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Ethnomedicinal Plants Utilized by the Ilongot-Eǵongot Community of Bayanihan, Maria Aurora, Aurora, Philippines

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Abstract The Philippines hosts 130 distinct and diverse ethnic groups. One ethnic group is the *Ilongots* that inhabit the mountainous region of Maria Aurora, Aurora Province that characterized by a rich culture of traditional medicine. The study conducted a survey on the ethnomedicinal plants utilized by the *Ilongot-Eǵongot* community at Bayanihan, Maria Aurora, Aurora Province. Personal interviews with the tribal chieftains were conducted as well as 22 respondents were asked to answer questionnaires about the plants and their medicinal uses. Sixty-five (65) plants were documented as treatments to various conditions and are categorized into different areas: respiratory, circulatory, gastro-intestinal, obstetrics-gynecology, genito-urinary, dermatology, musculo-skeletal, diseases of the eyes, nose, ears and throat; and other categories such as antidiabetes, antioxidant, anticancer, antiviral antifungal/antibacterial/anti-infectants, antiparasitic, fever, immunostimulant/ immunity issues, anti-inflammatory and snake and dog bites. The sixty-five plants represented 27 families including Asteraceae, Euphorbiaceae, Fabaceae, Lamiaceae, Malvaceae, and Poaceae. Plant voucher specimens were preserved. It is recommended that pharmacological screenings be conducted to validate the medicinal uses of this plants.

Keywords: Ethnomedicinal plants, *Ilongot-Eǵongot*, Aurora

Introduction

The Philippines recognizes over 170 ethnolinguistic and 110 indigenous groups including the ethnic groups of Northern Luzon that has ten primary cultural groups that includes the *Ilongots* (Casal *et al*., 1981; PCHRD, 2015). The Ilongots reside on the boundaries of Quirino, Aurora, and Nueva Vizcaya, mostly in Dupax, Kasibu, and the Sierra Madre and Caraballo mountains along the Cagayan, Tabayon, and Conwap Rivers. The Ilongots are of Indonesian

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descent constitutes five subgroups: *Italon* (with Mongolian features), *Engongot, Kadayakan, Abaca*, and *Dagkan*. Each group has its own dialect and customs (Ethnic Groups Philippines, 2011; National Commission in Indigenous Peoples, 2011). They are densest in the municipality of Alfonso, Castaneda, the municipality of Nueva Vizcaya geographically closest to Maria Aurora, Aurora. The *Ilongots* are traditionally conservative, and resistant to external cultural pressures (NCCA, 2015). The *Ilongot-Egongot* group has a rich culture of beliefs and values including their traditional medicine using plants that are still handed up to this modern era.

The Philippines is a mega-diverse country and due to its geography, show high degrees of endemism. It houses more than 16,223 species of plants with nearly 33% endemic (BMB DENR, 2014). Consequently, it holds a high number of medicinal plant species entailing a broader scope for healing (Hawkins, 2008). These knowledge on the use of plants as medicine was inherited from great ancestors through oral tradition (Olowa *et al*., 2012). Presently, herbal plants are still of greater significance to cure most common aliments and have been consistently used by the population. But as modernization arises, the indigenous knowledge and on the use of medicinal plants have been threatened to extinction (Gruyal *et al.*, 2014). Although several ethnobotanical researches were conducted, many more medicinal plants warrant discovery and should be studied and tapped for scientific researches for validation of medicinal uses (Omonike *et al*., 2010).

The survey of the ethnobotanicals used by the *Ilongot-Egongot* community of Barangay Bayanihan, Maria Aurora, Aurora, Philippines highlights their preserved knowledge on the use of ethnomedicinal plants as remedy for some common ailments. The study emphasized the rich culture of traditional medication that was unique to every ethnic groups in the country.

