



American Journal of Life Science and Innovation (AJLSI)

ISSN: 2833-1397 (ONLINE)

VOLUME 4 ISSUE 2 (2025)

PUBLISHED BY
E-PALLI PUBLISHERS, DELAWARE, USA

Ethnobotanical Assessment of Medicinal Plants Used by the Higaonon Tribe in Barangay Langag, Esperanza, Agusan del Sur

Jean Rose Altrecha Abejo^{1*}, Meljjan T. Demetillo²

Article Information

Received: September 25, 2025

Accepted: October 30, 2025

Published: December 02, 2025

Keywords

*Ethnobotanical, Herbalists,
Medicinal plants, Traditional
Healers*

ABSTRACT

Indigenous medicinal plants are harnessed by the Higaonon tribe, enriching their cultural heritage and advocating sustainable healthcare practices through the utilization of their therapeutic properties. This study aims to document and explore the traditional medicinal plant knowledge and practices of the Higaonon Tribe in the northeastern part of Mindanao, Philippines. The study was conducted in Barangay Langag, Esperanza, Agusan del Sur, among elderly villagers, traditional healers, and herbalists. A total of 13 plant species belonging to 11 families were identified and documented, along with their local names, plant parts used, methods of preparation and administration, and medicinal uses. The most used plant parts were leaves, followed by bark, roots, and rhizomes. The plants were used to treat various ailments such as fever, stomachache, cough, diarrhea, hypertension, wounds, and others. The Lamiaceae family provided the highest number of medicinal plant species in the study. This research contributes to the documentation of traditional medicinal knowledge, supports future pharmacological research, and aids in the conservation and sustainable use of medicinal plants.

INTRODUCTION

Plants have been utilized as medicines for ages, primarily as traditional preparations. It is estimated that around 85% of traditional medicines used for basic healthcare globally are plant-based (Niazi & Monib, 2024). Despite the availability of conventional or mainstream medicine, a significant number of individuals, especially those residing in rural areas, still opt for traditional medicine as their preferred approach to treat various ailments (“Prevalence and Socio-demographic Variations in Traditional Medicine Use: A Study from East Nile Locality, Sudan,” 2024). The World Health Organization has estimated that around 80% of the population in developing countries relies on traditional medicine. Tribal communities, for instance, prefer medicinal herbs because they are more affordable than expensive pharmaceuticals. These communities have inherited the ancestral knowledge of indigenous healthcare practices (Jana *et al.*, 2021). Traditional healers impart their indigenous wisdom to patients, sharing knowledge about the preparation of home-based medicinal plant remedies like decoctions and poultices, which are vital for essential healthcare (WHO 2002). Additionally, local inhabitants assert that medicinal plants possess the ability to address ailments and expedite wound healing. The significance of medicinal plants lies in their potential to assist in the treatment of wounds and the prevention of diseases. Apart from being cost-effective, traditional medicine is also believed to have fewer harmful side effects that could potentially be detrimental to one’s well-being (“Herbal and Traditional Medicines Pharmacovigilance for Holistic Treatment,” 2023).

The transmission of this traditional knowledge occurs

orally within kinship networks, but its preservation is at risk due to waning interest among younger generations. Additionally, the gradual integration of Western medicine and the process of modernization further exacerbate the threat of this knowledge becoming extinct (Aziz *et al.*, 2018). The documentation of medicinal plants utilized in traditional and complementary medicine holds great significance, as it serves not only to safeguard cultural practices but also to facilitate the exchange of knowledge among communities and countries, thereby forming a network of shared wisdom (Miguéis *et al.* 2019). However, the documentation of medicinal plants remains incomplete in many countries. Indigenous peoples and rural communities possess traditional knowledge about the uses of these plants, but their existence is endangered by various cultural, social, and economic factors. Unfortunately, only a fraction of this valuable information has been thoroughly and systematically recorded (WHO, 1993).

