# TREES AND SHRUBS

of the

# NORTHERN MARIANA ISLANDS

by

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and

AGNES RINEHART

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# ACKNOWLEDGMENTS


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# INTRODUCTION

Local trees in the Northern Mariana Islands are some of our most precious resources. For centuries our people have relied on native trees and plants for food, medicine, building materials, and countless other uses. Trees also provide much-needed shade, help control soil erosion and serve as watershed areas which store our life-giving water. Birds, fruit bats and other animals also depend on plants for food and habitat needs. Today, much endemic vegetation is disappearing with increased land clearing for housing and development. Introduced plants often replace native species at development sites, and with the loss of native vegetation, losses in culture, tradition, and important ecological values also occur.

This guide should assist the general public, school children, developers and tourists to identify, propagate/maintain, and learn the natural history and uses of some of the more important trees and shrubs of the Commonwealth of the Northern Mariana Islands. It should also encourage the protection, planting and use of appropriate plant species to perpetuate the beauty, culture, ecological balance and overall quality of life here in our islands.

# PLANT COMMUNITIES

Several different plant communities are found in the Commonwealth of the Northern Mariana Islands. In addition to a variety of disturbed or secondary vegetation communities, these include native forest on limestone, savanna, ravine forest, strand and wetland communities.

Limestone forests (native forest on limestone) dominated Rota, Aguiguan, Tinian and Saipan because these islands are geologically older and have had reef material deposited on the original volcanic rocks. Years of deposition, uplift and weathering have formed a porous limestone covering much of the islands, and the woody plants that grow on this limestone form the limestone forest. It is an integrated community that requires a long time to form. Soil is transitory and nutrients are carried down into the rock with each rain. Roots can anchor the trees easily, but must also tap into the nutrients before they leach downward. A system of root fungi (mycorrhizae) develops to transport nutrients from decaying vegetation into living plant roots.

Typhoons prune the trees so that the vegetation is stunted, especially in exposed areas. One kind of limestone forest, halophytic-xerophytic scrub, consists of extremely small, stunted plants that can survive dry, sunny, rocky cliffs and edges where salt spray and winds are particularly damaging. All limestone forests are easily damaged, and most disturbed, secondary communities occur when limestone forest is damaged or destroyed.

Savanna vegetation occurs on red clay soils that result from the weathering of volcanic rocks. Savannas are basically grasslands with a few shrubs and scattered trees like gagu (*Casuarina*) and kafu (*Pandanus*). They typically occur on slopes and erode easily; there is always a problem with fire in the dry season. Most of the younger islands (from Anatahan north to Uracas) are dominated by savanna vegetation, while Aguiguan has none and Tinian, Rota and Saipan have progressively more savanna lands. On Saipan some relatively gray-white rocks are volcanic dacite and support savanna vegetation.

Ravine forest vegetation occupies stream valleys; on Guam the trees can cover the ridges between the valleys, but this is not usual in the CNMI. Ravine forest soils are typically clay, like savanna soils, but the habitat is more sheltered and retains water sufficiently to support tree-dominated vegetation. Thus more sheltered areas in the younger, northern islands can develop forests even though they lack limestone.

The strand is the plant community of beaches, where the soil is sand-dominated and sunlight, wind and salt and the lack of freshwater select the species that can survive there. The more sheltered backstrand often grades to limestone forest and exposed rocky cliffs and seasides are really halophytic-xerophytic scrub.

There are two kinds of wetland communities: those dominated by woody vegetation are swamps, and those dominated by non-woody plants are marshes. In the Marianas, fresh-water sites are marshes, usually dominated by grasses (like karisso — *Phragmites karka*) and sedges. Swamps are typically brackish (salt plus fresh water) and are dominated by mangrove species such as manglen lahi (*Bruguiera gymnorrhiza*).

Disturbed sites, or secondary vegetation, occur where primary communities have been disturbed; such disturbances can be by natural causes (such as typhoons, volcanic activity or fires), but most often have resulted from the activities of man in the older islands of the CNMI. The most profound changes of recent times involved the use of Rota, Aguiguan, Tinian and Saipan for the cultivation of sugar cane (1900–1940), and then the activities associated with World War II. The dominant species now occupying these areas is tangantangan (*Leucaena leucocephala*). On Saipan, *Albizia lebbeck* is a secondary vegetation dominant and on Saipan and Tinian, *Acacia confusa* (sosugi or boiffuring) does well on clay or mixed clay and limestone soils. All three species are introduced, and all have become naturalized.

Other disturbed communities are dominated by vines, or weeds; both of these are herbaceous (non-woody) types of plants and thus beyond the scope of this booklet.



## SPECIES PAGES

1. At the top of each species page are color photographs, usually a site photograph of the species in its usual habitat and one or more photos of distinctive features such as flowers, fruits, etc.

   Below the photographs:

2. Scientific Name and "namer(s)"
3. (Other scientific name, if any)
4. FAMILY (Other FAMILY, if any)
5. Common Name: English
6. Common Name: Chamorro
7. Common Name: Carolinian
8. Description/Distinctive Features
9. Propagation/Maintenance
10. Natural History
11. Uses

All scientific names, including Family (2, 3 and 4) are alphabetized in an "Index to Scientific Names". All common names (5, 6 and 7) are alphabetized in an "Index to Common Names". Items 8-11 are descriptive paragraphs as text; sometimes 9 and 10 are combined. Terms which may be unfamiliar in the text can be located (and defined) in the Glossary. WF refers to "Wildlife Food" species.

You will note that many plants have several common names, in one language, or in several. Scientific names, written in Latin, remain the same no matter what the local language is. Changing a scientific name requires publication of a paper that explains why the name is being changed, who changed it and what the "old name" was. This book has the species names organized alphabetically under the FAMILY name (and the SUBFAMILY in the FABACEAE). The families under GYMNOSPERMS come before the flowering plant (ANGIOSPERMS) groups; MONOCOT families (flowering plants with one seed leaf or cotyledon and flower parts in 3's and 6's) are listed alphabetically before DICOT families (flowering plants with two seed leaves or cotyledons and flower parts in 4's and 5's).

The authors gratefully accept additional information or corrections which can be sent to Box 428, Agana, Guam 96910.

*Cycas circinalis* L.

Cycad
Fandang, Fadan, Federico

CYCADACEAE

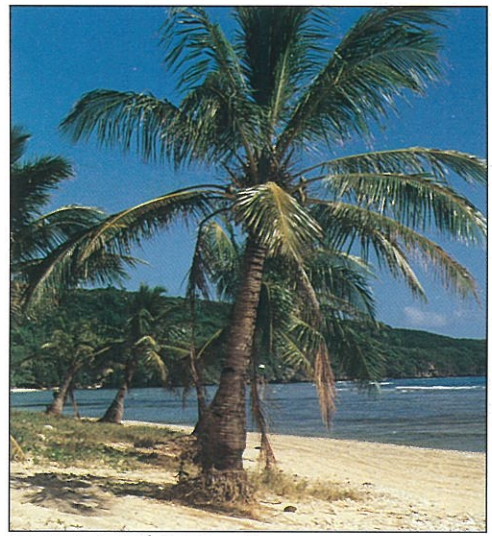
This is a stout-trunked tree with leaves restricted to the top of the trunk, which may branch as the plant ages. The leaves are glossy and spirally arranged; they look like palm fronds and may be 1-2.5 m long. The sexes are on separate trees. Male trees bear an elongate, upright cone in the center of the leaves; the woolly scales of the cone produce quantities of pollen and when the pollen is mature the cone is very strongly scented. The female trees also produce a central cone-like structure that opens outward to reveal individual tan, soft woolly leaves that are deeply lobed and toothed and bear ovules in notches along the margins. If the ovules are fertilized by pollen, glossy, large hard-shelled brown seeds develop on the leaves.

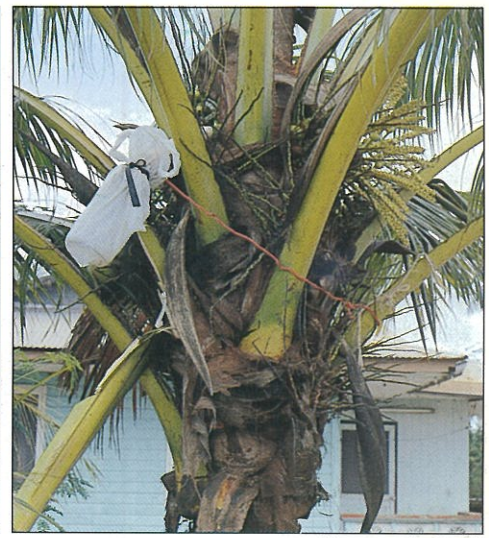
*Cycas* can be propagated by planting the seeds (which may require 3-6 months to germinate), or by cuttings; the plant is cut near its base and thrust 12-15 cm into the ground. Female plants presumably root better than males. Also, concave spots like scars or "eyes" on young (12-18 month) plants can be cut out and planted (like potatoes).

Fadang is native from India east and south to New Guinea and the Pacific islands including the Mariana Islands. It grows on clay and at the backs of beaches but is quite common on limestone. It is still abundant on Rota, and is being replanted on Tinian and Saipan.

The trunk material can be prepared like sago palm pith and the seeds can be pounded into a flour and eaten, but only if washed many times over several days. The seeds contain toxic hydrocyanic acid, which can be washed out, and perhaps other materials that may remain to cause trouble; the flour should be eaten seldom if at all. This cycad is extremely typhoon resistant, and makes an attractive ornamental plant.







*Cocos nucifera* L.

Coconut Palm
Niyog, Niyok
Lúú

ARECACEAE (PALMAE) **(WF)**

*Cocos* is a tall, unbranched tree with a gray, ridged, bare trunk with fibrous wood. Leaves, which are large (1-2 m long and 0.5 m wide) pinnate fronds borne at the top of the trunk, have a heavy, woody midrib and a waxy coating. The large inflorescence develops under a shield-like woody bract in a frond axil; this inflorescence is made of clusters of straw-like branchlets bearing whitish flowers in groups of three, with male flowers toward the tip and female flowers toward the branchlet base. The fruit (coconut) is large, somewhat triangular and has a hard shell (with three holes) surrounded by a fibrous husk. The plant embryo is near the base of the hard shell, surrounded by the endosperm or food storage material. This endosperm in young coconuts is liquid and watery; as the coconut matures (9-10 months) it becomes solid, firm, oily - and forms a hollow cavity (filled with water) in the center.

Coconut palms are propagated from the fruits (seeds); it is usually best to choose coconuts that have already sprouted. They transplant easily if space for the broad (but shallow) root mat is allowed.

There is only one species of coconut palm; it is distributed throughout the world tropics and subtropics and its origin is not definitely known. It is widespread because man is wide spread and has taken this valuable plant with him. Although coconuts float, seawater can soak through the husk and the three holes (of the hard shell) and kill the enclosed embryo. Coconuts might travel successfully from Saipan to Managaha Island, but not much further.

Almost every part of the lúú is useful; Safford (1905) devoted almost ten pages of text to the uses of this plant. The fronds serve as thatch and mats, the fruits as food, copra, water for drinking and oil for food, soap, perfume base and the husk and shell for containers and firewood. Sap from the young inflorescence is drunk or fermented (tuba), the bracts are used for containers and baby cradles, and the trunk for house and bridge foundations, rafters, etc.

*Pandanus dubius* Sprengel

Screw pine
Pahong, Pahon
Póghu

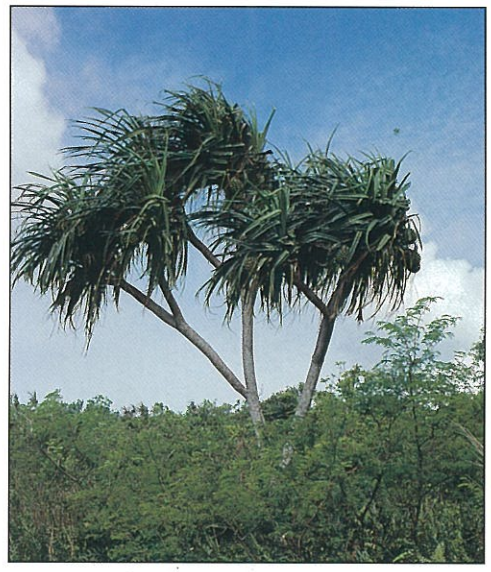
PANDANACEAE **(WF)**

Pahong is a small tree with prop roots and thick gray stems that branch and are topped with broad spirals of stiff, coarse, strap-shaped leaves. These leaves, which may be 2.5 m or more in length, have three conspicuous veins, bear sharp spines, and taper abruptly to a short pointed tip. The sexes are on separate trees. Male flowers are dense, white, fragrant, drooping, elongate cones within white specialized leaves. Female flowers are somewhat similar, but lack the white leaves and are supported by thicker stalks. The enormous, 15 kilogram fruits are dense compound heads containing 75-100 sections (drupes); each with one outward point.

Póghu can be grown from the individual drupes, or from cuttings. These trees are most abundant in limestone forests and often form impenetrable thorny barriers three to five plants wide. This species (one of 600 in this genus) occurs east of the Moluccas on or near seacoasts between Southeast Asia and Indonesia to the Pacific islands. Seeds are dispersed by the sea, freshwater and animals such as fish, turtles, birds and bats.

The seeds, especially basal portions, are edible, with a flavor much like coconut. On some islands this rich protein material is scraped, dried and then added to other foods. The leaves can be soaked, dried, and woven into mats; these mats are not as strong or durable as mats made of aggak, a "textile pandan". (Aggak apparently occurs in the Mariana Islands, but the only trees seem to be male, so it does not reproduce by itself.) Whole fruits are often used to decorate fiestas and weddings.





*Pandanus tectorius* Sol. ex Park.
(*Pandanus fragrans* Gaud.)

Kafu, Fatsao
Fashil wal

PANDANACEAE **(WF)**

Kafu is a small to medium sized tree with thin, forking trunks and aerial or prop roots. The leaves are long (2m +), narrower (ca. 8 cm wide) than those of pahong and they taper down their entire length to an elongated pointed tip. The margins and the midrib bear short curved teeth (serrations); leaf texture is stiff and the surface is glossy green. Male and female flowers occur on separate plants and are enclosed in white bracteal leaves. The fruits are large (ca. two kilograms) and rounded with about 50 sections (drupes) each. Each greenish section has two to four outwardly-rounded bumps and an orange pulpy base. Seeds in each drupe (1-12) are enclosed together in a thick, very hard, reddish wall (like that of the coconut inner shell). Flowering occurs roughly every other month except for the period from late November to late February when no flowering occurs.

Kafu can be propagated by its seeds. It may be endemic to the Mariana Islands, though there is some disagreement about its scientific name and therefore about its distribution. Safford (1905), for example, used the species name *P. fragrans* and reserved the name *P. tectorius* for the textile pandan "aggak" (which is solely male in the Marianas and must be propagated by cuttings). Kafu grows on limestone plateaus and clay hills; the fruits differ in structure in the two sites.

Fashil wal plants can be utilized as a living hedge, or as cultivated ornamentals. Trunks have been used for watering troughs, for temporary buildings on ranches, and the dichotomous branches provide supports for platforms - or chicken roosts. The heartwood of old trees can be used for walking sticks. The leaves have been used for mats and baskets, black dye has been made from roots and scent (perfume) from the male inflorescence. The orange pulp of the fruits is edible, but high in calcium oxalate; the seeds are edible, but difficult to remove from the thick, hard wall. Consequently the ripe fruits are much eaten by fanihi (fruit bats) and rats - but not by humans.

*Bambusa vulgaris* Schrad. ex Wendl.

Common Bamboo
Pi'ao, Pi'ao Palaoan
Bwai

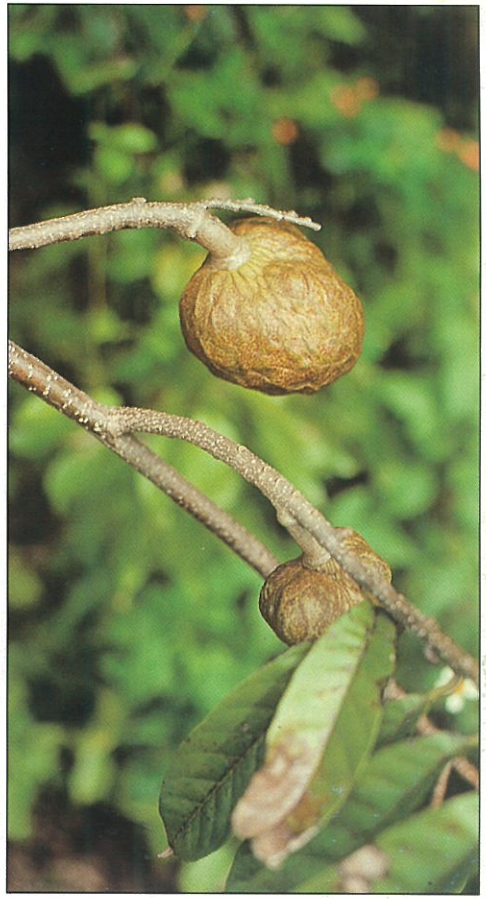
POACEAE (GRAMINEAE)

This species, like other bamboos, is a hollow-stemmed grass, with a "trunk" of hollow, woody segments and solid woody nodes. It grows to 10-15 m with a diameter of 10-15 cm. Leaves are dull green on both surfaces, grow from the tips of branchlets to a length of 10 cm or more and are lance-shaped (broader at the base and narrowing to a point). The stem sheaths, which are used to identify bamboo species, are broadly deltoid; their flaps (auricles) are broader than long, quite bristly, and have black hairs. Flowers are brownish, and achenes (fruits) are small and brown. However, flowering and fruiting occur only every thirty to forty years (or more), so fruit and flower characteristics are not much help in plant identification.

Bamboo is propagated by cutting out and transplanting "runners" from the plant roots, or by uprooting new stems and transplanting them. Pi'ao palaoan is native to Asia and has been brought to many tropical islands such as the Marianas, where it has become naturalized.

Bwai stems are used in construction - as scaffolding, fencing, house supports, walls and floors, and pala palas; they are also used for fishing poles and water containers. Their durability can be increased by soaking split canes in water for a week or two and drying them thoroughly. Young shoots are edible after being boiled and drained several times.





*Annona reticulata* L.

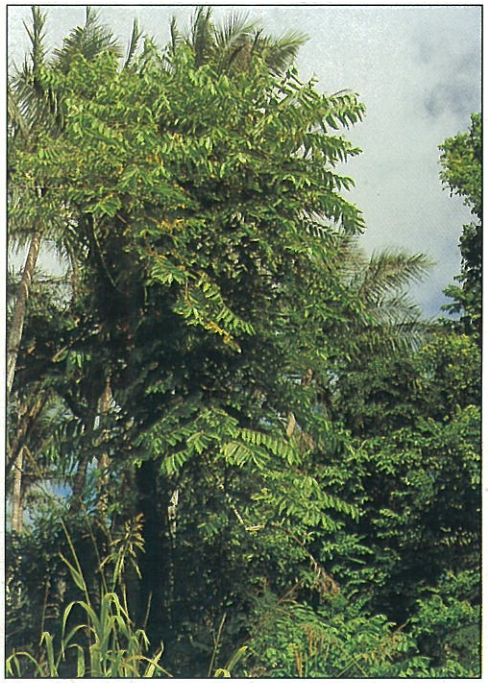
Custard/Sugar Apple; Bullock's Heart
Annonas, Anonas
Anoonas

ANNONACEAE **(WF)**

Annonas is a small or medium sized tree with arching branches. The medium sized (20 cm X 6 cm) dark green leaves have conspicuous midribs and side veins and a drip tip. Flowers are greenish and sepals and narrow petals are thick, with purple spots near their bases. Flowers occur singly, or in groups of two or three. Fruits are rough-surfaced (impressed lines form surface polygons), slightly heart-shaped and reddish; at maturity they have a fleshy sweet pulp containing numerous glossy-brown seeds, but they become woody afterward.

Custard apples can be grown from seeds. They are native to tropical America, including islands of the West Indies, but are naturalized in the Mariana Islands. They grow on limestone, particularly in forests and along the back strand, or around old homesteads in secondary forests.

Like other Annonaceae, anoonas produces an edible fruit, but the flavor is insipid, the fruit takes a long time to mature and may become woody without ripening. They are a favorite food of fanihi (fruit bats), which may be involved in their dispersal.



*Cananga odorata* (Lam.) Hook. *f.* & Thoms.

ANNONACEAE **(WF)**

Ilangilang, Alangilang
Lengileng

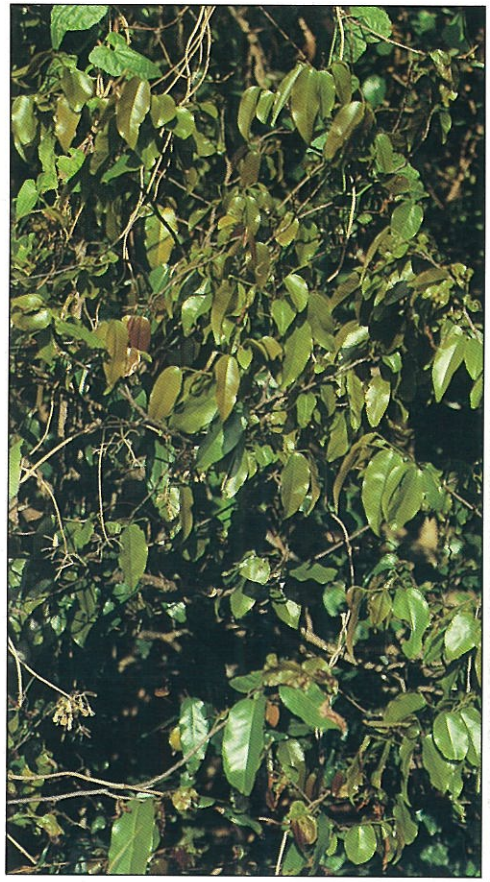
Ilangilang is a medium sized tree that is usually bent, with straggling branches and rough, dark, scaly bark. Leaves are simple, entire and oblong, with a conspicuous midrib and lateral veins, and a drip tip. They are alternate and occur in one plane along the branch. Flowers consist of long, narrow, petals that are green and curly when young and twisted, yellow and limp when mature. The flowers are extremely fragrant, especially at night. The fruits have six to twelve sections with constrictions between and the mature pod is long-ovoid and black.

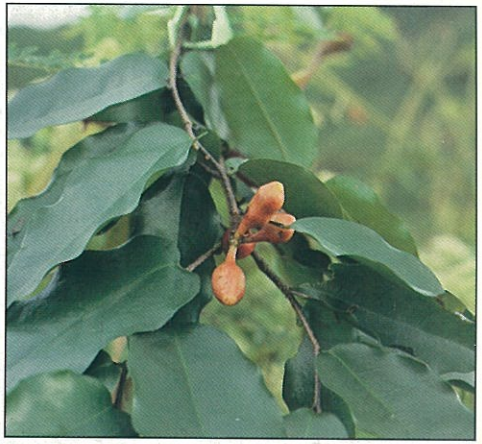
*Cananga* can be propagated by seeds or cuttings (planted 8 m apart); flowering will begin the third year and will be more or less continuous. The species is native from tropical Asia to Australia and probably was brought to the Marianas from the Philippines, since the common name is a Philippine name. Lengileng has become naturalized in the Mariana Islands; in Saipan it is frequently grown near Carolinian homes.

In Samoa, trees are large enough to make small canoes; in Malaysia drums are made from the trunks. The tree is a cultivated ornamental throughout the tropics and often escapes from cultivation; the fruits are sought out and spread by pigeons.

The flowers are used with other flowers, peppers, *Pandanus* drupes, etc. to make headbands (mwarmwars). Flowers soaked in coconut (or other) oil make perfume and are the base for ilangilang (cananga) oil, which is distilled from this mixture (25 g from 5 kilos of flowers). In some areas this is used to cure "spirit-caused" illness. Macassar oil, used as a hairdressing, is made from ilangilang and *Michelia champaca* (Magnoliaceae) blossoms.







*Guamia mariannae* (Saff.) Merr.

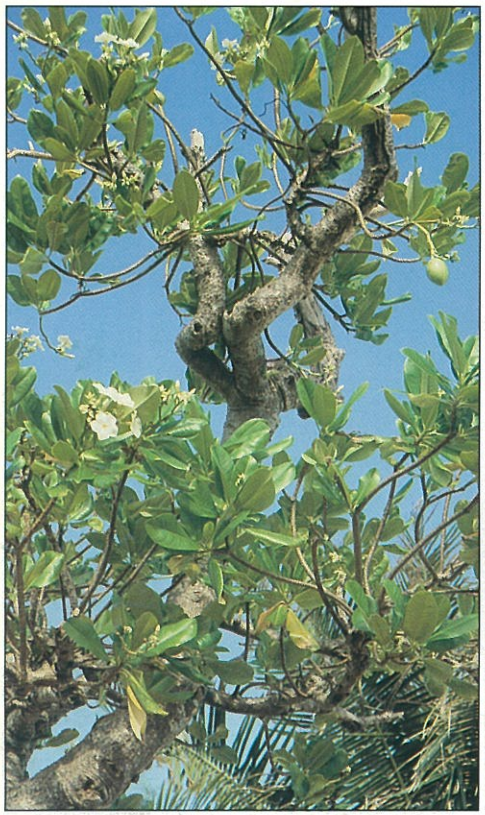
ANNONACEAE

Paipai, Pacpac
Peipei

Paipai is a small, compact, many-branched understory tree of the limestone forest. Its leaves alternate on the branches and are rounded at their bases and pointed at their tips. Mature leaves are dark green, glossy and stiff, but young leaves may be pale pink or cream in color and hang limply (like young gulos [*Cynometra*] leaves). Flowers have both male and female parts and occur singly on short branchlets among the branches. Their yellowish petals are triangular and thick and there are many stamens. The fruits are hard, somewhat cylindrical and constricted between the three to four seeds; many fruits may radiate out from a central disc-like area. The unripe fruits are yellow to red and mature to brown.

*Guamia* can be grown from seeds, and the forests on limestone can provide seedlings to plant. This species is the only one in the genus, which is named for Guam, and occurs naturally only in the Mariana Islands.

Peipei could be an attractive addition to lands that contain stony limestone; it does not become very large and would probably be best planted in small groups.



*Cerbera dilatata* Markgraf

Chiute
Apilas

APOCYNACEAE

Chiute is a small to medium sized tree (to 10 m). Its thick branches have conspicuous leaf scars and exude milky sap when cut or bruised. Leaves are light green when young but dark green when mature. They are elliptical, 7-15 cm long, spirally arranged and crowded near branch ends. The petioles and midribs can be reddish and the side veins are conspicuous. Flowers are white, showy, fairly large, tubular and fragrant. They are borne terminally in branched clusters on elongate pedicels. The fruits are slightly larger (5 cm X 4 cm) than those of *Neisosperma*, often twinned, glossy and speckled green, brown and white. The thin outer coat decays after the fruits fall and the fibrous interior encloses a seed with a tough, woody coat.

*Cerbera dilatata* can be propagated by seeds, or by cuttings that have been allowed to dry slightly. The genus occurs from India to the western Pacific and New Guinea, but this species is endemic to the Mariana Islands. It grows in a wide range of habitats from ravine forests on clay soils to forests on argillaceous limestone.

The plant and its showy flowers are quite attractive and with proper soil would make a good ornamental - an "island *Plumeria*". Like *Plumeria* and other members of its family (*Nerium oleander* and *Thevetia peruviana*), apilas has poisonous sap which makes all parts of the plant poisonous.



*Neisosperma oppositifolia* (Lam.) Fosb. & Sachet
[*Ochrosia oppositifolia* (Lam.) K. Schum]

Fagot, Fago

APOCYNACEAE **(WF)**

Fagot is a medium sized tree (to 15 m) with smooth, grayish bark and horizontal branches that extend outward in a whorl (pagoda branching) with fairly long distances separating the whorls. The elliptic, dark green leaves are opposite, or whorled in groups of three to five, and are 10-26 cm long and 6-13 cm wide with prominent midribs and numerous straight lateral veins. The small white five-petalled flowers are fragrant and occur in terminal cymes that are 5 cm long or more. The fruits are drupes about 8 cm long, elliptic-oblong and green, maturing to dull yellow. They decay when they fall to the ground to reveal a fibrous seed coating. Each fruit contains two flat, edible seeds.

*Neisosperm oppositifolia* can be propagated easily by seeds and the floor of the limestone forests or back strands where they occur usually contains many fibrous sprouting seeds. This species occurs from the Seychelles across the Indian Ocean to Malaysia and the western Pacific Islands.

The wood is fine grained, yellow and insect resistant, it is light and takes a fine polish but is not strong. Many species of the genus are utilized for dyes, timber and local medicine. The seeds and pericarp are edible and taste a little like coconut. The tree is very typhoon-resistant.

*Ochrosia mariannensis* A. DC. Lipstick tree
[*Bleekeria mariannensis* (DC) Koidz] Langiti
APOCYNACEAE **(WF)** Lengit

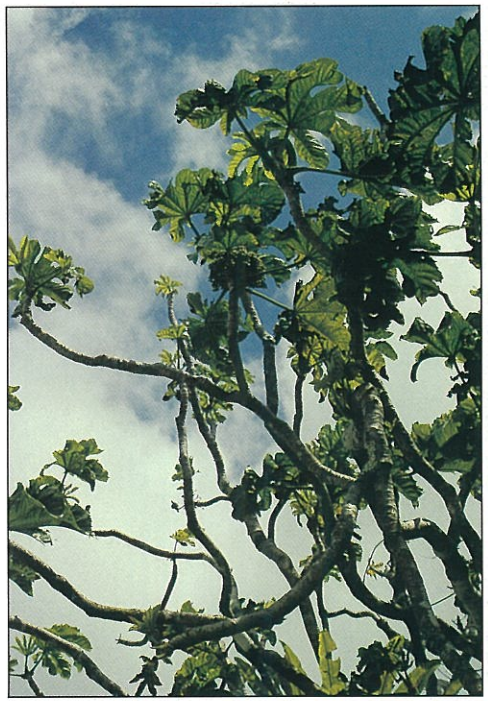
Langiti is a small to medium tree that grows on limestone. Its leaves are 12-20 cm long, 2-5 cm wide and they grow oppositely or in loose whorls of three around branches. They are slightly glossy, dark green above and paler below and have many pairs of closely-spaced lateral veins. The flowers are tubular, white and occur in few-flowered axillary cymes. They have both male and female structures. The keeled fruits (drupes) are "twinned" (they occur in pairs) and are about 5 cm long, waxy, glossy and may be yellow or red. Almost all parts of the plant release a milky sap when cut.

