases that are usually treated by the plants are cough, stomachache, kidney ailments specifically urinary tract infection, stomach ulcer, diarrhea, skin diseases such as boils, toothache, skin allergy, fresh wounds, diabetes, dysmenorrhea, fever, mouth sore, sore throat, headaches, skin diseases and rashes, hypertension, wounds, boils, athlete's foot, arthritis and others. Cough, stomach ache, and urinary tract infection in successive order, rank the first three ailments that are treated with the medicinal plants (Figure 4).

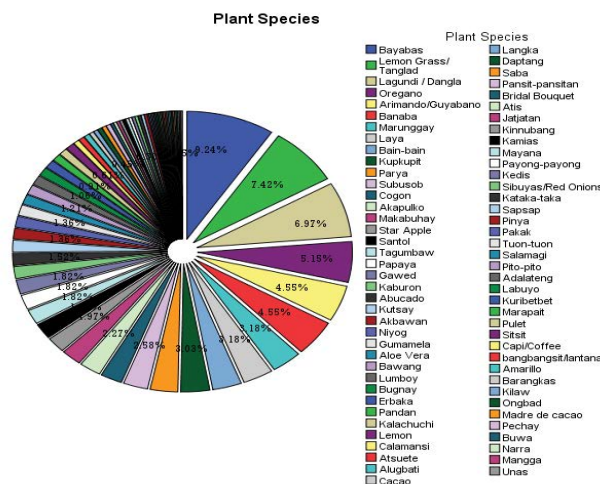
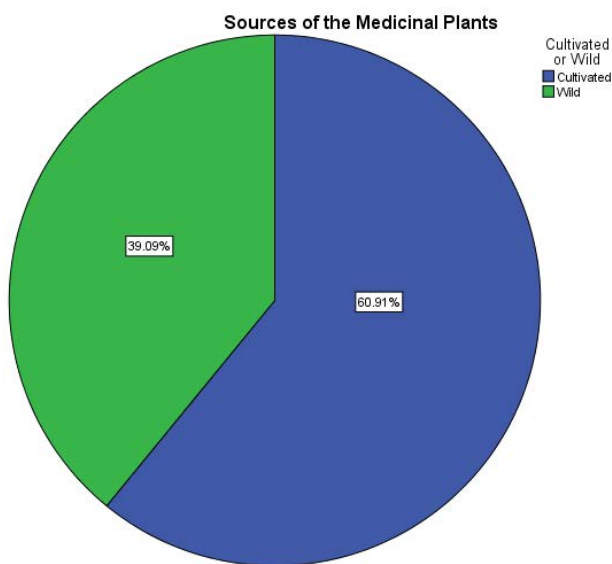


Figure 2. Sources of medicinal plants in Bayabas, Sablan.

Figure 3. Medicinal plants used by the local community of Bayabas, Sablan, Benguet Province and their citation frequency.

Table 2. List of medicinal plants used by the local community of Bayabas, Sablan, Benguet Province.