Various regions across the globe have seen the undertaking of ethnobotanical studies aimed at documenting the traditional knowledge held by indigenous communities regarding medicinal plants. Furthermore, ethnobotanical studies yield valuable information that serves as a foundation for subsequent phytochemical and pharmacological research. In the Philippines, several research studies have been carried out to evaluate the ethnobotanical knowledge of diverse ethnic groups. These studies include investigations among the Tagabawa Tribe in Davao del Sur (Waay-Juico *et al.*, 2018), the Mamanwa tribe of Surigao del Norte and Agusan del Norte (Nuneza *et al.*, 2021), and the Manobo tribe in Davao Occidental

¹ City College of Bayugan, Bayugan City Agusan del Sur, 8503, Philippines

² Biology Department, Caraga State University, Philippines

* Corresponding author’s e-mail: philippinesjeanrose.abejo@deped.gov.ph

(Cabugatan *et al.*, 2022). Through these studies, numerous plant species with promising medicinal properties have been identified, opening avenues for further exploration of their pharmacological activities. However, only few studies have been published (Olowa *et al.*, 2012; Buenavista *et al.*, 2022) on the medicinal plants used by Higaonon Tribe in Mindanao and there are still no studies recorded in Agusan del Sur.

The Higaonon tribe, one of the 110 Indigenous Peoples in the Philippines recognized by the National Commission on Indigenous Peoples. They are predominantly found in the northeastern part of Mindanao, particularly in the provinces of Agusan del Norte, Agusan del Sur, Bukidnon, and Misamis Oriental. Like many other indigenous communities, the Higaonon have their own unique culture and traditions, including their use of traditional medicine. The use of traditional medicine has been an integral part of their culture for thousands of years. Also, traditional medicine remains their primary form of healthcare. However, no extensive research of local Higaonon tribe's medical knowledge and practices has been done in the area.

Thus, the goal of this research was to uncover and document traditional medicinal plant knowledge and practices of Higaonon tribe in the area. The obtained data were utilized to direct subsequent pharmacological investigations and to safeguard the conservation of medicinal plants and indigenous knowledge. Moreover, the documentation of these indigenous plants and associated ethnobotanical knowledge can be used as basis for developing management plan for conservation and sustainable use.

Objectives of The Study

This study tries to investigate the medicinal uses of indigenous plants to human and to document native medicinal plants available at Brgy. Langag, Esperanza, Agusan del Sur. Specifically, the study sought to shed light on the following research objectives:

1. Identify and classify the medicinal plants used by Higaonon tribe in Langag, Esperanza, Agusan del Sur
2. Determine the plant sources, plant habit, and plant part used;
3. Determine the mode of preparation and application of each medicinal plants; and
4. Determine the common ailments, diseases treated of each identified medicinal plant.

Expected Output of the Study

1. A comprehensive documentation of the medicinal plants used by the Higaonon Tribe in Brgy Langag, Esperanza Agusan del Sur.
2. A list of the identified plants.

3. A report that can be used to validate the ethnomedicinal practices of the Higaonon Tribe and promote their conservation.

Significance of the Study

This study will contribute to the preservation of traditional knowledge of medicinal plants and promote their use in primary healthcare. The documentation of the traditional medicinal practices of the Higaonon Tribe will also enhance the understanding of the importance of biodiversity conservation in the Philippines.

Benefitting the study are the various sectors as follows:

Medical Practitioners

This study benefits health professionals as it provides valuable insights into traditional medicinal practices and the potential of medicinal plants. The findings can contribute to the development of new drugs, herbal remedies, and alternative treatments. Healthcare professionals can incorporate this knowledge into their practice and improve patient care.

Local Community

The study can contribute to improving the health and well-being of the local community by validating and preserving their traditional medicinal practices. It can help community members access alternative and locally available healthcare options.

Educators

The study can be used by educators to promote cultural diversity and appreciation among students, fostering an understanding of indigenous knowledge systems and traditional healing practices.

Future Researchers

The study can contribute to the existing body of knowledge in ethnobotany, traditional medicine, and indigenous practices. Future researchers can build upon this study's findings, expanding understanding of medicinal plants and their traditional uses.

