BIBLIOGRAPHY

ALPEREZ, MICHELLE P. OCTOBER 2009. Collection, Identification and Characterization of Indigenous Fruit Crops Eaten by the people of Benguet and Mt. Province. Benguet State University, La Trinidad, Benguet.

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ABSTRACT

The study was conducted from November 2008 to August 2009 in twelve (12) municipalities of Benguet and four (4) municipalities of Mt. Province to collect, Identify and characterize the different indigenous fruits eaten by the people and found abundantly growing on these areas. Specifically, the study aimed to determine the indigenous fruits eaten by the people and found growing in the municipalities of Benguet and Mt. Province; their growth habit and morphology which includes plant height/vine length; stem diameter and presence of sap, leaf characteristics, flower characteristics and fruit Characteristics; flowering season; methods of propagation; their uses and botanical classification.

Results showed that majority of the indigenous fruits were found in the municipality of Buguias, Benguet which can be due to the existing vegetation of the place, which provided a favorable environment for the abundant growth of the different fruits. Safowan/Degway (*Suararia sparsiflora)* was the tallest indigenous fruit tree which stands up to 15.8 m, while, Gumbayas (*Physalis peruviana)* was the shortest having an average height of 0.39 m. Most of the fruiting plants identified were shrubs, wherein 7

among the 12 indigenous fruit plants collected and identified were shrubs. Results further showed that, Kamias *(Averrhoa balimbi)* have the biggest stem diameter measuring about 65.8 cm, while Masaprula *(Passiflora edulis)* have the thinnest stem diameter with about 0.5 cm on average. It was also observed that among the identified fruits; 6 have sap present on their stems/trunks.

Observations show that, all the identified fruits have green leaves that are odorless. Eight (8) of the identified fruit plants have hairs present on their leaves. With regards to their flower characteristics, flowers differ from each other, but eleven of the collected indigenous fruit have small flowers. All of the fruiting plants have fragrant flowers when in full bloom. With regards to their fruit characteristics, all of the fruits collected have sweet taste, and sweet smelling fruits. Most of the identified indigenous fruits are medium in size which is about 0.5 in.-1 inch across. The biggest fruits are that of Masaprula (*Passiflora edulis) which* measures 10 cm long and 6 cm wide; while the smallest are the fruits of ayusip (*Vaccinum corymbossum*) and bugnay (*Antidesma bunius*) which are about 0.2 to 0.5 cm in diameter.

Flowering of most of the indigenous fruits was noted to be during summer months. Most of the indigenous fruits are being reproduced sexually which is through their seeds, although they can also be propagated through asexual means such as stem cuttings, marcotting and layering. Most of the indigenous fruits collected were grown and collected for fresh fruit consumption, but are also being processed into jams/jellies or wine/juice. Some of the identified fruit trees have medicinal uses and are also used as firewoods for handicrafts making and as ornamental plants.

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INTRODUCTION

In the history of man throughout ages, had shown that man's development has been a constant fight against hunger and malnutrition especially in the poor and developing countries of the world. Poverty and other social factors associated with malnutrition had been a constant problem which had existed for a long time. However, especial attention was given to this problem only during the last few decades. Food shortage led to deficiency diseases like "kwashiorkor", a term that describes a deficiency disease in protein which is characterized by generalized edema, retarded growth, and development and apathy. Another food deficiency disease is "marasmus', which is describe as calorie deficiency with retardation of growth and development. Severe weight losses in young children due to this disease were recorded in medical and biochemistry records in 1950's (Youngson).

Although the major staple foods provide the basic food calories; nutritionist advise us to eat more fruits because they furnish Vitamins- the key which unlock the doors to good health. They provide various mineral salts and organic acids, iron, and calcium, phosphorus and magnesium. They convey water to the system and relieve thirst and act as antiscobutic. Eating more fruits help by acting as diuretics and lessening urine acidity. Fruits stimulate the appetite and improve digestion.(Dagoon,undated)

Not all of the cultivated fruit crops however, maybe available to the people of Benguet and Mt. Province due to the following factors; proximity to the community to fruit producing areas. Existing topography of the land especially in the far-plunge areas, lack of readily available. Public transport system in the rural areas, lack of farm to market roads, and buying power of the peso.

Over the centuries that rural communities have managed to survive from local resources (Ninez,1984). Observations show that our people in Benguet and in Mt. Province augment their food needs with the indigenous vegetables and fruits which are either growing in the wild, or in cultivated plots previously grown to economic crops. The origin of civilization can be traced to man's discovery that he could assure himself of a plentiful food supply. The technology involved in cultivating nut or fruit trees, for example, is considerably intricate and time consuming; as a result, these edibles were probably gathered from the wild. Even today, some food gathered from indigenous uncultivated of plants first took place, it is known that the bulk of our present day food plants were selected by people of many lands long before recorded history. The way in which wild plants were transformed to their present cultivated forms is often obscure, and the original ancestors of many of our crop plants cannot be traced (Altieri,Anderson and Merrick,1987).

There are numerous indigenous fruits in Benguet and Mt. Province such as the blueberry which is locally known as 'ayosip' and wild strawberry as " pinit", which are just among these plants. Others have distinct local names such as "degway" and "bugnay", which makes the identification of these indigenous fruits quite difficult. Hence, this study was conceived to properly identify, characterize and document these plants that are abound in Benguet and in Mt. Province, as well to develop cultural management practices suitable for their domestication and mass propagation.

This study was conducted to:

1. collect and properly identify, document and characterize all possible indigenous fruits eaten by the people of the Benguet and Mt. Province;

2. know how these fruits are being eaten and their use/s;

3. mapping of areas in Benguet and Mt. Province where these indigenous fruits abound.

The study was conducted at the twelve (12) municipalities of Benguet and four (4) municipalities of Mt. Province from November 2008 to August 2009.

