Food and fruit-bearing forest species

2: Examples from Southeastern Asia

FAO FORESTRY PAPER

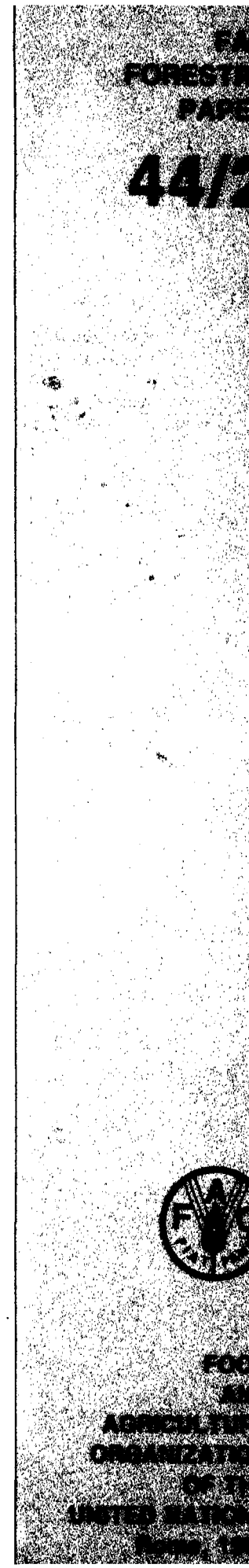
44/2

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Food and fruit-bearing forest species

2: Examples from Southeastern Asia

Forest resources development branch
Forest resources division
Forestry department



The designations employed and the presentation of material in this publication do not imply the expression of any opinion whatsoever on the part of the Food and Agriculture Organization of the United Nations concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

M-32
ISBN 92-5-102153-8

ABSTRACT

These monographs of 70 food and fruit-bearing forest species were prepared, under the auspices of FAO, by the Forest Research Institute of the Ministry of Natural Resources, Laguna, Philippines. Besides botanical and vernacular (Philippines) nomenclature and detailed descriptions, the illustrated monographs provide information, where possible, on the ecology, distribution, nutritional value and main uses of the species described.

FOREWORD

In many developing countries rural populations derive a significant part of their food and energy requirements from trees. The variety and nature of food and food products obtained from trees are not fully appreciated. Many of these fruit-bearing species occur naturally in forest environments, and better knowledge of the potential of these species and of their capacity to contribute to food production will enhance efforts to conserve these forests or woodlands and make them more productive.

The introduction of forest food and fruit species to agricultural areas and their possible domestication and improvement through breeding offer considerable possibilities, not only in the improved nutrition of rural populations but also in economic terms through the provision of cash incomes from the sale of raw fruits or processed products.

Monographs on forest food and fruit species are a useful aid to government extension agents, workers and specialists in programmes dealing with forest management and forestry for local community development, as well as to those interested in the conservation of natural resources.

These species descriptions are the second in a series of three entitled "Food and fruit-bearing forest species" covering the major tropical regions of the world.
FAO acknowledges the work of the director and staff of the Forest Research Institute, Laguna, Philippines, who prepared the monographs with the assistance of the technical editor, Mr R.L. Willan.

M.A. Flores Rodas
Assistant Director-General
and
Head of the Forestry Department

TABLE OF CONTENTS

LIST OF PLATES

Plate VIII *Antidesma pentandrum* (Blanco) Merr.

VIII$_1$ Branchlet with leaves and spikes of fruits

2 Axillary bud

3 Detail of flower

4 Spike bearing fruit

5 Fruit

6 Longitudinal section of fruit

7 Illustration of leaves and inflorescences

Plate IX *Ardisia pyramidalis* (Cav.) Pers.

IX$_1$ Branchlet with leaves and terminal inflorescence

2 Flower with stamens enclosing style

3 Flower with style

4 Clump of fruits

5 Single fruit on pedicel

6 Seed

7 Branchlets, leaves and terminal inflorescences

Plate X *Ardisia squamulosa* Presl

X$_1$ Branchlet with leaves and inflorescences

2 Fruit

3 Transverse section of fruit

4 Seeds

5 Illustration of foliage

Plate XI *Arenga pinnata* (Wurmb) Merr.

XI$_1$ Pinnate leaf

2 & 3 Sections of inflorescence bearing fruits

4 Vertical section of fruit

5 Transverse section of fruit

6 Illustration of palm in its natural habitat

Plate XII *Artocarpus ovata* Blanco

XII$_1$ Branchlet with leaves and fruit

2 Fruit and axillary pedicel

3 Transverse section of fruit

4 Illustration of tree and foliage

Plate XIII *Avicennia officinalis* L.

XIII$_1$ Illustration of branchlet with foliage

2 Branchlet with foliage and flowers

Plate XIV *Barringtonia asiatica* (L.) Kurz.

XIV$_1$ Branchlet with leaves, buds and flowers

2 Opened flower

3 Fruit and pedicel

4 Illustration of branch and leaves

Plate LIII		Portulaca oleracea L. Sp. Pl.
	$LIII_1$	Fleshy plant with leaves and roots
	2	Leaf
	3	Leaf and leaf-base
	4 & 5 & 6	Flower and cross-sections thereof
	7	Flower bud
	8	Capsular fruit
	9	Seed
	10	Seedlings
Plate LIV		Rhizophora mucronata Lam.
	LIV_1	Branchlet with leaves and buds
	2	Fruit with long peduncle
	3	View of upper end of fruit
Plate LV		Rubus elmeri Focke
	LV_1	Vine with leaves and fruit
	2	Detail of thorny vine stem
	3	Fruit
	4	Individual carpel
	5	Illustration of vine, leaves and fruit
Plate LVI		Rubus pectinellus Max.
	LVI_1	Vine with leaves and flowers
	2	Detail of spines
	3	Detail of leaf
	4	Interior of flower
	5 & 6	Corolla and calyx with fine spines
	7	Carpel
	8	Illustration of vine and leaves
Plate LVII		Rubus rosaefolius L.
	$LVII_1$	Branchlet with leaves and inflorescence
	2	Fruit
	3	Carpel
	4	Illustration of vine with leaves and fruit
Plate LVIII		Semecarpus gigantifolia Vid.
	$LVIII_1$	Leaf
	2	Inflorescence with fruit
	3	Illustration of trunk and leaves

Plate LIX		*Serialbizzia acle* (Blanco) Kosterm.
	LIX_1	Branchlet with inflorescence, flowers and leaves
	2	Pod
	3	Seed
	4	Illustration of leaves
Plate LX		*Sesuvium portulacastrum* L.
	LX_1	Branchlet with buds and leaves
Plate LXI		*Solanum cumingii* Dun.
	LXI_1	Branchlet with leaves, flower and fruit
	2	Illustration of plant
Plate LXII		*Solanum nigrum* L. Sp. Pl.
	$LXII_1$	Branchlet, leaves and fruit
	2 & 4	Flower and cross section thereof
	3	Anthers
	5	Transverse section of gynoecium
	6	Fruit
	7	Seed
	8	Illustration of plant with flowers and fruit
Plate LXIII		*Sonneratia alba* J. Sm.
	$LXIII_1$	Branchlet with buds and leaves
Plate LXIV		*Sonneratia caseolaris* (L.) Engl. (syn. *C. acida* (L) f.)
	$LXIV_1$	Branchlet with leaves and flowers in various stages of development
	2	Branchlet with fertilised flower
	3	Longitudinal cross section of flower
	4	Illustration of leaves and flowers
Plate LXV		*Sterculia oblongata* R. Br.
	LXV_1	Branchlet with leaves and fruits
	2	Opened fruit with seeds
	3	Seed
	4	Transverse cross section of seed
	5	Illustration of branches and leaves
Plate LXVI		*Strombosia philippinensis* (Baill.) Rolfe
	$LXVI_1$	Branchlet with leaves and fruits
	2	Fruit
	3	Transverse cross-section of fruit
	4	Illustration of leaves and fruit

INTRODUCTION

The Philippines, where this study was carried out, is noted for its diversity of plant species. Unfortunately, knowledge of the food potentials of the plant resources of the country is limited. This document provides information on 70 wild and semi-wild forest food and fruit-bearing plants occurring under various ecological conditions of the country. The descriptions include the scientific name of the plant, official common name, vernacular names, botanical description, distribution, mineral contents, propagation, value as human food and other economic uses. Thus, these monographs cover, among other things, species distribution and frequency in natural stands; collection and processing of the edible parts; nutritional value, where known, and natural and artificial methods of regeneration. The botanical descriptions and illustrations assist in identifying the species and facilitate a better appreciation of their usefulness.

Improved knowledge and appreciation encourage efforts to conserve better and wisely use the forest habitat in which these food-producing species occur and supplement largely starchy diets based on subsistence crops. When other means fail, local inhabitants often rely for their subsistence on the presence of these forest species.

The selection of species for private growing or community plantations should also stress the nutritional value of the produce in relation to the nutritional needs of the community. Whichever part of the tree is consumed, there are obviously those which will yield more calories and vitamins, and such matters need to be discussed with national nutritionists and their institutions in relation to the diets and needs of the local populations.

It should also be remembered that rural dwellers normally do not have refrigeration facilities or the fuel energy to preserve or convert foods into sophisticated preparations. Fruits or plant products requiring this type of preparation may not, therefore, be of much practical value unless included in some sort of cooperative scheme which could organize and finance the necessary preparation and marketing infrastructure. The arrangement of practical courses and demonstrations in the processing and marketing of tree foods should form part of the overall species introduction and development effort.

1. AGLAIA DIFFUSA

1.0 NAMES: Family — Meliaceae
Botanical — Aglaia diffusa Merr.
Common — Malasaging
Vernacular — kamata-mata, mata-mata (Sorsogon, Masbate); malabayabas (Burias Island); alikayon (Mindoro); papatkon (Palawan); maligang (Zamboanga); agulasi (Ugio, Isabela); balambanga, purao, daueng, oksa, palatangan, tal-lau, tibungan, agulasi (Cagayan); amamian, arangen, kalapini, kamandausen, salngen (Ilocos Norte); saralo (Ilocos Norte, Ilocos Sur); kaniue (Rizal); parusapil (Nueva Ecija); bayanti, bugalbol, salakin pula, malasaging (Laguna); malasaging, kapuri (Tayabas); libungan, sandana (Negros).

2.0 DISTRIBUTION

2.1 Locality: Malasaging is endemic to the Philippines and is widely distributed from Luzon to Mindanao.

2.2 Forest type and frequency: It is commonly found in the dipterocarp forest and lower elevations at low and medium altitudes. From inventories conducted, the density per hectare in Mount Makiling, Laguna (climatic type I) was 6 trees, 3 poles, 5 saplings and 3 seedlings; in Surigao (climatic type II), there were 2 trees, 1 pole, and 2 seedlings per hectare, for climatic type III represented by Zamboanga del Norte, the density was 1 tree and 2 saplings per hectare compared to that of Oriental Mindoro (climatic type IV) with a density of 1 tree, 1 pole, and 2 seedlings per heotare.

3.0 DESCRIPTION

Aglaia diffusa Merr. is a small tree reaching 8 meters in height and 42 cm in diameter, glabrous, with the exception of its lepidote and puberulent inflorescence. Trunk brownish in color, fairly straight, and slightly fluted. Branches terete, brownish, and spreading. Leaves alternate, 27-31 cm long, the petiole and rachis approximately 9 to 13.2 cm long. Leaflets 7, the lateral ones opposite, lanceolate or elliptic lanceolate in shape, 8.8 to 14.2 cm long, 1.8 to 4.1 cm wide, narrowed and acuminate at both ends, with 4-6 mm long petiolules. Leaf nerves slender, not very prominent, numbering 10 on each side of the midrib, with lax and subobsolete reticulations. Panioles on the upper axils, usually one on a branchlet, diffuse, measuring 30.5 cm, with the lower branches spreading, very many flowered; rachis brownish lepidote, ultimate branches somewhat brown puberulent. Flowers yellow, arranged racemosely on the ultimate branchlets, scattered, their pedicels 1 to 1.6 mm long. Calyx-teeth 5, broadly ovate to obovate, obtuse, 1.7 mm long, free from the staminal tube. Staminal tube broadly obovoid, truncate, about 1.1 mm long at the edge of the staminal tube, slightly inflexed and 0.26 mm broad. Fruits dark orange to light red color when ripe.

4.0 USE AS FOOD

The ripe fruits are collected and eaten raw after peeling the skin. It is sweet with a little taste of sourness. The fruits are also eaten by wild pigs and monkeys.

5.0 NUTRITIONAL VALUE

Approximate analysis of the fruits showed the following (Catibog, 1978):

% moisture	8.43
% ash	5.51
% crude fiber	24.79
% Ca	0.40
% P	4.24
% K	1.30

6.0 OTHER USES

The wood is used for house posts, window sills, agricultural implements like the plow handle, furniture, and general construction that needs strength and fair durability.

7.0 PROPAGATION

Malasaging is not cultivated but propagates itself by seeds in its natural habitat, however, it was observed that the regeneration is very low because the fruits are eaten by birds and wild pigs. It would be advisable to sow the seeds in seedbeds and transplant the seedlings when they are 10 cm tall.

PLATE I. Aglaia diffusa Merr.

C. NAME : Aglaia diffusa Merr.
FAMILY : Meliaceae

4

I_1 - Branchlet bearing leaves and fruit

2 - Fruit

3 - Transverse section of fruit

4 - Preserved specimen, twig, leaves and buds

2. AGLAIA LLANOSIANA

1.0 NAMES:

Family	Meliaceae
Botanical	Aglaia llanosiana D. DC.
Common	Bayanti
Vernacular	libanan (Sulu); bayanti (Laguna, Quezon); mangitlumboi, tapuyi, bulog (P. Visaya); kanuie, salamungi (Batangas, Rizal); tabataba, mata-mata (Bicol); mata-utta (Cagayen); adi-oas, tagasleng, arangen (Ilocos Sur, Ilocos Norte).

2.0 DISTRIBUTION

2.1 Locality: Bayanti is endemic to the Philippines and is widely distributed from Luzon to Mindanao, however, it is found to be most abundant in Northern Luzon.

2.2 Forest type and frequency: It thrives in ridges of dipterocarp forests at low and medium elevations and sometimes along the seashore. Inventories conducted in the dipterocarp forests of Mount Makiling, Laguna (climatic type I) gave a density of five seedlings, 2 saplings, 2 poles and 1 tree per hectare; in Quezon National Park (climatic type II) the density was 3 seedlings, 1 sapling, 1 pole, and 1 tree per hectare; for Palawan (climatic type III), the density was 1 tree, 1 pole, and 1 sapling and 1 seedling per hectare; and for Oriental Mindoro representing climatic type IV, the density was 1 tree and 1 seedling per hectare.

3.0 DESCRIPTION

Aglaia llanosiana C. DC. is a small-sized tree which attains a height of 8 to 12 meters and a diameter of 29-41 cm. It has a straight, smooth cylindrical bole, a grey-brown bark with rounded depressions and very small inconspicuous lenticels, and a very pronounced boardshape buttress. Leaves arranged spirally, pinnate, consisting of 7 leaflets. Leaflets alternate, almost opposite, elliptical, 8.8 to 11.1 cm long, 3.9 to 7.1 cm wide, with acuminate apex and acute base. Leaflets papery thin in texture; upper surface glabrous, midrib and lateral veins covered with yellow powdery tomentum and appearing as depressed lines on upper surface; venation pinnate with 7 to 11 lateral veins, tertiary veins faint, irregular, usually terminating abruptly. Leaflet petiole measures 2.8 to 9.1 mm, with grooves on the upper side. Panicles terminal, relatively coarse, and densely covered with grayish brown scales. Flowers very many, nearly globose, attached on stout pedicels with a yellow glabrous corolla. Fruits obovoidly globose, 2.2-2.6 cm long, densely covered with small greyish brown scurfy scales, orange to reddish color when ripe.

4.0 USE AS FOOD

The fruits are picked when ripe and eaten raw. They taste sweet with a little mixture of sourness.

No analysis was made so far on the constituents of the edible parts.

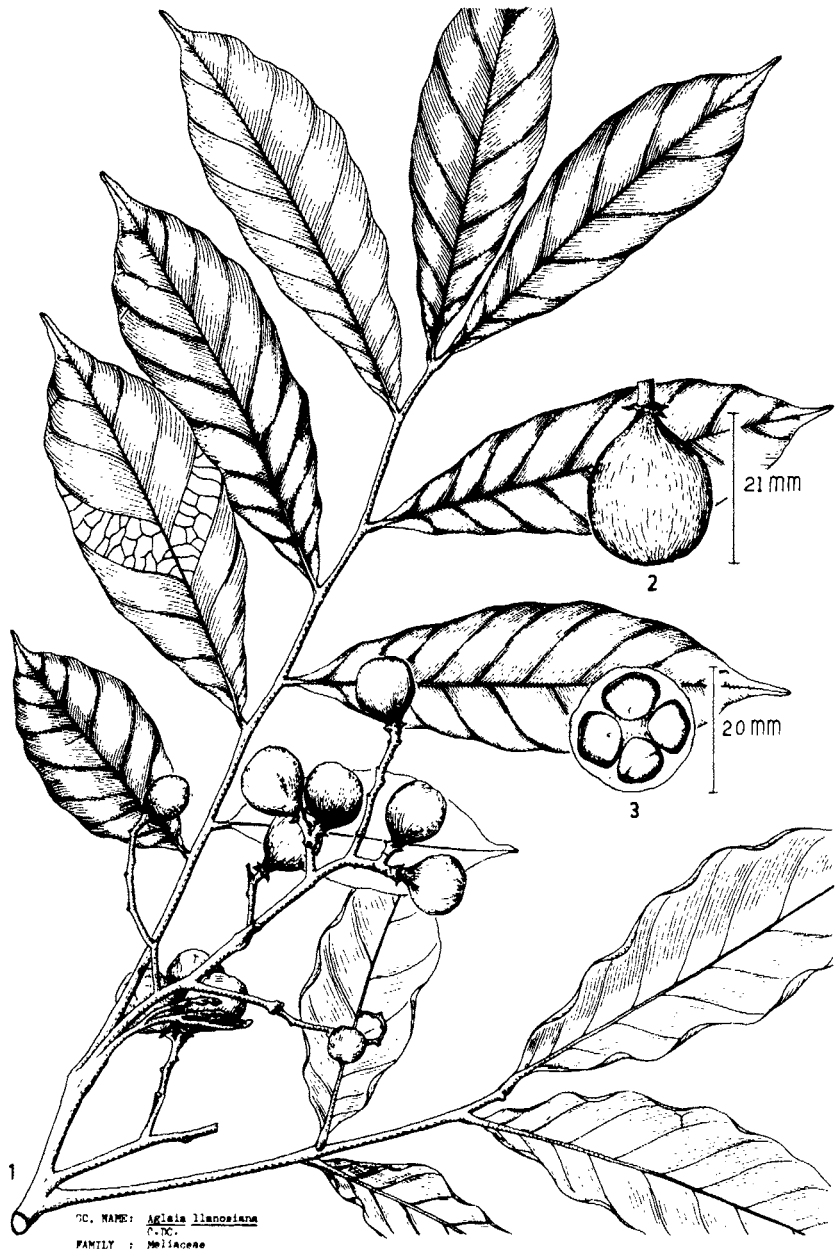
5.0 OTHER USES

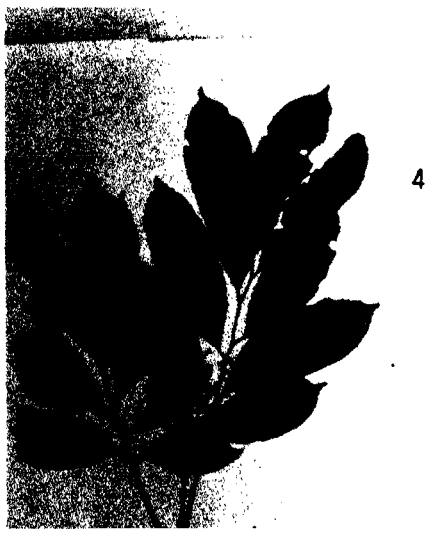
The wood is used for house construction in rural areas.

6.0 PROPAGATION

Bayanti is not cultivated but propagates itself by seeds in its natural habitat.

PLATE II. Aglaia llanosiana C. DC.





4

II$_1$ - Branchlet with leaves, fruit and buds.

2 - Fruit

3 - Transverse section of fruit

4 - Preserved specimen twigs, leaves and buds

3. ALLAEANTHUS LUZONICUS

1.0 NAMES:

Family	Moraceae
Botanical	Allaeanthus luzonicus (Blanco) F. Vill.
Common	Himbabao
Vernacular	alibag (Cagayan); alokon, bongon (Mt. province, Pangasinan); baeg (Pangasinan); himbabao (Nueva Ecija); alitatag (Camarines); kabag (Mindoro); malakadios (Batangas, Masbate); karud (Misamis); liba (Davao); malambingan (Sulu).

2.0 DISTRIBUTION

2.1 Locality: this tree is distributed in the Philippines from Northern Luzon to Basilan.

2.2 Forest type and frequency: It is commonly found in thickets and second-growth forests at low and medium altitudes. In the dipterocarp forest of Mount Makiling, Laguna (climatic type I), the density is 1 tree per hectare.

3.0 DESCRIPTION

This is a medium sized tree that attains a height of 15 m and a diameter of 30 cm. Leaves alternate with pointed apex and rounded base. Lower surfaces of leaves very hairy. Flowers very small and borne on very long, slender, spike-like flowering branches.

4.0 USE AS FOOD

The young leaves and flowers of Himbabao are cooked and eaten as a vegetable. It could be cooked solely or in mixture with other vegetables such as eggplant, bitter melon, cabbage, sweet potatoes, etc.. and seasoned with fish sauce and tomatoes. Flowers are blanched and make a good salad.

5.0 NUTRITIONAL VALUE

Mineral contents: (mg/100 g edible portion)

Ca	- 257	Fe	- 6.7
P	- 125	Na	- 5
K	- 784		

Vitamin contents (Mg/100 g edible portion)

A (U)	-	1590
Thiamin	-	.10
Riboflavin	-	.29
Niacin	-	1.7
Ascorbic acid	-	23

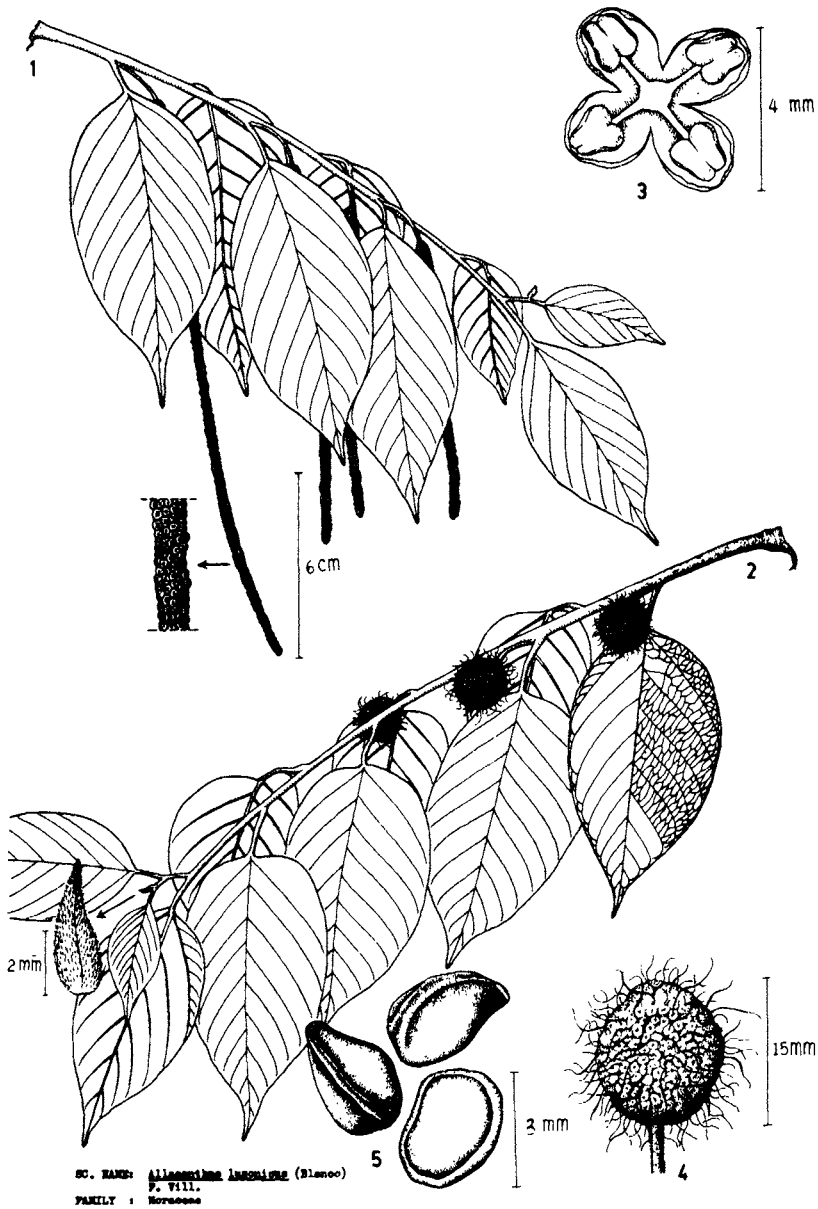
6.0 OTHER USES

Wood is used in the manufacture of wooden implements such as wooden plates, bowls and trays.

7. PROPAGATION

This tree species is generally propagated by seeds but could also be propagated by cuttings from matured branches of approximately 2-inch diameter.

PLATE III. **Allaeanthus luzonicus** (Blanco) F. Vill.



III$_1$ - Branchlet with flowering spikes

2 - Branchlet with fruit and terminal bud

3 - Detail of flower

4 - Fruit

5 - Seeds

6 - Branch with branchlets, leaves and flowering spikes

4. ALPHONSEA ARBOREA

1.0 NAMES:

Family	Annonaceae
Botanical	Alphonsea arborea (Blanco) Merr.
Common	Bolon
Vernacular	lanutan (Tayabas); bolon (Camarines); kalai (Laguna); taputosa (Davao); lalapid (Zamboanga).

2.0 DISTRIBUTION

2.1 Locality: Bolon is an endemic species found in Laguna, Rizal, Quezon and Camarines provinces in Luzon. It is also found in Mindoro, Masbate, Leyte, Cebu and in Mindanao at low and medium altitude.

2.2 Forest type and frequency: Based on field inventories, the stem density in the dipterocarp forest of Mount Makiling (climatic type I) was 30 trees, 23.3 poles, 3.3 saplings, and 6.7 seedlings per hectare. In the Molave forest only 2 trees per hectare occurred. For climatic type II, in Atimonan, Quezon the dipterocarp forest gave 6.7 saplings and 6.7 seedlings per hectare. In Puerto Princesa, Palawan, also representing climatic type I, the dipterocarp forest yielded 2 trees and 10 saplings per hectare.

3.0 DESCRIPTION

It is a tall forest tree reaching a height of about 40 m and a diameter of about 70 cm. It branches horizontally. Leaves ovate-oblong, 10 to 15 cm long and 2 to 3 cm wide with pointed base and tip. Inflorescence lateral, usually upon short, hairy stalks. Flowers small, yellow and odorless. Sepals short; petals about 6 mm long. Fruit usually single, large, hard, woody, scurfy, brown, elliptical or subglobose and about 6 to 9 cm long.

4.0 USE AS FOOD

The ripe fruit is edible and is eaten raw.

5.0 OTHER USES

Guerero and Father Blanco (as cited by Quisumbing 1978) said that the fruit of this tree is boiled and used locally as a cure for fever, and a decoction of it is a good remedy in amenorrhoea. A decoction of the bark with dried leaves of garlic is good for urticaria.

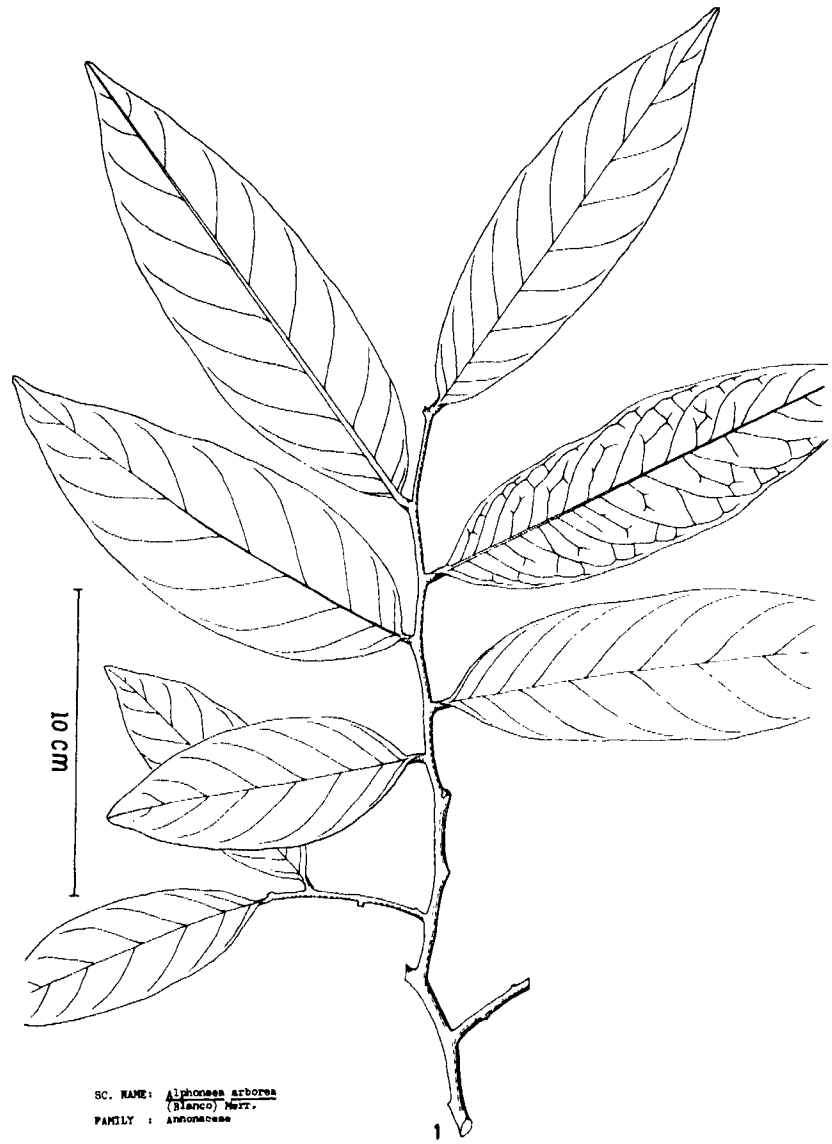
Bolon could also be cultivated for ornamental purposes and, because of its horizontal branching, it also serves as a shade tree that could be cultivated and planted in resort areas and parks.

It is also used in the manufacture of baseball bats and bowling pins.

6.0 PROPAGATION

Bolon is propagated by seeds and by means of marcotting the matured branches.

PLATE IV. Alphonsea arborea (Blanco) Merr.



1

2

IV_1 - Branchlet with leaves

2 - Illustration of shrub in stand of trees

5. ANISOPTERA THURIFERA

1.0 NAMES:

Family	Dipterocarpaceae
Botanical	Anisoptera thurifera (Blanco) Blume
Common	Palosapis
Vernacular	duyong, guyong (Ilocos Norte, Ilocos Sur, Nueva Ecija); apnot, duong (Abra); aju (Isabela); balinasuas (Nueva Vizcaya); palosapis (Pangasinan, Nueva Ecija, Zambales, Bataan); baliuisuis, barakbak, bariuiuis (Pangasinan); apis-apis, kumpol, lanum puti (Nueva Ecija); palohapi, mayapis (Zambales); dagang, mayapis (Bulacan, Bataan, Rizal, Mindoro); basapis/pisapis (Bataan); dagang, dagang na puti, lauaan, mala-atis (Rizal); dagang, dagum (Laguna, Albay); manapo (Polillo); dagang, tabila (Camarines); malamba (Albay); dagang (Catanduanes); makaasim betis, letis (Masbate); bagobahong, lauan nga busag (Samar); letis (Ticao, Panay); pakpakan (Negros Occidental).

2.0 DISTRIBUTION

2.1 Locality: This is an endemic species which is common and widely distributed in the Philippines.

2.2 Forest type and frequency: It is dominant in primary forest but also occurs in some types of secondary forest. In the dipterocarp forest of Mount Makiling (climatic type I) the stem density is 0.5 trees and 0.5 seedlings to a hectare. For climatic type II represented by Atimonan, Quezon, the density per hectare is 6.7 saplings and 6.7 seedlings in the dipterocarp forest.

3.0 DESCRIPTION

Anisoptera thurifera is a large-sized tree reaching a height of 40 to 45 m and a diameter of 140 to 180 cm. It has a straight, regular, unbuttressed bole that is three-fifths to two-thirds of the height of the tree. Bark 15-25 mm thick, light grey with yellowish tinge and irregular flakes from bottom. The canopy is dense during the rainy season and open in the dry, at which time it changes leaves. Leaves elliptic and alternate with pointed apex and rounded base, light green beneath, 7.5 to 16 cm long and 3 to 7 cm wide. Fruit rounded, 4 to 15 mm in diameter, and with two wings which are 5 to 9 cm long and sometimes more than a centimeter broad.

4.0 USE AS FOOD

The seeds of Palosapis are eaten raw or sometimes roasted.

5.0 OTHER USES

Wood is used for making crates, also used for shipbuilding, flooring for house and car construction, for manufacture of spools, barrels and baseball bats.

6.0 PROPAGATION

Palosapis, like other dipterocarps, is propagated by seeds.

PLATE VI. Antidesma bunius (L.) Spreng.

5

VI$_1$ - Branchlet with leaves and axillary spikes of fruits

2 - Spike of fruits

3 - Single fruit

4 - Transverse section of fruit

5 - Illustration of leaves and fruits

7. ANTIDESMA GHAESEMBILLA

1.0 NAMES:

Family	Stilaginaceae
Botanical	Antidesma ghaesembilla Gaertn.
Common	Binayuyu
Vernacular	dangul (Mt. Province); binayuyu, binayoyo (Zambales, Laguna); arosep, arosip, arsep, arusip (Ilocos Sur, Ilocos Norte); aniam (Tagbilaran); arusip, ayusit (Bontoc, Benguet); tubo-tubo (Bicol); pinang, limuyang (Batangas); bayet, kabugbug, binayuyu (Quezon); minul (Sulu); inyam, kingan (P/ Visaya).

2.0 DISTRIBUTION

2.1 Locality: Binayuyu is endemic to the Philippines but sparsely distributed throughout the country. It thrives in open grasslands and thickets at low and medium altitude. It is also found in Tropical Africa, Asia, India, Southern China through Australia.

2.2 Forest type and frequency: Inventories conducted in Mount Makiling, Laguna (climatic type I) gave a density of 1 tree per hectare. In Quezon National Park, Quezon (climatic type II), there were 1 tree and 1 pole per hectare; in Palawan (climatic type III), the density was 1 tree and 2 poles per hectare, whereas in Oriental Mindoro (climatic type IV), there was only 1 tree per hectare.

3.0 DESCRIPTION

Antidesma ghaesembilla Gaertn. is an erect, pubescent or nearly glabrous tree that produces a smooth, straight but branchy trunk attaining a diameter of 21 cm and a height of 7.5 meters, with a clear bole of approximately 3 to 4 meters. Leaves alternate, broad and elliptic to elliptic-oblong, measuring 2.8 to 8.1 cm long, apex broadly acute, usually rounded or subcordate base and entire margin; flowers in pubescent spikes, and panicled measuring 3.9 to 10.2 cm long. Flowers white, generally small, sessile, consisting of 5 to 7 stamens and blooming from March to May. The fruit are subglobose, olivaceous, acidic, 3.8 to 5.2 mm in diameter, rather smooth and dark violet in color when ripe. Fruits appear very wrinkled when dry.

4.0 USE AS FOOD

The fruit is eaten raw when the fruit is ripe in the same manner as Bignai (A. bunius). No analysis has been made so far on the constituents of its edible part.

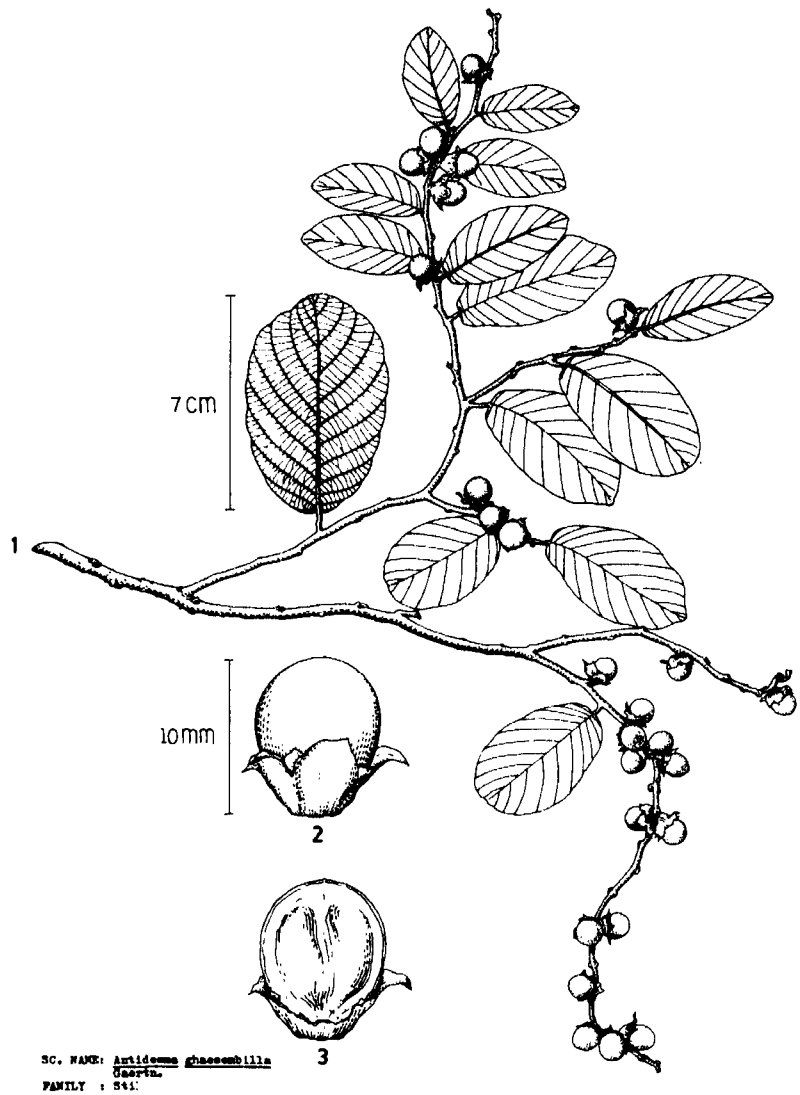
5.0 OTHER USES

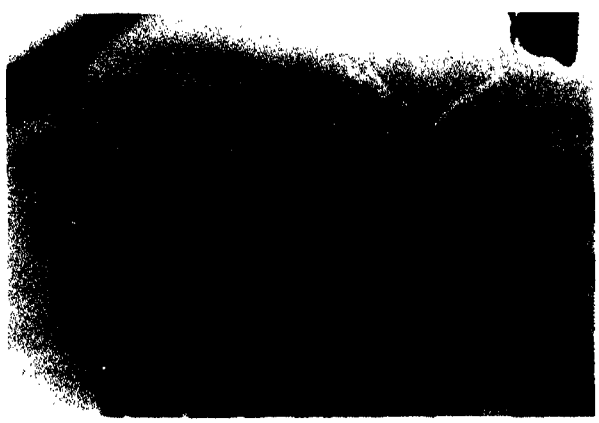
The wood is used in rural areas for temporary construction, but generally it is a good source of fuelwood and material for charcoal making. It is also planted as an ornamental in parks and school grounds.

6.0 PROPAGATION

Binayuyu is not cultivated but it regenerates naturally by seeds in its natural habitat; however, its natural regeneration is hampered by birds and deer that make use of it as a food source.

PLATE VII. Antidesma ghaesembilla Gaertn.





4

VII$_1$ - Branchlets with leaves and fruits: singly and on inflorescences

2 - Fruit

3 - Longitudinal section of fruit

4 - Illustration of branchlets with inflorescences

8. ANTIDESMA PENTANDRUM

1.0 NAMES:

Family	Stilaginaceae
Botanical	Antidesma pentandrum (Blanco) Merr.
Common	Bignai-pugo
Vernacular	bignai-pugo (Laguna, Mindoro, Quezon).

2.0 DISTRIBUTION

2.1 Locality: It is usually found in thickets and is widely distributed in the Philippines, Tropical Africa and Malaysia.

2.2 Forest type and frequency: Inventories made in climatic type I, showed a stem density of 2 trees and 3.3 poles per hectare for the dipterocarp forest, and 2 trees and 3.3 poles per hectare in the Molave forest.

3.0 DISTRIBUTION

Antidesma pentandrum (Blanco) Merr. is an erect, small sized tree attaining a height of 3 to 10 m.

This is an open-branched tree, more or less pubescent or nearly glabrous. Leaves broadly elliptic to elliptic-oblong, 3 to 8 cm long; the apex broad, usually rounded, and the base subcordate. Spikes pubescent and panicled, 4 to 10 cm long. Flowers, which usually bloom in March to May, white, small and sessile. Stamens 4 to 7. Fruit subglobose, olivaceous, with a sour taste, 4 to 5 mm in diameter and smooth. When the fruit dries, it is strongly wrinkled.

4.0 USE AS FOOD

The fruit tastes sour and is eaten raw.

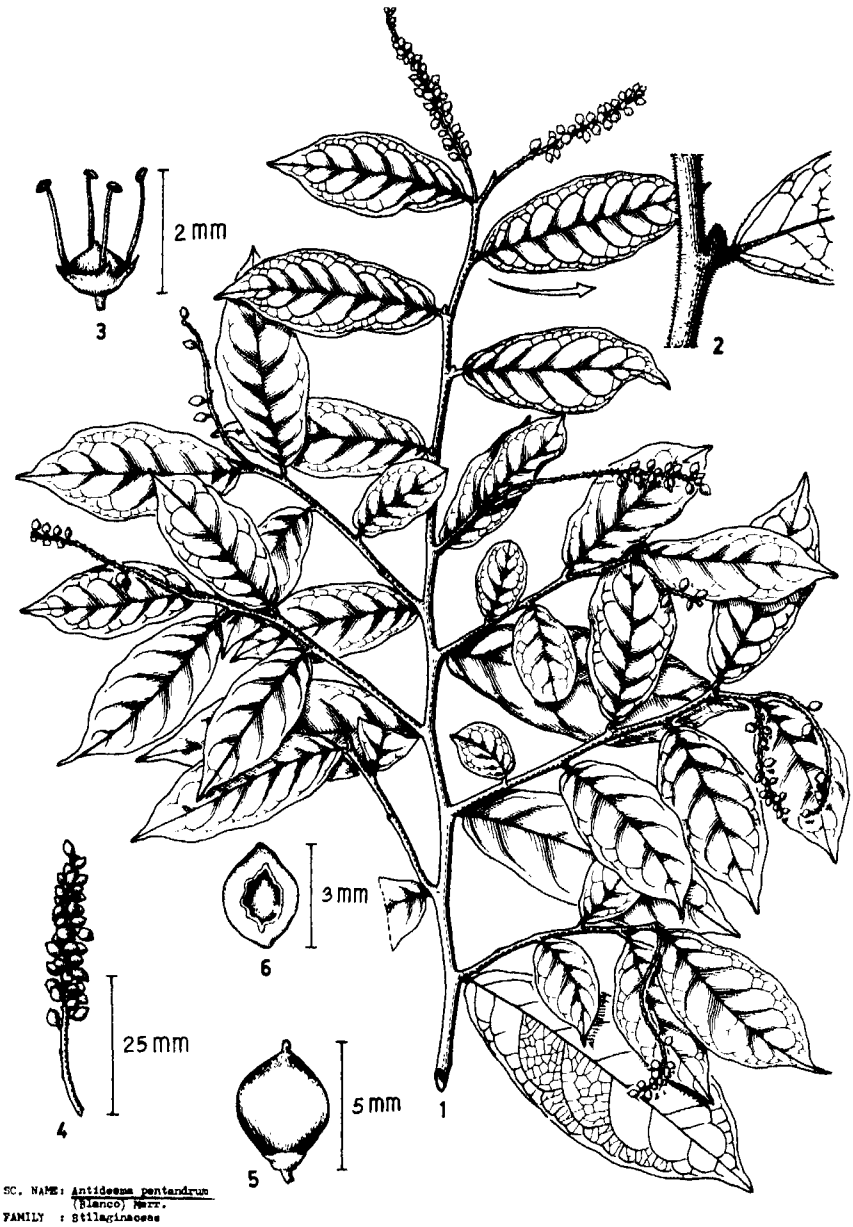
5.0 OTHER USES

The leaves are used for medicinal purposes.

6.0 PROPAGATION

Propagation of this plant is carried out by means of marcotting, layering, cuttings and from seeds.

PLATE VIII. Antidesma pentandrum (Blanco) Merr.



7

VIII$_1$ - Branchlet with leaves and spikes of fruits

2 - Axillary bud

3 - Detail of flower

4 - Spike bearing fruit

5 - Fruit

6 - Longitudinal section of fruit

7 - Illustration of leaves and inflorescences

9. ARDISIA PYRAMIDALIS

1.0 NAMES:

Family	Myrsinaceae
Botanical	Ardisia pyramidalis (Cav.) Pers.
Common	Aunasin
Vernacular	aunasin (Laguna, Bicol); dugsu, dugrugusu, kalaki-ti-rugsu (Ilocos Sur, Ilocos Norte); kataypa (Visayas); liuhin bakit (Sambali); paraparangit (Negros Oriental and Negros Occidental); tagiman (Cebu).

2.0 DISTRIBUTION

2.1 Locality: This plant is endemic to the Philippines, however, the distribution is confined so far in Luzon in partially shaded areas of secondary dipterocarp forests.

2.2 Forest type and frequency: It thrives at low and medium altitudes and was observed to flower during the months of March to June. It is not selective of the soil type except for sandy soils, but grows vigorously on soils with thick humus. In Mount Makiling, Laguna, representing climatic type I, the density was 2 seedlings, 2 poles and 3 trees per hectare, in Quezon National Park, Quezon (climatic type II), inventories showed only 1 tree per hectare; but in Palawan (climatic type III) and Pakyas, Oriental Mindoro, this plant could not be found.

3.0 DESCRIPTION

Ardisia pyramidalis (Gav.) Pers. is a small tree attaining a height up to 5.5 meters and a diameter of 8–10.5 cm. It has alternate crowded and ascending curved branches thickened at the base with the terminal ones reduced in length. Leaves simple, crowded at the tip, oblong or oblanceolate, membranous, cuneate toward, or subobtuse at, the petiole which is 1.2 to 3.1 cm long; glabrous, 6–7 cm wide and 25–27 cm long, entire or obscurely serrate, with midrib keeled underneath and prominent lateral veins. Inflorescence pyramidal in shape, terminal, glabrous, the lower branches usually short and rebranched. Flowers pale pink, borne on a 1.1 cm long, slender pedicel, umbellately clustered from the thickened ends of the branches; calyx glandular and dotted, lobes blunt with thin ciliate margins. Fruits crustaceous, 7.5 to 8.1 mm in diameter, spherical in shape, obscurely striate longitudinally, on an elongated thickened pedicel. Seeds brown, more or less round, about 0.3 cm in diameter.

4.0 USE AS FOOD

The young leaf tops are used as greens, or cooked with meat or fish and eaten as a vegetable. The flowers and fruits are cooked as flavoring for fish. As salad, these young leaves are blanched, then mixed with onions, tomatoes, garlic, and salt. The young leaves are eaten by deer and the fruits by monkeys, wild pigs and birds.