| Scientific Name/ Family | Local Name | C/W* | Plant part used | Mode of preparation | Ailment/Disease cured | Citation frequency | UV* |
|--|--------------------|------|------------------|--|---|--------------------|------|
| <i>Allium cepa</i> L. (Alliaceae) | Sibuyas/Red Onions | C | Rhizme/blk | Crushed and applied onto affected area | Chicken pox, skin rashes | 2 | 1 |
| <i>Allium odoratum</i> L. (Alliaceae) | Kutsay | C | Lvs, Whle Plnt | Crushed and applied as poultice, infusion | Fresh wound, swelling, bruise & sprain | 10 | 0.4 |
| <i>Allium sativum</i> L. (Alliaceae) | Bawang | C | Rhizme/bulb, Lvs | Freshly eaten or chewed, crushed and applied | Snake bites, toothache, hypertension | 8 | 0.38 |
| <i>Aloe vera</i> L. (Aloaceae) | Aloe vera | C | Lvs | Sap applied onto the scalp | Balding or loss of hair | 8 | 0.13 |
| <i>Ananas comosus</i> (L.) Merr. (Bromeliaceae) | Pinya | C | Frt | Freshly eaten / Chewed | Hypertension, ringworm | 2 | 1 |
| <i>Annona muricata</i> L. (Annonaceae) | Arimando/ Guyabano | C | Lvs | Decoction, freshly eaten | Anti-cancer, diabetes, diarrhea, cough, arthritis | 30 | 0.17 |
| <i>Annona squamosa</i> L. (Annonaceae) | Atis | C | Lvs | Ashed, decoction | Fresh wound, cleansing drink | 2 | 1 |
| <i>Antidesma bunius</i> (L.) Spreng. (Euphorbiaceae) | Bugnay | W | Lvs | Decoction | Cough, kidney problem, colds, UTI, diabetes | 7 | 0.71 |
| <i>Areca catechu</i> Linn. (Arecaceae) | Buwa | C | Frt | Chewed | Toothache, strengthen teeth | 1 | 2 |

| | | | | | | | |
|--|----------------------|---|--------------------|---|--|----|------|
| Artemisia vulgaris L.(Asteraceae) | Erbaka | W | Lvs | Decoction | Dysmenorrhea, stomach ache | 7 | 0.14 |
| Artocarpus communis J.R et G. Forster (Moraceae) | Pakak | C | Lvs, Rts | Decoction | Dysmenorrhea, enhances energy | 1 | 2 |
| Artocarpus integrifolia L. (Moraceae) | Langka | C | Lvs | Decoction, crushed | Hypertension, boils | 3 | 0.67 |
| Averrhoa bilimbi L.(Oxalidaceae) | Kamias | C | Fr | Applied as poultice | Mumps | 2 | 0.5 |
| Basella rubra L.(Basellaceae) | Alugbati | W | Lvs | Applied as poultice | Boils | 4 | 0.25 |
| Bidens pilosa L.(Asteraceae) | Ongbad | W | Lvs | Decoction | Stomach ache | 1 | 1 |
| Bixa orellana L.(Bixaceae) | Atsuete | C | Lvs | Decoction, crushed, ashed | Relieves pain on burns | 4 | 0.25 |
| Blumea balsamifera L. DC (Asteraceae) | Subusob | W | Lvs | Decoction, boiled for steam inhalation | Diabetes, cough, stomach ache, asthma | 17 | 0.24 |
| Brassica chinensis L. (Brassicaceae) | Pechay | C | Whle Plnt | Cooked and eaten | Diarrhea | 1 | 1 |
| Capsicum frutescens L. (Solanaceae) | Labuyo | C | Fr | Crushed and applied on affected area | Rheumatism | 1 | 1 |
| Carica papaya L. (Caricaceae) | Papaya | C | Fr, Lvs, Sp | Freshly eaten, crushed and extract can be applied onto affected area, | Indigestion, dog bites, Constipation, tonsillitis, fresh wound, snake bites | 12 | 0.5 |
| Catharanthus roseus (L.) G.Don (Apocynaceae) | Kalachuchi | C | Lvs | Crushed, steam inhalation or spray, decoction | Skin allergy, skin rashes, asthma | 6 | 0.67 |
| Centella asiatica (L.) Urb. (Apiaceae) | Kupkupit | W | Lvs | Decoction, crushed and applied as poultice | Cough, UTI, memory enhancer, fresh wound | 20 | 0.2 |
| Chromolaena odorata (L.) R.M.King & H.Rob. (Asteraceae) | Kedis | W | Lvs | Crushed and applied on affected area | Fresh wound | 2 | 0.5 |
| Chrysophyllum cainito L. (Sapotaceae) | Star apple | | Lvs | Decoction | Diarrhea, stomach ache | 13 | 0.15 |
| Citrus grandis Hassk. (Rutaceae) | Barangkas | C | Fr | Fruits are eaten raw | Hypertension | 1 | 1 |
| Citrus limon (L.) Burm.f. (Rutaceae) | Lemon | C | Lvs, Fr | Decoction, juice drink | Stomach ache, cough | 6 | 0.17 |
| Citrus microcarpa Bunge (Rutaceae) | Calamansi | C | Fr, Lvs | Juice drink, decoction | Sore throat, high fever | 4 | 0.5 |
| Cocos nucifera L. (Arecaceae) | Niyog | C | Fr, Lvs, Ccnt shll | Juice drink, decoction, ashed | Kidney problem, cleansing, Diarrhea, skin itchiness, UTI | 9 | 0.56 |
| Coffea robusta L.Linden (Rubiaceae) | Capi/Coffee | C | Fr | Decoction | Enhances energy | 1 | 1 |
| Coleus blumei Benth. (Lamiaceae) | Mayana | C | Lvs | Crushed, poultice | Fresh wound | 2 | 0.5 |
| Cymbopogon citratus (DC.) Stapf. (Poaceae) | Lemon Grass/ Tanglad | W | Lvs, Whle Plnt | Decoction, ashed | Hypertension, cleansing, cough, fresh wound, diarrhea, colds stomach ache, UTI | 49 | 0.16 |

