

Ethnobotanical study of indigenous plants used by local people of Agusan del Sur, Philippines

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ABSTRACT

Medicinal and wild edible plants are important for human existence. This study aimed to investigate medicinal uses of indigenous plants to human and to document wild edible plants (WEP). Ethnobotanical data were obtained from 493 informants using semi-structured interviews and field observations done in 32 communities. The study documented 126 species of medicinal plants belonging to 57 families and 105 genera. Herbs were largely

utilized and prepared mostly by decoction, extraction, and infusion to cure human diseases/ailments. The largest number of taxa of medicinal plants came from Families of Gramineae and, Lamiaceae (7), Euphorbiaceae (6), Liliaceae, Asteraceae, Moraceae and, Malvaceae (5). Some documented 53 species of wild edible plants belong to 46 families mostly utilized as vegetables for food and sources of income.

The commonly used wild edible plants belong to Family Convolvulaceae, Musaceae, and Arecaceae. Documenting these indigenous plants and associated ethnobotanical knowledge can be used as basis for developing management plan for conservation and sustainable use.

Keywords

Ethnobotany, Medicinal Plants, WEP

Introduction

One of the millennium development goals is sustainability of the environment. Forest preservation, plant resources in the community should be available for its use for the coming generations.

Ethnobotany, the study of plants used by specific cultures for various reasons, traces the development of modern medicine. Medicinal plants have important contributions in the healthcare system of local communities as the main source of medicine for the majority of the rural population (Bekalo, 2009).

An inquiry into the ethnobotanical knowledge of students in Arizona, USA revealed that students have limited knowledge of the plant domain listing only an average of five plants out of twenty seen from a video clip, the majority of which were non-

native (O'Brien, 2010). The research results highlighted how cultural knowledge about local plants can be applied to educational programs that promote experiential learning.

The United Nations Convention on Biological Diversity (CBD) (Upreti, 2012) strived to implement its three major goals: conservation of biological diversity; sustainable use of its components; and a fair and equitable sharing of the benefits from the use of genetic resources. These goals are applicable to medicinal plant resources. According to CBD's article 8 (j): "Traditional knowledge, Innovations and Practices, signatories agree to respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity and promote their wider application with the approval and involvement of the holders of such

knowledge, innovations and practices and encourage the equitable sharing of the benefits arising from the use of such knowledge innovations and practices.”

Balch (2012) said that herbs support general health and the top reasons given for using herbs are boosting energy (60%); preventing colds (56%); boosting immune system (54%); improving sleep (43%); and helping prostate (18%) of the 500 males in the survey.

Purposely, this study tried to investigate the medicinal uses of indigenous plants to human and to document wild edible plants (WEP) available at Prosperidad, Agusan del Sur, Southern Philippines.

Specifically, the study sought to shed light on the following research questions:

1. What the medicinal plants are used by the local people in Agusan del Sur, its utilization, preparation and administration routes?
2. What are the wild edible plants and how are these utilized and prepared by the local people?
3. Which species of the wild edible plants can be a source of income?

Prosperidad, Agusan del Sur where the study was conducted, has thirty two (32) communities which are remote and very far from D.O. Plaza Memorial Hospital located in Patin-ay, Agusan del Sur, the government center of the province. Due to the distance and scarcity of public utility vehicles, some folks used medicinal plants to treat illnesses and diseases. However, most of the folks are not aware of the benefits of the medicinal plants and tend not to take care and value the resources.

In *Eastern Bostwana*, there is a shrinking on the knowledge and on uses of medicinal plants due to migration to urban areas and that young generation lost their interest in people medicinal uses of plants (*Motihonka & Nthoiwa, 2013*). The problem also assails in Agusan del Sur, Philippines and

similar places where over the counter drugs are available.

In the study conducted by Bekalo (2009) in Konta Special Woreda, Ethiopia claimed that environmental and cultural changes threaten the resources which signal the need to take measures for public awareness in conserving the medicinal plants in the natural ecosystem

One of the reasons of losing the knowledge of traditional medicine in West Ethiopia was due to advancement of knowledge of people in the place. Since traditional medicine is transferred orally from generation to generation, basic information in the use of the plants and the part used, drug preparation method, the diseases treated and others may be lost and discarded in the knowledge transfer process (Megersa et. al, 2013).

In another study conducted by Au (2008) in Guangdong , China and at Jeolla, Korea and by Kim and et., al. (2012), revealed that the cause for fast disappearance of traditional culture and natural resources was linked to urbanization and industrialization, suggesting that unrecorded information may be lost forever.