REVIEW OF LITERATURE

Fruits have been used as food since before dawn of civilization, and they are perhaps more popular than their nutritional quality justifies. No doubt ancestral primates gathered wild fruits as a not inconsiderable part of their food supply. They are plant species which, at other times or under other conditions, played a fundamental role in the agriculture food supply of indigenous peoples and local communities; their neglect was in many cases the result of the deliberate suppression of self-sufficient ways of life which characterized traditional cultures. Fruit crops today, considered together by weight, compare favorably with the world's staples in agricultural crops.(Bermejo and Leon,1994)

Tropical fruits, especially offer an exceeding wide and diverse assortment. The numerically fewer temperate fruits are perhaps better known and more thoroughly investigated as horticultural crops (Jules,1972). Since, a fruit is the normal reproductive structure of flowering plants it is no cause for wonder that an almost unlimited selection of fruit occurs in the wild from which people have chosen domesticates. Indeed particularly in the tropics, a wide assortment of wild species is still important to local populations (Bermejo and Leon,1994). In temperate climates the collecting of wild fruits and berries, once common place in rural societies has now largely given way to mass marketing of especially grown cultivars. In some cases, eating habits of the people and the nutritional and culinary superiority of the primitive cultivars contribute to their survival.(Ninez,1984)

Recognizing the value of forests is essentially a political question, since research

has shown that the products extracted and scientific forest management prove to be of greater value. Collecting from the wild, populations is frequently seen as an imperfect system which needs to be improved by development. In actual fact, as Altieri, Merrick and Anderson (1987) have shown, collecting can be turned into an important factor and, in the rural framework, it is already an activity that had prevented many families from descending into absolute poverty.

MATERIALS AND METHODS

Materials

The materials used were: Black plastic bags for the collection, digital camera, shovel, pruning shear, meter stick and labeling materials.

Methods

Twelve (12) municipalities of Benguet and four (4) municipalities of Mt. Province served as the collection sites for the indigenous fruits. The collected fruits were identified, characterized and documented. Figures 1 and 2 show the sites where the different indigenous fruits can be collected in Benguet and Mountain Province.