MATERIALS AND METHODS

Study Site

The study was conducted among elderly villagers, traditional healers, and herbalists in Barangay Langag, Esperanza Agusan del Sur. Esperanza using geographical coordinates of 8°41'N 125°39'E. (Figure 1) A 1st class municipality in the province of Agusan del Sur, Philippines. According to the 2020 census, it has a population of 59,353 people (Esperanza, Agusan Del Sur - Wikipedia, 2021). The ethnic group in this area is Higaonon and Banwaon speaking.

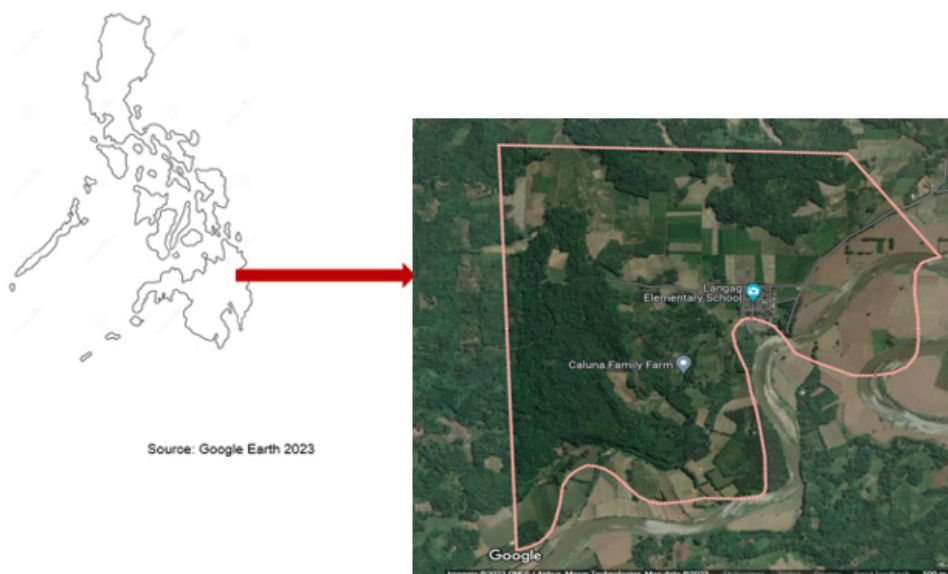


Figure 1: The Study Site – Langag, Esperanza Agusan del Sur

Data Collection and Selection of Study Participants

Fieldwork for this study will be conducted between April and May 2024. Prior to the conduct of study, approval and in accordance with the guidelines provided by the Indigenous Peoples Mandatory Representative (IPMR) and the Chieftain of the Higaonon Tribe was obtained. The participants were purposively selected, comprising herb sellers, traditional health practitioners, farmers, and individuals with indigenous knowledge. Key informants of 20 were composed of 11 females and 9 males with an age range from 40-65 years old. Each informant verbally consented in advance and voluntarily before the interviews began. They were given the assurance that the information would be used solely for academic reasons because knowledge is a natural resource for the local population. After explaining the purpose of our study, the researcher took note of the gender, age, and marital status of every respondent. The respondent’s location, degree of education, and method of learning about medicinal plants, their uses, plant parts used, diseases treated, the preparation and administration methods, and the conservation status (availability of the plants) were also noted by the researcher.

Ethnobotanical information was obtained from participants using a semi-structured questionnaire. The

questionnaire was prepared in English. However, to facilitate efficient communication, informal discussion with herb sellers and traditional health practitioners was held in Cebuano, the local language in these local government areas.

Identification of Medicinal Plants

Preliminary identification of the specimens was documented by taking photographs. Characteristics were noted for accurate classification, then referred to the website used to identify its common name, scientific name through the book “Amazing Healing Plants” by JC Kurian and website stuartchange.com and other internet sources.

Data Analysis

With descriptive statistical methods using percentages, the study tried to analyze and summarize data on the reported medicinal and wild edible plants and associated indigenous knowledge.