The people of *Quijar tribe* of India had maintained the preservation of knowledge due to continues reliance to WEP, but decline in the use of these plants may gradually lead to fading away of indigenous knowledge associated with their use. Anthropogenic factors are evident causing wild edible plants for they are under growing pressures (Rashidet. al, 2008). Overgrazing and stocking, expansion of agricultural land forest cuttings for construction and technology, over exploitation of forest products and uncontrolled fire settings threaten the WEP in Janmu and Kashmir State-India.

Wild edible plants in Poba, India are gathered from different habitats and provide as source of income and livelihoods, needs urgent conservation initiatives for ecological stability, human well-being and also as local heritage (Pegu et al, 2013). Deforestation and other anthropogenic activities and natural

calamities, particularly erosion is a big threat on their ecosystem.

Educating people about non timber forests products may promote better harvesting practices and improve the likelihood of sustainable use and resource conservation (Burgess, 1994). Understanding the relationship between indigenous people and their threatened economic plants can aid the conservation effort of many levels.

In the Philippines, gardens of medicinal plants are part of culture. People of different status are using herbal plants as remedies for headaches, stomach ache, fatigue, muscle pains, spasm, gas pains, and wounds, much more in their local communities where medical practitioners are very few who cannot attend to the needs of the people for healing of the ailments they have.

Republic Act 8423, otherwise known as the "Traditional and Alternative Medicine Act (TAMA) of 1997 gave rise to the creation of the Philippine Institute of Traditional and Alternative Health Care (PITACH) which is tasked to promote and advocate the use of traditional and alternative health care modalities through scientific research and development.

Ammakiw, C.L. & Odiem, M.P. (2014), hold that there was no significant relationship determined on the level of knowledge on the preparation of the herbal plants except origin where the highlanders were significantly more knowledgeable than the lowlanders. People in Kalinga, Northern Philippines were not knowledgeable on the uses of *Cassia alata* L. (akapulko) to cure cough and as mouthwash and purgative; on the antipyretic effect of *Momordica charantia* (ampalaya) and the use of *Psidium guajava* (guava) to prevent nose bleeding.

Miano, R.S. & Alonso, C.G. (2011) stated that medically-important plant roots cited by traditional healers from the four municipalities of Cebu, Philippines reported to be very effective in treating ailments/diseases are the *Justicia sp.* (mandalusang puti) in Argao, *Euphorbia hirta* Linn. (mangagaw) in

Naga, male *Carica papaya* (papaya) in San Fernando, and *Ortosiphon aristatus* (wachichao) in San Remigio.

With the common causes of losing the medicinal and edible plants in almost any part of the world, documentation of the indigenous knowledge of the local people on the utilization of these indigenous plants in Agusan del Sur, Philippines is much needed for environmental awareness, management, reproduction and sustainability for the next generation.

Framework of the Study

Thompsonianism Theory (Thompson, 1981) stated that a disease is a result of a decrease derangement of the vital fluids, brought by loss of animal heat. The resulting symptoms are interpreted as efforts of the vital force to get rid of the toxic encumbrances generated. The *Physiomedicalism* Theory came as the second major stream of thought in herbal medicine. Ultimately, this new system of herbal medicine retained much of what had been accepted as fundamental in the *Thompsonianism* Theory. Thus, herbal function was thought of as aggregate expression of vital force, acting through cellular metabolism to maintain the functional integrity of the entire organism.

Method

This study used the descriptive survey research design. It employed a purposive sampling of 490 informants with age ranging from 40 to 80, and three herbalists of ages 50 - 75 who used traditional healing practices for more than 30 years and who are natives in the 32 communities of *Prosperidad, Agusan del Sur, Southern Philippines*. For ethical purpose, the researchers asked permission from community chairmen and key informants to answer questions during the documentation process of the medicinal and wild edible plants.

Ethnobotanical Data Collection

Ethnobotanical data were collected from July 2013 to May 2014 through semi-structured interviews and field observations with selected knowledgeable elders, herbalists. The community health workers using the vernacular (Visayan language). Information regarding plant part used, preparation administration routes and its efficacy were documented.

Photographs were taken for plants found on their home gardens and available in the nearby place during the visit. For plants found in the jungle, local names were identified and characteristics were given by the informants.

Plant Identification Procedure

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.

Ethnobotanical Data Analysis

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

Results and Discussion

The informants reported one hundred-twenty-six (126) plant species that they actually used for medicinal purposes. The total number of taxa is summarized into total number of species recorded, families and genera of medicinal plants used by local people in Prosperidad, Agusan del Sur, Philippines, as shown in Table 1.