5.0 NUTRITIONAL VALUE

Approximate analysis of the fruit showed the following (Catibog, 1978):

% moisture	10.57
% ash	6.11
% crude fiber	37.99
% crude protein	13.50
% crude fat	0.41
% Ca	0.96
% P	0.21
% K	1.90
% N	2.16

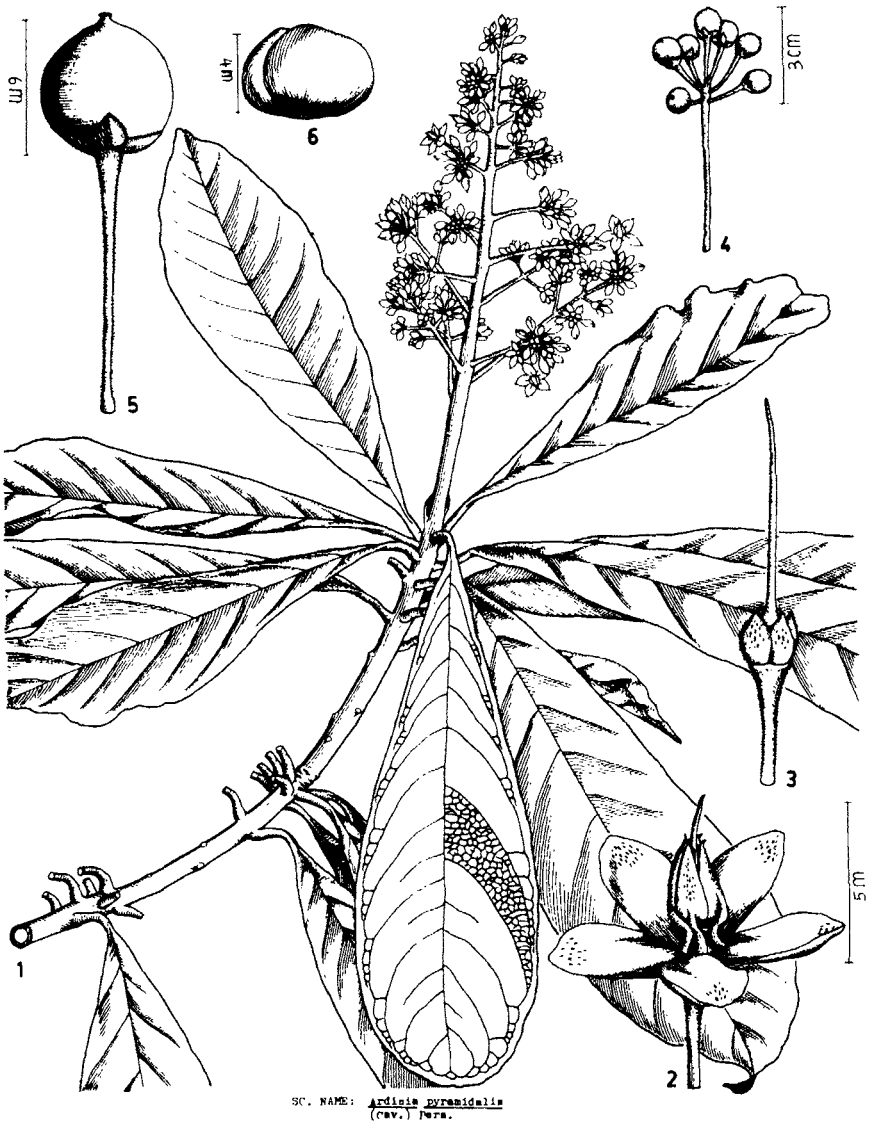
6.0 OTHER USES

It is cultivated as an ornamental plant in parks, gardens and offices.

7.0 PROPAGATION

This plant is propagated by seeds. The mature seeds are extracted from the fruit, then directly seeded or sown in potting media and planted out when the seedlings are 18 cm high.

PLATE IX. Ardisia pyramidalis (Cav.) Pers.



7

IX$_1$ – Branchlet with leaves and terminal inflorescence

2 – Flower with stamens enclosing style

3 – Flower with style

4 – Clump of fruits

5 – Single fruit on pedicel

6 – Seed

7 – Branchlets, leaves and terminal inflorescences

10. ARDISIA SQUAMULOSA

1.0 NAMES:

Family	Myrsinaceae
Botanical	Ardisia squamulosa Presl
Common	Tagpo
Vernacular	apiot (Agusan); kanai (Palawan); katagpo (Batangas); mulang (Cagayan), oksor (Ilocos); katatbum, pataktol (Pampanga) and malaranum (Nueva Ecija).

2.0 DISTRIBUTION

2.1 Locality: This species is very common and is distributed throughout the Philippines in primary forests at low and medium altitudes ascending to 1,000 meters.

2.2 Forest type and frequency: Inventories made on this species showed a stem density per hectare of 1 pole in the dipterocarp forest of Mount Makiling (climatic type I); 13.3 seedlings per hectare in the Molave forest of the same locality, 3.33 saplings and 13.22 seedlings per hectare in the dipterocarp forest of Puerto Princesa, Palawan, representing climatic type I too.

3.0 DESCRIPTION

Tagpo reaches a height of 10 meters and a diameter of 15 cm. Leaves alternate, oblanceolate, rather slender, 6 to 15 cm in length, 2 to 6 cm in width and pointed at both ends. Flowers borne on compound, terminal or lateral inflorescences, about a centimeter in length; white or pink in color and fragrant. Fruit dark blue or purple, rounded and 5 to 8 cm in diameter.

4.0 USE AS FOOD

The fruits and flowers of this plant are cooked as flavoring for fish.

5.0 NUTRITIONAL VALUE

Approximate analysis of the fruits:

% Moisture	29.00
% Ash	4.90
% Crude fiber	27.00
% Crude protein	15.31
% Crude fat	2.12
% Ca	1.17
% P	0.15
% K	0.55
% N	1.62

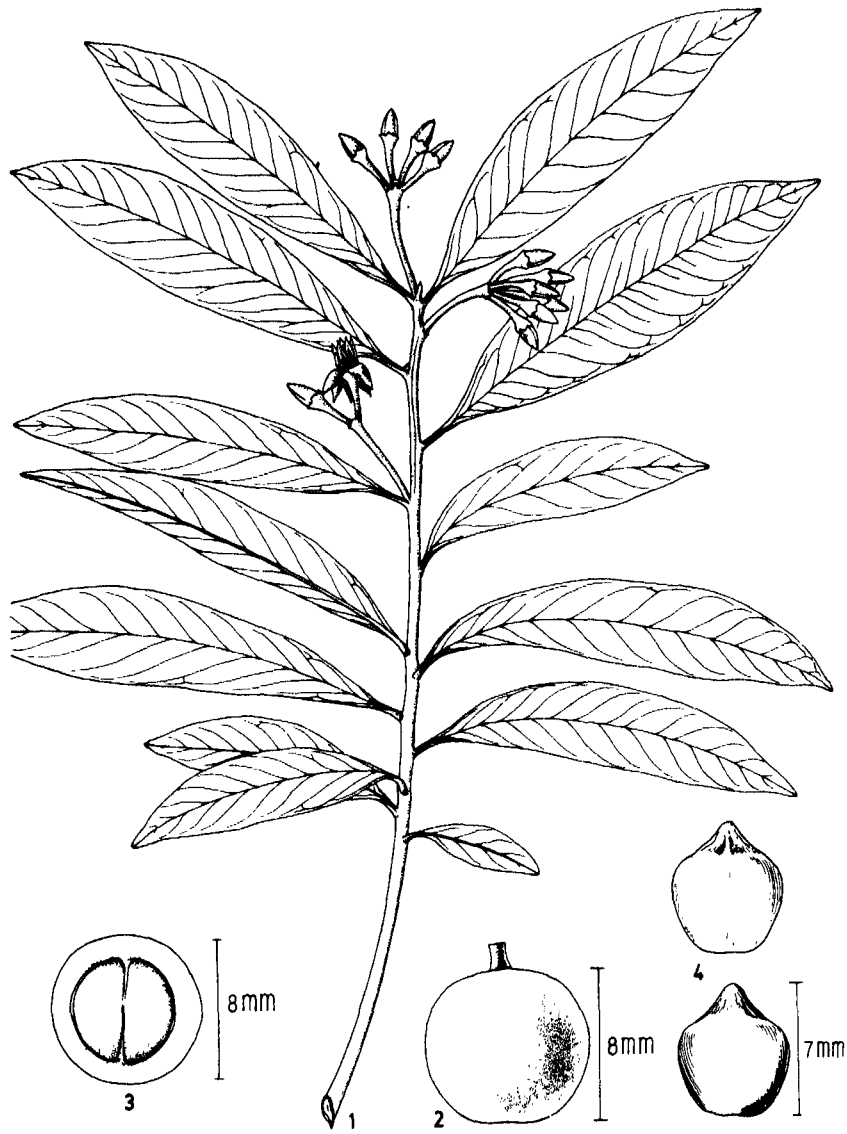
6.0 OTHER USES

The leaves of this plant are applied on wounds for a soothing effect.

7.0 PROPAGATION

This plant is propagated by seeds.

PLATE X. Ardisia squamulosa Presl



SC. NAME: Ardisia squamulo
Presl
FAMILY : Myrsinaceae

5

X_1 - Branchlet with leaves and inflorescences

2 - Fruit

3 - Transverse section of fruit

4 - Seeds

5 - Illustration of foliage

11. ARENGA PINNATA

1.0 NAMES:

Family	Palmae
Botanical	Arenga pinnata (Wurmb) Merr.
Common	Kaong
Vernacular	bagatbat (Negros Oriental); batbat (Bohol); habiok (Capiz); hidiok (Bikol); kaong (Tagalog region); rapitan (Ilocos Provinces).

2.0 DISTRIBUTION

2.1 Locality: It is widely distributed at low and medium altitudes throughout the settled areas in the Philippines, in ravines along streams and in semi-cultivation. It may not however be native to the Philippines, but a species purposely introduced by the Malays in their early invasions.

2.2 Forest type and frequency: Its occasional occurrence in virgin forest may be due to the fact that it is naturally a forest species, and that its ripe fruits have been distributed by wild hogs and fruit bats, both of which eat the mature fruit.

In climatic type I, inventories made in the dipterocarp forest of Mount Makiling showed 2 mature palms, 79 young palms and 105 seedlings to a hectare. In the Molave forest type, however, there are 373 young palms and 26.6 seedlings per hectare. In the dipterocarp forest of Pakyas, Oriental Mindoro, representing climatic type IV, inventories showed 4 mature palms, 263 young palms and 699 seedlings to a hectare.

3.0 DESCRIPTION

This species, a large palm, is characterized by its very long, ascending, pinnate, leaves, up to 8.5 m in length with 100 or more pairs of linear leaflets which are whitish beneath, 1 to 1.5 m long, lobed and variously toothed at the apex and auricled at the base. The large axillary, pendulous inflorescence is also a characteristic of this species. It reaches a height of 12 to 15 m and a diameter of 40 cm. When the palm matures, a flowering shoot is sent out from the axil of the upper leaf, then followed by other flowers until the palm is exhausted and dies. Male flowers in pairs and about 12 mm long. It has very numerous, crowded, green nuts, which turn yellow when mature, are about 5 cm in diameter and contain 2 or 3 seeds.

4.0 USE AS FOOD

Fruits are edible. The fleshy kernels of the young fruits are cooked and eaten or made into sweets. The buds are eaten raw as an excellent salad or cooked as vegetables. The sweet sap is used in the production of sugar, starch, vinegar and "tuba" (a native drink).

5.0 NUTRITIONAL VALUE

Approximate analysis of the fruits yielded the following:

% Moisture	6.76
% Ash	7.90
% Crude fiber	16.20
% Crude protein	10.03
% Crude fat	1.46
% Ca	1.48
% P	0.05
% K	1.19
% N	1.12

6.0 OTHER USES

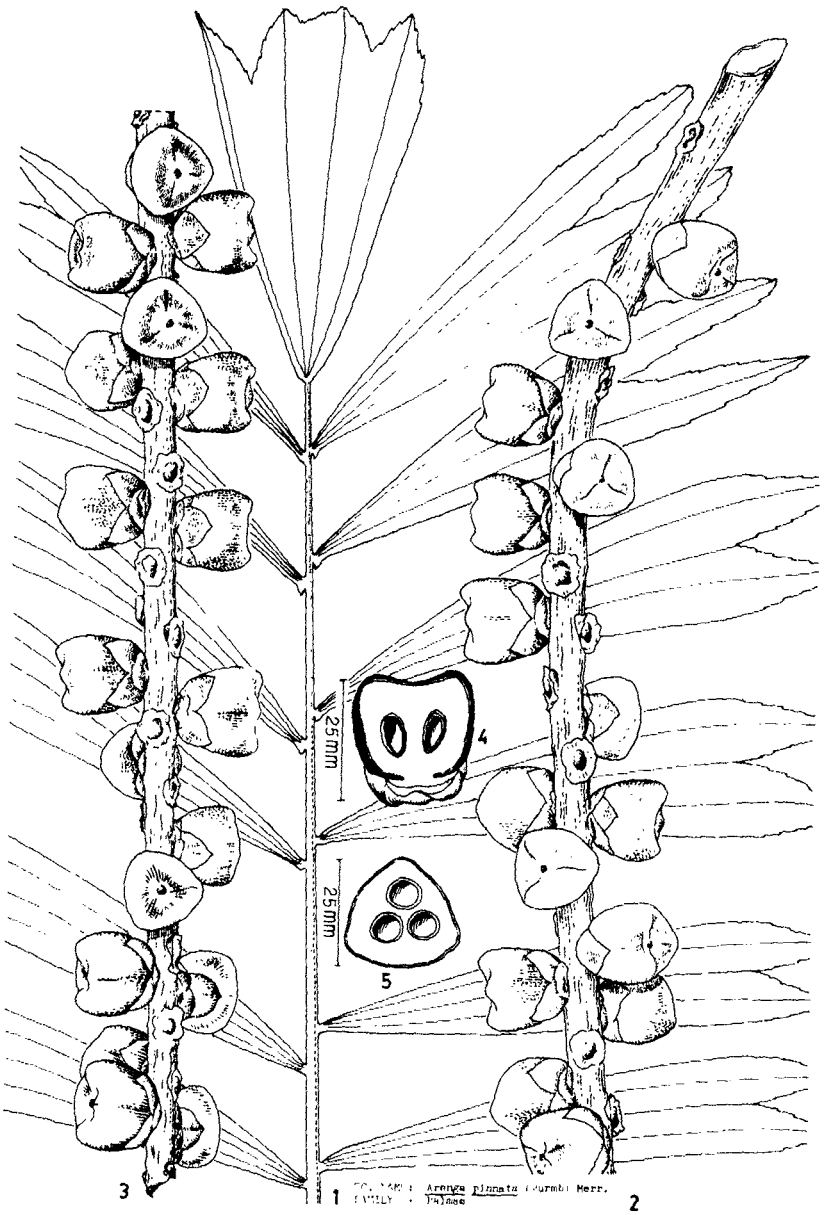
The leaves are sometimes used for thatching roofs, and are said to be durable. For this purpose the leaflets are removed and prepared in a manner similar to that of preparing the nipa palm (Nypa fruticans). The mid ribs of the leaflets are frequently used for brooms, and are sometimes woven into coarse baskets. The splints prepared from the petioles are also used in making baskets and for a type of marquetry work on tables, stands, screens, boxes and other light pieces of furniture.

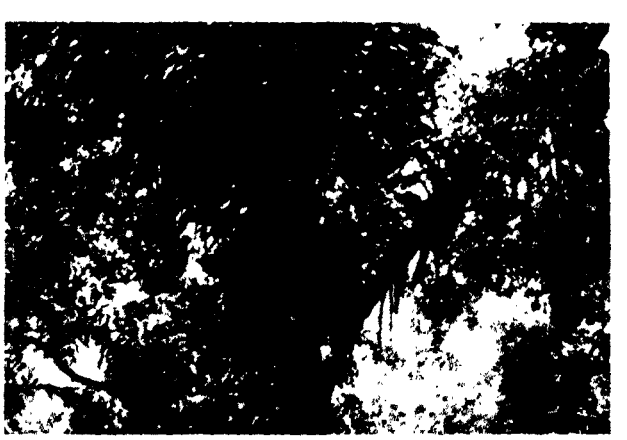
The most important industrial yield of this palm is, however, the black tough fiber locally known as "yunot" which is chiefly used in the manufacture of ropes for use in salt water and for thatching houses. The rope made from this fiber is prized not only for its remarkable durability against exposure to either fresh or salt water, but because it does not readily burn. The fibers are also used for making different types of brushes.

7.0 PROPAGATION

The palm is propagated by means of seeds and suckers.

PLATE XI. Arenga pinnata (Wurmb) Merr.





XI_1 - Pinnate leaf

2 & 3 - Sections of inflorescence bearing fruits

4 - Vertical section of fruit

5 - Transverse section of fruit

6 - Illustration of palm in its natural habitat

12. ARTOCARPUS OVATA

1.0 NAMES:

Family	Moraceae
Botanical	Artocarpus ovata Blanco
Common	Anubing
Vernacular	kamandog, kubi, pakak (Cagayan); ubien (Ilocos Norte, Abra, Isabela); anabien (Pangasinan); pintug (Zambales); anabong (Rizal); anibiong, kilian, sulipa (Bataa); anubing, tagop, togop (Tagalog); kanubling (Camarines Sur); anubling, kubi (Albay, Sorsogon); kalulotor, kanet (Mindoro); kili-kili (Samar, Leyte); bayako (Iloilo); bayogo, bayuko (Negros Occidental).

2.0 DISTRIBUTION

2.1 Locality: This plant species is widely distributed from Northern Luzon to Palawan and Mindanao in forests at low and medium altitudes in most islands and provinces, but not abundant anywhere.

2.2 Forest type and frequency: Results of surveys in the Dipterocarp forest of Mount Makiling, Laguna (climatic type I) gave a stem density of 33.3 seedlings per hectare, whereas in the Molave forest the figure was 4 trees and 819.2 seedlings per hectare. In the dipterocarp forest of Pakyas Oriental Mindoro (climatic type IV), the density was 2 trees per hectare.

3.0 DESCRIPTION

This is a medium-sized tree up to 100 cm in diameter and 30 meters in height, with a clear, cylindrical trunk. Branches more or less horizontally spreading and widely spaced along the trunk. Bark when freshly cut exudes a milky sap. Leaves alternate and entire. Flowers small and unisexual. Fruits composed of numerous united carpels, dry and borne on the inner side of a yellow colored fleshy receptacle.

4.0 USE AS FOOD

The seeds are extracted from the ripe fruits, then they are roasted and eaten like cashew nuts.

5.0 OTHER USES

The wood is utilized for purposes requiring strength and durability, like telegraph poles, house posts, railroad ties and bridge timber.

6.0 PROPAGATION

The propagation of this tree, so far known, is by means of seeds.

PLATE XII. Artocarpus ovata Blanco

4

XII$_1$ - Branchlet with leaves and fruit

2 - Fruit and axillary pedicel

3 - Transverse section of fruit

4 - Illustration of tree and foliage

13. AVICENNIA OFFICINALIS

1.0 NAMES:

Family	Avicenniaceae
Botanical	Avicennia officinalis L.
Common	Api-api
Vernacular	kalapini, kalumpini (Ilocos Norte, Pangasinan, Zambales); mangitit (Zamblaes); bongalon (Pangasinan, Polillo, Marinduque, Mindoro, Iloilo, Negros Occidental); bungalin (Pampanga); api-api (Bataan, Capiz, Mindoro, Masbate, Cotabato, Zamboanga); api, mayapi (Albay); kuyapi (Camarines); pepisik (Tayabas, Camarines); niapi, piapi (Tayabas, Samar, Leyte, Misamis); kilassi (Cotabato, Davao); pundung (Davao).

2.0 DISTRIBUTION

2.1 Locality: This species is widely distributed in the Philippines along tidal streams and seashores. It is also found from East Africa to tropical Asia and through Malaysia to New Zealand and Polynesia.

2.2 Forest type and frequency: Inventories made in the mangrove forest of Pagbilao, Quezon (climatic type II) gave a stem density of 114 trees, 53.3 poles, 100 saplings and 692.6 seedlings per hectare.

3.0 DESCRIPTION

It is a shrub or a medium-sized tree reaching a height of 8 meters, often flowering when less than 1 m high. Bark usually light grey or brown and rather smooth but finely checked by small cracks. The diameter is about 45 cm. Leaves opposite, oblong-obovate to elliptic, apex obtuse or rounded, base narrowed, acute, coriaceous, 4 to 10 cm long and 2.5 to 5 cm broad, upper surface dark green and shiny, lower surface white or pale-greyish and hairy with stout and very prominent midrib. Flowers yellow and densely crowded. The few-flowered heads (with 3 to 7 flowers in each head) are 1 cm in diameter or less, the heads peduncled, solitary to cymosely arranged. Corolla orange-yellow. Corolla tube very short, about 5 mm long, pubescent or nearly glabrous, cylindrical and with 4 lobes; lobes 5 mm in length, hairy outside. Calyx with 5 lobes which are 2 to 8 mm long. Fruit a capsule, ovoid, pointed, pubescent, 2.5 to 4 cm in length and containing a single seed whioh completely fills the capsule.

4.0 USE AS FOOD

The fruit of this species is edible, and can be collected from May to June.

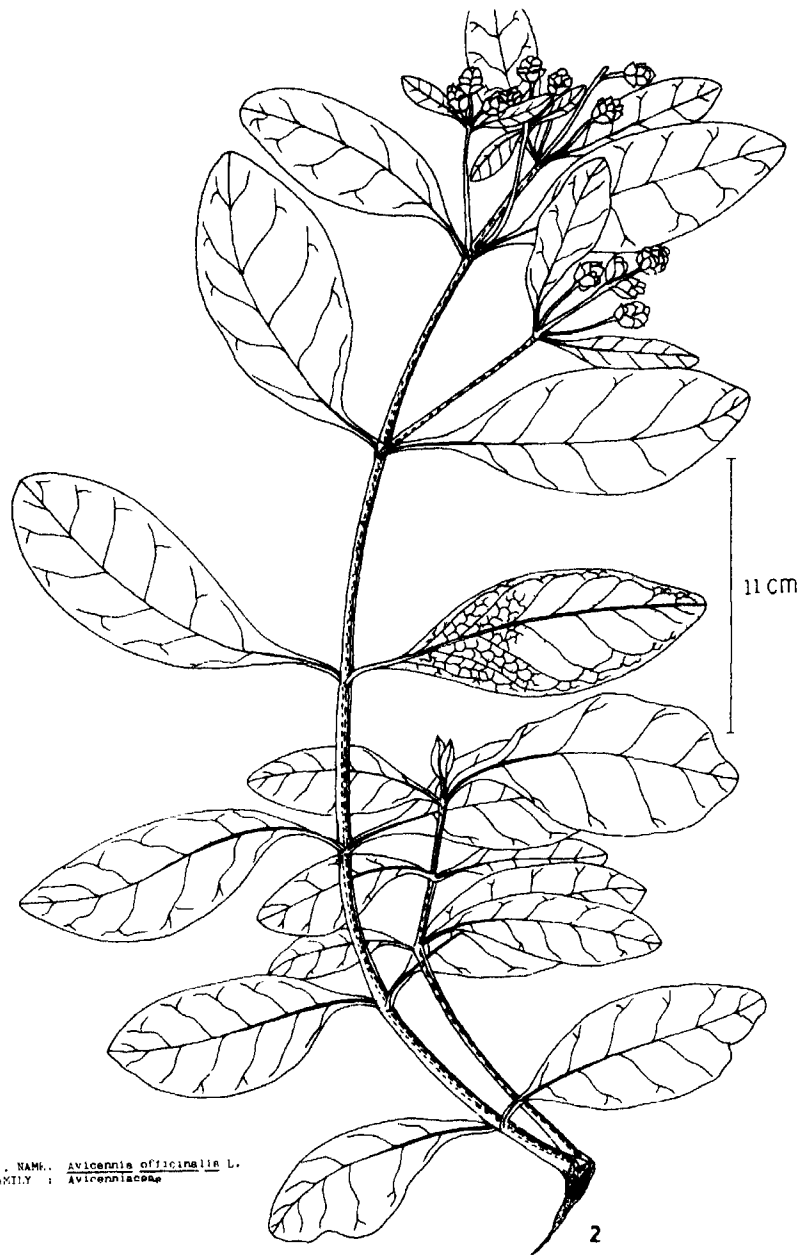
5.0 OTHER USES

The wood of Api-api is used for building purposes, for firewood and for posts.

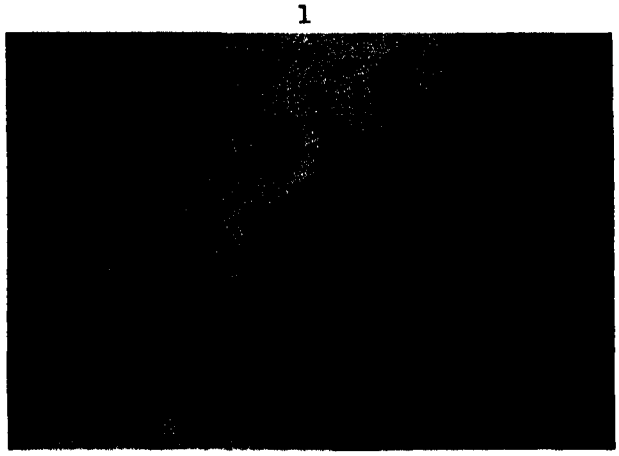
6.0 PROPAGATION

This plant is propagated by seeds, the dispersal of which is influenced by stream current and seawaves.

PLATE XIII. Avicennia officinalis L.



1



XIII$_1$ - Illustration of branchlet with foliage

2 - Branchlet with foliage and flowers

14. BARRINGTONIA ASIATICA

1.0 NAMES:

Family	Barringtoniaceae
Botanical	Barringtonia asiatica (L.) Kurz.
Common	Botong
Vernacular	botong (Laguna, Quezon)

2.0 DISTRIBUTION

2.1 Locality: It is a characteristic strand plant found along the seashores of the Philippines.

2.2 Forest type and frequency: The tree density as inventoried in the mangrove forest of Pagbilao, Quezon (climatic type II) showed only 1 tree per hectare. It is also found in Ceylon to Malaysia, Australia and Polynesia.

3.0 DESCRIPTION

Barringtonia asiatica (L.) Kurz is a large-sized tree attaining a height of 8 to 15 meters. Leaves large, sessile, obovate or obovate-oblong, entire, thick, shining, 20 to 40 cm long with obtuse apex and narrowed base. Flowers very large, borne on short, erect few flowered racemes. Calyx tube about 1 cm long; lobes two or three in number, oblong-ovate, concave, green and about 2.5 cm long. Petals deciduous, four, thin, white becoming brownish, oblong, 7 to 8 cm long, and 3 to 4 cm wide. Stamens very numerous, slender, united at the base, 10 to 12 cm long, white below and shading to purple above. Anthers small and yellow. Style slender, about 13 cm long and purplish. The species flowers all through the year. Fruit obovoid, sharply 4-rarely 5-angled, 8 to 14 cm long, 8 to 12 cm thick, containing a single, large seed.

4.0 USE AS FOOD

The young shoot of this plant is eaten fresh. It is however slightly astringent.

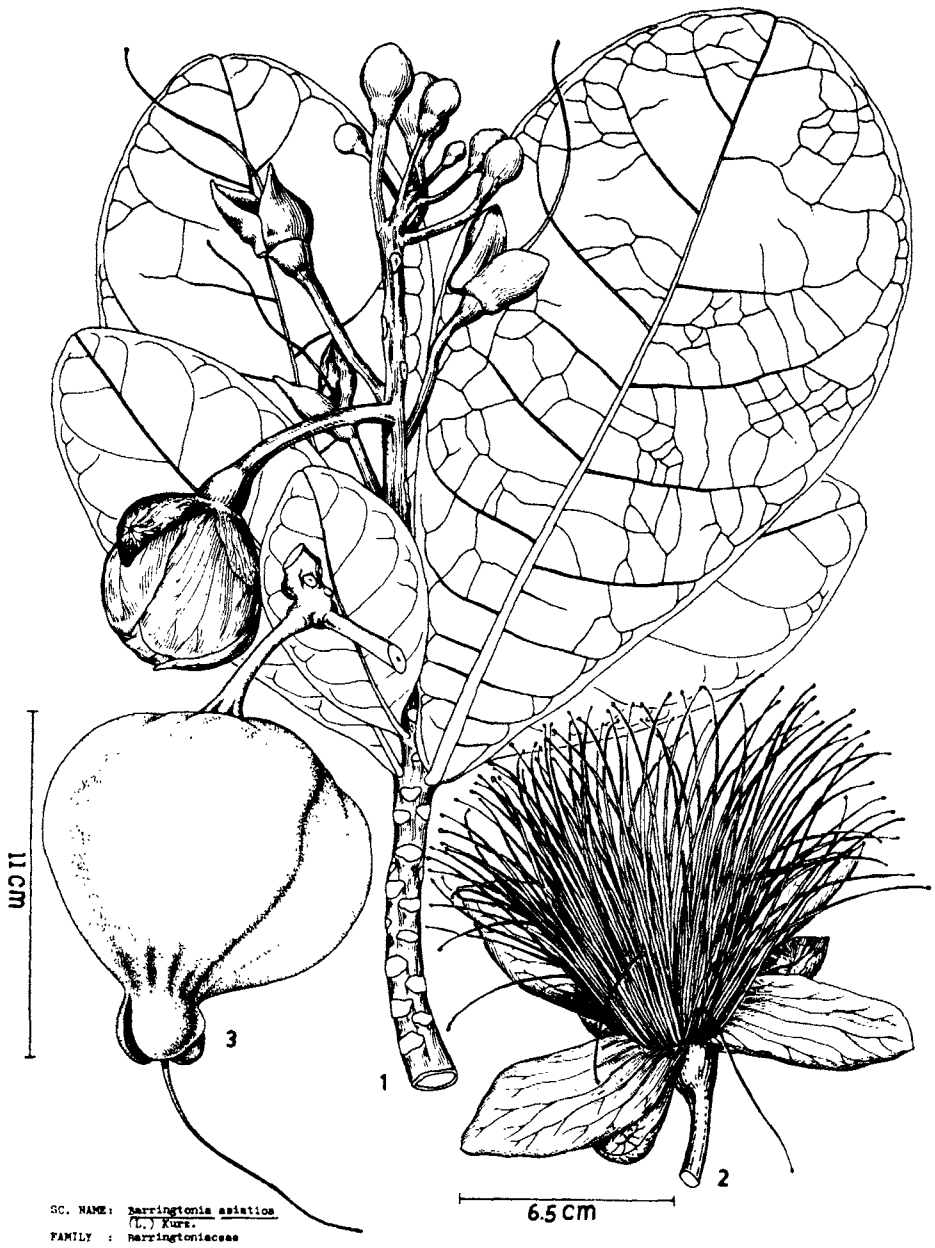
5.0 OTHER USES

Botong wood is generally used for fuelwood. It is also propagated for ornamental purposes. The seeds are also made into key holders and hand-painted with designs and quotations for souvenirs.

6.0 PROPAGATION

This tree species reproduces itself by means of seeds.

PLATE XIV. Barringtonia asiatica (L.) Kurz.



XIV$_1$ - Branchlet with leaves, buds and flowers

2 - Opened flower

3 - Fruit and pedicel

4 - Illustration of branch and leaves

15. BARRINGTONIA RACEMOSA

1.0 NAMES:

Family	Barringtoniaceae
Botanical	Barringtonia racemosa (L.) Blume
Common	Putat
Vernacular	putat (Laguna, Quezon, Mindoro)

2.0 DISTRIBUTION

2.1 Locality: It is commonly found along the seashore throughout the Philippines, in open lowlands and thickets up to 1,000 feet (300 m) elevation.

2.2 Forest type and frequency: In the dipterocarp forest of Mount Makiling, Laguna (climatic type I) the species is represented by 1 tree/hectare whereas in Puerto Princesa, Palawan, inventories showed that there are 2 trees, 20 poles, 60 saplings and 20 seedlings per hectare in the dipterocarp forest.

3.0 DESCRIPTION

Barringtonia racemosa (L.) Blume is a shrub or small tree reaching a height of up to 10 meters. It is glabrous and the branches have prominent leaf scars. Leaves found at the end of the branches, subsessile, oblong-obovate, 10 to 30 cm long, with narrowed base and crenate-serrate margin. Racemes terminal or arising from the axils of fallen leaves, solitary, drooping and 20 to 60 cm in length. Flowers white or pink. Calyx segments joined in the bud stage. Petals oblong-ovate to lanceolate, 2 to 2.5 cm long and slightly connate at the base. Stamens very numerous and 3 to 4 cm in length. Fruit ovoid to oblong-ovoid, 5 to 6 cm in length, somewhat 4-angled and crowned by the persistent calyx. Pericarp leathery, greenish or purplish in color.

4.0 USE AS FOOD

The edible parts of this species are the young leaves and seeds. The young leaves are eaten as vegetables while the seeds are pounded to extract the starchy contents which are made into cakes.

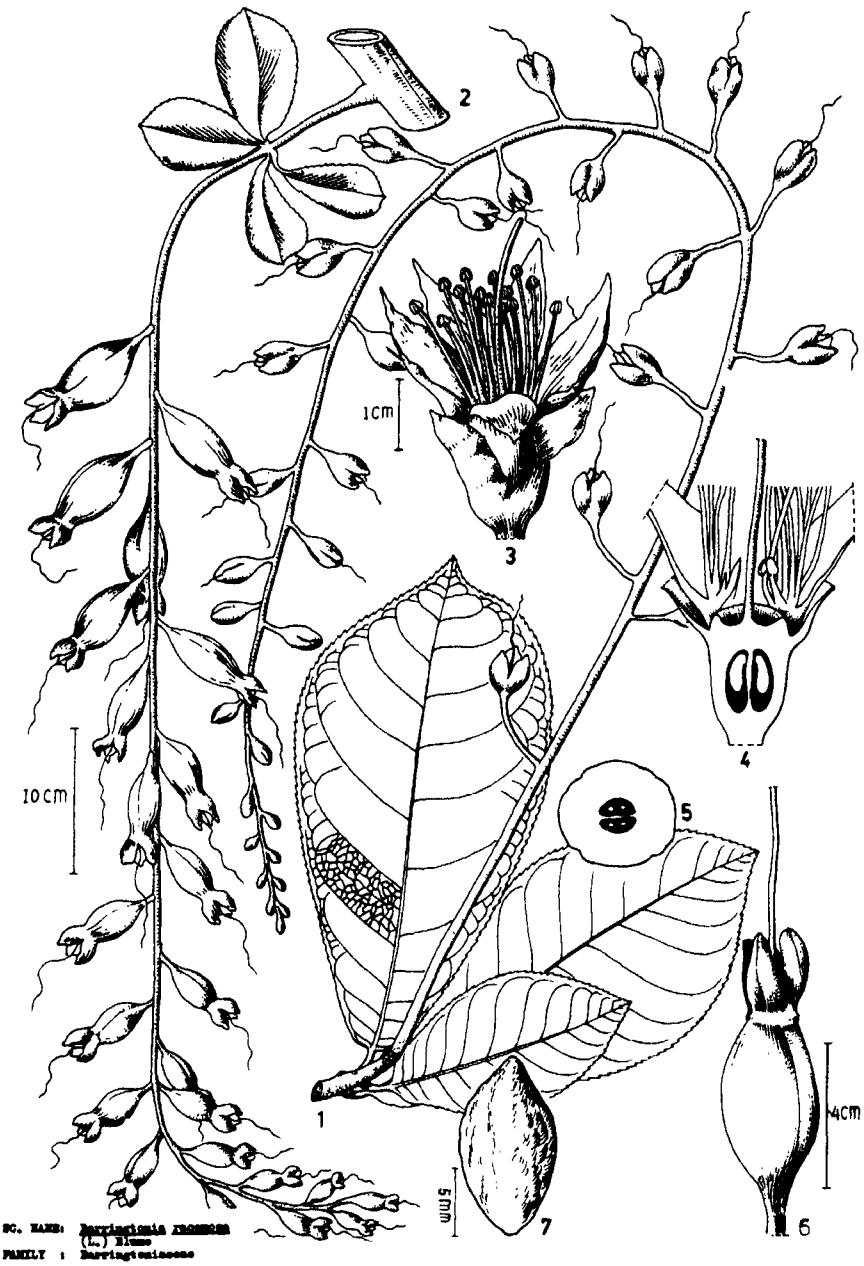
5.0 OTHER USES

The wood is used for light construction that does not require great strength; also used for fuelwood.

6.0 PROPAGATION

This tree species propagates itself by means of seeds.

PLATE XV. Barringtonia racemosa (L.) Blume



XV_1 - Leaves and inflorescence with buds

2 - Inflorescence

3 - Flower

4 - Longitudinal section of flower

5 - Transverse section of fruit

6 - Fruit

7 - Seed

16. **BISCHOFIA JAVANICA**

1.0 **NAMES:**

Family	Bischofiaceae
Botanical	Bischofia javanica Blume
Common	Tuai
Vernacular	toogen (Cagayan); tuel (Cagayan, Abra); duag (Cagayan, Tarlac); taua (Isabela); dueg (Ilocos Norte, Mount Province, Nueva Vizcaya); kauarem (La Union, Nueva Vizcaya); tual, tuan, tuir, tuo (Mount Province); dampol tanarem (Nueva Vizcaya); ayuni, baguá, tual (Bataan); tua, bitug (Rizal); tua, toe (Rizal, Laguna); apalang, bagna (Batangas); tui (Mount Province, Bataan, Cavite); toog, tuog (Tayabas, Camarines, Mindoro, Antique, Negros Occidental); uban (Tayabas); monoko (Camarines); digahongon (Samar); akayan, ulayan (Cebu); panasan (Iloilo); bino (Negros Occidental); bunian (Cotabato); bangu (Davao); mandos (Mindanao).

2.0 DISTRIBUTION

2.1 Locality: It is found in the lower and upper hill dipterocarp forest up to an elevation of 800 m preferring sites near creeks. It is common in the provinces of Laguna, Quezon, Camarines, Palawan and Visayas.

2.2 Forest type and frequency: In Mount Makiling, Laguna, representing climatic type I, there are 2 trees per hectare in the Molave forest type and 4 trees per hectare in the dipterocarp forest.

3.0 DESCRIPTION

This tree reaches a height of about 8 to 12 meters and a diameter of about 1.2 m without buttresses, but with a wide-spreading crown. Bark grey-brown to black-brown, smooth with small pustules and flaky. Leaves palmate-trifoliolate, alternately arranged, with 9 to 10 cm long rachis. Leaflets glabrous, ovate, 9 to 13 cm long, 4.5 to 6.5 cm wide, with acuminate apex and rounded base, margin crenate. Flower small, dioecious, apetalous in axillary panicled racemes. Male flowers scattered or clustered. Sepals 5, concave, imbricate, concealing the anthers. Fruit globose, fleshy, brown or reddish, with 3 to 4 cells, 10 to 15 mm in diameter with 5 mm long, oblong seeds.

4.0 USE AS FOOD

The young soft leaves are cooked and eaten as vegetables.

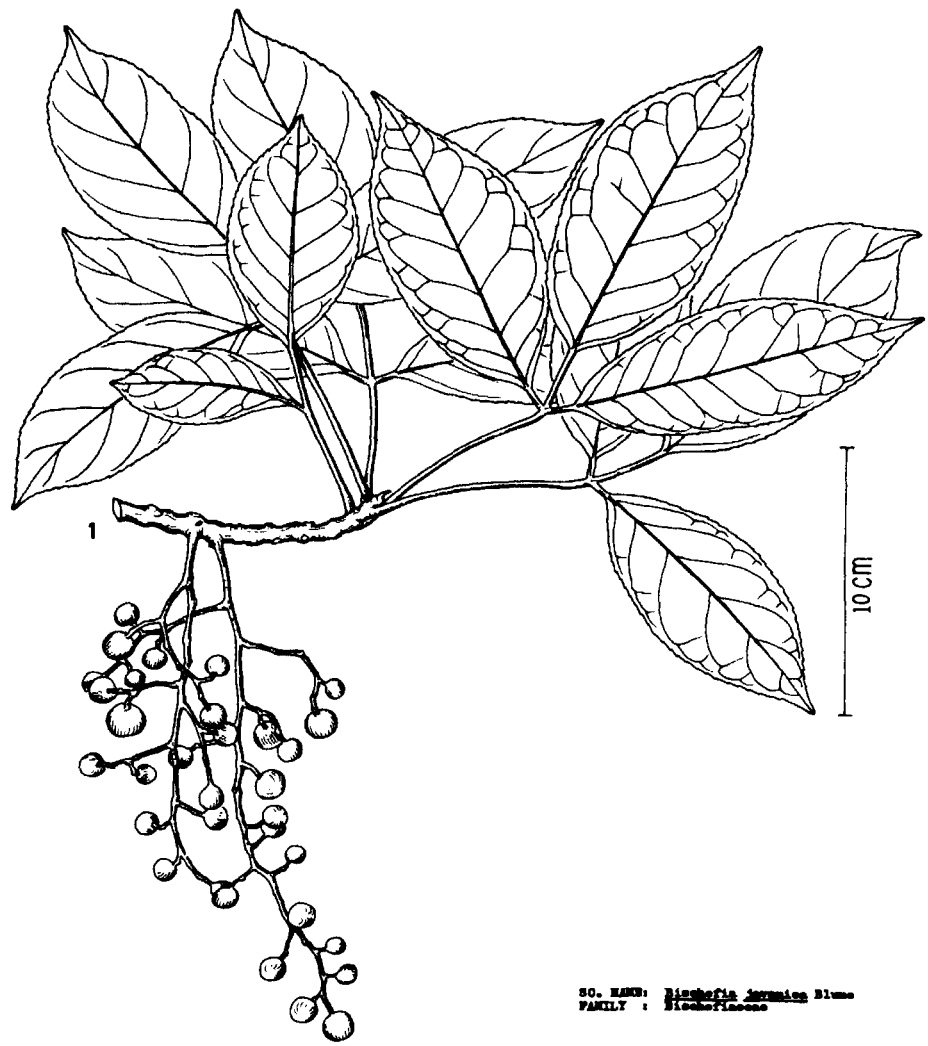
5.0 OTHER USES

A red dye obtained from the bark is used to stain rattan baskets. The bark is also used for tanning. The wood is used for general construction protected from the weather. In some localities, it is used for building posts for light housing and for making agricultural implements.

6.0 PROPAGATION

Tuai is propagated by seeds.

PLATE XVI. Bischofia javanica Blume



XVI_1 – Branchlet with leaves and inflorescence

2 – Illustration of tree crown and foliage

17. BUCHANANIA ARBORESCENS

1.0 NAMES:

Family	Anacardiaceae
Botanical	Buchanania arborescens Blume
Common	Balinghasai
Vernacular	araká, ganga, kamung, palang, pappagan (Cagayan); panan (Ilocos Norte); rangas (Cagayan, Ilocos Norte, Pangasinan); langlanges (Ilocos Sur); kanteng (Abra Mount Province); arengas (Isabela); palankomog, uyok (Mount Province); bauan (Nueva Vizcaya); bisal, bolowan, boroan, buluan, kaming, pakaran rangas (Pangasinan); balinghai (Zambales); balinghasai (Nueva Ecija, Tarlac, Bulacan, Bataan, Rizal, Laguna, Batangas, Civite, Tayabas, Mindoro, Cotabato, Davao, Zamboanga); kamiling, kaming, kaning (Tarlac, Zambales, Bataan); alitagtag, balitagtag (Tayabas, Camarines); bagulibas, balansai, balansi, balinsood, unkan (Mindoro); blayohot, balihod, balingahood, balitangtang, hongas, maguliok, malaligas na lalake (Tayabas); balinghasai, bahai-uud (Tagalog); balahood, upong-upong, kalampuso (Camarines); tagangtang (Ticao); ana-an, kalantong, karangtong, malapug (Palawan); butubutu (Cebu); anegas (Negros Occidental); an-am, an-an (Mindoro, Iloilo, Surigao); logindingan (Cotabato); balanga (Guimaras); maumanga (Davao); balunug dilaan, mambalumo, mangapuli (Sulu).

2.0 DISTRIBUTION

2.1 Locality: It is widely distributed and very common in the Philippines. It is found in thickets and second growth forests at low and medium altitudes. It also occurs in India and Malaysia.

2.2 Forest type and frequency: Survey and inventory in Molave forests of Mount Makiling Laguna (climatic type I) gave a stem density of 8 trees per hectare.

3.0 DESCRIPTION

This tree grows to a height of 5 to 10 meters. Leaves oblong-obovate, with acute or rounded bases, narrowed, 8 to 25 cm long and spirally arranged, somewhat crowded towards the ends of the branches. Flowers very numerous, white, 3 to 4 cm long; petals reflexed. The panicles are in the uppermost axils, many on each branch, 6 to 20 cm long, and rather narrow. It flowers from February to June. Fruit red, compressed, suborbicular to ovoid, 7 to 10 mm long, the pulp very thin and scanty.

4.0 USE AS FOOD

The fruit is delicious and eaten raw when ripe.

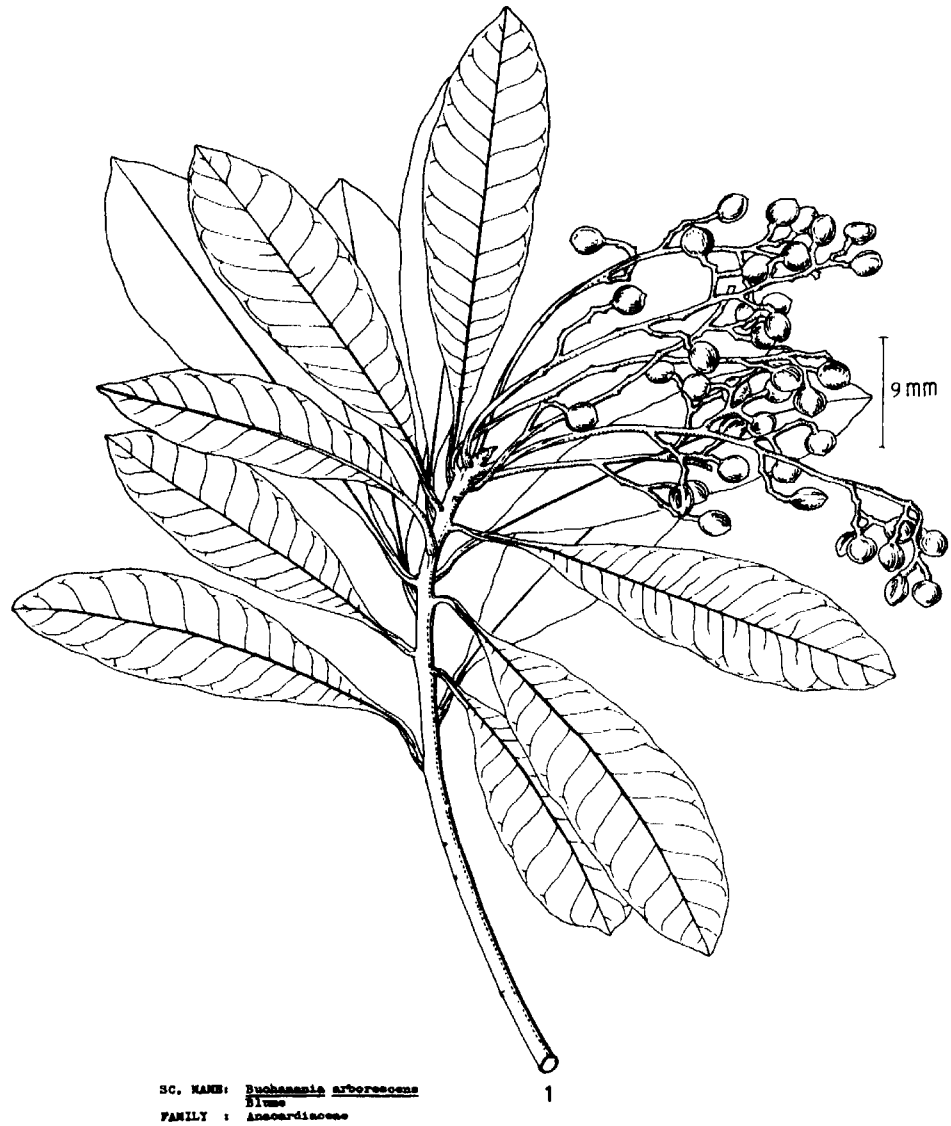
5.0 OTHER USES

It is one of the cyanophoric plants of the Philippines. The chemical occurs in both stems and leaves, a large amount being present in the leaves.

6.0 PROPAGATION

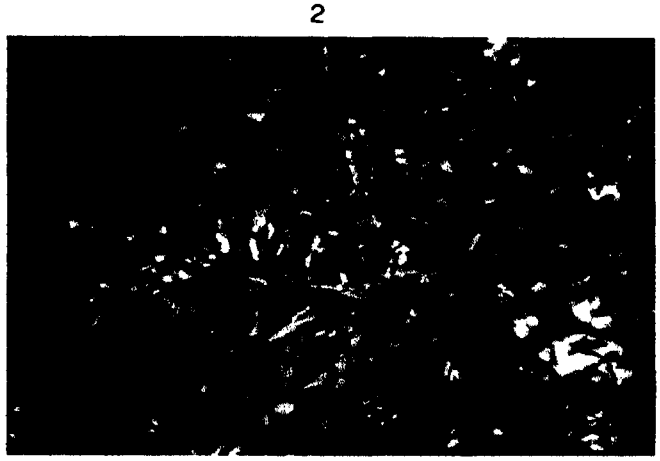
Propagation known so far is by means of seeds.