Materials and methods

The survey of ethnobotanicals was conducted at the *Ilongot-Egongot* community of Bayanihan, Maria, Aurora, Aurora Province, Philippines. Permission from the provincial chieftain as well as from two tribal chieftains

was obtained prior to the conduct of the study. A survey questionnaire was used to determine the medicinal plants utilized by the community. The survey questionnaire included questions on the local name of the plant, its medicinal uses, the plant part utilized for the treatment of diseases and mode of preparation. Personal interviews on members of the community, preferably elders who have previous knowledge on the therapeutic uses of the plants, were also conducted.

The collection of the surveyed 64 plant samples was done at the *Ilongot-Egongot* domain of Bayanihan, Maria Aurora, Aurora, which is dominated mostly by mountainous forests. Samples of leaves, stems, and flowers of the ethnomedicinals were collected for authentication. Voucher specimens were pressed, treated with denatured alcohol and mounted in herbarium sheets with labels. The time, location, season, and the name of collector were recorded. The medicinal plants were identified using morphological characters. Voucher specimens were authenticated and deposited at the Department of Biological Sciences, College of Arts and Sciences, Central Luzon State University with assigned voucher numbers.

Informants' Consensus Factor was computed based on the formula used by Uddin and Hassan (2014). This is to indicate the level of informant consent. This was computed as ICF= Nur – Nt / (Nur – 1); Where, Nur = number of use reports from informants for a particular plant-use category; Nt = number of taxa or species that are used for that plant use category for all informants. ICF value range from 0 to 1, where '1' indicates the highest level of informant consent (Uddin and Hassan, 2014).

Results

A total of 22 respondents participated in the conduct of the survey. Additional information was obtained from personal interviews of the chieftains and with the members of the community who are mostly knowledgeable elders.

A total of sixty-five plants were recorded and collected from various collection sites within the *Ilongot-Egongot* domain. The recorded taxa were classified under 27 families, dominated by Poaceae, Asteraceae, Euphorbiaceae, Fabacea, Lamiaceae and Malvaceae, representing 46 genera and 50 species. The family, scientific name, medicinal use, parts utilized and mode of preparation and administration were recorded (Table 1). Leaves are the commonly used plant part in the preparation of medicine (36 out of 65). A variety of medicinal usage and mode of preparation and administration were observed, these include decoction which are taken orally; or prepared as poultice or boiled for bathing which are mainly for external applications.

Majority of the plant samples collected are considered as weeds. Seventeen (17) plants were not identified scientifically due to insufficient parts when collected, hence, unauthenticated and are only known through their local *Ilongot* name.

Table 1. List of Ethnomedicinal Plants used by the *Ilongot-Ḗgongot* Community of Bayanihan, Maria Aurora

Family	Scientific name	Local name	Usage of plant	Plant parts used	Mode of preparation and administration
Amaryllidaceae	*Allium tuberosum* L.	*Kutsay*	Wounds	Leaves	Pounded leaves; applied externally
	Allium sativum L.	*Bawang*	High blood pressure and abdominal discomfort	Bulb	Heated directly; taken orally
Anonaceae	*Annona muricata* L.	*Guyabano*	Cough; High blood pressure	Leaves	Decoction; taken orally
Apiaceae	*Hydrocotyle vulgaris* L.	*Gotu kola*	Immuno-stimulant, high blood pressure, antioxidant, anticancer, abdominal discomfort, UTI, kidney disease and cough	Leaves	Fresh; taken orally
Apocynaceae	*Rauvolfia serpentine* L.	*Serpentina*	Diabetes	Leaves	Fresh; taken orally
Asteraceae	*Cyanthillium cinereum* L.	*Bégéw (Ilongot)*	Body pain, stomachache	Roots	Decoction; taken orally
	Mikania cordata (Burm.f.) B.L.Rob	*Bikas, Taltalikod (Ilongot)*	For babies "subi-subi", and toothache	Leaves	Decoction; taken orally
	Chromolaena odorata (L.) R.M.King H.Rob.	*Itmo, Géwéd (Ilocano), Litlit (Ilongot)*	Coughs	Leaves	Decoction; taken orally Leaves heated massage through neck; external application
Athyriaceae	*Diplazium esculentum* (Retz.) Sw.	*Pako-pako (Ilongot)*	Wounds, Malaria, and infection	Bark and leaves	Boiling; used for bathing; applied externally