Table 1
Total Number of Taxa Recorded
(Medicinal Plants)

Number of Species	126
Families	57
Genera	105

Table 2. List of Medicinal Plants used by Local People in Agusan del Sur, Philippines (see Appendix A.)

The degree of informants' knowledge in each medicinal plant in treating specific health problems was identified in general. The plants are grouped according to a disease treated.

Table 2
Medicinal Plants used to treat Various Ailments/Diseases

Hypertension	<i>Acorus gramineus</i> , <i>Anonna muricata</i> , <i>Catharanthus roseus</i> , <i>Blumea balsamifera</i> , <i>Crescentia cujete</i> , <i>Tabebuia heptaphylla</i> , <i>Ipomoeae paniculata</i> , <i>Orthosipon aristatus</i> Benth, <i>Kalanchoe pinnata</i> , <i>Momordica spp.</i> <i>Andropogon citratus</i> , <i>Centella asiatica</i> , <i>Artocarpus heterophyllus</i> , <i>Corchurus olitorius</i> , <i>Vitex negundo</i> , <i>Curcuma longa</i> .
Measles	<i>Euphorbia hirta</i> , <i>Tinospora rumphii</i> Boerl.
Arthritis	<i>Theobroma cacao</i> <i>Acorus gramineus</i> , <i>Blumea balsamifera</i> , <i>Symphytum officinale</i> , <i>Jatropha curcas</i> , <i>Premma odorata</i> Blanco, <i>Curcuma longa</i>
Colds	<i>Acorus calamus</i> , <i>Artemisia vulgaris</i> , <i>Mentha cordofilia</i> Opiz, <i>Kalanchoe pinnata</i> , <i>Averrhoa carambola</i> , <i>Kaempferia galanga</i> L.
Snake bite	<i>Sansevieria trisafaciata</i> Prain. <i>Hyptis suaveolens</i> L. Poit
Teething of Baby	<i>Imperata cylindrica</i> L. Beauv. <i>Heteropogon contortus</i> , <i>Cucurbita maxima</i> , <i>Allium schoenoprasum</i> .
Asthma	<i>Vitex negundo</i> , <i>Allium odorum</i> Linn. <i>Piper betle</i> , <i>Kleinhovia hospita</i> Linn. <i>Nauclea orientalis</i> L.

