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Useful Plants of Selected Ayta Communities from Porac, Pampanga, Twenty Years after the Eruption of Mt. Pinatubo

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A survey of useful food and medicinal plants was conducted among the Ayta from three barangays of Porac, Pampanga. Twenty years after the eruption of Mt. Pinatubo, the Ayta communities of Porac have experienced extensive changes in their life, culture and society. In the survey, 83 plants were used as food and 167 plants used as medicine. The most number of species are classified under the Fabaceae family. The food and medicinal plants used by the Ayta communities declined in number as compared to the study of Fox in 1952. A contributing factor to the decline may have been the dislocation of the communities and the loss of the forest after the eruption of Mt. Pinatubo. Likewise, the acculturation and integration into prevailing society has affected the lives of the Ayta, but their botanical knowledge remains an important part of their culture.

Key Words: Ayta community, Porac, Pampanga Province, medicinal plants, culture, Mt. Pinatubo

INTRODUCTION

The Pinatubo Ayta have been dependent on the forests for generations. The forests have served as their market, pharmacy, hardware store and ritual areas. When the Pinatubo mountain erupted in 1991, the Ayta communities have been displaced and relocated to the lowlands or other provinces in Central Luzon. Some Ayta communities have returned as soon as the threat of eruption was over. On the average, the Ayta have returned after about two years or in 1993-94. Now, 21 years after the eruption, the original forest and vegetation of Mt. Pinatubo has changed. For instance, in the town of Porac, Pampanga, in Barangay Inararo, the community has resettled in an area a couple of hours hike from their original settlement. For barangays Villa Maria and Camias, they have returned to their original areas. Upon their return, many governmental and non-governmental organizations have assisted the Ayta in building homes patterned after the lowland settlements. A single road passes through the settlement, and houses, made of cement and steel roofs, were built on the two sides of the road. When a person decides to plant, he or she will have to hike far from the settlement and many families would build a makeshift house near their "uma" (clearings or kaingin).

The lifestyle of the Ayta have also changed. Whereas before they depended on fruits and whole plants from the forests for their food and medicinal needs, and hunted birds, bats, wild pig for their sustenance, they now had to plant and cultivate crops both for home consumption and cash. Likewise, financial and material aide from many individuals, corporations and the government flowed to the Ayta community. Many seeds were donated by local and international groups. These were planted in various areas so that eventually, many of the fruit bearing trees bore fruit and provided a source of income for some Ayta communities.

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Now, the Ayta communities have electricity and TV. They use cell phones, and their children go to school. They are integrated into the mainstream politics and local government through their barangay. The barangay council is elected by the people and in Bgy. Inararo and Camias, the barangay chairpersons are pure Ayta and in Bgy. Villa Maria, the barangay chairperson is a mestizo Ayta.

In July 15-16, 2010, Leonard Co and two Ayta leaders met in UP-Diliman in a conference held at UP NISMED. In that conference, entitled "Mainstreaming Native Species-Based Forest Restoration", the participants all agreed to use native plant species for reforestation. During that time also, two Ayta leaders, Benny Capuno and Arnel Valencia from Barangay Camias were planning a "Balik Kagubatan" or reforestation of Mt. Pinatubo. The Ayta leaders met Leonardo and discussed with him the situation of Mt. Pinatubo. (Photo 1). They also invited Leonardo to help in the assessment of the vegetation of the area. Leonardo readily agreed to go as this was part of his involvement in the restoration of forests and his continuous advocacy of supporting ethnobotanical researchers. Leonardo also encouraged the documentation of traditional botanical knowledge and this was part of his commitment to enriching and educating the Filipinos with regard to the Philippine botanical flora. Unfortunately, because of his untimely demise on November 15, 2010, this visit did not materialize. This paper, the documentation of the ethnobotany of the Ayta is an attempt to partly fulfill what Leonardo promised to do for the Ayta people. Likewise, this paper will try to answer the question: given the forest loss and acculturation twenty years after the eruption of Mt. Pinatubo, how have the plants used as food and medicine by the Ayta changed? The seminal paper by Robert Fox entitled: The Pinatubo Negritos, Their Useful Plants and Material Culture was published in 1952. In this voluminous work conducted for two years, Fox, an anthropologist, described the plants used by the Pinatubo Ayta. Fox worked with the Ayta from the Zambales range and they were described as "shifting cultivators" in their "kaingin". He also wrote that the Ayta depended on 3 introduced plants: sweet potato, cassava and corn. This paper will also compare the current knowledge of useful plants by the Ayta and Fox's 1952 paper.

METHODS

Study area

The three barangays included in the study are upland barangays of Porac, Pampanga. These barangays are on the foothills of Mt. Pinatubo. As of 2007, Bgy. Inararo has a total population of 780 Ayta and Bgy. Villa Maria had a total population of 719. The population of Bgy. Camias in 2000 was 1,492. The Ayta from Villa Maria speak Mag-anchi dialect, while the Ayta from Bgy. Inararo and Camias speak the Mag-indi dialect.

Participant interview

A total of 84 Ayta people were interviewed between Oct. 2010 and Oct. 2011. There were 36 informants from Bgy. Inararo and 25 informants from Bgy. Villa Maria. Eight informants were extensively interviewed in Bgy. Camias although an additional fifteen informants joined the interviews that turned into group discussions. Prior to the field work, the investigators asked permission from the PAADFI (Porac Ayta Ancestral Domain Federation, Inc.) headed by Mr. Roman King. The purpose of the study was explained to each informant and a consent form was signed or their thumb mark was put on paper by the informant who agreed to be interviewed.

The ethnobotanical survey was conducted using semi-structured interviews. The participants were mostly selected by convenience sampling. The researchers went from house to house but the families in some homes were

Photo 1. Leonard Co with the authors and the Ayta leaders (from the left, Mr. Arnel Valencia, Mr. Benny Capuno, Ms. Ragragio, Mr. Obico, Mr. Leonardo Co, and back to the camera, Dr. Zayas) in July 15, 2010.

not in their houses. Most were in their "uma" or planting field during the conduct of interviews.

