Research Article

Medicinal Plants used by the Manobo Tribe of Prosperidad, Agusan Del Sur, Philippines-an Ethnobotanical Survey

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Submission Date: 13-09-2020; Revision Date: 22-11-2020; Accepted Date: 01-12-2020

ABSTRACT

Objectives: The Philippine Manobo tribe is historically rich in ethnomedicinal practices and known to use local names as "Lunas" (meaning cure) of most medicinal plants. The purpose of this study is to record the traditional practices, use of medicinal plants and information of the Agusan Manobo tribe in order to establish the relative significance, consensus and scope of all medicinal plants used. **Methods:** Ethnomedicinal survey of medicinal plants was carried out in three selected barangays of Prosperidad City, Agusan del Sur. Ethnomedicinal data were collected through a semi-structured interview, group discussions and guided field walks from 144 primary informants. Plant importance was calculated using indices such as Family importance value (FIV) and relative frequency of citation (RFC). **Results:** A total of 40 species belonging to 34 genera and 23 families have been identified as having ethnomedicinal significance. The highest FIV (97.27) in the treatment of body pain, hypertension and infection was reported for Asteraceae. The most commonly cited species of medicinal plants were *Anodendron borneense* King and Gamble and *Thottea* sp.(RFC = 0.50) which is primarily usedfor treating gastrointestinal infection. **Conclusion:** The findings of this study show the rich ethnomedicinal tradition and knowledge of the cultural community of Agusan Manobo in Prosperidad City. Thus, for the potential management and conservation strategies of such plant genetic resources, recording these traditional knowledge of medicinal plants and practices is highly important. This indigenous legacy of awareness regarding medicinal plants will open pathways for future drug discovery to enhance global healthcare.

Key words: Agusan Manobo, Ethnobotany, Medicinal plants, Prosperidad, Survey.

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INTRODUCTION

In the last century, ethnobotany has developed into a scientific discipline that uses not only botany and anthropology but also ecology, economics, public policy, pharmacology, public health and other disciplines as necessary to investigate the relationship between people and plants.[1] Ethnobotanical studies can have a critical role in highlighting important plant species in a particular region.[2] Philippine ethnobotanical studies prevail among diverse cultural communities and enhance the complex existence of traditional knowledge. This knowledge stems from the numerous studies conducted in different regions which cover the areas of Luzon, Visayas and Mindanao. The World Health Organization (WHO) accounted for approximately 60% of the world's population depending on conventional medicine and 80% of the population in developing countries depend almost entirely on traditional medical practices, especially herbal treatment. The use of herbal treatment and phytonutrients or nutraceuticals continues to

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DOI: 10.5530/ajbls.2020.9.49

grow rapidly throughout the world with many people now resorting to such products in different national healthcare settings for the treatment of various health problems.[3] Due to the growing demand for drug discovery and medicinal plant production, the application of ethno-pharmacology has been increasingly rising in recent decades including multivariate analysis.[4]

Literature suggests that the Philippines is abundant with the numerous medicinal plants used by the Filipinos. Nevertheless, few comprehensive ethnobotanical research studies have been carried out to record the availability and the use of the Philippines' rich plant biodiversity and cultural diversity.[5] The Ayta community in Dinalupihan, Bataan of Luzon.[6] and the Ati community in Iloilo of Visayas[7] were recorded in particular while Mindanao remained less studied. Mindanao is mainly populated with 61% of the Philippine's total indigenous population (IPs). One of the largest IP communities in Mindanao is the Manobo Tribe, which primarily resides in the Agusan del Sur province known as the Agusan Manobo. They are regarded as the largest ethnic group in the Philippines occupying a larger distribution area than other indigenous groups such as the Bagobo, Higaonon and Atta.[4] Ethnologically, the word Manobo has been named after "Mansuba" which means river people. They live along the provincial valley of the Agusan River and Agusan marshland territories.[8] Due to geographical division, indigenous Manobo groups are clustered accordingly, sharing areas with different dialects and certain aspects of culture. Their historic lifestyle and daily livelihood are rural agriculture and depends primarily on their rice harvest, root crops and consumable vegetables.[4] Over the years, their tribe has passed many hurdles, but has managed to uphold and defend their ancestral territory to retain their cultural traditions, rituals and values to this present generation continuously. This culture suggests that the traditional practices of Agusan Manobo include a rich knowledge of medicinal plants, but their indigenous knowledge has not been recorded systematically.[4] Five studies have already been carried out covering certain areas of Agusan del Sur[4,5] particularly in Bayugan, Esperanza and Sibagat[9] which reveal the medicinal plants used by people of Manobo to assess and study the medicinal value of their plants that will help people living in remote rural areas and far from modern healthcare.[10]