PLATE XVII. Buchanania arborescens Blume



1

2



XVII$_1$ – Branchlet with leaves and fruit

2 – Illustration of leaves and fruit in tree crown

18. CALAMUS MERRILLII

1.0 NAMES:

Family	Palmae
Botanical	Calamus merrillii Becc. (syn. Calamus maximus Blanco)
Common	Palasan
Vernacular	Palasan (Laguna, Quezon, Mindoro, Zambales, Cagayan).

2.0 DISTRIBUTION

2.1 Locality: This species is found throughout the forested areas in the Philippines at low and medium altitudes.

2.2 Forest type and frequency: Based on field inventories made, there were 1 pole and 13.3 saplings per hectare in the dipterocarp forest of Mount Makiling, Laguna (climatic type I); 40 poles, 33.3 saplings and 33.3 seedlings per hectare in Oriental Mindoro dipterocarp forest (climatic type IV); and 100 seedlings per hectare in the dipterocarp forest of Atimonan, Quezon (climatic type II).

3.0 DESCRIPTION

This is a very robust climbing palm. Leaf sheaths covered with slender minute pointed structures; leaflets more or less furnished with long bristles, especially on the midrib underneath. The flagelliform appendage is borne as an extension of the leaf. Fruit spherical, secondary spathes smooth.

4.0 USE AS FOOD

The fleshy portion of the fruit is eaten raw. The buds are also roasted and eaten and the sap is a good drinking water.

5.0 NUTRITIONAL VALUE

The approximate analysis of the fruits showed the following:

% Moisture	34
% Ash	1.10
% Crude fiber	11.64
% Crude fat	.76
% Ca	1.08
% P	0.11
% K	0.18
% N	0.75

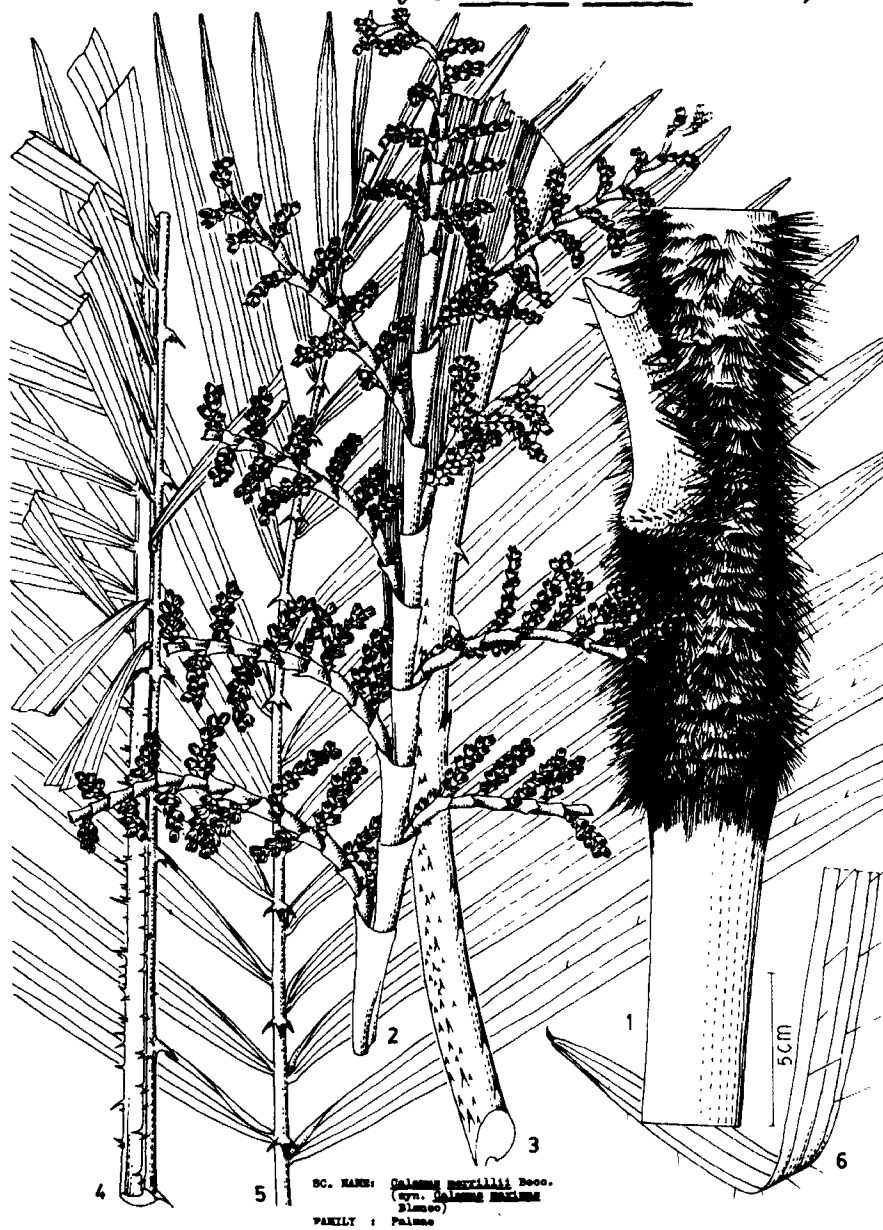
6.0 OTHER USES

The palm is a source of raw materials for furniture-making, basketry, fish traps, hats, walking sticks, fans and bags.

7.0 PROPAGATION

Calamus merrillii Becc. can be propagated from seeds, wildings or suckers.

PLATE XVIII. Calamus merrillii Becc.
(syn. Calamus maximus Blanco)



7

XVIII$_1$ - Portion of cane with spines

2 - Inflorescence

3 - Leaf petiole with characteristic spines

4 - Spiny leaf midrib

5 - Hooks on underside of leaf

6 - Leaflet blade with spines

7 - Illustration of typical climbing habit

19. CALAMUS ORNATUS var. philippinensis

1.0 NAMES:

Family	Palmae
Botanical	Calamus ornatus Blume ex Schult var. philippinensis Becc.
Common	Limuran
Vernacular	limuran (Laguna, Mindoro, Quezon province, Zambales, Cagayan).

2.0 DISTRIBUTION

2.1 Locality: This species is found throughout the Philippines orests.

2.2 Forest type and frequency: Field inventory showed a stem density of 25.3 mature and 13.3 immature stems per hectare in the dipterocarp forest of Oriental Mindoro (climatic type IV); 1 mature and 2 immature stems in the dipterocarp forest of Mount Makiling, Laguna (climatic type I); and in the dipterocarp forest of Atimonan, Quezon (climatic type II), the stem density is 23.3 mature stems and 133.2 seedlings per hectare.

3.0 DESCRIPTION

This is a climbing palm, mostly abundant at low and medium altitudes in the virgin forests. Leaflets lance-shaped, about 4 cm wide; margins armed with fine short spines; spines flat, short, green with black tips. Leaves lance-shaped, very robust, large and equidistant. Flagellum or whip-like appendage arising from stem. Fruits large, ellipsoid, green when young but orange brown when ripe. Seeds quadrangular, brown in color when matured, resembling those of the Buri (Corypha elata) or Anahaw (Livistona rotundifolia) palms.

4.0 USE AS FOOD

The ripe fruits and young buds are used. The fleshy portions of the ripe fruits are eaten raw. The young buds are sliced and mixed with onions and tomatoes as salad, or cooked with coconut milk.

5.0 NUTRITIONAL VALUE

The approximate analysis of the fruits showed the following:

% Moisture	70
% Ash	2.35
% Crude fiber	9.30
% Crude protein	5.72
% Crude fat	1.04
% Ca	0.37
% P	0.10
% K	0.25
% N	0.92

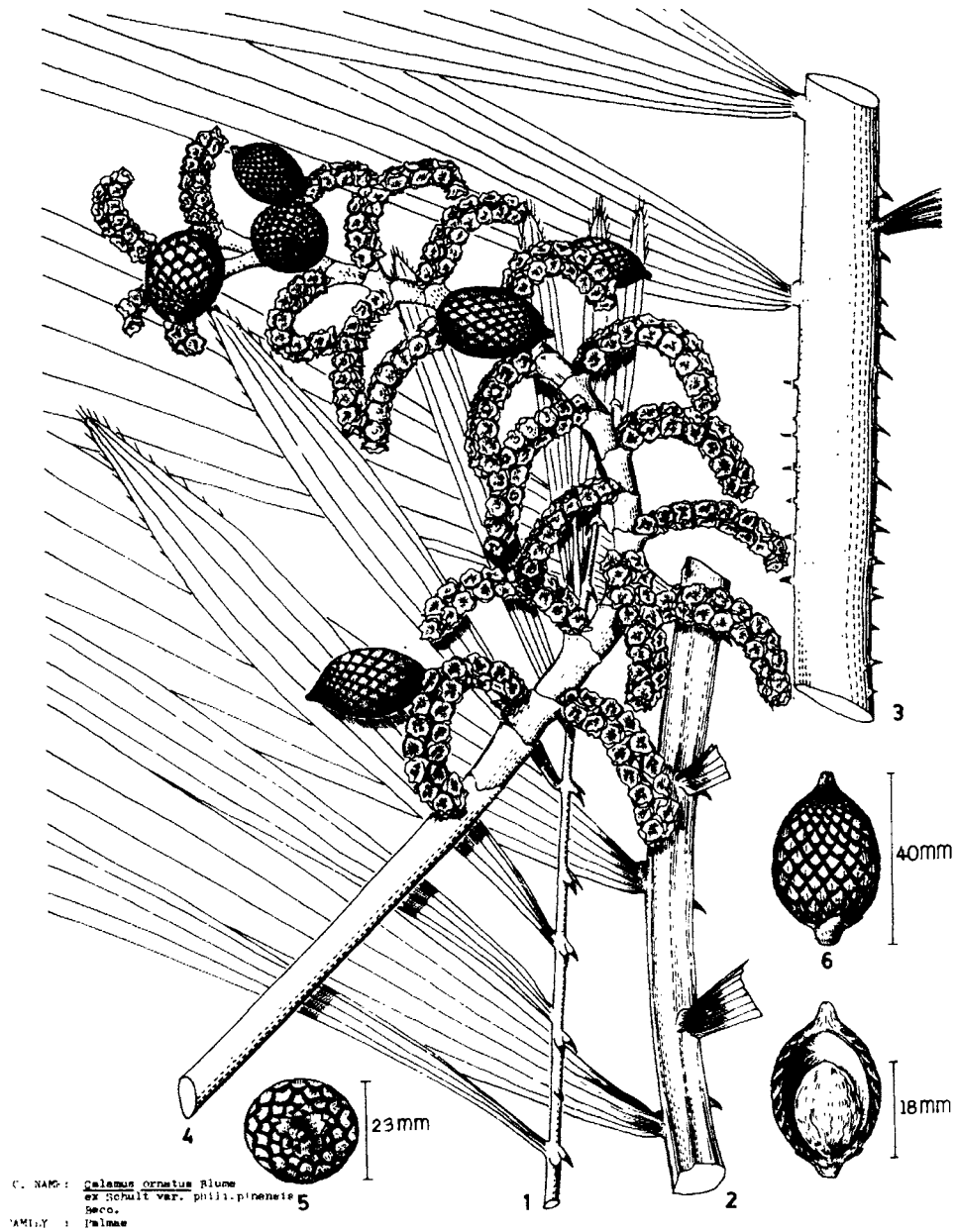
6.0 OTHER USES

This palm species is a source of raw materials for the manufacture of furniture, basketry, fishtraps, fans and hats.

7.0 PROPAGATION

Calamus ornatus var. philippinensis is either propagated from seeds or suckers.

PLATE XIX. Calamus ornatus Blume ex Schult var. philippinensis Becc.



XIX$_1$ - Leaf midrib with hooks

2 - Leaf midrib enlarged

3 - Portion of cane

4 - Inflorescence with fruit

5 - Under-view of fruit

6 - Elevation of fruit

7 - Longitudinal section of fruit showing seed

20. CARYOTA CUMINGII

1.0 NAMES:

Family	Palmae
Botanical	Caryota cumingii Lodd
Common	Pugahan
Vernacular	bahi (Cebu); hagol (Bicol); patikan (Negros Oriental, Masbate); tagipan (Quezon province); pola (Davao del Norte, Agusan); pugahan (Laguna, rizal, Mindoro, Bulacan, Batangas); fish-tailed palm (English).

2.0 DISTRIBUTION

2.1 Locality: Pugahan is an endemic and widely distributed species in the Philippines.

2.2 Forest type and frequency: Based on the field inventories conducted in the dipterocarp forest of Oriental Mindoro (climatic type IV), there were 4 mature palms, 13.4 young palms and 6.7 seedlings to a hectare. In the dipterocarp and Molave forests of Mount Makiling, Laguna (climatic type I), the stem density was 4 mature palms, 3.3 young palms and 20 seedlings per hectare for the former and 6 mature palms, 66.6 young palms and 79.9 seedlings per hectare for the latter, respectively.

3.0 DESCRIPTION

This palm, also called fish-tailed palm because of its leaves which resemble the tail of a fish, grows to a height of about 5 to 8 m and 20 cm in diameter with a slender trunk. It has a spreading crown, with alternate leaves up to 1.5 m long, scattered along a considerable portion of the upper part of the trunk. Petioles very short; pinnae about 10 on each side of the midrib, up to 1 m long. Leaflets numerous, up to 20 cm long, broad, flabelliform, the 2 sides straight, the apex obliquely truncate, irregularly and prominently toothed. Inflorescence axillary, pendulous, and up to 80 cm long. Peduncle 20 cm in length. Spikes numerous, furfuraceous, slender and up to 50 cm long. Male flowers dull-purplish and yellow, petals about 5 mm long. Stamens 6. The species flowers continuously from the upper axils first until exhausted. Fruit globular, purple, fleshy, small in size and with a single globose seed. The outer covering pulp contains very numerous, stinging, needle ike crystals or raphides. The seed has a chestnut-brown polished surface. The branches of the spadix bear strong, hairy minute scales.

4.0 USE AS FOOD

The seed of this species is used as a substitute for chewing gum. The sap is a source of "tuba" or palm wine. The bud is collected and used as a vegetable. It is cooked with coconut milk or sometimes sauté with fish and meat.

5.0 NUTRITIONAL VALUE

Approximate analysis of the fruits:

% Moisture	24.68
% Ash	5.18
% Crude fiber	26.82
% Crude protein	37.38
% Crude fat	1.36
% Ca	0.71
% P	0.12
% K	0.98
% N	4.19

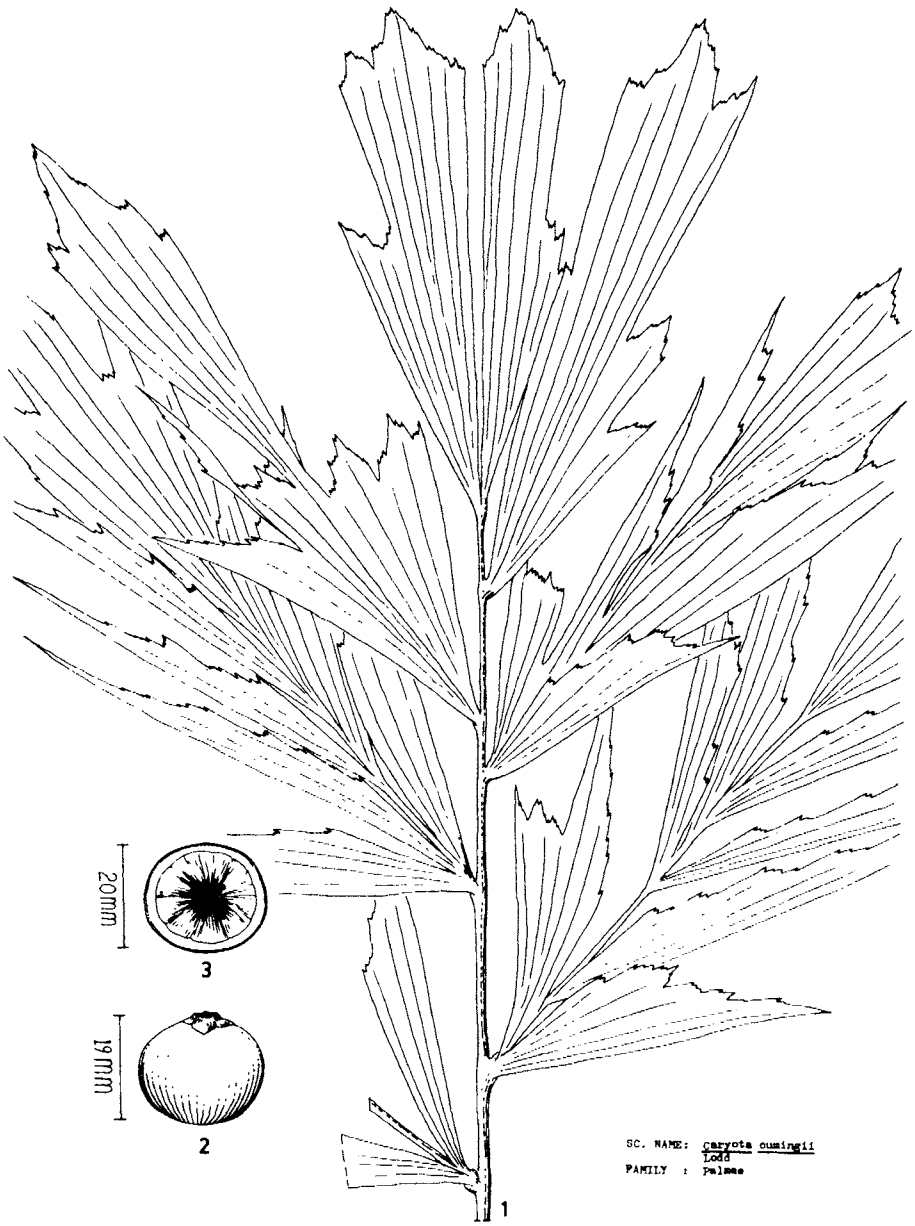
6.0 OTHER USES

The sap of Caryota cumingii Lodd is a good source of alcohol and starch. The lower parts of the petiole furnish a soft, rather flossy fiber similar to that obtained from Arenga pinnata (Wurmb) Merr. The two fibers are called by the same name, "barok", and are used for the same purposes as tinder, for caulking boats and for stuffing pillows. Splints cut from the petioles are used in making baskets and the outer part of the trunk is split and made into durable slats for flooring. This species is also cultivated for ornamental purposes.

7.0 PROPAGATION

This plant is propagated by seeds and suckers.

PLATE XX. Caryota cumingii Lodd



4

XX_1 - Leaf

2 - Fruit

3 - Transverse section of fruit

4 - Illustration of palm in its natural habitat.

21. CINNAMOMUM MERCADOI

1.0 NAMES:

Family	Lauraceae
Botanical	Cinnamomum mercadoi Vid.
Common	Kalingag
Vernacular	kalingag, kalingak, samiling, similing (Tagalog); kalingad (Pampango); kandoroma, kanila, kasin (Iloko); kanilau (Bicol); karinganat, uliuan (Negros); kalingag (Samar, Leyte, Bisaya).

2.0 DISTRIBUTION

2.1 Locality: It is found only in the Philippines, where it is very widely distributed and well known but rather scarce.

2.2 Forest type and frequency: It occurs in forests at low and medium altitudes sometimes ascending to 2,000 m. From inventories conducted, there are 4 trees per hectare in the Molave forest of Mount Makiling, Laguna (climatic type I), and 10 saplings and 6.7 seedlings per hectare for the dipterooarp forest of Puerto Princesa, Palawan of the same climatic type. In the dipterocarp forest of Malaybalay, Bukidnon representing climatic type III, there are 20 saplings and 79.9 seedlings per hectare. For the dipterocarp forests of Pakyas, Oriental Mindoro the stem density was 6 trees, 3.3 poles, 19.8 saplings and 26.6 seedlings per hectare.

3.0 DESCRIPTION

It is a small to large tree attaining a diameter of up to 65 cm, usually straight but not very tall, with relatively thick aromatic bark. Leaves opposite, smooth, leathery, pointed at both ends, distinctly 3-nerved, from 8 to 20 cm in length, 4 to 6 cm in width, pale green or subglaucous beneath, rigid, shining above, ovate-oblong or broadly lanceolate or occasionally subelliptic, and borne upon petioles 5 to 15 cm long. Calyx canescent and tubilate. Petals smooth and scarcely exserted. Fruit smooth, narrowly ellipsoid, about 2 cm long and surrounded in the middle by a persistent calyx.

4.0 USE AS FOOD

The bark is a good ingredient for root beers because of its sassafras odor and taste. It is also used as a condiment in place of cinnamon.

5.0 OTHER USES

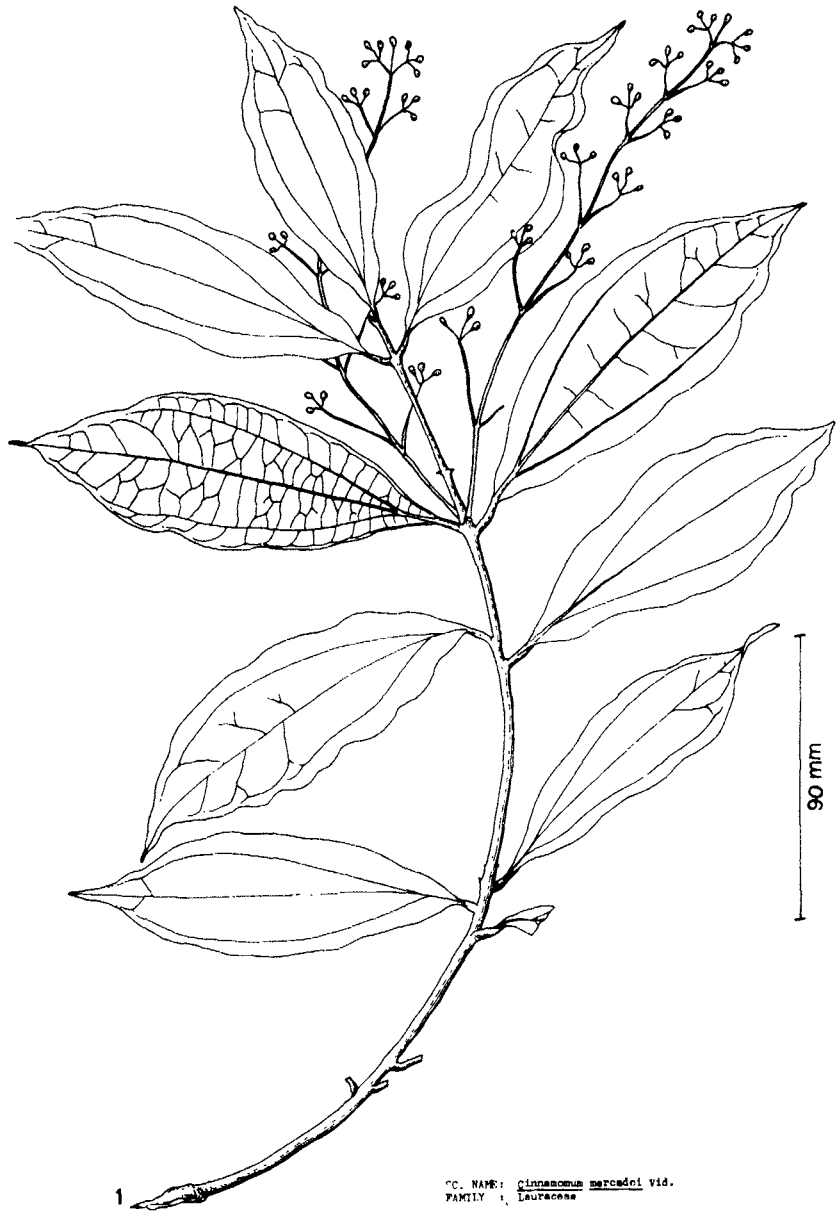
Kalingag has medicinal values, too. According to Father Alizna (as cited by Quisumbing 1951) the bark when taken internally (although in what form it is taken was not stated) would aid digestion. It is used in flatulence and as an expectorant. The bark, according to Guerrero (Quisumbing 1951), has rubifacient 1/ properties and is reportedly used as a remedy for headaches and rheumatism, is also chewed in cases of stomach troubles, and is utilized in tuberculosis.

6.0 PROPAGATION

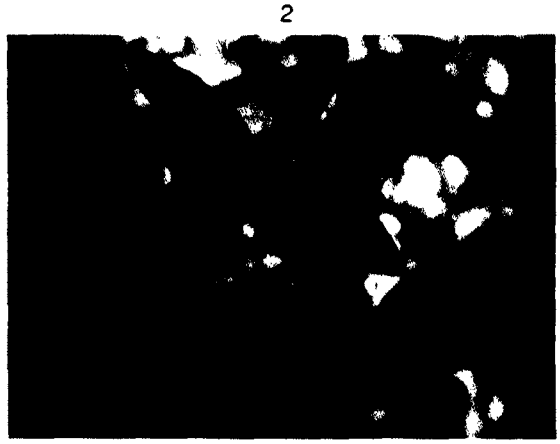
This plant is propagated by seeds.

1/ That is to say inducing redness of the skin by external application.

PLATE XXI. Cinnamomum mercadoi Vid.



2



XXI$_1$ - Branchlet with leaves and inflorescences

2 - Illustration of foliage

22. DILLENIA REIFFERSCHEIDTIA

1.0 NAMES:

Family	Dilleniaceae
Botanical	Dillenia reifferscheidtia Naves
Common	Katmon-kalabau
Vernacular	palai, katmon-kadlagan (Bikol); katmon, katmon-kalabau (Tagalog); katmon (Bisaya).

2.0 DISTRIBUTION

2.1 Locality: This is an endemic species and commonly found in primary forests at medium altitudes in Zambales, Mindoro, Catanduanes, Negros and Mindanao.

2.2 Forest type and frequency: An inventory of this species in the dipterocarp forest of Pakyas, Oriental Mindoro (climatic type IV), showed 8 trees, 3.3 poles, 3.3 saplings, and 20 seedlings per hectare.

3.0 DESCRIPTION

This tree reaches a height of about 15 meters and a diameter of 45 cm. Leaves alternate, smooth and very large. Flowers also very large, white and showy. Fruits green, fleshy and about the size of a small apple.

4.0 USE AS FOOD

The fruits are eaten raw. The edible portion is green, juicy, acidic with something of the flavor of apple. The taste of the fruit is not particularly good but, owing to its acid, juicy character, it is refreshing when eaten in the woods. The fruits are also made into excellent sauce or jam.

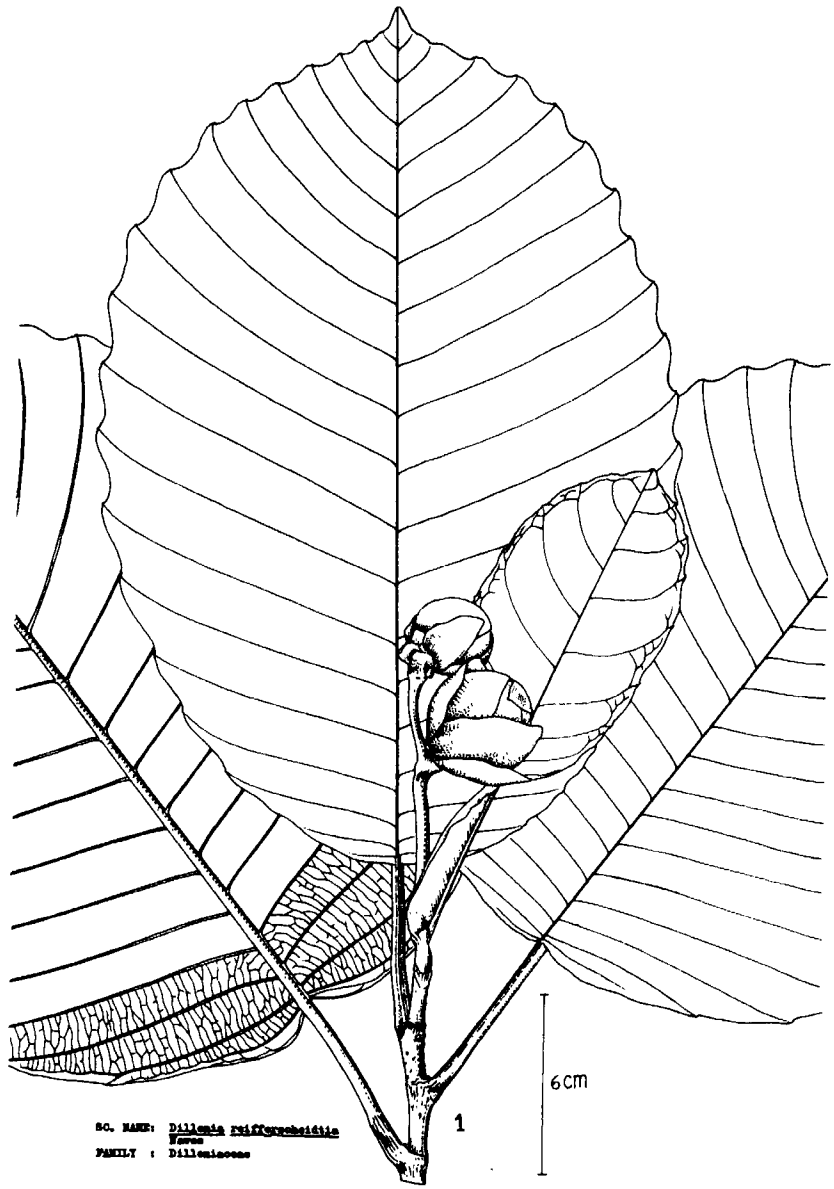
5.0 OTHER USES

The mature trees are used for house construction for people living in the mountains.

6.0 PROPAGATION

Katmon kalabau is propagated by means of seeds and cuttings from mature trees.

PLATE XXII. Dillenia reifferscheidtia Naves



XXII$_1$ - Branchlet with leaves and flowers

2 - Illustration of foliage of young tree

23. DIOSPYROS PYRRHOCARPA

1.0 NAMES:

Family	Ebenaceae
Botanical	Diospyros pyrrhocarpa Miq.
Common	Anang
Vernacular	anang, mala-mabolo (Camarines Norte); kabag (Isabela); balubagto (Nueva Vizcaya); kugao, pugao (Tayabas, Polillo); talang-gubat (Rizal); pogaui, pogaui itim (Laguna); ata-ata, dupanan, kamalum, konalum (Negros Occidental).

2.0 DISTRIBUTION

2.1 Locality: Anang is endemic to the Philippines and is widely but sparsely distributed from Luzon to Mindanao.

2.2 Forest type and frequency: It occurs on lower hills of secondary dipterocarp forests at low and medium altitudes. From inventories conducted in Mount Makiling, Laguna, representing climatic type I, the density was 5 trees and 2 poles per hectare compared to that of olimatic type IV represenly by Oriental Mindoro with a density of 1 pole per hectare. For Surigao (climatic type II), the density was 1 tree and 2 poles per hectare; but in Palawan (climatic type III) inventories gave a density of 1 pole per hectare.

3.0 DESCRIPTION

Diospyros pyrrhocarpa Miq. is a small to medium-sized tree reaching a diameter of 30-40 cm and a height of 18 meters, with a clear bole of 4-6 meters. It has an oval-shaped bole when young, becoming more or less fluted as it grows bigger in size. The bole has a few short spreading vertical fissures and horizontal scars; bark rough, black with white and grey blotches; buttresses 3-4, short, 30-45 cm high and forming small angles with the trunk; crown dense, spreading with slender ascending branches. Leaves smooth, leathery, alternate, younger ones lanceolate, mature ones elliptic; apex acuminate, base narrowly rounded, margin entire, wavy and curved downwards; upper leaf surface shiny, dark green, lower surface yellowish green, midrib sunk on the surface but very prominent and protruding underneath, venation pinnate, with 8-10 lateral veins and prominent and distinct tertiary veins on both surfaces; petiole 1-2 cm long; leaf blades measuring 14.5-28.5 cm long and 4-10.4 cm wide. Fruit edible when ripe, occurring singly, seldom in pairs, fleshy, acorn-shaped when young and becoming approximately round when mature, measuring 4.5-6.0 cm long and 4-4.7 cm mid-diameter, with fine brown hairs all over, orange red to red in color when ripe and containing 4-5 compressed ellipsoid brown seeds 2-3 cm long and 1.3-2.0 cm wide in the middle.

4.0 USE AS FOOD

When the fruit is ripe, the skin is peeled off and the fleshy part eaten raw in the same manner as the fruit of kamagong (D. philippinensis).

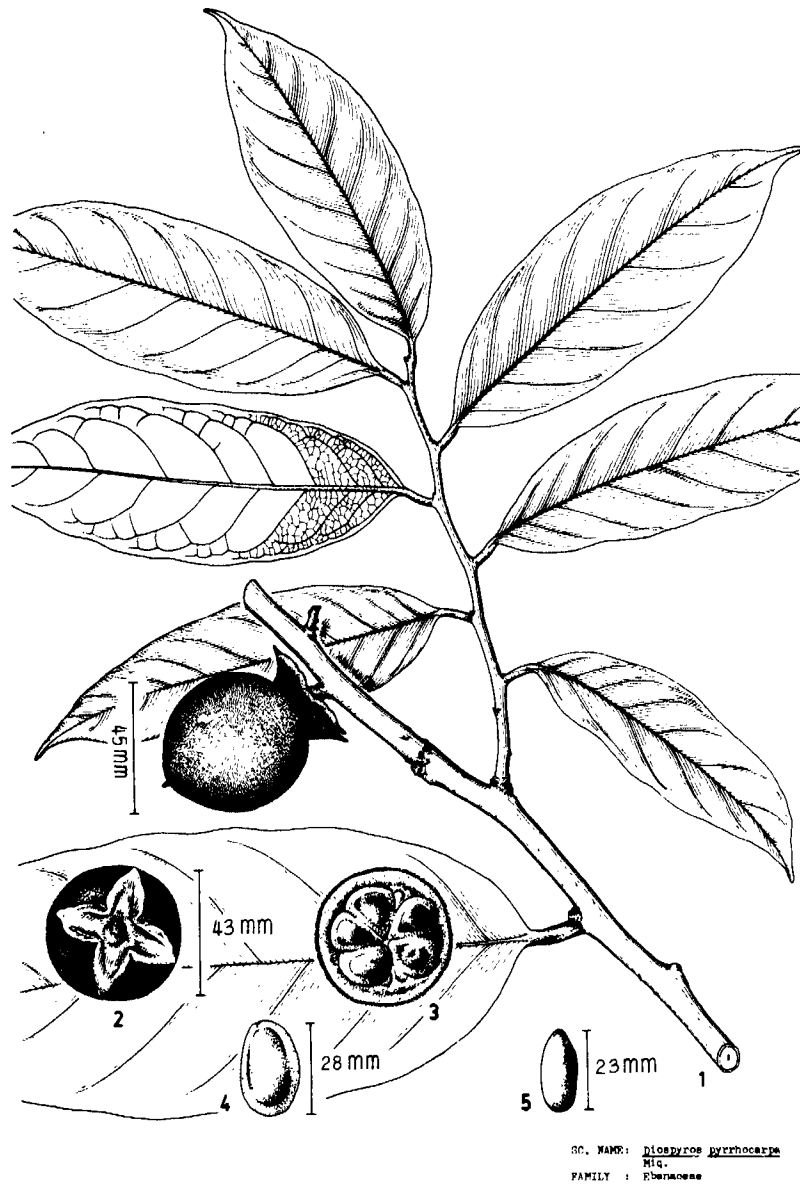
5.0 OTHER USES

The wood is used for house posts in rural areas, or manufactured into scaling sticks, rulers, golf heads and bowling balls.

6.0 PROPAGATION

Anang is propagated by seeds and asexually by marcotting. The seeds from the ripe fruit are extracted and direotly seeded. In the oase of the asexual method, branches 4 to 5 cm are marcotted. Once roots are produced, the rooted branches are cut from the mother plant and planted directly in the field.

PLATE XXIII. Diospyros pyrrhocarpa Miq.



6

XXIII$_1$ - Branchlet with leaves and fruit

2 - Basal view of fruit

3 - Transverse section of fruit

4 - Seed with pericarp

5 - Seed

6 - Illustration of leaves and branchlet

24. DRACONTOMELUM DAO

1.0 NAMES:

Family	Anacardiaceae
Botanical	Dracontomelum dao (Blanco) Merr. and Rolfe
Common	Dao
Vernacular	habas (Butuan); kamarak or kamarag (Northern Luzon); lupigi (Cagayan); makadray (Ilocos Norte); mamakau (Agusan and Davao); makau (Cotabato) and dao (Tagalog and Bicol Regions).

2.0 DISTRIBUTION

2.1 Locality: This is a large tree widely distributed in the Philippines at low elevations in flat or rolling lands; often near creeks and rivers.

2.2 Forest type and frequency: An inventory of the forest in Mount Makiling, Laguna (climatic type I) gave a stem density of 8 trees/hectare in Molave type forest and, 10 trees, and 6.7 seedlings per hectare in the dipterocarp forest.

3.0 DESCRIPTION

Dao is a buttressed tree attaining a height of 35 to 40 meters and a diameter of 100 cm or more. Bark grey with many light grey spots, smooth and peeling off in large irregular flakes which have ochre-colored portions covered with many tiny corky pustules. Leaves closely alternate and compound, usually with 5 to 8 pairs of leaflets bunched at the end of the twigs. Leaflets smooth and glabrous with acuminate apex, pointed and inequilateral base, oblong-elliptic, 5 to 15 cm long and 3 to 4.5 cm wide. Rachis 20 to 35 cm long, petiole 5 mm. Flowers small, white, odorless and borne in compound inflorescences. Fruit a yellow, rounded drupe about 2 cm in diameter with a soft, fibrous, edible pulp and a flattened, angular, very hard seed.

4.0 USE AS FOOD

The edible part of this species is the pulp around the seeds.

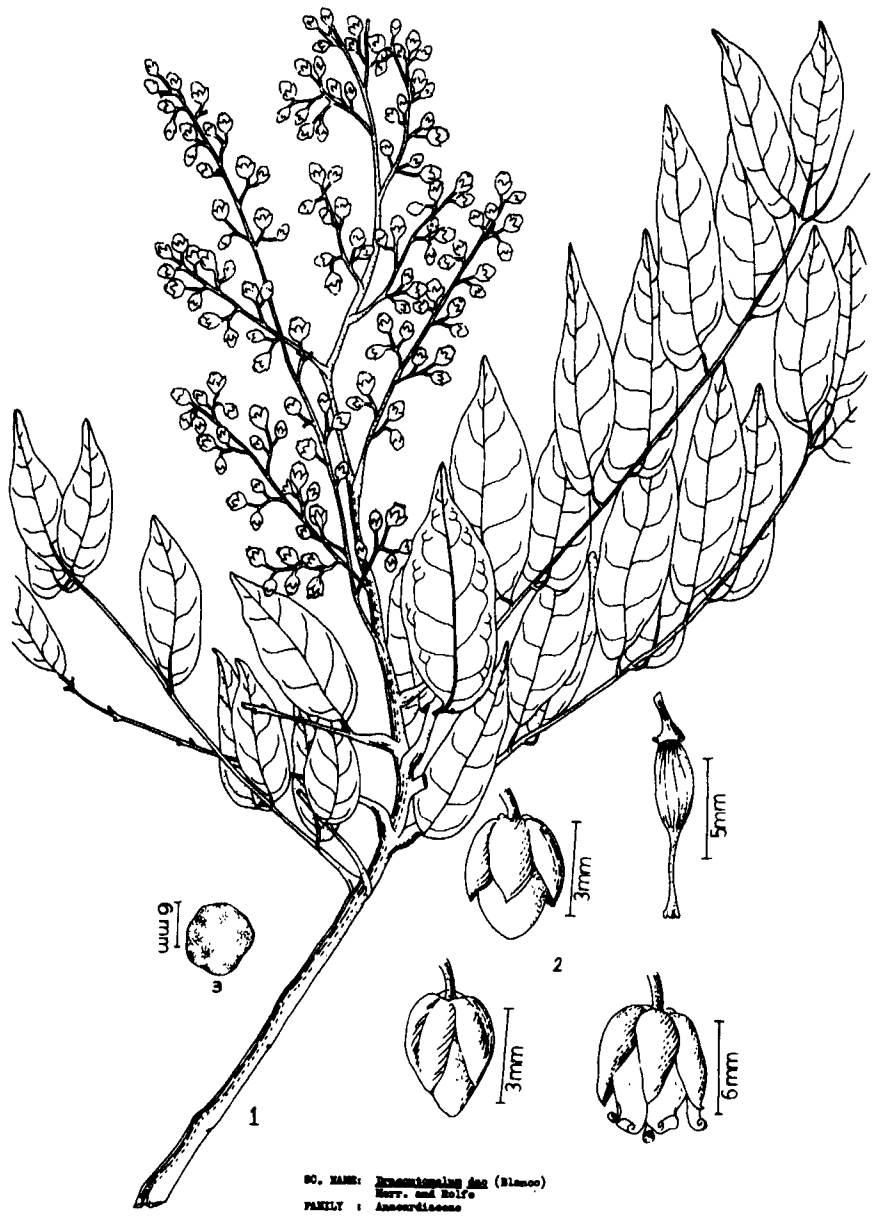
5.0 OTHER USES

This tree is also harvested for its quality timber for construction purposes as well as for furniture making such as radio and TV cabinets, tables, chairs, cabinets, etc.. It is also used in the manufacture of musical instruments like guitars, violins and harps, and used as a substitute for black walnut for airplane construction.

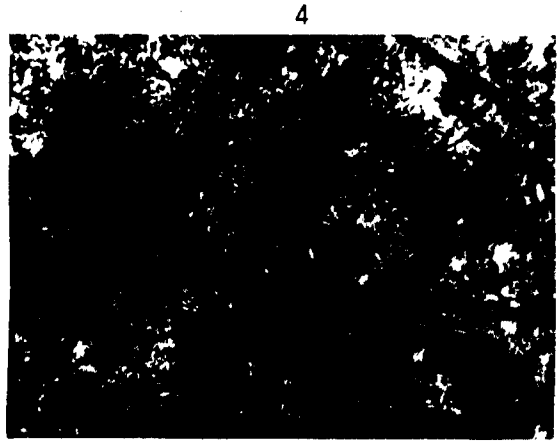
6.0 PROPAGATION

Dao is propagated by means of seeds.

PLATE XXIV. Dracontomelum dao (Blanco) Merr. and Rolfe



4



XXIV$_1$ - Branchlet with leaves and inflorescence

2 - Flowers and fruit in various stages of succession

3 - Seed

4 - Crown of Dracontomelon

25. DRACONTOMELUM EDULE

1.0 NAMES:

Family	Anacardiaceae
Botanical	Dracontomelum edule (Blanco) Skeels
Common	Lamio
Vernacular	pinka (Cagayan); palatangan, suket (Ilocos Norte); lamio (Bulacan, Bataan, Rizal, Laguna); ananging puti (Tayabas); aduas (Rizal); bili-bili (Tayabas, Tablas); mabka (Camarines); alauihau, arauuihau, halauihau, lauihau (Camarines, Albay, Sorsogon, Samar, Iloilo); lauhau (Samar, Leyte); alalandog, ulandog (alawan).

2.0 DISTRIBUTION

2.1 Locality: Lamio is a widely distributed species from Northern Luzon to Southern Mindanao.

2.2 Forest type and frequency: It occurs in lower and upper hill dipterocarp forest between 50 and 800 meters above sea level, but prefers the low elevations. The stem density in the dipterocarp forest of Mount Makiling (olimatic type I) is 6.6 poles per hectare while in the Molave forest, there are 4 trees per hectare. In the case of the dipterocarp forest of Oriental Mindoro (climatic type IV) the density is 4 trees per hectare.

3.0 DESCRIPTION

Lamio is a large tree attaining a height of 20 meters and a diameter of 100 cm or more. It has strong irregular branches. Bark light ochre-grey-brown, smooth, flaking off in large rounded patches which are clearly marked. Leaves compound, alternate, about 60 cm long, bunched at the ends of the twigs. Leaflets oblong, hairy with acuminate apex and obliquely rounded base. Petiole very short, finely pubescent and relatively thick. Flowers small, in rather large, compound inflorescences. Fruit a yellow flattened drupe about 3 to 4 cm in diameter.

4.0 USE AS FOOD

Fruits are edible. The drupe has a thin layer of pulp around the hard seed which is eaten raw. Young leaves and fruits are used as fish or meat adjunct in a native dish called "sinigang".

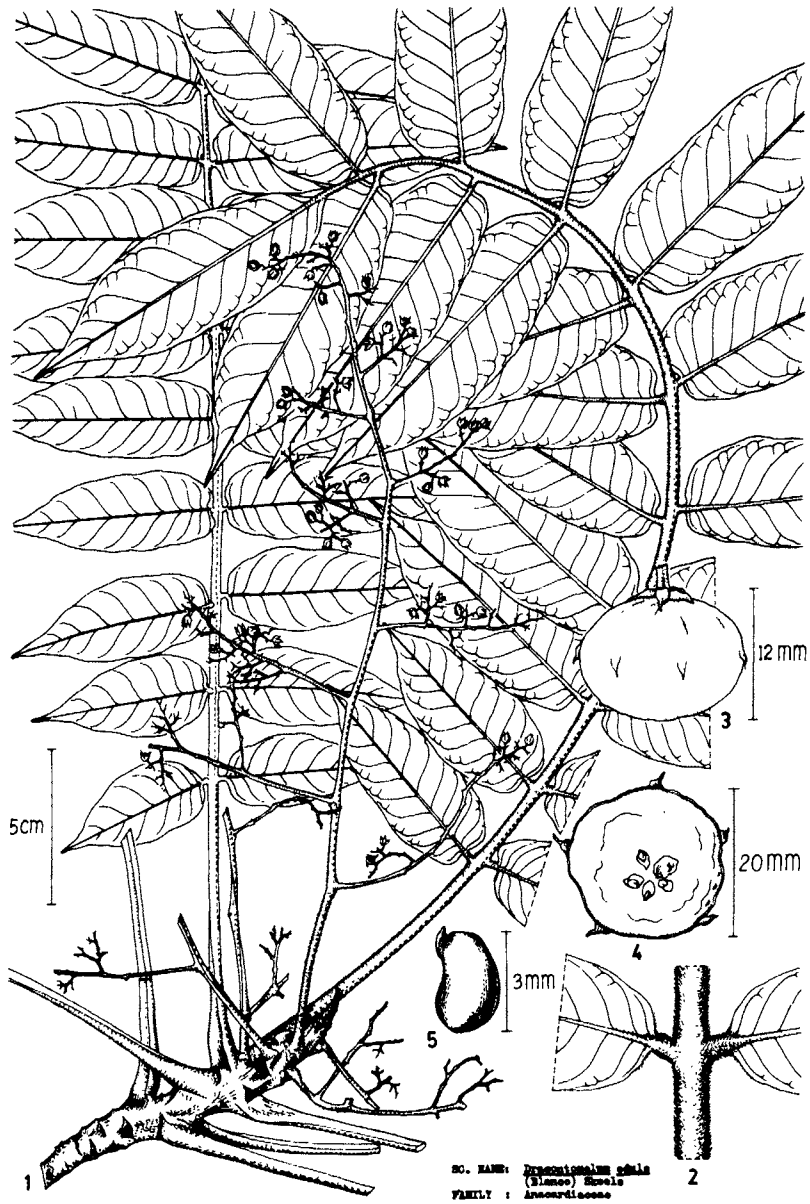
5.0 OTHER USES

Wood is used for the manufacture of musical instruments and wooden wares as bowls, platters and the like.

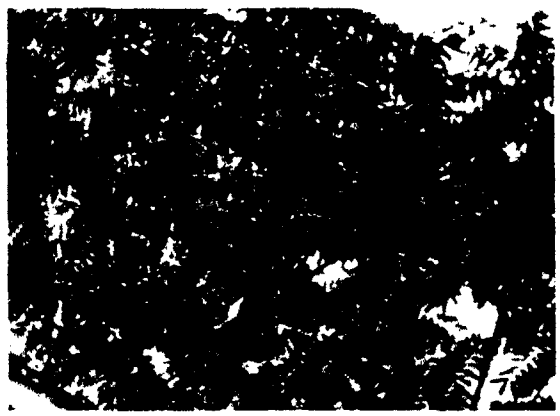
6.0 PROPAGATION

Propagation of this species is by means of seeds, the dispersal of which is influenced by wild animals and the wind current during strong winds.

PLATE XXV. Dracontomelum edule (Blanco) Skeels



6



XXV$_1$ - Branchlet with leaves and inflorescence

2 - Pubescent petiole of leaflet

3 - Fruit

4 - Transverse section of fruit

5 - Seed

6 - Spreading crown of Dracontomelon

26. DYSOXYLUM ARBORESCENS

1.0 NAMES:

Family	Meliaceae
Botanical	Dysoxylum arborescens (Blume) Miq.
Common	Kalimutain
Vernacular	malakbalak, tabataba, katabataba (Bicol); sasaba, kupel (Negros); malasantol (Bontoc, Benguet); mangramayen (Cagayan); ngarau-na busag (S. Visaya); maradalaga (Ilocos Sur, Ilocos Norte); baginabot, abubuli, gogo (P. Visaya); darai, kalimutain (Laguna, Quezon); buahan-bauahan (Sulu).