RESULTS AND DISCUSSION

The study documented the utilization of 13 plant species by the Higaonon tribes residing in Brgy. Langag, Esperanza Agusan del Sur, which were found to belong to 13 genera across 11 families.

Table 1: List of medicinal plants used for the treatment of various ailments common among the Higaonon tribe of Brgy. Langag, Esperanza Agusan del Sur

Family	Scientific Name	Common Name	Uses	Plant parts Use	Methods of preparation and administration
Apiaceae	<i>Apium graveolens</i>	Hilbas	Fever, body pain. Stomach	Leaves	Poultice, applied to the body to relieve soreness and inflammation and kept in place with a cloth.
Asteracea	<i>Blumeabalsamifera</i>	Gabon	Body Pain	Leaves	Poultice, applied to the body to relieve soreness and inflammation and kept in place with a cloth.

Caricaceae	<i>Carica papaya</i>	Kapayas	Dengue	Leaves	Leaves are soaked in hot water and the infusion (1 cup) is taken three times daily
Lamiaceae	<i>Vitex negundo</i>	Lagundi	Fever, Stomachache, cough and body pains	Leaves	Leaves are soaked in hot water and the infusion (1 cup) is taken three times daily
Lamiaceae	<i>Coenblumei Benth</i>	Mayana	Cough, fever	Leaves	Leaves are soaked in hot water and the infusion (1 cup) is taken three times daily
Lamiaceae	<i>Menthaalberti sennen</i>	Karabo	Cough	Leaves	Leaves are soaked in hot water and the infusion (1 cup) is taken three times daily
Moraceae	<i>Ficus benjamina Linn</i>	Balete	Sprain	Bark	Poultice, applied to the body to relieve soreness and inflammation and kept in place with a cloth.
Myrtaceae	<i>Psidium guajava</i>	Bayabas	Ulcer, Diarrhea, Wounds	Leaves	Chewed, Also Fresh leaves are boiled in water and a cup of the decoction is taken as tea three times a day, Fresh leaves are crushed and used as wound dressing daily
Piperaceae	<i>Piper Betle</i>	Buyo	Flatulence, Stomachache	Leaves	Leaves are boiled in water and 1/2 cup of the decoction is taken three times a day
Poaceae	<i>Cymbopogon</i>	Tanglad	Hypertension	Leaves	Leaves are soaked in hot water and the infusion (1 cup) is taken three times daily
Rutaceae	<i>Citrus maxima</i>	Buongon	Cold Fever	Leaves	Infusion or decoction of leaves (1 cup) is taken orally as tea three times a day
Sapotaceae	<i>Chrysophyllum cainito</i>	Kaimito	Vomiting, stomachache, cough and cold	Leaves	Leaves are soaked in hot water and the infusion (1 cup) is taken three times daily
Zingiberaceae	<i>Curcuma longa Linn</i>	Dulaw (Yellow)	Swelling	Rhizome or Roots	crushed and used as wound dressing daily

The plants were categorized based on their local names, the parts used, preparation methods, and medicinal properties. Among the identified families, Lamiaceae contained three plant species. In contrast, the remaining 10 families, namely Poaceae, Myrtaceae, Zingiberaceae, Apiaceae, Rutaceae, Asteraceae, Caricaceae, Moraceae, Sapotaceae, and Piperaceae, each contributed one species (refer to Table 1). The indigenous people of the Higaonon tribe and traditional healers residing in Brgy. Langag, Esperanza Agusan del Sur, employs a variety of plants available in their surroundings, utilizing different plant parts such as leaves (84%), roots (8%), and bark (8%), which aligns with the practices observed in this study. The leaves, including newly sprouted and young leaves, were the most utilized plant part, with 11 species involved. Additionally, roots were used in one plant species, and rhizomes/roots in another. Based on the responses and observations, the prevalent ailments treated with medicinal plants in Brgy. Langag includes

stomachache, fever, cough, diarrhea, hypertension, and wounds. Given limited access to modern healthcare, a significant portion of the population in Brgy. Langag continues to rely on traditional healthcare practices, although some individuals combine traditional and contemporary medicine approaches.