Abdominal discomfort/ stomachache	<i>Artemisia vulgaris</i> <i>Andrographis paniculata</i> , <i>Annona muricata</i> Linn. <i>Allium odorum</i> Linn. <i>Artemisia vulgaris</i> , <i>Blumea balsamifera</i> , <i>Pseudelephantopus spicatus</i> (Juss ex Hubi.) C.F. Backer, <i>Mentha crispa</i> blanco, <i>Cinnamomum mercadoi</i> Vidal, <i>Mimosa pudica</i> , <i>Orthosipon aristatus</i> Benth, <i>Hyptis capitata</i> , <i>Jatropha curcas</i> , <i>Centella asiatica</i> , <i>Zingiber officinale</i> , <i>Tinosphora rumphii</i> Boerl. <i>Aloe barbadensis</i> Mill.	Diabetes	<i>Gossypium herbacium</i> Linn., <i>Hyptis suaveolens</i> L. Poit, <i>Blumea balsamifera</i> , <i>Panax ginseng</i> , <i>Luffa acutangula</i> , <i>Annona muricata</i> Linn. <i>Crescentia cujete</i> , <i>Blumea balsamifera</i> , <i>Panax ginseng</i> , <i>Centella asiatica</i> , <i>Ananas comosus</i> , <i>Pandanus amaryllifolius</i> .
Toothache	<i>Panax ginseng</i> , <i>Cocos nucifera</i> , <i>Aloe barbadensis</i> , <i>Moringa oleifera</i> , <i>Hesperantha coccinea</i> , <i>Citrus maxima</i> .	Overfatigue	<i>Heliotropium indicum</i> Linn. <i>Rhoeo discolor</i> , <i>Pseudelephantopus spicatus</i> (Juss ex Hubi.) C.F. Backer, <i>Gossypium herbaceum</i> Linn. <i>Ficus hauili</i> , <i>Blumea balsamifera</i> , <i>Coleus aromaticus</i> , <i>Bidens pikesa</i> L. <i>Gliricidia sepium</i> , <i>Stachytarpheta jamaicensis</i> L. <i>Panax ginseng</i> , <i>Elaeis guiniensis</i> , <i>Artocarpus triculianus</i>
Goiter	<i>Opuntia ficus indica</i> , <i>Annona muricata</i> , <i>Aloe barbadensis</i> Mill. <i>Curcuma longa</i> .		
Cyst	<i>Opuntia ficus indica</i> , <i>Annona muricata</i> .		
Bronchitis	<i>Althernanthera ficodea</i> var. <i>Tizickian (regel)</i> Backer.	Pain reliever during labor	<i>Piper nigrum</i>
Famish	<i>Kleinhovia hospital</i> Linn. <i>Spondias pinnata</i> , <i>Blumea balsamifera</i> .	Spasm Flatulence	<i>Blumea balsamifera</i> <i>Blumea balsamifera</i> , <i>Impatiens balsamina</i> Linn. <i>Coleus aromaticus</i> , <i>Artemisia vulgaris</i> , <i>Piper betle</i> , <i>Kaempferia galangal</i> L., <i>Jatropha curcas</i> , <i>Hyptis suaveolens</i> L. Poit, <i>Elaeis guiensis</i> , <i>Heteropogon contortus</i> , <i>Gossypium hirsutum</i> , <i>Impatiens balsamina</i> Linn. <i>Eleusine indica</i> .
Urinary Tract Infection	<i>Annona muricata</i> Linn. <i>Blumea balsamifera</i> , <i>Symphytum officinale</i> , <i>Jatropha curcas</i> , <i>Cocos nucifera</i> , <i>Peperomia pellucida</i> , <i>Averrhoa carambola</i> , <i>Psidium guajava</i> , <i>Morinda citrifolia</i> Linn. <i>Muntingia calabura</i> , <i>Curcuma longa</i> .		
Hair loss/ Hair fall	<i>Aloe barbadensis</i> Mill.	Dewormer	<i>Ananas comosus</i> , <i>Caesalpinia sappan</i> .
Migraine Cancer	<i>Catharanthus roseus</i> <i>Catharanthus roseus</i> , <i>Panax ginseng</i>	Amenorrhea	<i>Luffa acutangula</i> , <i>Biva Orellana</i> , <i>Hyptis suaveolens</i> L. Poit.
Leukemia	<i>Moringa oleifera</i> , <i>Catharanthus roseus</i>	Hepatitis	<i>Curcuma longa</i> , <i>Saccharum officinarum</i> .
Anemia	<i>Momordica charantia</i> , <i>Andropogon citratus</i> , <i>Moringa oleifera</i> , <i>Ipomea batatas</i> Linn.	Sprain	<i>Artemisia vulgaris</i> , <i>Ficus stipulosa</i> Miq. Linn. <i>Albizzia procera</i> Benth, <i>Ricinus cumunis</i> L.
Anti-cancer	<i>Amaranthus sp.</i> , <i>Annona muricata</i> Linn., <i>Allamanda cathartica</i> , <i>Curcuma longa</i> .	Skin Diseases	<i>Artemisia vulgaris</i> , <i>Derris trifoliata</i> , <i>Carica papaya</i> , <i>Tinosphora rumphii</i> Boerl.
Bleeding Wounds	<i>Colocasia esculenta</i> (L.) Scott, <i>Psidium guajava</i> , <i>Ipomea spp.</i> , <i>Chromolaena odorata</i> .		<i>Lunasia amara</i> Blanco, <i>Coleus blumei</i> , <i>Ipomea paniculata</i>
Viral diseases/ Infection	<i>Momordica charantia</i> , <i>Arachis hypogeal</i> , <i>Centella asiatica</i> .	Sore eyes Boils	<i>Euphorbia hirta</i> <i>Kalanchoe pinnata</i> , <i>Euphorbia nerifolia</i> , <i>Theobroma cacao</i> ,
Body pain	<i>Vitex negundo</i> ,		