The informants were asked their names, age, marital status, number of children and educational attainment. They were then asked what plants they used as food, medicine, material culture and plants for other purposes. The informants were also asked how they prepared the medicinal plants, what parts of the plants were used and how these are applied to patients. The most important medicinal plants were computed based on the frequency of citations by the informants (Martin 2004).

Plant collections were done after the interviews. Plant specimens were photographed or collected and brought to the UP-Manila, Department of Biology for identification. If a specimen cannot be located during the field interviews, then a subsequent collection work was made. However, some plants could not be identified scientifically since there was no sample that could be gathered. Collected plants were then dried and voucher specimens were prepared using standard herbarium procedures. The voucher specimens are kept at the Department of Biology, College of Arts and Sciences, UP-Manila.

Plants that were used as food and medicine were listed in Tables 1 & 2 and a comparison of the plant species used by Ayta communities reported in the present study with that reported in Fox (1952) was shown in Table 3.

RESULTS AND DISCUSSION

There were a total of 84 informants with ages ranging from 11 to more than a hundred years old (one informant from Bgy. Camias said he was more than a hundred year old). Majority of the informants were female (59.5%) and most were between 20 to 60 years old.

Table 1 lists the plants used as food. There were 83 scientifically identified plants used as food by the three Ayta communities. Barangay Inararo informants cited 65 plants used as food, Villa Maria informants cited 53 plants while Camias informants listed only 29 plants. Fifteen plants were cited in all three barangays. These are *Begonia* sp. , *Carica papaya* L., *Citrofortunella x microcarpa* (Bunge) Wijnands, *Colocasia esculenta (*L.) Schott, *Dioscorea alata* L.*, Ipomoea batatas (*L.) Lamk., *Mangifera indica* L.*, Manihot esculenta* L.*, Musa errans (*M. Blanco) N.G. Teodoro, *Musa x paradisiaca* L., *Persea americana* Mill., *Phaseolus radiatus* L.*, Psophocarpus tetragonolobus* L.*, Solanum nigrum* L. and *Zingiber officinale* Roscoe. Twelve species of food plants were classified in the Fabaceae family. Six species were classified under Moraceae family and 5 species classified under Cucurbitaceae family. Other plant families had four or less representative species and twelve families had one representative species each. Most of the Fabaceae species are the beans whose seeds are an important source of protein. Barangay Inararo had the most citations of plants used as food. One reason could be that prior to the eruption of Mt. Pinatubo, the original settlement of the Inararo Ayta was at the interior of the forest of Mt. Pinatubo. There the Inararo Ayta had access to seeds, fruits and leaves that can be harvested from the forest. After the eruption, the Inararo Ayta had to be relocated far from the forest and nearer the lowland areas of Pampanga.

Table 2 lists the plants used for medicinal purposes. There were 167 plants scientifically identified that were cited by the Ayta communities. Barangay Inararo informants cited 133 plants used for medicinal purposes. The informants from Barangay Villa Maria and Camias cited 83 and 58 plants respectively. Twenty three plants are classified under family Fabaceae. These include *Bauhina malabarica* Roxb., *Cajanus cajan* (L.) Millsp., *Cassia alata* L.*, Desmodium sp., Entada phaseoloides (* L.) Merr., *Gliricidia sepium* (Jacq.) Kunth, *Mimosa pudica* L., *Phaseolus lunatas* L., *Pongamia pinnata* (L.) Merr., *Pterocarpus indicus* Willd., and *Tamarindus indica* L. These plants are also listed in the Medicinal Plants of the Philippines by Dr. Eduardo Quisumbing (1978). This number is notable since most of the plants are classified under one family only. However, there are 12 plants classified under Poaceae and the families Asteraceae, Lamiaceae and Moraceae are represented by eight species each. Just like the result in the survey on food plants, the informants from Barangay Inararo had the most citations. Their access to the forest prior to the eruption of Mt. Pinatubo could explain the abundance of plants that they know and use either as food or medicine.

Table 3 shows a comparison between the plants listed by Fox (1952) and the plants provided by the present survey of the Ayta from the three barangays. A reduction in the number of plants cited by the Ayta from the 3 communities in the present study as compared to the study of Fox (1952) can be observed. For food plants from 126 plants listed by Fox, the Ayta informants provided only 83 plants. For medicinal plants, from 297 plants listed by Fox, the Ayta informants provided only 167 plants. The plants listed are the scientifically identified ones. Other plants are known only by their common names and their formal botanical classifications were not identified because of lack of specimens. The researchers tried to look for the scientific names of the common names given by the informants. In particular, the informants gave 18 common names of plants for food but none of these common names were present in either Fox (1952) or Merrill (1912) .

Table 1. Plants used as food by the Ayta people in Porac, Pampanga Province.