Lengit may be propagated by seeds, or by cuttings. Members of this family include plumeria and false gardenia and most can root from branches cut, dried slightly and then stuck in the ground. *Ochrosia* is drought-tolerant, though it does wilt in the afternoons of hot, dry days.

The genus *Ochrosia* occurs from the Mascarene Islands through tropical Asia to the islands of the Pacific. *Ochrosia mariannensis* is one of about 10-15 species and is endemic to the Mariana Islands. Here it grows on limestone in exposed areas such as cliffs, or at the edges of forests. It is an edge species, not an understory species.

Members of this genus supply wood for timber and leaves, fruits, roots and bark for medicines and dyes. Some seeds are edible for people, but most supply food for wildlife.





*Osmoxylon mariannense* (Kaneh.) Fosb. & Sachet
(*Boerlagiodendron mariannense* Kaneh.)
ARALIACEAE **(WF)**

*Osmoxylon* is a spindly, soft-wooded tree to 10 m in height. It has several ascending, gray-barked branches that bear conspicuous leaf scars. Leaves vary in size; the mature ones are palmately lobed and about 30 cm long and 50 cm wide. The seven to nine lobes are coarsely toothed and each lobe has a conspicuous, depressed mid-vein. The leaves are alternate, or whorled, at branch tips; the petioles are 35-40 cm long and based in distinctive, conspicuous green multiple "sockets".

The yellow flowers have both male and female components and are borne in compact, much-branched, large terminal cymes or umbels. Fruits form as the compact head spreads, and are globular, maroon and conspicuous.

Nothing exact is known about the propagation of *Osmoxylon*; presumably its seeds could be utilized. Members of its family, especially *Polyscias*, are propagated easily by cuttings.

*Osmoxylon mariannense* is one of about 50 species in a genus that extends from central and east Malesia north to Taiwan and east to the western Pacific. This species, however, is endemic to Rota; its closest relatives occur only in Palau in all of Micronesia. It inhabits limestone forests on the sabana and its escarpments on Rota, and is not very common.

The fruits are large (large pea to small grape size) and fleshy, and probably provide food for wildlife. Because this species is unusual and uncommon, some attempt should be made to propagate it and reduce its chances for extinction.

*Polyscias grandifolia* Volk.

Pepega

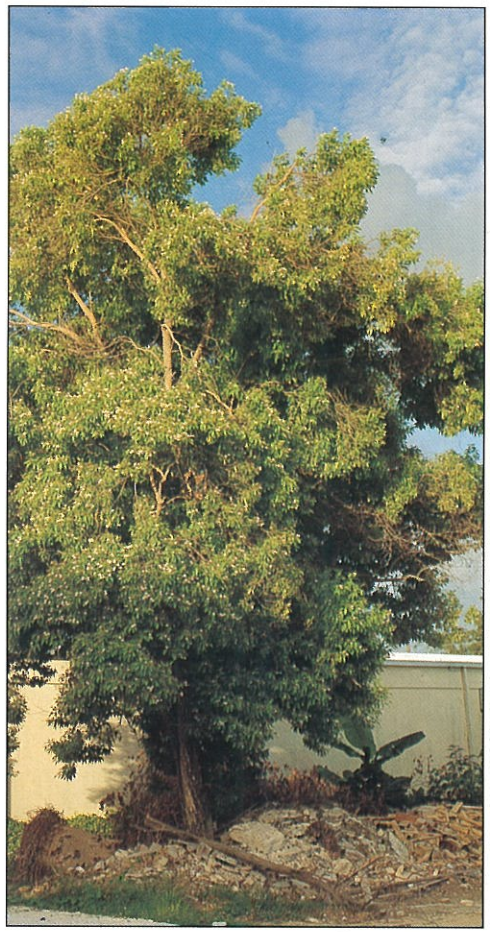
ARALIACEAE

Pepega is a small tree with few branches that occasionally reaches a height of 4-5 m. The once-pinnate compound leaves are 30-90 cm long and are composed of five to nine opposite green leaflets that are entire when mature but slightly toothed on young leaves. Flowers are individually very tiny (2-3 mm long) and greenish-white, but are borne on broadly spreading paniculate umbels that are the size of the leaves. The fruits are small (5-7 mm wide) and flattened, and have two compartments and two seeds.

*Polyscias grandifolia* can be grown from seeds and from stem cuttings. There are about 100 species of *Polyscias* in the old world tropics; this species is endemic to the Marianas and to the Central and Western Carolines. It seems to grow on limestone only, and is an understory tree in limestone forests.

Although species of *Polyscias* are used as ornamentals - as hedges, as platitos - to stupefy fish - no uses are recorded for *Polyscias grandifolia*.





*Catalpa longissima* Jacq.

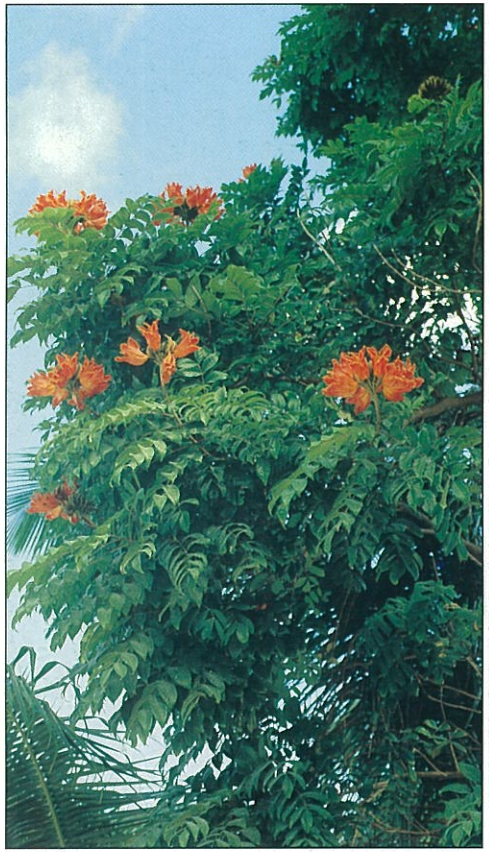
Yokewood

BIGNONIACEAE

*Catalpa* is a spreading tree to 15-16 m in height. The opposite or whorled leaves are narrowly oblong, simple, 8-16 cm long on 2-4 cm petioles. The two-lipped white-to-pink tubular flowers occur in clusters among the leaves. The fruits look like long, skinny string-beans hanging beneath the leaves. The seeds are small and flat and have papery white wings.

*Catalpa longissima* can be propagated by seeds or cuttings. It is native to the West Indies, and is one of eleven species in Eastern Asia and North America.

Yokewood has been used to make small objects such as the "yokes" it is named for; it can also be used for framing strips and other small construction items. It survives well on dusty city streets, is quite attractive when it blooms and makes an excellent shade tree. It tends to be rather brittle in strong winds, but grows rapidly and may be useful in windbreaks. It is sparingly naturalized in the CNMI but is common along the east coast of Saipan in Garapan and Susupe.



*Spathodea campanulata* Pal. de Beauv. African Tulip Tree

BIGNONIACEAE Apär

The African tulip tree is moderate to large in size and has straight, pale, fluted trunks and ascending branches. The compound leaves may be 45 cm long, and bear 7-19 leaflets (all paired except one terminal) that are elliptic or ovate and bear conspicuous veins. Red or red orange scentless flowers are large (10-13 cm) and showy, and borne on erect, dense racemes. Fruits are flattened blackish capsules 15-20 cm long and 4-5 cm wide, they contain seeds with wide, papery wings.

*Spathodea campanulata* can be easily grown from seeds and cuttings. Young plants grow from the roots of mature trees so that clusters of trees are usual if one is planted. These root suckers continue to grow and propagate even after the original tree is removed. The tree is native to tropical Africa but is now a cultivated ornamental street tree in much of the world's tropics.

Apär is an imported plant that has become naturalized in the tropics. Its trunks are weak and do not fare well in typhoons although the surviving part of the plant makes a rapid recovery. It flowers when young, grows in marginal circumstances and provides some shade. Its habit of forming clusters may be useful in some places and undesirable in others.



*Ceiba pentandra* (L.) Gaertn. Kapok, Silk cotton tree
Algidon, Atgidon de Manila
Arúghüschél

BOMBACACEAE **(WF)**

Kapok is a medium to large straight tree with gray spiny bark near the ground and horizontal branches that leave the trunk at nodes or tiers (pagoda branching). The leaves are palmately compound with 5-9 lanceolate leaflets that are green above and whitish beneath; both leaves and leaflets have conspicuous stalks (petioles) and are deciduous, falling just before the fruits ripen. Flowers are cream or pale pink and cluster on branchlets; they have five petals and five stamens with twisted anthers. Fruits are oblong pods about the size of small cucumbers and are divided in five sections that split open at maturity. Flattened round seeds are embedded in a cottony fiber of long hairs.

Algidon can be easily propagated from seeds and probably by cuttings; it is usually found on limestone and does not seem to escape from cultivation. The species is native to India and Africa and until recently was widely cultivated in the tropics.

The cotton-like, very buoyant pod material, kapok, is used to stuff pillows, cushions and quilts, and to provide padding for clothing. It does not become matted, but the fibers are brittle, elastic and cannot be spun; they are also highly flammable. Trees are grown for telephone poles in Java and often serve as property boundary markers or living fence posts. Seeds are an oil source and young fruits are edible. In many areas, flowers are pollinated by bats and the nectar is a favorite fruit bat food.

*Cordia subcordata* Lam.

BORAGINACEAE

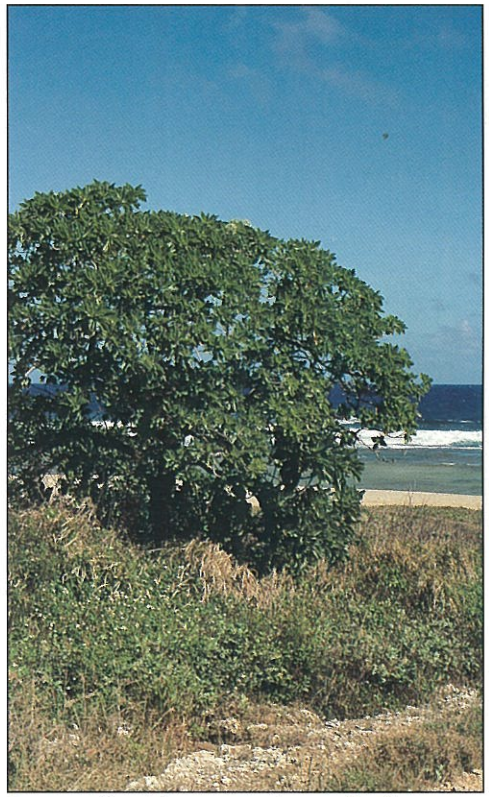
Niyoron
Aliw

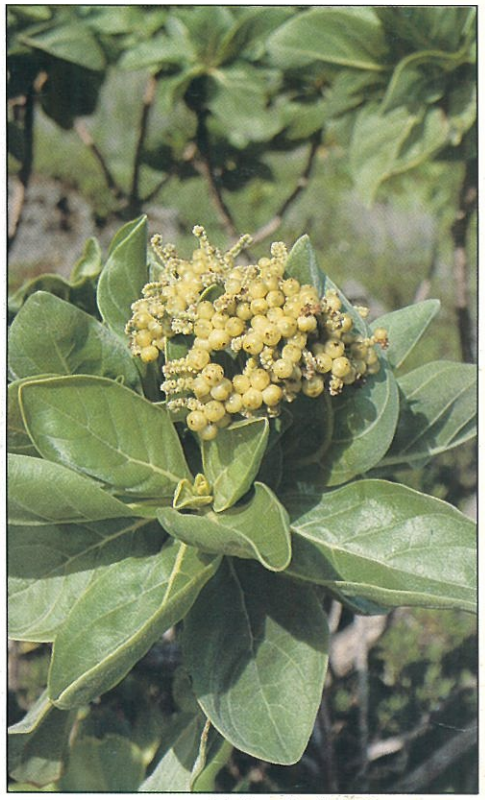
Niyoron is a small to medium sized tree; often the trunk, which has pale gray, slightly fissured bark, branches near the ground to produce several vertical trunks and arching branches. Seedling plants and juvenile trees have toothed leaves but mature trees have leaves with entire-to-wavy margins; 4-5 pairs of lateral veins from the yellowish midrib and long (2-8 cm) petioles. Flowers are orange and bell-shaped; they occur in few-flowered corymbs that are terminal or lateral on branches. The fruits are yellowish to brown and 2-3 cm long. They are tipped with persisting sepals and contain 1-2 corky seeds.

*Cordia subcordata* can be propagated by seeds or cuttings. It is a strand plant from Zanzibar and Madagascar through Indomalaysia to the islands of the Pacific Ocean and also grows on limestone boulders and cliffs. Though the seeds are waterproof, it is likely that much of the spread of this plant - like that of the coconut palm - resulted from man's activities.

Aliw wood is rather soft, but durable; the alternating dark and light bands make it attractive for bowls (including poi calabashes in Hawaii), cups, trays and carving in general. The wood is also used for canoe parts such as outriggers. The tree is attractive and provides shade in open shores and the flowers can be used for necklaces and headbands (leis and mwarmwars).







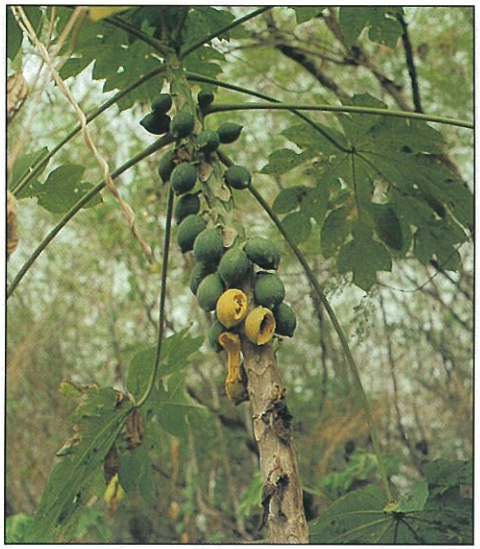
*Tournefortia argentea* L.*f.*
[*Messerschmidia argentea* (L.*f.*) IM Johnst.]
BORAGINACEAE **(WF)**

Velvet leaf
Hunik, Hunek, Hunig
Tchel

Hunig is a small to medium tree (5-6 m tall) with dark, deeply furrowed bark, a spreading crown and thick, stout branchlets with obvious, large leaf scars. Leaves are large (10-30 cm long and 3-12 cm wide), light green, silky-pubescent, and crowded at branch ends. Individual flowers are small and white with black anthers, but they occur in large, tightly coiled, many-branched paniculate cymes found among the leaves at branch ends. The fruits are at first small and green and mature into brown, pea-sized, globose structures that contain two pale, corky nutlets.

*Tournefortia argentea* can be propagated by seeds, and as an Indo-Malaysian strand plant has utilized ocean currents to carry these floating seeds from the Indian to the Pacific Ocean, and to islands in the north and south Pacific. It grows rapidly, but can become infected by heliotrope moth larvae at certain times of the year.

As a strand plant, tchel provides shelter and shade in a habitat where both may be scarce. When it is flowering, it is a "butterfly attractor"; spiders that build webs here never wait long for a meal. The leaves can be rubbed on face masks (and windshields) to prevent "fogging". The wood is not durable, but has been used for shoe-lasts and of course for firewood. Many beach parks are losing valuable shade as these trees are hacked to pieces for barbecue fuel.



*Carica papaya* L.

CARICACEAE **(WF)**

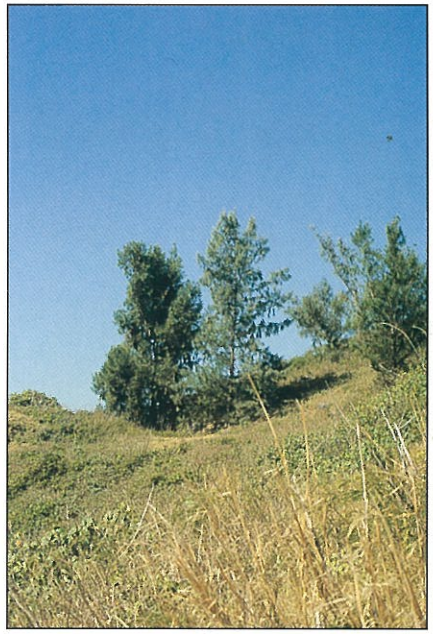
Papaya, Pawpaw
Papaya
Bweibwayúl mwel, Bweibwayúl wal

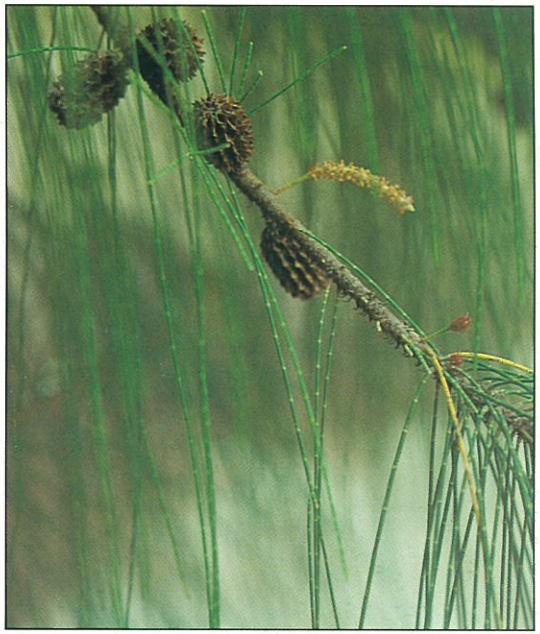
Papaya is a huge herb, with a soft, fibrous, usually unbranched "trunk" with conspicuous leaf scars. The large palmately-lobed leaves have 7-11 irregularly toothed lobes and petioles that may be 1 m long. Male and female flowers are usually borne on separate trees. Male flowers, which are small and pale yellow or cream-colored, are borne on long (30-90 cm), hanging, branched panicles. Female flowers are larger (4-6 cm wide) with white back-curling petals; they occur singly in leaf axils on very short pedicels and mature after the leaf falls. The fruits vary in size and shape; they are green maturing orange and have orange to reddish pulp with many seeds, each with pulp around it, in a central chamber. All parts of this plant have a milky sap that contains papain, a protein-digesting enzyme.

Bweibwayúl mwel is easily propagated by seeds. Papaya is native to Central America and the West Indies, and naturalized in most tropical regions, including the Mariana Islands. It grows well on limestone or limestone-clay mixtures, so long as the site is open. Disturbances, such as land clearing or typhoons, give seeds access to sunlight and papaya trees appear in large numbers.

Mature fruits are eaten raw by bats, birds, rats, lizards and people. People also pick the immature fruits and pickle them, boil them for vegetables, or feed them - green and ripe - to pigs. Green papayas are a good source of vitamin B; ripe papayas are a fair source of iron and calcium, a good source of vitamins A and B and an excellent source of vitamin C. The seeds are eaten by birds and the seeds (plus latex from the plant) destroy intestinal worms. Leaves contain (in addition to papain) carpaine, an alkaloid heart depressant (similar to digitalis). Leaves have been smoked as a tobacco substitute and as an asthma cure. Wrapping leaves around meat for several hours tenderizes the meat (commercial meat tenderizers are basically papain); and fresh leaves are used in poultices to relieve boils. Leaf infusions have been used to treat colic and intestinal worms. Juice from the roots is diuretic and also used to treat kidney stones.







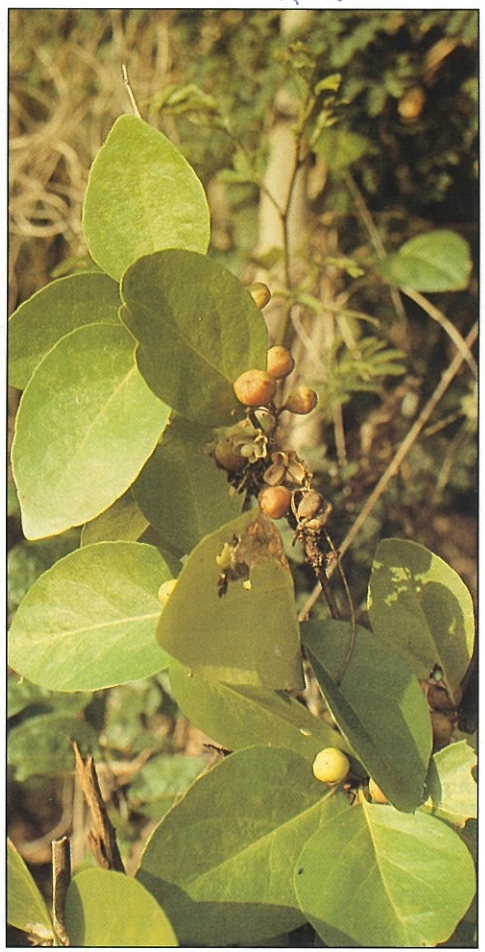
*Casuarina equisetifolia* L.
(*Casuarina littorea* L.)
CASUARINACEAE

Ironwood, Australian Pine
Gagu, Gago
Weighu

Gagu is a pyramid shaped tree to 15-20 m with scaly grayish bark and horizontal branches bearing long, drooping, green, needle-like branchlets. These cylindrical jointed stems are photosynthetic and usually mistaken for leaves (or "pine needles"). The real leaves are minute (less than 1 mm long), triangular, and occur in fives at stem joints. Male and female flowers are separate, but are usually carried on the same branchlets. Male flowers occur in catkins at the tips of the green branchlets, or on special branchlets; they produce pollen and then fall off. Female flowers are borne on short pedicels along the woody branches, and are wine-red in color at maturity. The pollinated female catkins become woody, cone-like fruits that open at maturity to release winged seeds.

Ironwood can be propagated best by planting/transplanting seedlings; cuttings root poorly and a mycorrhizal fungus (associated with the roots) may be required for proper growth. The species is native to the old world tropics from the Pacific islands to India, Australia and the islands of Malesia, and is indigenous to the Mariana Islands. It is a pioneer, salt-resistant seashore tree, and is very hardy on limestone and volcanic soils. It is particularly common in abandoned quarries.

Its wood is reddish, heavy, strong and difficult to work. Timber is used for shingles and rafters and in Samoa was used for spears and war clubs. The wood is excellent for fuel, burns with great heat, and the smoke is said to repel mosquitos. An astringent from the bark is used to treat chronic diarrhea and roots are used in medicinal teas. The trees are adapted to high winds, sunlight intensity and water deficiency. They are also somewhat fire resistant and make good windbreaks, though their spreading root system is shallow and typhoon winds can uproot single trees.



*Maytenus thompsonii* (Merr.) Fosb.

Lulujut, Luluhut

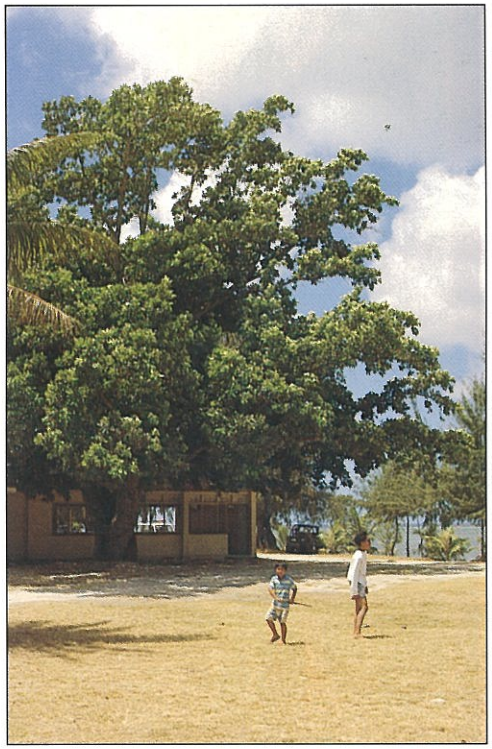
CELASTRACEAE

This tree, which seldom reaches 3 m in height, has irregular, gray, spreading branches. Its glossy bright green leaves are alternate, elliptic or ovate with entire or slightly wavy margins. The leaf petioles are usually red. The flowers have both male and female parts and are small, white and occur on clusters at leaf axils. The fruits are 3-part capsules that are brown when mature and open while still on the branches to release the seeds.

Lulujut can be propagated by seeds; other methods are not known. The genus *Maytenus* has about 225 species; this species is endemic to the Mariana Islands where it is common on limestone, in both forests and backstrand. It is both a forest understory and an edge plant.

Leaves of this species are often added to all-purpose medicinal combinations. The wood has been used for enclosure stakes and for fuel. It is an attractive small tree that could be used as an ornamental, particularly in limestone areas.





*Calophyllum inophyllum* L.

Palomaria, Mastwood
Da'ok, Da'og
Rághisch

CLUSIACEAE (GUTTIFERAE)

Da'ok is a medium to large tree with heavy, furrowed bark, large ascending limbs and a broad crown; its sap is a yellow-to-cream colored, resinous latex. The large (16 X 9 cm), stiffly leathery leaves are opposite on 1-2 cm petioles, ovate-to-oblong, and have secondary veins about 1 mm apart off the midrib. The flowers are fragrant and showy, with white petals and numerous yellow stamens, and are carried on racemes to 10 cm in length. The brown fruits are nearly spherical, 3-4 cm in diameter with a wrinkled exterior and one large seed covered additionally by a bony shell.

Rághisch is an Indomalay strand plant that is distributed on Asian, African, and Australian strands and on ocean islands. It can be propagated and dispersed by its floating fruit. In the Marianas it grows on beaches, savannas and as a cultivated plant. It grows slowly, is highly typhoon resistant and makes an excellent windbreak.

The tree is an excellent shade tree and a commonly planted ornamental. Its wood is hard and of excellent quality, and has been used for boat timber, carabao cart wheels and for large canoes. The branches are used as knees, stem and stern posts for boats. The sap from the trunk and bark makes an aromatic gum. Oil is skimmed from the surface of water in which leaves are soaked and used as a remedy for sore eyes. The fruit is used to provide both medicinal oil and lamp oil (doomba, dilo or pinnay oil). The seed kernel is poisonous and contains a number of harmful constituents.

*Mammea odorata* (Raf.) Kosterm.

Chopak, Chopag
Lifeis

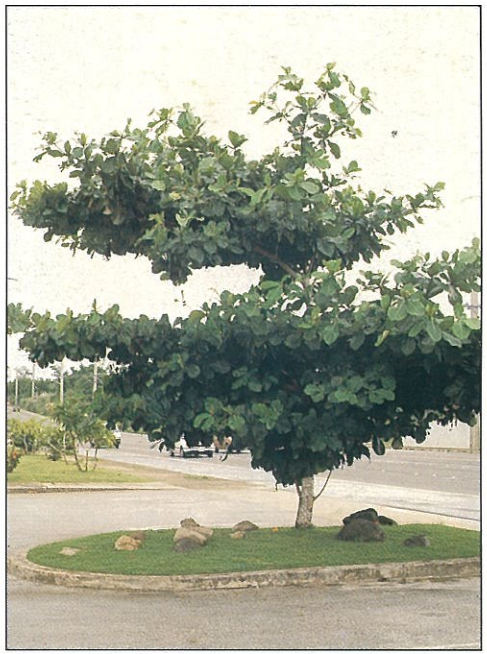
CLUSIACEAE (GUTTIFERAE)

This medium sized tree (5-10 m tall) has a straight, muscled trunk with dark red wood, and stiff, rigid, warty branches with light colored bark. The dark green, leathery, entire leaves are opposite, obovate, rounded at the tips and narrow toward the base. They have very short (to 13 mm) petioles. The midrib is broad, yellowish and prominent; the veins are pinnate and reticulate and the lower leaf surface is lighter than the upper. The flowers are borne along branches below the leaves - or even on the trunk - and have two persistent sepals, six white petals and numerous yellow stamens. Although all flowers look alike, female flowers have sterile stamens (male structures), and male flowers have sterile pistils (female structures). Lifeis fruits are fairly large (6-8 cm) oblong, hard, woody and slightly curved.

*Mammea odorata* is one of 50 worldwide tropical *Mammea* species and one of 27 Indomalayan to Pacific island species. It is native to limestone forests along coastal cliffs and slopes in the Mariana Islands. It typically occurs in groups with almost no other species and the ground is usually crowded with fruits, newly-sprouted fruits and seedlings. Such fruits and seedlings can be used to propagate this species but growth after germination is very slow.

Chopak wood is hard and durable, and used for house beams and posts, planks, tool handles, bullcarts and corner posts of livestock fences. The heartwood, which is red, can be used to produce a dye.





*Terminalia catappa* L.

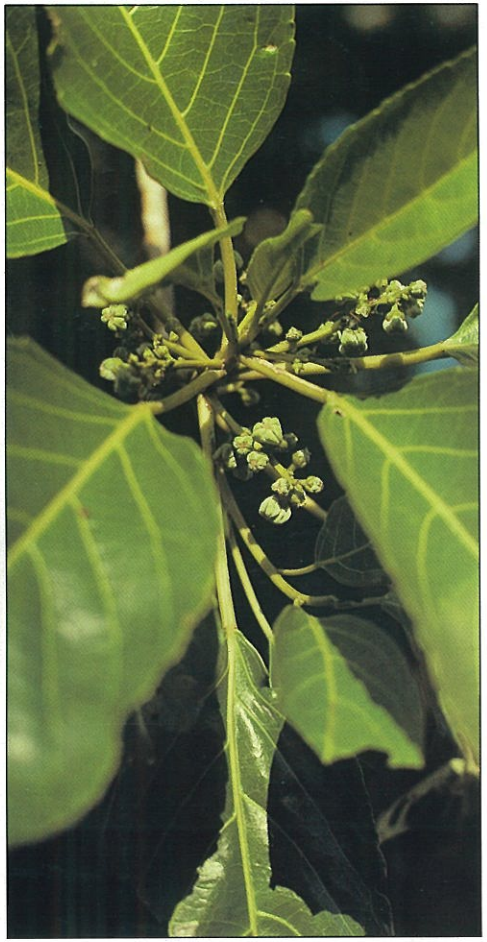
Pacific almond
Talisai
Talisei

COMBRETACEAE **(WF)**

Talisai is a deciduous pagoda-branching tree to 25 m, though it is usually shorter in the Marianas because of typhoons. Branches are horizontal and slightly ascending and leave the trunk at nodes. They bear conspicuous leaf scars. The large (20-30 cm long and 8-12 cm wide), rough-papery leaves have a rounded apex, are largest near the apex and taper to a heart-shaped base. They cluster near the branch tips on short petioles and wither red before they fall. Flowers are small and white or cream colored and smell rather musty. They lack pedicels but grow clustered on an axillary flowering spike 6-18 cm long. The fruits are one-seeded drupes 3-6 cm long and 3-4 cm wide, obovoid, compressed and narrowly winged. They are green maturing red to blackish and have a fleshy rind. The seed within is edible but hard to extract and often abortive even though the fruit develops in its usual way. Plants bear fruit several times a year.