On the contrary, there is still an incomplete detail of ethnobotanical studies of medicinal plants used by the Manobo tribe in the Philippines. Three unexplored barangays in Prosperidad, the capital city of Agusan del Sur, is here conducted to extend the ethnobotanical knowledge in this area to complement the earlier studies. This cultural knowledge possessed by indigenous people is an essential resource to be preserved. Therefore, an ethnobotanical study of the medicinal plants used by the Manobo tribe of Prosperidad, Agusan del Sur, is needed. Because knowledge of traditional medicinal plant application is useful for community health care activities,[11] recording plants used by the traditional healers is of prime importance to local and tribal people to treat ailments.

MATERIALS AND METHODS

Study area

Fieldwork was carried out in the province of Agusan del Sur, Philippines (8° 30´ N 125° 50´ E), bordered by Agusan del Norte to the north, Davao del Norte to the south and Misamis Oriental and Bukidnon to the west, Surigao del Sur to the east. Agusan del Sur is bounded by mountain ranges from the eastern and western sides which form an elongated basin or valley in the longitudinal center section of the land. The province is divided into 13 municipalities ranging from the largest to the smallest area of land: La Paz, Esperanza, Loreto, San Luis, Talacogon, Sibagat, Prosperidad, Bunawan, Trento, Veruela, Rosario, San Francisco and Sta. Josefa. This study purposely covered three selected barangays of Prosperidad (Figure 1) with the certification of ancestral domain title (CADT), as endorsed by the National Commission on Indigenous Peoples (NCIP)-CARAGA Administrative Area, for reasons of accessibility, availability and protection. Such sites are part of the province's protected areas that constitute nearly two-thirds (74%) while alienable and disposable areas are around one third (26%).[12]

Field Survey

Fieldwork for the entire month of November 2019 was carried out. Before the actual interview, field survey and selection in selected barangays of Prosperidad, Agusan del Sur, namely Magsaysay, Mabuhay and Poblacion, prior acquisition of the requisite approval was secured such as informed consent, certification and permit (GP No. R13-2019-62 of October 2, 2019). Meetings and consultation were held together with 1 tribal leader and tribal healer.

A total of 144 indigenous respondents were chosen by purposive and snowball sampling, which is more than 10% of the total population of chosen barangays, consisting of tribal council and members. A total of 59 females and 85 males were collected with an age range between 18-80 years old and the median age being 46

Figure 1: Geographical Map showing A. The Province of Agusan del Sur in a box of the Philippines Map and B. The selected sites of the Municipalities of Prosperidad: Mabuhay, Magsaysay and Poblacion. (Map data @ 2020 Google).

were sampled. Ethnomedicinal data on plant uses were collected using semi-structured interview guide for locals and elderly people who were familiar with typical plant uses that were uniquely prepared in study. Focus group discussions among respondents were supported as consultant by the respective barangay tribal leaders to acquire consensus and explain their importance points and ideas.

Collection and identification

During field works, actual species identification of plants was carried out with the assistance of the City Environment and Natural Resources Office's (CENTRO) forester guide and tribal healer to document the vernacular names. Collection of at least 2-3 branches with reproductive parts was then pressed, poisoned and placed as herbarium vouchers and deposited in the University of Santo Tomas Herbarium (USTH). Dictionary of Philippines Plant Names by Madulid[13] applied to vernacular names of specimens. Mr. Danilo Tandang, a botanist and researcher at the National Museum of the Philippines, confirmed the plant identifications. Using The Plant List[14] and the newly created World Flora Online[15] all scientific names were reviewed for spelling and synonyms and family classification. The occurrence, distribution and latest identification of species was further verified in the updated Co's Digital Flora of the Philippines.[16]

Family Importance Value (FIV)

FIV identifies the most important family according to the number of informants' citation reports.[17] This was determined using the following formula: FIV=(FC/N) × 100, where FC is the plant family quotation frequency and N is the total number of informants. The FIV also helps to characterize families according to the number of plants used as medicinal products in a specific plant family.

Relative Frequency of Citation (RFC)

RFC on the other hand, determines the local importance of medicinal plant species[18] as calculated using this formula: RFC = FC/N, where FC is the number of informants who listed the plants species while N is the total number of informants. RFC ranges its value from 0 to 1 where the values of most significant species are closer to 1.