Scientific name	Family	Common name	Parts used
Abelmoschus esculentus L.	Malvaceae	Okra	fruit
Allium sativum L.	Alliaceae	Bawang	bulb
Alpinia haenkei C. Presl.	Zingiberaceae	Tambak *[4]	leaves
Amaranthus spinosus L.	Amaranthaceae	Kulitis/Amaranth *[1]	Leaves
Amomum L.	Zingiberaceae	Dalakit *[4]	stem, fruit
Anacardium occidentale L.	Anacardiaceae	Kasuy/ Balobad *[1]	fruit, seed, leaves
Ananas comosus Merr.	Bromeliaceae	Pinya *[1]	fruit
Annona muricata L.	Annonacee	Guyabano/Baldibana *[1]	fruit
Antidesma bunius (L.) Spreng.	Euphorbiaceae	Ayhip*[4]	Fruit
Arachis hypogaea L.	Fabaceae	Mani	seed
Artocarpus altilis (Park.) Fosb.	Moraceae	Tiyep/Kamansi*[4]	fruit
Artocarpus blancoi Merr.	Moraceae	Antipolo/Kalanat/Kalamunggi	Leaves
Artocarpus heterophyllus Lam.	Moraceae	Langka/Yangka*[4]	fruit
Bambusa sp.	Poaceae	Kawayan/bangaba*[2]	young stem
Bauhinia malabarica Roxb.	Fabaceae	Kalibangbang*[4]	fruit
Begonia sp.	Begoniaceae	Pingul-bato /alwas*[4]	leaves
Brassica oleracea L. var.*capitata*	Brassicaceae	Repolyo	leaves
Brassica rapa L. *var. chinensis*	Brassicaceae	Petsay	leaves
*Cajanus cajan (*L.) Millsp.	Fabaceae	Kardis/Kare	seeds
Calamus L.	Arecaceae	Rattan/Bulilat/yantok/law-i*[1]	fruit, stem
Canarium ovatum Engl.	Burseraceae	Bulao/Pili *[4]	seed
Capsicum frutescens L.	Solanaceae	Sili/Lara *[1]	fruit
Carica papaya L.	Caricaceae	Papaya *[1]	fruit
Caryota cumingii Lodd. ex Mart	Arecaceae	Takipan*[4]	water source
Caryota mitis Loureiro	Arecaceae	Ubol	young stem
Castanea sp. Mill.	Fagaceae	Kastanyas	seed
Chrysophylum cainito L.	Sapotaceae	Kaimito	fruit
Citrofortunella x microcarpa (Bunge) Wijnands	Rutaceae	Kalamansi/Kalamunding*[4]	fruit
*Citrus maxima (*Burm.) Merr	Rutaceae	Suha *[4]	fruit
Cocos nucifera L.	Arecaceae	Niyog *[2]	seed, young stem
Coffea arabica L.	Rubiaceae	Kape	seeds
*Colocasia esculenta (*L.) Schott	Araceae	Gabi/Luko/gabing pula/gabing puti*[3]	Leaves, stem
Colocasia macrorrhiza (L.) Schott	Araceae	Biga/Galyang*[3]	stem, leaves
Corchorus capsularis L.	Malvaceae	Saluyot *[4]	leaves
Cucurbita maxima Duchesne	Cucurbitaceae	Kalabasa *[1]	flower, fruit, leaves
Dioscorea alata L.	Dioscoreaceae	Ube/Murado/kagunaw*[3]	root
Dioscorea esculenta (Lour.) Burkill	Dioscoreaceae	Tuge/tungi*[3]	root
Dioscorea hispida Dennst.	Dioscoreaceae	Kalut *[4]	root
Dioscorea pentaphylla L.	Dioscoreaceae	Kabwang * [4]	fruit
Diospyros blancoi A.DC.	Ebenaceae	Talang/Mabolo	fruit
Dolichos purpureus L.	Fabaceae	Bataw	seed,fruit
Embelia philippinensis A.DC	Myrsinaceae	Balinaknak	Leaves

Table 1 continues next page

*Ficus minahassae (*Teysm.& De Vr.) Miq.	Moraceae	Aymit*[4]	Fruit
Ficus nota (Blanco) Merr.	Moraceae	Tibey/Têbêy	fruit
Ficus variegata Blume	Moraceae	Kayahan	fruit
Flacourtia indica (Burm. F.) Merr.	Flacourtiaceae	Dalin	fruit
*Gliricidia sepium (*Jacq.) Kunth	Fabaceae	Kakawati/ Madre cacao	stem
*Graptophyllum pictum (*L.) Griffith	Acanthaceae	Saresa	fruit
*Ipomoea batatas (*L.) Lamk.	Convolvulaceae	Kamote/ kamoteng-baging/kagunaw*[1]	Root, leaves
Kolowratia elegans C. Presl.	Zingiberaceae	Panoy-poy	fruit
Lagenaria siceraria (Mol.) Standl.	Cucurbitaceae	Upo	fruit
Litchi chinensis Sonn.	Sapindaceae	Alpay	Fruit
Luffa cylindrica (Linn.) M. Roem.	Cucurbitaceae	Kamatiti/ Kabatuti*[3]	fruit
Lycopersicon esculentum Mill.	Solanaceae	Kamatis*[1]	fruit
Mangifera indica L.	Anacardiaceae	Mangga*[4]	fruit
Manihot esculenta L.	Euphorbiaceae	Kamoteng Kahoy/balanghoy/muros*[1]	Root, leaves
Momordica charantia L.	Cucurbitaceae	Ampalaya*[3]	Fruit, leaves
Moringa oleifera Lam.	Moringaceae	Malunggay/unaba	leaves
Musa acuminata Colla	Musaceae	Saba *[3]	fruit, flower
*Musa errans (*M. Blanco) N.G. Teodoro	Musaceae	Amukaw*[3]	Fruit, flower
Musa x paradisiaca L.	Musaceae	Saging /saa*[3]	fruit, flower
Oryza sativa L.	Poaceae	Palay *[3]	grain
Pachyrrhizus erosus L.	Fabaceae	Singkamas* [1]	root
Persea americana Mill.	Lauraceae	Abokado *[1]	Fruit
Phacelophrynium interruptum K.Schum	Marantaceae	Agik-ik	Fruit
Phaseolus lunatus L	Fabaceae	I-ilo/patani/bule/buli/patani*[1]	seed
Phaseolus vulgaris L.	Fabaceae	Mongo/pardas*[1]	seed
Pithecellobium dulce (Roxb.) Benth.	Fabaceae	Kamatsile/kamantilis*[1]	fruit
Psidium guajava L.	Myrtaceae	Bayabas *[1]	fruit
Psophocarpus tetragonolobus L.	Fabaceae	Sigarilyas	fruit
Raphanus sativus L.	Brassicaceae	Labanos	root
Saccharum officinarum L	Poaceae	Tubo	Stem
Sandoricum koetjape Merr.	Meliaceae	Santol/Kato* [4]	fruit
Sechium edule (Jacq.) Sw.	Cucurbitaceae	Sayote	fruit
Solanum melongena L.	Solanaceae	Balasinas/ Talong /barsines*[2]	Fruit
Solanum nigrum L.	Solanaceae	Untsi/Tubangmanok/bayahan*[2]	leaves
Spondias purpurea L.	Anacardiaceae	Sariguelas/siniguelas	fruit
*Syzygium cumini (*L.) Skeels	Myrtaceae	Duhat *[4]	fruit
Tamarindus indica L.	Fabaceae	Sampalok *[2]	Fruit
Vigna unguiculata (L.) Walpers subsp. *sesquiipedalis* (L.) Verdc.	Fabaceae	Kamangyang/sitaw	fruit
Xanthosoma sp.	Araceae	Dipulyo	corm, leaves, stem
Zea mays L.	Poaceae	Ma-ih*[1]	fruit
Zingiber officinale Roscoe	Zingiberaceae	Luya	rhizome