2.0 DISTRIBUTION

2.1 Locality: Kalimutain is endemic to the Philippines and is widely distributed in the forested areas of the country from Luzon to Mindanao.

2.2 Forest type and frequency: It thrives in lower and middle forested belts up to the transition zone of the mossy forest. From inventories conducted in Mount Makiling, Laguna (climatic type I), the density was 2 trees, 1 pole, 1 sapling and 2 seedlings per hectare. In Quezon National Park, Quezon (climatic type II), there were 1 tree and 1 pole per hectare; whereas in Oriental Mindoro (climatic type IV) and Malaybalay, Bukidnon (climatic type III), the densities were 1 tree and 2 saplings for the former and 1 tree and 1 seedling per hectare for the latter.

3.0 DESCRIPTION

Dysoxylum arborescens (Blume) Miq. is a large tree reaching a height of 20-30 meters and a diameter of 50 to 65 cm. It is characterized by rigid branches, fluted irregular bole, smooth but lenticelled bark and steep buttresses. Leaves alternate, odd pinnate, with 4 pairs of opposite leaflets, the lowest pair ovate and much smaller than the upper pairs. Upper leaflets oblanceolate, pinnately veined with 8-9 fine lateral veins looping near the leaf margin, tertiary veins very fine forming a reticulate pattern, 9.5 to 16.1 cm long by 3.8 to 6.6 cm wide. Terminal leaflet 19-21 cm long. Leaflet apex acuminate, base acute, both upper and lower leaf surface glabrous and thinly leathery. Petioles 2.8 to 5.1 mm. Flowers borne in axillary inflorescences, the corolla cylindrical and yellowish white in color; stamens shorter than the petals. Fruits rather compressed, globose, shiny red outside, white inside, bearing 1 to 4 seeds.

4.0 USE AS FOOD

The pericarp of the ripe fruit is eaten raw by man, birds and wild pigs. In addition to this, the matured seeds are roasted like the cashew nut and eaten.

5.0 NUTRITIONAL VALUE

Approximate analysis of the fruit showed the following (Catibog, 1978):

% Moisture	25.00
% Ash	3.35
% Crude protein	8.65
% Ca	0.53
% P	0.15
% K	0.73
% N	1.38

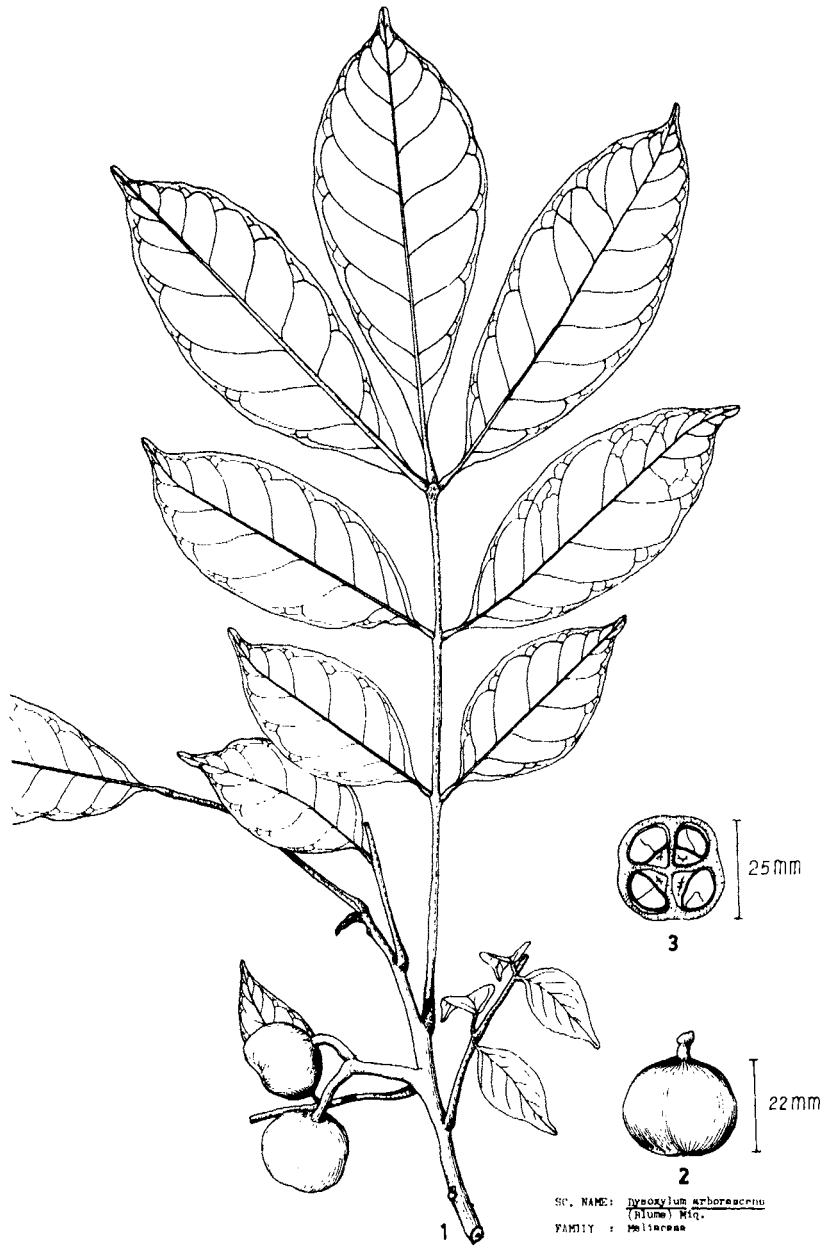
6.0 OTHER USES

The bark when powdered has been proved to be a safe emetic by rural folk. The wood is also used as material for furniture making and house construction.

7.0 PROPAGATION

The species can be propagated from seed.

PLATE XXVI. Dysoxylum arborescens (Blume) Miq.



4

XXVI$_1$ - Branchlet with leaves and fruit

2 - Fruit

3 - Transverse section of fruit

4 - Illustration of foliage

27. ELAEOCARPUS CALOMALA

1.0 NAMES:

Family	Elaeocarpaceae
Botanical	Elaeocarpus calomala Merr.
Common	Kalomala
Vernacular	bongani, maglumboi, malaropit, unggo (Tagalog region); bunsilak (Bisaya); hunggo (Bikol).

2.0 DISTRIBUTION

2.1 Forest type and frequency: It is found in primary forest of low altitudes. It is also found in the transition zone to mossy forest, about 1100 to 1300 m. elevation, in association with Almaciga (Agathis philippinensis) on the eastern slope of Mount Apo. In Atimonan, Quezon (climatic type II), inventories made in the dipterocarp forest gave a figure of 3.3 saplings per hectare.

3.0 DESCRIPTION

Kalomala is a large endemic tree that grows to a height of 25 meters and a diameter of 60 cm with smooth bark, pronounced buttresses and stilt roots. Bark greyish and smooth with short cracks. Leaves alternate, smooth, oval, often slightly asymmetric, with pointed almost caudate apex, and acute base; 6 to 15 cm long, with toothed margins, the "teeth" being 1 to 2 cm apart; glabrous on both faces with the lower face invariably roughened by numerous tiny, wart-like pustules. Petiole length 12 to 28 mm. Flowers white, fragrant, about a centimeter in diameter, and borne in axillary racemes. Fruit red, oval, about 2.5 to 3 cm long and containing a single, large, rough stone.

4.0 USE AS FOOD

The fleshy portion of the fruit is eaten raw.

5.0 OTHER USES

The inner bark of Kalomala has been reportedly used for rope-making.

6.0 PROPAGATION

Kalomala is propagated by seeds.

PLATE XXVII. Elaeocarpus calomala Merr.

10

XXVII$_1$ - Branchlet with inflorescence and leaves

2 - Branchlet with fruit

3 - Anthers

4 & 5 - Flower and petal

6 - Fertilised gynoecium

7 - Fruit

8 - Seed

9 - Transverse section of seed

10 - Illustration of bole and crown

28. EMBELIA PHILIPPINENSIS

1.0 NAMES:

Family	Myrsinaceae
Botanical	Embelia philippinensis (A.DC.) Mez.
Common	Dikai
Vernacular	dikal (Quezon); dikai (Laguna); binurok, banarok, palongpong (Ilocos Sur, Ilocos Norte); bisalak, bisudak, pong-pong (Bontoc, Benguet); dekai-dekaiang, dikai-dikaiang (Bukidnon).

2.0 DISTRIBUTION

2.1 Locality: Dikai is an endemic plant of the Philippines, and is confined to, and sparsely distributed in, Northern Luzon and Southern Mindanao.

2.2 Forest type and frequency: It thrives in open or partially shaded secondary dipterocarp forest at low and medium altitudes. In Mount Makiling, Laguna (climatic type I), the density is 1 young and 1 mature plant per hectare, while in Malaybalay, Bukidnon representing climatic type III, there was only 1 mature plant per hectare. This shows that the density of occurrence appears to be decreasing.

3.0 DESCRIPTION

Embelia philippinensis (A. DC.) Mez. is a woody vine with smooth and glabrous branches and spiny stems when old. It attains a length of 4 meters and a diameter of 0.5 to 1.5 cm at the biggest portion of the stem. Leaves alternate, elliptic, leathery and smooth in texture, measuring 6.8 to 14.2 cm long and 3.5 to 4.2 cm wide; acuminate, margin entire, acute base, midrib prominent, lateral veins distinct, upper surface shiny and dark green, with the lower surface light green. Fruit berry-type in appearance, with an apiculate style, attaining a diameter up to 0.5 cm with a red color when ripe, edible, with a sweet-sour taste.

4.0 USE AS FOOD

The fleshy pericarp of the ripe fruit is eaten raw, and the young acidic leaves are cooked with fish, meat, or vegetables to give a sour-flavoured taste to the soup. No analysis has been made so far on the constituents of the edible parts.

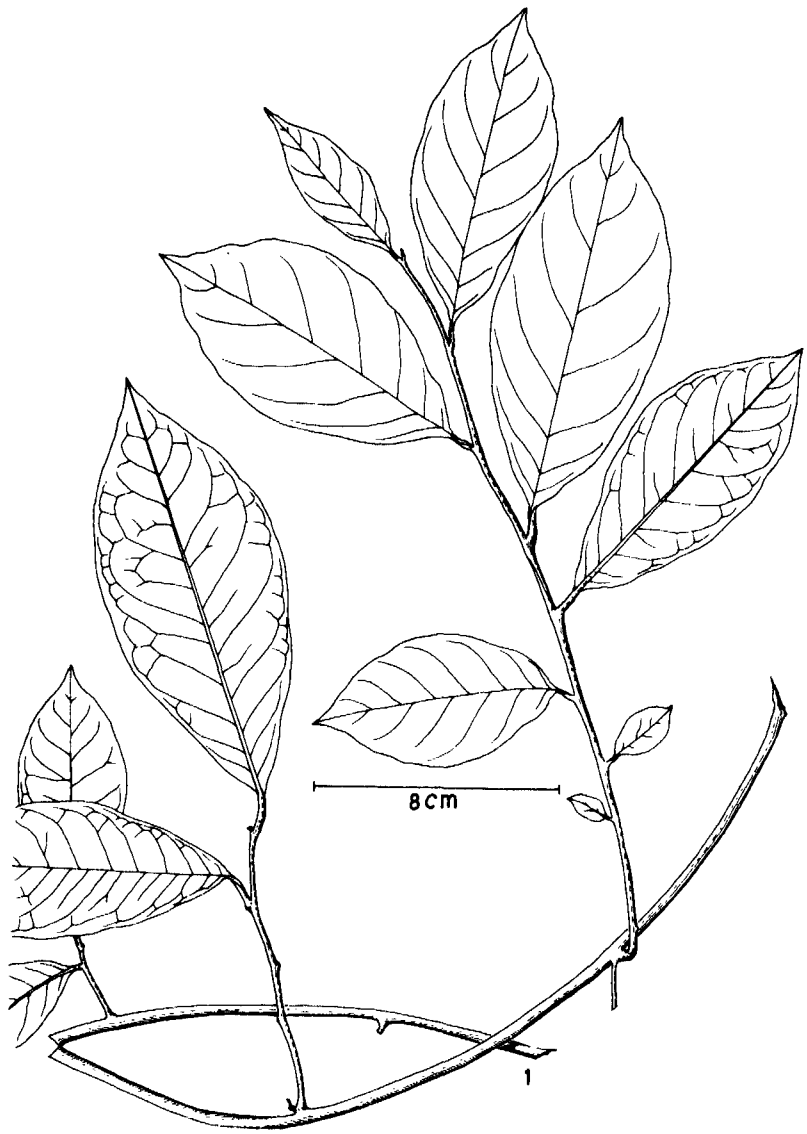
5.0 OTHER USES

The mature fresh stems are used as tying materials by rural people for temporary purposes.

6.0 PROPAGATION

Dikai is propagated by seeds and cuttings. Mature seeds are sown in potting media until they germinate and grow into seedlings. When they reach a height of 30 cm, the seedlings are planted out in the field. Cuttings are taken from the mature stems when propagating the plant asexually.

PLATE XXVIII. Embelia philippinensis (A. DC.) Mez.



SC. NAME: Embelia philippinensis (A. DC.) Mez.
FAMILY : Myrsinaceae

2

XXVIII$_1$ - Branchlet with leaves

2 - Illustration of leaves and vine

29. EUGENIA UNIFLORA

1.0 NAMES:

Family	Myrtaceae
Botanical	Eugenia uniflora L.
Common	Pitanga
Vernacular	pitanga (Laguna, Quezon, Brazil); surinam cherry (English).

2.0 DISTRIBUTION

2.1 Locality: This is an exotic species of the Philippines being introduced from Brazil in the late 18th century. Among the exotic and endemic Eugenia species in the Philippines, this species seems to be nearly extinct.

2.2 Forest type and frequency: From field inventories and surveys conducted in all the forest types of the Philippines, only 5 were found in the Manila Memorial Park area, 5 at Quezon National Park, and 1 at Los Baños, Laguna, both representing climatic type I. This tree species thrives in lowland open areas up to 100 meters elevation.

3.0 DESCRIPTION

Eugenia uniflora L. is a glabrous shrub to small-sized tree reaching about 7 cm diameter and a height of 4 meters (in the Philippines), with branches spreading evenly around the trunk. Leaves decussate, ovate to ovate-lanceolate, attaining 3 to 5 cm, usually lucid with dark green color on the upper surface and light green underneath, acuminate, with base more or less rounded, and nearly sessile. Flowers white, solitary at the end of long peduncle, 1 or several together in the axils of the leaves, approximately 1 cm across. Flowering starts in April and ends in June. Fruit oblate, 1 to 2 cm across, eight-ribbed, with a crimson color when ripe. The fruit is edible, generally sweet with a little mixture of sourness.

4.0 USE AS FOOD

The ripe fruits are eaten raw by man, birds and deer. No analysis has been made so far on the constituents of the edible parts.

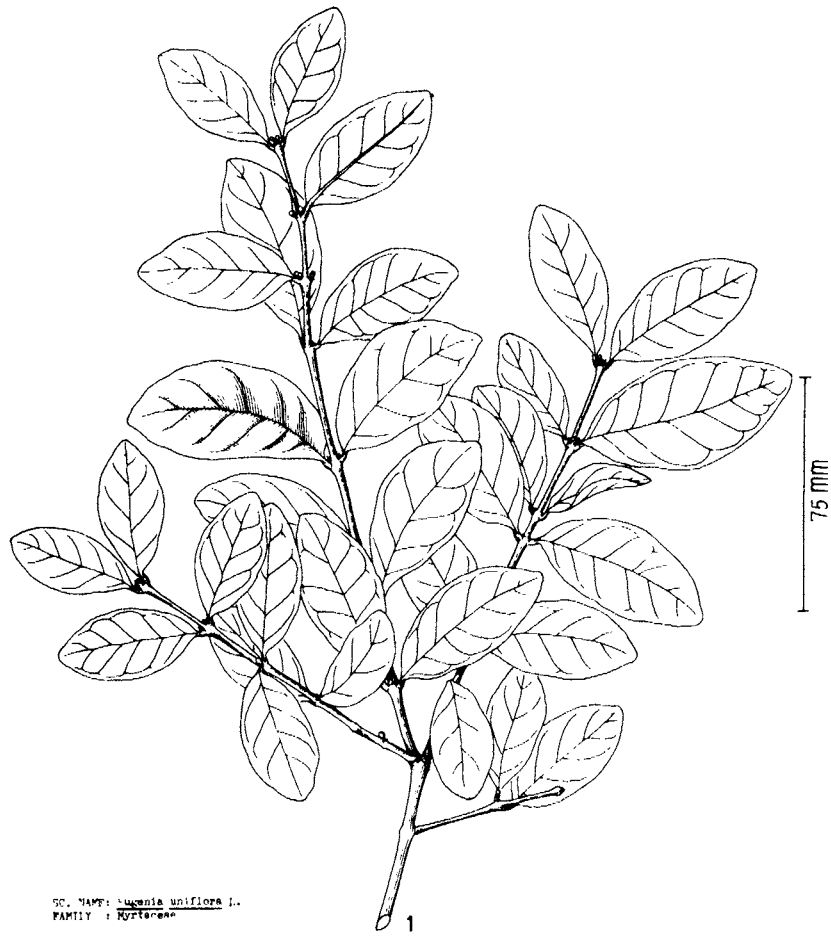
5.0 OTHER USES

This plant is cultivated an an ornamental in parks and offices and house gardens.

6.0 PROPAGATION

The only propagation known of this plant is by seeds, although it might be possible to propagate it asexually by marcotting like other species of the family Myrtaceae.

PLATE XXIX. Eugenia uniflora L.



2

XXIX$_1$ - Branchlet with leaves

2 - Illustration of leaves

30. EUPHORIA DIDYMA

1.0 NAMES:

Family	Sapindaceae
Botanical	Euphoria didyma Blanco
Common	Alupag
Vernacular	alupag, alupak (Bataan, Lanao, Marinduque, Laguna, Batangas, Basilan, Malani Island); alupag-amo, bayyet, bait (Tayabas); alupai (Bulacan, Nueva Ecija, Pampanga); arupai (Rizal, Laguna, Mindoro); apalung, bakkalau or bakalau (Ilocos Sur, Ilocos Norte); apalung, marutong, demopa (Cagayan); arupag, ayupag (Mindoro); apalung, balit (Negros); buk-kalau (Abra, Isabela); usau, dagindingan (S. Visaya, Samar); gisihan (Cavite); halupag (Polillo); lupak (Camarines, Cotabato); mamata (Olutanga Island); kalupai (Zambales); kandongisok, panuto (Masbate); kukuris (Palawan); mata-mata (Sulu, Zamboanga); usau, ulayan (Leyte); aniguai (Pangasinan); balit, aropag (P. Visaya); halupag, bayit, aropai (Batangas, Quezon); lupak (Bicol).

2.0 DISTRIBUTION

2.1 Locality: Alupag is an endemic plant of the Philippines and is widely but sparsely distributed from Northern Luzon to Mindanao including the isalands of Mindoro and Palawan.

2.2 Forest type and frequency: It thrives naturally in hilly, open or semi-open dipterocarp forests from low to medium altitudes. It is also found growing in gullies and slopes with deep clay loam soil. In Palawan representing climatic type III, inventories showed a density of 2 trees and 1 pole per hectare. In Mount Makiling, Laguna (climatic type I), there were 4 trees, 1 pole and 2 seedlings per hectare; whereas in Quezon National Park, Quezon (climatic type II), there were 2 trees, 1 pole, and 2 seedlings per hectare compared to that of Oriental Mindoro (climatic type IV) with a density of 1 tree and 1 pole per hectare.

3.0 DESCRIPTION

Euphoria didyma Blanco is a large tree which attains a diameter of 80 cm and a height of 25.5 meters, producing a clear bole of approximately 12 meters. The bole is characterized as fluted, rarely straight, with low thick buttresses. Leaves are alternate and compound, with entire margin and acute apex. Upper surfaces of leaves smooth and shiny, with glaucescent undersurface. Inflorescences paniculate, terminal and axillary. Flowers regular, small, whitish to yellowish in color and borne in simple or compound inflorescences. Calyx deeply five-cleft, pubescent, and imbricately lobed. Petals 5, spatulate to lanceolate and hairy within. Stamens usually 8, as long as the petals and inserted in a pubesoent disc. Ovary two-lobed, rarely three-lobed, with a 2 to 3 celled erect style. Fruit one-seeded, yellowish-orange when ripe, very rough, 2.5 cm in diameter. Fruits similar to those of the Chinese litchi, occuring in clusters. Seed almost spherical in shape with a diameter of 1 to 1.5 cm, dark purple with a scar at the base, wrapped by a white, translucent, sweet, juicy edible pulp with a very delicious flavor.

4.0 USE AS FOOD

When the fruit is ripe, the skin is removed and the translucent flesh is eaten raw. This is eaten not only by man but also by birds, monkeys and wild pigs. It is juicy, sweet tasting and very delicious. No analysis has been made so far on the constituents of its edible part.

5.0 OTHER USES

The timber is a durable material used as posts and beams of houses in the rural areas.

6.0 PROPAGATION

Alupag is propagated from seeds by direct seeding or asexually by marcottage. In the latter, branches having a diameter ranging from 3-5 cm diameter are marcotted then, once roots have fully developed, these are cut from the mother plant and planted in the field.

PLATE XXX. Euphoria didyma Blanco

SC. NAME: Euphoria didyma Blanco
FAMILY : Sapindaceae

2

XXX$_1$ - Branchlet with leaves and fruit

2 - Illustration of branchlet with leaves

31. FICUS NOTA

1.0 NAMES

Family	Moraceae
Botanical	Ficus nota (Blanco) Merr.
Common	Tibig
Vernacular	tibig (Laguna, Quezon, Batangas, Mindoro).

2.0 DISTRIBUTION

2.1 Locality: Tibig is an endemic species occasionally found in thickets at low and medium altitudes. It is also found in dry woods of the "parang" formation throughout the Philippines.

2.2 Forest type and frequency: This species is represented by 3.3 poles per hectare in the dipterocarp forests of Mount Makiling, Laguna (climatic type I) and 6 trees, 6.7 poles, and 6.7 saplings per hectare in the dipterocarp forest of Pakyas, Oriental Mindoro representing climatic type IV.

3.0 DESCRIPTION

This is an erect tree, 4 to 8 m high, more or less pubescent, with spreading branches. Leaves oblong to oblong-obovate, 15 to 35 cm long, acuminate, the base somewhat inequilateral, cordate; margins distantly and irregularly toothed, with small teeth; more or less pubescent, not or slightly roughened. Receptacles borne in large masses on special, branched inflorescences springing directly from the trunk and from the larger branches, 10 to 25 cm in length, frequently very dense; the receptacles themselves subglobose, green or when mature yellowish, soft and fleshy, 2 to 3.5 cm in diameter. This species flowers throughout the year.

4.0 USE AS FOOD

The young leaves are cooked as vegetables and the fruits are eaten raw when ripe. The sap of the freshly cut stem also yields drinkable water.

5.0 NUTRITIONAL VALUE

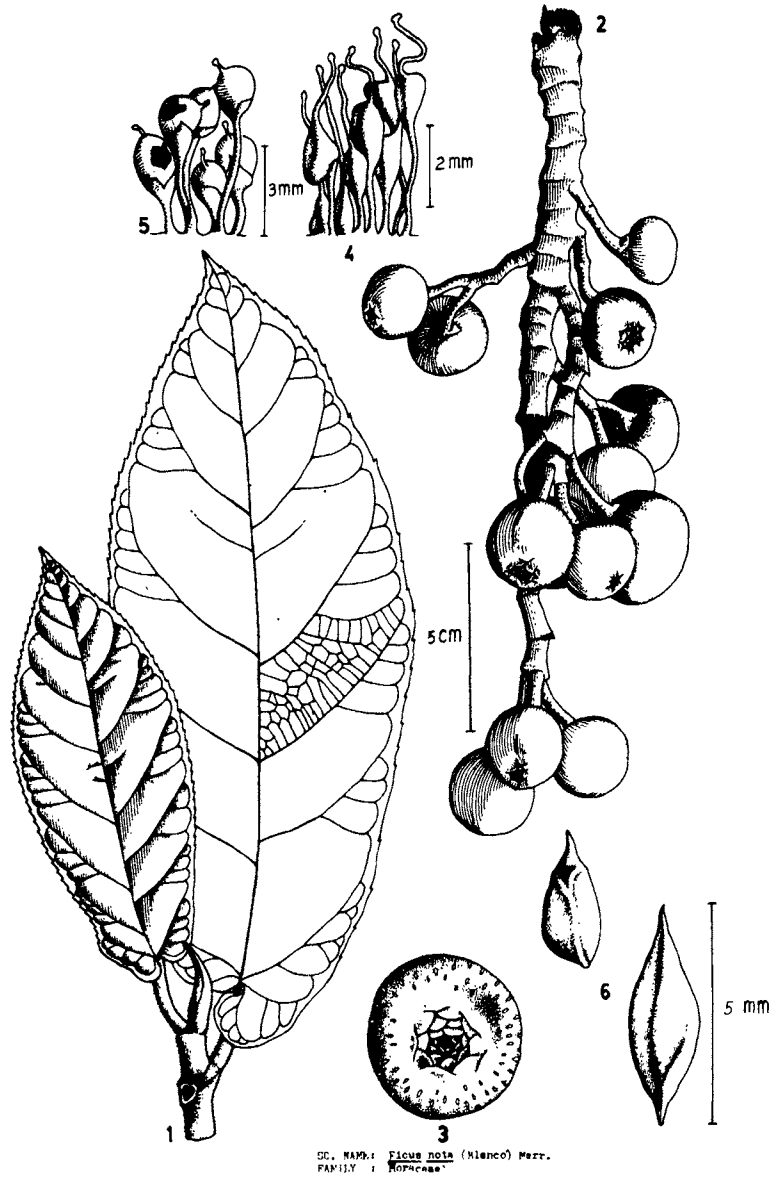
Approximate analysis of fruits showed the following:

% Moisture	91.00
% Ash	6.50
% Crude protein	8.47
% Crude fat	1.97
% Ca	2.73
% P	0.19
% K	1.11
% N	1.36

6.0 PROPAGATION

Effective propagation of this species is carried out by means of seeds. In natural stands, reproduction is aided by the birds, monkeys and other animals that eat the ripe fruits. The species could also be propagated by cuttings.

PLATE XXXI. Ficus nota (Blanco) Merr.




7

XXXI$_1$ - Leaves and bud

2 - Inflorescence

3 - Top view of receptacle

4 - Anthers

5 - Pistils

6 - Seed

7 - Illustration of tree with stem-borne fruit

32. FICUS ODORATA

1.0 NAMES:

Family	Moraceae
Botanical	Ficus odorata (Blanco) Merr.
Common	Pakiling
Vernacular	pakiling (Laguna, Quezon, Mindoro).

2.0 DISTRIBUTION

2.1 Forest type and frequency: This is an endemic species and is confined to water sources in the country. The stem density per hectare in the dipterocarp forest of Mount Makiling (olimatic type I) is 4 trees per hectare.

3.0 DESCRIPTION

Ficus odorata is a shrublike or medium-sized tree attaining a height of 6 to 9 m. Leaves rough, the upper surface with numerous hard papillae, the lower surface also rough and more or less pubescent, the base very strongly inequilateral and obliquely cordate, one basal lobe broad and rounded, the other usually acute, 15 to 25 cm long, acuminate and with obscurely toothed margins. Receptables axillary, solitary, sessile, subglobose, densely hirsute, yellowish when mature and 1.5 to 2.5 cm in diameter. It flowers all the year.

4.0 USE AS FOOD

The fleshy portion of the fruit and the seeds are eaten raw.

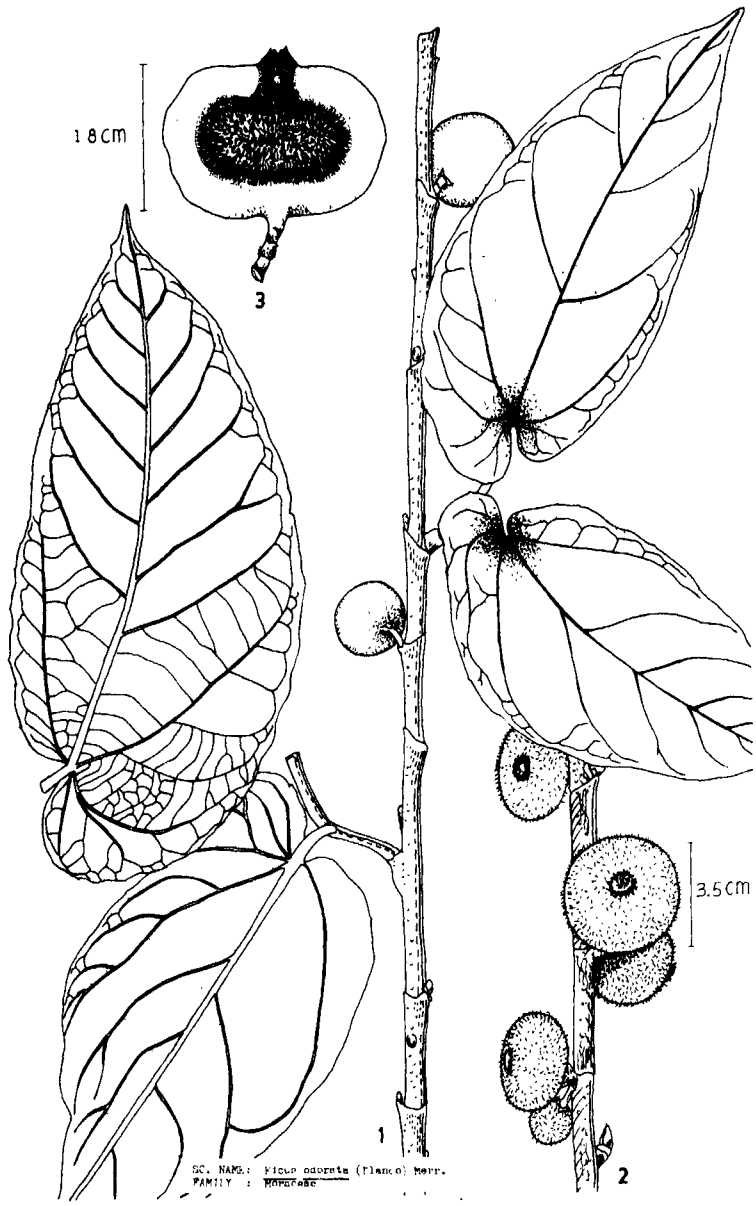
5.0 OTHER USES

The rough leaves are used for scouring purposes.

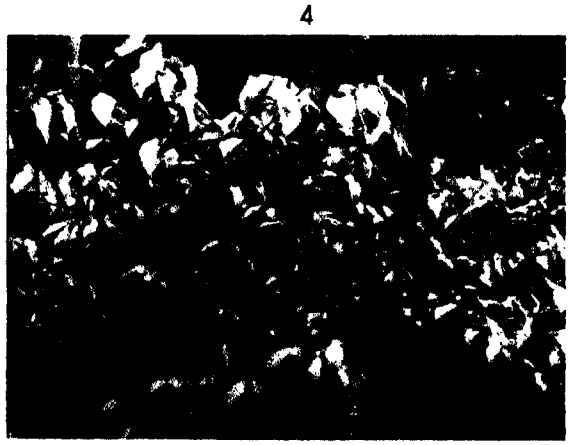
6.0 PROPAGATION

Propagation of this species is by means of seeds and dispersal is influenced by wind and animals.

PLATE XXXII. Ficus odorata (Blanco) Merr.



4



XXXII$_1$ - Branchlet with leaves and fruit

2 - Fruit on branch

3 - Longitudinal section of fruit and receptacle

4 - Illustration of growing shrub

33. FICUS PSEUDOPALMA

1.0 NAMES:

Family	Moraceae
Botanical	Ficus pseudopalma Blanco
Common	Niog-niogan
Vernacular	niog-niog (Tagalog); lamiog or sulamiog (Visayas) and lubi-lubi (Bicol).

2.0 DISTRIBUTION

2.1 Locality: Ficus pseudopalma is an endemic and widely distributed species in the Philippines.

2.2 Forest type and frequency: It is common in dry woods and thickets ranging from the seacoast to 5,000 feet in elevation. Surveys and inventories made in climatic type I gave a stem density of 2 trees, 2 poles, 2 saplings per hectare in Mount Makiling dipterocarp forest, and 2 trees, 20 poles and 3.3 saplings per hectare in Mount Makiling Molave forest. In Pakyas Oriental Mindoro (climatic type IV) dipterocarp forests, there were 10 trees, 6.7 poles, 6.7 saplings and 13.3 seedlings per hectare, whereas, in the Quezon National Park dipterocarp forests (climatic type II), the stem density per hectare is 6.7 seedlings.

It has been observed that the species thrives well with other species of the Moraceae, Annonaceae and Anacardiaceae family.

3.0 DISCRIPTION

Niog-niogan is an erect, small, palm-like tree, glabrous, unbranched, 2 to 6 m high and 4 to 6 cm in diameter. Rarely it has a few branches or several stems from the base. Leaves crowded at the end of the trunk, oblanceolate, acute or acuminate, coriaceous, up to 80 cm in length, narrowed to slightly cordate base, subsessile or shortly petiolate, the margins coarsely and irregularly sinuate-toothed; the upper surface shining and the lower surface paler; stipules lanceolate, persistent, 5 to 7 cm long, usually in pairs on short peduncles in the axils of the leaves. Receptables solitary or in axillary pairs, dull red or purplish when mature. It flowers throughout the year.

4.0 USE AS FOOD

Young leaves of Ficus pseudopalma are cooked and eaten as a vegetable. The young leaves are blanched and served with tomatoes and fish sauce to make a salad. It could also be cooked with coconut milk or sauté with meat or fish.

Histochemical findings on this species revealed that the stems and leaves contain from detectible to abundant range the following: amylodextrin, hydrocellulose, amygdalin, protein, tannin, saponin, pectin substances, calcium oxalate and sulfur.

5.0 OTHER USES

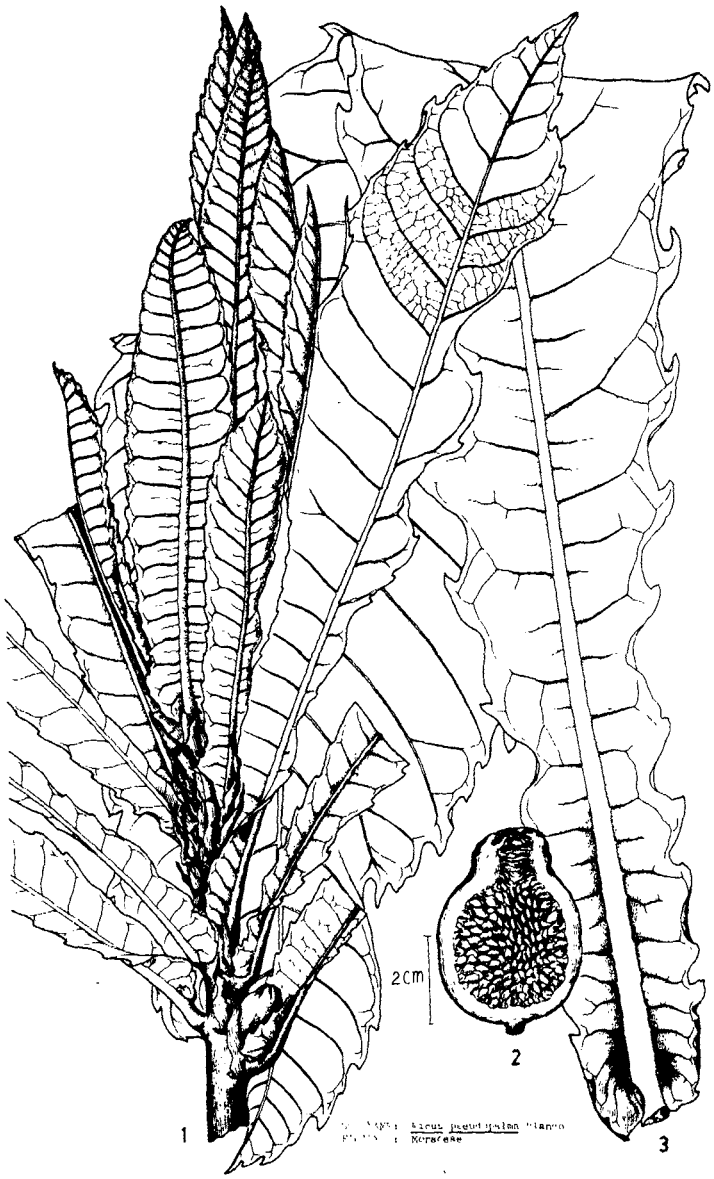
Medicine - the fruit of Ficus pseudopalma (especially dried nuts) are used as anthelmintic for ascarides and trichina. For adults, 8-10 medium sized dried nuts, chewed (2 nuts after meal as single dose then drink half glass of water). For children 3 to 5 years old (4-5 dried nuts).

Ornamental - the species is sometimes used as an ornamental plant.

6.0 PROPAGATION

Ficus pseudopalma could successfully be propagated by seeds.

PLATE XXXIII. Ficus pseudopalma Blanco



4

XXXIII$_1$ - Branch with leaves and stipules

2 - Vertical cross section of fruit and receptacle

3 - Detail of leaf

4 - Illustration of growing plant

34. FLACOURTIA JANGOMAS

1.0 NAMES:

Family	Flacourtiaceae
Botanical	Flacourtia jangomas (Lour.) Raeusch
Common	Governor's plum
Vernacular	bitangol, bitungol, bolong (Laguna, Quezon, Mindoro, Batangas).

2.0 DISTRIBUTION

2.1 Locality: This tree is very common in the Cagayan Valley region, in Zambales, Tarlac, Bataan, Rizal, Batangas and in Mindanao.

2.2 Forest type and frequency: It is found in dry thickets at low altitudes. In the Molave forest of Mount Makiling, Laguna (climatic type I) there are 2 trees per hectare as compared to 0.5 trees per hectare in the dipterocarp forest. In Oriental Mindoro (climatic type IV) there are 2 trees to a hectare.

3.0 DESCRIPTION

This is an erect, branched, more or less spiny shrub or small tree, 1 to 6 meters in height. Spines rather slender, scattered and often 2 cm long. Leaves obovate to oblong-ovate, 2.5 to 5 cm long; margins toothed with rounded lobes, base pointed, apex rounded. Flowers white, about 5 mm in diameter and borne on axillary or terminal short branchlets, either solitary or in pairs. Fruits rounded, about 1 cm in idameter, fleshy when fresh, purple or nearly black, smooth and enclosing 6 to 10 small flattened seeds.

4.0 USE AS FOOD

The ripe fruit has a fleshy sweet-flavored pulp which is eaten raw.

5.0 OTHER USES

At present, governor's plum is utilized for medicinal purposes. The astringent bark, when infused and used as a gargle, is a remedy for hoarseness and, when triturated in oil, is used as a liniment for rheumatism. The ashes of roots are serviceable in kidney troubles and dried leaves are carminative, expectorant, tonic and astringent.

Useful in asthma, bronchitis, phthisis and catarrh of the bladder.

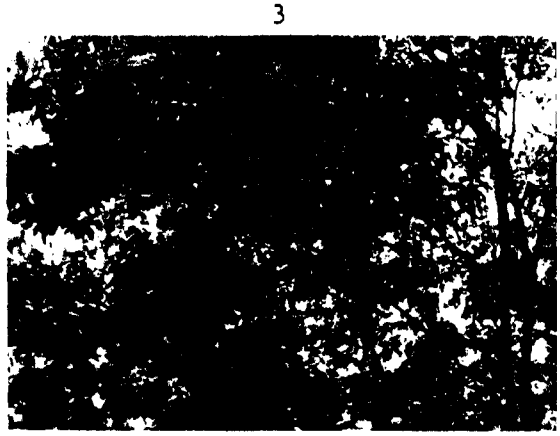
Fruit is used to relieve nausea and to check purging. Juice of fresh leaves and their tender stalks is useful in fevers as an antiperiodic, also used in affections of the chest, phthisical coughs, dysentery, diarrhoea and indigestion caused during dentition.

6.0 PROPAGATION

This is propagated by means of seeds as dispersed by wind, animals and man.

PLATE XXXIV. Flacourtia jangomas (Lour.) Raeusch

3



XXXIV$_1$ - Branchlet with leaves and flowers

2 - Detail of flower

3 - Illustration of crown and stem

35. FLACOURTIA RUKAM

1.0 NAMES:

Family	Flacourtiaceae
Botanical	Flacourtia rukam Zoll. and Mor.
Common	Bitongol
Vernacular	agas-as, salabagin (Cebu-Bisaya); amaiit, bitongol (Tagalog); kalamasati, lalamasali (Sbl.).

2.0 DISTRIBUTION

2.1 Forest type and frequency: Bitongol (Flacourtia rukam Zoll. and Mor.)is found in forest at low and medium altitude. In the dipterocarp forest of Mount Makiling, Laguna representing climatic type I, we have a stem density of 1 tree per hectare. It also occurs in the Peninsular Malaysia.

3.0 DESCRIPTION

This is an erect tree attaining a height of 20 meters. Leaves oblong-ovate to elliptic, 5 to 15 cm long and 5 to 7 cm wide, apex pointed, base pointed to rounded, margins toothed. Flowers small, greenish, in clusters in the axils of the leaves. Fruit somewhat rounded, 2 to 2.5 cm in diameter, violet, fleshy, sub-acid, and with pleasing flavor.

4.0 USE AS FOOD

The fruit of the cultivated forms is edible and is good for making pies and jams. The wild forms have sour fruit.

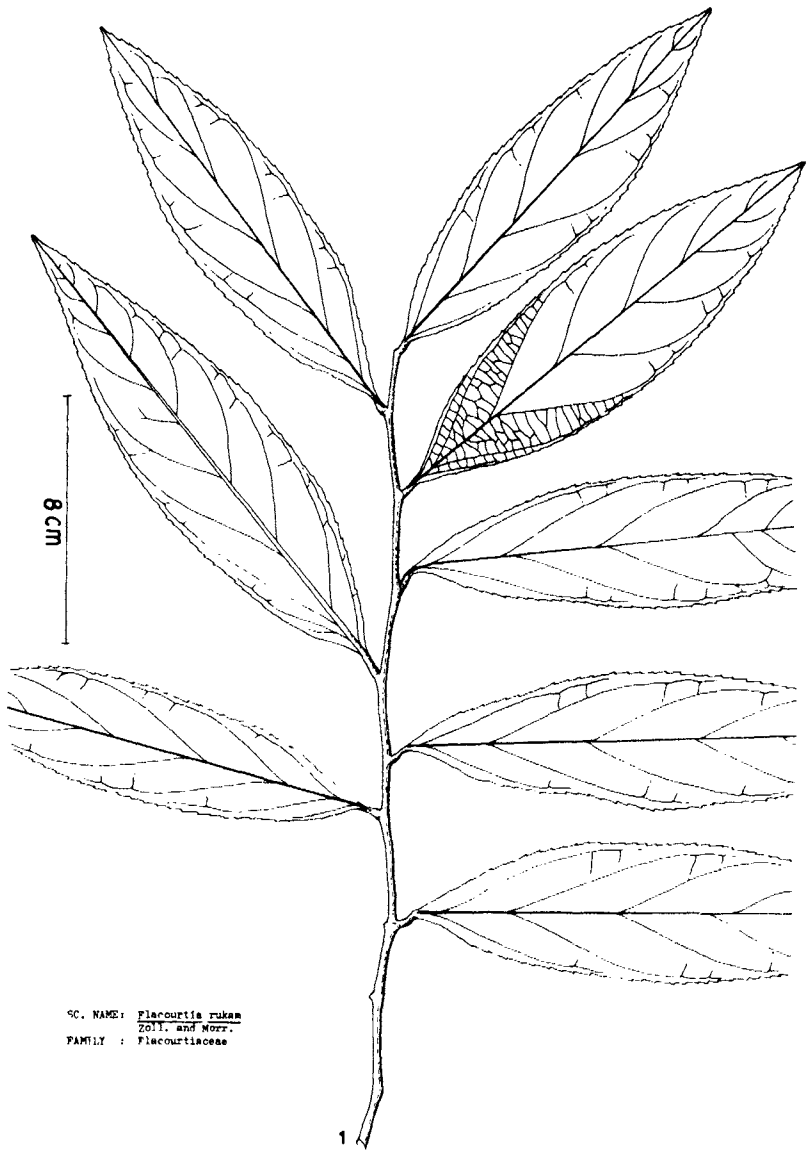
5.0 OTHER USES

The wood is used for light house construction, especially in the rural areas.

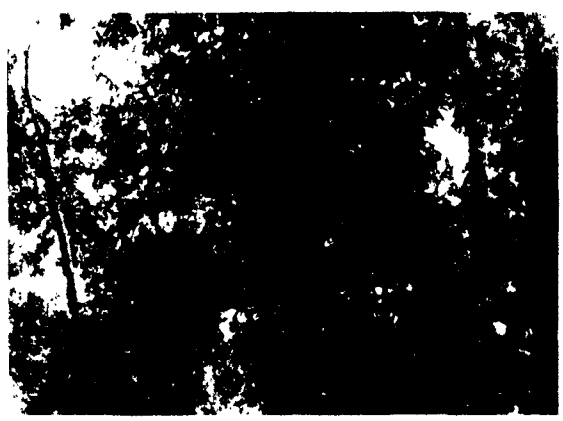
6.0 PROPAGATION

This plant is propagated by means of seeds.

PLATE XXXV. Flacourtia rukam Zoll. and Mor.



2



$XXXV_1$ - Branchlet with leaves

2 - Illustration of growing tree and crown

36. GNETUM GNEMON var. gnemon

1.0 NAMES:

Family	Gnetaceae
Botanical	Gnetum gnemon L. var. gnemon
Common	Bago
Vernacular	bago, lamparan (Laguna, Quezon, Batangas); banago (Visaya); nabo (Bicol).

2.0 DISTRIBUTION

2.1 Forest type and frequency: This species is commonly found in secondary forest at low to medium altitudes in the Batangas, Visayan and Palawan provinces. Inventories in the dipterocarp forest of Puerto Princesa, Palawan (climatic type I) showed 2 trees and 8 saplings per hectare.

3.0 DESCRIPTION

This is a small tree about 10 meters high found at low and medium altitudes throughout the country. Leaves opposite, dark green, shiny, 10 to 20 cm in length, oval and usually pointed at both ends. Fruits in clusters, red, ovoid or ellipsoid and about 2 cm long.

4.0 USE AS FOOD

The edible parts of this plant are the young leaves which are used as vegetables and the fruits which are eaten either boiled or roasted.

5.0 NUTRITIONAL VALUE

Approximate analysis of leaves revealed the following:

% Moisture	74
% Ash	5.26
% Crude fiber	25.07
% Crude protein	9.73
% Crude fat	4.14
% Ca	0.79
% P	0.21
% K	2.70
% N	1.56

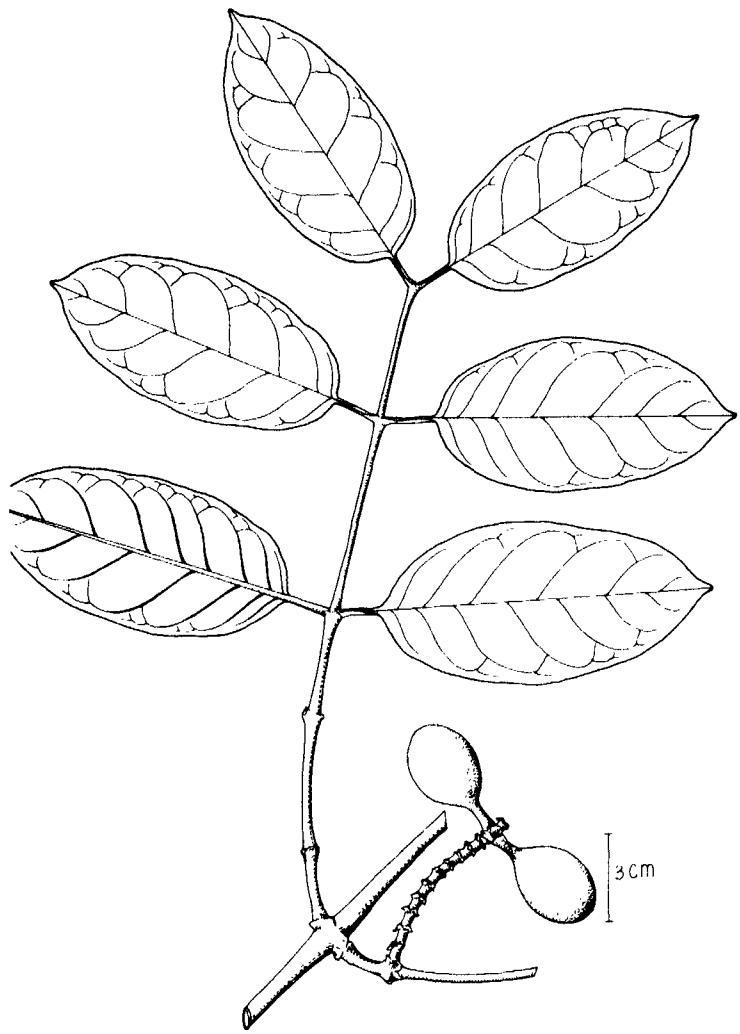
6.0 OTHER USES

A potential economic use of this species is the utilization of its bark for rope-making.