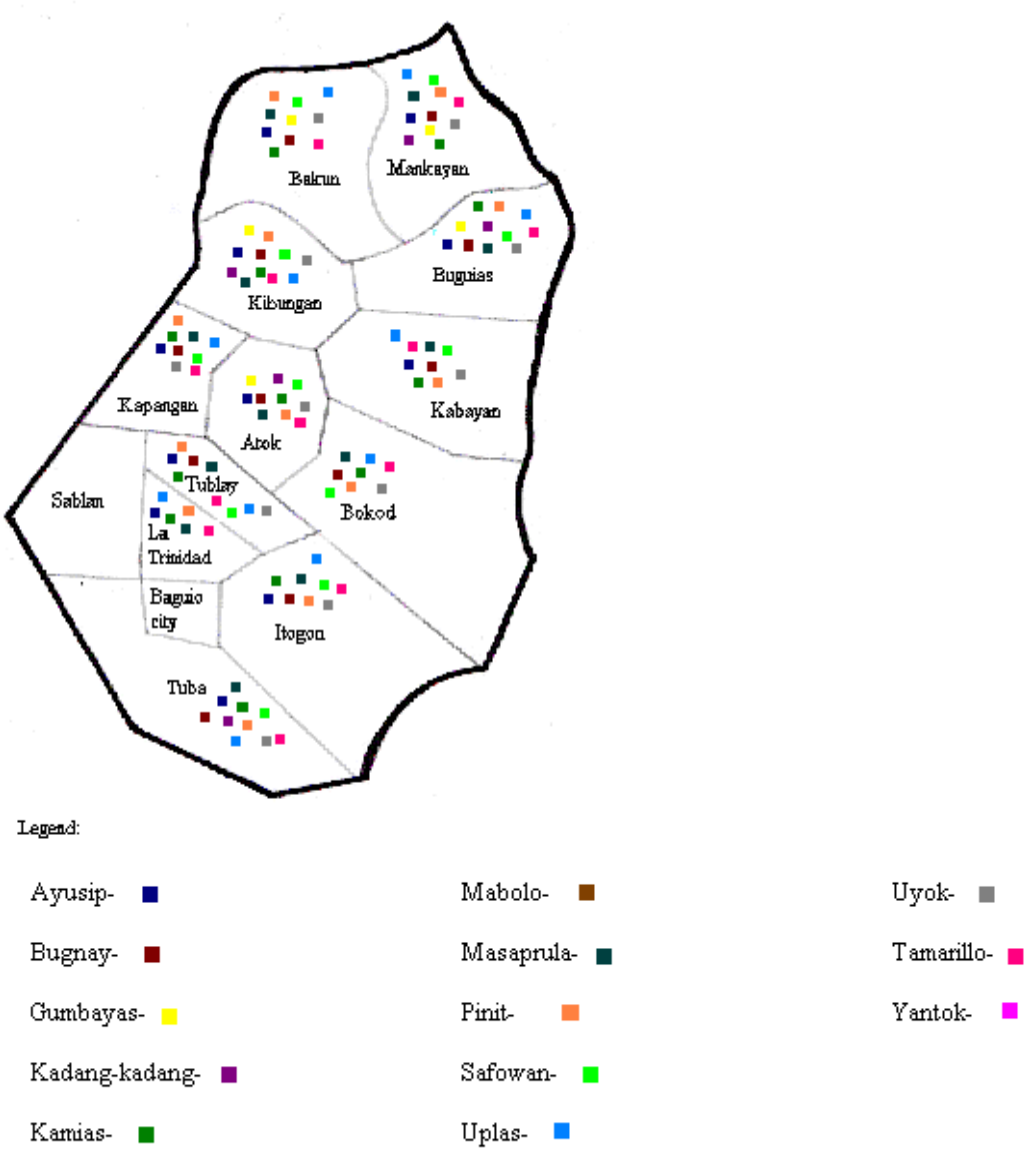

Figure 1. Sites of collection in Benguet

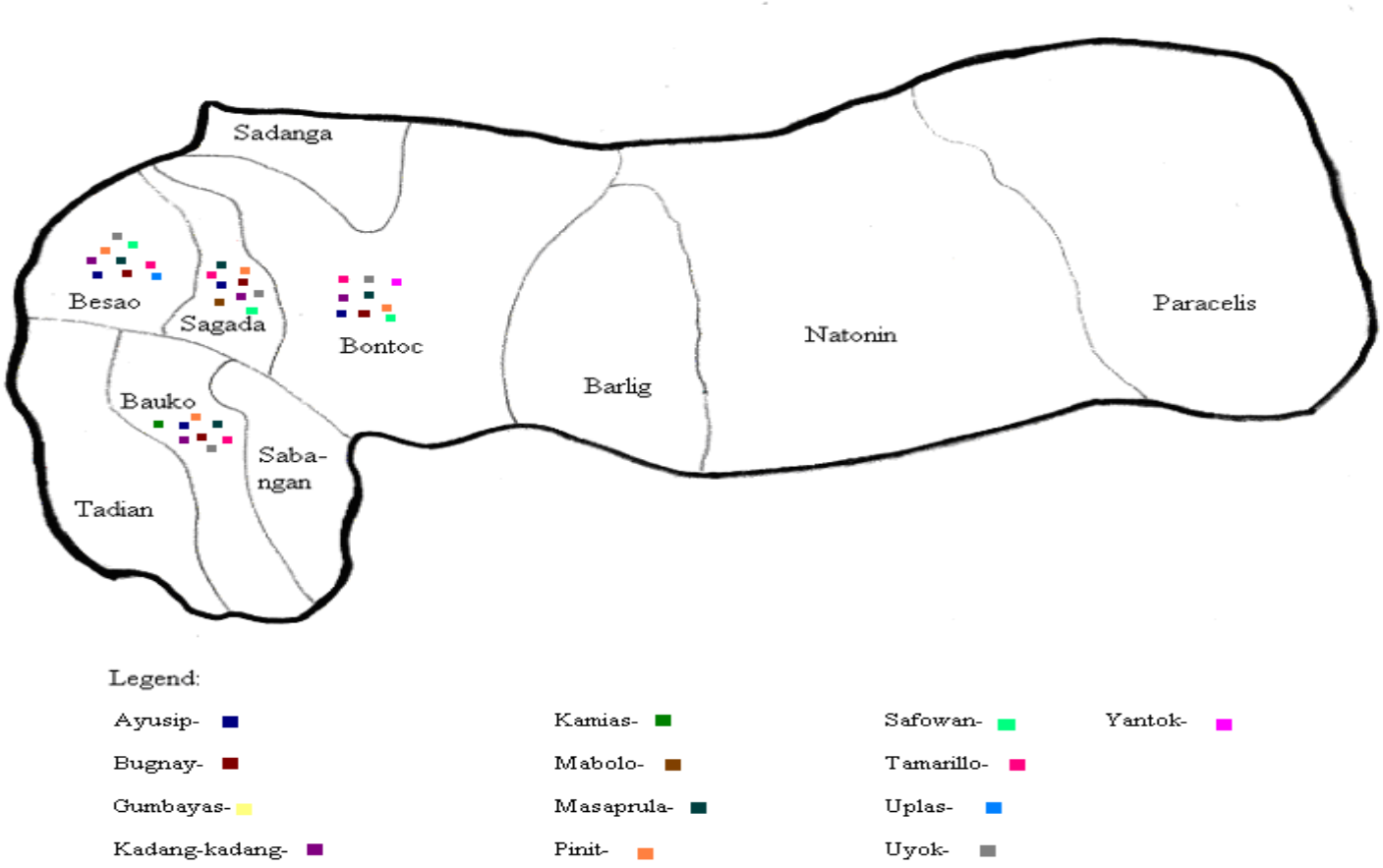

Figure 2. Sites of collection in Mountain Province

The data gathered were as follows:

A. Plant Characteristics

1. Plant height (cm). The height of the plant was measured from the base to the tip of the plant at flowering/fruiting.

2. Leaf characteristics. Size, shape, color, odor, presence/absence of hairs in the leaves was determined.

3. Flowering season

4. Flower characteristics. Size, type, color and odor of the flower was recorded.

5. Plant growth habit

6. Trunk/ stem characteristics. Stem /trunk diameter at flowering or fruiting was measured, and the presence/absence of sap was determined.

7. Fruit characteristics. Color, odor, taste and size were characterized.

8. Methods of propagation. The mode of propagation was identified, either sexual (seeds) or asexual (vegetative plant parts).

9. Uses

10. Botanical classification. Identification of the specific fruit collected and identified by local name, scientific name and family.

B. Habitat / Location

1. Sunlight/ shade level.
2. Temperature.
3. Rainfall (mm).
4. Topography, altitude and other characteristics of the area.

C. Documentation of the study. The indigenous fruits were documented through pictures.

D. Characterization of the collected indigenous fruit crops as described in A and B.

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RESULTS AND DISCUSSIONS

Location of Identified Indigenous Fruit in Benguet

Table 1 shows the location of Identified fruits in Benguet. Results obtained differ with regards to the number of fruits that were collected from the different municipalities of Benguet, and it was found that among the twelve municipalities of Benguet, Buguias has the highest number of identified indigenous fruits with 11 fruits identified, which maybe due to its existing vegetation, that provided environmental conditions favorable for the growth of the indigenous fruits. Municipalities of Atok, Kibungan and Mankayan followed with 9 fruits each identified. This was followed by the municipality of Bakun. On the other hand, the municipality of La Trinidad has only 5 fruits identified which maybe due to the prevalence of residential houses and industrial buildings in the area.

Results show that indigenous fruits grow well or thrive well on forested areas/mountainous areas and are very abundant in thickets and partially-shaded areas, but can also thrive well on well-drained soil. Fruits found growing on forested areas that are partially-shaded were found to have good quality fruits with robust and dark green leaves.

Location of Identified Indigenous fruit in Mt. Province

Table 2 shows the location of identified indigenous fruit being eaten by the people of Mt. province. There were 4 selected municipalities of Mt. Province namely: Bauko, Besao, Bontoc and Sagada which served as the collection sites. The results show that among the 13 identified fruits, 9 of them were found abundantly growing in the municipality of Besao, while 8 were found growing on some parts of the municipalities ofBauko,Sagada,andBontoc

Table 1. Location of identified fruits in Benguet

FRUIT NAME	PLACES											
	Atok :	Bakun :	Bokod :	Buguias :	Itogon :	Kabayan :	Kapangan :	Kibungan:	Mankayan:	LaTrinidad:	Tuba:	Tublay
Ayusip; Alumani *Vaccinum corymbossum*	/	/	X	/	/	/	/	/	/	/	/	/
Bugnay *Antidesma bunius*	/	/	/	/	/	/	/	/	/	X	/	/
Gumbayas; Gubbais *Physalis peruviana*	/	/	X	/	X	X	X	/	/	X	X	X
Kadang-kadang;bang-bang *Medinillia magnifica*	/	X	X	/	X	X	X	/	/	X	/	X
Kamias *Avverhoa balimbi*	/	/	/	/	/	/	/	/	/	/	/	/
Mabolo *Diospyros blancoi*	X	X	X	X	X	X	X	X	X	X	X	X
Masaprula *Passiflora edulis*	/	/	/	/	/	/	/	/	/	/	/	/