*Refer to plants listed in Fox (1952)
[1]Refer to plants of American or New World origin according to Fox (1952)
[2]Refer to plants introduced from other places other than the New World according to Fox (1952)
[3]Refer to cultivated plants of prehistoric introduction according to Fox (1952)
[4]Refer to cultivated, semi-cultivated and spontaneous fruit trees of prehistoric introduction according to Fox (1952)

Table 2. Plants used as medicines by the Ayta in Porac, Pampanga Province.

Scientific names	Family	Common names	Uses
Acacia Mill.	Fabaceae	Alikasya	Smallpox, chicken pox
Acacia auriculiformis A. Cunn. ex Benth.	Fabaceae	"Eucalyptus"	Insect repellent
*Albizia procera (*Roxb.) Benth.	Fabaceae	Alalangad / Karael	Toothache
Allium cepa L.	Alliaceae	Sibuyas	Measles
Allium sativum L.	Alliaceae	Bawang **	High blood pressure dog bites, toothache
Alpinia haenkei Presl. *[5]	Zingiberaceae	Tambak**	seasoning
Alstonia scholaris (L.) R. Br.*[5]	Apocynaceae	Dit-a	dropsy
Amaranthus spinosus L.	Amaranthaceae	Aya /kulitis **	Kidney problems
Anacardium occidentale L. *[1]	Anacardiaceae	Kasuy/Balobad* *	Headache, fever, nosebleed
Ananas comosus (L.) Merr.*[1]	Bromeliaceae	Pinya **	Anti-cancer, throat pain, tonsilitis
Andropogon citratus DC. *[3]	Poaceae	Tanglad/Tanglay/Sulay/Salay/ Bangyad	High blood pressure, stomach ache
Annona muricata L. *[1]	Annonaceae	Guyabano/Goldibana/Baldibana**	Fever, insect repellent, headache, stomach ache
Annona squamosa L.	Anonaceae	Atis	Stomach ache, vomiting
Arachis pintoi Krapov. & W.C. Greg.	Fabaceae	Mani-manian	"binat", childbirth
Arcangelisia flava Merr.	Menispermaceae	Shuma	Wounds
Areca catechu L. *[2]	Arecaceae	Mama (nganga)	Toothache
Aristolochia L.*[5]	Aristolochiaceae	Malaubi	Diarrhea
Artemisia vulgaris L.*[2]	Asteraceae	Dikot Maria/Damong Maria	Sore eyes, ear infection, cough
Artocarpus blancoi Merr. *[5]	Moraceae	Antipolo/ Kalanat/ Kalamung-gi* *	Insect repellent
Artocarpus heterophyllus Lmk. *[4]	Moraceae	Langka/Yangka* *	Anti"kilat"(sudden fever after birth)
Athyrium esculentum (Retz.) Copel.	Woodsiaceae	Pako	Vegetable
Averrhoa bilimbi L. *[1]	Oxalidaceae	Kamias	Fever, measles
Azadirachta indica A. Juss.	Meliaceae	Neem Tree	Insect repellent
Bambusa Schreb.*[2]	Poaceae	Kawayan/Bangaba* *	Dropsy
Bambusa vulgaris Schard. ex J.C.Wendl.*[2]	Poaceae	Kawayang dilaw	To cut umbilical cord of newborns, childbirth
Bauhinia malabarica Roxb.	Fabaceae	Kalibangbang**	Throat pain, tonsillitis, headache
Bixa orellana L.	Bixaceae	Atsuete	Stomach ache, headache
Blumea balsamifera (L) DC.*[5]	Asteraceae	Aliabong/Sambong	Fever, vomiting, cough, colds, spasm
Breynia vitis-idaea (Burm.f) C.E.C.Fisch.*[5]	Phyllanthaceae	Bugbugayong/ Matan-ulang	Mouthwash
Bryophyllum pinnatum (Lam.) Kurz *[5]	Crassulaceae	Kataka-taka	Boils, rashes, diarrhea, wounds
Buddleja L.*[5]	Loganiaceae	Tutuloy/Kutuan	To calm babies
Cajanus cajan (L.) Millsp.	Fabaceae	Kardis/Kare	Diarrhea, skin diseases, measles
Calamus L. *[1]	Arecaceae	Rattan/bulilat/yantok/ Law-i **	Childbirth
Capsicum frutascens L.*[1]	Solanaceae	Sili/Lara **	Sore eyes, pregnancy or during parturition
Carica papaya L. *[1]	Caricaceae	Papaya **	Antihelminthic, pregnancy, snake bite