| | | | | | | | |
|---|----------------------|---|---------------|---|--|----|------|
| Desmodium sandwicense E. Mey. (Fabaceae) | <i>Pulet</i> | W | Lvs | Crushed and applied | Fresh wound | 1 | 1 |
| Drymaria cordata (L.) Willd. ex J.A. Schultes (Caryophyllaceae) | <i>Sitsit</i> | W | Lvs | Crushed and applied onto affected area | Boils | 1 | 1 |
| Elephantopus tomentosus L. (Asteraceae) | <i>Kaburon</i> | W | Lvs | Crushed and applied onto affected area | Fresh wound | 10 | 0.1 |
| Eleusine indica (L.) Gaertn. (Poaceae) | <i>Jatjatan</i> | W | Lvs | Decoction | Kidney problem, arthritis | 2 | 1 |
| Flemingia strobilifera (L.) W.T.Aiton (Fabaceae) | <i>Tuon-tuon</i> | W | Lvs | Applied as poultice | Skin infection | 1 | 1 |
| Imperata cylindrica (L.) Beauv. (Poaceae) | <i>Cogon</i> | W | Rts, Lvs | Decoction | Diarrhea, UTI, kidney problem, colds | 15 | 0.27 |
| Ipomoea purpurea (L.) Roth (Convolvulaceae) | <i>Daptang</i> | W | Lvs | Decoction | Ulcer, stomach ache, arthritis | 3 | 1 |
| Jatropha curcas L. (Euphorbiaceae) | <i>Tagumbaw</i> | W | Brk, Lvs | Crushed and applied as poultice, Infusion | Rheumatism, removes milk deposits on baby's tongue, sprain | 12 | 0.25 |
| Kalanchoe pinnata (Lam.) Pers. (Crassulaceae) | <i>Kataka-taka</i> | W | Lvs, Rts | Applied as poultice | Headache, rheumatism | 2 | 1 |
| Lagerstroemia speciosa (L.) Pers. (Lythraceae) | <i>Banaba</i> | W | Lvs, Brk, Rts | Decoction | Stomach ache, UTI, Diarrhea, Hypertension | 30 | 0.13 |
| Lantana camara L. (Verbenaceae) | <i>Bangbangsit</i> | C | Lvs | Applied as poultice | Mumps | 1 | 1 |
| Livistona rotundifolia Mart. (Arecaceae) | <i>Payong-payong</i> | W | Lvs | Crushed and applied on affected area, decoction | Fresh wound, diarrhea | 2 | 1 |
| Macaranga grandiflora Merr. (Euphorbiaceae) | <i>Kinnubang</i> | W | Lvs | Crushed and applied onto affected area, ashed | Fresh wound, chicken pox | 2 | 1 |
| Maesa denticulata Mez. (Myrsinaceae) | <i>Kilaw</i> | W | Lvs | Crushed and applied on affected area | Fresh wound | 1 | 1 |
| Malvaviscus penduliflorus DC. (Malvaceae) | <i>Gumamela</i> | C | Flwr, Lvs | Crushed and applied as poultice onto affected area | Boils, athlete's foot | 9 | 0.22 |
| Mangifera indica L. (Anacardiaceae) | <i>Mangga</i> | C | Lvs | Decoction | High fever | 1 | 1 |
| Mikania cordata (Burm.f.) B.L. Rob. (Asteraceae) | <i>Akbawan</i> | W | Lvs | Applied as poultice, crushed and applied on area, ashed | Fresh wound | 9 | 0.11 |
| Mimosa pudica L. (Fabaceae) | <i>Bain-bain</i> | W | Rts | Decoction, crushed and applied on affected area | Stomach ache, diarrhea, mumps, UTI, arthritis, tooth ache | 20 | 0.3 |
| Miscanthus floridulus (Labill.) Warb. ex K. Schum. & Laut. (Poaceae) | <i>Sapsap</i> | W | Lvs | Freshly eaten / chewed, decoction | Diarrhea, ulcer | 2 | 1 |