The Lamiaceae family emerged as a prominent source of medicinal plant species in the present study. This botanical family encompasses numerous plants that serve as functional food sources, yield oils, and possess medicinal properties. It also encompasses a significant number of flowering plants belonging to the mint family. Ethnobotanical, pharmacological, and phytochemical investigations have revealed that Lamiaceae exhibits a wide range of activities, such as antioxidants, antihyperlipidemic, vasorelaxant, and thrombolytic effects, both in vitro and in vivo. These mechanisms contribute to various aspects of cardiovascular diseases (CVD), including stroke, heart attack, and others, as

highlighted in a recent study by Chakrabartty *et al.* (2022). For the Poaceae family, certain plant species within it have been found to have therapeutic applications in treating hypertension, diabetes, inflammation, parasitic infestations, and ulcers, as well as possessing diuretic and antioxidant properties, as indicated in a study by Fatima *et al.* (2018). In the case of the Myrtaceae family, several of its species have been utilized as spices and have a longstanding history in folk medicine for treating various ailments. Multiple studies have highlighted their antimicrobial, anti-inflammatory, and antioxidant activities. As for the Zingiberaceae family, almost every part of these plants is utilized as a source of food, natural dyes, and traditional medicine. Their rhizomes are recognized for their medicinal, pharmacological, and nutritional properties, as explored in the research by Rachkeeree *et al.* (2018).

The Apiaceae or Umbelliferae family, which includes plants like celery, carrot, and parsley, is primarily known for its aromatic nature and characteristic hollow stems. Many plants within this family serve as condiments or vegetables, while some also possess medicinal properties, as noted in the study by Tshikalange *et al.* (2017). On the other hand, the Rutaceae family comprises medicinal plants used in the treatment of pain, dermatitis, rheumatism, and other inflammatory conditions, albeit with limited use due to potential toxicity. Over centuries, the members of the Asteraceae family have been incorporated into both dietary and medicinal practices, as explored by Rolnik and Olas (2021). The Caricaceae family is globally recognized for its therapeutic and nutritional properties, with various parts of the plant being utilized for their therapeutic applications since ancient times, as highlighted in the research by Singh *et al.* (2020).

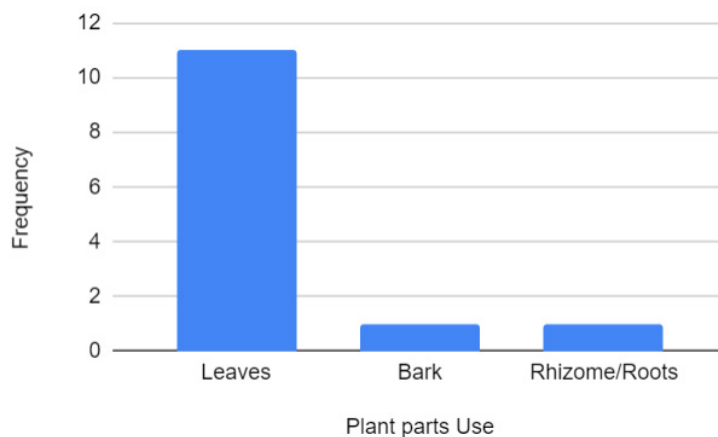


Figure 2: The different parts of plants used against ailments common among the Higaonon tribe of Brgy. Langag, Esperanza Agusan del Sur

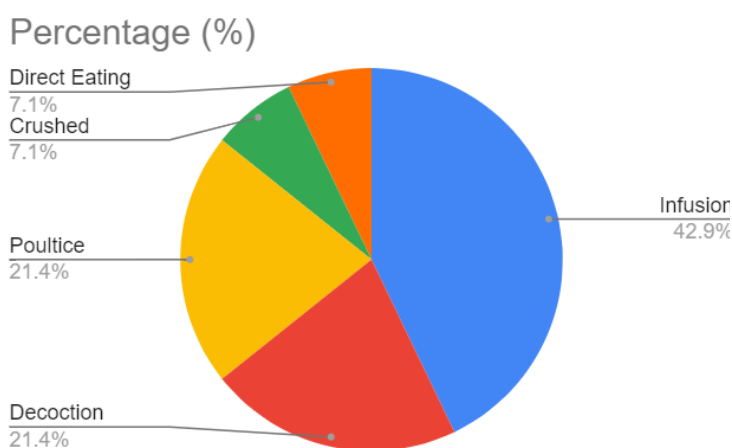


Figure 3: Mode of Preparation of remedies used in the treatment of ailments common among the Higaonon tribe of Brgy. Langag, Esperanza