This species is native to the Asian-African tropics and is a strand plant that is easily propagated from seeds. It is indigenous to the Mariana Islands.

Talisei is a versatile tree that is often cultivated. It is an excellent shade tree and has a reddish wood that is used for timber, troughs, carts and posts. Fijians and Samoans use the hollowed trunks for drums. The bark, leaves and roots contain tannin, which is used for dyeing wood and skins; mixed with iron salts (in India) to produce a black dye; and the bark and leaves are used as an astringent in dysentery. The leaves are fed to silkworms and can be applied to joints to ease rheumatism and the juice from young leaves can be taken internally to cure headaches and colic. Seeds are edible and excellent, especially roasted with caramel. Crows are also very fond of the seed kernels.



*Claoxylon marianum* Muell.-Arg.

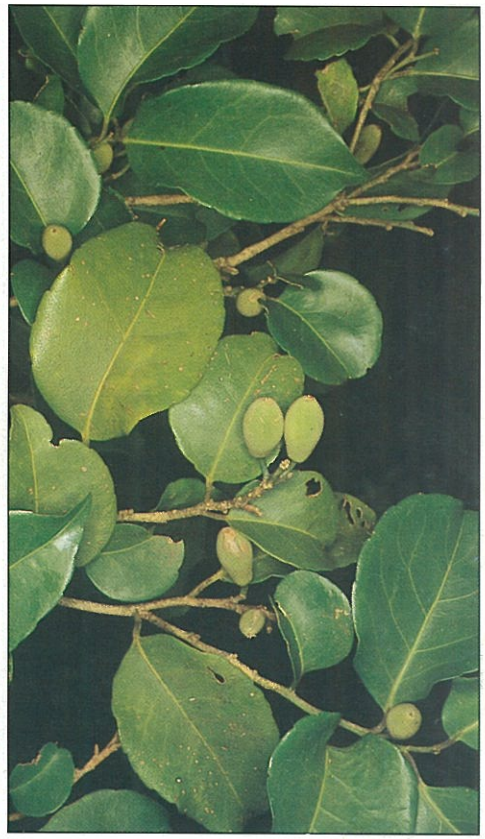
Cator, Panao
Mwesor

EUPHORBIACEAE

Cator is an attractive small to medium sized tree with rather stout smooth gray branches that are densely leafy. The crowded leaves are smooth, membranous, elliptic-oblong and alternate on 3-5 cm firm petioles. The margins are irregularly toothed and have 7-10 pairs of secondary veins that are broadly reticulated. Young leaves are purplish and pubescent while older leaves, when pressed dry, have the texture of sandpaper and are red-purple. Male and female flowers are separate, but both are carried on axillary fascicled racemes and are blue-green, waxy and elongate. Male flowers have about 25 stamens and three valvate sepals. Female flowers have sepals that look like petals and no stamens. Mwesor fruits are purplish capsules 7-8 mm thick and three-chambered.

*Claoxylon marianum* is one of 80 species of the Asian-African tropics and it is found only in the Mariana Islands in native limestone forests. It can be propagated by seeds, or perhaps by cuttings. It is suitable for cultivation in limestone habitats and it grows in shade or as an edge species.



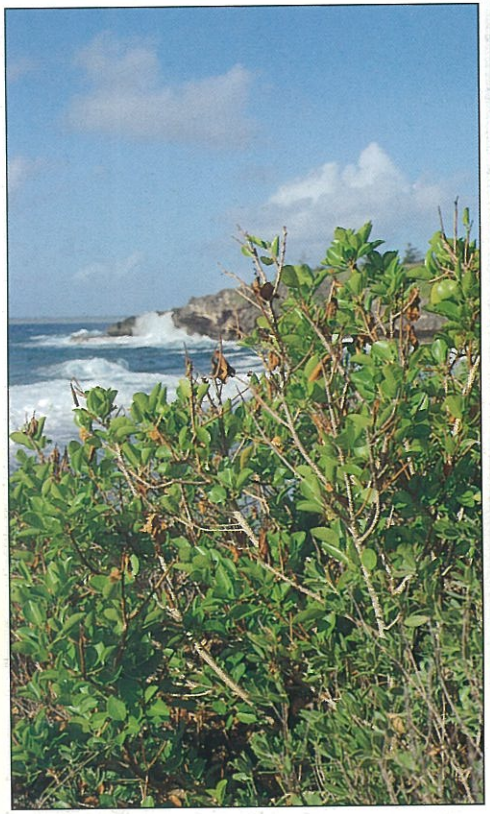


*Drypetes dolichocarpa* Kaneh.

EUPHORBIACEAE **(WF)** Mwelel

Mwelel is usually a small tree (one to 12 m has been seen) with rough, warty whitish-gray branches with prominent lenticels. The young branches are grooved, and the wood is yellowish and very hard. Leaves have shallowly toothed margins, are alternate and broadly lance-shaped and are quite variable in size (2.5 cm wide X 6.5 cm long and 5 cm wide X 12 cm long on the same branch). They are slightly asymmetrical, have a yellowish midvein and 4-5 pairs of subopposite major lateral veins. The upper surface is dark olive-green and the lower surface is paler. The petioles are 0.5-1.5 cm long and twisted; they are finely ridged near the branch. Flowers are of separate sexes, and both kinds of flowers are borne on clusters of 10-12 flowers on small axillary branchlets; both lack petals. The fruits are soft and fuzzy-skinned drupes, green maturing tan, obscurely grooved and oblong, 2 cm X 1 cm; and each encloses one seed.

*Drypetes* is native to the tropics from south Africa east through Asia and its islands to the Pacific islands. The species *D. dolichocarpa* is endemic to the Mariana Islands. It occurs on limestone in open clearings or at forest edges. It can be propagated by its fruits which mature at the beginning of the dry season (December and January). Wildlife may feed on and disperse the fruits.



*Excoecaria agallocha*
var. *orthostichalis* Muell.-Arg.

Blinding Tree, Milky Mangrove

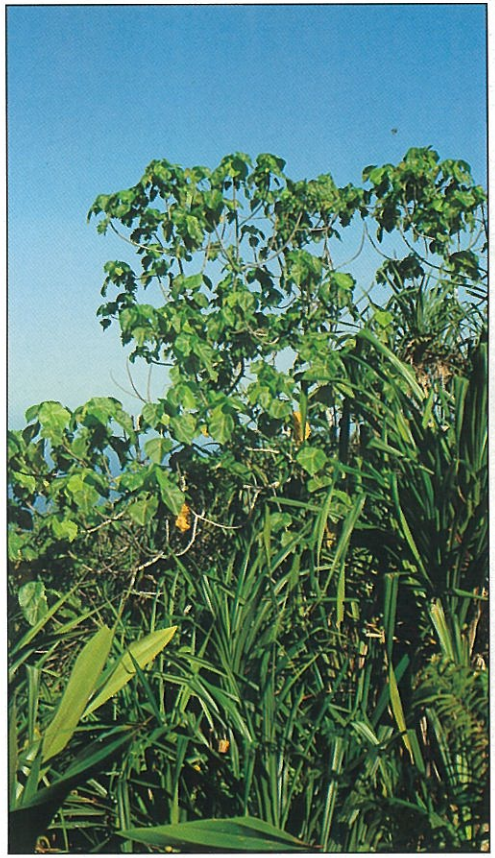
EUPHORBIACEAE

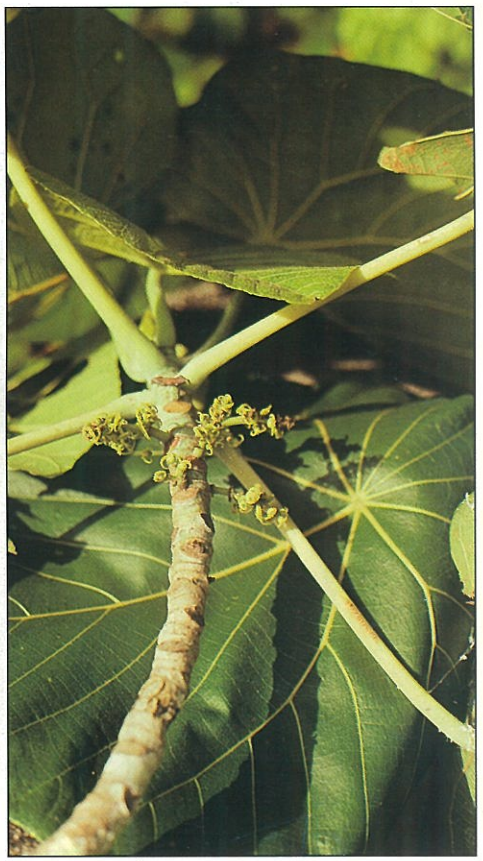
A large shrub or small tree, *Excoecaria* has white, soft, spongy wood and an acrid, milky sap. The alternate leaves are oblong, bluntly rounded at the apex and base and 3-11 cm long and 2-6 wide. They are glossy green, slightly papery and grow on 1-2 cm petioles. They often turn bright red before falling. Flower spikes are thick and whitish and usually have a few female flowers near the branch and a number of male flowers toward the tip. Some spikes contain only male flowers. Flower bracts are numerous and overlapping; neither male nor female flowers have petals. Fruits are smooth, subglobose, small (3-6 mm) capsules containing three rounded seeds.

*Excoecaria agallocha* is one of 40 species from the African-Asian-Indonesian tropics and occurs from Asia to Australia and through the Pacific islands. It can be propagated by seeds and probably by cuttings, but the milky sap can blister skin and cuttings may not be a suitable method. It is a strand species, especially rocky strands, and also occurs on the fringes of mangrove swamps.

In India, fishing floats are made from the roots. The smoke from its burning wood is extremely irritating, but has been used (in Fiji) as a treatment for leprosy. DO NOT GET SAP, OR THE SMOKE FROM BURNING WOOD, INTO THE EYES.







*Macaranga thompsonii* Merr.

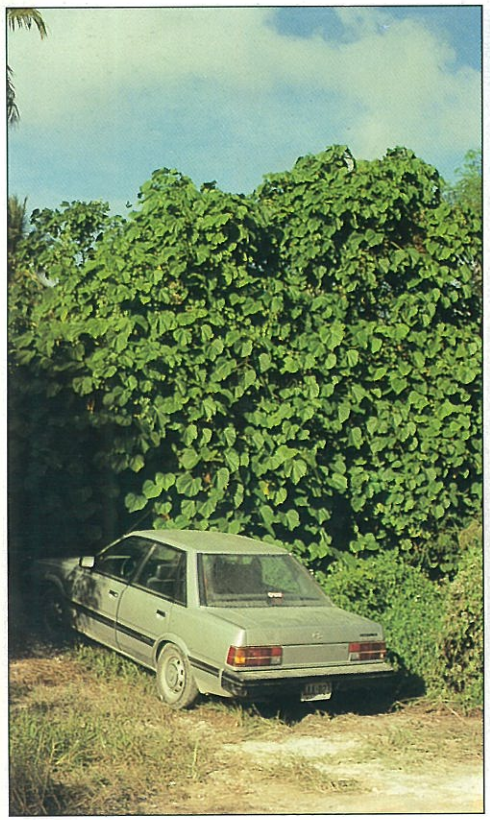
Pengua
Bwengwa

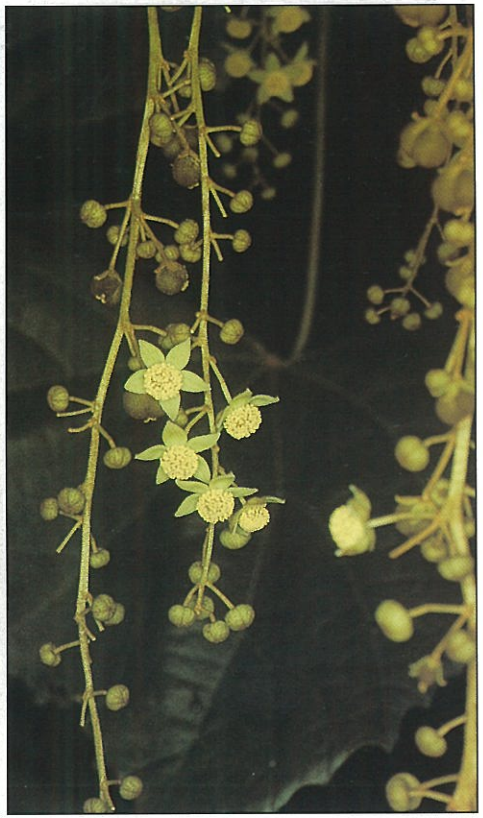
EUPHORBIACEAE

Pengua is a small to medium tree (to 5-12 m) with many thickish (1 cm diameter) reddish brown branches that show conspicuous leaf and stipule scars. The large (15-20 cm broad and long) rounded leaves are peltate on long (10-14 cm) petioles and have nine major veins that radiate from the petiole attachment. Leaves are alternate, clustered near the branch tips, rough-surfaced and green or olive green in color. Both male and female flowers are small and greenish and occur in leaf axils. Male flowers occur in long (to 16 cm) many-flowered axillary panicles that are shaped like thin pyramids; the flowers are crowded and there are no bracts. Female flowers are solitary or few in bract axils. Bwengwa fruits are capsules of 1-6 rounded sections; the seeds are globose.

*Macaranga thompsonii* is endemic to the Mariana Islands, and is the only *Macaranga* in the Marianas; two other species occur in the Caroline Islands. It can be propagated by seeds and perhaps by cuttings, and is most often a component of secondary forests on limestone, growing at edges.

The wood is durable in salt water, and larger trees can supply planks for building. Slashing the trunk causes a resin-like reddish gum to be released that can be used for furniture glue.





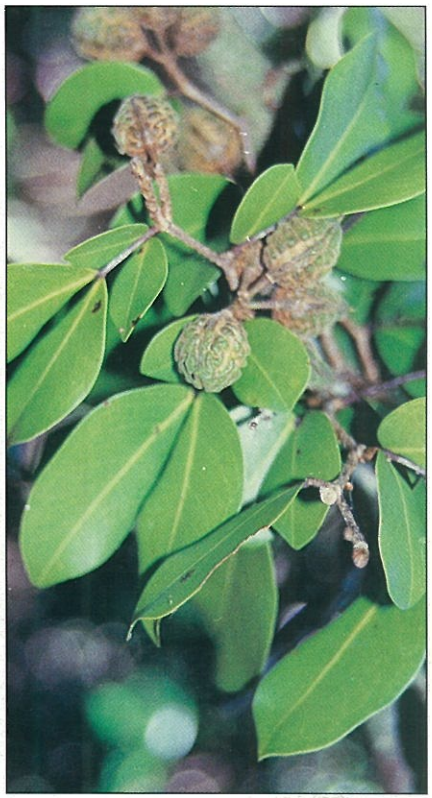
*Melanolepis multiglandulosa* Alum, Alom
var. *glabrata* (Muel.-Arg.) Fosb.
EUPHORBIACEAE **(WF)**

This small to medium sized tree (4-7 m) is shrubby, with pale trunk and irregularly ascending branches. The three to five lobed coarsely toothed leaves are palmately three-five veined and alternate at branch tips. They are 10-35 cm long on 10-35 cm petioles and resemble the leaves of temperate zone maple trees. When the leaves are pressed, they turn red-purple, as do many maple leaves. Both male and female flowers occur on the same tree, they both are greenish, have bracts and lack petals. Male flowers cluster in drooping panicles from leaf axils and have a densely brown, stellate pubescence. Female flowers are small and solitary in bract axils. Alum fruits are pea-sized capsules that are green maturing to brown. They have two or rarely three lobes.

*Melanolepis multiglandulosa* is one of one or two species that are native from Taiwan and southeast Asia to the Pacific islands. Alom is a variety that is endemic to the Mariana Islands and is found on most of them. In the southern Marianas it occurs on limestone soils and often pioneers in second growth woodlands, but it also occurs on the volcanic northern islands. It can be propagated by seeds or cuttings.

The wood is soft but has been used for shoe lasts. Portions of the plant are utilized in local medicines and the fruits are a favorite food for white-headed doves.



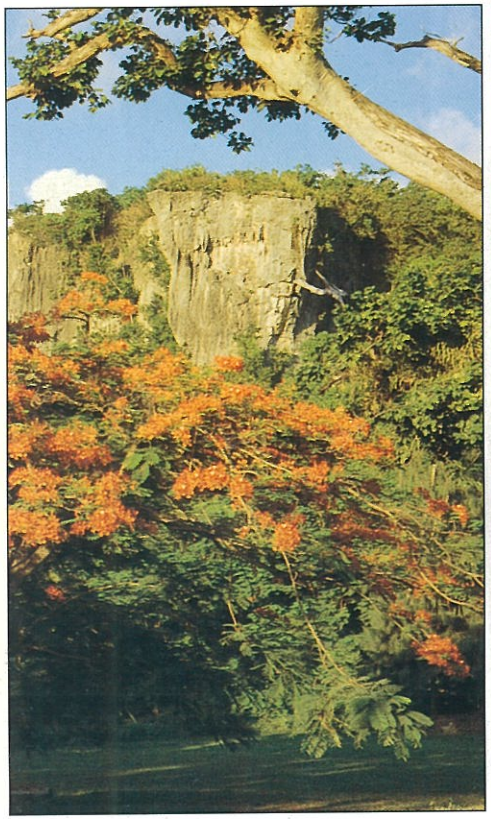


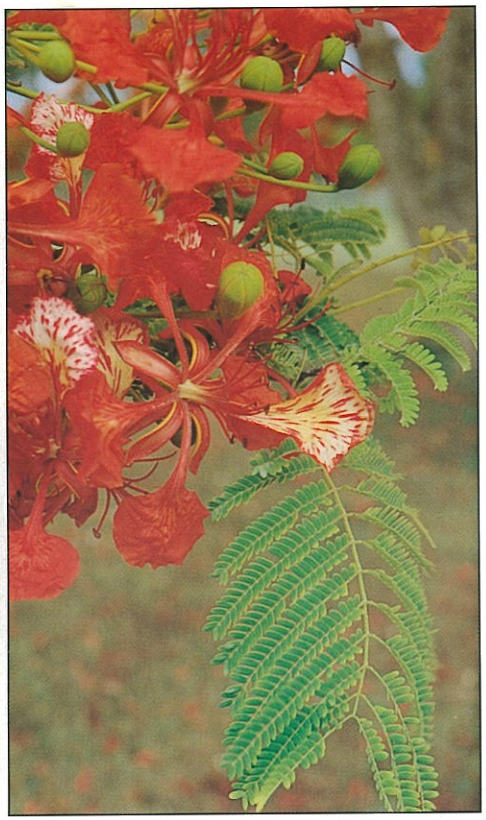
*Cynometra ramiflora* L. Gulos
FABACEAE-CAESALPINIOIDEAE (LEGUMINOSAE) **(WF)**

Gulos is a small to medium, somewhat shrubby tree. It has compound leaves of four leaflets; the basal leaflets are small and oblong and the outer (terminal) leaflets are larger and quite elongate. Both pairs are asymmetric, with the inner edges straight and the outer edges convex. Young leaves are often soft, limp and pink or white. Flowers are dull white to whitish brown and occur in short axillary racemes that are typically shorter than the leaves. The fruits are brown pods 3-4 cm long that resemble a small grenade with irregular ridges and grooves with rounded edges. They generally contain one seed.

*Cynometra ramiflora* is one of 70 tropical species and occurs from Indomalaysia to the Pacific Islands. It is propagated by seeds and is found on limestone and also along stream banks. Some specimens occur in the halophytic-xerophytic scrub of limestone slopes above the sea, and are prominent members of the dwarf limestone forest community found in such sites.

The tree is attractive and would be a very satisfactory ornamental on limestone as either an understory or edge species. The fruits are eaten by fanihi (fruit bats), and the almond-like seeds are also edible. This small tree dominates relatively undisturbed forests of limestone terraces on Saipan, Tinian and Aguiguan and in January the new, pale pink leaflets are often abundant enough to give those forests a pink tone.





*Delonix regia* (Boj.) Raf.

Flame tree, Poinciana
Atbut, Arbol-del-Fuego
Fáyárbaw

FABACEAE-CAESALPINIOIDEAE (LEGUMINOSAE)

Flame tree is a medium sized tree with pale bark, arching branches and a broad crown. Its large leaves are twice-compound; each leaf, which can be 30-60 cm long, has 10-20 pairs of pinnae and each pinna has 25-35 pairs of leaflets. The stipules at the bases of each leaf are also compound and pinnate, and bear 3-6 leaflets. The flowers occur in large corymbose racemes near branch tips and have five brilliant red clawed petals. The uppermost petal is streaked with yellow or yellow and white, and the petal bases are abruptly constricted. Atbut fruit is a long (50-60 cm) flat pod that hangs below the leaves; it opens along the sides to release the oblong gray seeds.

Fáyárbaw can be propagated by seeds, which are found in long, flat woody pods that are generally deposited not far from the parent tree. The species is native to Madagascar, but is rare there and was not rediscovered until 1932. It is a widely planted street tree that grows rapidly and is found around the world in the tropics.

Flame trees are excellent shade trees, are deciduous and flower when the leaves are gone. They are beautiful ornamentals. The sap yields a gum that contains oxalate of lime. They should be carefully tended as they are susceptible to both defoliating caterpillars and root fungi.



*Intsia bijuga* (Colebr.) Ktze.

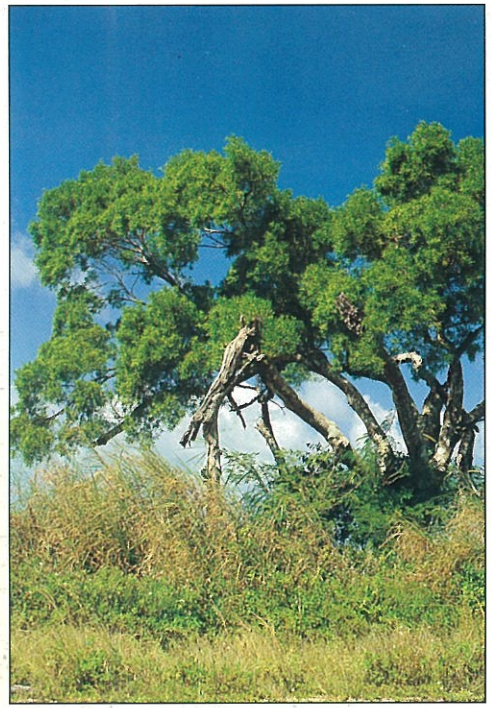
Ifit, Ifil, Ipil
Iifil

FABACEAE-CAESALPINIOIDEAE (LEGUMINOSAE)

Ifit is a slow growing medium to large tree (to 25 m) with gray bark and dark red wood. Because of typhoons it is seldom taller than 12 m. The leaves are compound with four leaflets; each is 8-15 cm long, broadly elliptic, asymmetrical and medium to dark green. Flowers have one pink or white petal and three long pink stamens and occur in axillary or terminal corymbose panicles. Only a few flowers usually open at one time. The fruits are thick, rigidly leathery pods 10 cm wide and up to 30 cm long. Each pod contains 3-6 rounded flattened seeds and opens only slightly to release them.

*Intsia bijuga* can be propagated by seeds and many sprout beneath the parent tree. The species occurs from the Indian Ocean islands to the Pacific islands, but does not reach Taiwan or Hawaii. It grows as a strand tree or along mangrove swamp edges and also grows well on limestone or other rocky soils. Ifil is uncommon on Tinian and Saipan but common on Rota where local laws prohibit the cutting of live trees.

Iifil is a handsome shade tree with attractive flowers, but its greatest value is as a timber source. The dark red wood is durable and old wood is nearly black. The heartwood is very hard, heavy and inelastic. It can be highly polished, is resistant to termites and becomes even harder after it is cut. The wood has been used for beams, window frames, doors, house posts, flooring and furniture and for carved objects such as clocks, board games, bookcases, and lamp bases, etc. It is an extremely useful species and efforts should be made to plant specimens in all suitable locations.



*Acacia confusa* Merr.

FABACEAE-MIMOSOIDEAE (LEGUMINOSAE) **(WF)**

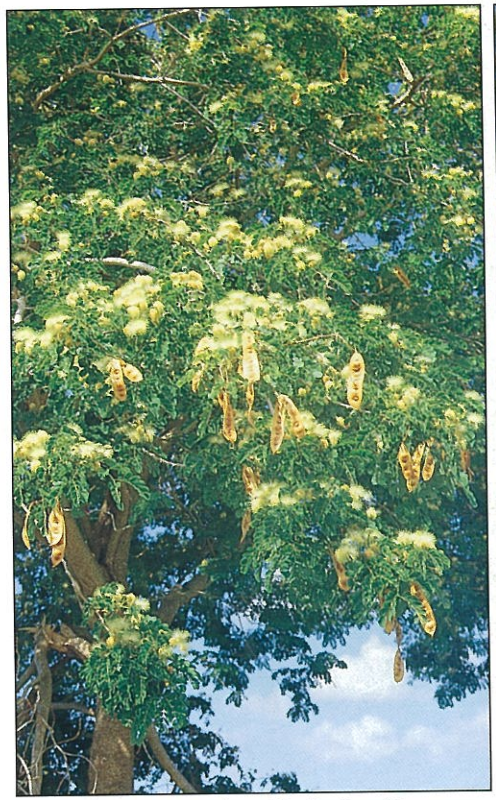
Formosan koa
Sosugi, Boiffuring
Serepa, Soschghi

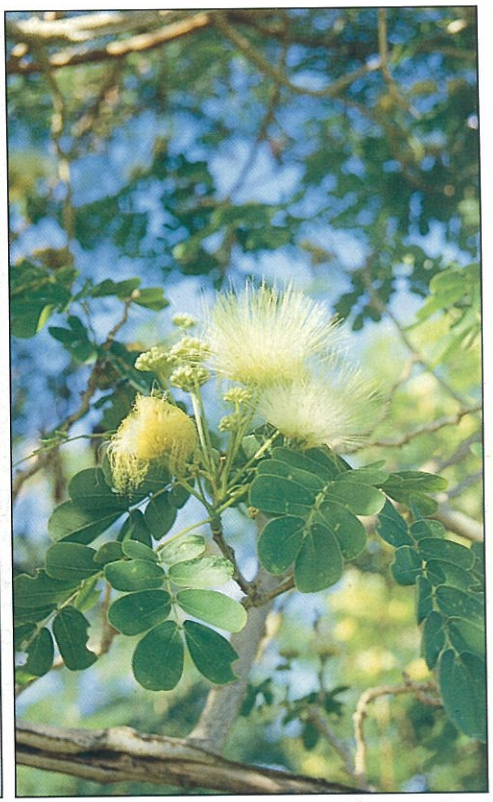
Sosugi is an evergreen, medium to large tree with many slender, crooked branches and a wide spreading bushy crown. The leaves appear to be alternate, entire, narrow and strap-shaped with parallel veins. These "leaves" are actually elongated, flattened, photosynthesizing petioles (properly called phyllodes). Real leaves occur only on juvenile foliage or on sucker-shoots, which is typical for many of the 1200 *Acacia* species and is an adaptation to the dry, sunny habitats where they thrive. Real "leaves" would lose too much water. The small, fragrant yellow powder puff flowers occur in ones and twos on short pedicels in phyllode axils. Flowering is not particularly consistent; some limbs will be yellow with flowers while others on the same tree will have few or no flowers. Trees nearby may lack flowers entirely, or show equally scattered flowering. Serepa fruits are flattened pods 5-8 cm long that are dark brown when mature, each contains about eight compressed seeds.

*Acacia confusa* is native to the northern Philippines and Taiwan and is extensively naturalized in the CNMI. It can be propagated from seeds or root cuttings, and does best on clay or argillaceous limestone (limestone with a lot of clay in it). Seeds do not germinate well under the parent tree, but large numbers germinate if the parent tree dies, or is removed.

Boiffuring is an attractive shade tree of good shape and size, and is a good clay-soil stabilizer. It is often planted in groups as a wind break and is very typhoon-resistant. The Japanese introduced this tree to provide firewood and ties for the narrow-gauge sugarcane railroads.







*Albizia lebbeck* (L.) Benth.
FABACEAE-MIMOSOIDEAE (LEGUMINOSAE) **(WF)**

Siris tree, East Indian walnut
Trongkon-kalaskas
Schepil kalaskas

Trongkon-kalaskas is a medium to large tree (12-15 m) with ascending branches, spreading crown and a light gray trunk. The leaves are twice compound; there are 2-4 pairs of subopposite primary leaflets and 6-8 pairs of opposite secondary leaflets. The leaflets are rough, rounded and obliquely oblong at their apex. Flowers are yellow or yellow-green fragrant pompoms 4-5 cm in diameter that occur in loose heads of 5-15 flowers. Fruits are broad, leathery pods (30 cm long and 5-6 cm wide), that show the interior seed outline on both sides. They are few-seeded and remain on the tree and rattle in the wind until they fall off and decay.

*Albizia lebbeck* is a native of tropical Asia and naturalized in Africa and the Caribbean. It is also naturalized in the Mariana Islands. Although it can probably be propagated by cuttings, seeds are abundant and so are seedlings beneath established trees. It is often cultivated and can be found on limestone in forests, at edges and in open fields. It prefers reasonably good soils, yet it is salt tolerant and grows on beaches as well.