| | | | | | | | |
|---|------------------------|---|----------------|--|--|----|------|
| Momordica charantia L. (Cucurbitaceae) | <i>Parya</i> | C | Lvs, Frt | Crushed, decoction, cooked and eaten, juiced | Athlete's foot, fresh wound, anemia, diabetes | 19 | 0.21 |
| Moringa oleifera Lam. (Moringaceae) | <i>Marunggay</i> | C | Lvs | Decoction, juice drink, Cooked and eaten | High fever, anemia, Diabetes | 21 | 0.14 |
| Musa paradisiaca L. (Musaceae) | <i>Saba</i> | C | Lvs | Crushed and applied, Decoction, freshly eaten | Skin allergy, urinary tract infection, diarrhea | 3 | 1.33 |
| Origanum vulgare L. (Lamiaceae) | <i>Oregano</i> | C | Whle Plnt, Lvs | Decoction, applied as poultice, crushed | Ulcer, cough, fresh wound, sore throat | 34 | 0.12 |
| Pandanus amaryllifolius Roxb. (Pandanaaceae) | <i>Pandan</i> | C | Lvs | Decoction | Stomach ache, cleansing drink, UTI | 6 | 0.5 |
| Peperomia pellucida (L.) Kunth (Piperaceae) | <i>Pansit-pansitan</i> | W | Whle Plnt | Decoction | Kidney problem | 3 | 0.33 |
| Persea americana Gaertn. (Lauraceae) | <i>Abucado</i> | C | Lvs, Brk | Decoction | Stomach ache, hypertension, colds, diarrhea, UTI, cleansing | 10 | 0.6 |
| Piper betle L. (Piperaceae) | <i>Gawed</i> | W | Lvs | Applied as poultice | Cough, fresh wound | 12 | 0.17 |
| Psidium guajava L. (Myrtaceae) | <i>Bayabas</i> | C | Lvs | Decoction, ,ashed, freshly eaten / chewed, Applied as poultice, steam bath | Diarrhea, cough, skin allergy, fever, athlete's foot, wound, scabies, asthma, tooth ache | 61 | 0.15 |
| Pterocarpus indicus Herb.Madr. ex Wall. (Fabaceae) | <i>Narra</i> | C | Brk | Used as wash or gurgle | Mouth ulcer | 1 | 1 |
| Saccharum officinarum L. (Poaceae) | <i>Unas</i> | W | Lvs | Crushed and applied | Mouth ulcer | 1 | 1 |
| Sambucus javanica Reinw. ex Blume (Caprifoliaceae) | <i>Bridal bouquet</i> | W | Lvs | Decoction, crushed and applied onto affected area | Diabetes, wash for fresh wound | 2 | 1 |
| Sandoricum koetjape Merr. (Meliaceae) | <i>Santol</i> | C | Lvs | Decoction | Cough, ulcer, stomach ache, diarrhea, high fever | 13 | 0.38 |
| Senna alata L. (Fabaceae) | <i>Akapulko</i> | W | Lvs | Crushed, decoction | Skin allergy, acne | 15 | 0.13 |
| Senna spectabilis (DC.) Irwin& Barneby (Fabaceae) | <i>Madre de cacao</i> | W | Lvs | Applied as poultice | Fresh wound | 1 | 1 |
| Syzygium cumini (L.) Skeels (Myrtaceae) | <i>Lumboy</i> | C | Brk, Lvs | Decoction | Urinary tract infection, Diarrhea, colds | 8 | 0.38 |
| Tabernaemontana cumingiana A.DC. (Apocynaceae) | <i>Kuribetbet</i> | W | Lvs | Freshly eaten / chewed | Diarrhea | 1 | 1 |
| Tagetes erecta L. (Asteraceae) | <i>Amarillo</i> | C | Lvs | Applied as poultice | Boils | 1 | 1 |
| Tamarindus indica L. (Fabaceae) | <i>Salamagi</i> | C | Lvs | Ashed | Fresh wound | 1 | 1 |
| Theobroma cacao L.(Sterculiaceae) | <i>Cacao</i> | C | Lvs | Decoction, poultice | Cough, eczema | 3 | 0.67 |