Table 2 continues next page

Cassia alata L.*[1]	Fabaceae	Akapulko/ Pakayungkong	Skin problems, ringworm
Casuarina equisetifolia L.	Casuarinaceae	Agoho	Dropsy
Catharanthus rosesus (L.) G. Don	Apocynaceae	Chichirica	Cough
Ceiba pentandra (L.) Gaertn	Bombacaceae	bulak/kapis	Diarrhea
Chamaesyce hirta L.*[2]	Euphorbiaceae	Tawa-Tawa/Gatas-gatas	Wounds, fever
Chromolaena odorata (L.) King & H. Rob.	Asteraceae	Paliktad	Nausea, childbirth
Chrysophylum cainito L.	Sapotaceae	Kaimito**	Stomach ache, diarrhea
Citrofortunella x microcarpa (Bunge) Wijnands	Rutaceae	Kalamansi/ kalamunding**	Throat pain, tonsillitis, cough, colds
Citrus maxima (Burm.) Merr.	Rutaceae	Suha **	Dropsy
Citrus nobilis Lour.	Rutaceae	Dalanghita	Sore throad
Clerodendron Burm.*[5]	Lamiaceae	Mung-iw/tagalbag	Fever
Clerodendron minahassae Teysm.& Binn*[5]	Lamiaceae	Danuko	Stomach ache
Cocos nucifera L. *[2]	Arecaceae	Niyog**	Kidney stones; wound healing, pregnancy, cough
Coffea arabica L.	Rubiaceae	Kape **	Wounds
Coleus blumei Benth.	Lamiaceae	Mayana	Headache
Colocasia esculenta (L.) Schott*[3]	Araceae	Gabi/Luko **	childbirth
Corchorus capsularis L.	Malvaceae	Saluyot**	Low blood platelet count
Cordia dichotoma Forst. *[5]	Boraginaceae	Anonang	Diarrhea, “binat”, edema
Coriandrum sativum L.	Apiaceae	Kolantro/Kulantro	Chicken pox, measles
Crotalaria linifolia L. *[2]	Fabaceae	Lihik-lihik	Sore eyes
Cyanthillium cinereum (L.) H. Rob*[5]	Asteraceae	Vernonia	Childbirth
Cyperus cyperoides(L) Kuntze	Cyperaceae	Muta/Mutha	Spasm
Cypholophus moluccanus (Blm.) Miq.*[1]	Urticaceae	Ulip	Childbirth
Desmodium scorpius (W.) Desv.	Fabaceae	Kinew	Sore eyes
Desmodium Desv. *[1]	Fabaceae	Pakpak-langaw	Lazy eye, sore throat, wounds
Dianella javanica (Blm.) Kunth *[5]	Xanthorrhoeaceae	Payuyut	Childbirth
Dioscorea alata L.	Dioscoreaceae	Ube/Murado**	Stomach ache, fever
Dioscorea esculenta (Lour.) Burkill*[5]	Dioscoreaceae	Tuge **	Boils
Dioscorea hispida Densst. *[5]	Dioscoreaceae	Kalut **	Wound, clotting
*Donax canniformis (*Forst.)K. Schum	Marantaceae	Bamban	“pasma”
Elephantopus scaber L. *[1]	Asteraceae	Kalahaka	Cough
*Eleusine indica (*Linn.) Gaertn.*[2]	Poaceae	Hayapey/Hayapaw	Rheumatism, body pain, child-birth
Entada phaseoloides (L.) Merr.	Fabaceae	Gugo	Skin diseases, baldness
Eucalyptus sp. L.	Myrtaceae	Eukaliptus	Headache, nausea, flu
Ficus hauili Blco. *[5]	Moraceae	Awili	Wounds
Ficus minahassae (Teysm. & De Vr..) Miq.	Moraceae	Aymit	Childbirth
Ficus nota (Blanco) Merr.*[5]	Moraceae	Tibey/Têbêy **	Toothache, stomach ache
Ficus nuda Miq.	Moraceae	Balete/Balite	Muscle spasm
Ficus L.	Moraceae	Gih-gih / Is-is	Weak blood circulation
Gliricidia sepium (Jacq.) Kunth *[1]	Fabaceae	Kakawati/ Madre cacao **	Fever, cough, toothache,stomach ache
Gmelina arborea Roxb *[5]	Lamiaceae	Melina	wounds

Table 2 continues next page

Gomphrena L.	Amaranthaceae	Malabutonis	Skin problems
Goniothalamus amuyon (Blanco) Merr.	Annonaceae	Amuyong	Mosquito repellent
Graptophyllum pictum (L.) Griffith	Acanthaceae	Saresa**	Wounds, stomach ache
Hibiscus rosa-sinensis L.*[2]	Malvaceae	Gumamela/Rosas	Boils. Sore eyes
Hyptis capitata Jacq. *[1]	Lamiaceae	Pansi-pansi/Palsi-palsi	Stomach ache, childbirth, diarrhea
*Imperata cylindrica (*L.) P. Beauv.	Poaceae	Ilib/Yabot/Kugon	High blood pressure,kidney problems
*Intsia biyuga (*Colebr.)Kutze	Fabaceae	Ipil	deworming
*Ipomoea batatas (*L.) Lamk.*[1]	Convolvulaceae	Kamote/Kamoteng baging/kamotenggapang/kagunaw**	High blood pressure
Ipomoea trilobata L.	Convolvulaceae	Magkakamote/Magkakamutsi	Insect repellent
Ixora coccinea L.	Rubiaceae	Santan	Goiter, post pregnancy, UTI
Jatropha curcas L. *[1]	Euphorbiaceae	Tuba-tuba/Takumbaw	Wounds, inflammation
*Lagenaria siceraria (*Mol.) Standl.	Cucurbitaceae	Upo **	High blood pressure, childbirth
Lagerstroemia speciosa (L.) Pers.*[5]	Lythraceae	Mitla/Banaba	Fever, tea, health enhancer, "pasma"
Lantana camara L.	Verbenaceae	Gaymis/Gaynis	Headache, flu, nausea
Laportea meyeniana (Walp.)Warb.	Urticaceae	Lepa	Sinusitis
Leea manillensis Walp. *[5]	Leeaceae	Imamali	"binat", wounds
Litchi chinensis Sonn.	Sapindaceae	Alpay	"binat", skin diseases
Litsea sp.Lam.*[2]	Lauraceae	puso-puso	Baldness
Lunasia amara Blanco	Rutaceae	Lunas/Dayangdang/dayang	Toothache , sore eyes
Lycopersicon esculentum Mill.	Solanaceae	Kamatis **	Skin burns
*Macaranga tanarius (*L.) Muell.-Arg.	Euphorbiaceae	Binunga	Throat problems, spasm
Mangifera indica L. *[4]	Anacardiaceae	Mangga **	"pasma", diarrhea, skin problems, fever
Manihot esculenta L.*[1]	Euphorbiaceae	Kamoteng Kahoy/balanghoy/muros**	Insect repellent, fever, colds, high blood pressure
Melanolepis multiglandosa(Reinw.)Reichb. & Zoll.	Euphorbiaceae	Em-em	Snake bite, chicken pox, headache
Mikania micrantha (L.) Kunth	Asteraceae	Malakamote	Insect repellent, wounds
Mimosa pudica L.*[1]	Fabaceae	Makahiya/Kurerungey/kalumparit	Ear infection, pregnancy or parturition
Miscanthus floridulus Warb. ex K Schum & Lauterb.*[5]	Poaceae	Uyong/Las-a/Dakipan	Fever, snake bite
Momordica charantia L.*[3]	Cucurbitaceae	Ampalaya **	Cough, skin diseases, high blood pressure
Morinda citrifolia L. var. *bracteata (*Roxb.)Kurz		Apatot	Heart problems, male sterility
Moringa oleifera Lam.	Moringaceae	Malunggay**	Wounds , toothache
Mucuna nigricans (Lourd.) Steud.*[5]	Fabaceae	Pamiki-win/mantug	Fever
Mucuna sericophylla Perk *[5]	Fabaceae	Duglo	Fever
Muntingia calabura L.	Tiliaceae	Sari-sa / Mansanitas/Aratiles	Cough, diarrhea
Musa acuminata Colla.	Musaceae	Saba **	Diuretic, tootache
Musa errans (M.Blanco) N.G.Teodoro *[3]	Musaceae	Amukaw**	Diuretic
Musa x paradisiaca L. *[3]	Musaceae	Saging **	Wounds, stomach ache, diarrhea
Nepenthes alata L.	Nepenthaceae	Baso ng Binangonan	Snakebite