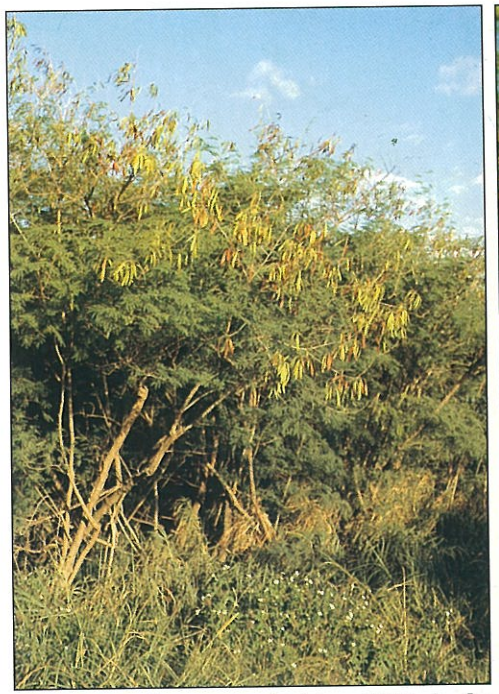
Schepil kalaskas is a fast-growing shade tree that is also a timber tree. Its wood is moderately heavy and difficult to work. It tolerates moderate winds, but has a shallow root system and is liable to topple in typhoons. Planting these trees in groups might serve to protect them in storms.

*Leucaena insularum* var. *guamensis* Fosb. & Stone — Native tangantangan
FABACEAE-MIMOSOIDEAE (LEGUMINOSAE)

This species is small and shrub-like, with several main stems (trunks) and spreading branches that produce a dense domed crown. In sheltered areas this plant can be 10 m tall with a trunk 20 cm in diameter, but it usually grows in open sites and only reaches 2-3 m in height. Leaves are twice pinnate and have 3-8 pairs of pinnae each divided into 15-50 pairs of leaflets. Though the leaves have more leaflets that those of *L. leucocephala,* they are smaller and appear more lacy. Flowers have both male and female structures, are white, and occur in small, globose heads on 4 cm long peduncles. Fruits are small, flattened pods 6-10 cm long and 1-2 cm wide that are blunt at the apex and taper toward the base. They are nearly black when ripe and split to open and release two to four flat brown seeds.

This variety is endemic to the Mariana Islands where it is restricted to coastal limestones and limestone strands, particularly on the windward sides of islands. It can be propagated from seeds, but probably will not survive away from windy, rocky coasts. Landscapers with such sites would do well to utilize this small attractive species.



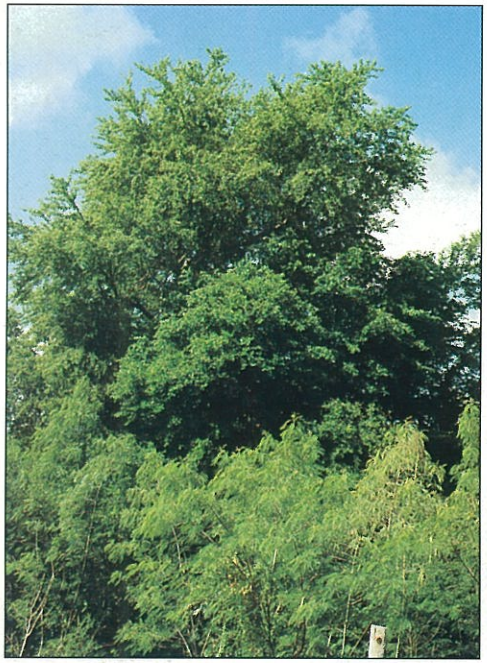


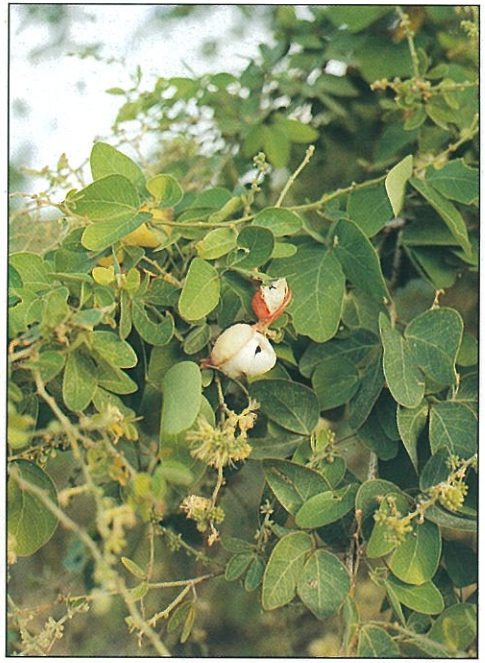
*Leucaena leucocephala* (Lam.) de Wit. — Hedge acacia
(*Leucaena glauca* Benth.) — Tangantangan, Talantangan
FABACEAE-MIMOSOIDEAE (LEGUMINOSAE)

Tangantangan is a small, scraggly tree to 8-10 m with short branches that are persistent near the ground even on older plants and thus restrict its useful shade. Leaves (to 25 cm in length) are twice pinnately compound with 4-9 pairs of pinnae, each of which bear 11-17 pairs of leaflets. Flowers have individual petals that are narrow and only one third as long as the stamens. The flowers are borne in globose heads on peduncles 5-6 cm long in clusters from the ends of branches. The fruits are flat pods that are green maturing reddish brown and are very conspicuous in clusters from each former flower head. Seeds are numerous, oval, flat and glossy brown.

This species is easily propagated by seeds or by sticking cuttings in the ground. It is native to tropical America but is now naturalized throughout India, tropical Asia, Africa and many tropical islands. Safford, in 1905, reported that it formed dense thickets in abandoned clearings on Guam and was one of the most common hedge plants, so it has been in the Marianas for some time. It does best on limestone and is an edge species.

As noted, it can be used as a hedge plant. All parts of the plant contain mimosine, which is toxic, and causes hair to fall out, though cooking inactivates the toxin. Cattle also seem to be immune to mimosine; their digestive systems apparently "detoxify" it. It has been used as a shade tree in plantations, for firewood (it burns when green or newly cut), as a source of charcoal, as food for cattle, as pulpwood, and as poles for vine crops such as beans. The seeds have been used for beads or for novelty jewelry. In some areas it is considered a noxious weed, but in the Marianas it is considered to be quite useful.





*Pithecellobium dulce* (Roxb.) Benth. Madras thorn
Kamachile
Ghamasiligh

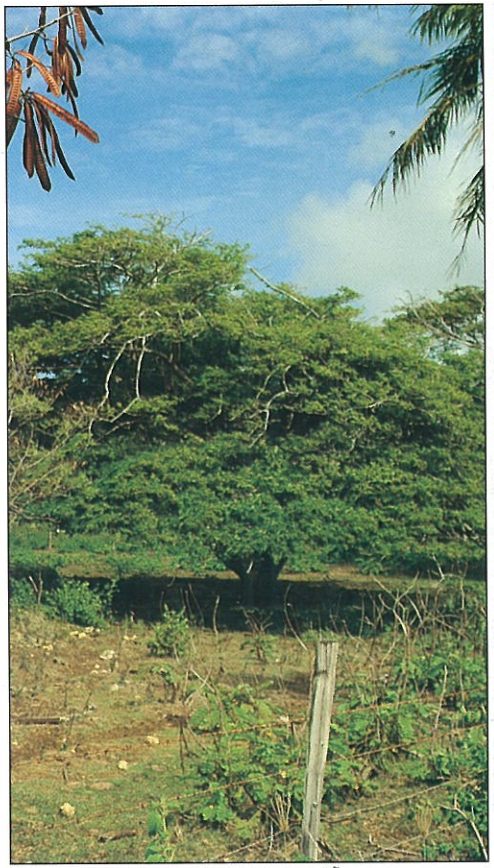
FABACEAE-MIMOSOIDEAE (LEGUMINOSAE)

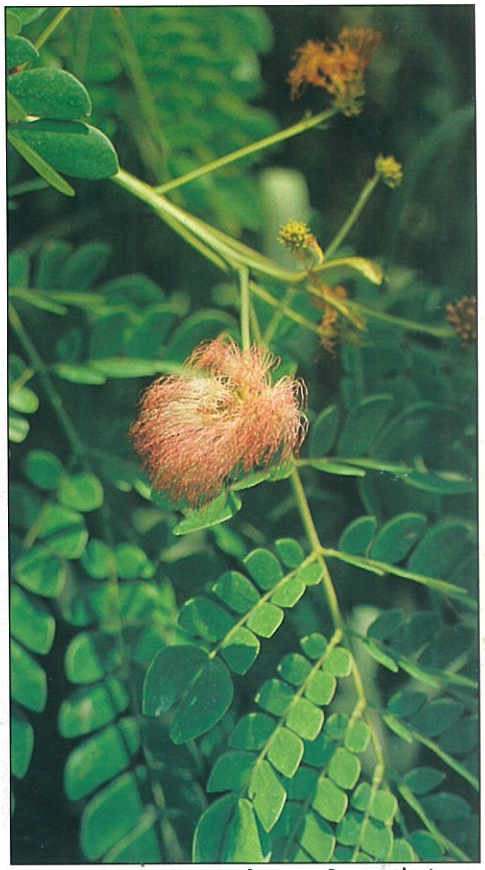
Kamachile is a medium sized tree with several irregularly spreading heavy, thorny/spiny branches. The trunk is also spiny and has a dark red heartwood. The small leaves are twice compound with one pair of pinnae, each of which has two paired leaflets that are very asymmetrical and 2-4 cm long. Flowers are small, greenish-white puffballs that are fragrant and sessile in dense heads. The fruits are long, twisted or coiled pods that are green maturing reddish and are irregularly inflated and constricted. The 6-8 black shiny seeds are embedded in a sweet, white, edible pulp that is especially enjoyed by children.

This species can be propagated by seeds or by collecting seedlings beneath a parent tree; it grows rapidly. Ghamasiligh is native to central America and was introduced to the Marianas from the Philippines, which got the plants from Mexico. Interestingly enough, this species was first described from samples from India; it was apparently introduced to Asia as a shade tree or thorny hedge very long ago. In the Marianas, it grows most often on limestone, though it is often cultivated.

*Pithecellobium dulce* can be used as a shade tree or thorny hedge. The wood is hard and has been used to make carts, door panelling, packing boxes and as firewood. Because the bark is a source of tannic acid, it was stripped from trunks, made into troughs, filled with water and used to soak (and cure) skins of cattle, carabao and deer. The fruit pulp is edible when mature and can also be made into a lemonade. Often humans must compete with insect larvae to harvest this pulp! Pods can be used for animal fodder. This tree is brittle and does not do well in typhoons, when it loses many branches. New ones grow back readily, but this is not a good choice for a house-shading tree.





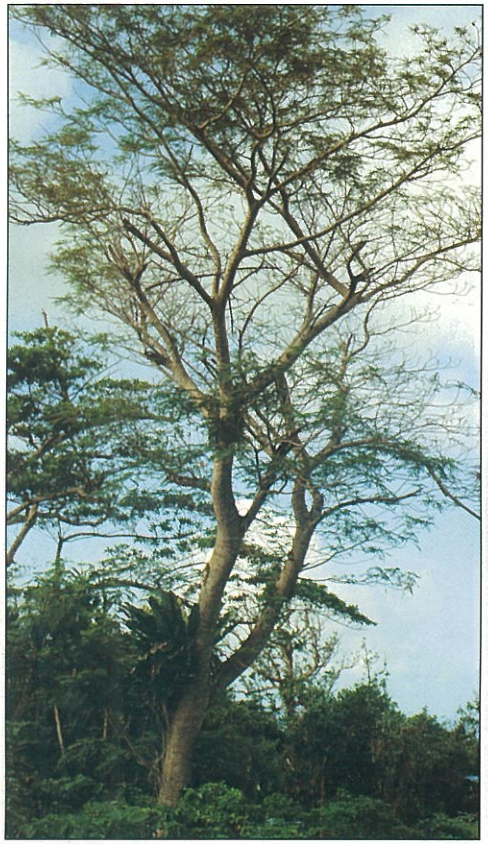


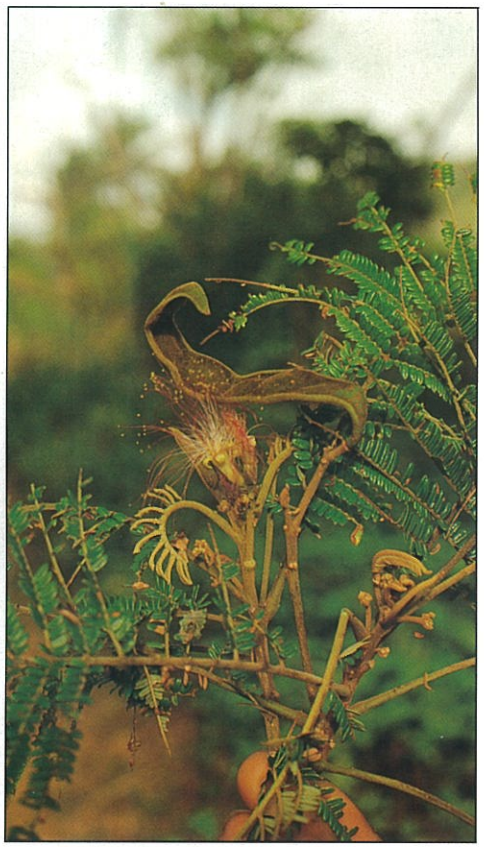
*Samanea saman* (Jacq.) Merr. Monkeypod, Raintree
[*Pithecellobium saman* (Jacq) Benth in Hook] Trongkon-mames
FABACEAE-MIMOSOIDEAE (LEGUMINOSAE) **(WF)** Filinganga

Monkeypod is a massive tree with a rounded crown that is usually broader than it is tall. Its twice pinnate leaves have 2-8 pairs of pinnae and each pinna has 2-7 pairs of ovate leaflets that are 3-6 cm long. These leaflets fold downward from the midrib at night and when it rains (hence the name "Raintree"). Pompom flowers occur in loose heads; they have greenish-yellow petals but appear pink because of the large number of dark pink stamens. The folding of the leaves places the flowers "on a pedestal" at night when they are probably pollinated. Fruits are thick, compressed, elongate pods with a lumpy black surface. The interior contains numerous seeds in a sweetish pulp.

*Samanea* is native to tropical America, probably northern South America, and has been distributed throughout the tropics as a shade tree. It was brought to Guam from Hawaii by Safford in the early 1900's and can be propagated by seeds and by transplanting seedlings from beneath parent trees. Even medium-sized trees can be pruned and moved quite successfully.

Filinganga is a magnificent shade tree that supports many epiphytes. Its wood is used for housewares; bowls, trays, spoons, etc. The pods contain pulp that is eaten by horses and cattle.





*Serianthes nelsonii* Merr.
FABACEAE-MIMOSOIDEAE **(WF)**
(LEGUMINOSAE)

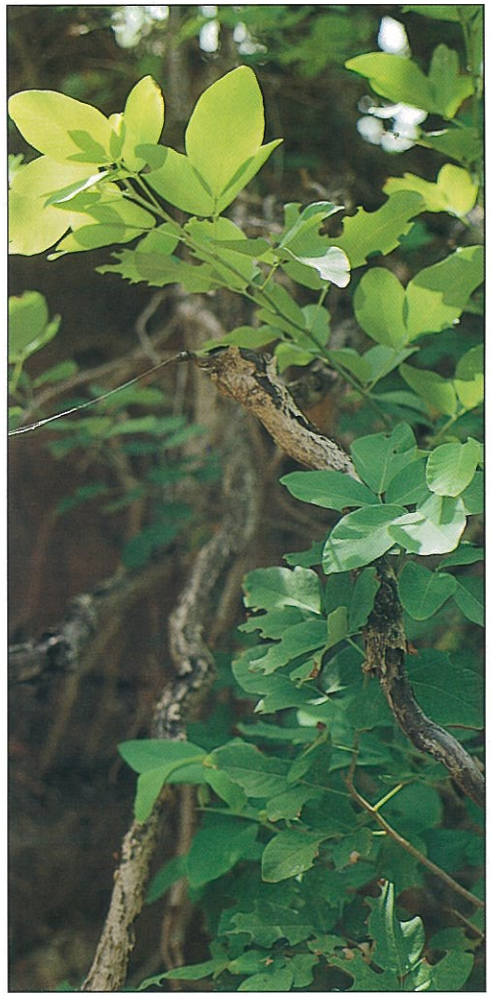
Fire tree
Trongkon guafi, Hayun lago

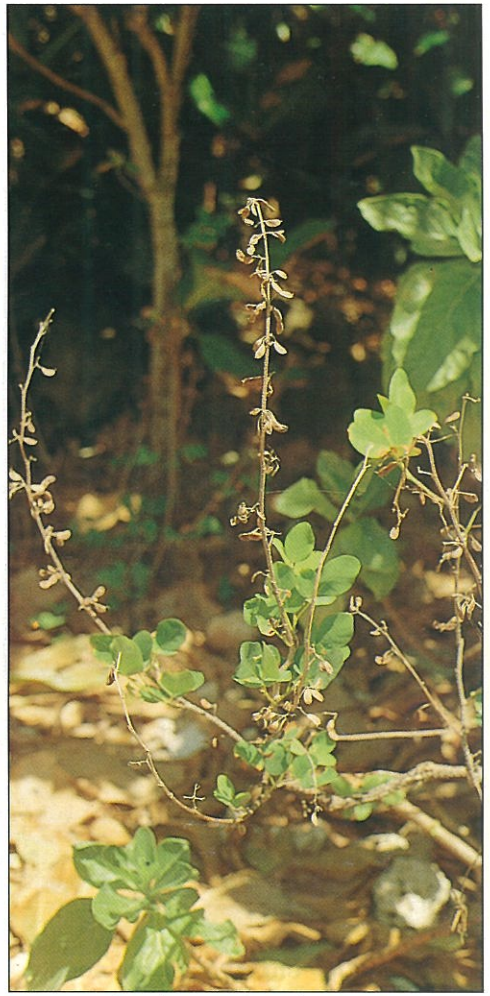
Trongkon guafi is a tree to 20 m with a trunk to 2 m in diameter and spreading-ascending branches that produce a moderately broad crown. The leaves are twice pinnate, with 10-20 pairs of pinnae, each of which has 22-30 pairs of leaflets. The midribs have rusty-colored hairs and from a distance the leafy parts of the tree look rusty brown. Flowers occur in few-flowered panicles that are 5-10 cm long with rusty hairs; the corolla is 15-23 mm long and surrounds several long stamens. Fruits are 7-12 cm long pods with a brownish hairy surface and slight constrictions between seeds. Seeds are hard, shiny, flattened, smooth and brown about 10 mm X 8 mm.

*Serianthes nelsonii* can be propagated by seeds and cuttings; it is one of ten Malay and western Pacific (Micronesia and Polynesia) species and is found only on Rota and Guam. One of the local names means "western" or "northern" tree, but there is no evidence that this is not a native plant. It has been found on limestone and in ravines, and is an edge species.

The tree is a handsome forest and shade tree and its wood is good for timber. It is listed on the International Rare and Endangered species list, and should be planted extensively to increase its survival chances.





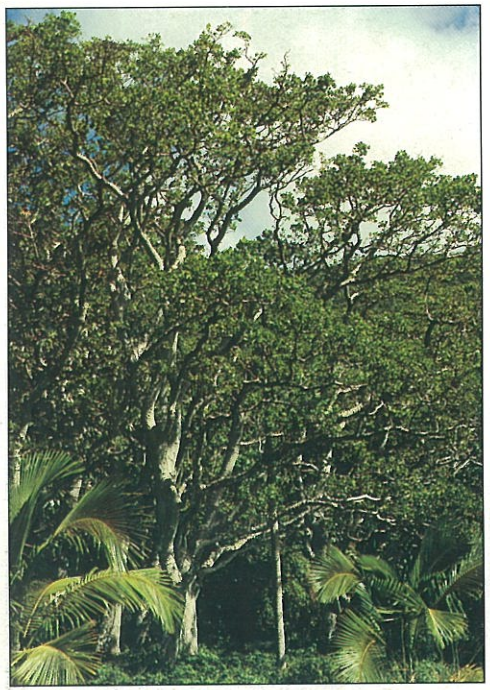


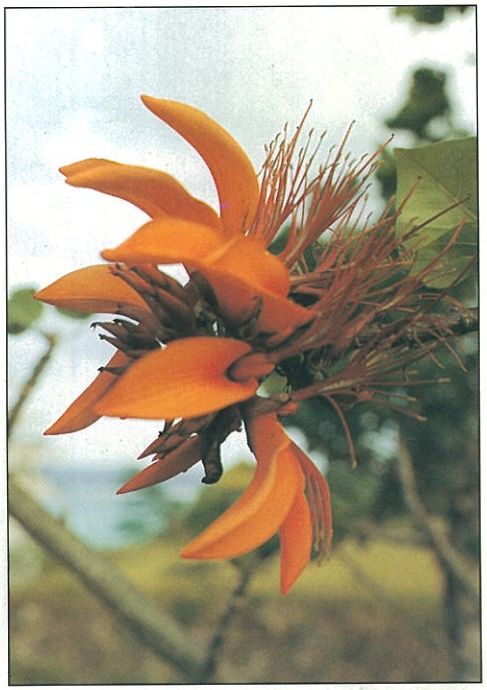
*Desmodium umbellatum* (L.) DC.
FABACEAE-PAPILLIONIDEAE (LEGUMINOSAE)

Bush tick-trefoil, Beggarweed
Palaga Hilitai

This *Desmodium* is a woody shrub or small tree (1-4 m tall) with spreading branches. Its leaves are made of three leaflets (trifoliate) on 2-5 cm petioles; the middle leaflet is the largest. The leaflets are elliptic and rounded on both ends and have prominent veins. The upper surface is green and the lower is grayish. The green to pinkish-white, densely hairy flowers are borne in loose axillary umbels of 6-12 flowers on a 1-2 cm peduncle. The fruits (called "legumes") are small pods (2-4 cm long) that are flattened side-to-side and partly constricted between the three to four seeds.

Palaga hilitai can be propagated by seeds, which are called "stick tights" and are distributed on animal hair, and clothing. It is a common strand plant that is indigenous from tropical Asia north to Taiwan and Okinawa and south and east to Micronesia, Polynesia and Melanesia; it is native to the Marianas.





*Erythrina variegata*
var. *orientalis* (L.) Merr.
FABACEAE-PAPILLIONIDEAE (LEGUMINOSAE)

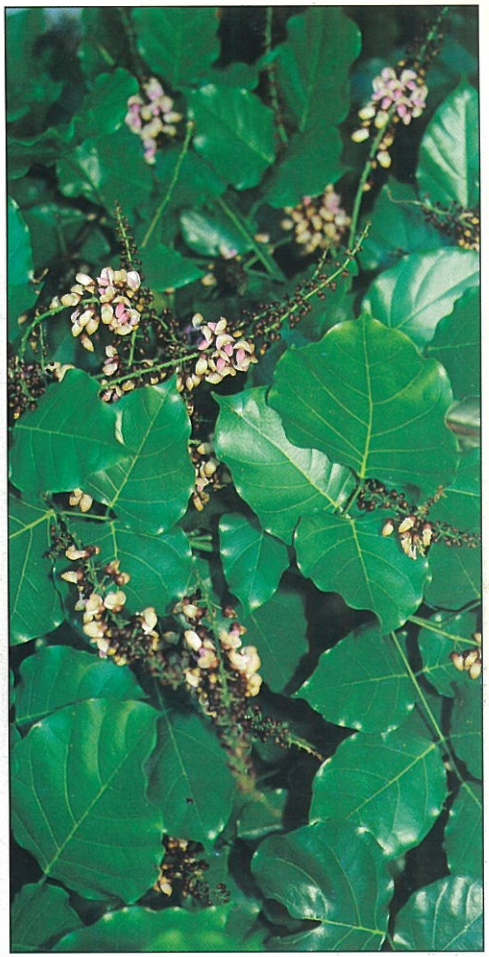
Coral Tree, Catclaw Tree
Gaogao

Gaogao is a large, stocky tree with a sturdy trunk and branches, both of which bear spiny prickles and a conspicuously patterned bark. Its leaves are pinnately trifoliate on long petioles (10-12 cm); the central leaflet is two times the size of the side leaflets. The leaves are shed before the tree flowers near the start of the dry season. The 6 cm long red flowers are crowded into dense terminal racemes; petals are scarlet red and very unequal in size. Fruits are 15-30 cm long pods with constrictions between the shiny maroon seeds.

*Erythrina variegata* can be propagated by seeds and cuttings. The species is native to India, Malesia and Pacific islands and is probably indigenous to the Mariana Islands. It grows on limestone, particularly on clifflines with native forest species, and also does well in town as a cultivated ornamental.

The catclaw tree serves as an ornamental, as shade for coffee and other crops, and as a calendar marking the change of seasons. Its wood is light, soft and easily worked. It is used for troughs, for canoe outriggers (Samoa), for face powder (Thailand) and for making long-burning fires (wood smolders but doesn't go out). Young and tender leaves are eaten in curry; older leaves are fed to cattle (India). Leaves are supplementary ingredients in an all-purpose island medicine. In India, leaves are boiled with ripe coconut and made into an ointment for venereal disease lesions and for joint pains. Branches stuck in the ground are used to make living fences. One possible disadvantage is that this plant feeds a caterpillar that matures into a fruit-sucking moth and thus indirectly damages many fruits, including guavas, bananas and citrus.





*Pongamia pinnata* (L.) Merr.

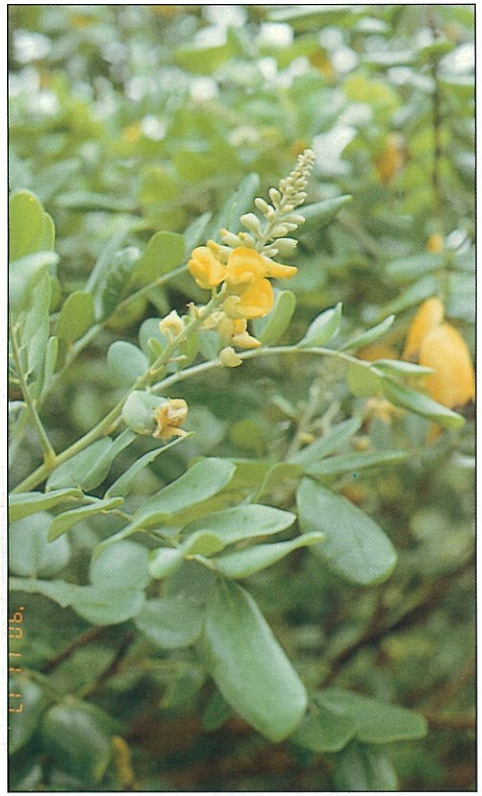
Indian Beech, Karanja

FABACEAE-PAPILLIONIDEAE (LEGUMINOSAE)

*Pongamia* is a medium sized (8-10 m tall) with a stout trunk and a broad crown. Its bark is dull gray and smooth or slightly fissured. The light green, elliptic or ovate leaves are compound with 5-9 pairs of leaflets that are 8-15 cm long and have dark green petiolules. Flowers are 1.5-2 cm long, white, pale pink or lilac and occur in large (to 20 cm) crowded racemes. Fruits (legumes) are 3-5 cm elliptic-oblong pale brown pods with curved beaks. They hold one (rarely two) 2 cm long seed.

*Pongamia pinnata* can be propagated by seeds or cuttings. It is indigenous from the Indian to the Pacific Ocean and occurs in coastal regions on beaches and rocky shores, on rocky headlands or along rivers. In the Mariana Islands, trees occur near the clifflines of terraces above the sea.

The species is attractive as a roadside shade tree. The wood is not useful except for firewood. Leaves and young bark can be used to produce a reddish oil used in skin treatments.



*Sophora tomentosa* L. Necklacepod Sophora, Silver Bush

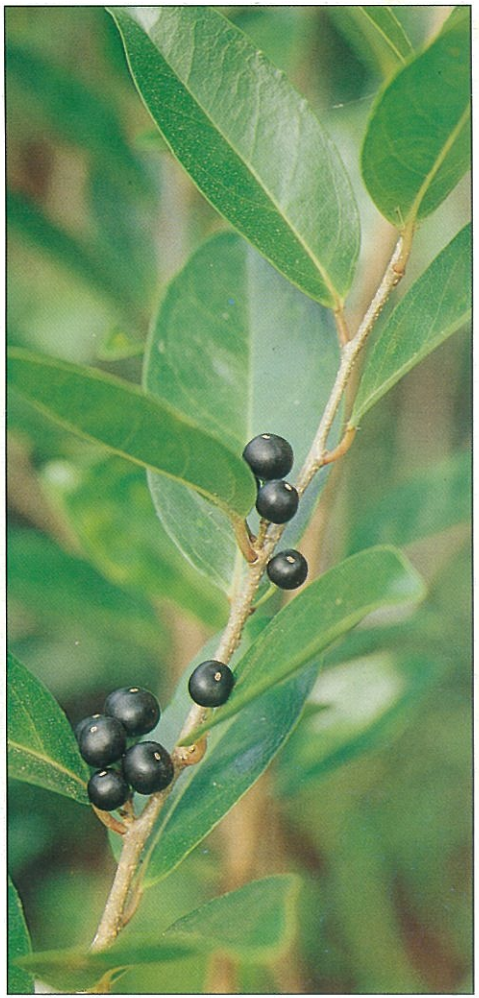
FABACEAE-PAPILLIONIDEAE (LEGUMINOSAE)

*Sophora* is a small tree or tall shrub (to 3-4 m) with few ascending branches and the entire plant has a pungent (though not unpleasant) smell. The alternate, odd-pinnate (7-8 pair) leaves have leaflets that are silvery gray-green, soft, downy, elliptic and rounded at both ends. The bright yellow, 2 cm long flowers grow in terminal and axillary erect racemes about 15 cm long. The fruits are specialized pods (legumes) called loments because there are constrictions between each seed (the pod looks like a beaded necklace). The pods, which are 10-16 cm long, slender and grayish, hang arched in clusters. The seeds are yellow and pea-like.

*Sophora tomentosa* is easily propagated by seeds. It is a tropical strand species around the world and is native to the Mariana Islands where it grows on rocks and terraces near the sea. It is not usually cultivated.