| | | | | | | | |
|---|------------------|---|-------------------|---|---|----|------|
| Tinospora rumphii Boerl. (Menispermaceae) | Makabuhay | W | Brk, Sp, Stm, Lvs | Decoction, ashed, applied directly onto affected area | Scabies, athlete's foot, dysmenorrhea, diarrhea | 14 | 0.29 |
| Tithonia diversifolia (Hemsl.) Gray (Asteraceae) | Marapait | W | Lvs | Crushed | Fresh wound | 1 | 1 |
| Urtica meyeniana Walp. (Urticaceae) | Adalateng | W | Flwr | Crushed and applied onto affected area, poultice | Boils | 1 | 1 |
| Vitex negundo L. (Verbenaceae) | Lagundi / Dangla | W | Lvs | Decoction, boiled for steam inhalation, ashed | Cough, high fever, stomach ache, asthma, skin allergy | 46 | 0.11 |
| Zingiber officinale Roscoe (Zingiberaceae) | Laya | C | Rhizme/blb | Decoction, freshly eaten / chewed | Sore throat, cough | 21 | 0.10 |
| A mixture of seven leaves (santol, guyabano, etc) (Different families) | Pito-pito | C | Lvs | Decoction | A mixture of seven leaves from different plants has higher efficacy as energy booster | 1 | 1 |

Lvs-leaves; Stm-stem; Brk-bark;Flwr-flowers; Rhzme/blb-rhizome/bulb; Frt-fruit; C-cultivated; W-wild; *Use Value

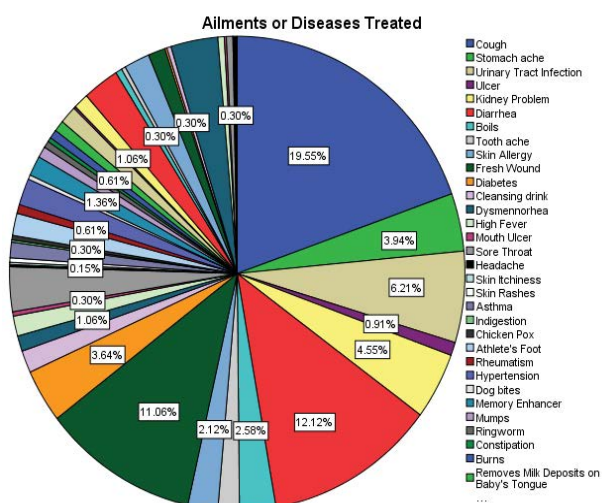


Figure 4. The different ailments that are treated using medicinal plants in Bayabas, Sablan.