	<i>Cocos nucifera</i> , <i>Impatiens balsamina</i> Linn., <i>Basella rubra</i> , <i>Aloe barbadensis</i> Mill. <i>Curcuma longa</i> .	Pneumonia	<i>Moringa oleifera</i> , <i>Bischofia javanica</i> , <i>Curcuma longa</i>
Hemorrhage	<i>Caesalpinia sappan</i>	Gas pains	<i>Althernantherafi ficodoi</i> var. <i>Tizickian (regel)</i> Backer.
Dyspepsia	<i>Hyptis capitata</i>		<i>Allium schoenoprasum</i> ,
Cough	<i>Biva orellana</i> , <i>Rhoeo discolor</i> , <i>Curcuma longa</i> , <i>Artemisia vulgaris</i> , <i>Mentha cordofilia</i> Opiz., <i>Blumea balsamifera</i> , <i>Impatiens balsamifera</i> Linn., <i>Premma odorata</i> Blanco, <i>Kaempferia galangal</i> L., <i>Zingiber officinale</i> , <i>Hibiscus rosa sinensis</i> , <i>Jatropha curcas</i> , <i>Heteropogon contortus</i> , <i>Allium schoenoprasum</i> , <i>Euphorbia hirta</i> , <i>Kleinhovia hospital</i> Linn., <i>Corchurus olitorius</i> , <i>Piper betle</i> , <i>Vitex negundo</i> , <i>Citrofortunella microcarpa</i> , <i>Tinosphora cordifolia</i> , <i>Mentha crispa</i> Blanco, <i>Averrhoa carambola</i> , <i>Callicarpa formosana</i> Rolfe, <i>Coleus blumei</i> , <i>Coleus aromaticus</i> , <i>Ocimum brasilicum</i> , <i>Allium cepa</i> , <i>Allium achoenoprasum</i> , <i>Muntingia calabura</i>	Fever	<i>Premma odorata</i> Blanco, <i>Zingiber officinale</i> <i>Artemisia vulgaris</i> , <i>Mentha cordofilia</i> Opiz, <i>Kalanchoe pinnata</i> , <i>Cucurbita maxima</i> , <i>Muntingia calabura</i> , <i>Hesperantha coccinea</i> , <i>Mentha crispa</i> Blanco, <i>Coleus blumei</i> , <i>Spondias pinnata</i> , <i>Vitex negundo</i> , <i>Averrhoa carambola</i> , <i>Tinosphora cordifolia</i> , <i>Moringa oleifera</i> , <i>Euphorbia hirta</i> , <i>Rhoeo discolor</i> , <i>Allium schoenoprasum</i> , <i>Kaempferia galanga</i> L.
	<i>Muntingia calabura</i>	Bruise	<i>Curcuma longa</i> , <i>Mentha crispa</i> Blanco, <i>Kalanchoe pinnata</i>
Gastro-intestinal pain	<i>Kalanchoe pinnata</i> , <i>Curcuma longa</i> .	Headache	<i>Artemisia vulgaris</i> , <i>Elaeis guiniensis</i>
Colds	<i>Rhoeo discolor</i>	Fractures	<i>Jatropha curcas</i> , <i>Coleus aromaticus</i>
Diarrhea/ LBM	<i>Hyptis capitata</i> , <i>Persia Americana</i> , <i>Ziziphus</i> Linn. Lam., <i>Tinosphora cordifolia</i> , <i>Psidium guajava</i> , <i>Blumea balsamifera</i> , <i>Annona muricata</i> Linn., <i>Moringa oleifera</i> , <i>Garcinia mangostana</i> L., <i>Centella asiatica</i> , <i>Muntingia calabura</i> , <i>Coleus blumei</i> , <i>Coleus aromaticus</i> , <i>Caesalpinia sappan</i> .	Colic	<i>Jatropha curcas</i> , <i>Zingiber officinale</i> , <i>Blumea balsamifera</i> , <i>Piper betle</i> , <i>Coleus aromaticus</i>
		Kidney problem	<i>Imperata cylindrica</i> "Red baron", <i>Curcuma longa</i> , <i>Lagerstroemia speciose</i> , <i>Orthosiphon aristatus</i> Benth, <i>Centella asiatica</i>
		Vomiting	<i>Garcinia mangostana</i> L.
		Insect Bites	<i>Mentha crispa</i> Blanco, <i>Lunasia amara</i> Blanco
		Stiff neck	<i>Mentha crispa</i> Blanco
		Alopecia	<i>Mentha crispa</i> Blanco
		Swelling	<i>Coleus blumei</i> , <i>Andropogon citratus</i> , <i>Theobroma cacao</i> , <i>Blumea balsamifera</i>
		Splitting of blood	<i>Coleus blumei</i> , <i>Tinosphora rumphii</i> Boerl.
		Folliculitis	<i>Coleus blumei</i>
Heart burn	<i>Andographis paniculata</i> , <i>Jatropha curcas</i>	Ulcer	<i>Coleus blumei</i> , <i>Moringa oleifera</i> , <i>Piper betle</i>
		Hyperacidity	<i>Orthosiphon aristatus</i> Benth
Wounds	<i>Musa paradisiaca</i> , <i>Syzygium cumunii</i> Linn. <i>Albezia falcataria</i> , <i>Impatiens balsamina</i> Linn. <i>Solanum melongena</i> , <i>Coleus blumei</i> , <i>Tinosphora rumphii</i> Boerl.	Antibiotic	<i>Coleus aromaticus</i> , <i>Gliricidia sepium</i>
		Clogged vessels	<i>Coleus aromaticus</i>
		Constipation	<i>Corchurus olitorius</i>
		External	<i>Gmelina arborea</i> ,