All parts of the plant, especially the roots and seeds, contain the bitter alkaloid sophorine (cytisine ?) - a nicotine relative. They are poisonous in large amounts but in small quantities are important medicinally. In the Malay Peninsula and the Philippines pulverized seeds are used for dysentery and cholera, and are antidotes for eating poisonous marine animals. The seeds are purgative and when used to treat tertian malaria, two seeds are presumably too much.



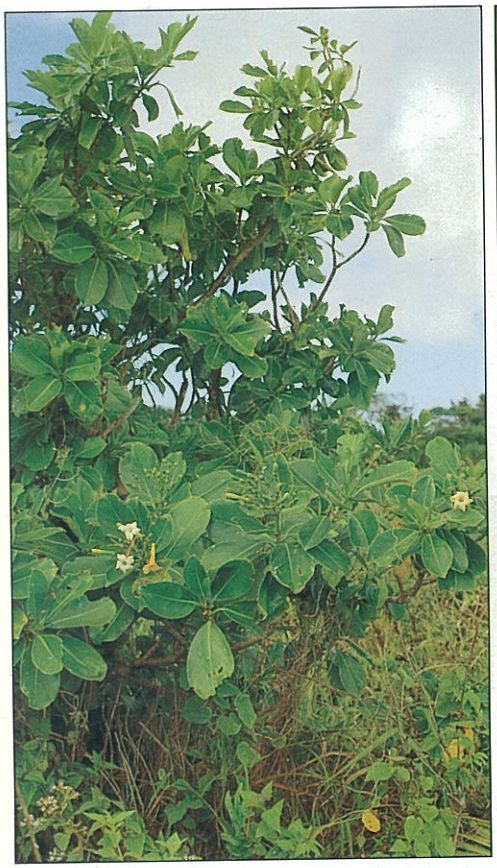


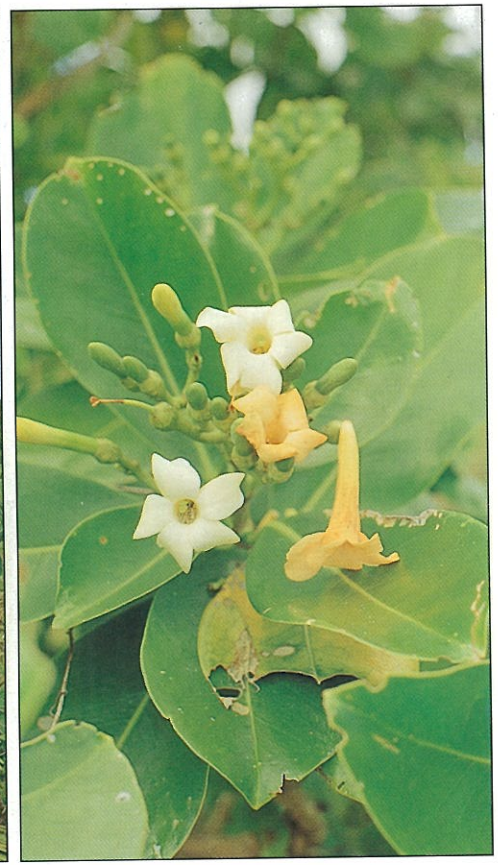
*Xylosma nelsonii* Merr.

FLACOURTIACEAE

*Xylosma* is a small shrubby tree 3-4 m tall with whitish bark and ascending branches. Its simple leaves are alternate, papery and elliptical (5-8 cm long and 2.5-5 cm wide). They are dark green and glossy above, with 5-6 pairs of lateral veins and fine reticulations between major veins; the lower surface is paler. Flowers are of separate sexes; both occur on the same plant in leaf axils and are small. Male flowers have many stamens and are either solitary or in fascicled racemes; female flowers are not usually solitary. Fruits are purple, pea-sized and occur on stout erect peduncles.

*Xylosma* can be propagated from seeds and perhaps by cuttings. *X. nelsonii* is one of 85 tropical species and is endemic to the Mariana Islands. It can be found on limestone in coastal areas, including cliffs and raised reefs in mangrove areas; presumably it also occurs on clay.





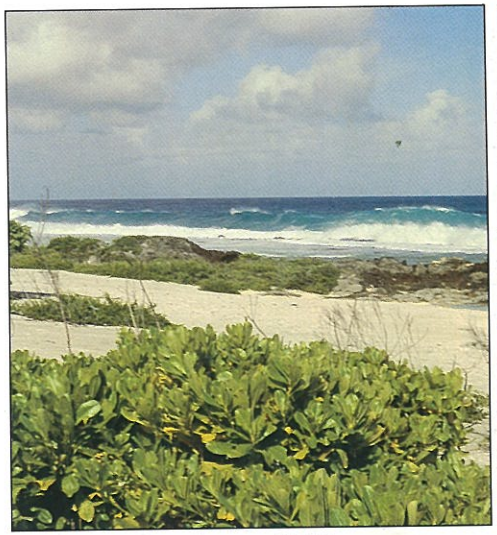
*Fagraea berteriana* var. *ladronica* Fosb.
(*Fagraea galilai* Walker & Rodin)
GENTIANACEAE (LOGANIACEAE) **(WF)** Wengú

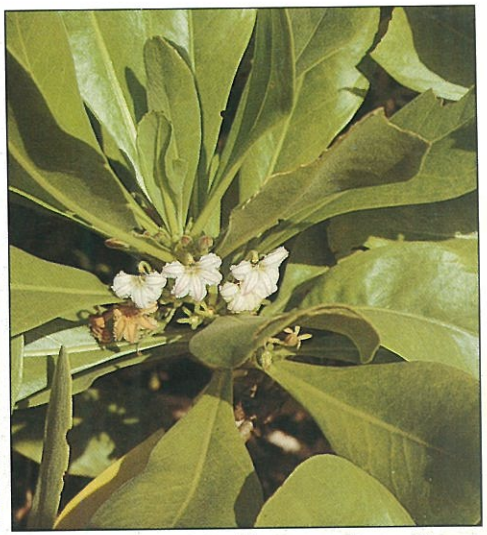
Wengú is either shrub-sized (2-3 m tall) or a slender tree to 15 m with gray bark and slightly ascending fleshy branches. The thin, papery, obovate leaves are 8-20 cm long and 5-10 cm wide. They have short petioles (17-30 mm) with basal flaps or "ears". The fragrant, tubular flowers have thick white petals with lobes that overlap to the right. They occur on terminal or subterminal cymes that are branched three or four times. Fruits are globose-ellipsoid, rather succulent and 25-30 mm long. They resemble an orange-red kumquat and have a firm glossy skin; they contain many seeds embedded in a fleshy pulp.

*Fagraea berteriana* is one of 35 species native from south India, Sri Lanka and the Maldives north to China and west to the Pacific. It is native to both the Caroline and Mariana Islands. *F. berteriana* var. *ladronica* occurs only on Rota and Guam. It can be propagated by seeds and cuttings and is limited to edge habitats on limestone. The few plants known to the authors occur at elevations above 250 m but closely related varieties occur on ocean atolls.

*Fagraea*, with its fragrant flowers and orange-red fruits should make an attractive ornamental in suitable habitats.







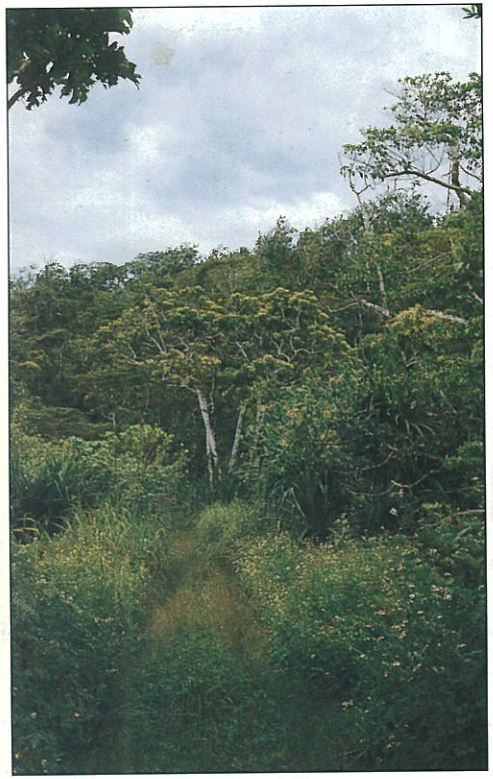
*Scaevola sericea* Vahl
[*Scaevola taccada* (Gaertn.) Roxb.]
GOODENIACEAE

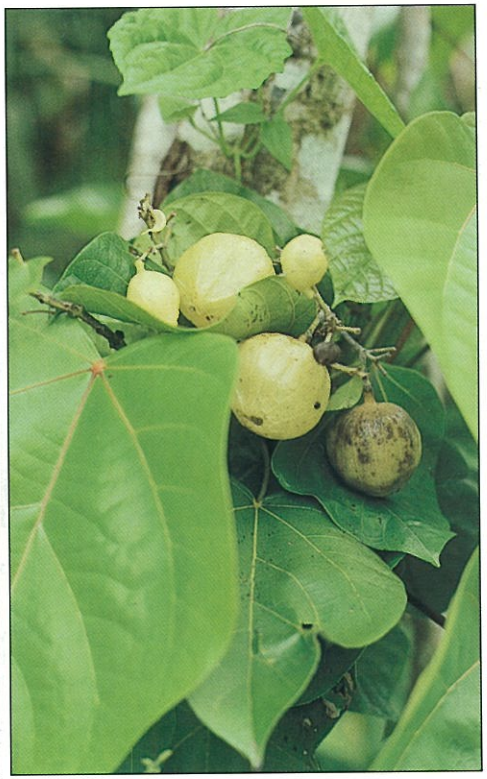
Half flower, Fan flower
Nanaso, Lanasa
Llát

Nanaso is a large shrub that grows as a rounded mound or, together with other plants, forms dense thickets. The wood of all stalks and branches is soft and easily broken. The pale green, obovate to long-spatulate leaves are spiraled on the branches and have very short petioles, they have entire margins and obscure venation (except the midrib) and are usually crowded at the branch tips. The unusually shaped fragrant flowers occur in downy pedicels on branching axillary cymes. The petals are white, or white with purple "veins"; they are peculiar because the five petals occupy only half of the flower. The petals are split apart dorsally and the pistil curves over and down from the "split". The round, fleshy fruits are drupes that contain one or two seeds, each of which is surrounded by a tough, bony shell covered by a ribbed, corky layer. Llát seeds float and are viable for a long time in sea water, but they will germinate only where freshwater is available (as rain, etc.).

*Scaevola sericea* is one of 130 species; all (except one Caribbean species) occur in the "old world" and the Pacific. This is a very widespread species found from East Africa eastward through the Indian and Pacific oceans to eastern Polynesia and north to Hawaii and Okinawa; it is native to the Mariana Islands. It is most common as a beach (strand) plant, but also occurs in savannas and on limestone, both near and away from the sea. It can be propagated by seeds and perhaps by cuttings; young plants are usually available on beaches and transplant easily.

Its hollow stems are used as straws or children's "blowguns". In Thailand and Malaysia the pith is cut into thin, papery flakes and made into flowers, butterflies, etc. and used in rice paper. The leaves are used medicinally, as a tonic, to treat tuberculosis and as one ingredient in a multipurpose folk medicine for stomach aches and other ills. In India, young leaves are cooked as vegetables. Fruits are squeezed into the eyes to relieve soreness, or eaten to control irregular menstruation. The wood has been used for curving outrigger booms and as house roof frames.





*Hernandia labyrinthica* Tuyama
(*Hernandia ovigera* L.)
HERNANDIACEAE

Oschal

Oschal is a small to medium sized tree (to 20 m) with a gray smooth bark and heavy, slightly ascending branches that form a broad, irregular crown. The alternate, large (9-30 cm long and 7.5-25 cm wide) leaves are glossy and rounded-ovate; they are only slightly heart-shaped at the base above the long (8-25 cm) petiole. They have entire margins and rounded tips. The small flowers occur crowded in axillary branched corymbs that are 15-20 cm long. Within these large inflorescences, flowers occur in sets of three, surrounded by four leafy bracts (involucres). The two lateral flowers are male and have parts in threes, while the center flower is female and its parts are in fours. Fruits are brown, 2.5 cm long and smooth. They are enclosed in a thin but fleshy inflated case that looks somewhat lantern-like. This case is made from the four leafy bracts and is open at the bottom with two teeth-like structures almost closing the hole.

*Hernandia labyrinthica* is one of 24 tropical species; it is native from Indonesia south to New Guinea and the Solomon Islands and east to Rota and Guam in the Marianas. It can be propagated by seeds and probably by cuttings. It occurs in the limestone forest on Rota (and in ravine forests in Guam), but does not occur near the sea.

Aside from its different habitat, its non-peltate leaves and the two teeth in the opening of the fruit case, *Hernandia labyrinthica* is like *H. sonora*, and can probably be used in the same fashion.



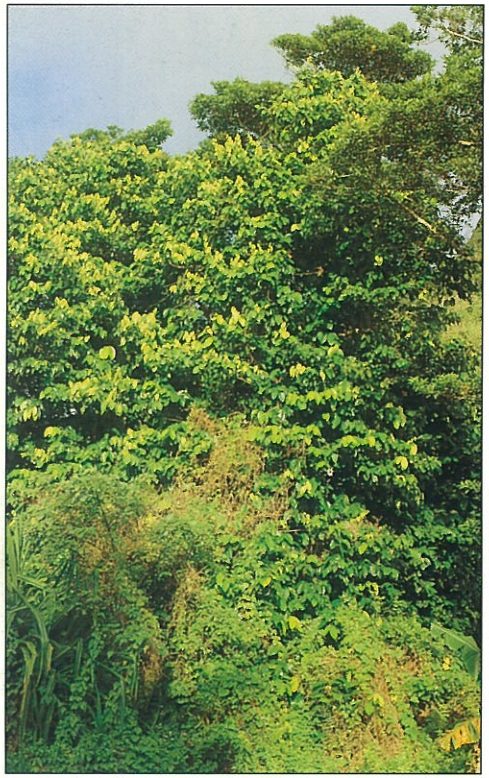
*Hernandia sonora* L.
(*Hernandia peltata* Meisn.)
HERNANDIACEAE

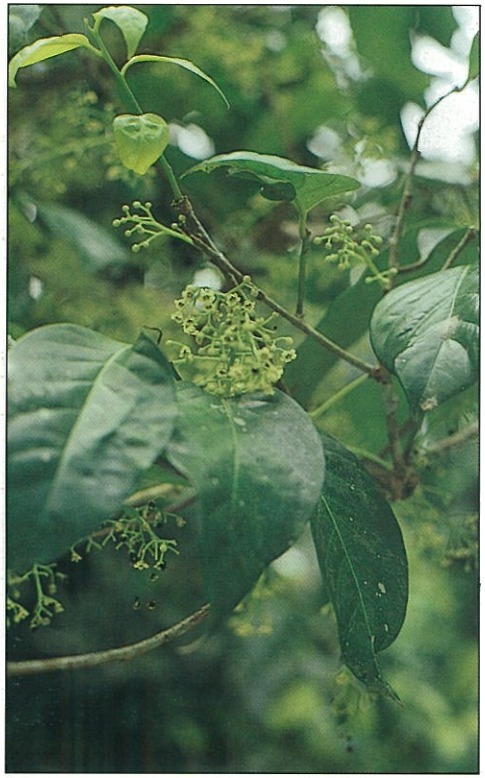
Nonak, Nonag
Oschal

Nonak is a large (to 20 m) tree with silvery gray, smooth or slightly fissured bark, a trunk with short basal buttresses and a dense spreading, rounded crown. The heart-shaped, peltate leaves are alternate, glossy and large (12-40 cm long and 10-30 cm wide). They have entire margins and long (10-40 cm) petioles; there is often a red dot on the leaf where the petiole and the leaf join. The creamy or silvery white flowers occur in axillary clusters on short stems; the clusters are based in fleshy bracts and the whole inflorescence is longer than the leaves. The fruits are black, elliptical nuts about 2.5 cm long. They contain one seed and are enclosed in a fleshy, inflated, globular cup made of the bracts. This cup is greenish to white and matures to pink; the opening of the cup is circular.

*Hernandia sonora* is one of 24 tropical species that occurs along the shores of seas in the old world (Africa and Asia) south to Australia and east through the Pacific to Tahiti. It is native to the Mariana Islands and a strand (beach) and backstrand species that is occasionally found on limestone. It can be propagated by seeds in appropriate habitats but germination is irregular and may require two-six months.

Oschal wood is white, soft and very light. It burns rapidly and can be used for canoes if painted and protected; otherwise it waterlogs easily. The sap of the leaves is a painless dipilatory (hair remover). The bark, seeds and young leaves are mildly purgative. The tree is an attractive shade tree and ornamental and should by considered for landscaping.





*Merrilliodendron megacarpum* (Hemsl.) Sleumer

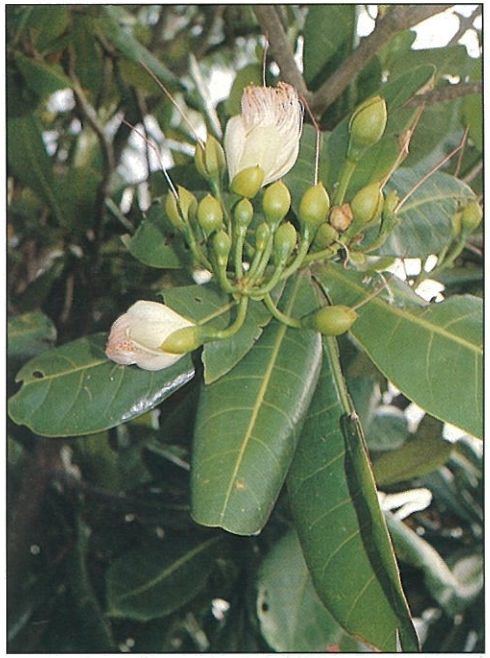
Faniok

ICACINACEAE

Faniok is a small to medium sized tree (6-15 m tall) with ascending branches and dark bark; new stalks grow vertically from broken branches. The simple, alternate, glossy green leaves have conspicuously networked veins and entire margins. Young leaves are an interesting shiny green yellow. The small flowers have five cream-white petals and are borne on many-branched, yellowish racemes (to 30 cm, usually less) in leaf axils. Trees at forest edges often flower profusely, especially on "open" sides of the tree, while trees within the forest do not flower so profusely. Flowers fall quickly if not pollinated, and raceme branches soon litter the ground beneath the tree. The fruits are fairly large (4-6 cm long and 2-3 cm broad) and elliptical; they are somewhat stony, contain one large seed and can float.

*Merrilliodendron megacarpum* is the only species of the genus and is native to the Philippines and the western Pacific. It occurs in the Solomons, New Ireland and the Marianas. It was "discovered" by several different people and named a different genus for each discovery! It grows on limestone and is a plant of lush forests; it apparently grows only where large supplies of water are available. It can be found in the backstrand where limestone is underlain by lens water emptying in to the sea, or on limestone at the junction with volcanic soils, or where springs occur. Seeds are not common, but young plants can be successfully transplanted if the new site is suitable. Where it grows, it forms dense woods and easily dominates the site.





*Barringtonia asiatica* (L.) Kurz

Fish-kill tree
Puting
Ghúül

LECYTHIDACEAE

Puting is a large tree (to 25 m, though usually storm-pruned in the Marianas to only 8-15 m) with dark gray bark and stout branches with conspicuous leaf scars. The large (15-50 cm long and 8-24 cm wide) leathery, obovate, shiny leaves are dark green with entire, wavy margins and grow crowded near branch ends. The short petioles are often reddish and young leaves are rather limp and pinkish-olive. The large, fragrant flowers have four white petals and are 7-8 cm long and 3-4 cm wide. They surround a large mass (pompom) of stamens that are 10-12 cm long, white below, pink-purple above and united at their bases. The flowers occur in several-flowered, erect, axillary cymes. Flowering begins in late afternoon and the stamens and petals fall the next morning. The large (10-20 cm thick) box-like fruits are sharply 4-angled and flattened on the sides. They are attached by a short pedicle and there is one seed within the exterior fibrous husk.

*Barringtonia asiatica* is one of 39 species native from east Africa through tropical Asia to the Pacific. It is distributed from the Indian Ocean through the Pacific, but not as far as Hawaii. It grows on limestone in the strand, backstrand and on cliffs. It forms dense stands and there are dozens - hundreds - of seeds and seedlings below most trees that could be used for propagation. Sprouted seedlings transplant very successfully.

Ghúül seeds, fruits and even the bark contain saponins that have been used to kill fish on shallow reefs (this is now illegal). The bark, boiled into a strong tea, presumably provides a remedy for fish poisoning in man. Fresh leaves are applied to the skin to relieve rheumatism, dried fruits are used as floats for fish nets and seeds can provide lamp oil and be used as a treatment for worms.

*Geniostoma micranthum* A. DC.

Majlocjayo, Anasser

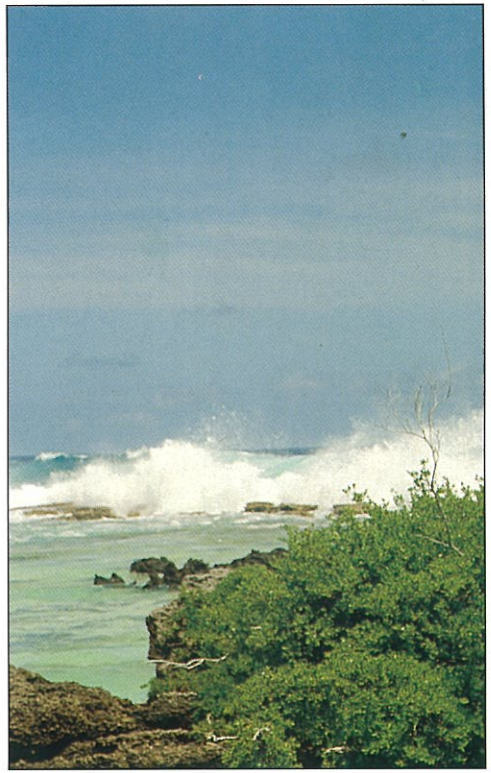
LOGANIACEAE **(WF)**

Malocjayo is a shrub or very small tree (in protected sites) with compact ascending branches. The dull green, elliptic leaves have a prominent mid-vein that somewhat "folds" the leaf, and seven pairs of lateral veins. The leaves also have a drip tip and occur on short petioles. Plants that grow in open areas have leaves that are pale, small and tough; those in shaded sites have dark green, large and delicate leaves. Broad, shortly D-shaped stipules occur between leaf bases, so that stems look jointed. Flowers are tiny (ca. 5 mm) with white joined petals and a throat with tiny hairs. They have extremely short pedicels and are borne in cymes that circle the stem at leaf axils. Some of the cymes are solitary though most are grouped together (fascicled). Fruits are small (6-7 mm), oblong-elliptical and green, maturing brown and woody. The fruits open widely at maturity to show the seeds in an orange pulp (aril).

*Geniostoma micranthum* is one of about 50 species distributed from Malesia to New Zealand and Tahiti to Japan; this species is endemic to the Mariana Islands. In the Marianas, it can be subdivided into three varieties: one is endemic to Pagan and has very small fruits; one occurs on volcanic soils and has leaves without hairs; and one occurs on limestone and has hairs on the leaves and midveins. They can be propagated (in appropriate sites) by the seeds and probably by cuttings.

*Geniostoma* would be an attractive ornamental plant and could probably be pruned into a thick hedge plant.





*Pemphis acidula* Forst.

Nigas
Engi

LYTHRACEAE

Nigas can be a bushy stunted shrub or a medium tree to 10 m with dark, fissured bark and numerous ascending branches. The small, opposite, crowded leaves are oblong-elliptic and semi-succulent. They taper at both ends and have entire margins. Leaves and even young branches have a gray pubescence. Flowers are small and solitary in leaf axils on peduncles with two basal bracts. The calyx forms a green bell with a ribbed surface and six small teeth and there are six white petals. The fruits are small, oval capsules with a persistent calyx. They contain many angled seeds.

*Pemphis acidula* is one of two species of the old world tropics; it is indigenous from east Africa to islands of the Pacific. In the Marianas, it is an indicator of limestone rock and grows on beaches and even out into the reef where these rocks occur. In open, high energy habitats (high wind, salt spray, sunlight intensity, etc.) plants are low shrubs. In more sheltered sites, the plants are trees. It can probably be propagated if seeds are scattered on limestone rocks near the sea, and it might be possible to transplant seedlings to damaged strand sites if revegetation is desirable. *Pemphis* is difficult to propagate except as suggested, and is very slow growing.

Engi wood can be used for fence stakes, walking sticks, spears and firewood. Dead stumps and branches weather gray and make attractive driftwood, but killing plants to make "instant driftwood" is illegal in some areas and <u>should</u> be at all sites!

*Hibiscus tiliaceus* L.

Sea-Hibiscus, Corkwood
Pago
Ghülúfé

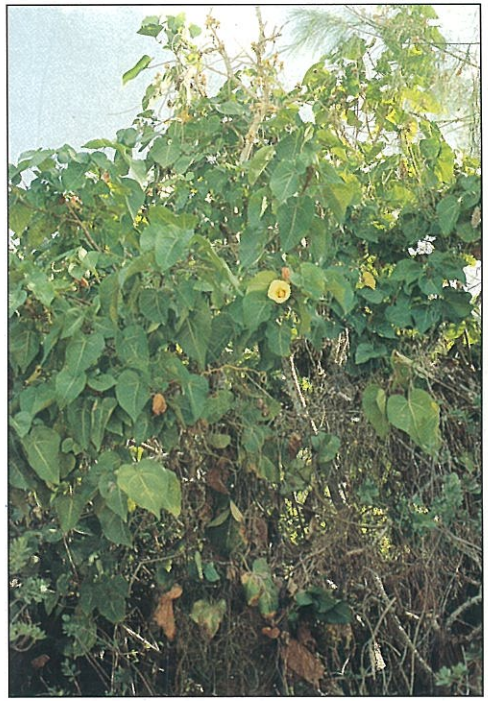
MALVACEAE

Pago is a small to medium tree to 6-8 m; it usually lacks a central trunk but has low, spreading branches and smooth gray bark. Leaves are heart-shaped on long (to 15 cm) petioles and have 7 major veins that extend somewhat palmately from the petiole attachment. They have entire margins and soft downy hairs, especially on the lower surfaces. The flowers are large, floppy and conspicuous with five yellow petals united only at their maroon bases. The flowers never open completely, but are most open in the morning. They become reddish and roll tightly in the evening and they last only one day. The 2-3 cm fruits are papery, downy capsules with five segments, each of which bears about 8 smooth seeds.

*Hibiscus tiliaceus* is one of about 200 species that are native to warm and tropical climates; it is pan-tropical and indigenous to the Mariana Islands. It can be propagated by seeds and cuttings and is common almost everywhere except the middle of savannas. Plants are abundant where they occur because storm winds knock trunks and branches down and they form roots and send up new trunks and branches. At wetland edges rooting is easier and pago is particularly dense and impenetrable.

Ghülúfé wood is white with brown heartwood, and is tough, light, flexible and durable. It can be used for furniture, boat frames and canoe outriggers. The inner bark can be soaked in water, retted and used for cordage, mats, sails, nets and ropes. The gummy material of new stripped bark is used in the preparation of sakau (kava). Crushed flowers can be applied locally to treat skin lesions. The whole plant provides shade on beaches and can be trimmed, pruned and used as a yard shade tree.





*Thespesia populnea* (L.) Sol. ex Correa

Rosewood
Banalo, Binalo
Púlé

MALVACEAE

Banalo is a medium sized tree (to 8-10 m) with a whitish bark slashed with dark furrows and slightly ascending branches and a thick crown. Young twigs and leaves are covered with woolly scales. The fairly hard, non-hairy, heart-shaped leaves have a long tip and are crowded at the branch ends. They are 7-12 cm long and palmately 7-veined from the attachment point of the long (2.5-7.5 cm) petioles. The flowers are large, somewhat crisp and conspicuous. They have five pale yellow petals united only at their maroon bases; they overlap counterclockwise. The flowers don't open completely, but most are open by noon. They become rose purple and limp by day's end. Like pago (and most Malvaceae, including the ornamental hibiscus) these flowers last only one day. Fruits are non-hairy, woody capsules about 2-3 cm in diameter; they are globose but flattened at the end and have 4-5 sections. They are green and mature brown.

*Thespesia populnea* is one of 17 tropical species and is distributed throughout the old world (Africa-India-Asia) tropics; it is indigenous to the Mariana Islands. Banalo grows on limestone; but is known as a beach or strand plant. It can be propagated by seeds or by cuttings.

Púlé wood is reddish and hard; it has been used for gunstocks, for poi calabashes (Hawaii) and when used for fenceposts often sprouts and produces new trees. The bark is tough and fibrous and can be used for cordage though it is inferior to pago cordage. Both the bark and fruits yield a yellow dye. It is an excellent street and shade tree that should be more widely planted. Groups of trees also make excellent windbreaks.

*Melastoma malabathricum* L.
(*Melastoma marianum* Naud.)
MELASTOMATACEAE

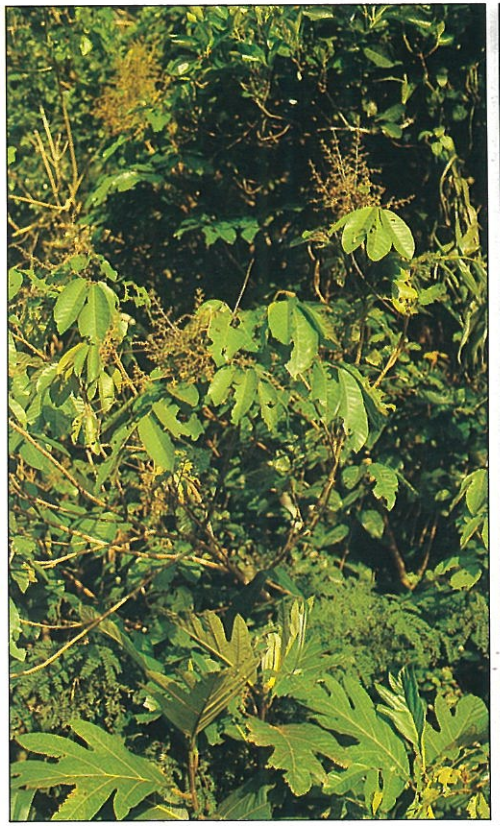
Melastoma
Gafao, Gafao

Gafao is a low (to 2 m) shrub with erect, spreading branches. Both branches and leaves are rusty or red-brown with stiff hairs and scruffy scales. The opposite, elliptic leaves are 2.5-7.5 cm long on short (1 cm) petioles. The margins are entire and there are 3 to 5 conspicuous longitudinal veins. Both upper and lower leaf surfaces are rough and covered with scales and stiff, sharp hairs. Flowers are showy and have 5 pink or white petals joined near their bases, and bright yellow anthers. They occur in small, few-flowered, terminal corymbose cymes. Fruits are globose, pea-sized brown berries; they are hairy, 5-compartmented and contain many seeds.