The Moraceae family encompasses plants whose fruits, roots, and leaves are utilized in traditional medicine to address a range of ailments, including gastrointestinal

issues (such as colic, indigestion, loss of appetite, and diarrhea), respiratory conditions (like sore throats, coughs, and bronchial problems), cardiovascular

disorders, and as anti-inflammatory and antispasmodic remedies, as discussed in the study conducted by Mawa *et al.* (2013). Sapotaceae is valued for its external application in treating skin diseases, rheumatism, headaches, chronic constipation, piles, hemorrhoids, and is sometimes employed as an emetic and galactagogue, as outlined by Chakradhari *et al.* (2019). Piperaceae, found

in many countries, is utilized for its potential to address diverse ailments such as cancer, urinary disorders, fever, stomachaches, and to improve appetite, as reported in the research by Eyob *et al.* (2018).

Identified Medicinal Plants Used By Higaonon Tribe

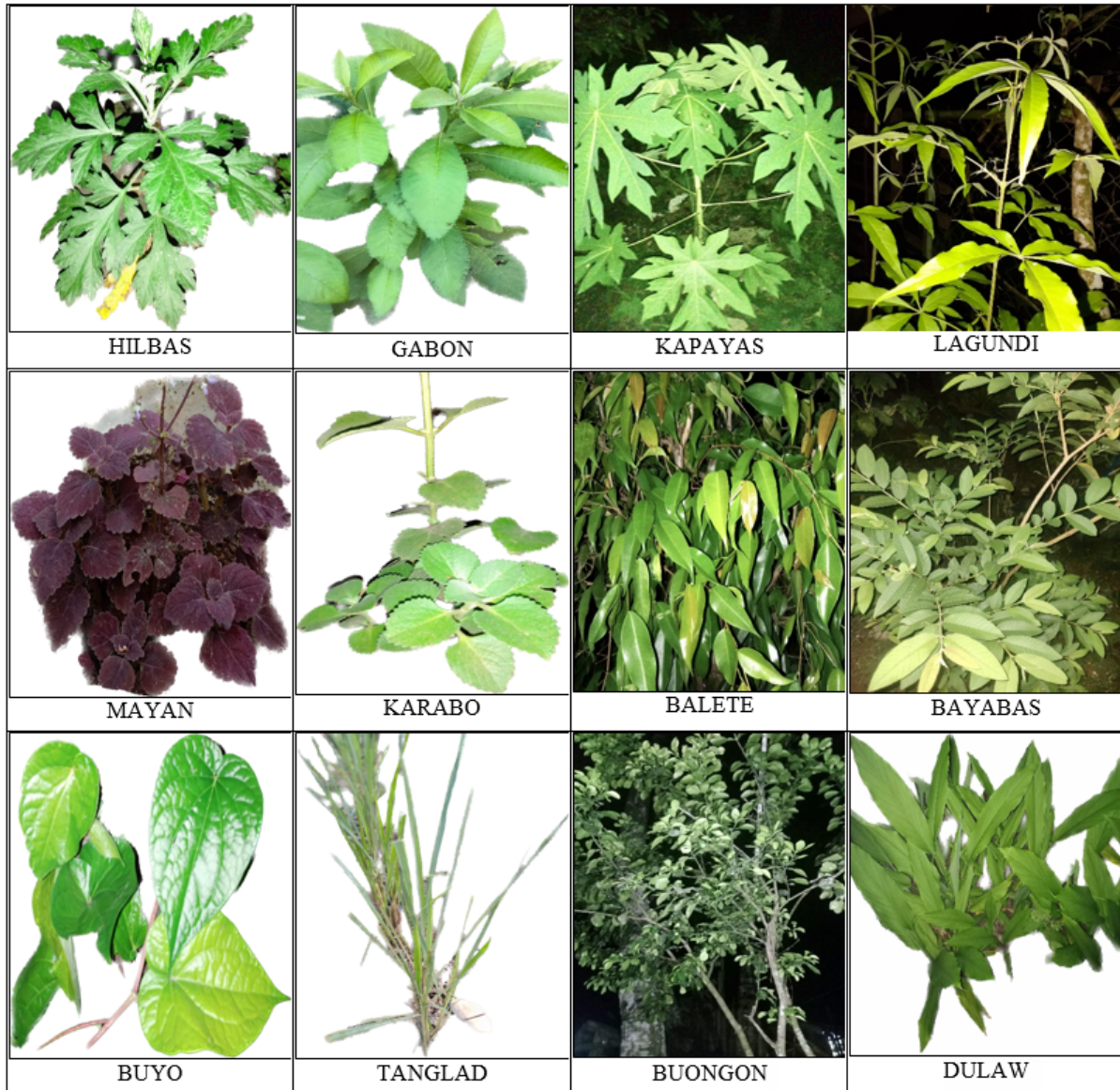


Figure 3: Medicinal plants used by higaonon tribe

Based on the findings from the interviews with the respondents, it was revealed that leaves were the most frequently utilized part of the plant in their therapeutic practices, followed by bark, roots, and rhizomes. According to Liu *et al.* (2023), alkaloids are a class of chemical substances that are synthesized and accumulated in leaves through the process of photosynthesis. The active ingredients found in most herbal preparations include tannins, coumarins, flavonoids, essential oils, and inulins. Unlike medications that necessitate the use of

whole plants, which can lead to uprooting, the utilization of leaves helps conserve the plants, as leaves are abundant, easily gathered, and capable of regeneration. The Higaonon tribe in Brgy. Langag, Esperanza Agusan del Sur employed various plant parts in the preparation of medicinal plants, such as concoction, decoction, extraction, infusion, crushing, and soaking of leaves. The most common method of preparation reported involved infusion (42.9%), decoction (21.4%), poultice (21.4%), then crushed and direct eating (7.1%) indicating both