Caricaceae	*Carica papaya* (L.)	*Papaya*	High blood pressure, dog bite	Young leaves and sap	Decoction; taken orally
Compositae	*Blumea balsamifera* (L.) DC.	*Sambong, Inamo (Ilongot)*	Coughs, UTI, for abdominal discomfort, and muscle pain	Leaves	Decoction; taken orally
Dilleniaceae	*Dillenia philippinensis* Rolfe	*Katmon/ Palagaw*	UTI laxative	Stem/ bark	Decoction; taken orally
Euphorbiaceae	*Euphorbia hirta* (L.)	*Tawa-tawa*	Dengue fever	Leaves	Decoction; taken orally
	Manihot esculenta (Cranz)	*Kamoteng kahoy, Olangkeyo (Ilongot)*	Rashes Inflammation	Leaves and fruits	Pound and apply to affected area; applied externally
	Codiaeum variegatum (L.) Rumph. ex A.Juss	San Francisco	For babies; "*subi-subi*"	Leaves	Leaf juice obtained by pounding; taken orally
	Ricinus communis L.	*Tangan-tangan*	Sprain, and bloated	Leaves	Poultice
Fabaceae	*Senna alata* (L.) Roxb.	*Bensola (Ilongot), akapulko*	Fungal infection; Wounds	Leaves; Stems	Poultice
	Abrus precatorius L.	*Bugayong*	Coughs	Leaves	Boiling; used for bathing; applied externally
	Adenanthera intermedia Merr.	*Kares*	Infected wounds; Dog and snake bite.	Leaves; Seeds	Boiling; used for bathing; applied externally
Labiateae	*Mentha arvensis* L.	*Herba buena*	Body pain, abortifacient	Leaves	Poultice
Lamiaceae	*Plectranthus amboinicus* Lour.	*Oregano/ Olegano*	Cough	Leaves	Decoction; taken orally
	Vitex negundo L.	*Lagundi Dangla (Ilongot)*	Coughs and sprain	Leaves	Decoction; taken orally
	Hyptis suaveolens Poir.	*Ambabangot (Ilongot)*	Stomach pain and abdominal discomfort	Leaves	Decoction; taken orally

Leguminosae	*Mimosa pudica* L.	*Makahiya*	Abdominal discomfort and Abortion	Roots	Decoction; taken orally
	Phaseolus lunatus L.	*Patani*	For babies "subi-subi"	Leaves	Leaf juice; taken orally
Lythraceae	*Lagerstroemia speciose* (L.) Pers.	*Banaba*	Kidney problems	Leaves and bark	Decoction; taken orally
Malvaceae	*Abelmoschus esculentus* L.	*Okra*	Immunity issues and for heart ailments	Seeds	Toast the seeds and used as tea; taken orally
	Urena lobata L.	*Pukot (Ilongot)*	Vomiting and Loose Bowel Movement	Roots	Decoction; taken orally
	Hibiscus rosa-sinensis L.	*Gumamela*	Pus	Flower	Poultice
Menispermaceae	*Tinospora crispa* (L.) Hook.f. & Thomson	*Makabuhay*	Tooth ache	Stem	Scrape outer layer of stem, put into cotton, then apply to damage tooth
Moraceae	*Ficus* sp.	*Balete, Geked (Ilongot)*	Deep cut	Plant sap	Apply the plant sap to cut wounds
Moringaceae	*Moringa oleifera* (Lam.)	*Malunggay*	Tooth ache, and fever	Stem	Scrape outer layer of stem, put into cotton, then apply to damage tooth
Myrtaceae	*Psidium guajava* L.	*Bayabas, Bayatbat (Ilongot)*	Wounds	Leaves	Bathing purposes
	Syzygium cumini (L.) Skeels.	*Duhat*	Kidney problems, ulcer and UTI	Stem bark	Decoction; taken orally
Nyctaginaceae	*Bougainvilla* sp.	Bougainvilla	Loose bowel movement	Leaves	Decoction; taken orally
Oxalidaceae	*Averrhoa bilimbi* L.	*Kamias, Ongsol (Ilongot)*	Fever	Leaves	Boiling; used for bathing
Pandanaceae	*Pandanus amaryllifolius* (Roxb.)	*Pandan*	High blood, and wounds	Leaves	Decoction; taken orally
Phyllanthaceae	*Phyllanthus urinaria* L.	*Iba-ibaan, Ola-ola (Ilongot)*	Abortifacient	Leaves and bark	Decoction; taken orally