*Melastoma malabathricum* is one of 70 species native from Indomalaysia through the Pacific Ocean islands. It is endemic in Micronesia and there are several varieties. This is a savanna species that utilizes clay soils; it can be propagated by seeds if the habitat is suitable.

It has been used as a cultivated ornamental. Safford (1905) noted that he was told it was injurious to chickens - that you cannot raise chickens where gafao grows.





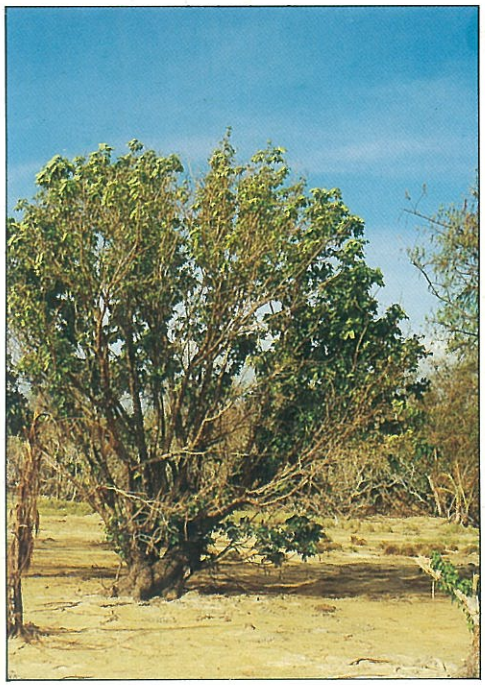
*Aglaia mariannensis* Merr.
MELIACEAE

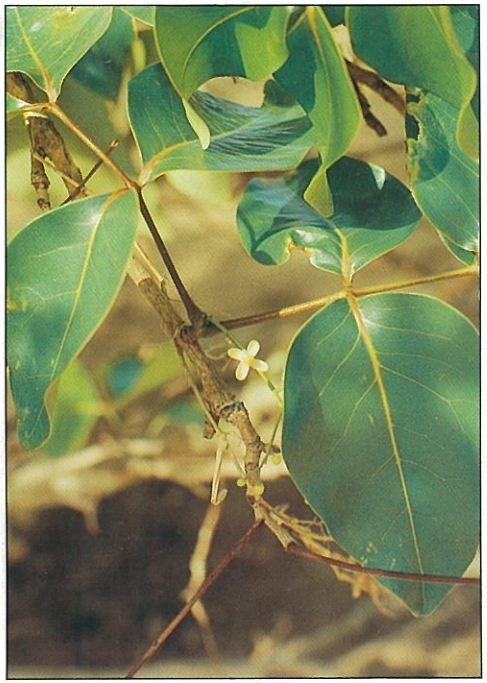
Mapunyao, Mapunao
Fischil Liyoos

Mapunyao is a small to medium tree to 7-8 m; the youngest branches and leaves are conspicuously rusty with reddish brown scales. Terminal leaf buds often look like praying hands. The alternate, once-compound leaves have 5 to 7 medium sized (10-15 cm long and 3-6 cm wide) leaflets. The terminal leaflet is usually largest and an entire leaf may be 50 cm long. Usually leaflets are dark green on top and only slighty lighter below; they have wavy entire margins and conspicuous veins. Flowers are borne in axillary, branching, racemose panicles that are usually half as long as the leaves but can be longer. Buds are small and brownish; as the flowers mature to their flesh-to-salmon color the inflorescence increases in size. Fischil liyoos fruits are elliptical, scaly and grape-sized (to 2 cm long). They mature orange, occur in clusters and each contains one seed.

*Aglaia mariannensis* is one of 100 species native from Indomalaysia to the islands of the western Pacific. It is endemic to the Mariana Islands and grows on most of them. It is an understory tree of forests on limestone and on volcanic soils and can be propagated by seeds or by transplanting seedlings that are particularly abundant in moist limestone forests.

*Aglaia* is a small shade-tolerant tree that might be an attractive ornamental. Its wood is useful for stakes and for firewood.





*Xylocarpus moluccensis* (Lam.) Roem. Puzzle-nut, Cannonball tree
Lalanyok, Lalanyog

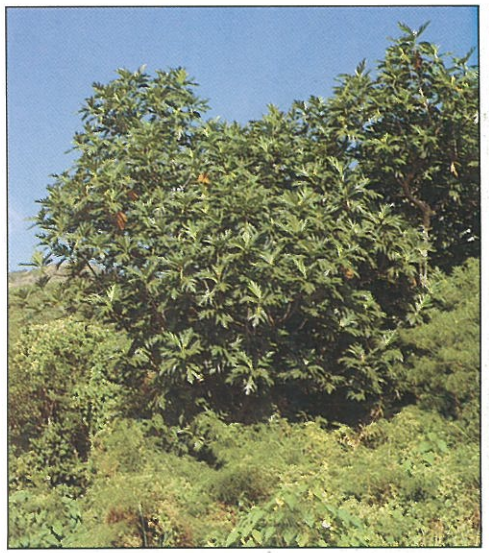
MELIACEAE

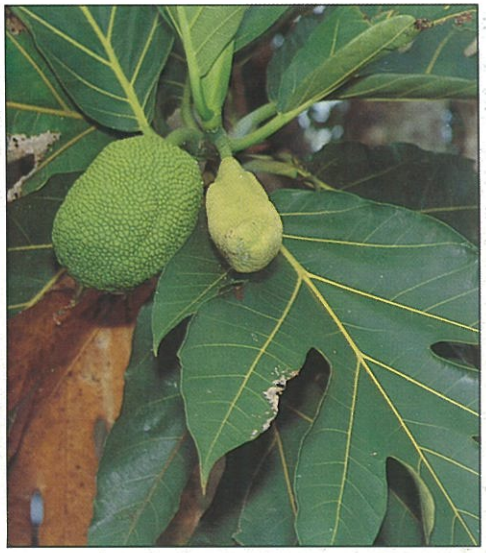
Lalanyog is a moderate sized tree to 5-8 m. The slightly ascending branches are sturdy and there are root structures (pneumatophores) that let air into the roots even when they are surrounded by mud and water. The alternate leaves are once pinnate and have an even number of obovate pinnae (2-12) that are entire, basally heart-shaped, green, tough-surfaced and asymmetrical. The vein pattern is extremely reticulate. The small yellowish or white, fragrant flowers have parts in 4's and occur in loose, open axillary panicles. The brown fruits are baseball-sized (10-15 cm thick) and slightly flattened top to bottom; they have a thin coat that opens along four lines. The 6-10 large, brown, corky seeds inside can float and are irregularly shaped with sharp angles.

*Xylocarpus moluccensis* is one of three species that occur in the old world tropics from east Africa through the Pacific; it is native to Indomalaysia and Pacific islands including the Marianas. It can be propagated by seeds and perhaps by cuttings. It is a mangrove or coastal species that also grows at river mouths.

The wood is reddish-brown with black stripes and is heavy, hard, durable, dense and fine-grained. It can be used for floors (small houses), wheel spokes, tool handles and patterned bowls, etc. The astringent red bark flakes off and is used to treat dysentery; the tree also yields a resin. The seeds yield a whitish, semi-solid oil that becomes fluid at high temperatures. In India it is used for oil lamps and for hair oil. The corky seeds are fitted together inside the fruit rind like a three-dimensional jigsaw puzzle; replacing them into the rind so they fit together provides a play activity for children (and adults).







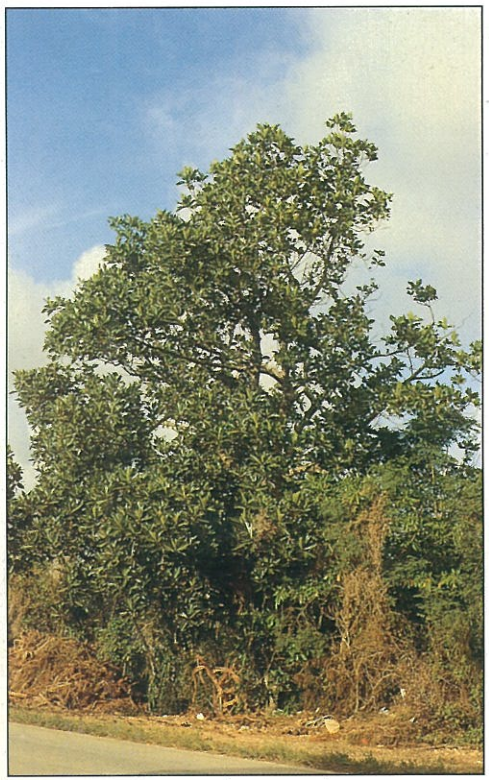
*Artocarpus altilis* (Park.) Fosb. Seedless breadfruit
Lemai, Rimae
Meiffai

MORACEAE **(WF)**

Lemai is a large tree with thick, ascending branches, a spreading crown and a gray trunk that supports epiphytes (ferns and orchids, etc.) and is often butressed. The large (to 90 cm in length) leathery, glossy dark green leaves can have three to nine deeply cut lobes, but there are cultivars that have almost round, scalloped-margin leaves and many other variations. Flowers are male or female (not both) and occur on two different structures. Male flowers are tiny and carried on the outside of elongate, yellowish, fleshy, hollow spikes 10-20 cm long. Female flowers are grouped on a spongy receptacle inside a globose fruit, so they are not visible. The fruit has a green to yellowish surface cut into small polygons, is slightly cylindrical and not lumpy. It grows to 25 cm long and weighs up to six kilograms. There are usually no seeds present in the massive, breadlike white pulp.

*Artocarpus altilis* is one of 31 Indomalayan species and is probably native to the Malay-Pacific region though its exact origin is unknown. Because it lacks seeds, it must be distributed by man; air layering is used today, but plants can also be propagated by using young sprouts that emerge around the base of the trunk, and from roots. Meiffai does well on limestone or mixed soils near or away from the sea.

The tree is an excellent shade tree and its timber is termite resistant and durable if kept dry. The wood can be used for furniture, shelving, household objects, canoes, paneling, etc., but the fruit is more important and the tree is not usually cut while it is still productive. The milky latex produced when the tree is cut can substitute for bird lime and can also be mixed with paint and used as sizing for whitewash. The fruits can be cooked (baked, boiled or fried) and eaten; can be sliced thinly and dried (for use when the trees are not bearing); or can be cut and layered into a soil pit, fermented and then shaped into cakes, etc. and baked. A cloth (like tapa) can be made from the fibrous inner bark of young trees or branches, and the leaves can be fed to horses and cattle.




*Artocarpus mariannensis* Trec.

Seeded breadfruit
Dogduk, dukduk
Meiyas

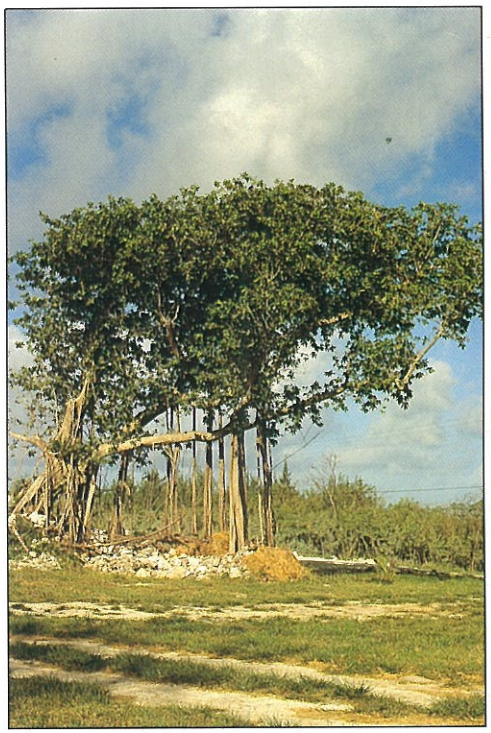
MORACEAE **(WF)**

Dogduk is a medium to large (to 20 m) tree with a gray trunk and buttress roots, strong ascending branches and a spreading crown. The dark green leaves are large (10-30 cm long and 8-15 cm wide) but smaller than those of *A. altilis*. The upper surface is somewhat shiny, while the lower surface has brownish hairs. The lower leaves, or "sucker" leaves, may have 3-5 shallow lobes, but the upper leaves are entire, with wavy margins and conspicuous venation. Breadfruit flowers are either male or female; the male spike is elongated (8-10 cm), fleshy and hollow; minute pollen-bearing "flowers" cover its surface. Female flowers are borne within an immature fruit, flower parts are present, but cannot be seen. The green fruits are moderately large, 12-14 cm in diameter and weigh 1-2 kilograms at maturity. They are lumpy in appearance and much smaller than *A. altilis* fruits; they bear 3-15 brown seeds the size of small chestnuts.

*Artocarpus mariannensis* is one of 31 species native to the Indomalaysian area; because it is seeded, it may be indigenous to the Mariana Islands. It grows on limestone and tolerates sun and forest shade but does not tolerate salt spray very well. It can be propagated by seeds, or by damaging a surface root and transplanting the young plant that results from such damage.

Meiyas is a major source of timber and gum because lemai (*A. altilis*) is too valuable to destroy. The seeds are rich in oil and can be eaten boiled or roasted.





*Ficus prolixa* Forst. *f.*

Strangler fig, Banyan
Nunu
Ghiliau

MORACEAE **(WF)**

Nunu can be a medium to large tree (to 15-20 m) with a gray trunk and many aerial roots that emerge from the trunk and branches. It often begins life as an epiphyte (seeds sprout in the bark of the host tree) that sends roots down the host to the ground. Often it grows faster than the host, overtops and shades the host tree, and kills it - not by "strangling" but by depriving it of light. The alternate leaves may be ovate or elliptic; they may have basal lobes or lack them; their margins may be wavy or slightly toothed: the leaf size and shape tends to be variable. However, all leaves have a milky sap, prominent midribs and 5 to 8 pairs of lateral veins. All trees are deciduous - they lose all their leaves at once. Figs are peculiar in that the flowers are always contained within an undeveloped fruit (fig) and are not visible to the observer. Pollination is presumably accomplished when a suicidal insect burrows into the fig and spreads pollen as it bumbles around trying to get out. Ghiliau fruits reach 8 mm in diameter and develop in leaf axils and on the trunk. They usually occur alone and ripen to a white color.

*Ficus prolixa* is one of more than 800 species in tropical and warm regions, especially Indomalesia. It is native to Micronesia and several varieties occur in the Mariana Islands. It can be propagated by air layering, seeds and cuttings.

The wood is useless but the milky sap is an astringent and can be used to stop bleeding. Nunu trees figure prominently in island legends and are never cut down or harmed, but it is unlikely that an islander would wish to plant one, either.

*Ficus tinctoria*
var. *neo-ebudarum* (Summerh.) Fosb.
MORACEAE **(WF)**

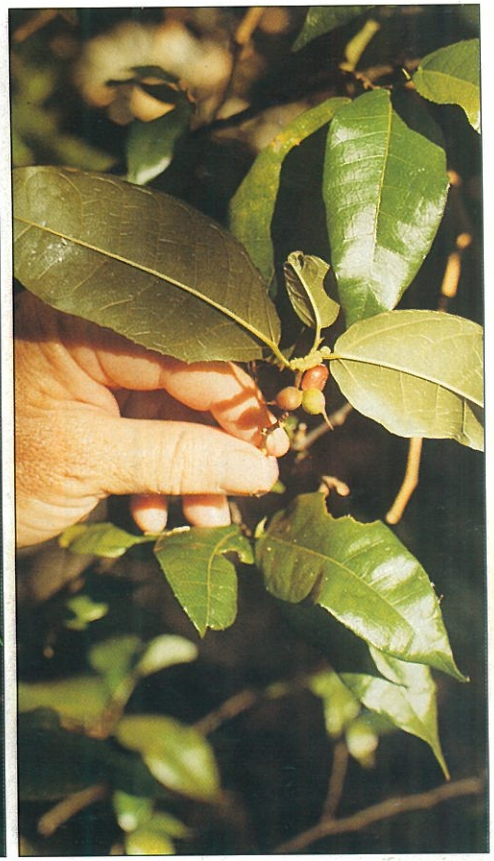
Dyer's Fig
Hodda, Hoda, Tagete
Awall

Hodda is a medium sized tree, seldom more than 8 m tall with gray bark and branches from which extend aerial roots. Like *Ficus prolixa*, this starts as an epiphyte or a small plant on cliff rocks and extends aerial roots to the ground as it matures. Its alternate, ovate leaves are 8-15 cm long and 5-8 cm wide and have an entire margin and prominent veins. The midvein is not in the middle of the leaf, so one half of the leaf is considerably larger than the other (asymmetrical leaf). Hoda does not lose all its leaves at once (is not deciduous) and the dark green leaves wither bright yellow. As with other *Ficus* the flowers are contained within the immature fruit. Mature fruits are globose, about 12 mm in diameter and occur on 10 mm peduncles. They mature from green through yellow to a dull reddish color.

*Ficus tinctoria* is one of about 800 species of the genus that occur worldwide in tropical regions. It is widespread from the Philippines through Micronesia to Polynesia. It can be propagated by seeds and grows on limestone, on beaches or in the back strand.

Awall wood is not useful but the milky sap can be used to seal wounds. The ripe fruits are especially favored by sali (the Micronesian starling, *Aplonis opicus*).





*Streblus pendulinus* (Endl.) Muell.

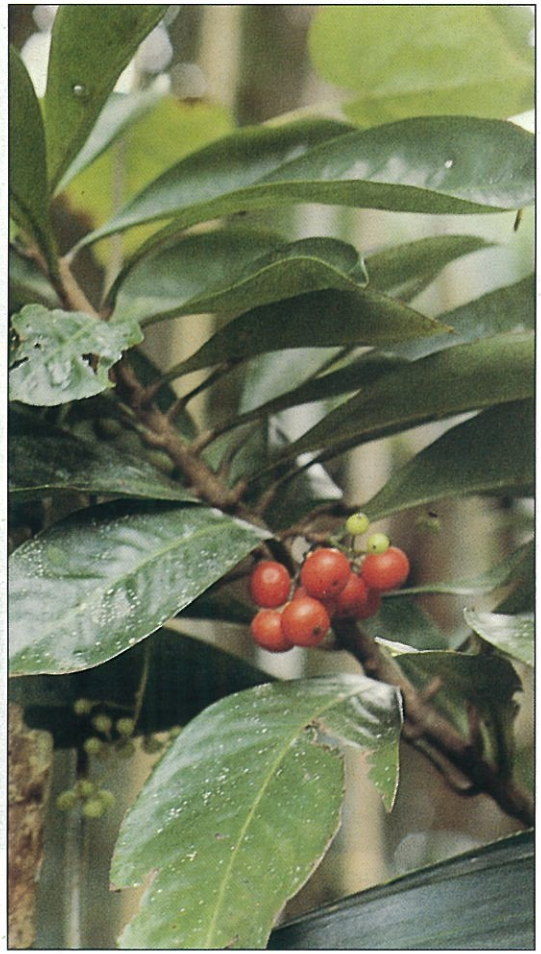
MORACEAE **(WF)**

Mwelel piut

Mwelel piut is an understory shrub of limestone forests; branches/stalks are gray and have a watery-milky sap. The thin, alternate, ovate-oblong leaves are dark green above, pale green below, basally rounded and show distincly reticulate venation. Their margins are irregularly toothed. Plants may be both male and female, or only one sex, but the flowers are either male or female, not both. Male flowers are carried on spikes that look fuzzy (catkins) and hang from upper leaf axils. Female flowers have white petals and are also axillary on short pedicels - sometimes clustered and sometimes singly. Fruits are red or red-purple berries 1 cm in diameter. They are juicy and contain one fairly large seed.

*Streblus pendulinus* is one of 22 species that occur from Madagascar through the Indomalay area to the Pacific Ocean. It is indigenous to the Mariana Islands and Yap. It can be propagated by seeds or cuttings and prefers shaded limestone soils such as those in humid limestone forests.

The fruits are probably eaten by wildlife. *Streblus* would be an attractive ornamental if proper habitat space could be made available.



*Discocalyx megacarpa* Merr.

Otot, Otug

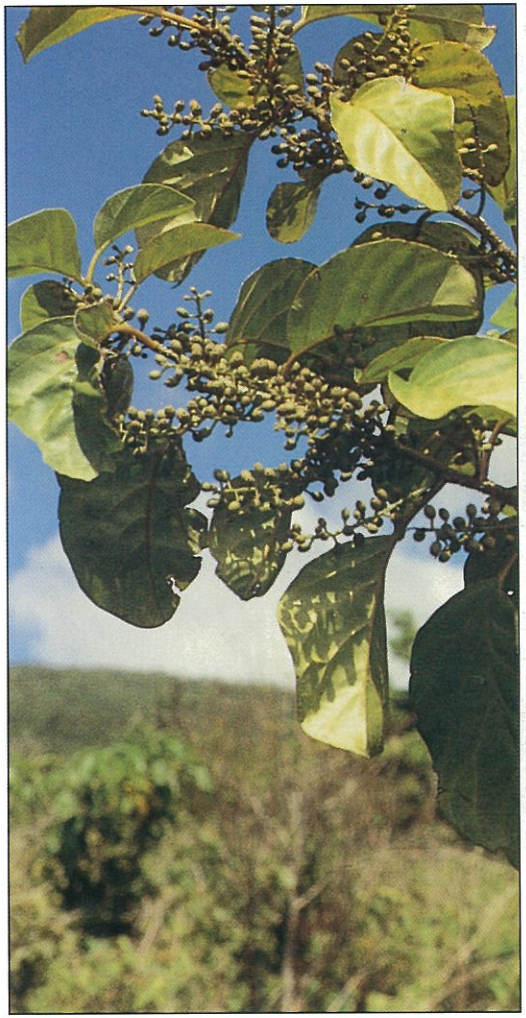
MYRSINACEAE **(WF)**

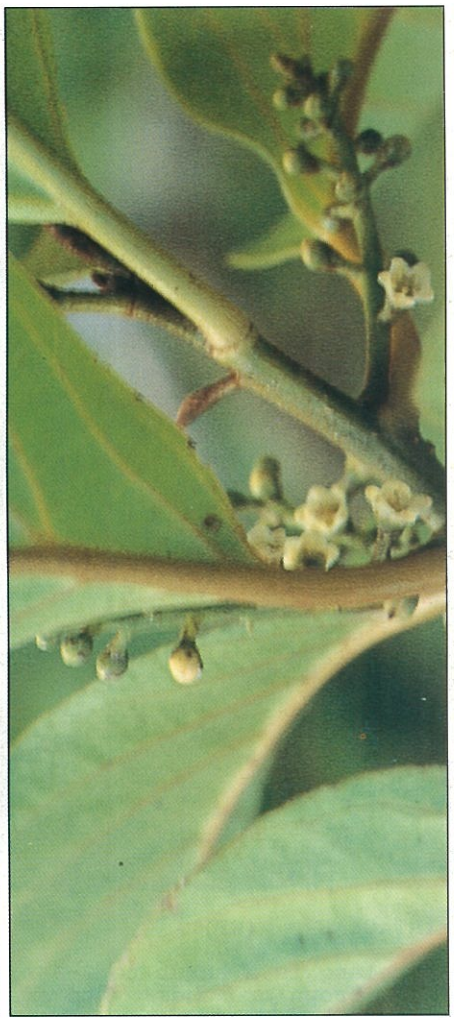
Otot is an erect shrub to 1-2 m with ascending brownish round branches. The lanceolate, medium-to-dark green leaves are alternate and bunched at branch tips. They occur on 1 cm petioles and are 10-22 cm long and 3-6.5 cm wide with 8-12 pairs of lateral veins. Flowers occur in many-flowered panicles, usually several together with a few small leaves, on small branches. Flowers are separate sexes, and both males and females are salmon-pink on short (4-5 mm) pedicels. Fruits develop from female flowers, and are 1 cm in diameter, thinly fleshy, red and finely ribbed and each contains one seed.

*Discocalyx megacarpa* is one of 50 species between eastern Malesia and Polynesia. It is endemic to Saipan, Rota and Guam where it occurs in moist, shaded forests on limestone and also along streams on clay. It can be propagated by seeds.

The red, attractive, edible fruits are said to have a flavor like that of tamarinds (Safford, 1905) and are likely wildlife food.







*Maesa*

MYRSINACEAE **(WF)**

*Maesa* is a shrub with reddish branches and conspicuous lenticels and leaf scars. Leaves are alternate and ovate with ruffled margins. They have prominent reddish veins and midveins and are dark green on top and lighter below. The blades are 6-10 cm long and the petioles about 2.5 cm long, reddish and twisted. The inflorescences are axillary and often branched and twisted, and the flowers are inconspicuous and alternate on the inflorescences. Fruits are small (3 mm in diameter), globular and brownish with longitudinal lines. A thin fleshy layer surrounds the mature seeds and both calyx and parts of the petals persist on the fruit.

This is one of 100 species of *Maesa* in the old world tropics. It is endemic to the Mariana Islands and occurs at edges or in open sunny sites on limestone. It is propagated by seeds and the fruits may be eaten by wildlife.

*Eugenia palumbis* Merr.

Agatelang
Aghotoleng

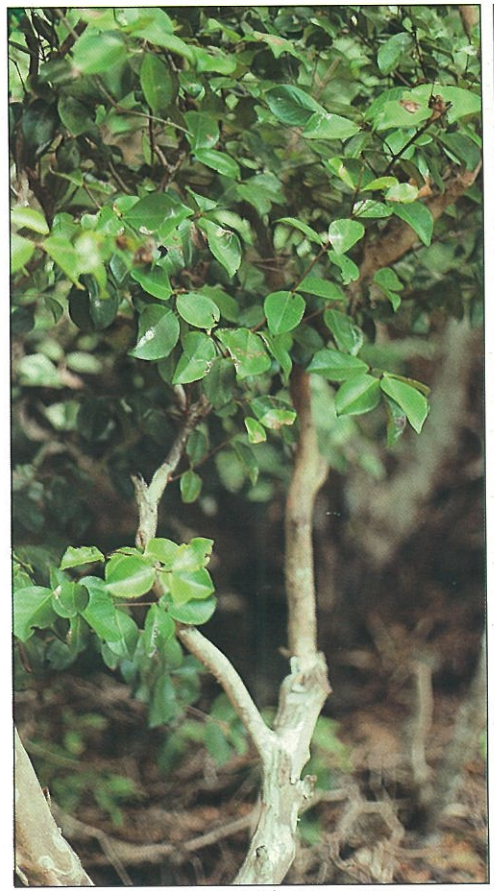
MYRTACEAE **(WF)**

Agatelang is a shrub to 2-3 m, with slender erect or spreading light brown branches. Its small, opposite, elliptic-ovate leaves narrow at both ends and have short (1-3 mm) petioles. Leaves are medium green on top, lighter below and entire; veins are obscure. Flowers are small and axillary on short (2-5 mm) pedicels, and resemble other Myrtaceae flowers in having four white petals that fall off easily and numerous stamens. Aghotoleng fruits mature bright red; they are about 1 cm in diameter, globose and topped by the persistent calyx. Succulent edible pulp surrounds the one or two seeds.

*Eugenia palumbis* can be easily propagated by seeds and is endemic in the Mariana Islands. It grows on limestone, as forest edge or understory; it also grows on exposed clifflines and on terraces near the sea. A close relative (perhaps a variety and not really a species), *Eugenia bryanii* Kaneh. is quite similar, grows on clifflines and has smaller stature, leaves, flowers and fruits.

*Eugenia* wood is noted for being strong but this species is quite small and it seems unlikely the wood would be very useful. The plant could be used ornamentally as an understory or hedge species. The fruits are eaten by birds and other animals.





*Eugenia reinwardtiana* (Bl.) DC.

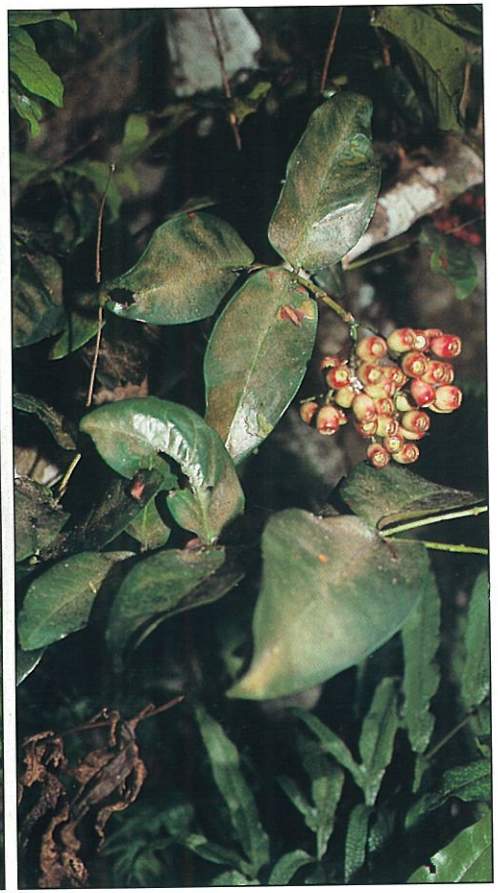
A'abang

MYRTACEAE **(WF)**

A'abang is a small to medium sized (3-8 m) understory tree with horizontal branches and a light brown trunk with a thin outer bark. The opposite green to dark green leaves are somewhat pointed on both ends, have short petioles 3-4 mm long, and dull, even coppery, undersides. The flowers are axillary and solitary on long (2-2.5 cm) pedicels. Like other Myrtaceae flowers the four petals are white and there are numerous stamens; the petals fall off easily. The flower fragrance may not be pleasant to some people. The fruits mature yellow to red, are globose, succulent and contain one large seed.