Absent – X
Present - /

Table 1. Continued…

FRUIT NAME	PLACES											
	Atok :	Bakun :	Bokod :	Buguias :	Itogon :	Kabayan :	Kapangan :	Kibungan:	Mankayan:	LaTrinidad:	Tuba:	Tublay
Pinit *Rubus niveus*	/	/	/	/	/	/	/	/	/	/	/	/
Rubus rosafoleus	/	/	/	/	/	/	/	/	/	/	/	/
Safowan;Degway *Suararia sparsiflora*	/	/	/	/	/	/	/	/	/	X	/	/
Tamarillo *Cyphomandra betaceae*	/	/	/	/	/	/	/	/	/	/	/	/
Uplas *Ficus ulmifolia*	/	/	/	/	/	/	/	/	/	/	/	/
Uyok *Sauruaia elegans*	/	/	/	/	/	/	/	/	/	X	/	/
Yantok;Litoko *Calamus manillensis*	X	X	X	X	X	X	X	X	X	X	X	X

Present: /
Absent: X

Table 2. Location of Indigenous Fruits in Mt. Province

FRUIT NAME	PLACES/MUNICIPALITIES			
	Bauko	Besao	Bontoc	Sagada
Ayusip;Alumani *Vaccinum corymbossum*	/	/	/	/
Bugnay:Bignay *Antidesma bunius*	/	/	/	/
Gumbayas;Gubbais *Physalis peruviana*	X	X	X	X
Kadang-dang;Bang-bang *Medinilla magnifica*	/	/	/	/
Kamias *Averrhoa balimbi*	/	X	X	X
Mabolo *Diospyros blancoi*	X	X	X	X
Masaprula *Passiflora edulis*	/	/	/	/

Present: /
Absent: X

Table 2. Continued…

FRUIT NAME	PLACES/MUNICIPALITIES			
	Bauko	Besao	Bontoc	Sagada
Pinit *Rubus niveus* *Rubus rosafoleus*	/ /	/ /	/ /	/ /
Safowan;Degway *Suararia sparsiflora*	X	/	/	/
Tamarillo *Cyphomandra betaceae*	/	/	/	/
Uplas *Ficus ulmifolia*	X	/	X	X
Uyok *Sauruaia elegans*	/	/	/	/
Yantok *Calamus manillensis*	X	X	X	X

Present: /
Absent:X

Plant Growth Habit and Average Plant Height/Vine Length

Table 3 shows the differences obtained on the height of the identified indigenous fruit. The result show that among the 13 identified fruits, *Suararia sparsiflora* commonly called as the Safowan/Degway was the tallest plant measuring about 15.8 m high. It was followed by *Diospyrus blancoi* or Mabolo having an average height of 15 m. On the other hand, *Physalis peruviana* or Gumbayas was the shortest plant with an average height of 0.39 m at flowering and fruiting stage.

The identified fruits were either a vine, shrub or a tree in terms of their growth habit. Results show that 6 are identified as shrub, 6 are trees; and 2 are vines.

Table 3. Plant growth habit and plant height/ vine length

FRUIT NAME	PLANT GROWTH HABIT	PLANT HEIGHT/ VINE LENGTH (m)
Ayosip;Alumani *Vaccinum corymbossum*	Shrub	0.4
Bugnay; Bignay *Antidesma bunius*	Shrub	1.5
Gumbayas;Gubbais *Physalis peruviana*	Shrub	0.39
Kadang-dang;Bang-bang *Medinilla magnifica*	Shrub	0.77
Kamias *Averrhoa balimbi*	Tree	13.61
Mabolo *Diospyros blancoi*	Tree	15
Masaprula *Passiflora edulis*	Vine	13.06

Table 3. Continued…

FRUIT NAME	PLANT GROWTH HABIT	PLANT HEIGHT/ VINE LENGTH (m)
Pinit;Boyot		
Rubus niveus	Shrub	1.1
Rubus rosafolius	Vine	1.5
Safowan;Degway *Suararia sparsiflora*	Tree	15.8
Tamarillo *Cyphomandra betacea*	Shrub	3
Uplas *Ficus ulmifolia*	Tree	1.55
Uyok *Sauruaria elegans*	Tree	14.03
Yantoc;Litoko *Calamus manillensis*	Tree	3

Stem Diameter and Presence of Sap

Observations show that *Averrhoa balimbi* which is commonly called Kamias have the biggest stem diameter measuring about 65.8 cm. *Diospyrus blancoi* commonly called Mabolo followed having a stem diameter of 50 cm. *Passiflora edulis* or Masaprula have the thinnest stem diameter, having a stem diameter of 0.5 cm.

With regards to the presence of sap, it was observed that among the identified fruits; 6 have sap present on their stems/trunks, while the others do not have sap in their stems.

Table 4. Stem diameter and presence of sap

FRUIT NAME	STEM DIAMETER (cm)	SAP
Ayosip;Alumani *Vaccinum corymbossum*	1.27	Present
Bugnay; Bignay *Antidesma bunius*	10.16	Absent
Gumbayas;Gubbais *Physalis peruviana*	2.5	Absent
Kadang-dang;Bang-bang *Medinilla magnifica*	0.8	Absent
Kamias *Averrhoa balimbi*	65.8	Absent
Mabolo *Diospyros blancoi*	50	Present
Masaprula *Passiflora edulis*	0.5	Present
Pinit;Boyot *Rubus niveus* *Rubus rosafolius*	 2.3 3	 Absent Absent
Safowan;Degway *Suararia sparsiflora*	45	Absent
Tamarillo *Cyphomandra betacea*	30	Present
Uplas *Ficus ulmifolia*	15.5	Present
Uyok *Sauruaria elegans*	43.5	Absent
Yantoc;Litoko *Calamus manillensis*	20	Present

Leaf Characteristics

Table 5 shows the leaf characteristics of the indigenous fruits collected. Among the thirteen indigenous fruits identified 3 of them have small leaves, in terms of their sizes which are as follows: *Vaccinum corymbossum, Averrhoa balimbi* and *Rubus niveus;* 6 have medium size leaves and 5 have large leaves. In terms of their shape, some are lanceolate, elongate, ovate, heart-shape, elliptical, oblate, and cordiform.

With regards to their odor /aroma or fragrance, 1 fragrant leaves while the 12 indigenous fruit plants have odorless leaves. It was also observed that 8 of the indigenous fruit identified have hairs present on their leaves, while the others have smooth leaves.

Flower Characteristics

Observations show that all of the identified indigenous fruits have fragrant flowers and the sizes of their flowers differ from each other; 11 of them have small sized flowers; while 3 are medium in size. In terms of their flower type, some are bell-form; some are raceme, thryse and corymb which is seen in *Passiflora edulis* or Passion fruit.