inflammation	<i>Gliricidia sepium</i> , <i>Theobroma cacao</i> ,
Muscular pain	<i>Basella rubra</i> , <i>Gmelina arborea</i> ,
Joint pains	<i>Curcuma longa</i> , <i>Pseudelephantopus spicatus</i> (<i>Juss ex Hubi.</i>) C.F. Backer <i>Pseudelephantopus spicatus</i> (<i>Juss ex Hubi.</i>) C.F. Backer, <i>Andropogon citratus</i>
Bleeding (Menopausal symptom)	<i>Musa paradisiaca</i>
Heart diseases	<i>Musa sapientum</i>
Open Wounds	<i>Musa textilis</i>
Canker sore	<i>Syzgium aquem</i>
Chicken pox	<i>Averrhoa carambola</i>
Defeaning	<i>Piper betle</i>
Injury	<i>Piper betle</i> , <i>Curcuma longa</i>
Lump on armpit	<i>Peperomia pellucida</i>
Dengue fever	<i>Carica papaya</i> , <i>Duriozi bethinus</i>
Dysmenorrhea	<i>Tinosphora rumphii</i> Boerl
Irregular Menstruation	<i>Tinosphora rumphii</i> Boerl
Tonsilitis	<i>Carica papaya</i>
Diphtheria	<i>Commelina benghalensis</i> L.
Anti - hemorrhagic	<i>Ipomea spp.</i>
Leg pain	<i>Acorus gramineus</i>
Back pain	<i>Premma odorata</i> Blanco
Bed sore	<i>Stachytarpheta jamaicensis</i> L.
Mumps	<i>Kaempferia galanga</i> Linn.
Ear infection	<i>Kaempferia galangl</i> Linn.
Sore throat	<i>Zingiber officinale</i>
Hoarseness	<i>Zingiber officinale</i>
Burn	<i>Aloe barbadensis</i> Mill.
Scalp diseases	<i>Aloe barbadensis</i> Mill.
Tumor	<i>Panax ginseng</i>
Rheumatism	<i>Blumea balsamifera</i>
Malaria	<i>Blumea balsamifera</i>
Chest strain	<i>Impatiens balsamina</i> Linn.
Amoebiasis	<i>Impatiens balsamina</i> Linn.
White fungal infection	<i>Cassia alata</i> L.
Diupretia	<i>Zea mays</i>
Convulsion	<i>Callicarpa formosana</i> Rolfe
White occurrence in the eye	<i>Callicarpa formosana</i> Rolfe
Abscess	<i>Theobroma cacao</i>
Difficulty of placenta delivery	<i>Hibiscus rosasinensis</i>

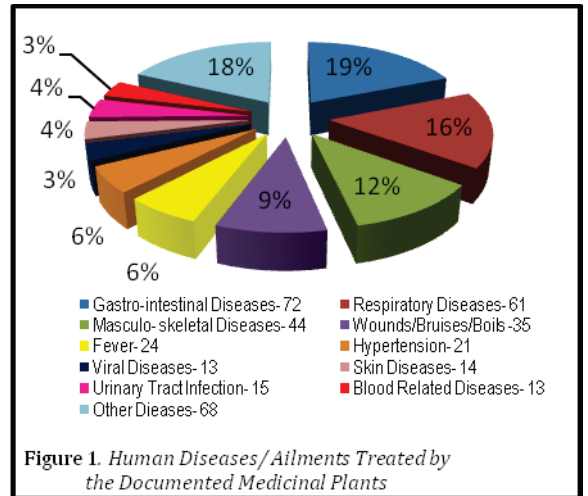
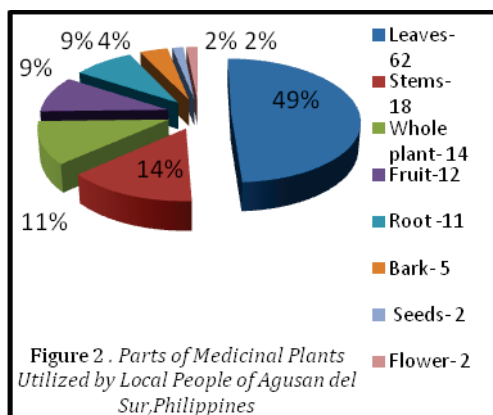