*Eugenia reinwardtiana* can be propagated by seeds and probably by cuttings. It is native from Malaya and the Moluccas to some Pacific islands, including the Marianas. It is an understory tree of both interior and coastal forests on limestone.

The fruits are edible but not very flavorful; they are eaten by birds and other animals. The wood is hard, strong, fine grained and straight, and has been used for handles (ax, machete, etc.), fence posts, walking sticks, coconut husking stakes and rice-pounding pestles.



*Eugenia thompsonii* Merr.

Atoto

MYRTACEAE **(WF)**

Atoto is a small tree to 5-6 m with irregularly spreading branches and rough reddish-brown bark. The opposite leaves are borne on very short (<3 mm) petioles, are glossy dark green above and paler below, oblong and fairly deeply heart-shaped at their bases. They are 8-18 cm long, 3-8 cm wide, and have ten pairs of lateral veins from the midrib. Attractive flowers with numerous stamens and four white petals are borne in sets of three in few- or many-flowered panicles that extend from the trunk or major branches. The panicle may have a few basal pairs of leaves, which gives the impression that panicles are terminal at branch tips. Fruits are ovoid, 1.5 cm long and bear a persistent calyx. They ripen to a glossy dark red/maroon color and enclose one hard seed.

*Eugenia thompsonii* can be propagated by seeds or cuttings. It is endemic to the Mariana Islands and occurs within or at the edge of forests on limestone.

This handsome small tree has edible fruits that are pleasantly tart and are doubtless eaten by wildlife, including birds. It would be worthwhile to cultivate, but the site should be shaded, on limestone, and moist.



*Psidium guajava* L.

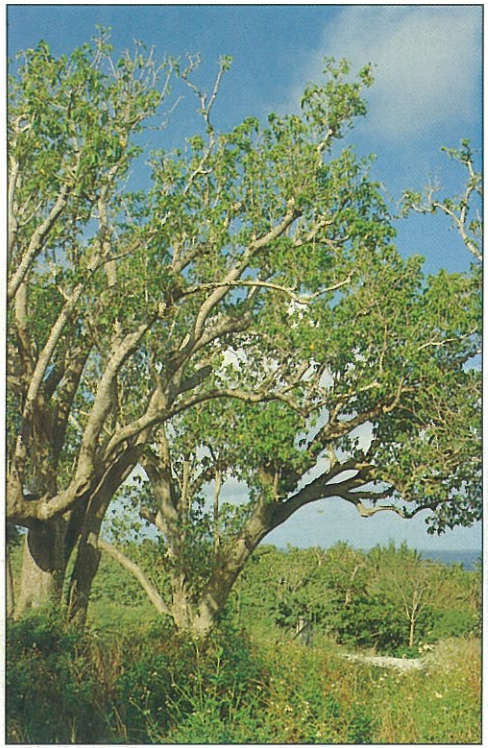
Guava
Abas
Abwas

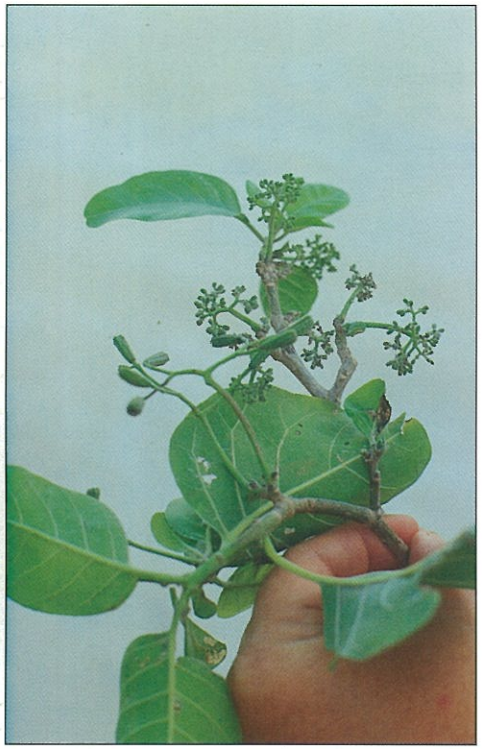
MYRTACEAE **(WF)**

Abas is a small tree with irregularly spreading branches and light reddish-brown bark that peels off in irregularly shaped sections. Leaves, which are opposite on short petioles, are oblong and entire with a somewhat rough upper surface and prominent midveins and side veins. Flowers are typical for the family, and have 4-5 white petals that fall easily, a slight fragrance and numerous stamens. They may be 3 cm in diameter and occur singly or in clusters on short axillary pedicels. The fragrant fruits are ovoid or globose, 2.5-10 cm in diameter, have a persistent calyx and are green, maturing yellow or pinkish. The pulp is granular and juicy and contains many yellowish seeds.

Guavas can be propagated by seeds or cuttings. They are native to continental tropical America and were introduced to Guam by the Spanish. They are now naturalized in the Marianas, the Philippines and throughout the tropics and subtropics. They will form extensive patches in abandoned fields and open places on clay and limestone soils, but will not grow well in shade.

Abwas wood is small, but strong, and can be used for tool handles or fuel. Leaves are often added to local medicinal combinations. The green to yellow fruits may be pickled or eaten raw, and ripe fruits are used for juice and jelly. In many places, (such as Hawaii) guava has displaced native vegetation and is considered a noxious pest, but in the Marianas the fruits are appreciated by both man and wildlife, and the plant is not yet considered a hazard to native vegetation.





*Pisonia grandis* R. Br.

Umumu; Umomo

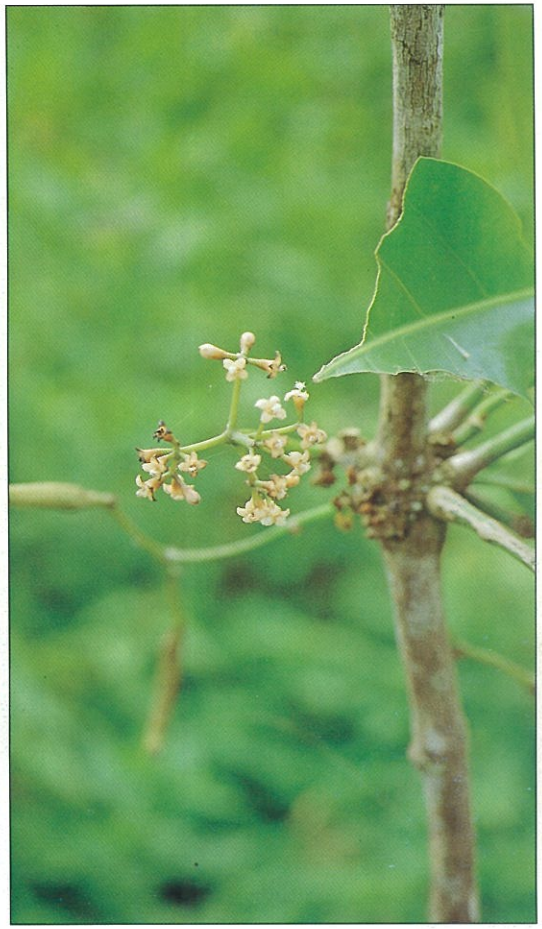
NYCTAGINACEAE **(WF)**

Umumu can be a very large tree, but in the Mariana Islands is often "pruned" by typhoons to produce a short, stocky tree with many trunks. The wood is quite soft, the bark is distinctive and branches are irregular and twisted. The leaves are opposite, or grow in whorls and are crowded at branch tips. They are pale green, pointed at the tips and slightly heart-shaped at their bases, 12-20 cm long, have conspicuous veins and are often insect eaten. Separate-sex flowers cluster in cymes of two or four at branch tips or in leaf axils. Male and female flowers look alike, with greenish to whitish sepals and petals. Flowering is not common. The fruits are angular, shortly-cylindrical and about 1 cm long. They have rows of short spines and are very sticky.

*Pisonia grandis* can be propagated by seeds or by rooting branch cuttings. It is native from Madras through Micronesia and Polynesia to Australia. The sticky fruits are dispersed by birds; this is a common nest tree and a limestone forest dominant.

Because it is a nest tree, *Pisonia* on coral atolls is often associated with guano deposits. Its wood is light but punky, so it tends to be used for canoe parts (but not for the canoe). On many atolls, large trees are seldom seen; they are felled when young, the wood is used and the branches stuck in the ground to form enclosures. Most of the branches root, assuring a constant supply of *Pisonia*. This species also figures in wayang (shadow puppet) shows in Java, where it is quite rare, and is used only for shows associated with the coronation of the Sultan of Solo.





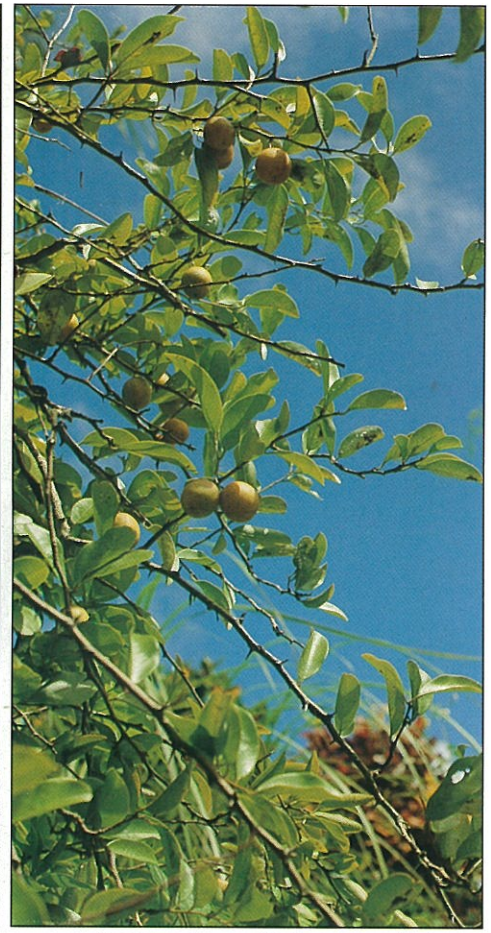
*Pisonia umbellifera* (Forst.) Seem.

NYCTAGINACEAE

*Pisonia umbellifera* is a fairly rare, punky tree to 5-10 m; it may have several trunks and ascending but irregular crooked branches. Its leaves are large (over 30 cm long and 10-15 cm wide), dark green, obovate, rounded at the tip and tapering toward the base. They occur on short petioles and are somewhat fleshy. The flowers are salmon-pink and occur in inflorescences of up to 20 flowers on branches, often near the main trunk. The fruits are dark and smooth, 3-5 cm long, bottle-shaped and tapered toward the tip. They are exceedingly sticky.

This species can be propagated by seeds (which are not common) or by branches stuck in the ground. It is native to Pacific islands from the Marianas through Polynesia to Hawaii. It is a component of moist forests on limestone.

Most of the larger trees in the Marianas have been severely pruned by typhoons, but support surprising amounts of epiphytic plants - mosses, ferns and orchids. As a component of native limestone forests, this species should be preserved.



*Ximenia americana* L.

Sour plum, False sandalwood
Pi'ut

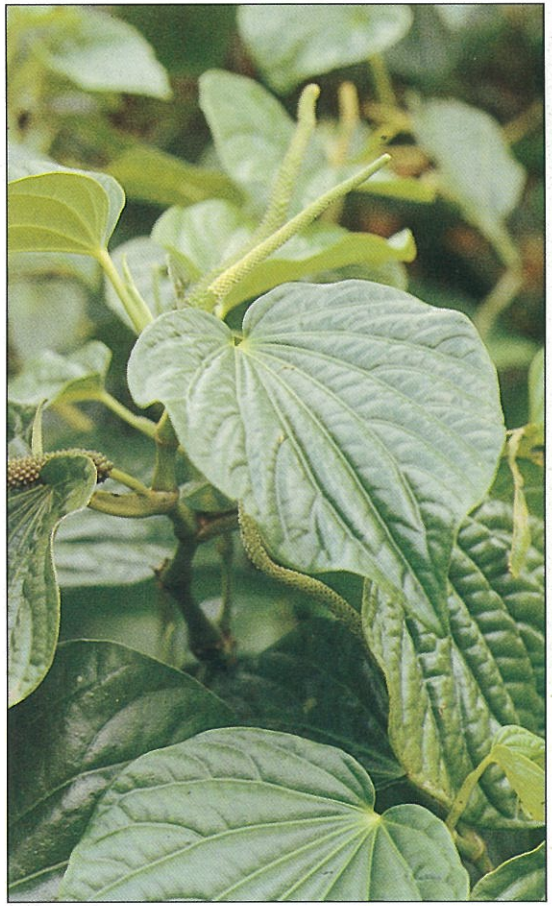
OLACACEAE **(WF)**

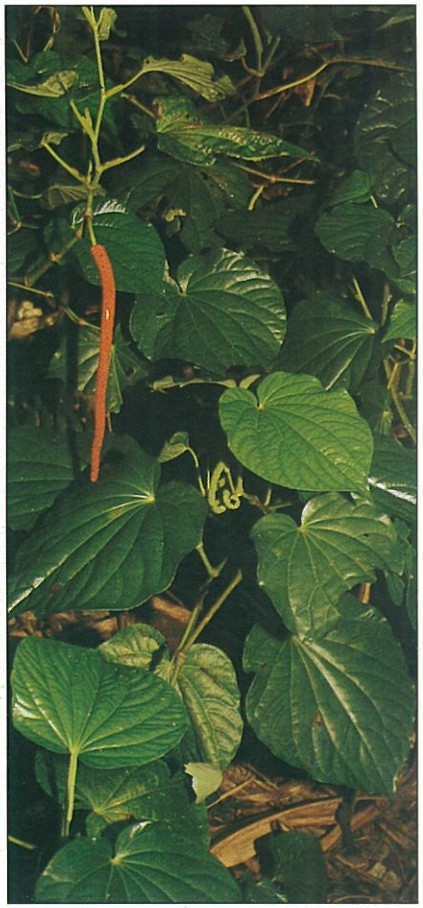
Pi'ut is a small tree with thorny, spreading branches, young angular shoots and a red, astringent bark. The small, glossy, yellow-green, entire, elliptic leaves are 3 cm long and 2.5 cm wide, one-veined on short petioles and alternate on the branches. The white, fragrant flowers grow on the ends of short axillary racemes. The edible fruits are olive-sized spherical drupes that are green maturing orange and contain one seed.

*Ximenia americana* is pantropical and one of eight tropical species of root parasites. In the Marianas it is an edge species on limestone, is found in open disturbed fields, and along the back strand. It is typically propagated by seeds.

The wood of the sour plum is hard, though small, and can be used as a substitute for sandalwood. Mature fruits are edible, and considered to be a favorite of fruit doves; they can also be pickled in olive brine. The seed, considered poisonous by some, is a strong purgative and in India, oilseed can be a substitute for ghee.







*Piper guahamense* DC.

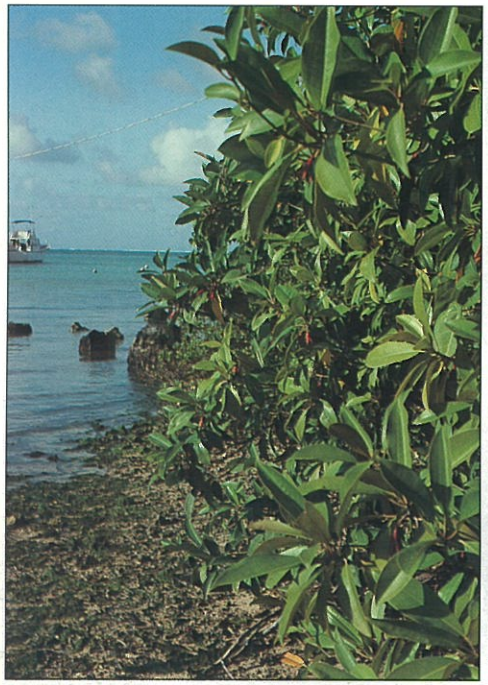
Wild pepper
Pupulu-n-aniti

PIPERACEAE

Pupulu-n-aniti is a shrub 1-3 m high; its stems are only somewhat woody and have prominent nodes. The heart-shaped dark green leaves are simple and entire and have 9-11 nerves extending palmately from the medium long petioles, which are expanded toward the stem and sheathe it. Flowers are densely packed onto solitary, axillary, pedunculate spikes that can be either male, female or monoecious. Flowers are white, male spikes are usually more slender that female, and spikes typically have round, peltate bracts. The mature fruits are red berries that fall off the spike easily.

*Piper guahamense* is one of more than a thousand tropical species of *Piper*, some of which are vines or even small trees. This species is endemic to the Mariana Islands and occurs in moist forests on limestone or on stream banks. It can be propagated by seeds or root stocks.

The roots have been used to treat gonorrhea. Leaves and stems are aromatic and contain alkaloids; they are often added to all-purpose medicine combinations.



*Bruguiera gymnorrhiza* (L.) Lam. Many-petalled mangrove
Manglen lahi, Manglen machu

RHIZOPHORACEAE

Manglen lahi is a medium sized (12-15 m) tree with short arched prop roots arising near the base of the trunk. It has dark, fissured bark and knuckle-shaped "breathing roots" (pneumatophores). The leathery, glossy green, oblong-elliptic leaves have petioles to 4 cm and are opposite and 10-20 cm long and 3-7 cm wide. Flowers hang singly on medium-long pedicels from leaf axils. The 10-14 petals are white, age to a golden color and are contained within a bright red, bell-shaped calyx with 10-14 lobes. Fruits are top-shaped, leathery, 2 cm long and develop within the persistent calyx. Like many mangrove species, *Bruguiera* fruits contain embryos that develop while the fruits are hanging from the tree. The root portion of the embryo - the radicle - becomes grooved and elongates to 20-25 cm. When the fruits fall, the radicle can implant itself in mud and begin growth.

The only way to propagate mangroves like *Bruguiera* is to plant the mature fruit with developed radicle; once the young plant has developed a stem and leaves, it is a poor risk for transplanting. *B. gymnorrhiza* is one of six East Africa to the Pacific mangrove species. In Micronesia it is the most northern (in Saipan) and eastern (the Marshalls) mangrove species. It grows only in muddy areas where freshwater streams meet the sea, and is fairly tolerant of both freshwater and seawater.

Like all mangroves, manglen lahi stabilizes shore sediments in estuaries. Its wood is generally termite resistant, with dark red, heavy heartwood used for posts, pilings, planks and furniture and sapwood which is reddish white and softer. The bark is astringent, and used in India for tanning and dyeing (black).

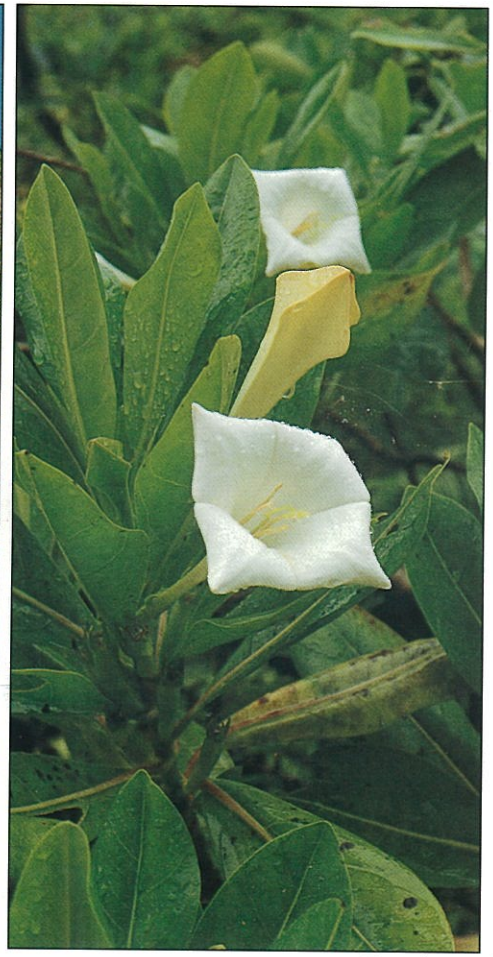


*Aidia cochinchinensis* Lour. Sumak, Sumag
[*Randia cochinchinensis* (Lour.) Merr.]
RUBIACEAE **(WF)**

Sumak is a small understory tree with smooth branches. The glossy oblong-lanceolate opposite leaves have conspicuous veins, wavy margins and moderately long petioles. The fragrant white flowers occur on long pedicels in rather densely-flowered axillary cymes. Fruits are pea-sized with a persistent calyx and are reddish, maturing black.

*Aidia cochinchinensis* is one of 25 species in the old world tropics and occurs from tropical Asia east through the Pacific islands, though not as far east as Hawaii. The species name refers to Cochin, China, an early name for southeast Asia. *Aidia* occurs in limestone forests and along edges, and is often a pioneer species under tangantangan (*Leucaena leucocephala*). It can be propagated by seeds and probably by cuttings.

The wood is flexible, elastic and termite resistant and has been used for roof framework in local houses. Leaves and stems have been used in medicinal combinations. This attractive small tree with its fragrant white flowers would make an excellent landscaping species on limestone.



*Bikkia tetrandra* (L.*f.*) A. Rich.
(*Bikkia mariannensis* Brongn.)
RUBIACEAE

Torchwood
Gausali

Gausali is an erect, branching shrub with pale bark; it grows on limestone cliff faces and often sprawls along the rock exposures. The obovate, opposite leaves have short petioles, small light green D-shaped stipules and a prominent pale midvein. Each leaf pair is offset from the pair above and the pair below. The long, tubular, white flowers occur one to a few on short pedicels in leaf axils. The calyx has two short D-shaped bracts and from the front the trumpet-shaped flower looks square. Fruits are fibrous, woody, two-celled capsules that are elongate, held vertically and contain numerous small black seeds. These fruits release seeds continually but persist on the plant even after all the seeds are gone.

*Bikkia tetrandra* is endemic to the Mariana Islands. It seldom grows far from the sea and always grows on limestone; it can be propagated by seeds if such a site is available. Stems cut into short sections can be used as candles; the wood ignites readily and can be used to make torches.



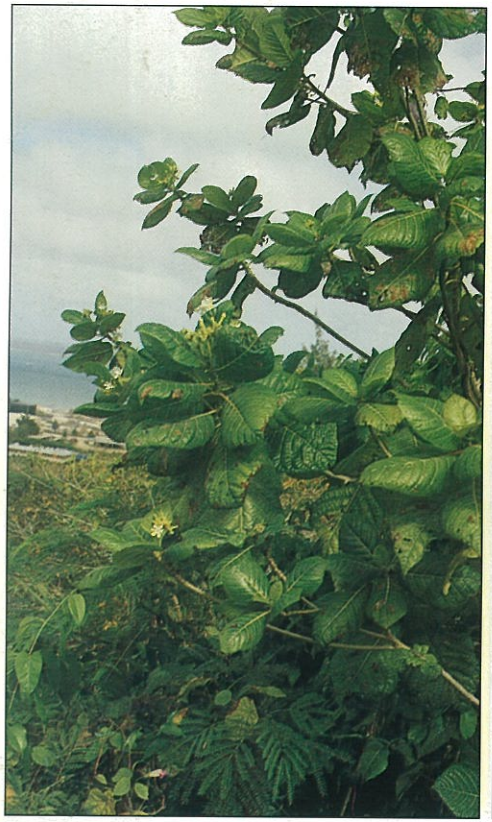
*Canthium odoratum* var. *tinianense* (Kaneh.) Fosb.

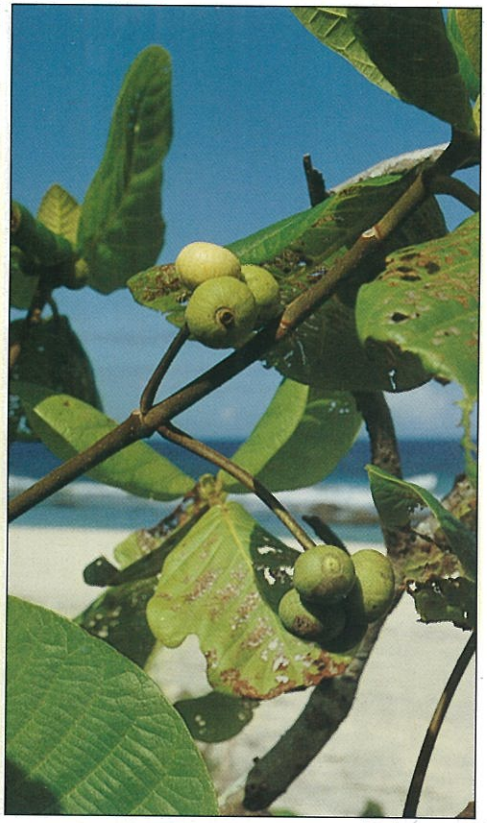
Llát

RUBIACEAE **(WF)**

Llát is a small (3-4 m) tree or large shrub that grows on limestone, often on sea-facing cliffs. The medium green, opposite, obovate leaves are 4-5 cm long by 2-3 cm wide, and are stiff or even semi-succulent. They have four to five pairs of lateral veins and occur on very short (3-5 mm) petioles. The fragrant pale greenish-white flowers grow on short (1-2 mm) pedicels in crowded axillary paniculate cymes. The fruits are small (5-7 mm), two-seeded and green, ripening to black.

*Canthium odoratum* is found in southeast Polynesia west to New Caledonia, Vanuatu and Tonga, and in the Mariana Islands. The variety *tinianense* is endemic to the Marianas. It can be propagated by seeds and perhaps by cuttings and would be an attractive ornamental plant in suitable habitats.





*Guettarda speciosa* L.

Zebrawood
Panao
Mwesor

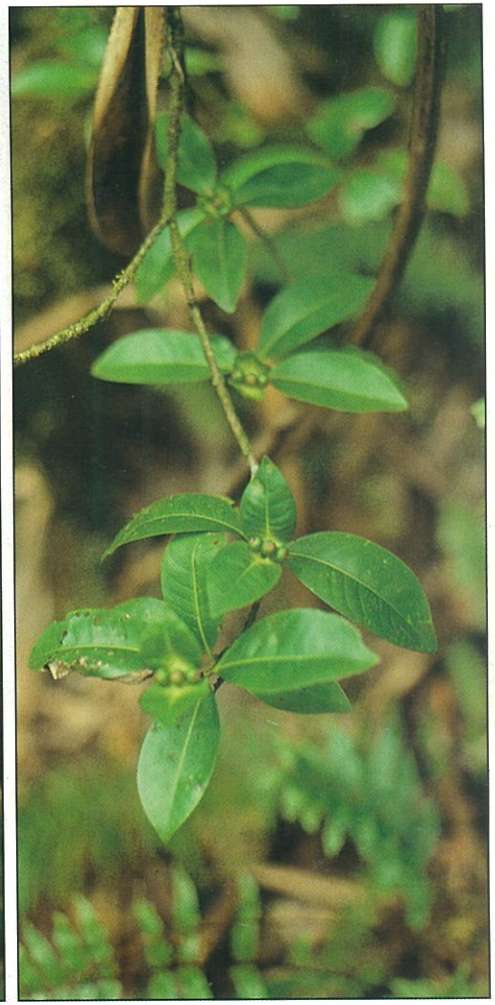
RUBIACEAE

Panao is a small, somewhat straggling tree with short stout branches that have large leaf scars. The green, glossy, broadly ovate leaves may be 12-25 cm long and 10-18 cm broad and are opposite or whorled in threes. Leaf edges are gently scalloped and the 7-10 pairs of veins and the midrib are conspicuous on both upper and lower surfaces. The stipules between the petioles are ovate and pointed. Flowers are small (2.5-5 cm long), tubular, fragrant and white with 5-7 fused petals. They occur on long (5-10 cm) pedunculate cymes that are axillary, usually from the axils of fallen leaves. The rounded, faintly ribbed fruits are white to pinkish and are about 1.5 cm in diameter. They are woody, contain 4-6 seeds and have a ring around the apex that surrounds perforations. These fruits float and are dispersed by ocean currents.

*Guettarda speciosa* is one of about 60 tropical species and is distributed from tropical Asia through much of the Pacific though not to Hawaii. It can easily be propagated by seeds and grows on limestone at the edges of forests, cliffs and in the backstrand.

Mwesor trees are small but the wood has been used for boards for construction. Flowers are pollinated by moths at night and fall off in the morning; they are used in mwarmwars in Samoa and Fiji and perfume is extracted from them in India.



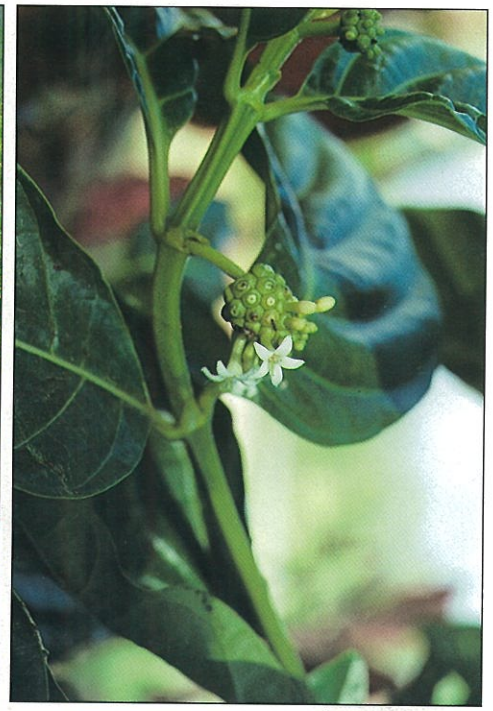


*Ixora triantha* Volk.

RUBIACEAE **(WF)**

This *Ixora* is a shrub or small tree that is an edge or understory species in forests on both limestone and clay soils. The opposite glossy green, oblong-elliptic leaves are 8-15 cm long and 4-6 cm wide on short (3-6 mm) petioles. They have a conspicuous network vein pattern that creates a vein around the edge of the leaf. The fragrant, tubular white flowers are fairly small (16-19 mm) and 4-lobed. They are unstalked and occur in sets of threes within two small D-shaped leaves (bracteal leaves) with white or yellow central splotches. Fruits are purplish black, round to oblong and also occur in groups of three.