7.0 PROPAGATION

This plant is propagated by means of seeds.

PLATE XXXVI. Gnetum gnemon L. var. gnemon



1

NAME: Gnetum gnemon L. var gnemon
FAMILY : Gnetaceae

2

XXXVI$_1$ - Branchlet with leaves and fruit

2 - Illustration of leaves

37. GNETUM INDICUM

1.0 NAMES:

Family	Gnetaceae
Botanical	Gnetum indicum (Lour.) Merr.
Common	Kuliat
Vernacular	kuliad (Bikol, Pampanga); malangot (S.L. Visaya); nonok (P. Visaya); kuliad (Cagayan); kuliat (Laguna, Pampanga, Lanao); lamparahan (Batangas); kaliat, kalat, konjat (Benguet); kalat (Ilocos Sur, Ilocos Norte); bulso (Bukidnon); bias, bias-bias (Quezon); baging (Butuan); bias (Rizal).

2.0 DISTRIBUTION

2.1 Forest type and frequency: This plant is endemic to the Philippines and is widely but sparsely distributed, generally in secondary forest from Luzon to Mindanao thriving in partially shaded areas at low and medium altitudes. Inventories made in climatic type I and II represented by Mount Makiling, Laguna and Quezon National Park, Quezon respectively, gave an average of 1 mature (mother plant) and 1 young vine per hectare. In Palawan (climatic type III) and in Palcyas, Oriental Mindoro (climatic type IV), this plant was not seen.

3.0 DESCRIPTION

Gnetum indicum (Lour.) Merr. is characteristically a coarse woody vine that attains a length of 4 meters and a diameter of about 1.2 cm at the biggest portion. Leaves large, opposite, oval, measuring 9.7 to 22.5 cm long, with entire margins, acute apex, rounded base and distinct midrib and lateral veins, upper surface dark green, lower surface light green. Fruit about 3.1 cm long, oval in shape, occurring in whorls. Fruit red when ripe, edible, containing a single seed.

4.0 USE AS FOOD

When the fruit is ripe, the kernels are extracted from the fruit and are either boiled or roasted like the cashew nut (Anacardium) and eaten. The kernels are also cooked with brown sugar and made into candies or dessert.

No analysis has been made so far on the constituents of the edible parts.

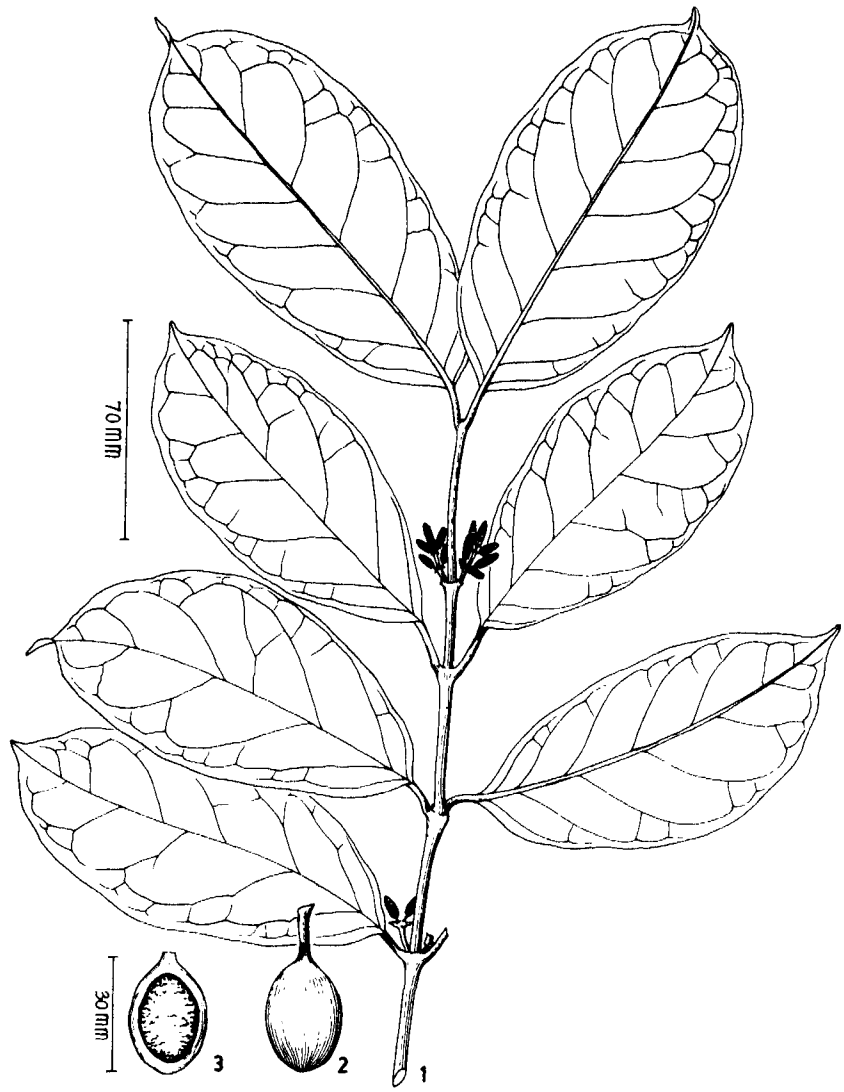
5.0 OTHER USES

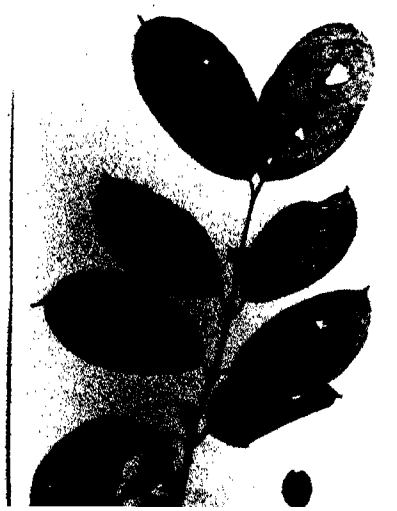
The stem when freshly cut exudes a considerable quantity of clean water which is a good source of drinking water in the forest. The bast of the plant is very tough and is utilized in the manufacture of cordage and bags.

6.0 PROPAGATION

Kuliat is propagated by seeds. The seeds are sown and raised in potting media until the seedlings reach 30 cm in height when they are outplanted in the field.

PLATE XXXVII. Gnetum indicum (Lour.) Merr.





4

XXXVII$_1$ - Branchlet with axillary inflorescences

2 - Fruit

3 - Longitudinal section of fruit

4 - Illustration of dried specimen

38. KOORDERSIODENDRON PINNATUM

1.0 NAMES:

Family	Anacardiaceae
Botanical	Koordersiodendron pinnatum (Blanco) Merr.
Common	Amugis
Vernacular	tirong, oris, uris, urisan (Cagayan, Ilocos Norte); taligaan (Ilocos Norte); salga, sarga (Ilocos Sur, Abra); molato (Abra); bankasi, hankasi, bankalari (Ilocano); malabanais, marabanias, palapiad (Pangsisnan); orisen (Tarlac); dangila (Tagalog); ambugis, amugis, mugis (Bulacan, Bataan, Rizal, Laguna, Tayabas, Camarines, Albay, Marinduque, Palawan, Negros, Zamboanga); barok, pamalatangan (Sorsogon); karogkog (Bicolano); hamoges, hamogis, koro (Catanduanes); kalumanog, lakolako, ambalayan (Bisaya); sambulauan (Masbate, Samar, Leyte, Capiz, Cebu, Surigao); kia-kia (Cebu); manguyabud, snimbuauan (Surigao); magmakopa (Misamis); mariganda, samboan, sinambuauan (Agusan); kalantas-colorado (Cotabato); sambauauan (Manobo); birgis, maguabod (Davao); gagel, magalibas, magulibas (Zamboanga, Davao, Sulu).

2.0 DISTRIBUTION

2.1 Forest type and frequency: Amugis is a tall tree of the lower hill dipterocarp forest of Northern Luzon to Southern Mindanao at an altitude of 400 m or less. In the dipterocarp forests of climatic type II, inventories made at Atimonan, Quezon gave 3.3 saplings and 3.3 seedlings per hectare. At Mount Makiling dipterocarp forest (climatic type I), the species is represented by 14 trees, 3.3 poles, and 20 seedlings per hectare, while in the Molave forest there are 34 trees, 10 poles and 46.6 seedlings per hectare. In Oriental Mindoro representing climatic type IV, there were 4 trees and 2.3 poles per hectare.

3.0 DESCRIPTION

A tree attaining a height of 15 meters or more and a diameter of more than 100 cm, with a light open crown and steep buttresses. Bark very dark, almost black, rough and permanently fissured; the long cracks are 2 to 3 cm apart and bark flakes off in between. Leaves odd-pinnate, 80 to 100 cm long, closely alternate, bunched at the end of the twigs with 13 to 16 pairs of leaflets. Leaflets oblong-lanceolate, 10 to 17 cm long, 3 to 3.5 cm wide, with acuminate apex and rounded base, glabrous, opposite; upper face dull green and lower face yellowish green. Petiole very short, 6 to 7 mm long. Flowers scattered, short-pedicelled and white. Fruit an ellipsoid and more or less flattened drupe, green, glabrous and about 3 cm in length. Exocarp fleshy, endocarp contains a large compressed seed.

4.0 USE AS FOOD

The ripe, yellowish-orange endocarp has a bitter-sweet taste and is eaten raw. Only the fruits are edible.

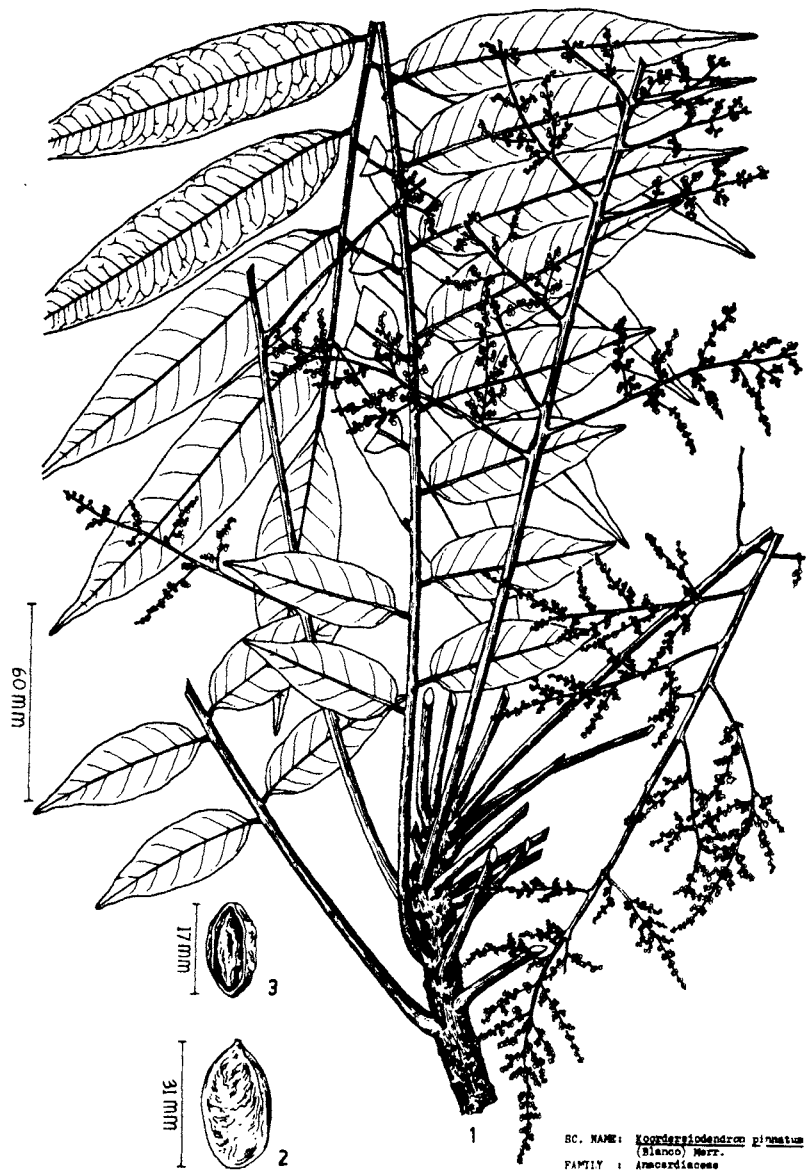
5.0 OTHER USES

Wood is used for house construction particularly posts and flooring; for manufacture of novelties and for cases for radio phonographs. It is also used in the back, sides and necks of musical instruments such as harps, guitars and violins.

6.0 PROPAGATION

This tree species is propagated by seeds.

PLATE XXXVIII. Koordersiodendron pinnatum (Blanco) Merr.



4

XXXVIII$_1$ - Branchlet with leaves and inflorescences

2 - Fruit

3 - Seed

4 - Illustration of leaves and inflorescences in crown of tree

39. LITHOCARPUS PHILIPPINENSIS

1.0 NAMES:

Family	Fagaceae
Botanical	Lithocarpus philippinensis (A. DC.) Rehd.
Common	Ulayan
Vernacular	ulayan, pangnan, pangnan-bundok (Laguna, Quezon); ulayan (Batangas, Cagayan).

2.0 DISTRIBUTION

2.1 Locality: This is an endemic plant of the Philippines but sparsely distributed in the country.

2.2 Forest type and frequency: It thrives in lower and upper hill dipterocarp forests at medium and high altitudes. Inventories made in the dipterocarp forests of Palawan representing climatic type IV, gave a density of 1 tree, 1 pole, and 1 sapling to a hectare. In Quezon National Park dipterocarp forest (climatic type II), we have 1 tree and 1 pole per hectare. In both climatic types I and IV which were represented by the dipterocarp forests of Mount Makiling, Laguna and Pakyas, Oriental Mindoro, the density was zero. This shown that this species is nearing extinction.

3.0 DESCRIPTION

Lithocarpus philippinensis (A. DC.) Rehd. is a medium to large tree reaching a diameter of 40-55 cm and a height of 20-25 meters; bark grey-brown, smooth with fine net-like pattern of fissures; open crown, far spreading, steeply ascending branches; slightly fluted and bent bole; 3-4 short slight buttresses 30-50 cm high forming small angles with the trunk; leaves alternate, oblong-oval, 11.5 - 15 cm long, 4.2 - 5.3 cm wide, apex acuminate, base rounded, leathery, both faces glabrous, upper surface shiny, lower face with ochre-grey bloom, venation pinnate with 10-13 finely marked lateral veins, midrib elevated on upper surface, tertiary veins barely visible, scalariform; petiole 0.5 - 0.6 cm long, 3 mm thick and woody; fruit is acorn-type measuring 1.5-2.0 cm in diameter and 1.7 - 2.1 cm long with a cup-like structure enclosing its base.

4.0 USE AS FOOD

The acorn (fruit) can be harvested from the tree when matured or can be simply picked up from the ground after they have dropped from the tree. The acorn is either roasted or boiled like the acorns of Castanopsis spp. and eaten. Sometimes the nut is extracted from the shell and cooked with brown sugar as candies and desserts.

No analysis has been made so far on the constituent of the edible parts.

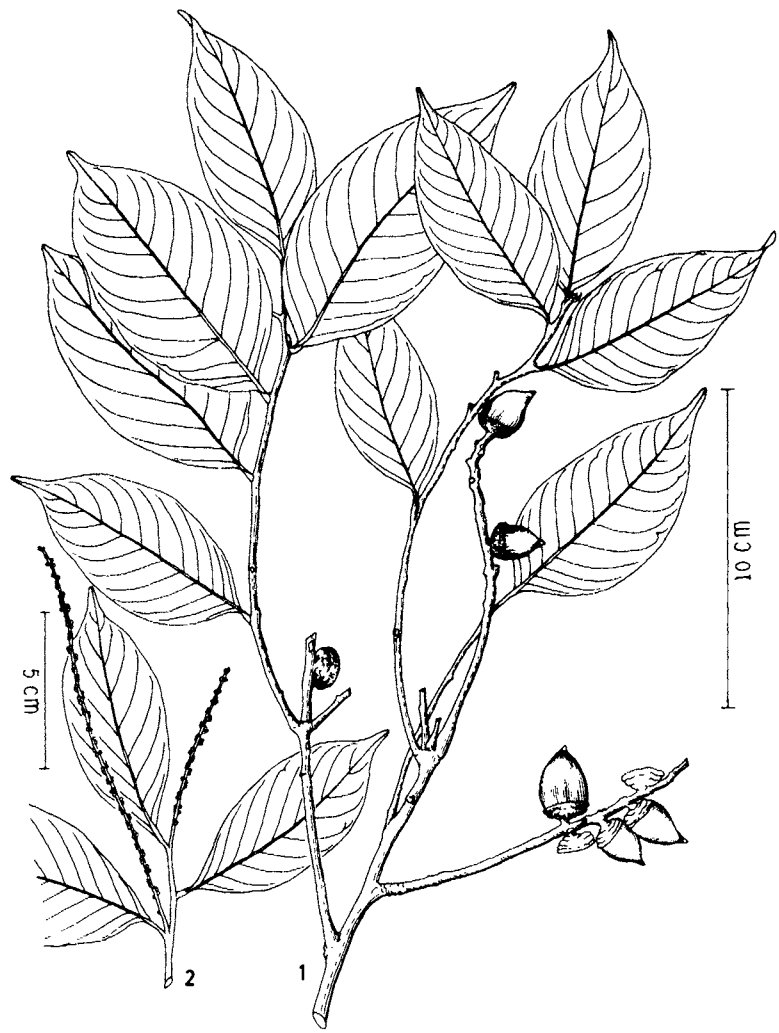
5.0 OTHER USES

The wood is used for furniture, axe and hammer handles, general house construction and interior work.

6.0 PROPAGATION

This tree species is propagated by seeds. It is directly seeded in the field, or sown in potting media, grown until they reach 20 cm in height and finally transplanted in the field. Natural seed dispersion and direct seeding have proved unsuccesful in regenerating this species because the acorns are eaten by wild animals (squirrels, etc..) and the effect of other environmental factors on the seed which hampers its germination and development.

PLATE XXXIX. Lithocarpus philippinensis (A. D.C.) Rehd.



SC. NAME: Lithocarpus philippinensis (A.DC.) Rehd.
FAMILY : Fagaceae

3

XXXIX$_1$ - Branchlet with leaves and acorns

2 - Twig with axillary inflorescences

3 - Illustration of branchlet and leaves

40. LIVISTONA ROTUNDIFOLIA var. luzonensis

1.0 NAMES

Family	Palmae
Botanical	Livistona rotundifolia (Lam.) Mart. var. luzonensis Becc.
Common	Anahaw
Vernacular	anahaw (Laguna, Quezon, Mindoro, Ilocos Sur, Ilocos Norte).

2.0 DISTRIBUTION

2.1 Locality: It is widely distributed in the country although the fruiting season varies by climatic type.

2.2 Forest type and frequency: It grows naturally in forest but abounds more in open areas. An inventory in climatic type I, Mount Makiling, gave a stem density of 8 mature palms per hectare in the Molave type forest and 10 mature palms and 6.7 seedlings per hectare in the dipterocarp forest. In Atimonan Quezon (climatic type II), there are 6.7 seedlings per hectare, for climatic type IV represented by pakyas, Oriental Mindoro there are 2 mature palms and 6.7 seedlings per hectare.

3.0 DESCRIPTION

This is a tall graceful palm with an annulated trunk. Leaves fan-shaped, orbicular, flabellately plicate, and split to the middle into slender bifid lobes, with spinose margins; petioles long and spiny in their basal parts when mature. Inflorescences in the leaf-axils, long peduncled, loosely and narrowly panicled, elongated, pendulous in fruit; spathes many, small, tubular and sheathing. Flowers small, perfect. Sepals 3, imbricate; corolla-lobes 3, valvate; stamens 6, with filaments united in a ring. Fruit a small globose drupe, spherical even when young, apple green to olive green when fresh, turning orange when ripe and brownish violet when dried.

4.0 USE AS FOOD

The fruits of this species are eaten raw or are made into preserves. The buds are cooked and eaten as vegetables with coconut milk.

5.0 NUTRITIONAL VALUE

Approximate analysis of the fruits:

% Moisture	73
% Ash	0.64
% Crude fiber	16.26
% Crude protein	3.60
% Crude fat	1.92
% Ca	0.49
% P	0.09
% K	0.08
% N	0.58

6.0 OTHER USES

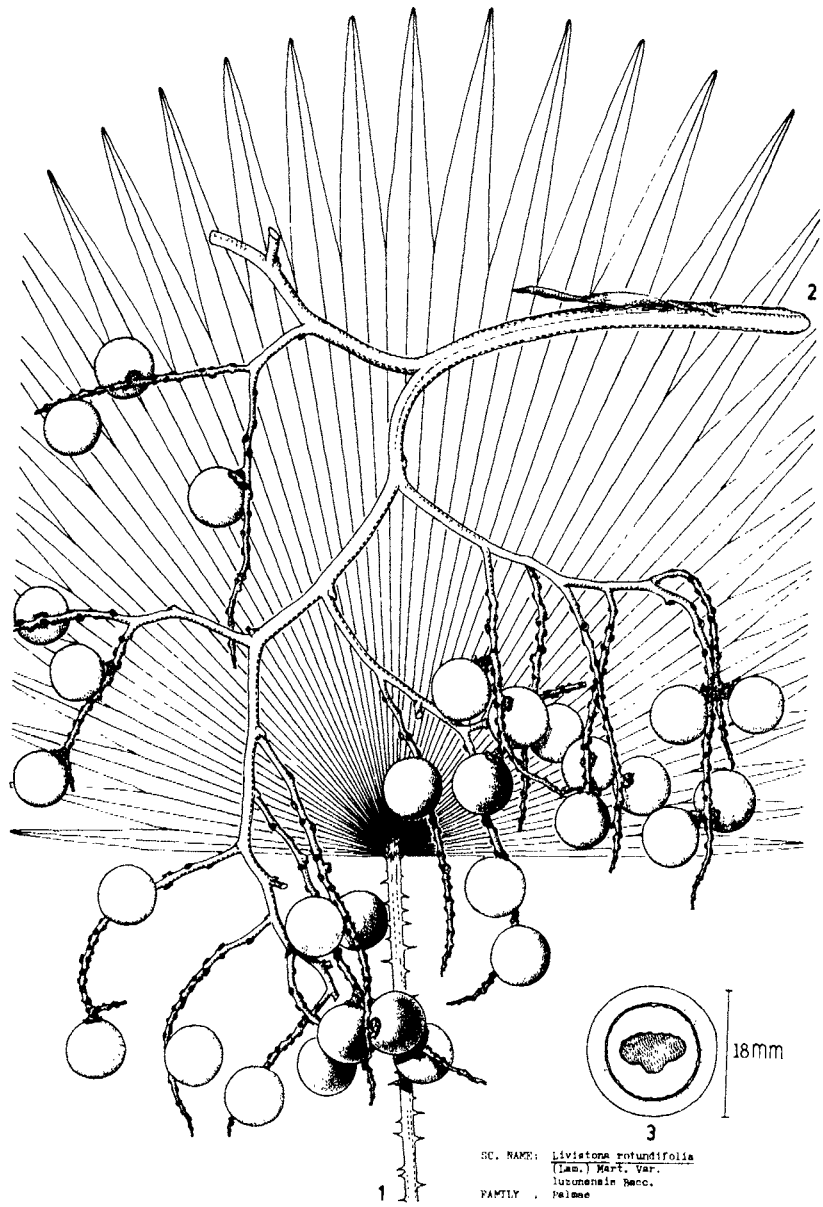
The trunks are used for pillars in houses, the outer part of the trunk is stripped then sliced and used for floors of houses, bow staves and spear shafts. The leaves are used for house roofing, sails for boats, native raincoats, hats and fans.

The plant is also used for ornamental purposes.

7.0 PROPAGATION

Anahaw is propagated by seeds.

PLATE XXXX. Livistona rotundifolia (Lam.) Mart. var. luzonensis Becc.



4

XXXX$_1$ - Spiked petiole and leaf

2 - Inflorescence

3 - Transverse section of fruit

4 - Illustration of growing plant

41. **MANGIFERA CAESIA**

1.0 NAMES:

Family	Anacardiaceae
Botanical	Mangifera caesia Jack
Common	Baluno
Vernacular	bauno (Basilan); baluno (Laguna, Zamboanga, Mindoro).

2.0 DISTRIBUTION

2.1 Locality: This species is reportedly found in Mindanao and neighboring islands and in the Sulu archipelago at low and medium altitudes in secondary forests.

2.2 Forest type and frequenoy: In the dipterocarp forest of Atimonan, Quezon representing climatic type II, there are 0.5 trees and 0.5 seedlings per hectare.

3.0 DESCRIPTION

Baluno is a large tree attaining a height of 25 meters and a diameter of 120 cm. Bark dark brown and fissured, branches drooping. Leaves smooth, with pointed bases and apexes. Fruit resembling the commonly cultivated mango. Flowers white.

4.0 USE AS FOOD

The fruit has a sour taste and is edible. When ripe, the fleshy pulp becomes sweet and has a pleasant taste. The seed kernels are also pounded with leaves of Solanum nigrum and used as a condiment with rice.

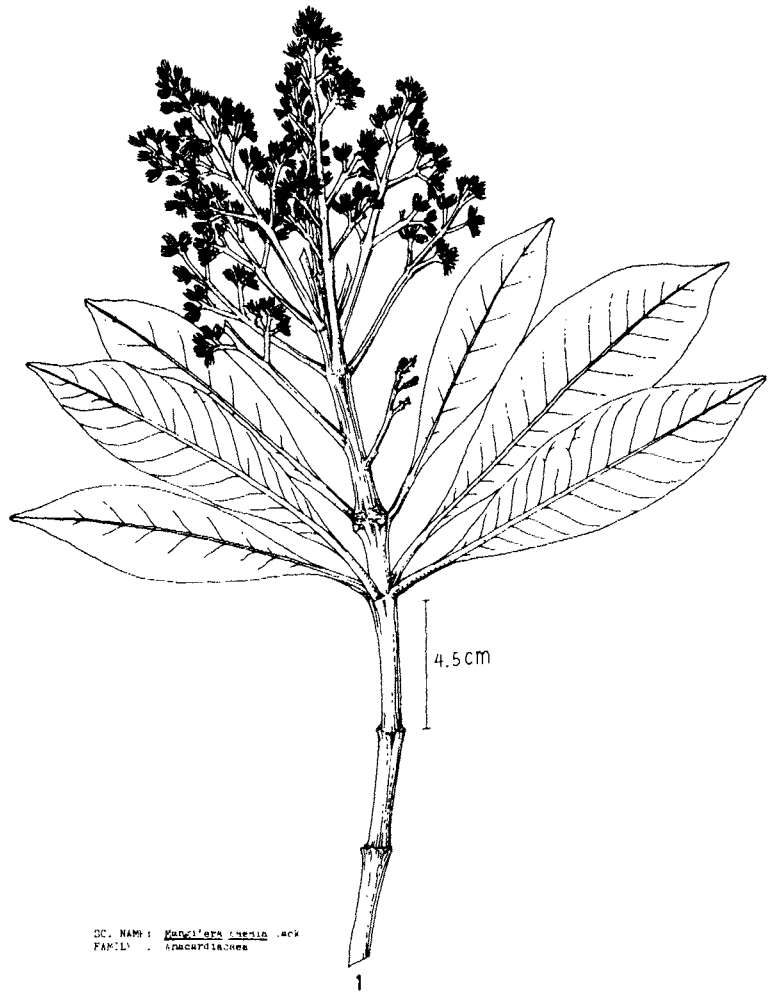
5.0 OTHER USES

The wood is used for wooden shoes and for light construction materials.

6.0 PROPAGATION

The propagation of Baluno is by means of seeds and also asexually using marcotted branches.

PLATE XXXXI. Mangifera caesia Jack



1

2

XXXXI$_1$ - Branchlet with leaves and terminal inflorescence

2 - Illustration of leaves

42. MIMUSOPS PARVIFLORA

1.0 NAMES:

Family	Sapotaceae
Botanical	Mimusops parviflora R. Br.
Common	Bansalagin
Vernacular	faffagan, pagpagan, pagpagin, palpagan, pappagan, patagan (Cagayan); kanikit (Ilocos Norte); gatasan, tatasan-mulato (Ilocos Sur, Nueva Ecija); pamalatien (Abra); pasak (Nueva Ecija, Bataan); anusep (Pampanga); kabiki (Bulacan); bansalagin (Tayabas, Cavite, Batangas, Sorsogon, Camarines, Mindoro, Ticao, Negros); igut (Masbate); talipopo (Culion); endoklay, samulagin (Palawan); lacharagon (Samar); patcharagon (Leyte); bansalagon (Negros); bansayagon (Surigao); lingo-lingo (Zamboanga); ligayan (Zamboanga, Sulu, Tawi-tawi); anak-katu (Tawi-tawi).

2.0 DISTRIBUTION

2.1 Locality: Bansalagin occurs from the Moluccas to New Caledonia and tropical Australia.

2.2 Forest type and frequency: This species is found in forest at low to medium altitudes, often immediately back of the beach, along the seashore and is very common and widely distributed from Northern Luzon to the Southern limits of the archipelago. The stem density in the dipterocarp forest of Mount Makiling, Laguna (climatic type I) is 1 tree and 0.5 seedlings per hectare.

3.0 DESCRIPTION

This tree, which has a dense crown, grows to a height of about 25 meters and a diameter of about 90 cm. Inner bark red, containing a sticky, milky sap. Leaves numerous, alternately crowded towards the end of the smooth twigs, sub-elliptic or oblong, about 10 cm long, 4 cm wide, pointed at the tip and blunt or somewhat rounded at the base. Flowers rather small, white, fragrant and usually borne in pairs in the axils of the leaves. Fruit oval, about 2-3 cm long and reddish or yellowish in color, with a firm outer covering and containing a single seed.

4.0 USE AS FOOD

The fleshy portion of the fruit surrounding the seed is aromatic and eaten raw.

5.0 OTHER USES

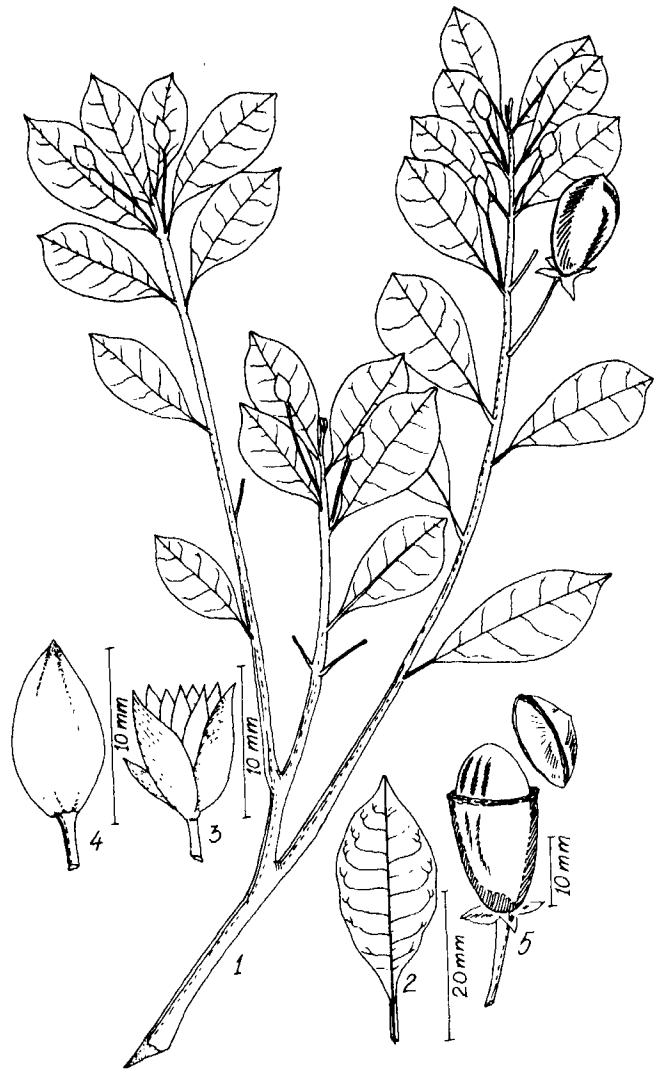
The wood is useful in the Philippines for ships' wheels, marlinespikes, fine tool handles, etc..

Guerrero (as cited by Quisumbing) states that the bark, as well as the ripe fruit, yields a powerful astringent remedy. Both are used as a gargle to strengthen the gums. They are further employed in lotions for ulcers, and in urethral injections for gonorrhoea.

6.0 PROPAGATION

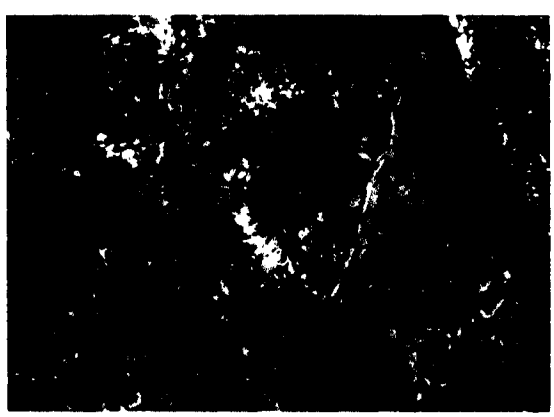
At present, this tree is propagated only by means of seeds.

PLATE XXXXII. Mimusops parviflora R. Br.



SC. NAME: Mimusops parviflora R. Br.
FAMILY : Sapotaceae

6



XXXXII$_1$ - Branchlet with leaves and fruit

2 - Leaf

3 - Flower

4 - Fruit

5 - Opened fruit

6 - Illustration of leaves in crown

43. MORINDA BRACTEATA

1.0 NAMES:

Family	Rubiaceae
Botanical	Morinda bracteata Roxb.
Common	Nino
Vernacular	nino (Laguna, Quezon, Mindoro).

2.0 DISTRIBUTION

2.1 Forest type and frequency: It is common in the valley and hill forest formations throughout the Philippines. In the dipterocarp forest of Pagbilao (climatic type II) the stand density is 0.5 trees and 0.5 poles per hectare.

3.0 DESCRIPTION

It is an erect shrub or small tree with slender, quadrangular, smooth young branches. Leaves very similar to those of M. citrifolia L. but often smaller. Leaf-like bracts always present, 1 to 1.5 cm long, subtending the flowers and persistent in the fruits. Flowers heads solitary, corolla yellowish white or with a reddish tinge on outside. Fruit a syncarp, yellowish white when mature, juicy.

4.0 USE AS FOOD

The fruit of this species is eaten raw when ripe.

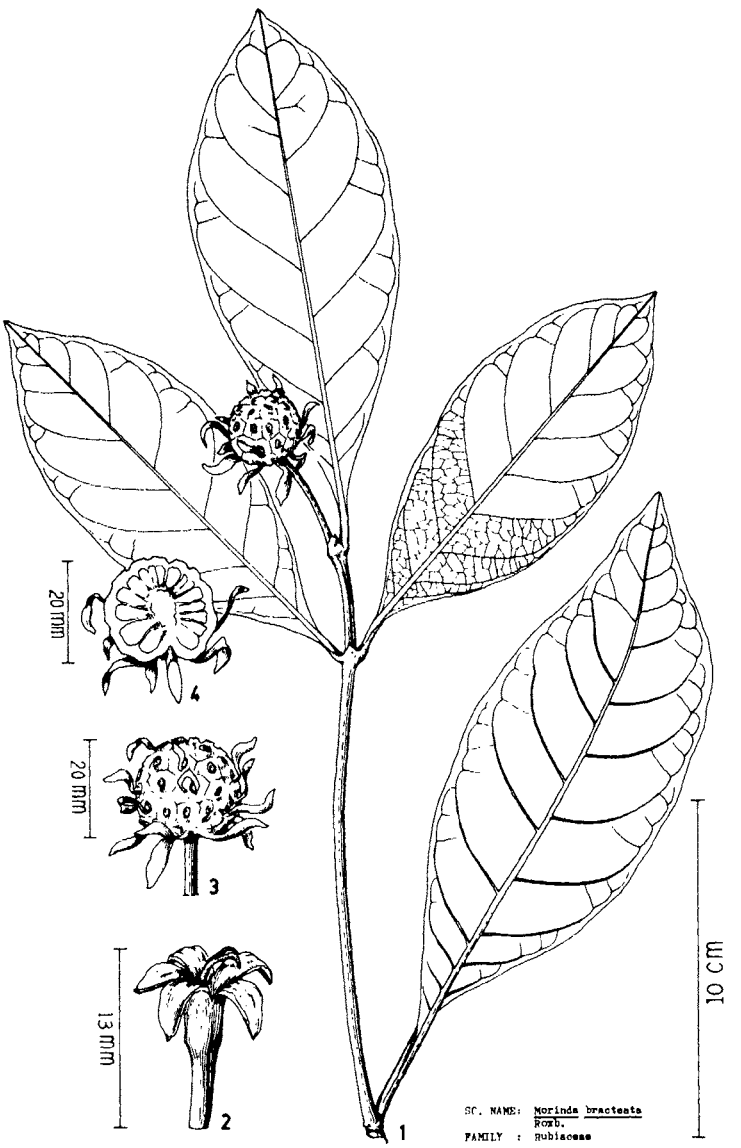
5.0 OTHER USES

There is no known economic use of this tree species so far except for fuelwood.

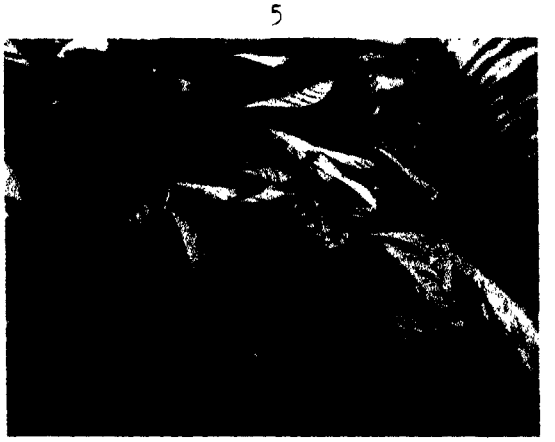
6.0 PROPAGATION

Nino is so far propagated only by means of seeds.

PLATE XXXXIII. Morinda bracteata Roxb.



5



XXXXIII$_1$ - Branchlet with leaves and fruit

2 - Flower

3 - Fruit

4 - Vertical section of fruit

5 - Illustration of leaves and fruit

44. MORINDA CITRIFOLIA

1.0 NAMES:

Family	Rubiaceae
Botanical	Morinda citrifolia L.
Common	Bangkoro
Vernacular	apatol (Batanes island); bangkoro (Laguna, Cuyo island, Cebu, Tayabas, Cotabato); bangkudo (Camarines Sur); Lino (Bataan); rukurok (Palawan); taing-aso (Mindoro); tumbong-aso (Manila).

2.0 DISTRIBUTION

2.1 Forest type and frequency: Morinda citrifolia L. is a small-sized tree commonly found along the seashore throughout the country, in thickets and second-growth forests. Inventory made in the mangrove forest of Pagbilao, Quezon, representing climatic type II, gave a density of 1 tree per hectare which shows that the species is diminishing in this locality. It is also found in India through Malaysia to Australia and Polynesia.

3.0 DESCRIPTION

Morinda citrifolia L. is an erect, glabrous shrub or small tree 3 to 10 meters high. Leaves broadly elliptic to oblong, obtuse, acute or slightly acuminate, 12 to 25 cm long, opposite; stipules more or less united into a short sheath. Flower heads dense, ovoid or globose, with flowers 1 to 1.5 cm in diameter. Fruits ovoid, fleshy, white or greenish-white, 3 to 6 cm long. Flowers not bracteolate, the calyx truncate, the corolla white, about 1 cm long, five-lobed, 1 cm in diameter.

4.0 USE AS FOOD

The fruit of this plant is eaten raw.

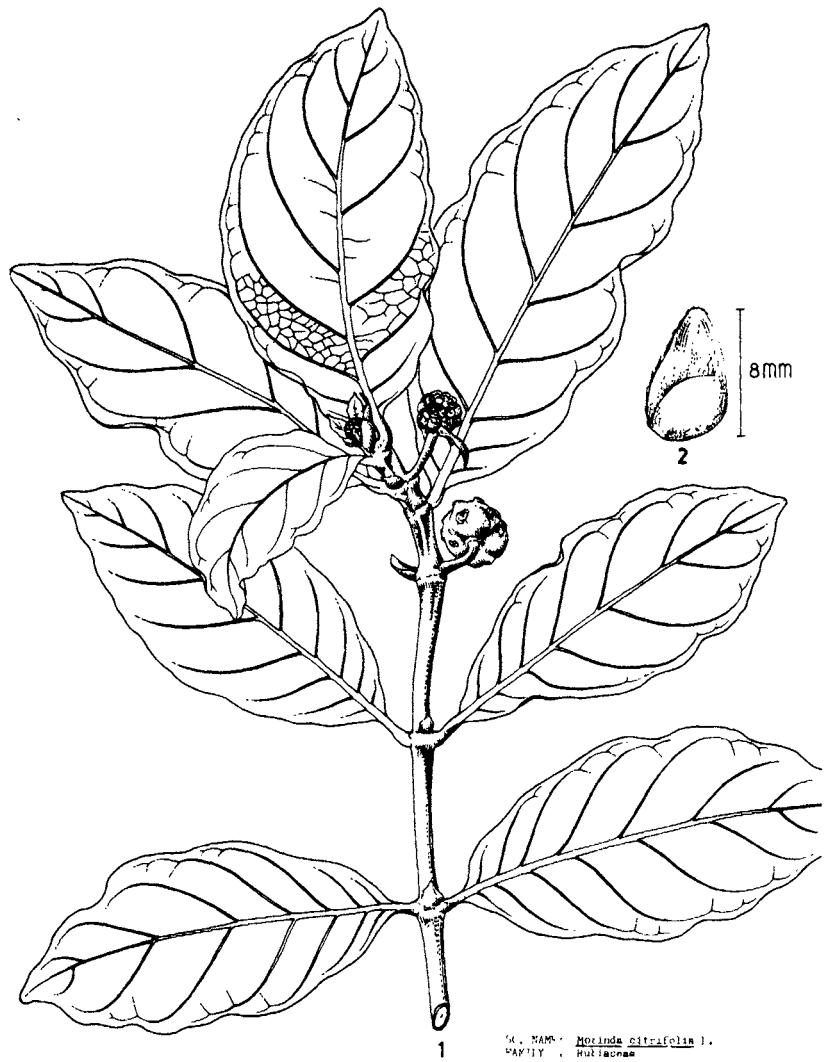
5.0 OTHER USES

The wood is generally used as fuelwood.

6.0 PROPAGATION

This species is propagated by means of seeds.

PLATE XXXXIV. Morinda citrifolia L.



3

XXXXIV$_1$ - Branchlet with leaves and fruit

2 - Seed

3 - Illustration of leaves and fruit

45. OROXYLON INDICUM

1.0 NAMES:

Family	Bignoniaceae
Botanical	Oroxylon indicum (L.) Vent
Common	Pinkapinkahan
Vernacular	pinkapinkahan (Laguna, Quezon, Mindoro).

2.0 DISTRIBUTION

2.1 Forest type and frequency: It is found in secondary forest at low and medium altitudes throughout the Philippines. Its stem density in the dipterocarp forest of Mount Makiling, Laguna (climatic type I) is 0.5 trees and 0.5 seedlings per hectare.

3.0 DESCRIPTION

It attains a height of 4 to 12 meters and a diameter of 20 cm with a few or no branches. Leaves up to 1.5 meters in length, 3-or 4-pinnate, with jointed rachis and branches and numerous, ovate, acuminate, acute, or obtuse leaflets 5 to 15 cm long. Racemes terminal, erect, flowering only at the apex, the peduncles and rachis 1 to 3 meters long. Calyx about 3 cm long. Corolla 6 to 7 cm long, dark-purple, fleshy, bell-shaped, unequal and five-lobed. Capsule 1 m long, 8 cm wide, 1 cm thick or less, flat, slightly curved; margins somewhat incurved or nearly straight, the valves woody, the septum thin. Seeds up to 6 cm in width which inoludes the very thin wings.

4.0 USE AS FOOD

The fruit of this species is delicious and eaten raw.

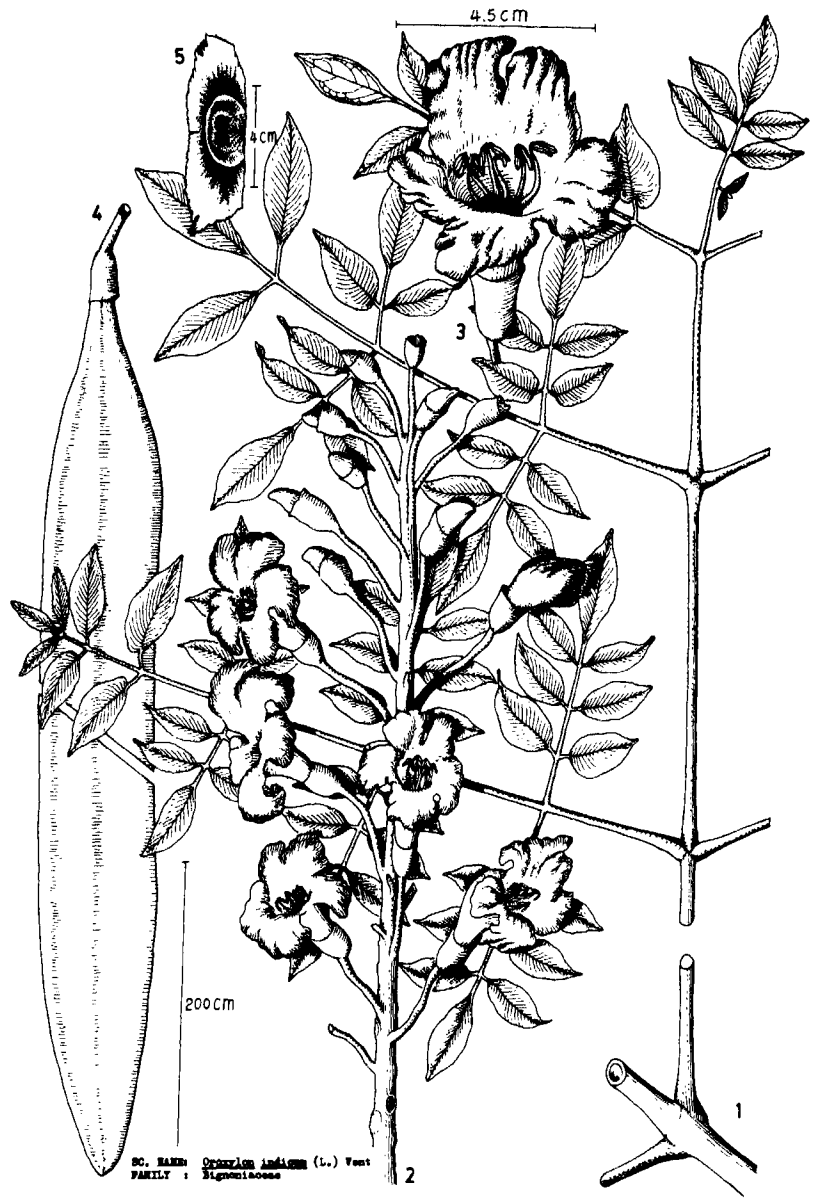
5.0 OTHER USES

So far there is no economic use known of this species except for its edible fruit and its wood used as fuelwood.

6.0 PROPAGATION

This is propagated by means of seeds only.

PLATE XXXXV. Oroxylon indicum (L.) Vent



5

XXXXV$_1$ - Branchlet and compound leaf

2 - Branchlet, buds, flowers and leaves

3 - Detail of flower

4 - Fruit

5 - Illustration of leaves in crown of tree

46. PANDANUS LUZONIENSIS

1.0 NAMES:

Family	Pandanaceae
Botanical	Pandanus luzoniensis Merr.
Common	Alas-as
Vernacular	alas-as (Laguna, Quezon); dasa (Batangas); pandin (Ilocos Sur, Ilocos Norte); pandan luzon (Manila).