With regards to their flower color, the fruits differ from each other, although the common color they have is white, wherein there are 8 fruits which have white flower color, while the others have flowers with crimson, violet/purplish, pale yellow, red, yellow and cream colors.

Table 5. Leaf characteristics

FRUIT NAME	SIZE	SHAPE	COLOR	ODOR	HAIRS
Ayosip;Alumani *Vaccinum corymbossum*	small	lanceolate	green	odorless	absent
Bugnay; Bignay *Antidesma bunius*	medium	elongate	green	odorless	absent
Gumbayas;Gubbais *Physalis peruviana*	medium	heart-shape	green	odorless	present
Kadang-dang;Bang-bang *Medinilla magnifica*	large	ovate	green	odorless	absent
Kamias *Averrhoa balimbi*	small	ovate	green	odorless	present
Mabolo *Diospyros blancoi*	medium	oblate	green	fragrant	absent
Masaprula *Passiflora edulis*	medium	lanceolate	green	odorless	absent
Pinit;Boyot					
Rubus niveus	small	serrated	green	odorless	present
Rubus rosafolius	medium	heart-shape	green	odorless	present

Table 5. Continued…

FRUIT NAME	SIZE	SHAPE	COLOR	ODOR	HAIRS
Safowan;Degway *Suararia sparsiflora*	large	elongate	green	odorless	absent
Tamarillo *Cyphomandra betacea*	large	cordiform	green	odorless	present
Uplas *Ficus ulmifolia*	medium	elongate	green	odorless	present
Uyok *Sauruaria elegans*	large	elongate	green	odorless	present
Yantoc;Litoko *Calamus manillensis*	large	elongate	green	odorless	present

Table 6. Flower Characteristics

FRUIT NAME	COLOR	TYPE	SIZE	ODOR
Ayosip;Alumani *Vaccinum corymbossum*	pale pink or red	Bell-form	small	fragrant
Bugnay; Bignay *Antidesma bunius*	white	Raceme	small	fragrant
Gumbayas;Gubbais *Physalis peruviana*	yellow with black spots	Bell-form	medium	fragrant
Kadang-dang;Bang-bang *Medinilla magnifica*	pink or white	Thryse	small	fragrant
Kamias *Averrhoa balimbi*	yellowish-green	Raceme	small	fragrant
Mabolo *Diospyros blancoi*	creamy-white	Raceme	small	fragrant
Masaprula *Passiflora edulis*	violet or white	Corymb	medium	fragrant

Table 6. Continued…

FRUIT NAME	COLOR	TYPE	SIZE	ODOR
Pinit;Boyot				
Rubus niveus	white	Thryse	medium	fragrant
Rubus rosafolius	white		small	fragrant
Safowan;Degway	white	Raceme	small	fragrant
Suararia sparsiflora				
Tamarillo	pinkish-white	Raceme	small	fragrant
Cyphomandra betacea				
Uplas	white	Raceme	small	fragrant
Ficus ulmifolia				
Uyok	white	Raceme	small	fragrant
Sauruaria elegans				
Yantoc;Litoko	white	Raceme	small	fragrant
Calamus manillensis				

Fruit Characteristics

Table 7 shows the fruit characteristics of the indigenous fruits being identified. It was observed that all of the fruits do have fragrant odor and are sweet, although some are sweetish acid, like *Averrhoa balimbi, Passiflora edulis, and Calamus manillensis.*

With regards to their sizes, 2 are large, 8 are medium and 3 are small, in terms of their color majority of the fruit are green when unripe, and indigo, red, yellow or orange when mature.

Flowering Season

Table 8 shows the flowering season of the different indigenous fruits identified, the results obtained shows that some of the indigenous fruits flower during summer which is from the month of March to May like the Bugnay (*Antidesma bunius*), and Uplas (*Ficus ulmifolia*). Although some bear flowers towards the month of March and after the month of May.

Table 7. Fruit Characteristics

FRUIT NAME	COLOR	ODOR	TASTE	SIZE
Ayosip;Alumani *Vaccinum corymbossum*	pale pink-unripe; indigo-ripe	fragrant	sweet	small
Bugnay; Bignay *Antidesma bunius*	green-unripe; red-ripe	fragrant	sweet	medium
Gumbayas;Gubbais *Physalis peruviana*	yellow green	fragrant	sweet	medium
Kadang-dang;Bang-bang *Medinilla magnifica*	pink-unripe; red-ripe	fragrant	sweet	small
Kamias *Averrhoa balimbi*	green-unripe; yellow-ripe	fragrant	sweetish acid	medium
Mabolo *Diospyros blancoi*	red	fragrant	sweet	medium
Masaprula *Passiflora edulis*	yellow/ purple	fragrant	sweetish acid	large
Pinit;Boyot				
Rubus niveus	green-unripe; red-ripe	fragrant	sweet	small
Rubus rosafolius	green-unripe; orange-ripe	fragrant	sweet	small

Table 7. Continued…

FRUIT NAME	COLOR	ODOR	TASTE	SIZE
Safowan;Degway *Suararia sparsiflora*	green-unripe; yellow green-ripe	fragrant	sweet	medium
Tamarillo *Cyphomandra betacea*	green-unripe; red-ripe	fragrant	sweet	large
Uplas *Ficus ulmifolia*	green	fragrant	sweet	medium
Uyok *Sauruaria elegans*	dark gray	fragrant	sweet	medium
Yantoc;Litoko *Calamus manillensis*	brown	fragrant	sweetish acid	medium

Table 8. Flowering season

FRUIT NAME	FLOWERING SEASON
Ayosip;Alumani *Vaccinum corymbossum*	January- March
Bugnay; Bignay *Antidesma bunius*	March- May
Gumbayas;Gubbais *Physalis peruviana*	November- March
Kadang-dang;Bang-bang *Medinilla magnifica*	December- May
Kamias *Averrhoa balimbi*	December
Mabolo *Diospyros blancoi*	March- May
Masaprula *Passiflora edulis*	January-May
Pinit;Boyot *Rubus niveus* *Rubus rosafolius*	April- May
Safowan;Degway *Suararia sparsiflora*	February- May
Tamarillo *Cyphomandra betacea*	September- December
Uplas *Ficus ulmifolia*	March-June
Uyok *Sauruaria elegans*	January- May
Yantoc;Litoko *Calamus manillensis*	May-June

Methods of Propagation

Table 9 shows the different modes of propagation of the collected and identified indigenous fruits. Results shows that these plants are reproduced both through asexual and sexual means. All of the 13 identified indigenous fruits are being propagated sexually, which is by means of their seeds; while 6 are asexually propagated, th by means of cuttings and, 5 plants can be propagated by marcotting, grafting and budding techniques.