Figure 1 shows the percentage of diseases that can be treated by the medicinal plants reported. The medicinal plants mostly treated diseases such as gastro-intestinal diseases (19%), respiratory diseases (16%), musculo-skeletal diseases (12%), wounds/bruises/boils (9%), fever (6%), hypertension (6%), skin diseases (4%), viral diseases (3%), blood-related diseases (3%), urinary tract infection (4%), and other diseases (18%) which include toothache, teething for babies, goiter, hair fall, cancer, burn, cyst, migraine, snake bite, diabetes, pain reliever, malaria, tumor, de-worming, dengue fever, skin softener, measles, and preventing pregnancy.

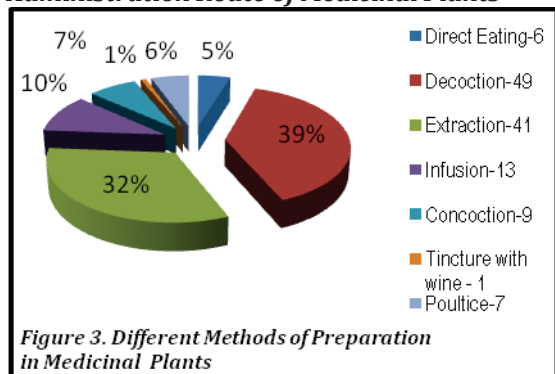
This can be tracked in Table 2



A total of 126 species of medicinal plant parts are utilized by the local people of Agusan del Sur, Southern Philippines. Leaves were largely used (49%), followed by stems (14%), whole plants (11%), roots (9%), fruits

(9%), bark (4%), flowers (2%), and seeds (2%). This is shown in *Figure 2*.

Preparation, Application and Administration Route of Medicinal Plants



Fresh plant parts were mostly used as medicine. Decoction was the most common way of preparing medicinal plants. The plant parts were boiled in water and the extract (crude drug) was used which constitute 39%, extraction was 32% where leaves are crushed and the extract was utilized directly after simple filtration. Infusion is 10% where leaves was dipped in tap or hot water and taken after few minutes. Concoction was 7%, poultice 6%, where leaves, stem or bark was softened and applied to the material directly to the affected part. Other ways of utilization consisted of direct eating 5%, concoction, and tincture with wine ranged 1%, were chopped roots or stems dipped in a wine for many weeks and the liquid was utilized. This is shown in *Figure 3*.

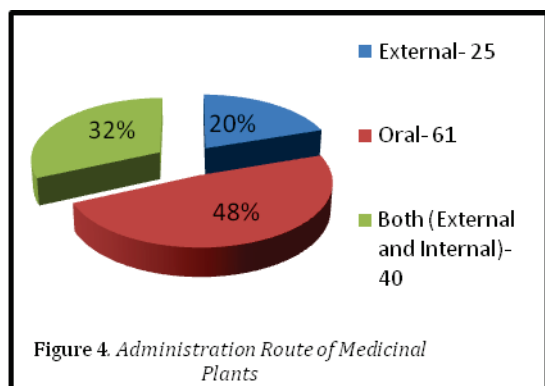


Figure 4 revealed that medicinal plants used by local people of Prosperidad, Agusan del Sur, Philippines were mostly taken orally through decoction and infusion (48%), others were administered both externally and

orally (32%), leaves and stems of a single plant were both utilized and applied externally like that of *Jatropha curcas*, stems used to remedy muscular fatigue and leaves for poultice on sprain.

Externally administered was 20% such that of *Ipomea spp.*, where fresh leaves are crushed to stop bleeding wounds and that of *Opuntia ficus indica* (Prickly pear cactus) applied by pounding gently as poultice to cyst and goiter.

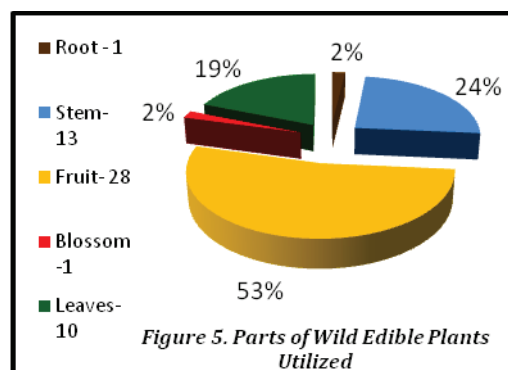
2.1 Wild Edible Plants used by Local People

The informants reported 53 wild edible plants species used as part of their diet. These plants were utilized as vegetables and fruits eaten directly.