2.0 DISTRIBUTION

2.1 Locality: Alas-as is an endemic plant of the Philippines but the distribution is confined to Luzon. It is generally found near rivers, creeks or moist areas in secondary forest at an elevation of 50-600 meters above sea level.

2.2 Forest type and frequency: From inventories conducted in the dipterocarp forests of Mount Makiling, Laguna (climatic type I), there are 2 mature plants per hectare; in Quezon National Park (climatic type II)
Oriental Mindoro (climatic type IV) 1.5 mature plants per hectare.

3.0 DESCRIPTION

Pandanus luzoniensis Merr. is an arborescent species reaching a height of 8.3 m. with an erect trunk of 9.5 to 20.5 cm in diameter, spreading and ascending branches of which the smallest measure 1.8 cm in diameter, and few short prop roots. Leaves very long and narrow measuring 1.3 to 2.2 meters long, and 2.3 to 3.2 cm wide, glabrous, with very long and narrow acuminate apex and antrorsely toothed margins throughout; midrib very prominent beneath with stout retrorse curved spines in basal portion, smooth in the middle, and with small antrorse spines in distal portion; upper surface of leaf glabrous except near the apex where there are two rows of small scattered teeth between the margins and the midrib; upper margins of apex finely serrate. Peduncle recurved, about 20 cm long with few foliaceous bracts towards the distal end. Inflorescence staminate, 19.5 to 31 cm long, fleshy, thickly branched, ascending, the lower branches 8.2 cm long; each branch subtended by a broad thin bract, 8.1 cm wide, the basal one abruptly contracted with foliaceous tip, approximately 31 cm long, the second and third bracts abruptly acuminate with more or less foliaceous tips, upper bracts smaller and acute. Stamens 4 to 9, with filaments united into a fleshy 3.9 to 8.1 mm long tube; anthers 2.1 mm long. Pistillate inflorescence not observed. Fruit solitary, subglobose, about 9.1 cm in diameter, with triangular peduncle thickening gradually upward, 20.1 cm long and 1.1 cm wide. In each head are 30 to 60 drupes, ovate or obovate, measuring 3 to 4 cm long and 2 to 2.6 cm thick, smooth and shiny, yellowish red when ripe, sharply angled, the upper third free, convexly pyramidal in shape with flattened apex 4.8 to 10.2 mm in diameter, slightly sulcate; flattened stigmas usually obscure. Seeds (nuts) edible numbering 6 to 10.

4.0 USE AS FOOD

The seeds are extracted from the ripe fruit and then either boiled or roasted. The seedcoat is then removed and the nut eaten. The fruit are also eaten by wild pigs.

5.0 NUTRITIONAL VALUE

Approximate analysis of the fruit showed the following; (Catibog, 1978):

% Moisture	6.13
% Ash	7.81
% Crude fiber	36.87
% Crude protein	12.06
% Crude fat	5.88
% Ca	1.53
% P	0.11
% K	1.34
% N	1.93

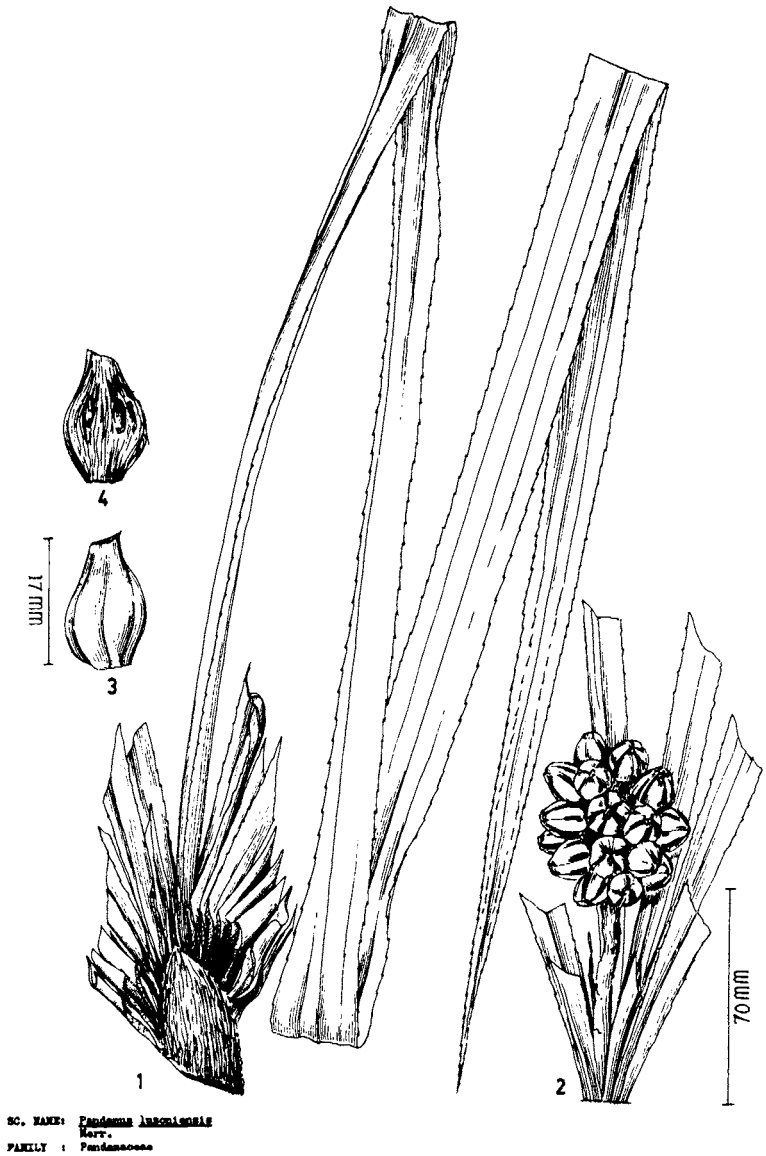
6.0 OTHER USES

This is planted in parks and in front of offices and houses as an ornamental. A decoction of the tip of the fresh or dried prop root is boiled and drunk as tea for diuresis in the rural areas.

7.0 PROPAGATION

Alas-as is propagated by seed or shoots. The latter, however, proved to be the faster means of propagating the plant.

PLATE XXXXVI. Pandanus luzoniensis Merr.



SC. NAME: Pandanus luzoniensis Merr.
FAMILY : Pandanaceae

5

XXXXVI$_1$ - Detail of leaf base, leaf and bud

2 - Inflorescence

3 - Fruit

4 - Longitudinal section of fruit

5 - Illustration of growing plant

47. PANGIUM EDULE

1.0 NAMES:

Family	Flacourtiaceae
Botanical	Pangium edule Reinw. ex Blume
Common	Pangi
Vernacular	pangi (Laguna, Quezon, Mindoro)

2.0 DISTRIBUTION

2.1 Locality: The species occurs abundantly in the **Peninsular Malaysia as well as** the Philippines.

2.2 Forest type and frequency: This tree is found in primary forest and clearings at low and medium altitudes. In Mount Makiling, Laguna (climatic type I) dipterocarp forest, there are 1 tree, 1 pole, 1 sapling to a hectare, whereas in Pakyas, Oriental Mindoro (dipterocarp forest-climatic type IV) stocking is 1 tree per hectare.

3.0 DESCRIPTION

Pangi grows up to a height of about 25 m and attains a diameter of about 50 cm. Lamina of leaves very large, smooth and leathery, broadly ovate or rounded, about 20 cm long, entire or lobed, with pointed apex and rounded or heart-shaped base. Petiole as long as lamina. Flowers yellowish green or whitish with a faint odor and about 4 cm wide. Fruit pendant upon a thick, brown stalk, ovoidly rounded, 10 to 20 cm in diameter, brown and rough, containing several seeds 3 to 5 cm across, compressed, somewhat angular and embedded in a yellowish, sweet, aromatic, edible pulp.

4.0 USE AS FOOD

The old leaves are shredded after removing the stouter veins and mixed with pigs blood, stuffed into a bamboo joint, boiled and eaten. The fresh seeds are said to be poisonous. However, by steeping and roasting them they become edible.

In Java, the oil is reportedly edible after prolonged boiling.

5.0 OTHER USES

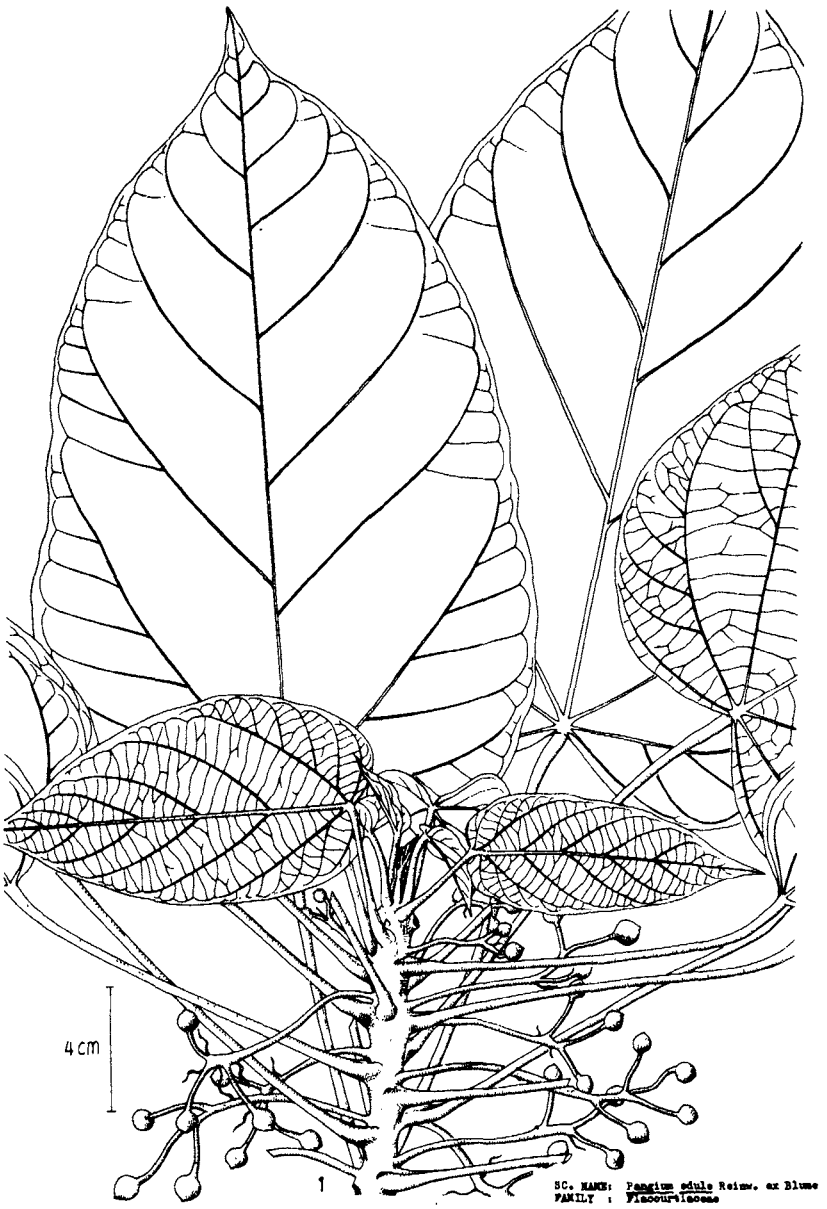
The oil is reportedly used as an illuminant and for making soap.

All parts of this tree are anthelmintic (Tavera as cited by Quisumbing 1951). The leaves, seeds, fruit and bark, according to Bocquillon-Limousin, have narcotic properties dangerous to man that may cause sleepiness, headache, intoxication, or delirium that may lead to death (Quisumbing 1951).

6.0 PROPAGATION

Pangi is propagated by means of seeds, these are extracted from the fruit, dried and directly seeded in the field.

PLATE XXXXVII. Pangium edule Reinw. ex Blume



2

XXXXVII$_1$ - Branchlet with inflorescences and leaves

2 - Illustration of leaves in crown

48. PARINARI CORYMBOSA

1.0 NAMES:

Family	Chrysobalanaceae
Botanical	Parinari corymbosa (Blume) Miq.
Common	Liusin
Vernacular	bitog, salifungan, salutui (Cagayan); karatakat (Cagayan, Ilocos Sur, Abra); bingas (Ilocos Norte, Isabela, Pangasinan, Tarlac); kagemkem, manolong (Ilocos Norte); aningat, manolong, sabongkaag (Ilocos Sur); tadiang-manok (Abra, Rizal); ping-gatingan (Tarlac); ansa, bakayan (Pangasinan); uas-uasa (Isabela); kulatingan, kulitingan (Nueva Ecija); kamulatingan, kamulitingan (Pampanga); liusin, luyusin (Bataan, Mindoro); ginayang (Rizal); anapiga, malapiyan, malasangke (Tayabas); kapgangan, katgagan, satdangan, tagdangan, takdngan (Mindoro); dilebaibai (Camarines); lanog (Masbate); tabon-tabon (Catanduanes Island); baret, bungog, sarangan (Samar); sapinit, tagpas (Guimaras); mata-mata (Leyte); langoog (Butuan); bagkangai, kamagaskas, langoog (Agusan); lankangan (Lanao); sigadaan, lumaluan (Cotabato); kankangan, kankangun (Davao); maluktit, mantalingan (Zamboanga); dumarga (Palawan).

2.0 DISTRIBUTION

2.1 Forest type and frequency: Often found on dry ridges in the lower hill dipterocarp forests. Survey and inventory made in the dipterocarp forests of Mount Makiling Laguna (climatic type I) showed 2 trees and 3.3 poles per hectare respectively.

3.0 DESCRIPTION

This is a large unbuttressed tree with a dense, dark crown consisting of a few strong branches with numerous fine, dark brown twigs. Bole slightly fluted, bent and twisted. Bark whitish to light grey with lenticels. Bole conspicuously covered with numerous narrow, elongated flakes. Leaves alternate, narrowly elliptic-lanceolate, often slightly asymmetrical and falcate; base slightly acuminate or acute, apex acuminate, 8 to 12 cm long and 3 to 3.5 cm wide. Both faces of the leaves are glabrous, with the upper face shiny and the lower face dull, leathery, with two small inconspicuous glands on the upper face at the base of the blade. Leaf petiole about 7 mm long, thick and woody. Fruit a drupe, 25 to 30 mm in length, green turning brown.

4.0 USE AS FOOD

The fleshy portion of the fruit is edible and eaten raw.

5.0 NUTRITIONAL VALUE

Approximate analysis (FRUITS)

% Moisture	13.57
% Ash	11.04
% Crude fiber	30.60
% Crude protein	32.88
% Crude fat	4.06
% Ca	0.51
% P	0.43
% K	4.01
% N	5.26

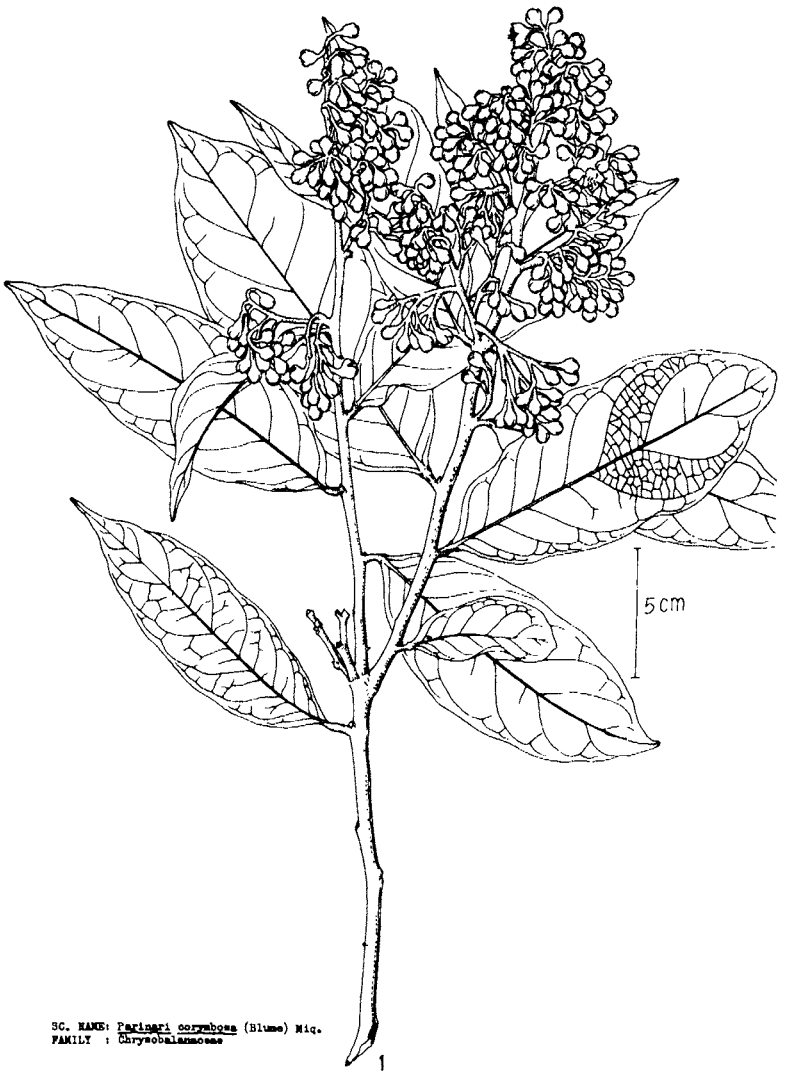
6.0 OTHER USES

This is a good source of lumber.

7.0 PROPAGATION

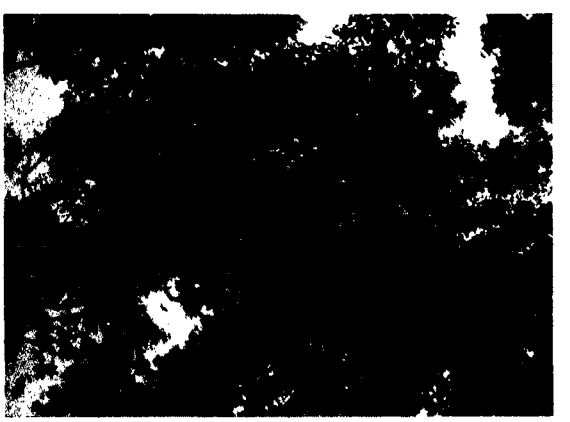
So far, propagation known is by means of seeds.

PLATE XXXXVIII. Parinari corymbosa (Blume) Miq.



1

2



XXXXVIII$_1$ - Branchlet with leaves and inflorescences

2 - Illustration of tree crown: foliage and flowers.

49. PARKIA ROXBURGHII

1.0 NAMES:

Family	Mimosaceae
Botanical	Parkia roxburghii G. Don
Common	Kupang
Vernacular	bagin, bullisan (Mount Province); kuyug (Pangasinan); kupang (Nueva Ecija, Bataan, Laguna, Rizal, Tayabas, Iloilo); maganhok (Masbate); aripa (Palawan).

2.0 DISTRIBUTION

2.1 Forest type and frequency: It is well scattered in the country in lower forested regions. In the dipterocarp forest of Mount Makiling, Laguna (climatic type I) the density is 2 trees per hectare.

3.0 DESCRIPTION

It is a large-sized buttressed tree attaining a height of 25 to 40 meters. Leaves bipinnate, 30 to 80 cm long, pinnae in 20-30 pairs, 8 to 20 cm long; leaflets in 30-70 pairs, linear-oblong, falcate, 6 to 12 mm long, closely set, shining above, and acute. Flower heads dense, obovoid or pyriform, axillary, long peduncled, up to 6 cm in length. Flowers white and yellow and about 1 cm long. Pods 25 to 30 cm long, about 3.5 cm wide, rather thick, pendulous, black and shining when mature, containing 15 to 20 seeds.

4.0 USE AS FOOD

The fleshy portion of the young pods of Kupang are eaten raw and the germinated seeds are eaten raw with chili and curry. It is slightly astringent.

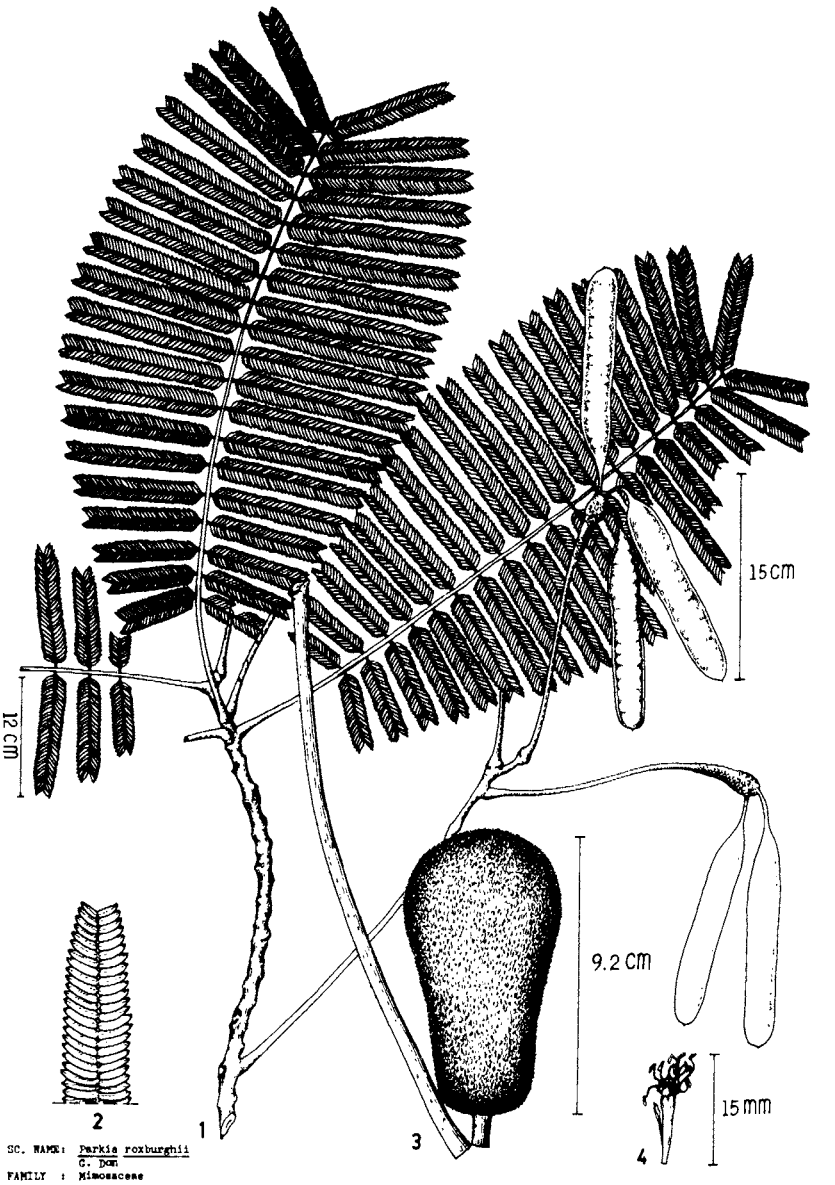
5.0 OTHER USES

Kupang is used for construction purposes and in the manufacture of wooden shoes (bakya). It could also be used in match-making and toothpick manufacturing.

6.0 PROPAGATION

Reproduction of this species is so far possible only from seeds.

PLATE XXXXIX. Parkia roxburghii G. Don



5

XXXXIX$_1$ - Branchlet with compound leaves and pods

2 - Detail of leaflet

3 - Inflorescence

4 - Individual flower

5 - Illustration of crown: pods and leaves

50. PASSIFLORA FOETIDA

1.0 NAMES:

Family	Passifloraceae
Botanical	Passiflora foetida L.
Common	Karunggot
Vernacular	lurunggut, masaflora (Bikol); karunggot, pasionariang-mabaho (Tagalog); taungon (Central Bisayas). It is called stinking passion flower in English and pasionaria que hiede in Spanish.

2.0 DISTRIBUTION

2.1 Locality: Passiflora foetida L. is a native of Tropical America and was introduced to the Philippines.

2.2 Forest type and frequency: It is now occasionally found in and about towns, in waste places, in thickets at low altitudes and logged-over opened areas in Rizal, Laguna, Leyte, Biliran, Mindoro, Bantayan, Cebu and in Mindanao. In oriental Mindoro (climatic type IV), the number of stems is 5 per hectare.

3.0 DESCRIPTION

This is a herbaceous, vine with slender, terete stems, covered with prominently villous hairs. Leaves ovate to oblong-ovate, 6 to 9 cm long, thin, shallowly three-lobed or often only sinuate, ciliate, acute or acuminate and with cordate base. Flower solitary, white or pinkish, about 3 cm in diameter, subtended by a prominent involucre of 3 bracts which are 1- to 3-pinnately divided into numerous segments, the ultimate segments glandular. Sepals about 1.5 cm long, pale, petals about as long as the sepals, white or pinkish. Corona 3-seriate, with slender segments. Fruit dry, inflated, ovoid, and 3 to 5 cm long. All the parts of the plant have a strong disagreeable odor.

4.0 USE AS FOOD

The fruit of this plant has a sweetish pulp and is edible when ripe.

5.0 OTHER USES

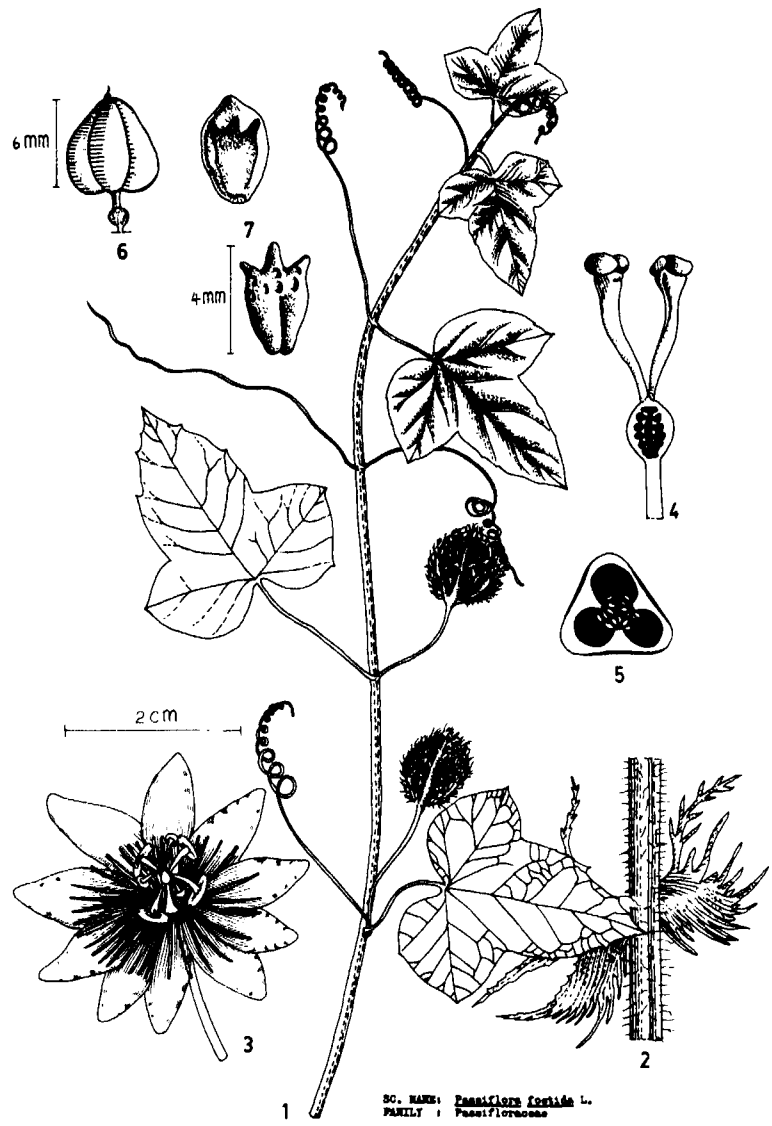
Among the potential economic uses of this plant is the medicinal. Passiflora foetida L. has mildy narcotic, astringent and soothing properties. It is employed as a sedative and analgesic in cases of itching, skin complaints, headaches, hemorrhoids and painful arthritic swellings.

It is also used for ornamental purposes.

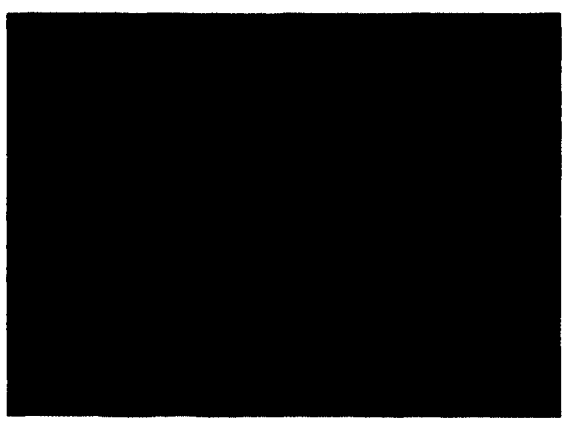
6.0 PROPAGATION

Propagation of this species is done by means of seeds.

PLATE L. Passiflora foetida L.



8



L_1 - Vine with leaves and fruit

2 - Detail of stem of vine with bracts

3 - Flower

4 - Longitudinal section of gynoecium

5 - Cross section of gynoecium

6 - Fruit

7 - Seed

8 - Illustration of vine, leaves and fruit

51. PILIOSTIGMA MALABARICUM

1.0 NAMES:

Family	Caesalpiniaceae
Botanical	Piliostigma malabaricum (Roxb.) Benth var. acidum Korth de Wit
Common	Alibangbang
Vernacular	alibang (Rizal); alibangbang (Laguna, Quezon); alambangbang (Batangas, Quezon); balibamban, kalibangbang (Pangasinan); kalibangbang (Ilocos Sur, Ilocos Norte); Malabar orchid (English).

2.0 DISTRIBUTION

2.1 Locality: Alibangbang is an endemic plant of the Philippines, however, its natural distribution is more or less confined to Northern and Central Luzon.

2.2 Forest type and frequency: It thrives on open dry slopes and in second-growth forests particularly in the early stages of the invasion of grassland. It is also found in other Asian countries like Malaysia and Indonesia. In the Ilocos region (climatic type I) inventories showed a density of 10 trees, 5 poles and 5 saplings per hectare. In Oriental Mindoro representing climatic type IV, the density was 2 trees and 2 poles per hectare; whereas in Quezon National Park, Quezon (climatic type II), inventories showed a density of 1 tree and 1 pole per hectare.

3.0 DESCRIPTION

Piliostigma malabaricum (Roxb.) Benth var. acidum Korth de Wit is a small to medium sized tree with widely spreading branches attaining a diameter of 41 cm and a height of 11 meters but seldom reaching a clear bole of 4 meters. Leaves are broader than long measuring 3.3 - 12.2 cm long by 4.8 - 16.3 cm wide, alternate, deeply notched at the apex, bilobed with 4-5 prominent nerves, glabrous on the upper surface, hairy and slightly glaucous underneath, with a cordate shape base. Racemes of flowers are dense, sessile axillary and measure 1.5 to 1.8 cm long; pedicels approximately 1.7 to 2.1 cm. Flower: calyx brown, tomentose 2.8 to 4.1 mm long, its limb 6.1 cm long; petals appearing oblong-obovate, corrugate in appearance 1.2 to 2.1 cm long and dorsally pubescent. The male has perfect stamens and a linear and rudimentary pistil; the female with 10 minute staminodes; ovary borne on a free stalk densely hairy; stigma broad and lobed. Flowers are large and white. Pod above remains of calyx borne on a long, linear, rather thick stalk measuring 1.8-2.6 cm, with a veined, corky indehiscent pericarp; seeds albuminous and numbering 10-31. Flowers have been observed during the months of October to November in the Ilocos region and July to October in Laguna and Quezon.

4.0 USE AS FOOD

The young leaves are sour and are used as a condiment. They are cooked together with fish or meat to give the soup a good smell and flavor. The species is well known in Luzon as a flavoring ingredient.

No analysis has been made so far on the constituents of the edible part.

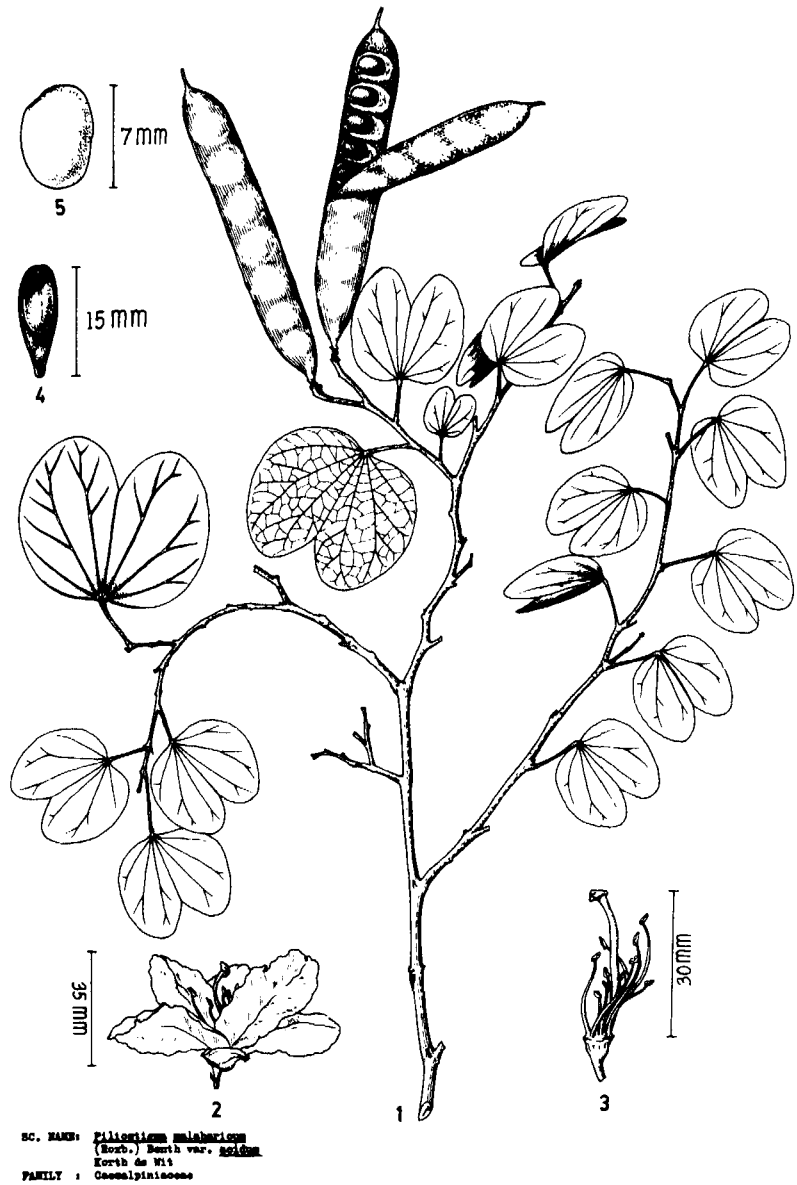
5.0 OTHER USES

The wood is used in the rural areas for temporary construction materials. It is also converted into wooden heels for certain types of women's slippers. It proved to be a good material for firewood and charcoal making. It is planted as an ornamental along roads, near offices, and in parks and gardens.

6.0 PROPAGATION

Alibangbang is propagated by seeds, cuttings or marcotting. By seeds, it is either directly seeded or raised in the nursery and outplanted in the field.

PLATE LI. Piliostigma malabaricum (Roxb.) Benth
var. acidum Korth de Wit



6

LI$_1$ - Leaflet with leaves and pods

2 - Flower

3 - Gynoecium with anthers

4 - Cross section of pod

5 - Seed

6 - Illustration of vine and pods

52. POMETIA PINNATA

1.0 NAMES:

Family	Sapindaceae
Botanical	Pometia pinnata Forst.
Common	Malugai
Vernacular	chai-i (Batanes); sida-i (Calayan, Batnes, Camiguin, Cagayan); laui, madala, madalo, madlau, talaburisu (Cagayan); malakobe (Isabela); kabokabot, kalambanan (Ilocos Norte); suket (Ilocos Sur, Ilocos Norte); doko (Launion); kirone, malatagum (Bulacan); aklam (Tagalog); bangked (Bataan, Batangas); kayani (Tayabas, Laguna); malugai (Laguna, Tayabas, Albay, Mindoro, Cebu); uyakya (Tayabas, Mindoro); agupanga, atam, bidoso, bioso, karangyan, karungyan, minamukai, sioso (Mindoro); bantog, malaguas (Camarines); kuglik (Bicol); kuyaue, tigaui, togaui, tugaui, turtugaui (Camarines, Albay, Catanduanes, Sorsogon, Masbate); bayod, goyod, moroboro (Albay); magtalisa, takuyan, takupan (Ticao); koyana (Catnaduances); aloyam, tonabug, baguso, bayuto, manggas (Palawan); bolokangan, daganon (Samar); alunipo, minamukai, balokang, ibu-madalo, mansanab (Negros Occ.); kia-kia (Leyte); kia-kia, gia-gia, kuakia (Masbate, Samar, Cebu, Bonhol); agupanga, kuhi (Iloilo); bayugon (Bohol); alinsoland, alinsuang, alisuang (Negros Occ., Bohol); nokalan (Surigao); alipanga, lipanga, lupangan (Palawan, Zamboanga, Zulu); ilio, ilo (Cebu, Davao, Bkidnon).

2.0 DISTRIBUTION

2.1 Forest type and frequency: This is a large tree commonly found along creeks and streams at low elevation. Inventories made in the dipterocarp forest of Mount Makiling gave 3.3 poles and 33.3 seedlings per hectare, and 4 trees, 3.3 poles, 10 saplings and 206.5 seedlings per hectare in the Molave forest (climatic type I). In the dipterocarp forest of Pakyas, Oriental Mindoro (climatic type IV), there were 6.7 poles and 6.7 saplings per hectare respectively.

3.0 DESCRIPTION

It attains a diameter of about 80 to 100 cm with irregular, fluted and crooked bole, a dense crown with dark green foliage and steep buttresses about 1.5 m high. Bark ochre-brown or dark grey, smooth but flaking-off in rounded patches or irregular flakes leaving scars on the tree trunk. Leaves closely alternate and spirally arranged at the ends of the grooved twigs; even-pinnate with 4 to 9 pairs of leaflets, the rachis 20 - 30 cm long. In young trees, there are up to 16 pairs of leaflets, the rachis up to 100 cm. Leaflets large and broadly lanceolate or oblong, 12 to 18 cm, 4 to 7 cm wide, the apex broadly acute or obtuse, the lower leaflets reduced to bracts. In young trees, the leaflets are acuminate, up to 40 cm long. Leaf base broadly acute or obtuse, margins serrate, the upper face glabrous while the lower face has occasional soft short hairs on midrib and side veins. Petiole short, about 2 mm, and thick. Fruit an ovoid drupe, about 2.5 cm long, red when ripening then black.

4.0 USE AS FOOD

The fruit is eaten raw.

5.0 NUTRITIONAL VALUE

Approximate analysis of the fruits yielded the following:

% Moisture	73
% Ash	4.36
% Crude fiber	39.90
% Crude protein	4.36
% Crude fat	4.42
% Ca	0.77
% P	0.12
% K	0.34
% N	0.70

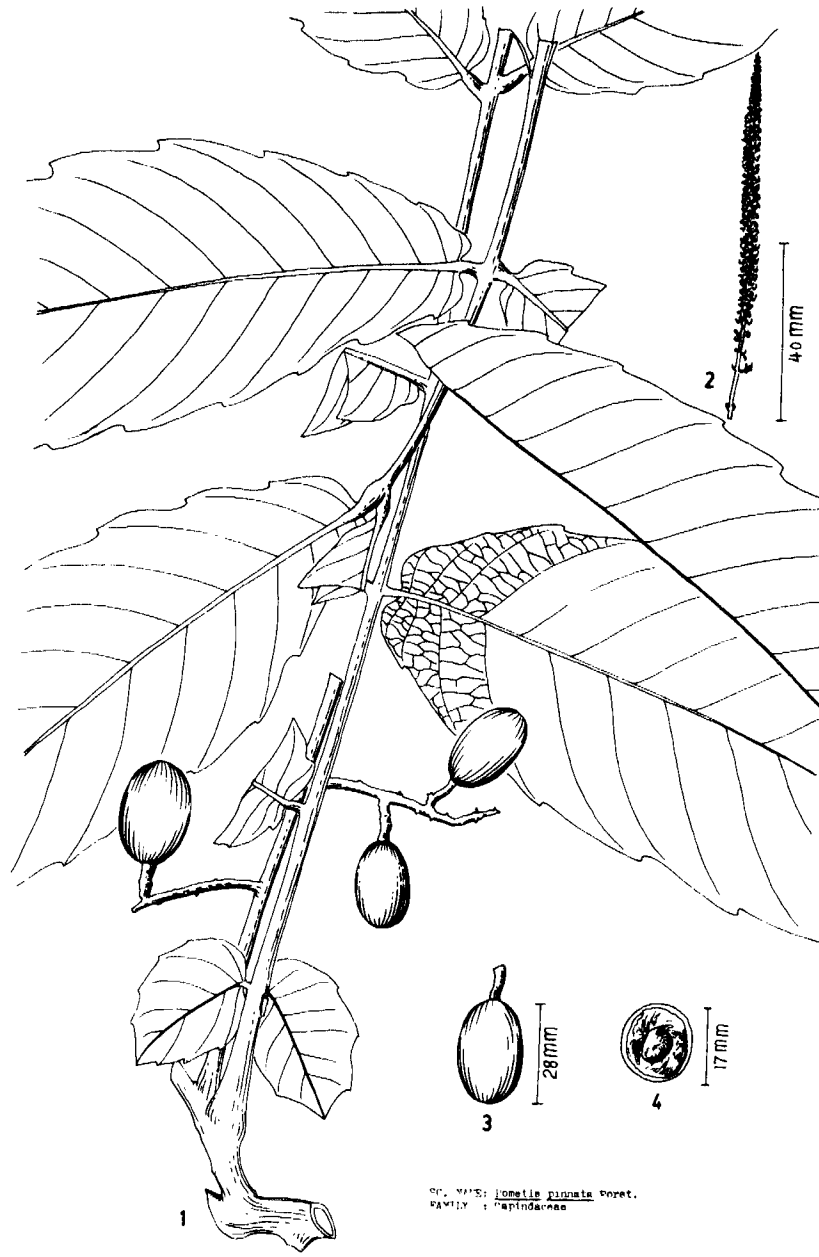
6.0 OTHER USES

This tree can be used for construction purposes. It could also be utilized in the manufacture of rims of tennis rackets and for tool handles such as cant hooks and peavies. It is also used as a substitude for white ash and for airplane construction.

7.0 PROPAGATION

This tree is propagated by means of seeds.

PLATE LII. Pometia pinnata Forst.



5

LII$_1$ - Branchlet with leaves and fruits

2 - Inflorescence

3 - Fruit

4 - Transverse cross section of fruit

5 - Illustration of foliage

53. PORTULACA OLERACEA

1.0 NAMES:

Family	Portulacaceae
Botanical	Portulaca oleracea L. Sp. Pl.
Common	Gulasiman
Vernacular	golasiman, kolasiman, makabling, sahikan (Tagalog); bakbakad, lungum (Ifugao); ngalog (Ilocano); alusiman, gulasiman, olasiman, ausiman, sahikan, ulisiman (Bikol); dupdupol, langum (Bontoc); tagalbag-dikol (Pinatubo Negrito); kantataba (Pangasinan); ulasiman (Camarines); olasiman (Leyte); purslane (English).

2.0 DISTRIBUTION

2.1 Locality: Gulasiman is endemic to the Philippines and is widely distributed from Luzon to Mindanao.

2.2 Forest type and frequency: It is oonsidered as a common weed and thrives in open areas adjacent to settled areas, unirrigated farmlots and along seashores that contain minimum surface soil. Results of field inventory showed a density per hectare of 20 young and 25 mature (flowering) plants near the beach and mangrove areas of Pangasinan (climatic type I); and 15 young and 10 mature plants per hectare in Pagbilao, Wuezon (climatic type IV).

3.0 DESCRIPTION

This is an annual plant with prostrate or spreading succulent smooth branches usually appearing as a purplish colored herb. The stems measure 9 to 52 cm in length and the biggest portion 1.2 cm in diameter. Leaves flat, succulent, oblong-ovate with wedge-shaped base and obtuse apex, 0.9 to 3.2 cm long. The flowers occur as yellow, sessile, axillary and terminal few-flowered heads that are solitary or cymose, the buds appearing compressed. Each flower with 8 to 12 stamens, and five yellow petals which have approximately the same length as the sepals and are notched at the tip. The species blooms throughout the year, however the flower opens only in the morning. Fruit capsule-shaped, splitting horizontally when mature to release minute, dark-brown heart shaped seeds.

4.0 USE AS FOOD

The young stems together with the leaves are boiled for 2-3 minutes then drained of water and mixed with tomatoes and onions as salad. In other cases it is cooked with pork or fish as condiment. The leaves are prepared as sauce because of its sour taste. In most cases it is cooked and served like spinach. Sometimes the tender and fleshy stems are made into pickles. The leaves and stems are commonly given to hogs as food supplement in the rural areas.

5.0 NUTRITIONAL VALUE

An analysis of the mineral and vitamin contents of gulasiman showed these findings (Catibog, 1978):

Mineral contents (mg/100 g)	
Ca	135
P	36
Fe	4.9
Na	262
K	290

Vitamin contents

A	6,660 I.U.
B_1	6
B_2	16
B_3	1.1
C	51

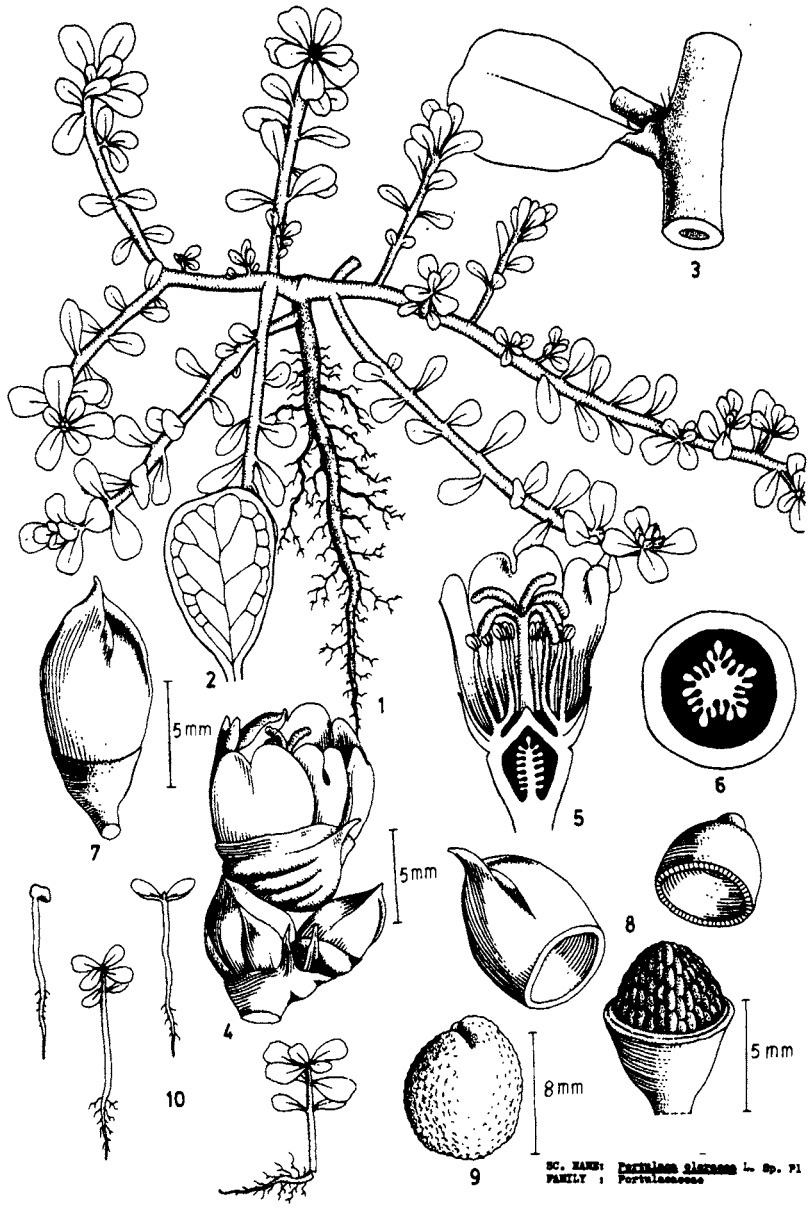
6.0 OTHER USES

The juice from the stems is used in the Philippines by rural folks as a medicine to relieve the itchiness of prickly heat and burning sensations of the hands and feet. The seeds are known to have a soothing effect on intestinal mucous membranes and are therefore used effectively to alleviate the pains caused by dysentery. Both stems and leaves are used as a diuretic, anti-hemorrhage and vulnerary.