Table 9. Method of propagation

FRUIT NAME	SEXUAL :	ASEXUAL		
	SEEDS :	CUTTINGS	MARCOTTING	BUDDING	GRAFTING
Ayosip;Alumani *Vaccinum corymbossum*	/	/	X	X	X
Bugnay; Bignay *Antidesma bunius*	/	/	/	X	X
Gumbayas;Gubbais *Physalis peruviana*	/	X	X	X	X
Kadang-dang;Bang-bang *Medinilla magnifica*	/	/	X	X	X
Kamias *Averrhoa balimbi*	/	/	/	X	/
Mabolo *Diospyros blancoi*	/	X	/	X	/
Masaprula *Passiflora edulis*	/	X	X	X	X
Pinit;Boyot					
Rubus niveus	/	/	X	X	X
Rubus rosafolius	/	/	X	X	X

Table 9. Continued…

FRUIT NAME	SEXUAL :		ASEXUAL		
	SEEDS	: CUTTINGS	MARCOTTING	BUDDING	GRAFTING
Safowan;Degway *Suararia sparsiflora*	/	X	/	X	/
Tamarillo *Cyphomandra betacea*	/	X	X	X	X
Uplas *Ficus ulmifolia*	/	/	X	X	X
Uyok *Sauruaria elegans*	/	X	/	X	/
Yantoc;Litoko *Calamus manillensis*	/	X	X	X	X

Uses of Identified Fruits

Table 10 shows the uses of the different identified indigenous fruits. Results show that most of the identified fruits are mainly used for fresh fruit consumption, however, they are also being processed into jams, jellies and wines like in *Vaccinum corymbossum.* It was also found that some of them are used as spices, and as ingredients for cakes, muffins and in some other delicacies. As for some fruit trees, their trunks are also being used in making furniture, and other handicrafts and decors which requires wood, and in some places the trunks and branches of the fruit trees and other fruit shrubs are also used as firewood.

In some instances, some of the indigenous fruits are used as medicines for some illnesses, like *Rubus niveus* which is believed that the leaves and roots are good in easing diarrhea, digestive upsets and gout.

Table 10. Uses of identified indigenous fruits

FRUIT NAME	USES					
	FOOD	JAM/JELLY	WINE/ JUICE	MEDICINAL	ORNAMENTAL	FIREWOOD/HANDICRAFTS
Ayusip;Alumani *Vaccinum corymbossum*	/	/	/	/	/	X
Bugnay:Bignay *Antidesma bunius*	/	/	/	/	/	/
Gumbayas;Gubbais *Physaliseruviana*	/	/	X	X	X	X
Kadang-dang;Bang-bang *Medinilla magnifica*	/	X	X	X	X	X
Kamias *Averrhoa balimbi*	/	/	X	/	X	/
Mabolo *Diospyros blancoi*	/	X	X	X	/	/
Masaprula *Passiflora edulis*	/	/	/	/	/	X

Table 10. Continued…

FRUIT NAME	USES					
	FOOD	JAM/JELLY	WINE/ JUICE	MEDICINAL	ORNAMENTAL	FIREWOOD/HANDICRAFTS
Pinit *Rubus niveus*	/	/	/	/	/	X
Rubus rosafoleus	/	/	/	/	/	X
Safowan;Degway *Suararia sparsiflora*	/	X	X	X	X	/
Tamarillo *Cyphomandra betaceae*	/	X	X	/	/	X
Uplas *Ficus ulmifolia*	/	X	X	X	X	/
Uyok *Sauruaia elegans*	/	/	X	X	X	/
Yantok *Calamus manillensis*	/	X	X	X	X	X


Name of the Indigenous Fruit: Ayosip; alumani
English Name (s): Blueberry
Scientific Name: *Vaccinum corymbossom*
Family: Ercaceae

Plant Characteristics

Blueberry which is commonly called as Ayusip or Alumani in the locality is a shrub attaining a height of 130 cm. The leaves are 1-8 cm long and 0.5-3.5 broad; they are green in color and are ovate to lanceolate. The flowers are borne cluster and bell-shaped, white, pale pinkish or red. The fruit is a false berry having a diameter of 5-16 mm with a flared crown at the end. They are pale greenish at first, then reddish-purple, and finally indigo on ripening. They have a sweet taste when mature, with viable acidity.

Habitat

They are commonly found freely growing on mountains; they can thrive on well-drained soil with direct sunlight and a temperature ranging from 18-25 C. These plants are found in most places of Benguet and in Mt. Province.

Economic importance

Blueberries are eaten fresh or processed as individually quick frozen fruit, juice or dried or infused berries which in turn may be used in a variety of consumer goods such as jellies, jams, pies, muffins, snack food and cereals. They are also used as traditional medicines for some ailments and this includes; headache, fever, eye problems including retinal hemorrhaging and diarrhea. The fruit is also rich in Vitamin C and Vitamin K.

Name of the Indigenous Fruit: Bugnay; Bignay
English Name (s): Chinese laurel; Salamander tree
Scientific name: *Antidesma bonius*
Family: Euphorbiaceae

Plant Characteristics

Bignay is commonly called Bugnay by the Ilocanos, Kalingas and Kankana-ey; while the kiangans of Ifugao call it Bugney. Bignay attains a height from 150 cm. It is an open branched tree, more or less pubescent or nearly glabrous. Leaves broadly elliptic to elliptic-oblong, 3-8 cm long; the apex broad, usually rounded and the base subcordate. Spikes pubescent and panicled, 4-10 cm long. The flowers which usually bloom in

March-May are white, small and sessile. The fruit are subglobose, olivaceous with sour taste, 4-5 mm in diameter and are smooth.

Habitat

They are commonly found in thickets, open slopes as well as in and around settlements all over the Philippines. It grows in most places in Benguet and in Mt. Province.

Economic Importance

The fruits are eaten raw when ripe and are used for seasoning fish or meat. The fruits can be processed into vinegar, wine and jelly. The leaves are also used for medicinal purposes.