The leaves are the most used part of the enumerated medicinal plants with a citation frequency of 78.64%. Almost all parts of the medicinal plants such as roots, bark, stem, fruit, sap, rhizomes or bults are useful in the preparation for treating various ailments. Even the shell of coconut is used (Figure 5). How the medicinal plants are prepared for use also vary but the usual mode of preparation is decoction with a citation frequency of almost 60% (Figure 6). Other modes of preparation include using the plants as poultice, as a wash for disinfecting wounds and skin diseases, crushed and applied directly onto the affected the area, ashed and others. Additionally, some plants are eaten raw or cooked depending on

the type of ailment being cured or treated. Moreover, the ingenuity of local communities is admirable because the knowledge is enhanced through time. During the interviews, it was mentioned that a mixture of leaves, called *pito-pito* (*pito* is a local word which means seven) from seven different plants has a higher efficacy (Table 2).

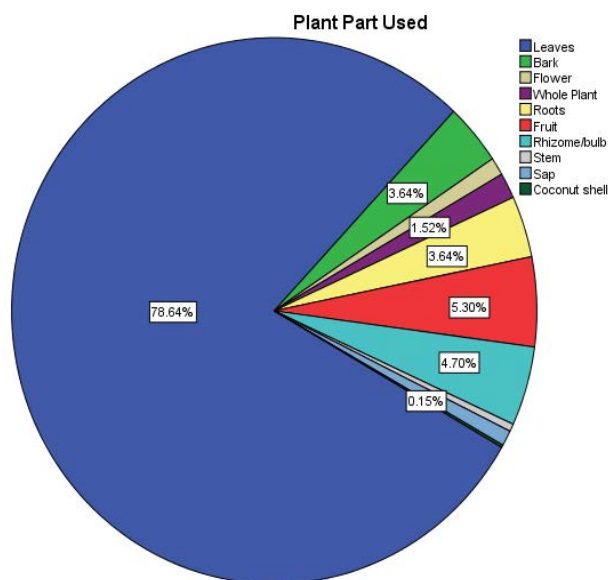


Figure 5. The different plant parts used by the local community in Bayabas, Sablan to treat various ailments.

In Table 2, the Use-Value (UV) was also computed and the three plants with highest UV are as follows: *Buwa* -2, *Pakak* -2, and *Saba* -1.33. The technique of

Use-Value may indicate the distribution of how local communities use a particular species. This technique requires interviewing the respondents separately to ensure that the responses are not influenced by each other.

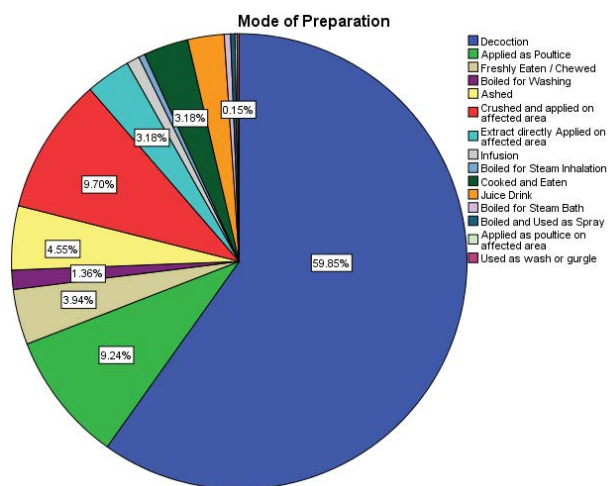


Figure 6. The modes of preparation of the medicinal plants used by the local community in Bayabas, Sablan to treat various ailments.