7.0 PROPAGATION

This plant is propagated by seeds and asexually by cuttings from the matured stems.

PLATE LIII. Portulaca oleracea L. Sp. Pl.



LIII$_1$ - Fleshy plant with leaves and roots

2 - Leaf

3 - Leaf and leaf-base

4 & 5 & 6 - Flower and cross-sections thereof

7 - Flower bud

8 - Capsular fruit

9 - Seed

10 - Seedlings

54. RHIZOPHORA MUCRONATA

1.0 NAMES:

Family	Rhizophoraceae
Botanical	Rhizophora mucronata Lam.
Common	Bakauan-babae
Vernacular	bakauan-babai (Tayabas, Bataan, Batangas, Zamboanga); bakauan (Tayabas, Camarines, Mindoro, Palawan, Zamboanga); bakao, bakhaul (Tayabas, Polillo, Samar, Iloilo, Negros, Palawan, Agusan, Zamboanga); baka-bahi (Tayabas, Polillo, Zamboanga); bakauan-puti (Masbate); bakau-tubig (Zamboanga).

2.0 DISTRIBUTION

2.1 Forest type and frequency: This is a tree of the mangrove swamps. It is found in mangrove swamps and along tidal streams throughout the Philippines and along the tropical shores of Asia, Africa and Malaysia. Inventories made at the mangrove forest of Pagbilao, Quezon (climatic type II) gave a tree density of 2 trees, 1 pole, and 1 sapling per hectare.

3.0 DESCRIPTION

Rhizophora mucronata Lam. is a medium-sized tree attaining a height of up to 12 meters and with stilt roots. Leaves oblong-elliptic, coriaceous, shining, 16 cm long, apex with a slender mucro. Peduncles axillary, 2.5 to 4 cm long, about as long as the petioles, forked at the apex, bearing 3 to 7 sessile flowers. Fruit ovoid, pendulous, brown or olivaceous, about 4 cm long, the persistent calyx-lobes reflexed, the protruded radicle, green, cylindrical, 20 to 40 cm long.

4.0 USE AS FOOD

The fruits are eaten raw and the young shoots are cooked and eaten as vegetables.

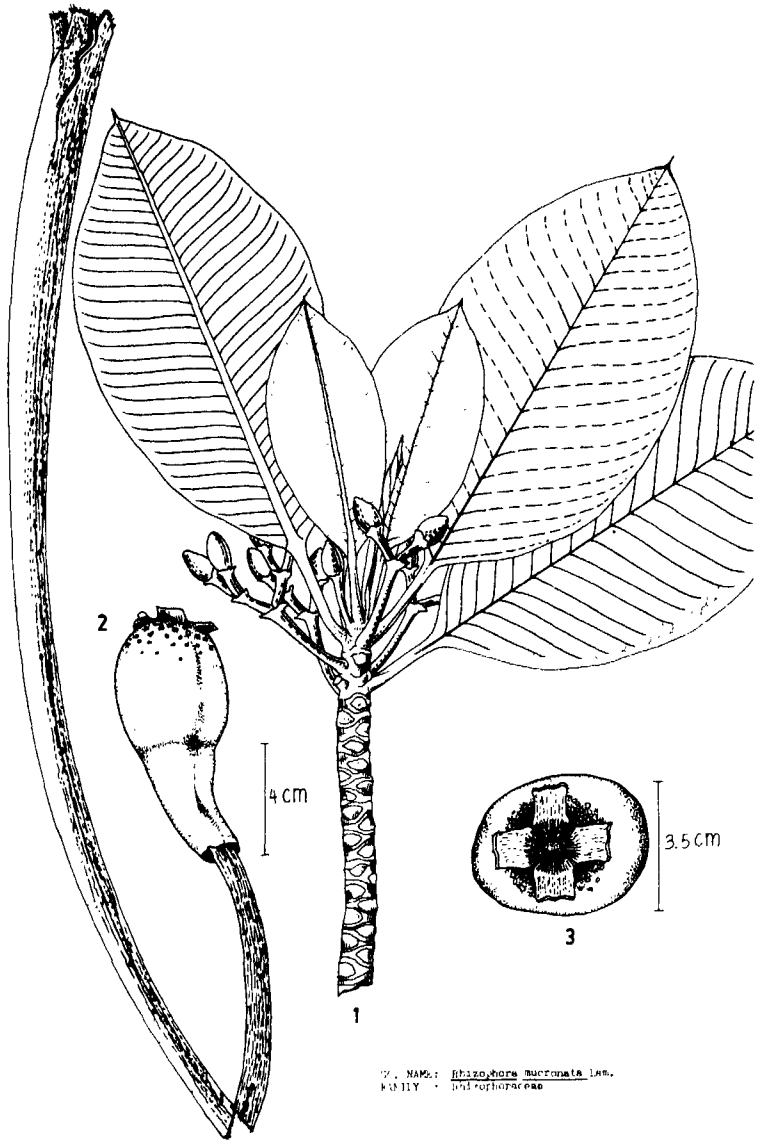
5.0 OTHER USES

Bakauan-babae is a source of quality firewood. It is also used for construction purposes and in the manufacture of fine tool handles.

6.0 PROPAGATION

This mangrove species is propagated by means of seeds, already germinated while on the mother tree, which are dispersed directly on the area where the mother seed tree is located; their dispersal is also influenced by the sea waves or currents that disperse them further to other places.

PLATE LIV. Rhizophora mucronata Lam.



LIV_1 - Branchlet with leaves and buds

2 - Fruit with long peduncle

3 - View of upper end of fruit

55. RUBUS ELMERI

1.0 NAMES:

Family	Rosaceae
Botanical	Rubus elmeri Focke
Common	Bunot
Vernacular	bunot (Laguna, Mount Province); subit, subat (Bontoc).

2.0 DISTRIBUTION

2.1 Locality: This is an endemic plant of the Philippines which thrives in mossy forest at an altitude of 1,300 to 3,200 meters above sea level.

2.2 Forest type and frequency: It was observed growing naturally in the cold areas of Luzon and Mindanao. Inventories showed a density of 5 mature and 2 young plants per hectare in Bontoc, Mount Province; 3 mature and 1 young plant in Mount Makiling, Laguna, both representing climatic type I, and 3 mature plants in Bukidnon (climatic type III).

3.0 DESCRIPTION

Rubus elmeri Fooke is a scrambling shrub attaining a height of about 2.2 meters and a stem of 1.5 cm diameter which is equipped with few small spines measuring up to 1 cm long. The young stem, flower buds, petioles and undersurface of the leaves are velvety, the upper leaf surface green. Leaves alternate, heart shaped, with prominent and distinct midrib and lateral veins and toothed margins, varying from entire to 3-5 lobed. Flowers white, solitary or borne in clusters. Fruit berry-type, edible, reaching a diameter of 1.7 cm, with a yellow-orange color when ripe and a sweet-sour taste.

4.0 USE AS FOOD

The ripe fruits are eaten by man, deer, and birds.

No analysis has been made so far on the constituents of the edible parts.

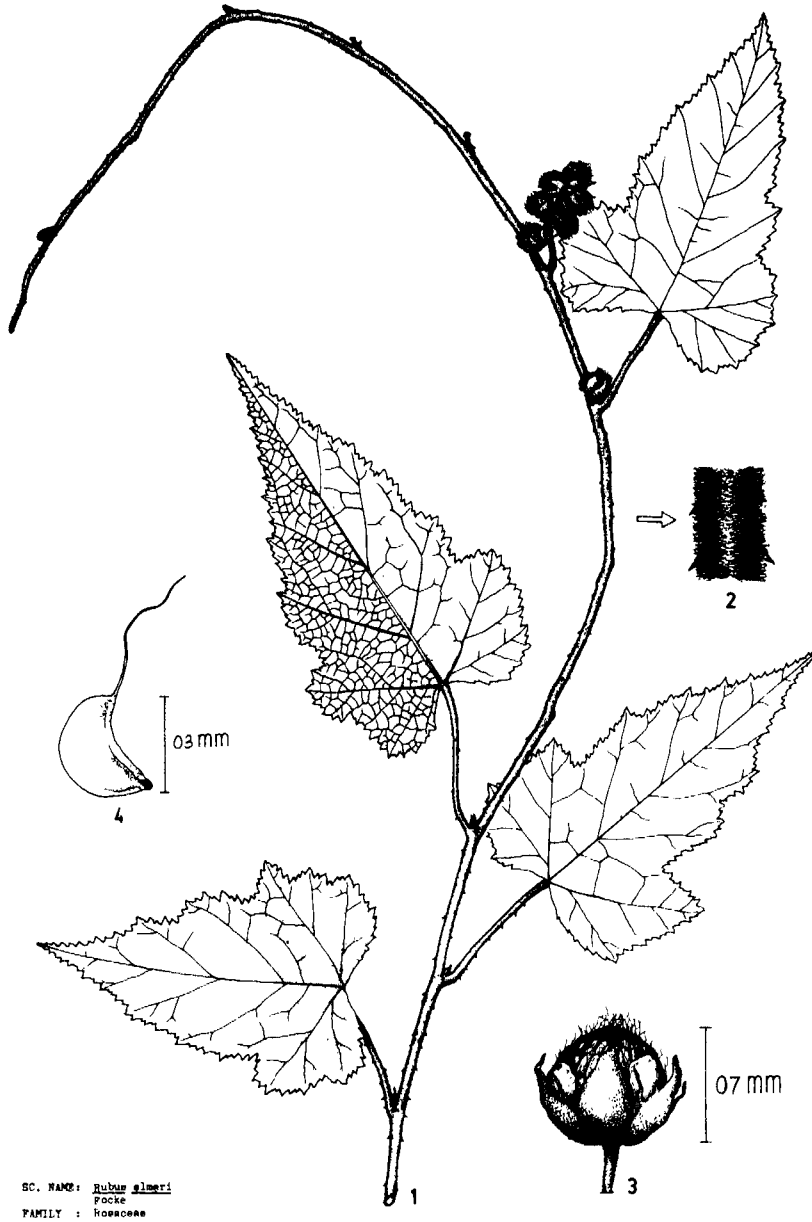
5.0 OTHER USES

Todate no other uses are known of this plant except for its edible fruits.

6.0 PROPAGATION

Bunot propagates itself by seeds in its natural habitat; however, it may be possible to propagate it asexually by cuttings like the other members of the family Rosaceae.

PLATE LV. Rubus elmeri Focke



5

LV_1 - Vine with leaves and fruit

2 - Detail of thorny vine stem

3 - Fruit

4 - Individual carpel

5 - Illustration of vine, leaves and fruit

56. RUBUS PECTINELLUS

1.0 NAMES:

Family	Rosaceae
Botanical	Rubus peotinellus Max.
Common	Atibulnak
Vernacular	atibulnak (Laguna, Quezon); apukid (Ifugao); bagalbalon (Benguet); bana, kalapachap (Bontoc).

2.0 DISTRIBUTION

2.1 Locality: Atibulnak is an endemic plant of the Philippines. It thrives commonly in mossy forest or in localities at low elevations but with moist/cold environment. It was observed to be growing in the cold area of Luzon and Mindanao.

2.2 Forest type and frequency: Inventories showed a density of 2 mature and 2 young plants in Ifugao (climatic type I); none in Quezon National Park (climatic type II); and 2 mature and 3 young plants in Bukidnon representing climatic type III.

3.0 DESCRIPTION

Rubus pectinellus Max. is characteristically a trailing plant. The stem measures 0.5 to 1 meter in length and a diameter of 0.2 - 0.5 cm at the biggest portion. Leaves alternate, rough, hairy, heart-shaped, with toothed margins and a diameter ranging from 3 to 6 cm, upper and lower surface green with the upper surface darker in color. Calyx, stems and leaves armed with fine, small spines. Flowers white, measuring 2 cm or more in diameter when fully opened; fruit 1.4 to 1.6 cm in diameter, edible, bright red in color when ripe with a juicy sub-acid flavoured taste.

4.0 USE AS FOOD

The fleshy pulp of the ripe fruit is eaten raw by man, birds and deer.

No analysis has been made so far on the constituents of the edible parts.

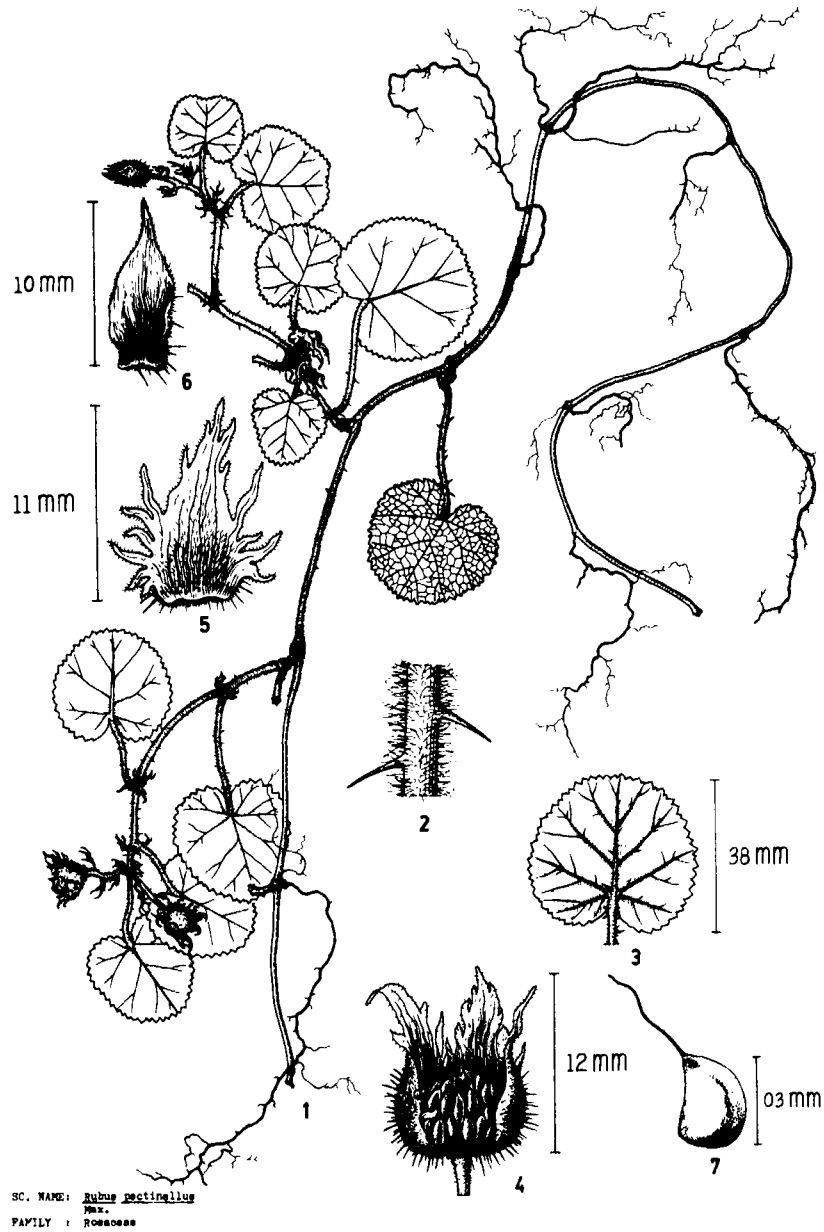
5.0 OTHER USES

No uses are known of this plant, other than the use of its fruits that serve as food for man and animals.

6.0 PROPAGATION

Atibulnak is not cultivated and it propagates itself in its natural habitat by seeds.

PLATE LVI. Rubus pectinellus Max.



8

LVI$_1$ - Vine with leaves and flowers

2 - Detail of spines

3 - Detail of leaf

4 - Interior of flower

5 & 6 - Corolla and calyx with fine spines

7 - Carpel

8 - Illustration of vine and leaves

57. RUBUS ROSAEFOLIUS

1.0 NAMES:

Family	Rosaceae
Botanical	Rubus rosaefolius L.
Common	Sapinit (Wild Strawberry)
Vernacular	init, pinit (Ilooos Sur, Ilocos Norte); sapinit (Laguna, Quezon); ragini (Bicol); lagiawat (Lanao); buhuit, pagar (Ifugao); balaungan, pupugan, palanau (Bontoc); tugas-tugas (P. Visaya); talagiawat (Bukidnon); wild strawberry (Davao).

2.0 DISTRIBUTION

2.1 Locality: Sapinit (wild strawberry) is endemic to the Philippines and is widely distributed in open secondary forests from Luzon to Mindanao at low to medium altitude, especially where there is abundant soil moisture and rather fertile soil.

2.2 Forest type and frequency: Inventories made in the dipterocarp secondary forests of Palawan (climatic type III) gave a density of 3 mature and 2 young plants per hectare; 2 mature and 1 young plant per hectare in Quezon National Park (climatic type II); 2 mature plants per hectare in Pakyas, Oriental Mindoro (climatic type IV); and 2 mature plants per hectare in Mount Makiling, Laguna for climatic type I.

3.0 DESCRIPTION

Rubus rosaefolius L. is a spiny rubiaceous branchy shrub that grows up to a height of 1.5 meters and a diameter of 3 cm. Leaves pinnate, consisting of 3 to 7 leaflets. Leaflets smooth or hairy, with prominent and distinct midrib and lateral veins, a green upper and pale green lower surface, lobed margins and measuring 1.9 to 7.2 cm long by 2-3 cm wide. Flowers white; fruits berry-type resembling the shape of the cultivated strawberry but measuring only up to 3 cm in length and 1.8 cm in diameter at the fruit base, orange-red color when ripe and with a sweet sour flavoured taste. Seeds very many, minute, semiflat, 0.1 cm long by 0.05 cm wide and brown in color.

4 0 USE AS FOOD

The ripe berries are picked and eaten raw. These are also made into jams like the cultivated strawberry. In the forest, the fruits and young leaves serve as food for birds and deer.

No analysis has been made so far on the constituents of the edible parts.

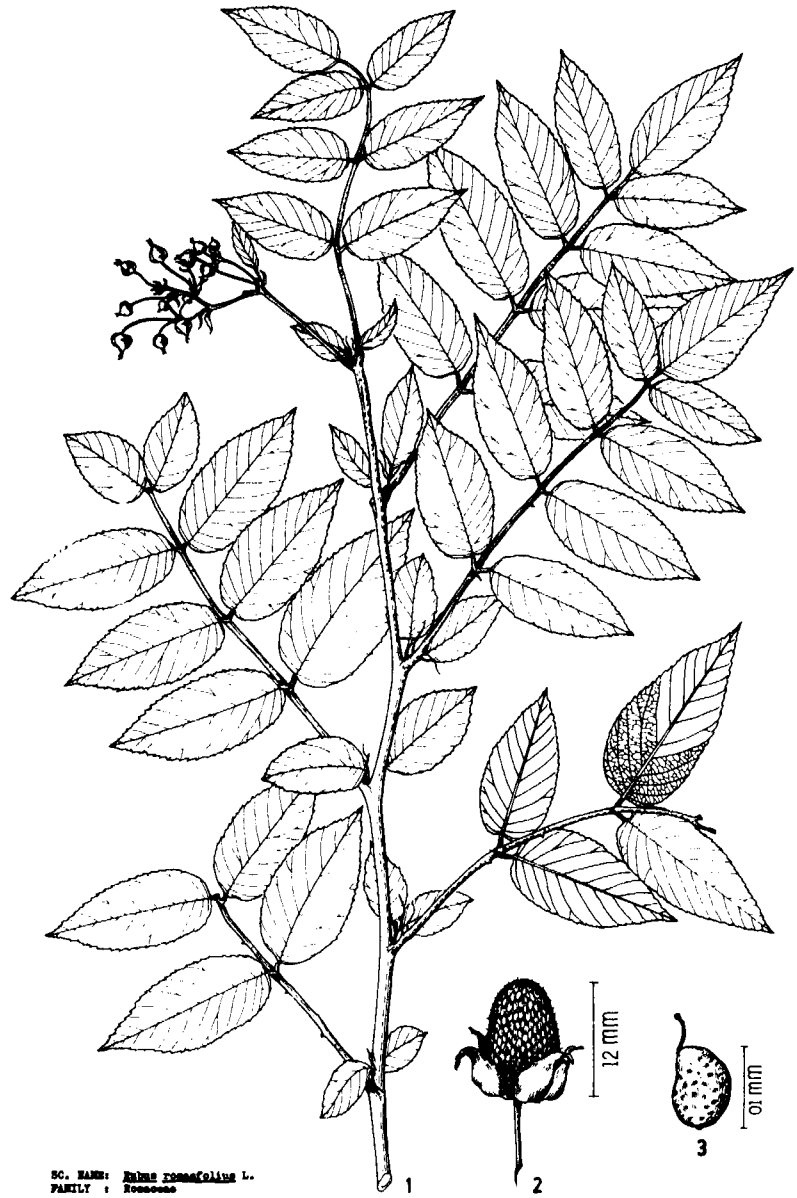
5.0 OTHER USES

So far no other uses are known of this plant except for its edible fruits.

6.0 PROPAGATION

This plant propagates itself by seeds in its natural habitat.

PLATE LVII. Rubus rosaefolius L.



5

LVII$_1$ - Branchlet with leaves and inflorescence

2 - Fruit

3 - Carpel

4 - Illustration of vine with leaves and fruit

58. SEMECARPUS GIGANTIFOLIA

1.0 NAMES:

Family	Anacardiaceae
Botanical	Semecarpus gigantifolia Vid.
Common	Manalu
Vernacular	anagas-babae, anagas (Quezon, Mindoro); isip (Bontoc); ligas (Batangas); topo (Bicol); manalu (Laguna); topo (Camarines); tukod-langit (Bataan).

2.0 DISTRIBUTION

2.1 Locality: Manalu is endemic to the Philippines and is distributed from Luzon to Mindanao.

2.2 Forest type and frequency: It is commonly found in the dipterocarp forests at low and medium altitudes. This plant, however, is becoming extinct because of "kaingin occupations" that destroy its natural habitat. Inventories made in Pagbilao, Quezon (climatic type IV) gave a density of 1 sapling and 1 tree per hectare; in Palawan climatic type III), the density was 1 tree per hectare; while in Leyte (climatic type II) the density per hectare was 1 tree and 2 seedlings, compared to that of Mount Makiling, Laguna (climatic type I) with a density of 2 poles per hectare.

3.0 DESCRIPTION

Semecarpus gigantifolia Vid. is a medium-sized to large tree that growns to a height of 16 meters and a diameter of 52 cm. It has brownish bark and very large leaves measuring up to 21 cm in length and 6 cm wide with ovate base and acute apex. Flowers small, borne in large compound inflorescences. Flowers bloom from April to May. Fruits fleshy, juicy, measuring 2.9 to 4.1 cm long and with a deep purple color when ripe. They are produced in abundance at the trunk in panicles which are 9 to 41 cm long and are edible when ripe although somewhat astringent. The tree produces a watery sap oxidizing to a blackish colour, irritating to the skin and poisonous if swallowed.

4.0 USE AS FOOD

When the fruit is ripe, it is eaten raw after peeling the skin. It is eaten by man as well as birds and wild pigs.

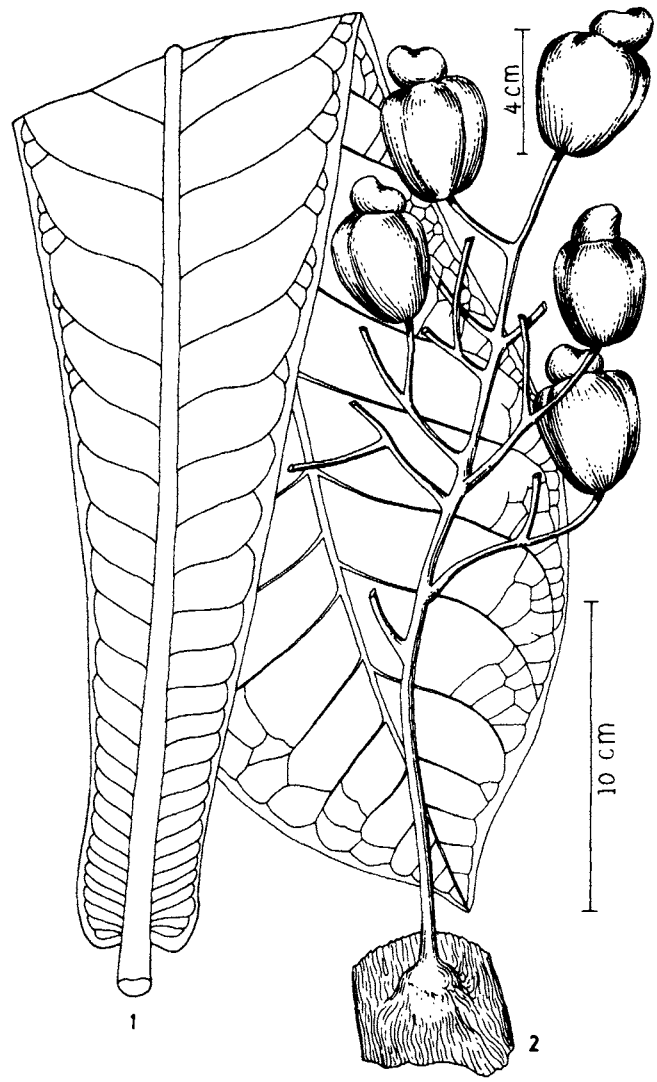
5.0 OTHER USES

The lumber is used for house construction and furniture making.

6.0 PROPAGATION

Manalu propagates itself naturally by seeds, however, since the fruits are eaten by wild animals, the regeneration is very poor which contributes to its scarcity. It could be propagated in the nursery to ensure maximum yield from seed before being outplanted.

PLATE LVIII. Semecarpus gigantifolia Vid.



SC. NAME: Semecarpus gigantifolia Vid
FAMILY : Anacardiaceae

LVIII$_1$ - Leaf

2 - Inflorescence with fruit

3 - Illustration of trunk and leaves

59. SERIALBIZZIA ACLE

1.0 NAMES:

Family	Mimosaceae
Botanical	Serialbizzia acle (Blanco) Kosterm.
Common	Akle
Vernacular	akle, sauriri, solungkigi (Tagbanua); akle, mabunga, anagep (Laguna); kita-kita, anagep, quita-quita (Ilocos Sur, Ilocos Norte); katakataka, akle (Pampanga); akle, banuyo, langon (Pananaya, Visaya); akle, tali, tilis (Sambali).

2.0 DISTRIBUTION

2.1 Locality: Akle is endemic to the Philippines and is widely distributed throughout the country. It is not very selective as to soil type, although it grows best in forest soils with considerable humus and good drainage.

2.2 Forest type and frequency: It thrives naturally in open to dense forest stands in a variety of sites from river beds and valleys to mountain ridge tops, in low to medium altitude forests. In Mount Makiling (climatic type I), the density per hectare as inventoried gave 2 trees and 2 saplings; in Leyte (climatic type II), there were 5 trees, 3 poles, 1 sapling, and 4 seedlings per hectare; in Oriental Mindoro (climatic type IV), the density was only 1 tree per hectare; while in Palawan, there were 1 tree and 1 pole per hectare.

3.0 DISCRIPTION

Serialbizzia acle (Blanco) Kosterm. is a medium-sized tree attaining a height of 9.5 to 20.5 meters and a diameter range of 39 to 61 cm. It is characteristically deciduous during the dry season. It has a broad, open and spreading crown. Leaves tripinnately compound, opposite, usually having one pair of pinnae each consisting of 3 to 6 pairs of leaflets with terminal pairs much larger than the others. Leaflets 4.8 to 20.1 cm long and 2.8 to 8.1 cm wide, oblong-ovate with acuminate apex, rounded base, dark green on the upper surface and pale green underneath. At the junction of the pinnae and the petiole of each leaf are glands. Flowers green, turning yellow when mature, 1.3 - 1.5 cm in length, borne in small, rounded heads. The flowers bloom from January to April when there is a low precipitation. Pods dark brown when mature, 2.8 to 5.1 cm wide and 12.8 to 38.1 cm in length. Each pod contains 4 to 12 seeds of varying sizes, ranging from 1.5 to 2.2 cm in length and from 1.3 to 1.6 cm in width, with thickness of 0.9 to 1.1 cm, and generally rectangular in shape.

4.0 USE AS FOOD

The seeds are extracted from the mature pod and roasted like the cashew nut and eaten.

No analysis has been made so far on the constituents of the edible part.

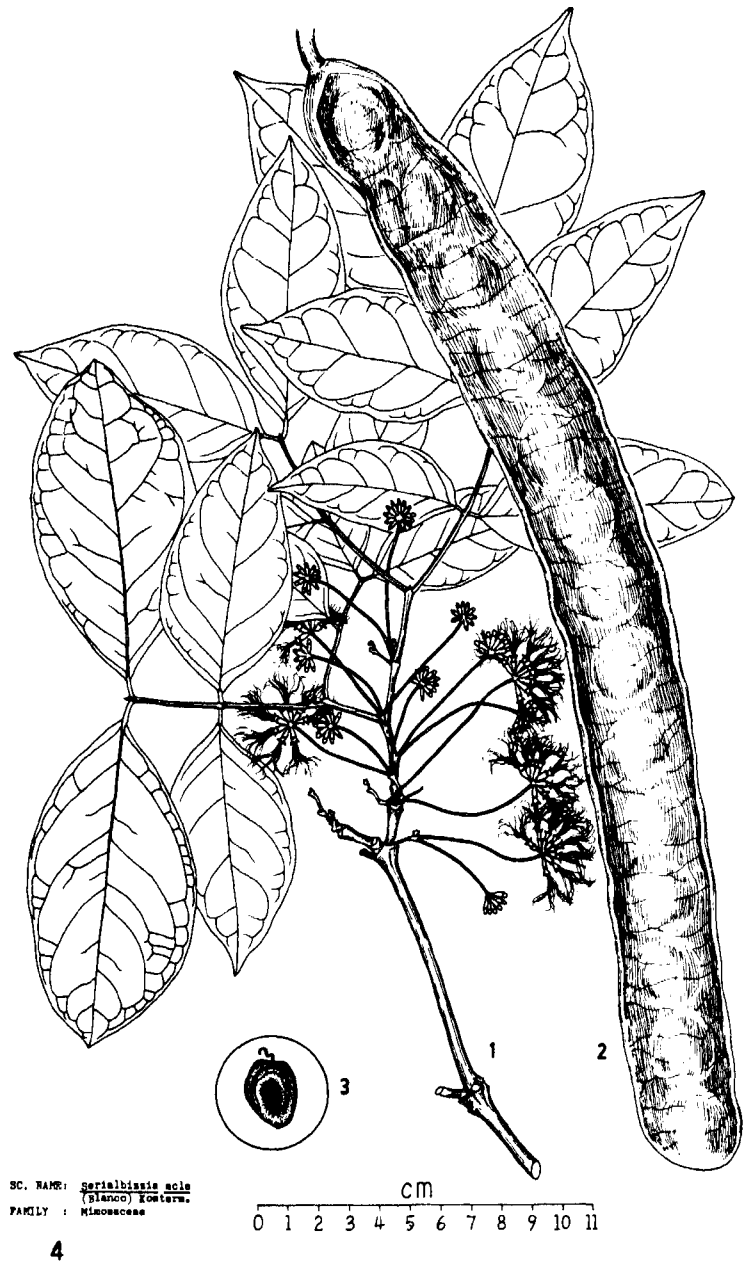
5.0 OTHER USES

The wood is utilized for furniture, musical instruments, carving, tiles, charcoal and for house construction materials.

6.0 PROPAGATION

Akle is propagated by seeds and usually raised in nurseries and outplanted after attaining 30 cm high.

PLATE LIX. Serialbizzia acle (Blanco) Kosterm.



4

LIX$_1$ - Branchlet with inflorescence, flowers and leaves

2 - Pod

3 - Seed

4 - Illustration of leaves

60. SESUVIUM PORTULACASTRUM

1.0 NAMES:

Family	Aizoaceae
Botanical	Sesuvium portulacastrum L.
Common	Dampalit
Vernacular	taraumpalit, dampalit (Tagalog); bilang-bilang (Bisaya); karampalit (Pampanga).

2.0 DISTRIBUTION

2.1 Locality: It is found along the banks of tidal streams and sometimes along the seashores throughout the Philippines.

2.2 Forest type and frequency: It is found on most tropical and subtropical seashores in other countries. An inventory of the mangrove forest of Pagbilao, Quezon representing climatic type II gave a figure of 0.5 trees and 0.5 saplings per hectare.

3.0 DESCRIPTION

Dampalit is a fleshy, prostrate, spreading, branched herb, with the stems rooting at the nodes, often reddish, 20 to 50 cm in length, with short ascending branches. Leaves oblong-linear to linear, green, fleshy and very thick, 2 to 4 cm long; petioles short, dilated below and clasping the stems by their thin margins. Flower solitary, small and shortly pedicelled. Calyx pink or red within, the segments 5 to 6 mm long, cuspidate. Fruit a capsule about 5 mm long containing small, round, black seeds.

4.0 USE AS FOOD

The leaves serve as a vegetable and can be mixed with fish or meat, giving a sour flavoring to the mixture. They can also be blanched and served as a salad dish with sliced tomatoes and fish sauce or salt.

5.0 OTHER USES

The vine is used as an ornamental. It is usually planted around ponds and in barren landscaped areas.

6.0 PROPAGATION

It is propagated asexually using stem cuttings or sexually by means of seeds.

PLATE LX. Sesuvium portulacastrum L.

LX_1 - Branchlet with buds and leaves

61. SOLANUM CUMINGII

1.0 NAMES:

Family	Solanaceae
Botanical	Solanum cumingii Dun.
Common	Talong-talongan
Vernacular	talong-talong, tarambulo, talong-talongan (Laguna, Batangas); balbalosa (Camiguin Islands); malvalusa (Cagayan); balbalusa, tarong-ti-aso (Ilocos Sur, Ilocos Norte); tabulak, tabulali (Pangasinan); taling-taling (Basilan)

2.0 DISTRIBUTION

2.1 Locality: Talong-talongan is an endemic plant of the Philippines which is widely distributed from Luzon to Mindanao.

2.2 Forest type and frequency: It thrives in open, flat to rolling waste places of rural areas at low and medium altitudes. Inventories made at elevations midway between the mangrove and dipterocarp forests showed a density of 2 mature and 1 young plant per hectare in Mount Makiling, Laguna (climatic type I); 2 mature and 2 young plants per hectare in Quezon National Park (climatic type II); 1 mature and 3 young plants in Palawan (climatic type III); and 4 mature and 2 young plants in Oriental Mindoro (climatic type IV) respectively.

3.0 DESCRIPTION

Solanum cumingii Dun. is a spreading or ascending, somewhat branched, stellate pubescent herb attaining 40-70 cm in height and a diameter of 1 - 1.7 cm at the biggest portion of the stem. The stem, petioles and leaves are armed with scattered, sharp, rather stout spines 0.25 - 0.7 cm long. Leaves alternate, oblong-ovate, acute or slightly acuminate, with inequilateral base, 4.1 to 12.2 cm long, stellate-pubescent on both surfaces and irregularly undulate-lobed at the margins. Flowers in axillary, 1 to 5 flowered racemes. Calyx green with a slightly spiny tube. Corolla violet or purplish in color, shallowly 5 lobed and nearly 2.1 cm in diameter, the stamens yellow in color. Fruit globose, glabrous, 2.6 cm in diameter, pale green mottled with white or yellowish color, the accrescent calyx nearly 2 cm in diameter. Seeds numerous, brown, oval, flat and measuring 3-5 cm long and 2-3 cm wide.

4.0 USE AS FOOD

The unripe fruits are cooked with either fish or meat and eaten as a vegetable.

No analysis has been made so far on the constituents of its edible parts.

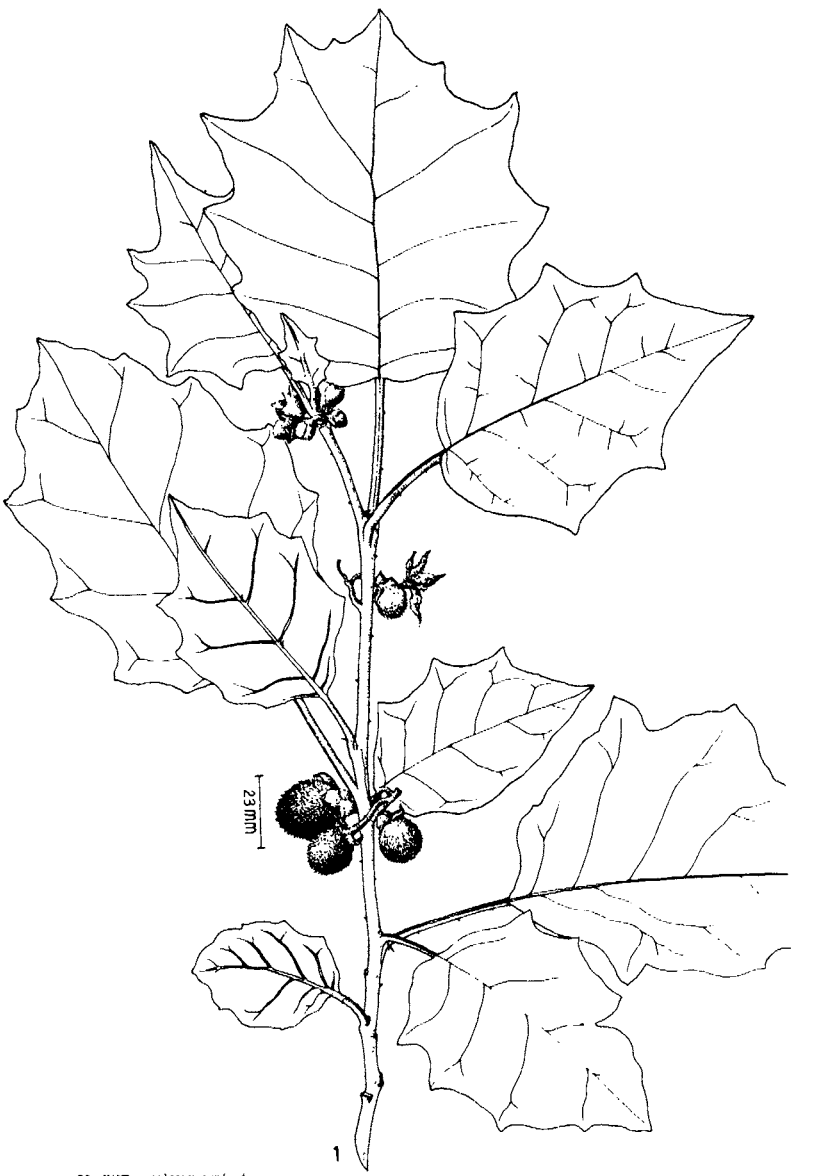
5.0 OTHER USES

The leaves are used in the rural area as poultice and the seeds are sedative and are being used to cure toothache.

6.0 PROPAGATION

Talong-talongan propagates itself by seeds in its natural habitat. If cultivated, the seeds are extracted from the ripe fruit (yellow color) and are sown in seedboxes. When the seedlings reach 12 cm they are planted out in the field. Its propagation and cultivation is the same as that of the eggplant.

PLATE LXI. **Solanum cumingii** Dun.



2

LXI_1 - Branchlet with leaves, flower and fruit

2 - Illustration of plant

62. SOLANUM NIGRUM

1.0 NAMES:

Family	Solanaceae
Botanical	Solanum nigrum L. Sp. Pl.
Common	Kunti
Vernacular	bolagtab, hulablub (Visaya); muti (Sulu); kamatis-manok, malasili (Samar, Leyte, Bisaya); kuti (Bicol); anti, amti (Benguet); nateng-ti-aso (Bontoc); kamakamatisan, kunti, lubi-lubi (Laguna, Quezon, Batangas).

2.0 DISTRIBUTION

2.1 Locality: Kunti is an endemic plant of the Philippines widely distributed from Luzon to Mindanao.

2.2 Forest type and frequency: It is commonly found in open, flat or rolling, waste places, recently disturbed soil and roadsides from sea level to an altitude of 2,000 m. Inventory reports showed a density per hectare of 3 mature and 5 young plants in Leyte (climatic type II); 3 mature and 2 young plants per hectare in Mount Makiling, Laguna (climatic type I); 2 mature and 2 young plants per hectare in Oriental Mindoro (climatic type IV) and 3 mature and 1 young plant per hectare in Batangas (climatic type III).

3.0 DESCRIPTION

Solanum nigrum L. Sp. Pl. is an erect branched, annual herb reaching a height of up to 1 meter. It has a green, smooth to nearly smooth and somewhat 3 angled stem. Leaves ovate to oblong in shape measuring 4.8 to 8.2 cm long and 2.0 to 2.7 cm wide, entire margin, petiolate, acuminate apex and acute to acuminate base; flowers umbellately disposed numbering 5-8 on each peduncle, nodding, and borne on extra auxillary inflorescences measuring 0.9 to 2.6 cm long. Calyx green with ovate-oblong lobes. Corolla white approximately 8.1 mm in diameter. Fruit berry like and dark purple to black in color, fleshy, measuring approximately 4-5 mm in diameter; seeds yellow and minutely pitted.

4.0 USE AS FOOD

The ripe fruits are picked and eaten raw. They are also made into jams and pies in the rural areas. The leaves and young shoots are cooked and eaten as a vegetable like spinach.

5.0 NUTRITIONAL VALUE

Approximate analysis of the fruits, leaves and flowers showed the following (Catibog, 1978):

Percentage	Leaves	Flowers & Fruits
% Moisture	85.00	80.00
% Ash	9.99	9.60
% Crude fiber	15.52	25.69
% Crude protein	21.53	3.91
% Crude fat	1.39	1.85
% Ca	2.65	0.39
% P	0.30	0.17
% K	0.63	1.72
% N	3.44	0.63

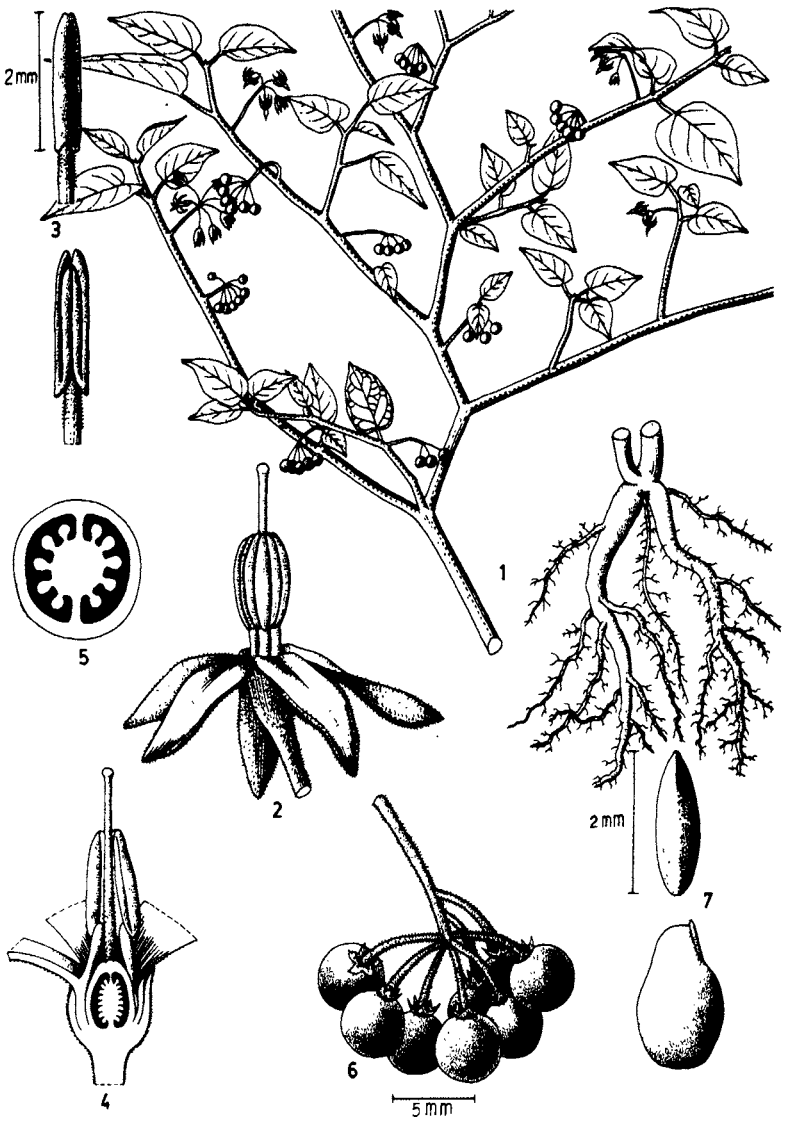
6.0 OTHER USES

A decoction of the leaves is used as a fomentation for various skin diseases, wounds, and sore eyes. It is externally applied as a cooling agent and for vulnerary and vaginal irritation. The fresh seeds are used as cosmetics. These are rubbed on the cheeks to remove freckles and improve the complexion. It is also used by diabetic persons because of its ability to lower the sugar content of the blood.

7.0 PROPAGATION

Kunti is propagated by means of seeds. The seeds are extracted from the ripe fruit and are directly seeded in a tilled soil where they germinate and grow. It can also regenerate naturally by the seeds that drop down to the ground from the ripe fruits, but the germination and survival have proved very low.

PLATE LXII. Solanum nigrum L. Sp. Pl.



SC. NAME: Solanum nigrum L. Sp. Pl.
FAMILY : Solanaceae

8

LXII$_1$ - Branchlet, leaves and fruit

2 & 4 - Flower and cross section thereof

3 - Anthers

5 - Transverse section of gynoecium

6 - Fruit

7 - Seed

8 - Illustration of plant with flowers and fruit

63. SONNERATIA ALBA

1.0 NAMES:

Family	Sonneratiaceae
Botanical	Sonneratia alba J. Sm.
Common	Pedada
Vernacular	pedada (Laguna, Quezon, Mindoro).

2.0 DISTRIBUTION

2.1 Locality: This is a plant of the mangrove forest, found along tidal estuaries but less abundant in the Philippines than S. caseolaris. It also occurs along the muddy coastlines of India and some other Asian countries.

2.2 Forest type and frequency: From inventories made in climatic type II, the mangrove forest type at Palsabangon, Pagbilao, Quezon, gave 6.7 trees per hectare.

3.0 DESCRIPTION

Sonneratia alba J. Sm. is a shrub or small tree reaching a height of 20 meters. Leaves oblong to elliptic-oblong, somewhat pointed, rarely obtuse, 4 to 10 cm long, 2 to 4 cm wide, and tapering to the base. Flowers solitary. Calyx green, 2.5 to 3 cm long; segments six, longer than the tube. Petals 6, linear, colored pink or white, about as long as the calyx segments. Fruit hard, depressed, globose, 3 to 4 cm in diameter, surrounded nearly to the middle by the calyx tube; calyx lobes spreading and persistent.

4.0 USE AS FOOD

The fruits are cooked and eaten and are also a source of vinegar.

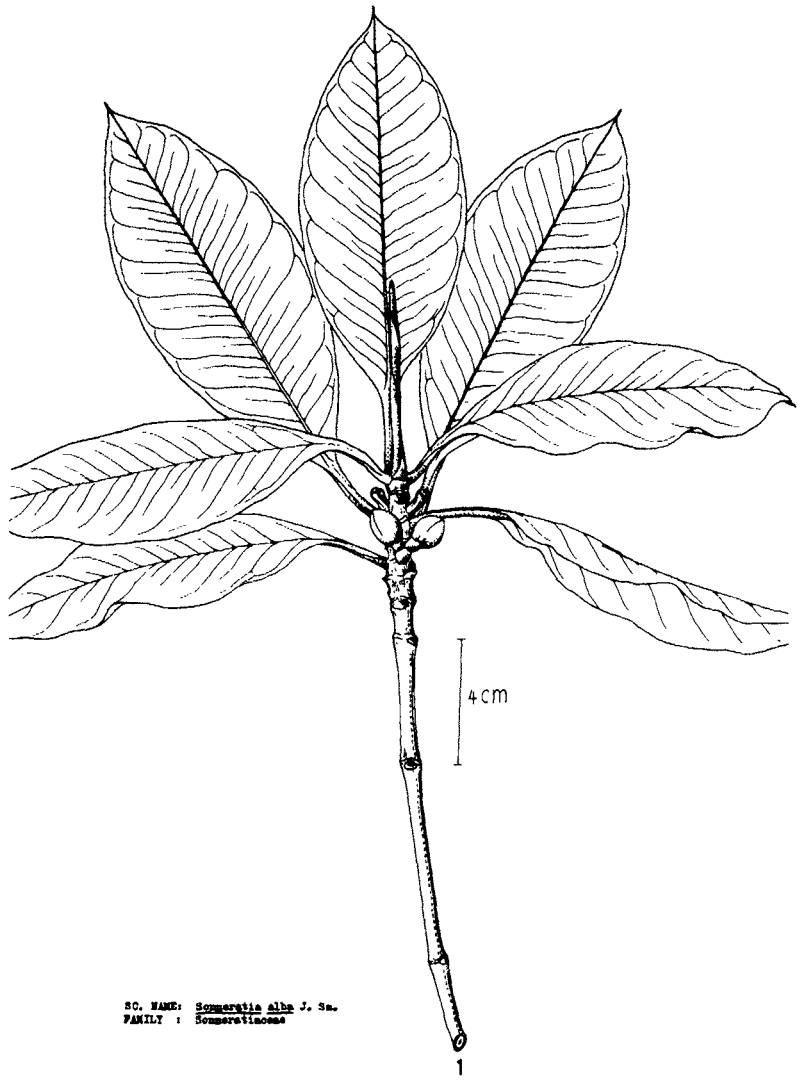
5.0 OTHER USES

It is generally a good and cheap source of fuelwood. It is occasionally extracted for timber and used for salt-water piling on account of its durability. The aereal root is used for making razor hones used in local barber shops.