RESULTS

The census of medicinal plants comprising a total of 40 species from 34 genera and 23 families was described in Table 1. Results showed that Asteraceae had the highest FIV (97.27), followed by Aristolochiaceae (31.15), Apocynaceae (24.28), Urticaceae (19.49) and Poaceae (11.02) that are medicinally used for abdominal and muscle pain, cuts and wounds, hypertension, diarrhea, skin diseases, fever, diabetes and blood infection. The highest RFC values have been recorded for *Anodendron borneense* King and Gamble and *Thottea* sp. (0.50). Such medicinal plants are highly cited to treat gastrointestinal disorders, diseases of the skin and infections as shown in Figure 2.

Among the various plant parts used by the Agusan Manobo against a variety of illnesses as shown in Figure 3. The most medicinally used parts of the plants are the leaves (35%) followed by roots (33%), stem (20%), bark (10%), shoot (8%), whole plant (5%) and flower and rachis (2.5%). The fact that leaves are the most widely used part is in line with similar findings recorded in many other ethnomedicinal studies in Asia.[19] The preparation process is divided into four categories, plant parts used as a paste, juice extracted from the plant's fresh parts and plants used to make a decoction in combination with water and powder made of fresh or dried content. The mode of administration, however, differs from ailment to ailment, as in the case of *Ageratum conyzoides*, *Blumea balsamifera* and *Erigeron sumatrensis* wherein their leaves were heated over the flame and applied directly to the affected areas for abdominal and muscle pain, tension, stress, strain, swelling and tenderness., while the leaves of *Dischidia* sp. were used for scabies and skin diseases. Results also showed that leaves were mostly used to treat bruises, cuts and fresh wounds by pounding like *Chromolaena odorata, Leucaena*

Table 1:Medicinal plants used by tribal population of Prosperidad Agusan del Sur.

No.	Scientific Name	Local Name	Voucher #	Family	FIV	RFC	Plant Part/s Used	Preparation and Administration	Medicinal Uses
1	*Acmella grandiflora* R.J. Jansen	Lunas bitin	016363	Asteraceae	97.27	0.021	Fl	Chew flower and let the juice absorb by the tooth.	Toothache
2	*Ageratum conyzoides* L.	Kanding-kanding	016389	Asteraceae	97.27	0.042	Lf	Squeeze heated leaves over the flame and place in aching part of the stomach.	Abdominal pain
3	*Alphitonia excelsa* Fenzl	Winter green	016374	Rhamnaceae	1.60	0.069	Bk	Inhale aromatic decocted bark. Essential oil is used for rubbing.	Convulsion, colds, cough, fever, influenza
4	*Anodendron borneense* King and Gamble	Himag	016399	Apocynaceae	24.28	0.451	Bk, St	Infuse bark/stem with local wine for 6 -12hr and drink 1 tablespoon of the infusion twice a day.	Gastrointestinal and Liver infection
5	*Blumea balsamifera* L.	Gabon	016383	Asteraceae	97.27	0.146	Lf	Heat leaves over flame and place in affected area	Tension, stress, Strain, Swelling, Tenderness
6	*Calamus* sp.	Kape, Rattan	016398	Arecaceae	1.44	0.049	Ra/St	Apply stem extract on affected area.	Boils
7	*Caryota cumingii* Lodd.	Pugahan	016396	Arecaceae	1.44	0.042	Lf	Burn leaves mixed with oil and apply on affected area.	Body pain, muscle swelling, internal bleeding, snake bite
8	*Chromolaena odorata* R.M. King and H. Rob.	Hagonoy	016364	Asteraceae	97.27	0.222	Lf	Pound leaves and patch on apply in the affected area.	Bruises. cuts and wounds
9	*Dendrochnide* sp.	Aligatong	016377	Urticaceae	19.49	0.389	Rt	Drink decocted roots in 1-2 glasses.	Body pain, diarrhea, urinary tract infection,
10	*Dendrocnide* sp.	Sagay	016359	Urticaceae	19.49	0.035	Rt	Drink decocted roots in 1-2 glasses.	Kidney problem, urinary tract infection
11	*Dischidia* sp.	Makipot	016392	Apocynaceae	24.28	0.076	Lf	Squeeze heated leaves over the flame and place in affected areas.	Scabies, skin diseases
12	*Elephantous tomentosus* L.	Sambong	016362	Asteraceae	97.27	0.035	Lf	Drink decocted leaves in 1-2 glasses for thrice a day.	Detoxifier, hypertension, urinary tract infection
13	*Eleusine indica* L.	Paragis	016372	Poaceae	11.02	0.118	Wh	Drink decocted whole plant in 1-2 glasses.	Diabetes, heart and lung problems
14	*Embelia* sp.	Kapiko	016381	Primulaceae	0.64	0.028	Lf	Eat a leaf thrice a day.	High sugar
15	*Erigeron sumatrensis* Retz.	Manggisoy	016368	Asteraceae	97.27	0.035	Lf	Apply the heated leaves over flame to the painful parts to relieve soreness and inflammation.	Muscle pain and spasm