Table 2 continues next page

Nicotiana tabacum L. *[1]	Solanaceae	Tabako/Tobako	Toothache
Ocimum sanctum L.	Lamiaceae	Solasi	Skin diseases
*Opuntia ficus-indica (*L.) Mill.	Cactaceae	Cactus	Stomach ache
Orthosiphon aristatus (Blume) Miq.	Lamiaceae	Balbas pusa	Sore throat
Oryza sativa L. *[3]	Poaceae	Palay **	Throat pains, tonsillitis, measles, sore eyes
Pandanus odoratissimus L.f.	Pandanaceae	Pandan	Stomach ache
Pandanus L.f.	Pandanaceae	Pandan na lalaki	Stomach ache, kidney stones
Persea americana Mill.*[1]	Lauraceae	Abokado **	Cough, colds, stomach ache, vomiting, diarrhea
Phaseolus lunatus L.	Fabaceae	I-ilo **	Headache, pregnancy
Phyllanthus niruri L.	Euphorbiaceae	Sampaluk-sampalukan/Magla	Menstrual problems, fever
Piper nigrum L.	Piperaceae	Paminta	Wounds, toothache
Pipturus arborescens (Link.) C.B.Rob. *[5]	Urticaceae	Dalunot	Fever
*Pithecellobium dulce (*Roxb.) Benth.*[1]	Fabaceae	Kamatsile/Kamantilis**	Stomach ache, diarrhea
*Plectranthus amboinicus (*Lour.) Spreng.	Lamiaceae	Oregano	Wounds
Pokiliospermum suaveolens Rlm.	Urticaceae	Anupo	Cough
*Pongamia pinnata (*L.) Pierre	Fabaceae	Balun-balunan /Balu-balo ng manok	Wounds
Portulaca grandiflora Hook.	Portulacaceae	Tagalbag	Dropsy
Premna odorata Blco. *[5]	Verbenaceae	Aglaw	Headache, cough
Psidium guajava L. *[1]	Myrtaceae	Bayabas **	Wounds, fever, tonsillitis, headache
Psophocarpus tetragonolobus L.	Fabaceae	Sigarilyas **	Inflammation
Pterocarpus indicus Willd.	Fabaceae	Narra	Fever, measles, flu
Ricinus communis L. *[2]	Euphorbiaceae	Tangan-tangan	Measles
Rottboellia ophiuroides Benth.	Poaceae	Talangaw	Toothache
Saccharum spontaneum L. *[5]	Poaceae	Talahib/Taib	Kidney problems
Sandoricum koetjape Merr.*[4]	Meliaceae	Santol/Katoh/Karakatos* *	Fever, fever, snake bite, measles, diarrhea
*Schizostachyum diffusum (*Blco.) Merr	Poaceae	Bikas/Bika	High blood pressure
*Schizostachyum lumampao (*Blanco) Merr.	Poaceae	Buho	Cough, headache
Schizostachyum Ness.	Poaceae	Binahak	Yellow eyes
Scleria scrobiculata Nees. *[5]	Cyperaceae	Banglit	Measles
Scoparia dulcis L. *[1]	Plantaginaceae	Kolantro **	Measles
Sida acuta Burm.f.*[2]	Malvaceae	Mamalis/Palis-palis/ Walis-walis	Wounds, chicken pox, skin diseases
Solanum nigrum L. *[2]	Solanaceae	Untsi/Tubang-manok/ Bayaban**	Swelling
Solanum L.	Solanaceae	Tanggutum	Sore throat, fever
Spondias purpurea L.	Anacardiaceae	Sariguelas/Siniguelas **	Fever, cold
*Stachytarpheta jamaicensis (*L.) Vahl	Verbenaceae	Yabing	Itch, dandruff
Stachytarpheta Vahl.	Verbenaceae	Ikoy dagis/Buntot ng daga	Itch, dandruff
Streblus asper Lour.	Moraceae	Kalyos	Mouth sores and gum problems
Swietenia macrophylla (L.) Jacq.	Meliaceae	Mahogany	Diarrhea
*Syzygium cumini (*L.) Skeels *[5]	Myrtaceae	Duhat **	Diarrhea, skin diseases