Poaceae	*Cymbopogon citratus* (DC.) Stapf.	*Saray (Ilongot), Tanglad*	High blood pressure	Whole plant	Decoction; taken orally
	Eleusine indica (L.) Gaertn.	*Pag (Ilongot)*	Antioxidant, anticancer, for abdominal discomfort, kidney problems, and UTI	Whole plant	Decoction; taken orally
	Cymbopogon winterianus Jowit.	*Taday*	High blood pressure	Leaves	Decoction; taken orally
	Bambusa sp	*Kawayan, Kewe (Ilongot)*	Stomach pain and discomfort	Stem bark of bamboo	Decoction; taken orally
Solanaceae	*Capsicum annuum* L.	*Sili*	Wounds, antibiotic, and anti-inflammatory	Fruits	Pound and apply to infected area.
Umbelliferae	*Centella asiatica* (L.) Urb.	*Takip kuhol*	Measles	Whole plant	Boiling; use for bathing
Verbenaceae	*Premna odorata* Blanco	*Asédaong (Ilongot)*	Wounds	leaves Stem/bark	Applied externally
	Stachytarpeta sp.	*Luzviminda (Ilongot)*	Sore Eyes and Wounds	Leaves and Flower	Poultice
Zingiberaceae	*Curcuma longa* L.	*Luyang dilaw*	Body pain, cough, and sprain	Rhizome	Pound then boil and used for bathing
	Zingiber officinale Roscoe	*Luyang Tagalog, Gepang (Ilongot)*	Body pain, sprain, and *pasma*	Rhizome	Boiling; use for bathing
Other scientifically unidentified plants		*Kugon. Kanawan (Ilongot)*	Diuretic	Roots	Decoction; taken orally
		Butalingan (Ilongot)	Wounds	Leaves and Flowers	Poultice
		Tapgit (Ilongot)	Hygienic purposes (anti-dandruff and lice)	Bark	Pound, put water ‘til bubbly, apply to hair

	Kamugat	Body pain, immune-stimulant, and bone fracture	Roots and vines	Decoction; taken orally
	Talahib, Seke (Ilongot)	Wounds	Roots	Boiling; used to wash or clean the wounds
	Butingog "butŋ́og"	Wounds	Seeds	Directly heat the seeds, toast, pound and apply to wounds
	Salana	Wounds	Leaves	Poultice
	Kuribétbét	Tooth ache and sprain	Leaves and plant sap; bark	Pound and put into cotton then apply to decayed tooth; mix with oil then massage to pained body parts
	Saray	High blood pressure	Whole plant	Decoction; taken orally
	Kanumay	Tooth ache	Fruits and vines	Pound and put into decayed tooth
	Saynat	For pregnant women's immune system	Leaves and roots	Decoction taken orally
	Kulkulantro	For women who gave birth (immuno-stimulants)	Whole plant	Decoction; taken orally
	Tuwino (Ilongot)	Coughs and flu	Stem and vines	Freshly eaten or decoction; taken orally
	Asebéngan	Fever, Malaria, and flu	Leaves	Steamed
	Kawdekéd	Coughs	Leaves	Decoction; taken orally
	Paku-pakuan	Coughs	Leaves	Decoction; taken orally
	Béték	Malaria, flu and ulcer	Bark	Decoction; taken orally

The plants are grouped under disease categories (Table 2). The diseases and ailments treated using these ethnomedicinal plants are categorized into different areas: respiratory, circulatory, gastro-intestinal, obstetrics-gynecology, genito-urinary, dermatology, musculo-skeletal, diseases of the eyes, nose, mouth, ears and throat; and other categories such as antidiabetes, antioxidant, anticancer, antifungal/antibacterial/anti-infectants, antiviral, antiparasitic, fever, immunostimulant/ immunity issues, anti-inflammatory and snake and dog bites. Majority of these plants are taken orally or applied externally (Table 1). Medicinal plants are mostly used for gastro-intestinal diseases (14 plants), circulatory (13), respiratory problems (9) and treatment of wounds (12).