(continued)

Table 1:*(continued)*.

No.	Scientific Name	Local Name	Voucher #	Family	FIV	RFC	Plant Part/s Used	Preparation and Administration	Medicinal Uses
16	*Euphorbia hirta* L.	Tawa-tawa	016382	Euphorbiaceae	0.32	0.014	Lf, Rt	For eye infection, drop leaf extract in the affected area. For dengue and malaria, drink decocted roots thrice a day.	Dengue, eye infection, malaria
17	*Ficus botryocarpa* Miq.	Basikong	016379	Moraceae	8.63	0.021	St	Rub young stem, squeeze and drink the extract.	Body and muscle pain
18	*Ficus minahassae* Teijsm and Vriese	Hagimit	016380	Moraceae	8.63	0.042	Sh	Drink squeezed young shoot mixed with the *Alphitoniaexcelsa.*	Convulsion, colds, cough, fever, influenza
19	*Ficus concinna* Miq.	Balete	016369	Moraceae	8.63	0.063	Bk	Apply decocted bark directly as brace to the broken parts. Replace once dried.	Broken bones
20	*Ficus* sp. *1*	Hagimit	016388	Moraceae	8.63	0.042	St, Sp	Drink the stem sap.	Fever and convulsion
21	*Ficus* sp. *2*	Tabod	016385	Moraceae	8.63	0.076	Rt	Drink decocted roots in 1-2 glasses.	Cough
22	*Ficus* sp. *3*	Hibi-hibi	016384	Moraceae	8.63	0.035	Sh	Drink decocted young shoots in 1 cup.	Muscle spasm
23	*Hellenia speciosa* J. Koenig	Tambabasi	016378	Costaceae	4.63	0.201	Sh	Drink squeezed extract of young shoot mixed with the *Alphitonia excelsa.*	Convulsion, colds, cough, fever, influenza
24	*Homalomena philippinensis* Engl.	Gabi-gabi, Tapol	016360	Araceae	4.31	0.007	Rt	Drink decocted roots in 1-2 glasses.	Kidney problem, urinary tract infection
25	*Imperata cylindrica* L.	Kogon	016373	Poaceae	11.02	0.007	Rt	Chew young roots.	Urinary tract infection
26	*Knema glomerata* Blanco	Duguan	016394	Myristicaceae	0.32	0.014	Bk	Drink decocted bark in 1-2 glasses.	Anemia, influenza, hypertension, postpartum care and recovery, relapse
27	*Leucaena leucocephala* Lam.	Ipil-ipil	016371	Fabaceae	1.44	0.014	Lf, Sp	Pound leaves and drink 1 tablespoon of leaf sap.	Deworming
28	*Mapania cuspidata* Miq.	Handig-handig	016393	Cyperaceae	0.80	0.035	Rt	Drink decocted roots in 1-2 glasses.	Relapse, postpartum care and recovery, spasm
29	*Mikania cordata* Burm. F.	Moti-moti	016365	Asteraceae	97.27	0.104	Lf, St	Pound leaves and young stem then apply in the affected area.	Wounds

(continued)

Table 1:*(continued)*.