Table 3
The number of Taxa Recorded (WEP)

Number of
Species
Genera
Families

Among the 53 Wild Edible plants documented, forty-five were sold in the market and eight species yet unsold as a source of income; *Spondias pinnata* (Libas), *Caryota mitis* Lour. (Pugahan), *Dillenia indica* Blanco (Katmon), *Securinega flexouosa* (Anislag), *Phyllanthus acidus* (Kabihid), *Artocarpus treculianus* (Tugop), *Pandanus odoratus* (Pandanus), *Ziziphus jujuba* (Mansanitas).



The part of wild edible plants directly utilized were fruits (53%), stem (24%), leaves (19%), blossom (2%), and root (2%). Ripe or unripe fruits were eaten directly after gathering from forests. The blossom of *Musa sapientum* (banana) was made into meatless burger. Leaves were used as vegetables sometimes added to fish. *Pandanus odoros* (pandan) was added to rice for aroma. (Shown in Fig. 5).

One root crop *Manihot esculenta* (cassava) was mostly cooked singly and sometimes as emergency food in the absence of rice not only during famine.

The majority of these wild edible plants can be domesticated but, because of the availability of some in the wild, no one had attempted to plant near their homes. An example of this wild edible plant is *Athyrium esculentum* (fern) which grows in farms, roadsides, near river ecosystem, and uncultivated lands. This is even a best source of income.

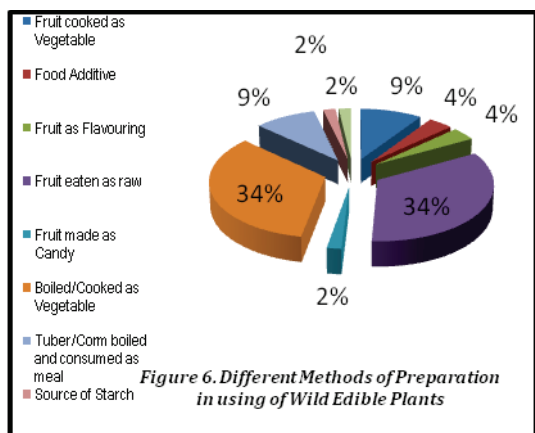


Figure 6 explains the different methods of preparation on the use of wild edible plants. There are fruits cooked as vegetable (9%), food additives (4%) represented by *Bixa orellana* Linn. and *Spondias pinnata*, leaves and stems are cooked as vegetables (34%), fruit as flavouring (4%), the *Pandanus odoros* and *Capsicum frutescens*, fruits were eaten raw during or after gathering (34%). Boiled tubers and corm (9%), source of starch (2%) *Corypha elata* Roxb., blossom of *Musa sapientum* (2%) are added or made into meatless burger and a

fruit made into candy added with syrup (2%), the *Tamarindus indica*.

Conclusion and Recommendation

There are one hundred twenty six (126) medicinal plants documented that can largely treat gastro-intestinal, respiratory, musculo-skeletal, wounds/bruises/boils, fever, hypertension and other human diseases/ailments. Leaves are prepared for decoction, infusion and extraction, and mostly administered orally.

Local users strongly believe that herbal plants are so effective that in two to three days ailments are cured. There is no uniformity in their preparation and dosage. They even claim that there are no over dosage in using these medicinal, plants as experienced. Their uses are most beneficial since hospitals and modern facilities are non-accessible. Both medicinal and wild edible plants, however, are getting scarce due to over collection, harvesting style and lack of care.

Fifty three species of wild edible plants were utilized as fruits cooked as vegetables, food additive, flavouring and candy. Tubers and corm are boiled and consumed as meal. Seventy-nine and twenty-five percent (79.25%) can be source of food and income while twenty and seventy-five percent (20.75%) can be source of food, but not sold in the market.

The data obtained will help the local management to make policy for conservation, reproduction, advocacy on their uses for sustainability.

For future researches, phytochemical screening and other laboratory tests will be conducted to selected medicinal and wild edible plants; develop strategic plan for conservation, scientific utilization and preparation of medicinal and wild edible plants for local use and as sources of income. Finally, strengthen dissemination and information campaign on their uses.

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