internal and external applications.

CONCLUSION

Thirteen medicinal plants have been documented, which demonstrate significant efficacy in treating stomachache, fever, cough, diarrhea, hypertension, and arthritis. The leaves of these plants are commonly utilized through decoction, poultice, crushing, and infusion, with oral administration being the preferred method. The Higaonon tribe firmly believes in the remarkable effectiveness of these herbal remedies, often witnessing complete recovery within two to three days. Notably, there is no uniformity in the preparation and dosage practices. These traditional medicinal plants play a crucial role in providing accessible treatment in the absence of immediate access to hospitals and modern healthcare facilities. In conclusion, this study expands our understanding of the medicinal plants utilized by the indigenous Higaonon Tribe in Brgy. Langag, Esperanza Agusan Del Sur. The findings demonstrate that most of the documented medicinal plants possess multiple therapeutic properties. Furthermore, certain plants identified in this study exhibit similarities in terms of their uses and application methods. As such, these findings serve as valuable baseline data for future research endeavors, including pharmacological investigations, as well as the preservation of both medicinal plants and local knowledge to mitigate the risk of extinction. Additionally, this research will serve as a valuable resource for other researchers who are interested in pursuing further investigations into ethnomedicinal plants. The data collected will aid local management in formulating policies for conservation, reproduction, and advocacy to ensure the sustainability of these plants. Future researchers can utilize this data to conduct phytochemical screenings and other laboratory tests on selected medicinal and wild edible plants, as well as develop strategic plans for conservation. Moreover, efforts to strengthen dissemination and information campaigns regarding the uses of these plants will be emphasized.

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