No.	Scientific Name	Local Name	Voucher #	Family	FIV	RFC	Plant Part/s Used	Preparation and Administration	Medicinal Uses
30	*Mimosa pudica* L.	Sampinit	016387	Fabaceae	1.44	0.007	Lf, Rt, St	Drink decocted roots, stem and leaves.	Muscle spasm
31	*Musa* sp.	Agutay, Saging-saging	016395	Musaceae	0.48	0.021	St	Squeeze stem to obtain extract. Drink or mix extract in water used as wash.	Muscle pain and spasm
32	*Neonauclea* sp.	Hambabaod	016376	Rubiaceae	1.44	0.063	Rt	Drink decocted roots in 1-2 glasses.	Abdominal pain, arthritis, colds, influenza
33	*Pandanus* sp.	Bayoy	016390	Pandanaceae	0.80	0.035	Rt	Drink decocted roots in 1 cup.	Abdominal cramps, nausea, vomiting blood
34	*Paspalum conjugatum* P.J. Bergius	Carabao-grass	016361	Poaceae	11.02	0.035	Lf	Drink decocted leaves in 1-2 glasses for thrice a day.	Fever, urinary tract infection
35	*Peperomia pellucida* (L.) Kunth	Lato-lato	016366	Piperaceae	1.12	0.049	Rt	Drink decocted roots in 1-2 glasses.	Stomachache
36	*Phrynium bracteosum* Suksathan and Borchs	Hagikgik	016367	Maranthaceae	2.88	0.125	Wh	Drink decocted whole plant.	Abdominal pain, convulsion
37	*Shorea squamata* Benth and Hook. F	Lauan	016397	Dipterocarpaceae	2.24	0.097	Rt	Drink decocted roots in 1-2 glasses.	Dehyrdration, diarrhea, stomach problem
38	*Stachytarpheta jamaicensis* L.	Elepante-elepante	016370	Verbenaceae	2.88	0.042	Lf	Pound leaves and place in affected area with pus.	Folliculitis
39	*Tetracera scandens* J.F.Forst and G.Forst	Habtong	016391	Dilleniaceae	0.64	0.028	St	Drink water from the stem early morning.	Cold, convulsion, fever, influenza
40	*Thottea* sp.	Salimbagat	016375	Aristolochiaceae	31.15	0.451	Rt	Drink decocted roots in 1-2 glasses.	Diarrhea and stomach problem

Fl - flower, Lf - leaf, Sp - sap, St - stem, Ra - rachis, Rt - root, Sh - shoot, Wh - whole plant

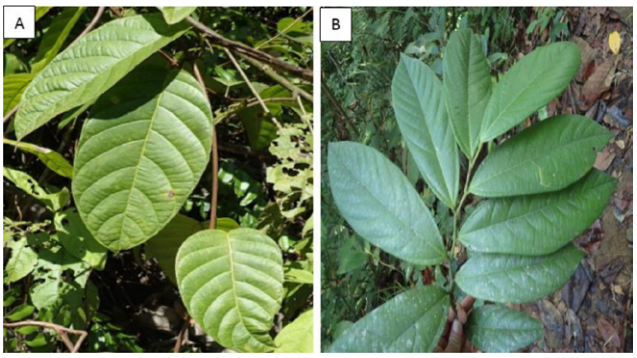

Figure 2: Leaf branch of medicinal plants with the optimum Relative Frequency of Citation values: (a) *Anodendron borneense* King and Gamble and (b) *Thottea* sp. Photos taken by Danilo Tandang.

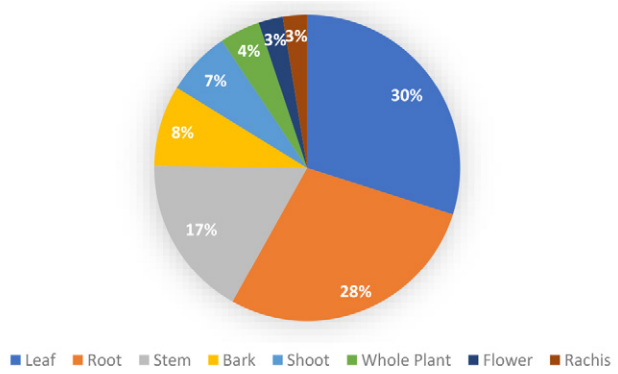

Figure 3: Percentage of plant parts used for medicinal preparation by tribal people of Prosperidad, Agusan del Sur, Philippines.

leucocephala and *Stachytarpheta jamaicensis*. Several species can also be used to treat with the same mode of preparation like decoction for fever, urinary tract infection, hypertension and detoxifier. Examples include *Elephantous tomentosus, Mimosa pudica* and *Paspalum conjugatum*. Other species can also be used to treat ailments with different modes of application. *Embelia* sp. can be eaten directly by chewing for diabetes and the leaf sap of *Euphorbia hirta* can cure eye infection.

It was also been found that some of the preparations used roots, stems, bark and whole plants to treat various conditions such as boils, all body pain, internal bleeding, snake bite, diarrhea, kidney problem, dengue, malaria, cough, relapse, postpartum care, influenza, nausea and vomiting blood.