Table 2. Ethnomedicinal plants used in different diseases

Disease category	Species of Plants
Respiratory Problems	*Annona muricata* L. *Blumea balsamifera* (L.) DC. *Plectranthus amboinicus* Lour. *Vitex negundo* L. *Abrus precatorius* L. *Chromolaena odorata* (L.) R.M.King H.Rob. *Tuwino* (local name) *Kawdékéd* (local name) *Paku-pakuan* (local name)
Circulatory	*Allium sativum* L. *Annona muricata* L. *Mikania cordata* (Burm.f.) B.L.Rob *Codiaeum variegatum* Rumph. ex A.Juss *Phaseolus lunatus* L. *Abelmoschus esculentus* L. Carica *papaya* L. *Pandanus amaryllifolius* (Roxb.) *Hydrocotyle vulgaris* L. *Cymbopogon citratus* (DC.) Stapf. *Cymbopogon winterianus* Jowit. *Taday* (local name) *Saray* (local name)

Gastro-Intestinal diseases	*Urena lobata* L. *Blumea balsamifera* (L.) DC. *Mimosa pudica* L. *Eleusine indica* (L.) Gaertn. *Bougainvilla* sp. *Allium sativum* L. *Hyptis suaveolens* Poir. *Syzygium cumini* (L.) Skeels. *Dillenia philippinensis* Rolfe *Cyanthillium cinereum* L. *Hydrocotyle vulgaris* L. *Kawayan* (local name) *Bétek* (local name) *Bégew* (local name)
OB-Gynecology	*Mimosa pudica* L. *Mentha arvensis* L. *Phyllanthus urinaria* L. *Saynat* (local name) *Kulkulantro* (local name)
Genito-Urinary	*Blumea balsamifera* (L.) DC. *Syzygium cumini (*L.) Skeels. *Lagerstroemia speciose* (L.) Pers. *Dillenia philippinensis* Rolfe *Eleusine indica* (L.) Gaertn. *Hydrocotyle vulgaris* L. *Kugon* (local name)
Eyes, Ears, Nose, Mouth, Throat, Hair	*Stachytarpeta* sp. *Tinospora crispa* (L.) Hook. F. and Thomson *Moringa oleifera* Lam. *Mikania cordata* (Burm.f.) B.L.Rob *Kuribétbét* (local name) *Kanumay* (local name)
Musculo-skeletal	*Curcuma longa* L. *Vitex negundo* L. *Cyanthillium cinereum* L. *Mentha arvensis* L. *Ricinus communis* L. *Curcuma longa* L. *Zingiber officinale* Roscoe *Blumea balsamifera* (L.) DC. *Kamugat* (local name) *Kuribétbét* (local name)
Dermatology	*Manihot esculenta* Cranz *Tapgit* (local name)