Tabernaemontana cumingiana A.DC. *[5]	Apocynaceae	Kalibutbut	Stomach ache, wounds, tooth ache
Tagetes erecta L	Asteraceae	Amarillo	Diarrhea
Tamarindus indica L. *[2]	Fabaceae	Sampalok**	Fever , throat pains, tonsillitis, colds
Tinospora rumphii Boerl. *[2]	Menispermaceae	Makabuhay	Rheumatism
Tithonia diversifolia A. Gray	Asteraceae	Samplawud/Kuber/maglalamiran	Wounds, childbirth
Tradescantia pallida (Rose) D.R. Hunt	Commelinaceae	Violet	Sore eyes
Tradescantia spathacea Sw.	Commelinaceae	Aksibal/Bangkabangkaan/Masitas	Inflammation, sprains and fractures
Trema orientalis (L.) Bl.	Ulmaceae	Maladurong	Sprains and fractures
*Trema tomentosa (*Roxb.) Har.	Cannabaceae	Alarung/Alarong	Diarrhea, cough
Tridax procumbens L. *[2]	Asteraceae	Pulukutus/Pulukuto	Stomach ache, diarrhea
Urena lobata L. *[1]	Malvaceae	Pakalkal	Sprains and fractures
Verbena L.	Verbenaceae	Kalandirya/kandelaria	childbirth
Vigna radiata (L) R. Wilczek	Fabaceae	Monggo/balatong **	Wounds, measles
Vitex negundo L. *[5]	Lamiaceae	Lagundi	Colds, cough, throat problems, "pasma"
Zingiber officinale Roscoe *[3]	Zingiberaceae	Luya **	Stomach ache, colds

*Plants listed in Fox as medicinal.
**Plants listed as food by the Ayta.
[1]Refer to plants of American or New World origin according to Fox (1952).
[2]Refer to plants introduced from other places other than the New World according to Fox (1952).
[3]Refer to cultivated plants of prehistoric introduction according to Fox (1952).
[4]Refer to cultivated, semi-cultivated and spontaneous fruit trees of prehistoric introduction according to Fox (1952).
[5]Refer to plants listed in Fox(1952) as medicinal but origin not described.

Table 3. Comparison of plants listed in Fox (1952) and those reported by the three Ayta barangays in Porac, Pampanga Province.

Category	Fox (1952)	Ayta barangays (2012)	Cited in both
Food	126 plants	83 plants (65.8% of Fox)	51 plants (40.4% of Fox)
Medicine	297 plants	167 plants (56.2% of Fox)	77 plants (25.92% of Fox)

Fox (1952) listed a total of 126 plants used as food. These plants were categorized into: 1) plants of American origin (or New World plants) and used by the Ayta, prior to the arrival of the Spaniards, 2) introduced plants not of American or New World origin, 3) cultivated, semi-cultivated plants, spontaneous fruit trees and plants of prehistoric introduction, and 4) wild food plants.

In the present study, of the 83 identified as food plants, fifty-one of these plants were also listed in Fox (1952) and categorized as food. Of these food plants. 18 are of New World origin (category 1 of Fox (1952) and 5 plants are introduced plants not of New World origin (category 2 of Fox (1952)). Nine plants are included in the category 3 of Fox (1952) while 19 plants are category 4 of Fox (1952).

The 32 plants not found in the list of Fox are plants commonly sold in markets all over the province. These are the common vegetables that were probably cultivated elsewhere. These plants include *Abelmoschus esculentus* L., *Allium sativum* L., *Brassica oleracea* var. *capitata*, *Brassica oleracea* L. var. *chinensis*, *Arachis hypogaea* L. *Castanea* sp., *Cocos nucifera* L., *Coffea arabica* L., *Dolichos lablab* L., *Lagenaria vulgaris* Ser., *Litchi chinensis* Sonn., *Moringa oleifera* Lam., *Psophocarpus tetragonolobus* L., *Raphanus sativus* L., *Saccharum officinarum* L., *Sechium edule* (Jacq.) Sw., *Zingiber officinale* Roscoe. Furthermore, fruit trees were mentioned by the Ayta and the fruits are eaten and harvested.. These include *Artocarpus blancoi* Merr., *Chrysophylum cainito* L. , *Diospyrus blancoi* A. DC., *Spondias purpurea* L. and *Antidesma bunius* (L.) Spreng.

According to Fox (1952), when he analyzed the sources of food during the prehistoric and historic periods, he said that plants were a greater source of food than animals during the prehistory. However, in the list of food during the historic period, Fox (1952) showed that more than 53% of the food of the Ayta was sweet potato (*Ipomoea batatas*). Corn, (*Zea mays*), *Colocasia* sp., two species

of *Dioscorea*. *Manihot* and bananas comprised only 35% of their annual subsistence. Cultivated vegetables and rice was only 1.5% of the total diet. At present, most of the Ayta eat rice and vegetables purchased from the market. They grow different vegetables (during the dry season they cultivate *Colocasia esculenta*, and during the wet season, other commercial crops such as ampalaya). They also subsist on sweet potatoes and yam but they are becoming more dependent on what is commercially available. When the Ayta stayed in camps after the eruption of Mt. Pinatubo, people donated canned goods. They grew to dislike the canned goods. This is similar to the study reported by Seitz (1998) among the Ayta of Zambales province. One of the stimuli to return to their original villages was the quest for natural foods from the forest.

The 167 plants used for medicinal purposes listed in the present study were about half of the number listed by Fox (1952) which was 297 plants. This is a reduction of the number of plants for medicinal purposes as most of the interviewees said that they would usually buy medicine from the drugstore for ailments such as headache or fever. It is also noticeable that only 77 plants or 25.92 % in the present study are found in the study of Fox (1952). Similar to the plants categorized by Fox (1952), the categories 1 to 4 follow the categories for food plants; that is, Category 1 refers to plants of American or New World origin, Category 2 refers to plants not of American or New World origin, but introduced, Category 3 refer to cultivated, semi-cultivated plants, spontaneous fruit trees and plants of prehistoric introduction, and Category 4 refer to wild food plants. However, Fox (1952) made a separate list of plants used as medicine. He did not determine the origin of these plants. These plants are listed as Category 5 in table 2. Twenty one plants are in Category 1, 14 plants are in Category 2, 8 plants are in Category 3 and 3 plants are listed in Category 4. Thirty plants are listed in Category 5.