DISCUSSION

The sample consists of 41% female and 59% male informants. The majority of primary informants in terms of occupation are farmers (54%), followed by unemployed (36%), formal employment (13%), animal husbandry (2%). Many of them completed primary level (74%), followed by secondary level (24%) and higher education (2%). The survey included respondents who were either married (90%) or single (10%). Most of them were Manobo members (60%), followed by tribal leaders (24%), tribal council of elders (12%) and one each for tribal chieftain (2%) and tribal healer (2%).

On the average, each main informant at Agusan Manobo has reported 40 species of medicinal plants used in the treatment of different diseases. The relative frequency of citation (RFC) and family importance value (FIV) of medicinal plants were relatively dependent on the number of reported medicinal plants known among the respondents of Agusan Manobo. Among the main informants, this number of medicinal plant information varied relative to place, social role, nature of work, educational attainment, civil status, gender and age. Descriptive and inferential statistics demonstrate important factors influencing Agusan Manobo's knowledge of medicinal plants.

This study recorded ethnobotanical knowledge of 40 medicinal plant species belonging to 34 genera and 23 families to treat various ailments such as fever and headache, cough and cold, toothache, dermatological diseases, cuts and wounds, ophthalmological problems gastrointestinal disorders, kidney problems musculoskeletal disorders (Table 1). Most of these medicinal plants grow in the wild in different ecotype, as the Agusan Manobo believes that they can flourish in their natural environment with healing powers.

CONCLUSION

This study revealed the Agusan Manobo's rich ethnomedicinal plant information on medicinal plants used to treat different diseases. Hence, the need for more detailed medicinal plant documentation to help local health care. It also leads to the advancement of the alternative medicine programs. This richness of Agusan Manobo's traditional knowledge may be lost unless it is completely passed on to the younger generation as a whole. In line with the government programs and initiative, recognizing the role of indigenous knowledge for potential leads to satisfying the needs of searching for bioactive compounds and future drug discovery, growth, sustainability and conservation.

ACKNOWLEDGEMENT

We are grateful to all the people behind the success of this research work, namely Atty. Felix Alicer (Regional Director CARAGA Region), Honorable Frederick Mark Mellana (Municipal Mayor, LGU, Prospeidad, Agusan del Sur), Josephine Dumas, Mark Lloyd Dapar, Julius

Salamanes and Manobo indigenous community of Prosperidad, Agusan del Sur. The first author thanks the financial support granted by the Center for Research Development, Adamson University and Department of Science and Technology- Accelerated Human Resource Development Program-National Science Consortium (DOST-ASTHRDP-NSC)for scholarship award.

CONFLICT OF INTEREST

The author declare no conflict of interest.

ABBREVIATIONS

Bk: Bark; **Fl:** Flower; **GP:** Gratuitous permit; **IP:** Indigenous People; **Lf:** Leaf; **Ra:** Rachis; **Rt:** Root; **Sh:** Shoot; **Sp:** Sap; **sp:** Species; **St:** Stem; **Wh:** Whole plant.

SUMMARY

This paper is an ethnobotanical survey of the various medicinal plants utilized by the Manobo tribe in Prosperidad, Agusan del Sur, Philippines presenting the specific parts of the plants particularly used for therapeutic purposes, the preparation and manner of administration, including information about the diseases in which the medicinal plants are used. The data showed that a total number of 40 plant species belonging to 34 genera and 23 families possess a substantial medicinal property. Asteraceae appeared to possess the highest Family Importance Value (FIV), a value which distinguishes the most significant plant family according to the number of informants' citation reports particularly used in the treatment of body pain, hypertension and infection. Furthermore, the Relative Frequency of Citation (RFC) which determines the local importance of medicinal plant species revealed that *Anodendron borneense* King and Gamble and *Thottea* sp. were the most commonly cited medicinal plant species used mainly as a remedy for gastrointestinal infection. Hence, this study demonstrated that the Agusan Manobo tribe have an immense and varied knowledge about medicinal plants which warrants robust management and conservation efforts for potential future drug discovery for the benefit of not only of the locals but also of entire humanity.

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Cite this article: Paraguison LD, Tandang DN, Alejandro GJD. Medicinal Plants used by the Manobo Tribe of Prosperidad, Agusan Del Sur, Philippines-an Ethnobotanical Survey. Asian J Biol Life Sci. 2020;9(3):326-33.