Name of the Indigenous Fruit: Gumbayas; Gubbais
English Name(s): Cape gooseberry
Scientific name: *Physalis peruviana*
Family: Solanaceae

Plant Characteristics

Herbaceous or soft-wooded perennial plant usually reaches 40 cm in height but occasionally may attain 6 ft. It has ribbed, often purplish, spreading branches and nearly

opposite, velvety, heart-shaped, pointed, randomly toothed leaves 6-15 cm long and 4-10 cm wide, and in the leaf axils, bell shaped, nodding flowers to 2 cm wide, yellow with 5 dark purple brown spots in the throat, and cupped by a purplish-green, hairy, 5 pointed calyx. After the flower falls, the calyx expands, ultimately forming a straw-colored husk much larger than the fruit it encloses. The berry is globose, 1.25-2 cm wide, with smooth, glossy, orange-yellow skin and juicy pulp containing numerous very small yellowish seeds. When fully ripe, the fruit is sweet but with a pleasing grape-like tang. The husk is bitter and inedible.

Habitat

Grows in any well-drained soil but does best on sandy to gravelly loam. On highly fertile alluvial soil, there is much vegetative growth and the fruits fail to color properly. The plant grows on sloping or rolling areas having a temperature ranging from 16-25 C. This is present in Atok, Bakun, Buguias and Kibungan.

Economic Importance

The Cape gooseberry are being canned whole and preserved as jam, and also made into sauce, used in pies, puddings, chutneys, and ice cream, and eaten fresh in fruit salads and fruit cocktails. The fruit is rich in Vitamin A.

Name of the Indigenous Fruit: Kadang-dang; Bang-bang
English Name(s): Medinilia
Scientific name: *Medinillia magnifica*
Family: Melastomataceae

Plant characteristics

Bang-bang or kadang-dang as commonly called by the people in Benguet and Mt. Province is an evergreen shrub or liana which can reach a height of 1.8 m or 180 cm. The leaves are oposite or whorled, elongated and grow to about 12 inches (30 cm). The matured leaves are colored green and the young leaves are red. The flower is bell-shaped and pinkish and 2.3 cm in diameter and are produced in large panicles. The fruit is pink at first, then red and finally purple when ripe. The taste of the fruit is sweet when ripe.

Habitat

The plant is usually found on mountains and usually thrives in rich, moist, well-drained, humus-rich soil in partial shade. This is present in Atok, Buguias, Kibungan Mankayan and Tuba.

Economic Importance

The fruit are eaten fresh.

Name of the Indigenous Fruit: Kamias
English Name(s): Cucumber tree
Scientific name: *Averrhoa balimbi*
Family: Oxalidaceae

Plant Characteristics

This is a small tree, growing from 1,200 cm in height. The leaves are pinnate and 20-60 cm long, with hairy rachis and leaflets. The leaflets are opposite, 10 to 17 pairs, oblong and 5- 10 cm in length. The panicles growing from the trunk and larger branches are hairy and 15 centimeters long or less. The flowers are about 1.5 centimeters long, and are somewhat fragrant. The calyx is hairy and the corolla is purple often marked with white. The fruit is sub-cylindrical, obscure, broad, rounded, longitudinal lobes, green, acid, edible, and about 4 centimeters long.

Habitat

Kamias thrives best in full sun and also in rich, moist, but well-drained soil; it grows and fruits quite well on sand or limestone.

Economic Importance

Aside from being eaten raw, the fruit is also used to remove stains from clothing and also for washing the hands. It is much used as seasoning and is made into sweets, including jam, and is used in making pickles. It was reported that the leaves are also used as a paste applied hot to itches; and internally, fresh or fermented, for syphilis; or in the form of infusion, as a protective medicine after childbirth.

Name of the Indigenous Fruit: Mabolo
English Name(s): Velvet apple
Scientific name: *Diospyros blancoi*
Family: Edenaceae

Plant Characteristics

It is a tropical tree that varies in form from a small tangy tree with drooping branches, to erect, straight tree, with stout, black, furrowed trunk to 50 in (80 cm) thick. It is rather slow- growing. The evergreen, alternate leaves, oblong, pointed at apex, rounded or pointed at the base, are 6- 9 in long, 2 to 3 ½ in wide; leathery, dark-green, smooth and glossy on the upper surface, silvery- hairy underneath. New leaves are showy, pale-green

or pink and silky- hairy. The tubular, 4- lobed, waxy, faintly fragrant blooms are short-stalked, creamy- white, downy. Fruits are fleshy, globose, up to 8- 10 cm in diameter, densely covered with short brown hairs. The pulp is edible. The fruit hairs have rubbed off before eating as it cause peri- oral itching and irritation.

Habitat

The mabolo is indigenous to low and medium altitude forest rom the sea level to the 2,400 feet above sea level. It needs a good distribution of rainfall through the year.

Economic Importance

The fruit are being eaten fresh and can be sliced and season with lime or lemon juice, added to other fruits in salads. Cut into strips and fried, it is crisp and fairly agreeable as a vegetable of taro type appropriate for serving with ham, sausage or other spicy meat.

Name of the Indigenous Fruit: Masaprula
English Name(s): Passion Fruit
Scientific name: *Passiflora edulis*
Family: Passifloraceae

Plant Characteristics

A vigorous climber (vine) with smooth, deeply lobed, toothed leaves and sprilling climbing tendrils. The attractive white flowers have numerous stamens and characteristic curved styles. The fruit are egg shaped berry with a tough skin (purple or yellow, and somewhat wrinkled at maturity0 containing numerous sees with fleshy, sweet or sour arils.

Habitat

These fruits were found on all places in Benguet.

Economic importance

Fruits are mainly eaten fresh or the fruit pulp is used in drinks, yogurts and desserts. The fruit pulp is also processed and combined with sauces, jams, candies, ice cream, sorbet, cake icing, jellies and cocktails. Purple fruit are preferred for eating.

Rubus rosafolius

Rubus niveus

Name of the Indigenous Fruit: Pinit; Boyot
English Name(s): Wild Strawberry
Scientific name: *Rubus niveus; Rubus rosafolius*
Family: Rosaceae

Plant Characteristics

Wildberry is locally known as pinit or boyot.It is a scrambling, spiny shrub growing in thickets of limestone formation; it has 5-9 leaflets with toothed margins. The flowers are white. The fruits occur in terminal clusters and with a good flavor. The fruits are orange or red when ripe.

Habitat

Wild strawberries are very abundant in thickets at more than 1000 m elevation. The fruits occur only in Benguet and in Mt. Province.

Economic Importance

Wild strawberries are eaten raw or used in making juice, jam, syrup and wine. Leaves are used in blended herbal teas. Leaves and roots are believed to have medicinal benefits in terms of easing diarrhea, digestive upsets and gout. The fruit is evidently used externally to counteract sunburn, skin blemishes and discolored teeth.