4. Discussion

The traditional knowledge on plant use is an important part of human existence. Plants are used in various ways from food, shelter, clothing, medicine and the like. Historically, traditional medicinal plants have been used and the efficacy of their uses to treat various ailments has been tested through time. Unfortunately, the traditional knowledge has been kept only within local communities because it has been transferred from generations only through oral communication. Presently, it has been observed that the younger generations no longer maintain the traditional knowledge because most of them leave the community thus this knowledge is particularly trapped within the older generations.

For many decades, man depended on the forest plants for their daily sustenance, such as food and other needs. Local communities in many countries have a lot to share to the world as far as traditional uses of plants are concerned. Cognizant to this, in recent decades, documentation and evaluation of the traditional knowledge of medicinal plants have been done in order to contribute to improved health care services especially in marginalized areas. In Mexico, a study evaluated the uses of the medicinal plants in four indigenous groups of Mexican Indians—Maya, Nahua, Zapotec and Mixe [33]. The relative importance of a medicinal plant within a culture is documented using a quantitative method and the data are compared intra- and inter-culturally [34]. Similarly, in other countries like India, Indonesia,

Thailand, Malaysia, and others, different cultures demonstrate different traditional knowledge and uses of plants as mentioned earlier.

In the Philippines, uses of plants also differ across cultures and tribes, although similarities on the uses exist. For example, *Psidium guajava* seems to be one of the most common and versatile plant that is used in disinfecting wounds. Among the negritos, a study conducted showed that *Psidium guajava* recorded the highest cited medicinal plant, followed by *Blumea balsamifera* and *Cocos nucifera* [35]. Earlier studies also showed that *Psidium guajava* is one of the plants that are traditionally used by various tribes or groups [36-37]. Recently, *Miscanthus sinensis*, a versatile plant which have many uses, was studied to have also medicinal value [38].

Likewise, among the *Ibaloi* tribe which is the focus of this study, many plants have been mentioned wherein the uses as medicine or as treatment for a particular ailment is also shared with other cultures. To mention some examples; *gawed* or *lawed* (*Piper betle*) is used by almost all tribes in the Cordillera as treatment for cough, aside from its use as an ingredient for betel nut chewing. Among betel nut chewers, *gawed* is also claimed to make teeth stronger. *Banaba* (*Lagerstroemia speciosa*) has been known traditionally as cure for many ailments such as kidney problems, stomach ache, urinary tract infection, diarrhea, hypertension and a decoction can also be a good wash for wounds [39]. Other lesser known plants, with low citation frequencies, are those that are still being tested for their efficacy.

The plant part that is commonly used is the leaves primarily because these are readily available, easily gathered and prepared. Gathering the leaves do not necessarily destroy the plants, hence can still continually provide an endless source of medicine. For the different plant parts such as bark, fruit, stem and others, the local communities, with their continued use of the plants around them, have discovered that these parts have active component. As for the mode of preparation, decoction dominates the other methods of preparation because this is the easiest way to prepare especially to cure internal ailments.

Generally, a lot of traditional uses of plants can be mined from local communities. Most of the knowledge has not really been explored because these are trapped among older generation and are only transferred through verbal means. The wisdom of the wise can only be shared and be made known to the world by documenting them and publishing this knowledge.

5. Conclusion and Recommendation

The continuous emergence of diseases, the emergence of drug-resistant organisms and the increasing prices of medicines call for the discovery of new and less-expensive plant-based medicines. As an initial effort, documentation of the traditional knowledge of the *Ibaloi* of Bayabas, Sablan on medicinal plants is important. Additionally, local communities share the knowledge across cultures although there are unique ways of using the medicinal plants. With the increasing cost of synthetic drugs and their known side effects, more and more people are going back to herbal medicine as their last resort. Hence, more detailed studies, i.e. determination and identification of the bioactive components should be encouraged and financially supported.

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