Of the medicinal plants in the present study, nine are promoted by the Dept. of Health as part of the list of medicinal plants for use (PDI 3/18/2007) These are akapulco, ampalaya, banaba, bawang, bayabas, luya, gumamela, lagundi, and sambong. Of these, only ampalaya, gumamela, banaba, lagundi and bayabas are listed by Fox (1952). Other than their medicinal use, fifty four plants are also used as food by the Ayta. For example, the fruits of coconut are used as food but the roots are used as medicine.

Mt. Pinatubo Aytas' traditional ways of healing and medicinal sources of plants are also derived from their bakuran (kitchen garden), open fields and forest. These plants are used to deal with illnesses from a simple fever, stomach pain and headache, etc. and especially illnesses caused by malevolent spirits, transgression of spaces in the forest, eating the wrong combination of food, among other things (Zayas 2010).

Most of the plants used by the Ayta for medicine are herbs and shrubs. These are usually boiled and used as decoction. Common ailments treated include cough, colds, diarrhea, aching body parts, wounds and pregnancy problems. *Psidium guajava* L. is said to treat 36% of the ailments mentioned by the Ayta. These include headache, stomach ache, sore throat, diarrhea, inflammation, wound, toothache, spasm, fever, animal bites, cold, tonsillitis, infection, skin diseases and anemia. Coconut (*Cocos nucifera* L.) is the second plant that is said to treat about 30% of diseases. The roots are boiled and used as a bath to treat various skin problems. In some cases, patients drink the root decoction to alleviate dysmenorrhea and relapse. It is said that Ayta women drink the decoction after giving birth to avoid *binat*. Sambong (*Blumea balsamifera* (L.*)* DC) is said to treat 27% of the total ailments. These include fever, spasms, cough, cold, diarrhea, sore throat, inflammation, headache, wounds, rheumatism and again for *binat.*

Several studies have shown that there is a decline in traditional plant knowledge among indigenous peoples (Bussman 2011, Sher 2011). In Ethiopia this has been attributed to a preference for a Western lifestyle especially healthcare since this is perceived to be better. Likewise, there is an expansion in the last decades of the healthcare supplied by the government (Bussman 2011). In a study in Pakistan, the decline in traditional plant knowledge has been explained by lack of awareness regarding the importance of medicinal and aromatic plants (Sher 2011). This has resulted in overharvesting of plant material and lack of conservation measures for the plants.

Mt. Pinatubo is intimately linked with the culture and society of the Ayta. Benny Capuno, one of the Ayta participant, says that the term *pinatubo* in their language means "nurtured with care". When the Ayta says that the mountain is nurtured with care, this means that the mountain for them is life and they will never harm the mountain. For they care for the mountain in the same manner as their ancestors did in the past. Capuno has this to say about the importance of Mt. Pinatubo: "*Tulad ng ninuno naming, inaalagaan nila (Ayta) ang kabundukan dahil dyan sila kumukuha ng herbal medicine. Diyan nakakakuha ng panggatong. Diyan sila kumukuha ng pang haligi ng bahay, inumin. Nandiyan na ang pagkukunan ng isda. Noon inaalagaan nila ang mga kabundukan dahil ang mga karneng nakukuha sa gubat walang kemikal. Kaya ang mga Ayta nuon ay walang malalang sakit. Kapag nagkakasakit sila, malaria lang. Nagkakasakit man*

sila – tigdas (at) lagnat." (Shimizu 1991). Mt. Pinatubo is also the spiritual center of the Ayta and for them, the mountain has cultural and spiritual significance (Seitz 1998).

Prior to the eruption, the exploitation of the forest of Mt. Pinatubo were undertaken in large scale by mining companies and big time loggers. However, the eruption was the single largest event that had the greatest impact on its forest. This event almost erased life in this hitherto sleeping mountain. The traditional Ayta way of life was altered. They left their homes, fields and hunting and gathering forest grounds. After a time they were slowly enlarging the areas where they could plant staple and cash crops. With their villages open to lowland merchants, they have become dependent on sakadora (middle men/women) for cash to purchase rice and other lowland food stuff and amenities, living in resettlement areas and/or areas designated as affected by the eruption of Mt. Pinatubo where schools and clinics were established. For the first time, the once slash and burn cultivators-cum-hunters and gatherers have now been absorbed in the Philippine national polity. An open access and a settled community of the Ayta have resulted in their patronage of a dual health care system, i.e. both traditional and western. Tradition refers to the use of medicinal plants and shamanistic rites, while western refers to the lowland health care practices.

On the other hand, the most traditional aspects of Ayta lives are still present. For example, most of the informants would say that with only a "bolo", the Ayta can live in the forest and find the plants for his food, medicine and materials for trapping game. The Ayta can also create fire from bamboo, build makeshift structures for sleeping and make things from plants for their needs. Judging from the information gathered, the Ayta have allocated certain places in their territories for plants. In the *gubat* (forest), they plant trees that attract animals that are also coveted as delicacies and sources of protein for their diet. *Sa paligid* (around the village settlement) are useful plants for immediate needs such as medicinal as well as food sources. Finally from their *kaingin*, are staple food and cash crops and also some secret medicinal species of traditional healers. Three basic knowledge derived are: (1) never leave land uncultivated for a long time; (2) plant trees that bear fruits which attract protein rich animals; and (3) plant useful plants for healing close by in the village (Zayas 2011).

Twenty years after the eruption of Mt. Pinatubo, the lives and environment of the Ayta has been severely changed. However, botanical knowledge is embedded in the minds of the Ayta people and their perseverance to restore the forest will be forever part of their lives. This paper is a tribute to Leonardo L. Co's deep concern for the plant life which even perhaps intersects with what Mt. Pinatubo means to the Ayta, the indigenous inhabitants of the mountain. We dedicate this paper to Leonardo and to the Ayta of Porac, Pampanga.

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