Name of the Indigenous Fruit: Safowan; Degway
English Name(s):
Scientific name: *Suararia sparsiflora*
Family: Dilleniaceae

Plant Characteristics

Medium sized tree reaching a maximum height of about 6 m. The leaves are colored green and are elongated. It is prolific and fruits heavily over a long period of time, say four months or more starting from the month of July. The fruit is green with sour taste and looks like a carmay. They are usually found on branches.

Habitat

They are commonly found on mountains, partially shaded areas.

Economic Importance

It is mainly eaten as fresh fruit and can be processed into candies and jam. They are also used as decoction. The branches and trunk can be used as firewood.

Name of the Indigenous Fruit: Tamarillo
English Name(s): Tree tomato; Tamarillo
Scientific name: *Cyphomandra betaceae*
Family: Solanaceae

Plant Characteristics

Tamarillo is a small tree, growing 300 cm in height, with a single trunk that is monopodial and branched at a height of 1 to 1.5 m into two or three branches. The leaves are cordiform, 17 to 30 cm long, 12-19 wide, subcarnose and lightly pubescent on the underside. There are caulinar inflorescences opposite the leaf. The flowers are 1.4 cm long, the calyx persists on the fruit, the corolla is pinkish white and rotate-campanulate with reflexed apices, connivent stamens that are shorter than the corolla, yellow anthers and are dehiscent through two apical pores. The style emerges between anthers. The fruit is 5-7 cm long, ovoid, glabrous, greenish yellow to orange in color, with longitudinal markings, and the mesocarp is orange.

Habitat

The plant grows best in regions having a temperature between 18-22 C and annual precipitations of 600-800 mm. They also grow best with less soil dehydration and where the light is diffused. The tree tomatoes do not tolerate low temperatures. This is present in all areas in Benguet and Mt. Province.

Economic Importance

The fruit is eaten raw or cooked. In all case the skin is removed as it has a bitter flavor. More frequently it is eaten as a dessert of fruit syrup. It is also sometimes used to make sauce. The fruit attribute to fruit medicinal properties for alleviating respiratory diseases and combating anemia. The tree tomato contains adequate number of Vitamins A,B_6, C, and E and iron.

Name of the Indigenous Fruit: Uplas: Updas
English Name: Figs
Scientific name: *Ficus ulmifolia*
Family: Moraceae

Plant Characteristics

Uplas is a perennial shrub/ tree, collectively known as fig trees or figs. Its leaves are rough and thick, vines are small. The fig fruit is an endorsed inflorences,sometimes referred to as a syconium, an urn like structure lined on the inside with the fig's tiny flowers, posses a white to yellowish sap(latex); the twigs has paired stipules or a circular stipule scar if the stipules have fallen off; and the lateral veins at the base of the leaf. It exhibits similar tiny flowers arranged on a receptacle but in this case the receptacle is a more or less flat, open surface. Its fruit are green in color and are medium in size.

Habitat

This are commonly found freely growing on mountains, this is present in all places of Benguet and some places of Mt. Province.

Economic Importance

Important both as food and traditional medicine contain laxative substances, flavonoids, sugar, vitamins A and C, acids and enzymes. Figs are also of paramount cultural importance throughout the tropics, both as objects of worship and for their many practical uses.

Name of the Indigenous Fruit: Uyok
English Name(s):
Scientific name: *Sauruaia elegans*
Family: Dilleniaceae

Plant Characteristics

Uyok as commonly called by some people in Benguet and Mt. Province is a tree

attaining a height of 20 m. Its leaves are green, acuminate and hairy and have a dark gray edible fruit.

Habitat

They are found growing in partially shaded areas. The fruit is found in some places in Benguet and Mt. Province.

Economic Importance

The fruit can be eaten fresh and some processes its fruit into jam or jellies.

Name of the Indigenous Fruit: Yantok; Litoko
English Name(s): Rattan fruit
Scientific name: *Calamus manillensis*
Family: Arecaceae

Plant Characteristics

This is an exotic fruit which comes from a vine locally called “Yantok” which is one among the variety of rattan. It is one among the sourest fruit in the world. These fruit are available in the market from August to October.

Habitat

These fruit are found in the jungle forest.

Economic Importance

Fruit is edible.

SUMMARY, CONCLUSION AND RECOMMENDATION

Summary

The study was conducted from November 2008 to August 2009 at the 12 municipalities of Benguet and 4 municipalities of Mt. Province, to collect and properly identify and characterize the different indigenous fruits being eaten by the people of Benguet and Mt. Province. Indigenous fruits growing in the area and are being domesticated were also included.

Results shows that among the identified fruits Kamias (*Averrhoa balimbi*), Masaprula (*Passiflora edulis*), Pinit (*Rufus niveus*) and (*Rubus rosafoleus*), Tamarillo (*Cyphomandra betaceae*), Uplas (*Ficus ulmifolia*) was present in al the municipalities. While Mabolo (*Diospyros blancoi*) was present in some part of Mt. Province. In terms of the number of fruits collected, Buguias has the highest number of fruits identified. Among the 13 fruits, 12 were found present in the area, while La Trinidad, has the lowest number of fruits with only, 6 indigenous fruits which can be due to the prevalence of residential houses and industrial buildings.

Safowan/Degway was the tallest fruit tree identified with a height of 15.8 m, while Gumbayas (*Physalis peruviana*) was the shortest with about 0.39 m plant height on average. Kamias (*Averrhoa balimbi*) has the biggest stem diameter measuring about 65.8 cm; while Masaprula (*Passiflora edulis*) has the thinnest with about 0.5 cm. Six (6) among the identified fruits have sap present on their stems/trunks.

Most of the indigenous fruits, bear flowers on the summer months, and were propagated sexually, but can also be propagated asexually. Most of the indigenous fruits grow well on forested areas, partially in shaded and moist places.

Almost all the indigenous fruits are for food consumption, others processed into jam/jellies, wine and other beverages; some also have medicinal uses, and others are used for firewoods and as ornamentals/plants.

Conclusion

The study shows that most of the indigenous fruits identified are trees. They were found growing on the wild and some are also being domesticated. They are being propagated through their seeds although they can be propagated through cuttings, budding and marcotting.

Although the indigenous fruits differ from their physical characteristics, the results shows that they are a good sources of vitamins, and they can also be processed into jams/jellies and other processed products which is beneficial to man.

Recommendations

It is further recommended that this study will be continued in all provinces of the Cordillera to have complete list of the possible indigenous fruits. It is also recommended that these indigenous fruits which are rich in vitamins should be domesticated by the people of Benguet and Mt. Province in commercial scale to augment the seasonal fruits in these localities.

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