Other categories	
Anti-diabetes	*Rauvolfia serpentine* L.
Antioxidant	*Eleusine indica* (L.) Gaertn. *Hydrocotyle vulgaris*
Anti-cancer	*Eleusine indica* (L.) Gaertn. *Hydrocotyle vulgaris* L.
Antiviral	*Centella asiatica* (L.) Urb. (measles) *Euphorbia hirta* L. (dengue) *Bétèk* (local name) (flu) *Tuwino* (local name) (flu) *Asebéngan* (local name) (flu)
Antifungal/Antibacterial/Anti-infectants	*Senna alata* (L.) Roxb. *Allium tuberosum* L. *Diplazium esculentum* (Retz.) Sw. *Adenanthera intermedia* Merr. *Ficus* sp. *Psidium guajava* L. *Capsicum annuum* L. *Stachytarpeta* sp. *Hibiscus rosa-sinensis* L. *Premna odorata* Blanco *Phyllanthus urinaria* L. *Butalingan* (local name) *Talahib* (local name) *Butingog* (local name) *Salana* (local name) *Tapgit* (local name) (dandruff)
Antiparasitic	*Bétèk* (local name) (malaria) *Tapgit* (lice)
Fever	*Averrhoa bilimbi* L.
Immunostimulant/ Immunity issues	*Hydrocotyle vulgaris* L. *Abelmoschus esculentus* L. *Kamugat* (local name) *Kulkulantro* (local name)
Anti-inflammatory	*Manihot esculenta* (Cranz) *Allium tuberosum* L. *Capsicum annuum* L.
Snake and dog bites	*Adenanthera intermedia* Merr. *Carica papaya* (L.)

Informed Consensus Factor

The ICF value (0 – 1.0) determines the agreement between informants over which plants should be used for each category of disease (Raterta *et al.*, 2014; Uddin and Hasan, 2014). The ICF values are presented in Table 3. The highest ICF value of 1.0 obtained for 2 disease categories (fever and anti-inflammatory) point to good precision in information flow within the community. ICF values of the disease categories varied from 0 up to 1.00 with an average value of 0.30. This value may be due to diverse options for the plants used per ailment as well as varied sources of plants used for each particular category.

Table 3. Disease categories with Informant Consensus Factor.

Disease Category	Number of Taxa	Number of use reports	ICF
Respiratory	11	19	0.44
Circulatory	12	23	0.50
Gastro-Intestinal diseases	14	14	0
OB-Gynecology	5	5	0
Genito-Urinary	7	10	0.33
Eyes, Ears, Nose, Mouth, Throat, Hair	6	9	0.38
Musculo-skeletal	10	14	0.31
Dermatology	2	2	0
Other categories			
Anti-diabetes	1	1	0
Antioxidant	2	2	0
Anti-cancer	2	2	0
Anti-viral	2	5	0.75
Antifungal/Antibacterial/Anti-infectants	13	22	0.43
Antiparasitic	2	2	0
Fever	1	4	1
Immunostimulant/ Immunity issues	4	4	0
Anti-inflammatory	1	3	1
Snake and dog bites	2	2	0

Discussion

The survey showed that plants are highly valued by the community as sources of medicine. The respondents mostly use plants that are in the immediate vicinity of the community while other plants are gathered from adjacent mountainous forested areas and near the river bank. A number of plants surveyed are already domesticated and found propagated in the houses of the members of the community. Majority of the plants surveyed are common medicinal plants in the Philippines wherein the use of plants as sources of medicine is a usual practice, especially in remote areas where medical services and healthcare are limited (Valle Jr. *et al*., 2015). Many of these plants are commonly cultivated for culinary and medicinal purposes. Five out of the ten Department of Health (DOH)-approved herbal medicines are included: *Vitex negundo* (lagundi), *Mentha sp*. (herba buena), *Blumea balsamifera* (sambong), *Psidium guajava* (guava) and *Allium sativum* (garlic) (VRH-DOH, 2017). Some plants have been commercially produced as herbal drugs, such as *Senna alata* (Paje-Villar, 2008), *Vitex negundo* and *Blumea balsamifera*.

Conclusion

This study documented the medicinal plants utilized by the *Ilongot-Eǵongot* ethnic community at Bayanihan, Maria Aurora, Aurora, Philippines. The survey revealed a great number of medicinal plants used traditionally for different ailments. The study also showed that the community makes use of plants that are readily available in their surroundings, from weeds, and vines to shrubs and trees, which shows high diversity of plants in the area as well as their rich traditional medicinal knowledge in which conservation and protection is warranted. It is recommended that pharmacological and phytochemical screenings be performed to validate the medicinal uses of these plants.

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