6.0 PROPAGATION

Propagation is by means of seeds. Wildings however are used for immediate and faster rehabilitation of denuded mangrove areas.

PLATE LXIII. Sonneratia alba J. Sm.



$LXIII_1$ - Branchlet with buds and leaves

64. SONNERATIA CASEOLARIS

1.0 NAMES:

Family	Sonneratiaceae
Botanical	Sonneratia caseolaris (L.) Engl. (syn. C. acida (L) f.)
Common	Pagatpat
Vernacular	payar (Pangasinan); palapat, palata, pagatpat, hikau-hikauan (Bataan); pagatpat (Tagalog Region); lukabban, ilukabban (Cagayan).

2.0 DISTRIBUTION

2.1 Forest type and frequency: The species occurs along the upper stretches of tidal streams. Inventory made in the mangrove forest type at Palsabangon, Pagbilao, Quezon, showed a stand density of 22 trees, 3.3 poles, and 20 saplings and 73.3 seedlings per hectare.

3.0 DESCRIPTION

This is a small-sized tree rarely attaining a height of 9 meters.

Leaves thick and leathery, narrow, tapering to a broad, short petiole, 4 to 10 cm long and 2 to 4 cm wide. The smallest branches are jointed and four-angled. Flowers single, calyx green, 2.5 to 3 cm long and divided into 6 to 8 angular lobes which are longer than the calyx tube. Petals pink or white, narrow, about as long as the calyx segments and 6 in number. Stamens very numerous, style long. Fruit slightly acidic, hard, rounded but depressed at the apex, with the base surrounded by the calyx tube, 3 to 4 cm in diameter, containing numerous seeds.

4.0 USE AS FOOD

The fruit is used as an article for food and also for making vinegar.

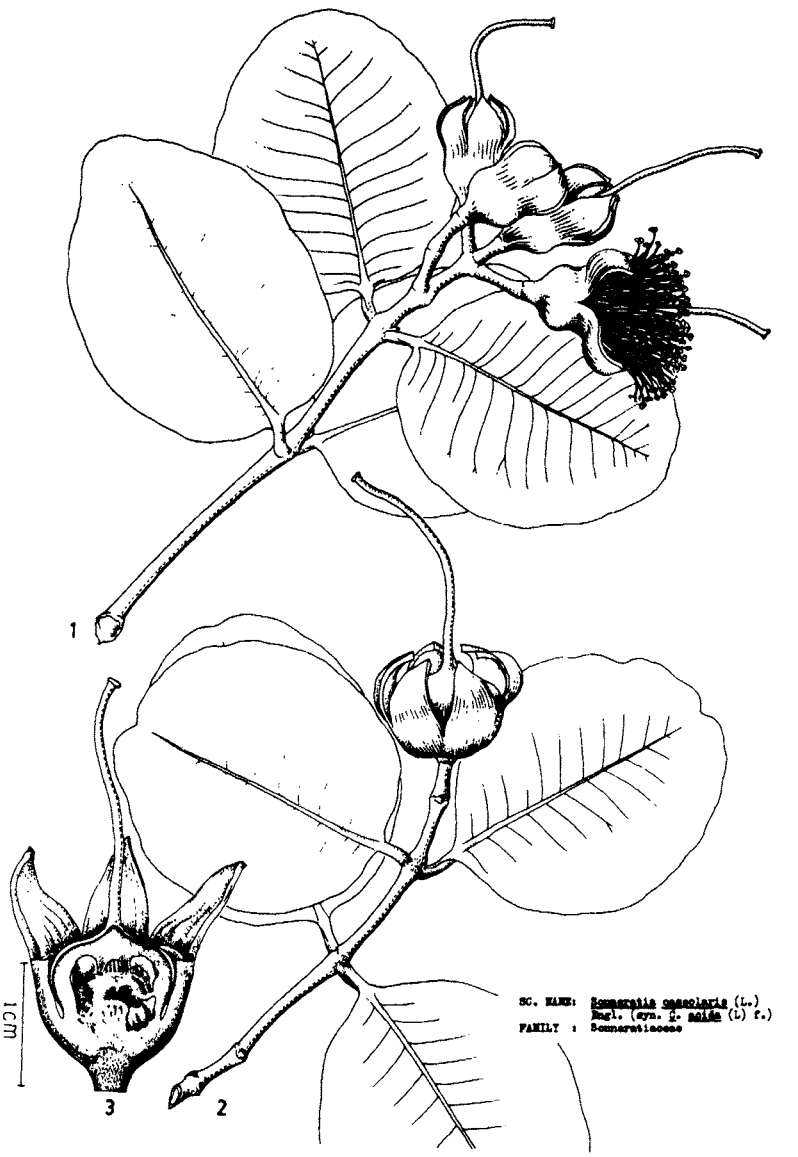
5.0 OTHER USES

Its bark contains a moderate proportion of tannin which could be used by the tanning industry. The air roots are sometimes used for the manufacture of wooden soles of shoes.

6.0 PROPAGATION

Like other mangrove species, this is propagated by means of seeds. They grow widely and vigorously in swampy and mangrove areas.

PLATE LXIV. Sonneratia caseolaris (L.) Engl.
(syn. S. acida (L) f.)



4

LXIV$_1$ - Branchlet with leaves and flowers in various stages of development

2 - Branchlet with fertilised flower

3 - Longitudinal cross section of flower

4 - Illustration of leaves and flowers

65. STERCULIA OBLONGATA

1.0 NAMES:

Family	Sterculiaceae
Botanical	Sterculia oblongata R. Br.
Common	Malaboho
Vernacular	hantak (Batanes); lapnot (Babuyanes, Cagayan); sinaligan (Ilocos Sur; Mount Province); banilad, malabanilad (Rizal, Bicol provinces, Mindoro); malabuho (Bataan); malacacao (Bataan, Laguna) bonga, malabonga (Tayabas); uos (Camarines, Albay); saripongpong (Sorsogon); bakan (Mindoro); malanbanilad (Samar); taroi (Negros Oriental).

2.0 DISTRIBUTION

2.1 Locality: This is an endemic and widely distributed species but uncommon in the Philippines.

2.2 Forest type and frequency: In climatic type I, the stem density per hectare as represented by the dipterocarp forest of Mount Makiling was 2 trees and 3.3 poles per hectare respectively.

3.0 DESCRIPTION

This medium sized tree attains a height of 12 meters, glabrous or nearly so. Leaves simple, entire, smooth or nearly so, oblong, shortly acuminate, with pointed apex and rounded or cordate base, 10 to 20 cm long. Panicles in the upper axils, narrow, slender, many flowered, the length equalling or longer than the leaves. Flowers 5 to 6 mm long, somewhat hairy; calyx-lobes linear, ciliate and cohering by their tips. Fruits red, inflated and hairy, about 5 cm long by 3.5 cm wide, with a thick leathery covering, containing 4–6 seeds about 1.5 cm long.

4.0 USE AS FOOD

The seed kernels of this tree are eaten raw and are of good flavor when roasted.

5.0 NUTRITIONAL VALUE

Approximate analysis of fruits:

% Moisture	48
% Ash	1.31
% Crude fiber	41.72
% Crude protein	5.61
% Crude fat	5.07
% Ca	0.78
% N	0.90
% P	0.12
% K	0.20

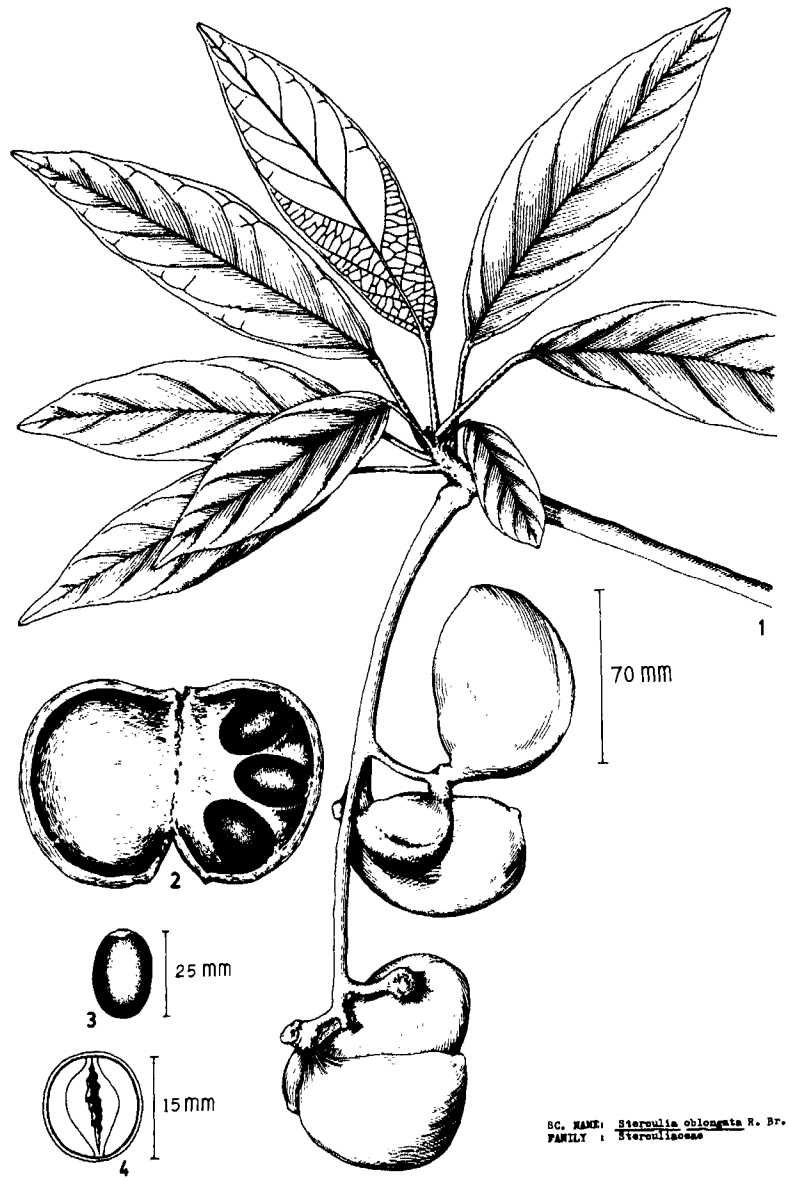
PROPAGATION

Malaboho grows wild in the forest and its only means of propagation is so far by seed.

OTHER USES

The wood is suitable for match making. The bast fibers of this species are reportedly made into ropes.

PLATE LXV. Sterculia oblongata R. Br.



5

LXV$_1$ - Branchlet with leaves and fruits

2 - Opened fruit with seeds

3 - Seed

4 - Transverse cross section of seed

5 - Illustration of branches and leaves

66. STROMBOSIA PHILIPPINENSIS

1.0 NAMES:

Family	Olacaceae
Botanical	Strombosia philippinensis (Baill.) Rolfe
Common	Tamayuan
Vernacular	tamanhuyan (Camarines, Masbate, Leyte); tamayuan (Bulacan, Laguna, Camarines, Catanduanes); tamayan (Ilocos Norte, Ilocos Sur); tamuyan (Cagayan); tamauyan, tamauan (Batangas, Tayabas, Sorsogon); larak, larag (Isabela); kamuan, kanauayan (Bataan); kamayuan, kamauyan (Quezon, Batangas); kamauyan, samayonan, tamaguan (Bicol); kamayuan (Bulacan, Bataan).

2.0 DISTRIBUTION

2.1 Locality: Tamayuan is endemic to the Philippines but sparsely distributed by localities from Luzon to Mindanao.

2.2 Forest type and frequency: It thrives in hilly, open to partially shaded, secondary dipterocarp forests at low to medium altitudes. It is also found in gullies and slopes with clay loams and fertile soil. Inventories conducted in Quezon National Park, Quezon (olimatic type II) gave a density of 3 trees, 1 pole, 1 sapling, and 1 seedling per hectare. In Oriental Mindoro (climatic type IV), there were 2 trees and 1 pole per hectare; whereas in Palawan and Mount Makiling, Laguna, representing climatic types III and I respectively, the stand density was 1 tree and 1 sapling for the first type and 3 trees per hectare for the latter.

3.0 DESCRIPTION

Strombosia philippinensis (Baill.) Rolfe is a small to medium-sized tree reaching a diameter of 30-50 cm and a height of 18-23 meters with a clear bole of 5-7 meters. It has a smooth, sometimes curved bole, oval-shaped when young and becoming irregularly shaped with vertical depressions around the trunk as it attains 20 cm diameter and bigger. Bark brown with white and grey blotches; 4-5 short buttresses 25-40 cm high forming small angles with the trunk. Dense crown with ascending slender branches. Leaves smooth, alternate, elliptic, apex faintly acuminate, base acute, blade measuring 11.5-15 cm long, 4-6.5 cm wide; margin entire, wavy, slightly curved downwards; midrib sunk on the upper surface but protruding underneath; lateral veins distinct on upper and lower surfaces, with tertiary veins distinct only on the lower surface; upper surface shiny, dark green, undersurface apple green; petiole grooved, 0.7-1.5 cm long. Fruits occuring singly, yellow-orange to orange-red in color and edible when ripe, 1.2-1.4 cm in diameter and 1.3-1.5 cm long, oval in shape. Seed only one, brown, oval to round with a diameter of 0.5-0.7 cm.

4.0 USE AS FOOD

The fleshy portion of the ripe fruit is edible and it is eaten by man, monkeys, birds, and wild pigs..

No analysis has been made so far on the constituents of the edible parts.

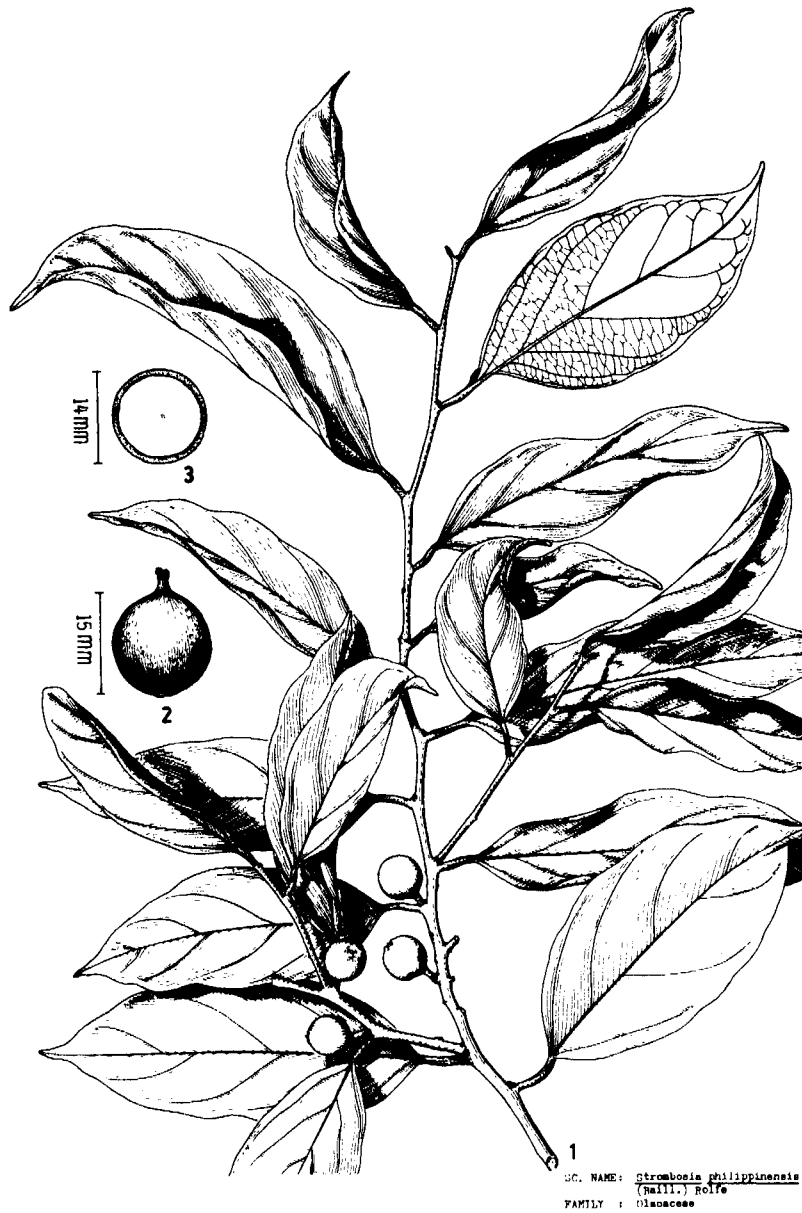
5.0 OTHER USES

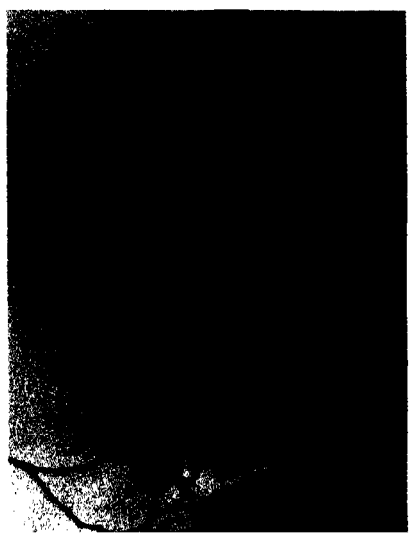
The wood is used as house posts, and is recommended for making shuttles and bobbins. A twisted young stem could be made into walking canes.

6.0 PROPAGATION

Tamayuan is not cultivated. It propagates itself by seeds in its natural habitat but, since its fruits are edible, these are eaten by birds, monkeys, and wild pigs aside from man and therefore only few germinate and grow into trees.

PLATE LXVI. Strombosia philippinensis (Baill.) Rolfe





4

LXVI$_1$ - Branchlet with leaves and fruits

2 - Fruit

3 - Transverse cross-section of fruit

4 - Illustration of leaves and fruit

67. SYZYGIUM CALUBCUB

1.0 NAMES:

Family:	Myrtaceae
Botanical	Syzygium calubcub (C.B. Rob.) Merr.
Common	Kalubkub
Vernacular	kalubkob (Laguna, Bataan, Mindoro, Quezon, Cagayan, Tarlac, Albay, Negros, Basilan, Rizal).

2.0 DISTRIBUTION

2.1 Locality: Kalubkub is fairly common in primary forests at low to medium altitudes throughout the islands. Only a limited number could be found from Cagayan, Pangasinan, Tarlac, Rizal, Bataan, Camarines, Albay, Mindoro, Negros, Basilan, and some lowlands of Mindanao.

2.2 Forest type and frequency: Inventories made in the Molave forest of Mount Makiling, Laguna (climatic type I) gave a stem density of 2 trees per hectare. In the dipterocarp forest, the density was 3.3 poles per hectare.

3.0 DESCRIPTION

This is a medium to large tree reaching 50 cm in diameter and 15 meters in height, with a branchy cylindrical trunk. Branches more or less horizontally arranged and widely spaced along the trunk. Leaves opposite, simple and entire. Flowers white and regular; stamens many and inserted in several rows with the petals upon the calyx rim; anthers small. Fruit fleshy, light yellowish-cream in color, deliciously sweet with a little mix of sourness. Seeds kidney-shaped, 2 cm to 2½ cm long, attached in pairs.

4.0 USE AS FOOD

The fruit when ripe is delicious and is eaten raw.

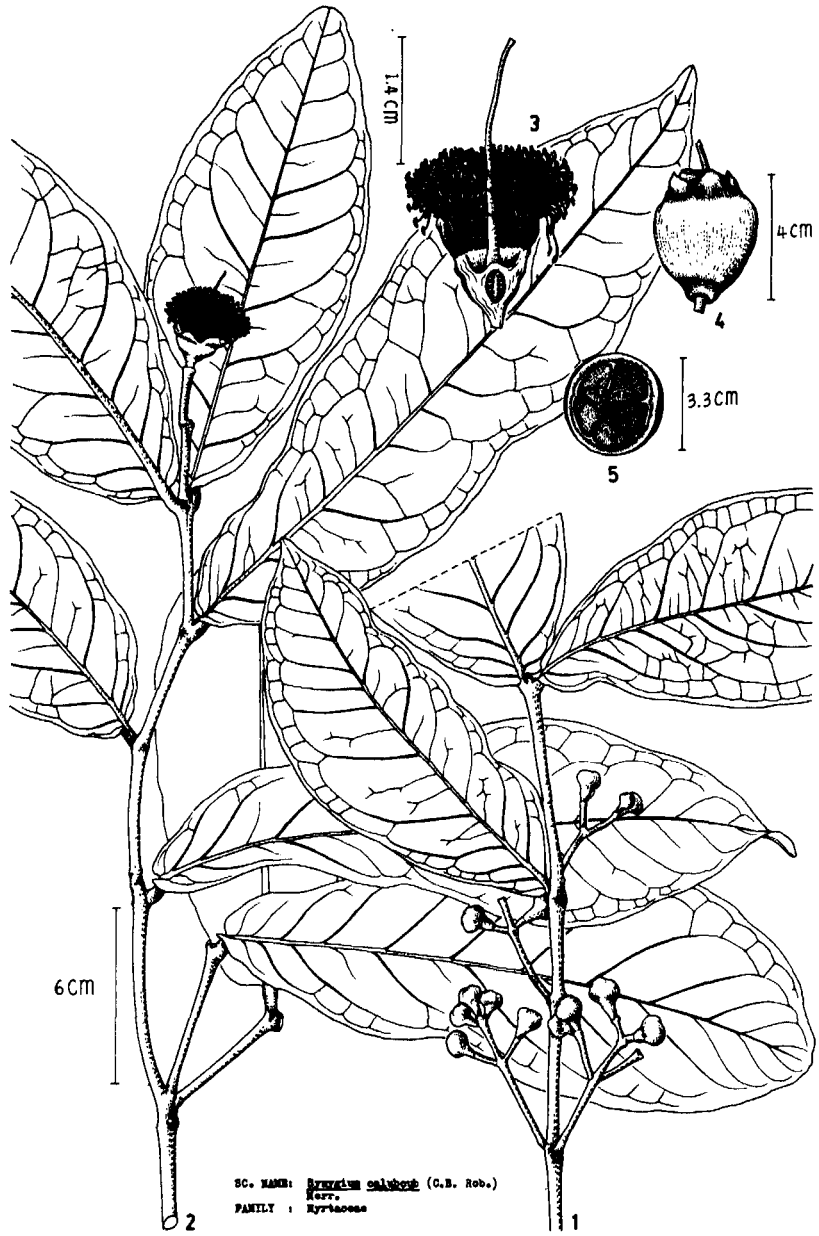
5.0 OTHER USES

The wood is used for tool handles, beams, posts, rice mortars and piles. The wood is similar to the Prunus spp. of the temperate zones, for which it is a suitable substitute.

6.0 PROPAGATION

This tree is propagated by means of seeds or from branches marcotted from nature branches approximately 2 cm to 3 cm in diameter and at least 1½ meter long.

PLATE LXVII. Syzygium calubcub (C.B. Rob.) Merr.



6

LXVII$_1$ - Branchlet with leaves and fruit

2 - Branchlet with leaves and flowers

3 - Longitudinal section of flower

4 - Fruit

5 - Transverse section of fruit

6 - Illustration of leaves, buds, flowers and fruit.

68. SYZYGIUM POLYCEPHALOIDES

1.0 NAMES:

Family	Myrtaceae
Botanical	Syzygium polycephaloides (C.B. Rob.) Merr.
Common	Lipote
Vernacular	egot, igot (Samar); lipote (Tagalog region).

2.0 DISTRIBUTION

2.1 Forest type and frequency: It is often found in primary forests at low and medium altitudes. Inventory in the dipterocarp forests of Atimonan Quezon for climatic type II gave 2 trees per hectare density.

3.0 DESCRIPTION

This is a large tree attaining a height of 15 meters and a diameter of 70 cm or more. It has an irregular bole, a dense ovoid crown and is slightly buttressed. The small branches are distinctly four angled and more or less swollen at the nodes. Bark light grey-brown, irregularly fissured and flaky. Leaves opposite, smooth, oblanceolate with acuminate apex and cordate base, 17 to 30 cm in length and 5 to 8 cm in width; leaf margin revolute. Both leaf faces glabrous, with the upper face shiny and the other face dull. Petiole 3 to 5 mm long, thick, club-shaped and woody. Flowers white, fragrant, over 1.5 cm in width, occuring in clusters on the trunks and branches. Fruit small, irregularly globose, red to purple in color, fleshy with a single seed.

4.0 USE AS FOOD

The edible part of this species is the fleshy portion of the fruit which is eaten raw.

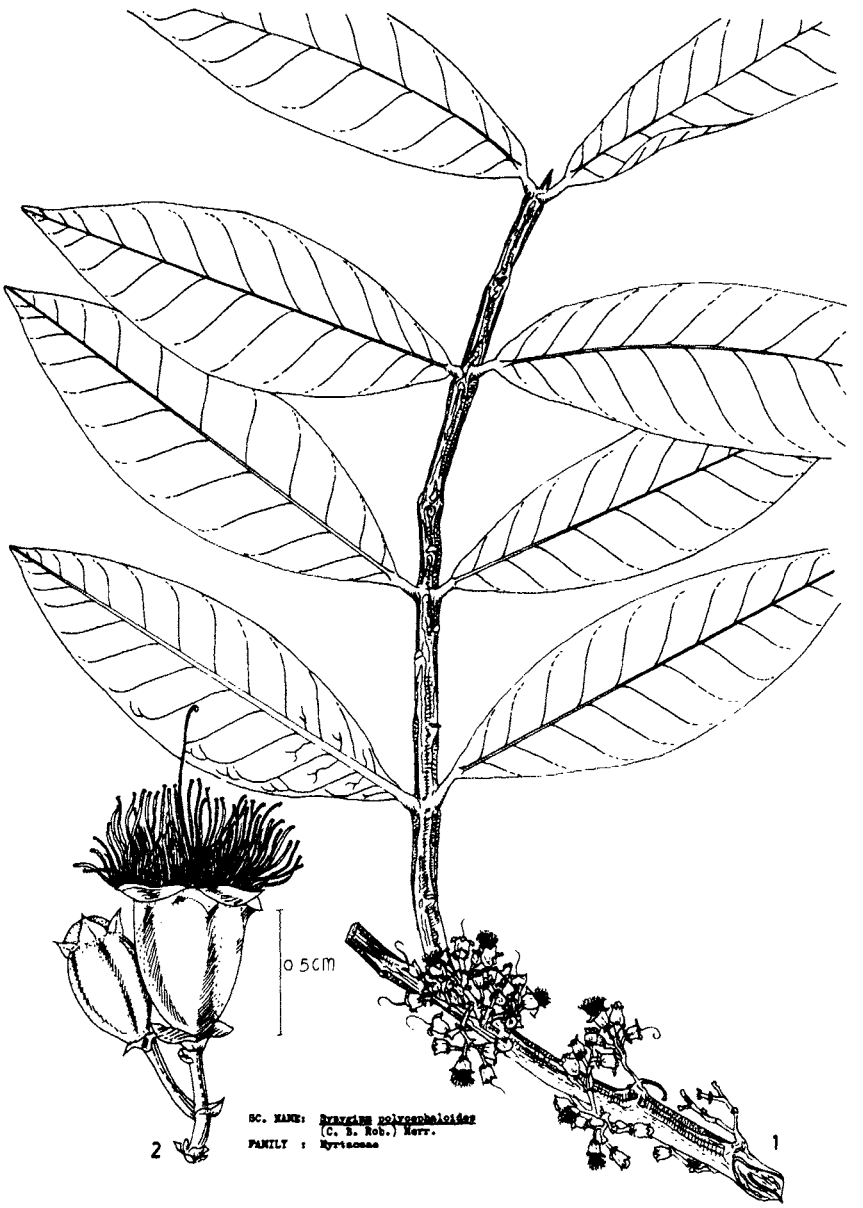
5.0 OTHER USES

The wood is used for general light construction of houses.

6.0 PROPAGATION

It is usually propagated by means of seeds but branches are also marcotted as asexual means of propagation.

PLATE LXVIII. Syzygium polycephaloides (C.B. Rob.) Merr.



3

LXVIII$_1$ - Branchlet with leaves and flowers

2 - Flower and flower bud

3 - Illustration of leaves and flowers along stem

69. TERMINALIA MICROCARPA

1.0 NAMES:

Family	Combretaceae
Botanical	Terminalia microcarpa Decne.
Common	Kalumpit
Vernacular	alupi, kalupe, kalupi or kalusit (Cagayan); anagep (Ilocos Sur); bagui (Butuan); baho (Palawan); kalumpit (Mindoro, Zambales, Laguna, Masbate, Zamboanga) and magtalisai (Visayas).

2.0 DISTRIBUTION

2.1 Forest type and frequency: Kalumpit is very common and widely distributed in the dipterocarp forests of Northern Luzon to Southern Mindanao, at low and medium elevations. Inventories made in the dipterocarp forest of Pakyas, Oriental Mindoro (climatic type IV), showed that the species is represented by 4 trees per hectare.

3.0 DESCRIPTION

The tree grows to a height of about 35 m and a diameter of about 100 cm. It has strong widespreading main branches, with the small-leafed foliage interspersed with aging red leaves. It has pronounced buttresses up to 4 m high with wavy ridges. Leaves closely alternate, bunched at the end of the twigs, smooth, oblong-obovate, from 6 to 15 cm in length and 3.5 cm in width; apex obtuse or shortly acuminate, base aoute; the upper face of the young leaves is covered with very fine, light, brown, silky depressed hairs while the lower face is glabrous. Flowers small, yellowish-white and borne on slender spikes which grow from the axils of the leaves. Fruit about 3 cm in diameter, smooth, fleshy, sour and dark red when ripe.

4.0 USE AS FOOD

The fruit is eaten raw when ripe (violet-black color) and because of its fleshy and acidic characteristic, it is good for preserves. The ripe fruits are boiled and cooked with sugar. Often fruits are sun-dried for longer storage.

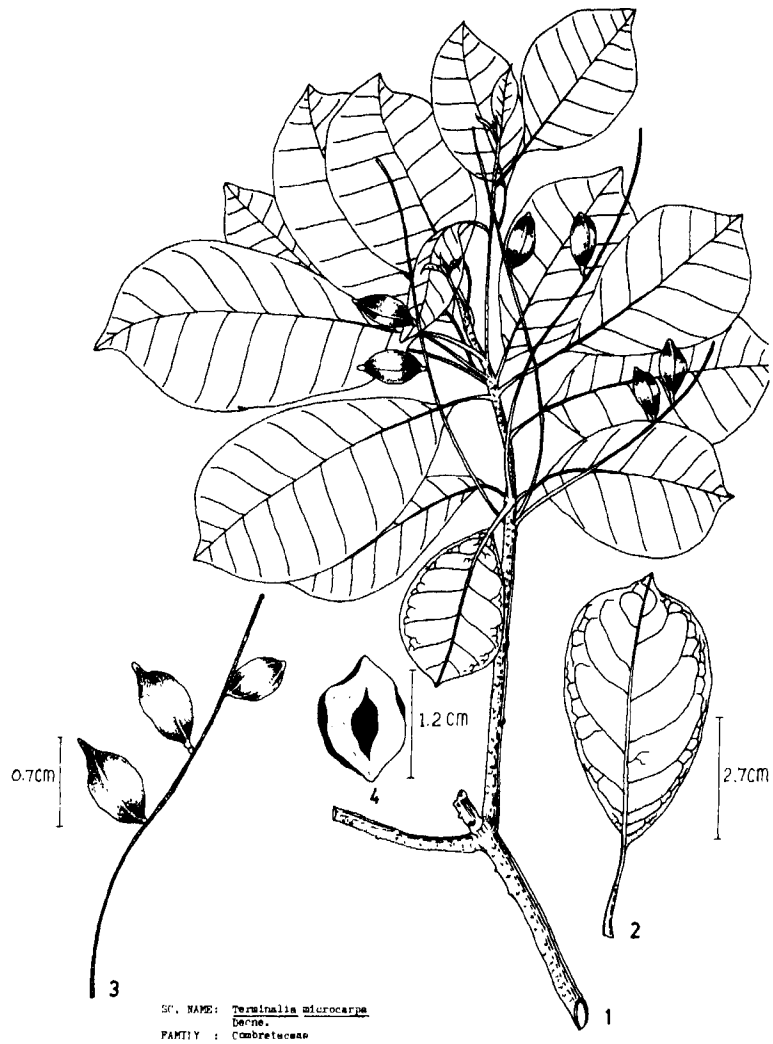
5.0 OTHER USES

The wood is used for general construction, ships' planking, the manufacture of furniture and cabinet making.

6.0 PROPAGATION

The species can be propagated from seed.

PLATE LXIX. Terminalia microcarpa Decne.



5

LXIX$_1$ - Branchlet with leaves and fruits

2 - Detail of leaf

3 - Fruits on inflorescence

4 - Transverse section of fruit

5 - Illustration of foliage

70 TERMINALIA NITENS

1.0 NAMES:

Family	Combretaceae
Botanical	Terminalia nitens Presl
Common	Sakat
Vernacular	kalampa, kalanpe (Cagayan); anagep, kalutit (Ilocos Norte, Ilocos Sur); pomgud (Nueva Vizcaya); aritongtong (Nueva Ecija); arimbokal, rimbukal, saket (Pangasinan, Tarlac); sakat (Tarlac, Bulacan, Cavite, Laguna, Rizal, Batangas); hakut, sakut, sulu-sulu (Zambales); kalumpit, melabung (Bulacan); dalinsi (Tayabas); malagabi (Mindoro); dalinson (Camarines); samando, tagit (Palawan); magatalisai, mangga- talisai-mantalisai (Masbate, Sorsogon, Negros Occidental, Agusan, Cotabato, Zamboanga).

2.0 DISTRIBUTION

2.1 Forest type and frequency: Sakat is an endemic species found at the open lower and more rarely upper hill dipterocarp forest of the country. An inventory at the Molave forest type (climatic type I) showed stem density of 2 trees per hectare. In the case of the dipterocarp forest of same climatic type, the stem density is 2 trees and 1 seedling per hectare.

3.0 DESCRIPTION

This is a deciduous tree attaining a diameter of about 100 cm with a cylindrical bole and pronounced boardshaped buttresses. Outer bark flaky with deep longitudinal lines. Young twigs ferruginous, mature twigs roughened by numerous scars; greyish-brown. Leaves alternate and sparsely grouped at the ends of the twigs, obovate, both faces glabrous, dark-green above and olive-green beneath; apex obtuse with short rounded apiculus, base acute; 9 to 12 cm long and 4 to 6.5 cm wide. Most leaves have domatia in the axils between midribs and lateral veins. Petiole 15 to 20 mm long, slender. The newly fallen leaves have purple-red blotches and the old fallen leaves turn dark chocolate brown. Fruit oval, about 3 cm long with flanges.

4.0 USE AS FOOD

The fruit is eaten raw when ripe.

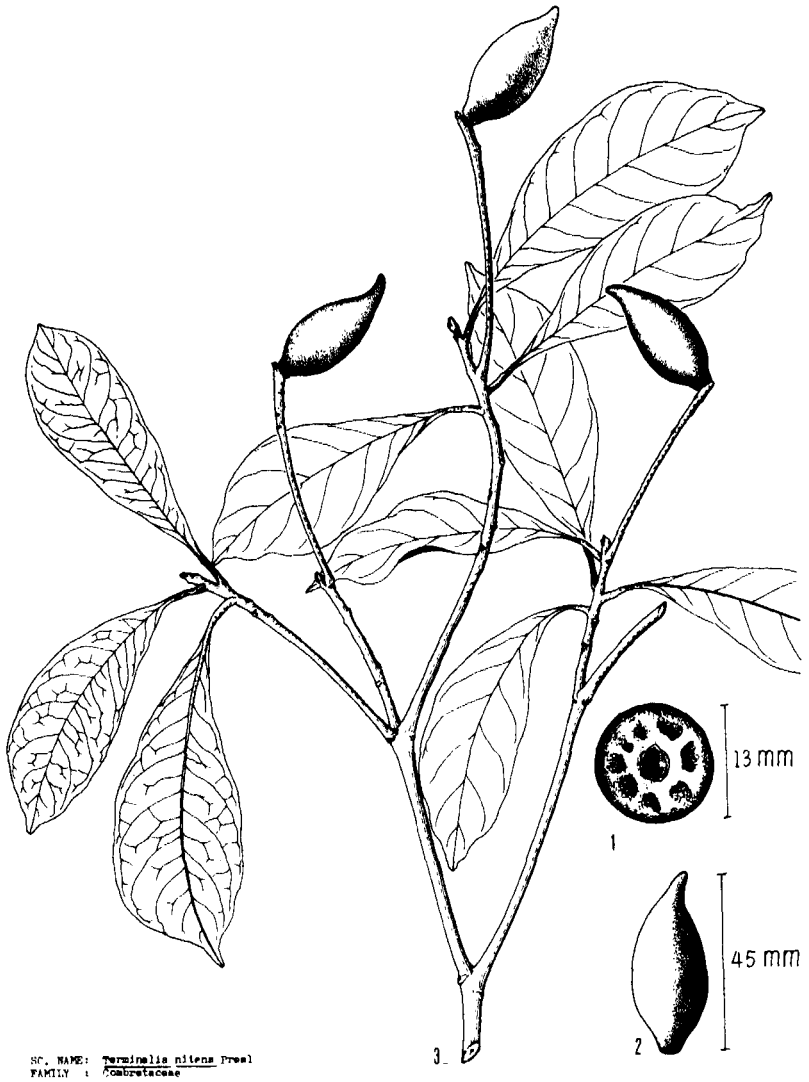
5.0 OTHER USES

For general construction and for ship planking.

6.0 PROPAGATION

Reproduction is done by means of seeds.

PLATE LXX. Terminalia nitens Presl



LXX$_1$ - Branchlet with leaves and fruit

2 - Fruit

3 - Transverse section of fruit

4 - Illustration of branches and foliage

APPENDIX 1

REFERENCES

Blanco, F.M. (1845) Flora de Filipinas. XXXVIII-887. Bureau of Printing, Manila.

Brown, W.H. (1921) Minor Products of the Philippine forests. Vol. 1 & 2 DANR. Bureau of Forestry. Bulletin No. 22. Bureau of Printing, Manila.

Brown, W.H. (1941) Useful Plants of the Philippines. Department of Agriculture and Commerce. Tech. Bull. 10. Bureau of Printing, Manila.

Catibog, C. (1978) Wild Plants for Food and Feeds. FORI, DANR. College, Laguna, Philippines.

Elmer, A.D.E. (1921) Forest Flora (Trees, shrubs, and woody vines) of Mount Makiling and Vicinity; unpublished manuscript.

Gutierez, Hermes, G. (1980) An Illustrated Manual of Philippine Matera Medica. Vol. 1.

Jacalne, Domingo, V. and Depositorio, W.C. (1974) Edible Fruit-Bearing Trees and other Plants of the Philippines. Forestry Digest. Vol. 2 & 3.

Lugod, Gregorio, C. and De Padua, L.S. (1979) Wild Food Plants of the Philippines. Vol. 1. UPLB Technical Bull. Vol. IV, No. 1 August, 90 pp.

Magsanoc, M.L. (1966) A Study of Bast Fiber Plants in the Philippines. Second Progress Report (unpublished) FORI Library, College, Laguna.

Mendoza, D. and Geromise. (1940) Survey of Plants in the Makiling National Park bearing Edible Fruits. The Philippine Journal of Forestry (3)1:115-134.

Merill, E.D. (1923) An Enumeration of Flowering Plants. Vol. 1-3. Dept. of Agriculture and Natural Resources. Bureau of Printing, Manila.

Merill, E.D. (1968) Flora of Manila. Wheldon and Wesley Ltd. Stechert-Hafner Service Agency Inc. Codicote Hants, New York.

Monsalud, M.R. and Tongacan, A.L.; Lopez, F.R. and Lagrimas, M.A. (1966) Edible Wild Plants in the Philippine Forests. Phil. Journal of Science, 95(4):431-561.

Quisumbing, Eduardo. (1951) Medicinal Plants of the Phil. Tech. Bull. No. 16. DANR. Bureau of Printing, Manila. 1234 pp.

Quisumbing, Eduardo. (1978) Medicinal Plants of the Philippines. Bureau of Printing, Manila. 1262 pp.

Weidelt, H.J. (1976) Manual of Reforestation and Erosion Control for the Philippines. Published by GTZ, Eschborn. 8-24 pp.

APPENDIX 2

CLIMATIC TYPES OF THE PHILIPPINES

Climatic type I	Two pronounced seasons; dry from November to April; wet during the rest of the year.
Climatic type II	No dry season with a very pronounced maximum rainfall during November to January.
Climatic type III	Seasons not very pronounced; relatively dry from November to April; wet during the rest of the year.
Climatic type IV	Rainfall more or less evenly distributed throughout the year.

APPENDIX 3

FOREST TYPES

1. Beach forest: found on sandy beaches above high tide limits. Typical beach forest includes Pandanus, large specimens of Calophyllum inophyllum with Hibiscus tiliaceus and others.

2. Mangrove forest: occurs along the tidal flats at the mouths of streams and the shores of protected bays. They are mainly composed of 8 species of the Rhizophoraceae and Avicennia. In thickly populated areas they are degraded to the extent that they produce only fuelwood.

3. Molave forest: on limestone soils in coastal areas with very distinct wet and dry seasons; easily accessible and most of the original forests have been exploited. The forest contains such species as Pterocarpus, Afzelia, and Dracontomelum.

4. Dipterocarp forest: occurs from coastal flats to about 800 m elevation and is best developed where rainfall is more or less uniform throughout the year or where the dry season is very short. It is sub-divided into the:

   (a) Lauan type: dense canopy, relatively free of undergrowth, regenerates readily after logging; extending from about 300 m to 400 m altitude.

   (b) Lauan-apitong: more open, more undergrowth, occurs where there is a pronounced dry season.

   (c) Yakal-lauan: slightly deciduous, preferring low coastal hills of volcanic origin and with yakal less dominant in gallery forest along streams and ravine slopes.

   (d) Lauan-lagakhak: restricted to areas of high water table, differing from the others by the predominance of hagakhak.

   (e) Tanquile-oak: covers the upper limits of the lauan and lauan-apitong type to the limits of the pine or mossy forest types from about 400 m to about 900 m above sea level.

5. Pine forest: generally in pure stands of either Benguet pine (P. insularis) and Mindoro pine (P. merkusii). The former extends from 700–1800 m and the latter occurs in two isolated areas of from 100–500 m elevation.

6. Mossy forest: occurs in area of low temperature, high and uniform, relative humidity with rain and fog throughout the year.

Glossary of local/botanical names

Apitong	Dipterocarpus grandiflorus
Hagakhak	Dipterocarpus warburgii
Lauan	Shorea spp.
Molave	Vitex parviflora
Oak	Quercus, Lithocarpus spp.
Tanquile	Shorea polysperma
Yakal	Shorea spp./Hopea spp.

Source: Based on Manual of Reforestation and Erosion Control for the Philippines; compiled by J. Weidelt et al. GTZ, Eschborn 1976.

THE FAO TECHNICAL PAPERS

FAO FORESTRY PAPERS:

1. Forest utilization contracts on public land, 1977 (E* F* S*)
2. Planning forest roads and harvesting systems, 1977 (E* F* S*)
3. World list of forestry schools, 1977 (E/F/S*)
3 Rev. 1. — World list of forestry schools, 1981 (E/F/S*)
4. World pulp and paper demand, supply and trade — Vol. 1, 1977 (E* F* S**)
   Vol. 2, 1978 (E* F* S**)
5. The marketing of tropical wood in South America, 1978 (E* S*)
6. National parks planning, 1978 (E* F* S***)
7. Forestry for local community development, 1978 (E* F* S*)
8. Establishment techniques for forest plantations, 1978 (Ar*** C* E** F* S*)
9. Wood chips, 1978 (C* E* S*)
10. Assessment of logging costs from forest inventories in the tropics, 1978
    1. Principles and methodology (E* F* S*)
    2. Data collection and calculations (E* F* S*)
11. Savanna afforestation in Africa, 1978 (E* F*)
12. China: forestry support for agriculture, 1978 (E*)
13. Forest products prices, 1979 (E/F/S*)
14. Mountain forest roads and harvesting, 1979 (E*)
15. AGRIS forestry wood catalogue of information and documentation services, 1979 (E/F/S*)
16. China: integrated wood processing industries, 1979 (E* F* S***)
17. Economic analysis of forestry projects, 1979 (E* F* S*)
17 Sup. 1. — Economic analysis of forestry projects: case studies, 1979 (E* S*)
17 Sup. 2. — Economic analysis of forestry projects: readings, 1980 (E*)
18. Forest products prices 1960-1978, 1980 (E/F/S*)
19. Pulping and paper-making properties of fast-growing plantation wood species — Vol. 1, 1980 (E*)
19. Pulping and paper-making properties of fast-growing plantation wood species — Vol. 2, 1980 (E*)
20. Mejora genética de árboles forestales, 1980 (S*)
21. Impact on soils of fast-growing species in lowland humid tropics, 1980 (E* F*)
22/1. Forest volume estimation and yield prediction, 1980
    Vol. 1 — Volume estimation (E* F* S*)
22/2. Forest volume estimation and yield prediction, 1980
    Vol. 2 — Yield prediction (E* F* S*)
23. Forest products prices 1961-1980, 1981 (E/F/S*)
24. Cable logging systems, 1981 (E*)
25. Public forestry administration in Latin America, 1981 (E*)
26. Forestry and rural development, 1981 (E* F* S*)
27. Manual of forest inventory, 1981 (E* F*)
28. Small and medium sawmills in developing countries, 1981 (E* S*)
29. World forest products, demand and supply 1990 and 2000, 1982 (E* F* S*)
30. Tropical forest resources, 1982 (E/F/S*)
31. Appropriate technology in forestry, 1982 (E*)
32. Classification and definitions of forest products, 1982 (Ar/E/F/S*)
33. Logging of mountain forests, 1982 (E*)
34. Fruit-bearing forest trees, 1982 (E* F* S*)
35. Forestry in China, 1982 (E*)
36. Basic technology in forest operations, 1982 (E* F* S*)
37. Conservation and development of tropical forest resources, 1982 (E* F* S*)
38. Forest products prices 1962-1981, 1982 (E/F/S*)
39. Frame saw manual, 1982 (E*)
40. Circular saw manual, 1983 (E*)
41. Simple technologies for charcoal making, 1983 (E* F* S*)
42. Fuelwood supplies in the developing countries, 1983 (E* F* S*)
43. Forest revenue systems in developing countries, 1983 (E*)
44/1. Food and fruit-bearing forest species, 1983 (E*)
44/2. Food and fruit-bearing forest species, 1984 (E*)
45. Establishing pulp and paper mills, 1983 (E*)
46. Forest products prices 1963-1982, 1983 (E/F/S*)
47. Technical forestry education - design and implementation, 1984 (E*)
48. Land evaluation for forestry, 1984 (E*)
49. Extracción de trozas mediante bueyes y tractores agrícolas, 1984 (S*)

FAO PLANT PRODUCTION AND PROTECTION PAPERS: 57 titles published
FAO CONSERVATION GUIDES: 8 titles published
FAO ANIMAL PRODUCTION AND HEALTH PAPERS: 45 titles published
FAO FOOD AND NUTRITION PAPERS: 31 titles published
FAO AGRICULTURAL SERVICES BULLETINS: 60 titles published
FAO IRRIGATION AND DRAINAGE PAPERS: 41 titles published
FAO SOILS BULLETINS: 53 titles published

Availability: October 1984

Ar — Arabic
C — Chinese
E — English
F — French
S — Spanish

* Available
** Out of print
*** In preparation

The FAO Technical Papers can be purohased locally through FAO Sales Agents or directly from Distribution and Sales Section, FAO, Via delle Terme di Caracalla, 00100 Rome, Italy.

M-32
ISBN 92-5-102153-8