*Ixora triantha* is one of 300 species of *Ixora*, many of which occur in Africa and Asia; it is endemic to Yap and the Mariana Islands. It can be propagated by seeds and cuttings, and because it grows in several habitats and soils, would be a desirable landscaping species.



*Morinda citrifolia* L.

RUBIACEAE

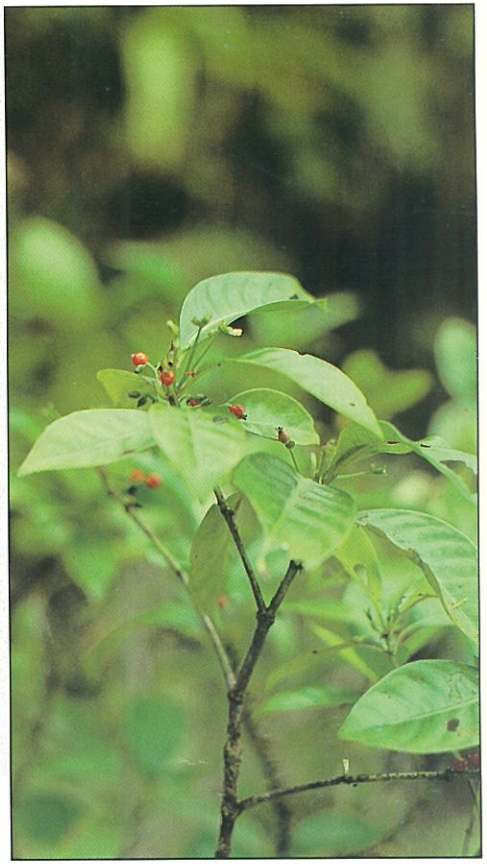
Indian Mulberry
Lada; Ladda
Leel

Lada is a small tree to about 10-12 m with four-angled branchlets; its crown is bushy but not widely spreading. The dark green, glossy, crinkly-edged, opposite leaves are 15-25 cm long and 6-18 cm wide. They are long and elliptical and narrow at both ends. The leaf petioles are short and conspicuous and large, D-shaped stipules occur between the petiole bases. Flowers occur in heads on 2-3 cm long peduncles; they are white with five points. The fruit begins maturing as the first flowers are pollinated, so that later flowers appear on the developing fruit. Leel fruits are fleshy and green, maturing yellow-white and gelatinous. Inside the lumpy fruit, which matures from many separate flowers, are stony sections, each containing one seed. Each seed has an air chamber and will sprout even after a long time in sea water.

*Morinda citrifolia* is one of about 30 tropical species (most from the "old world" of Africa and Asia) and is distributed from the west coast of Africa through India and Malaysia to islands of the Pacific Ocean. Ocean currents are probably a major distributing agent. In the Marianas, lada grows from seacoasts to limestone escarpments and terraces, and on clay soils as well. It can be propagated by seeds and cuttings.

The tree is the source of "canary wood" and the roots, flowers and bark are dye sources. The roots produce a yellow dye and the bark and flowers, a red dye. Immature fruits are used in curry (India) or boiled as an ingredient in many medicinal remedies. Mature fruits are edible, but the taste and smell supposedly resembles bad cheese. The fruits can be squeezed and the juice used as eye drops for sore eyes.





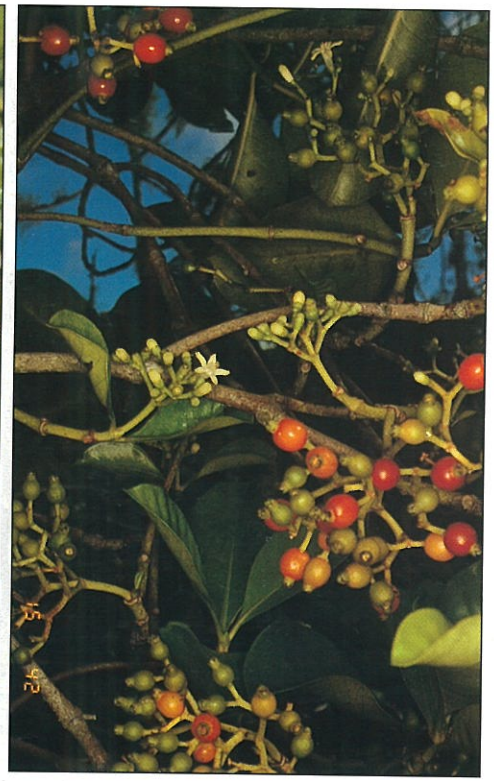
*Psychotria hombroniana* (Baillou) Fosb.

RUBIACEAE **(WF)**

Aplokhating-palaoan
Apulukalin

Aplokating-palaoan is a large shrub or small tree with round, reddish-brown branches and a trunk 4-5 cm thick. The opposite, elliptic-oblong leaves are small (6-10 cm long and 2-4 cm broad), moderately green and glossy above and paler below. They have eight pairs of lateral veins, occur on 5-15 mm long petioles and stipules occur at the bases between the petioles. Flowers are white or yellow-green and are borne on one to three-flowered cymes that are sessile or long-peduncled. Fruits are small (7-8 mm), smooth, fleshy, oblong-ovate drupes that are green maturing red. Each fruit contains two seeds in hard "shells".

*Psychotria hombroniana* is one of 1400 tropical tree and shrub species of *Psychotria*; it is endemic on Micronesian high islands: the Marianas and the Carolines. There are a number of varieties of this species, two of which occur in the Marianas. *P. hombroniana* var. *hombroniana* occurs on Rota and Guam and *P. hombroniana* var. *malaspinae* (Merr.) Fosb. has been reported from Alamagan, Rota and Guam. Apulukalin is not a common species and seems to prefer limestone soils and forest edges, and perhaps understories. It can be propagated by seeds and probably by cuttings, and would make an attractive ornamental shrub on appropriate soils.



*Psychotria mariana* Bartl. ex DC.

RUBIACEAE **(WF)**

Aploghating, Aplokhating

Aplokating is a small (to 10 m) dark, understory or edge tree on limestone soils. It has smooth, hairless branches that extend slightly upward; young sections are green with dark blotches. Leaves tend to cluster near branch tips and are opposite, dark green and obovate. They are moderate in size (7-10 cm long and 2.5-4 cm broad) and have entire margins and 6-8 pairs of conspicuous lateral veins. Broad stipules occur between the bases of the relatively short petioles, but are not often seen because they fall off soon after they form. Small stiff white flowers are held erect, often in groups of three, on branching terminal cymes that have peduncles shorter than the leaves; the flowers are not particularly fragrant. Fruits are pea-sized drupes or berries and are green maturing to wine-red. They retain the calyx and contain one or two seeds each.

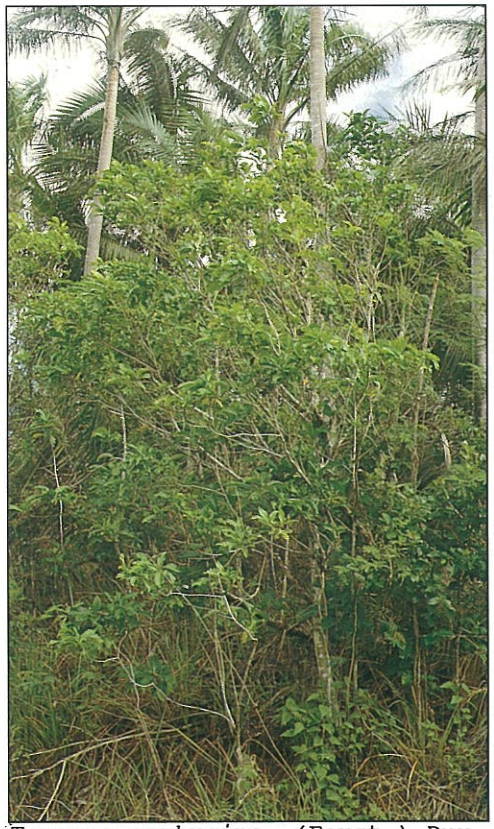
*Psychotria mariana* is one of 1400 tropical tree and shrub species and is endemic in the Mariana Islands. It can be propagated by seeds and probably by cuttings. It can be a pioneer species in secondary woodlands (like tangantangan woodlands) and is both an edge and understory species in forests on limestone. The leaves and wood are dark and quite distinctive against lighter species.

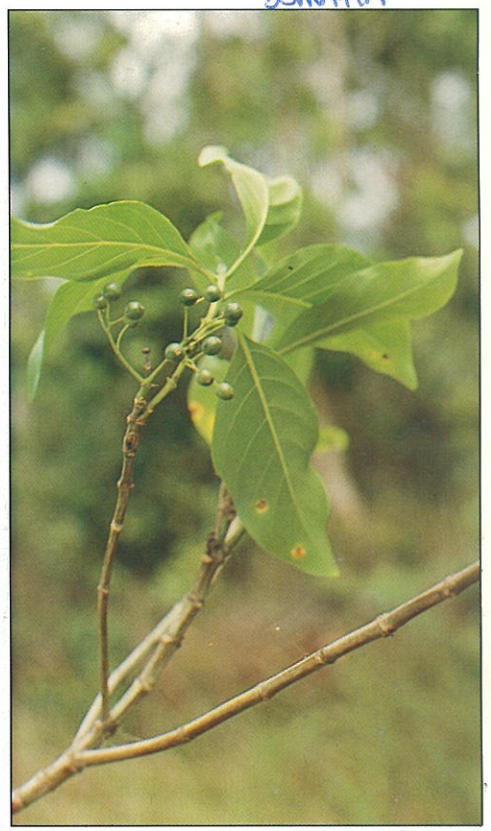
There are reports that the wood is durable and used in house construction (Safford, 1905), but the size of present-day plants makes this unlikely. The fruits, like those of most Rubiaceae, are probably good wildlife food.



ROTA 6/2001

DOMATIA





*Tarenna sambucina* (Forst.) Dur.

RUBIACEAE **(WF)**

Sumac-lada
Walmwasching

Sumac-lada is a small tree (6-8 m) with pale bark (often with lichens) and ascending branches with enlarged nodes; young branch ends are four-angled. The opposite, ovate-elliptic leaves are 10-20 cm long, 5-9 cm wide and narrow at both ends. They have entire margins and 7-8 pairs of conspicuous veins. Petioles are 1-3 cm long and entire, D-shaped stipules persist between the petiole bases. Flowers are creamy white and are numerous and crowded in terminal corymbose cymes. They are very close together in bud, but the inflorescence expands during flowering and fruiting. Walmwasching fruits are globose berries about 5-6 mm in diameter that are green, maturing purplish-black. Each fruit contains about eight seeds.

*Tarenna sambucina* is one of 180 species of the old world (Africa-Asia) tropics and is indigenous to the Pacific island groups of Melanesia, Micronesia and southern Polynesia. It seems to grow best on clay soils at forest edges; usually young trees occur around older specimens. It can be propagated by seeds and perhaps by cuttings.

According to Safford (1905), Don Felipe de la Corte noted that this species was used in house construction; most trees today seem too small for such use. The fruits are probably suitable for wildlife food.

*Triphasia trifolia* (Burm. *f.*) P. Wils. Limeberry, Orange berry
Lemondichina

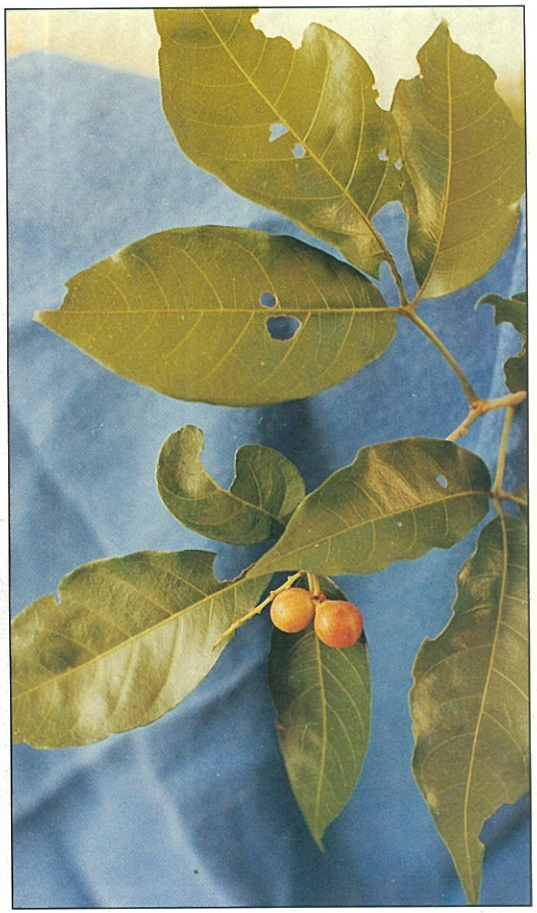
RUTACEAE **(WF)**

Lemondichina is a shrub or tree, often 2-3 m tall, but sometimes to 5-6 m. Trunks and branches bear straight, rigid, paired spines. The glossy, dark green, compound leaves have three leaflets; the middle leaflet is largest and all are slightly saw-toothed. The fragrant white flowers are tubular and have three petals. They occur 1-3 in leaf axils on 3-4 mm peduncles. The fruits are shaped like small grapes, are green maturing to wine-red, and contain one to three seeds. They are edible and have an oily, resinous citrus flavor that some say is like lemon and others say is like orange marmalade or Curacao liqueur.

*Triphasia trifolia* is one of three southeast Asian and Philippine species; its origin is unclear, but is probably southeast Asia or the Malay Peninsula. It is naturalized in the Mariana Islands. It can be propagated by seeds or by shoots sent up from the roots. It seems to prefer limestone soils over clay and grows in open sun or deep shade.

The wood is very hard and has been used for tool handles, coconut husking stakes and firewood. The rootstocks of lemondichina can be used for grafting other citrus trees. The fruits are a favorite of wildlife, particularly fruit doves, and are eaten by humans, raw or cooked and made into preserves. *Triphasia* is widely cultivated as a tropical hedge plant, and the thorns discourage trespassing!





*Allophylus ternatus* (Forst.) Radlk.

SAPINDACEAE **(WF)**

*Allophylus* is a tree to 8-10 m with pale trunk and branches. The alternate, compound leaves have three leaflets, each of which is elliptic, pointed at both ends and wavy-margined. The leaves are light green and not very glossy. Flowers are white and very tiny; they occur crowded on axillary stalks that are usually unbranched and shorter than the leaves. The flowers are either male or female (not both) but both sexes occur on the same stalk. Fruits are round, 8-10 mm in diameter and green maturing red. Each contains one seed.

*Allophylus ternatus* is one of the 175 distinct biological species that *Allophylus cobbe* (L.) Rausch. has been divided into; it is tropical but no definite origin is assigned. It is probably native to the Mariana Islands and occurs in forests on limestone soils. It can be propagated by seeds and perhaps by cuttings.

Members of the *Allophylus* complex are used as cultivated ornamentals. Some parts of the plant are found in local medicines and the wood of larger specimens is said to be useful. The fruits may be wildlife food.

*Allophylus timoriensis* (DC.) Bl.

Nger

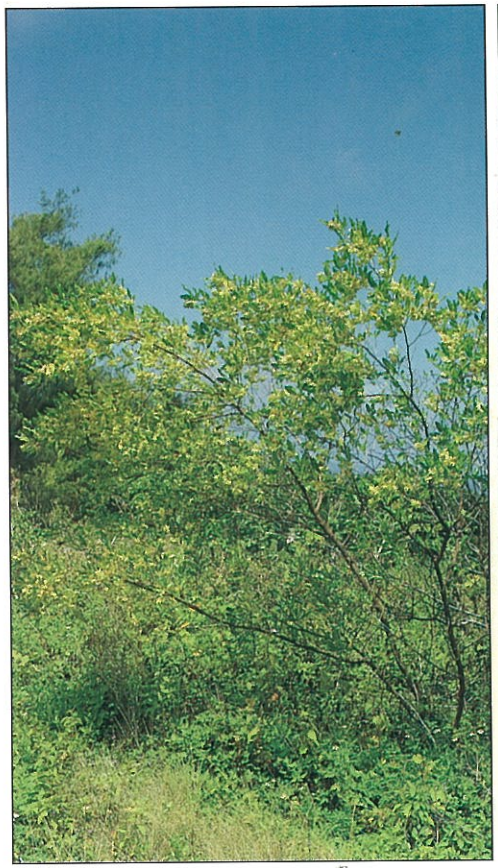
SAPINDACEAE **(WF)**

Nger is a shrub or small tree (to 4-5 m in sheltered sites) with pale bark and somewhat crowded branches. The alternate compound leaves have three leaflets; the central one is slightly larger than the two side leaflets. The leaves are borne on long petioles and the leaflets are elliptical, dull and have toothed margins. Flowers are tiny, whitish and either male or female (not both), but both sexes are found together in branching axillary spikes that have pedicels shorter than leaf petioles. Fruits are round, 4-6 mm in diameter, green ripening reddish or red-orange, and contain one seed each.

*Allophylus timoriensis* is one of the 175 distinct biological species that *Allophylus cobbe* (L.) Rausch. has been divided into; it is tropical but no definite origin is assigned. It is probably native to the Mariana Islands and occurs on limestone near the sea or on sea cliffs. It can be propagated by seeds and perhaps by cuttings in a suitable habitat.

Members of the *Allophylus* complex have been used for their wood or as cultivated ornamentals, and plant parts have been used medicinally. The fruits are probably wildlife food.





*Dodonaea viscosa* (L.) Jacq.

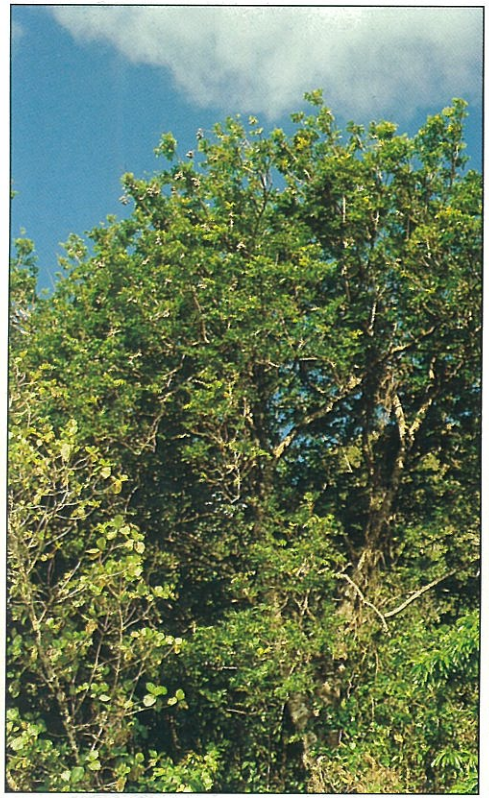
Lampauye

SAPINDACEAE

Lampuaye is a small to medium tree (to 6 m) with many wide-spreading, erect branches; its bark is longitudinally cracked and somewhat fissured. The simple, olive-green, linear-lanceolate leaves are 5-12 cm long and 1-3 cm wide. They taper greatly toward the very short (1-2 mm) petioles and are sticky with a shining resin coat. The small yellowish flowers occur in axillary panicles on long, slender, nodding pedicels. Fruits are broadly winged three-part capsules coated with resin. They are orange-brown and contain one or two black seeds per lobe.

*Dodonaea viscosa* is one of 50 species; all but two are found in the warm and tropical parts of Australia. This species is widely distributed in the tropics and is naturalized in the Mariana Islands. It grows on limestone and clay and occupies open sites and edges, which would be expected as it is wind pollinated. It can be propagated by seeds and probably by cuttings.

Its wood is said to be extremely hard; it also ignites easily and can be used for fuel. The leaves have fever-reducing properties and the winged fruits were used as a substitute for hops by the early settlers in Australia. The plants have been used as cultivated ornamentals and as hedges.



*Tristiropsis obtusangula*

Faniok, Fanog, Faia

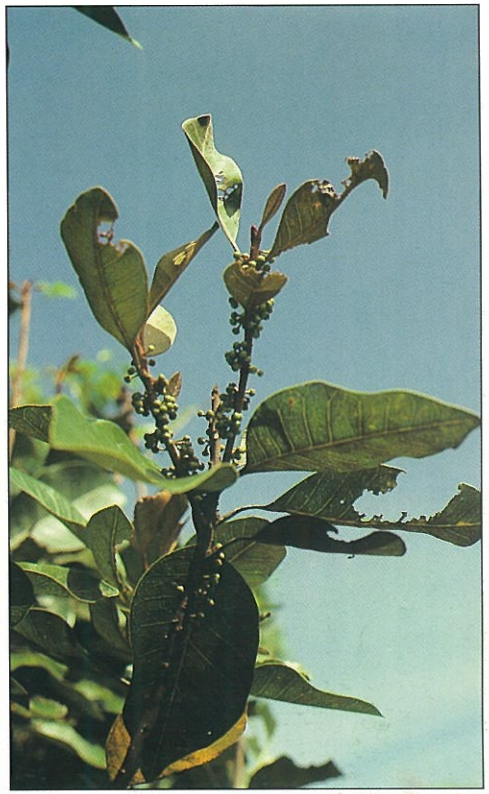
SAPINDACEAE

Faniok is a large tree (to 15-18 m) with upward arching branches and a rounded crown. The dark green, twice compound leaves have 2 to 9 subopposite pinnae and each pinna has 2-9 pairs of subopposite (or alternate) leaflets. The leaflets are variable in size, 3-9 cm long and 1.5-3 cm wide. They are asymmetric from the midvein, dark green on top and pale green below. Flowers are either male or female (not both) and are located on 12-15 cm long racemose-paniculate, terminal inflorescences. Fruits are woody, gray and pyramid-shaped with three (sometimes four) parts to the capsule, which can be 2.5-3 cm long and 2.5 cm wide at its widest near the tip.

*Tristiropsis obtusangula* is one of two or three species from central and western Malesia and the western Pacific and is indigenous to New Guinea, the Solomon Islands and the Marianas. It grows on limestone, tolerates shady forests and edges, and is one of the largest forest trees on the islands. It can be propagated by seeds or by transplanting seedlings from beneath parent trees.

The trees are large enough to be useful as wood for construction, but are uncommon even though they apparently survive typhoons in good order. The name "fanog" (faniok) is used on Saipan; the same name on Rota (and on Guam) refers to *Merrilliodendron* (which does not grow on Saipan), so "faia" is used on Rota and Guam.





*Pouteria obovata* (R. Br.) Baehni
(*Planchonella obovata* R. Br.)

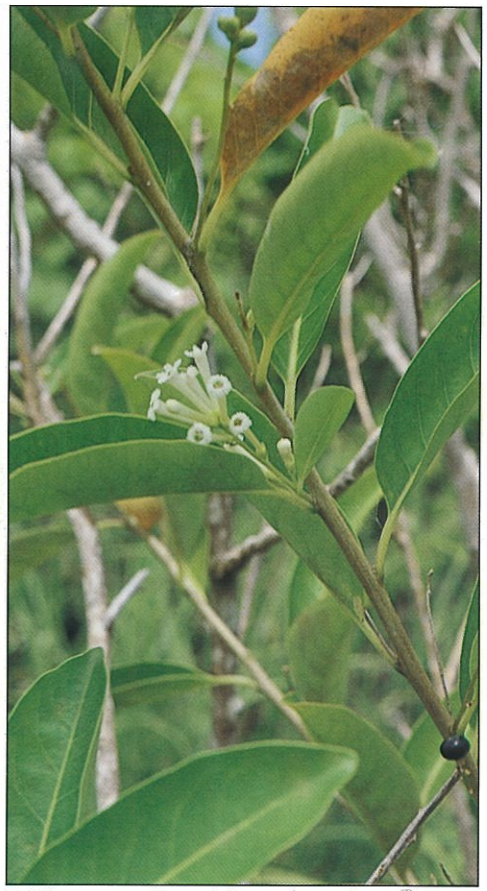
Lalaha, Lala

SAPOTACEAE **(WF)**

Lalaha can be a shrubby small tree or a tree to 15 m with branches not spreading very far from the trunk. The bark is dark brown, the inner bark is pink and young branches and leaves are rusty colored with fine hairs. The well-spaced, alternate, dark green leaves are extremely variable in shape and in size (5-20 cm long; 2-10 cm broad). Trees in open sites have small leaves with coppery-rusty undersides, while those in forests and shade have large elongated leaves that are not coppery or rusty below. The small (7 mm) whitish flowers are sometimes solitary but usually occur in tight clusters of 10 to 20 on short pedicels from woody branches. Fruits are oval to oblong and about 1 cm long, green maturing to a dark purple-black. Trees within a forest seldom flower or set fruit.

*Pouteria obovata* is one of about 50 tropical species of *Pouteria*, and is native from Malaysia to Pacific Islands, including Micronesia and Polynesia. It can be propagated by seeds, or perhaps by cuttings, and grows on limestone or clay soils. It is particularly abundant in the northern Mariana Islands (Guguan, Pagan, etc.) on volcanic soils.

The wood of *Pouteria* is white, brittle and coarse-grained; it has been used for charcoal. The fruits are wildlife food. The "open site", small, rusty, shrubby plants would be attractive ornamentals in open sites, especially on clay.



*Cestrum diurnum* L.

Inkberry, Day-blooming jasmine
Tinta'n-china

SOLANACEAE **(WF)**

Tinta'n-china is a many-branched smooth shrub that is usually short (1.5-2.5 m) but can be 3-4 m high with ascending round branches. The alternate, dull, medium green leaves are elliptic-oblong, 5-10 cm long and 3.5 cm broad. They have entire margins and short petioles. The white, tubular, 5-6 petaled flowers are nearly sessile and occur in cymose racemes on long peduncles that can be either terminal or axillary. The pea-sized globose berries are whitish-green maturing purple, fleshy and contain only a few seeds. Both the sap and the seeds may be poisonous; the poisonous elements are saponins and alkaloids, including nicotine.

*Cestrum diurnum* is one of 175 tropical American and Australian species. It is native to tropical America and the West Indies and was introduced into the Marianas in the late 1800's. It has escaped from cultivation and become naturalized on limestone and clay soils in open sites and along forest edges. It can be propagated by seeds and perhaps by cuttings.

The berries are important fruit for doves and other fruit eaters and birds have been important distributors for this species. The purple juice of the fruits is suitable for ink.



*Heritiera littoralis* Dry.

Looking-glass tree
Ufa, Hufa

STERCULIACEAE

Ufa is a medium sized tree (to 12-15 m) with a dark, usually broadly buttressed trunk and heavy dark, slightly ascending branches. The alternate, oblong-elliptic leaves are large, though variable (9-30 cm long by 6-9 cm wide), oval or oblong, with short (3 cm or less) petioles. The upper leaf surface is green or dark green, but the lower surface is coated with pale, silvery, individual scales and mid and lateral veins are conspicuous. Flowers are small, yellowish-tan and either male or female. They are borne in branched, loose, axillary panicles that are shorter than the leaves. The woody brown fruits are podlike, slightly larger than a Brazil nut (5-7.5 cm long), boat-shaped, and bear a keel that is 7.5-8.5 mm high and prolonged at one end into a short wing; they can float.

*Heritiera littoralis* is one of 30 species native from Africa through the Indomalaysian region to the Pacific and south to Australia. It is indigenous to Pacific islands north to south Asia and the Ryukyu Islands. It is an estuarine species and can be found along the coast, on tidal creeks and near mangrove swamps. It can be grown from seeds and will grow if planted in many habitats, including limestone. However, because the seeds are distributed by water, it will not be found naturally in sites away from sea water.

Ufa wood is reddish in color, durable, strong, tough, siliceous and hard to work. It provides timber for shipbuilding (including masts for dhows in east Africa), for wheelspokes and plows. The bark has medicinal properties.

*Heritiera longipetiolata* Kaneh.

Ufa-halomtano

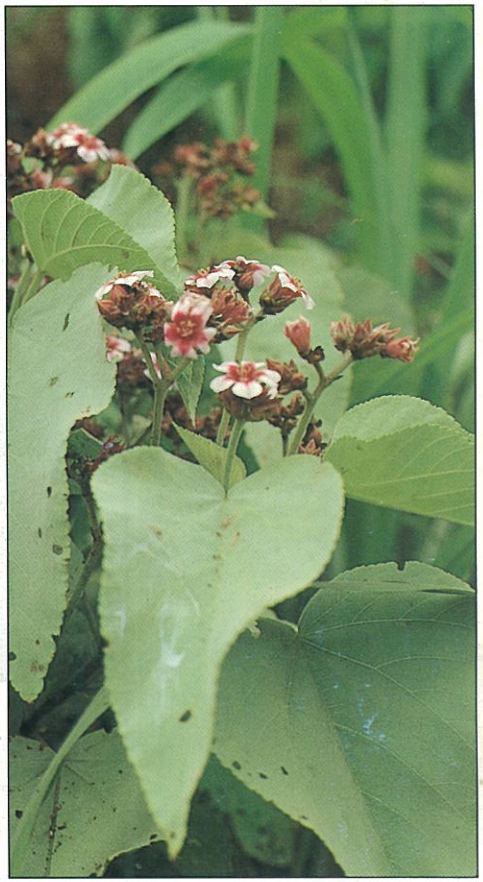
STERCULIACEAE

Ufa-halomtano is a medium sized tree, generally short, stout, and with a trunk that is often twisted. The alternate ovate-oblong leaves are large (15-30 cm long and 8-15 cm wide) and borne on long petioles (4-8 cm) that are abruptly enlarged at the base of the leaf blade. The upper leaf surface is dark green and slightly glossy with paler midrib and lateral veins. The lower surface is silvery-tawny with color scales, and the leaf margins are entire. The yellow-tan flowers are borne in branched, open, axillary panicles that are shorter than the leaves. The fruits are brown, woody and about the size of a Brazil nut, with thick walls (6-7 mm) and a keel about 5 mm high with no wing.

*Heritiera longipetiolata* is one of 30 Africa, Indomalay and Australian species, and is found only in the Mariana Islands. It can be propagated by seeds, but is never found in riverine or coastal strands. Instead, it occurs in crevices of rough limestone, especially on cliffs. Specimens that are sheltered can become somewhat tall, but trees are often wind-stunted and twisted.

Because it is limited to Saipan, Tinian, Rota and Guam, this is considered "rare and endangered" on Guam, but is not yet included in the international registry of rare and endangered species.





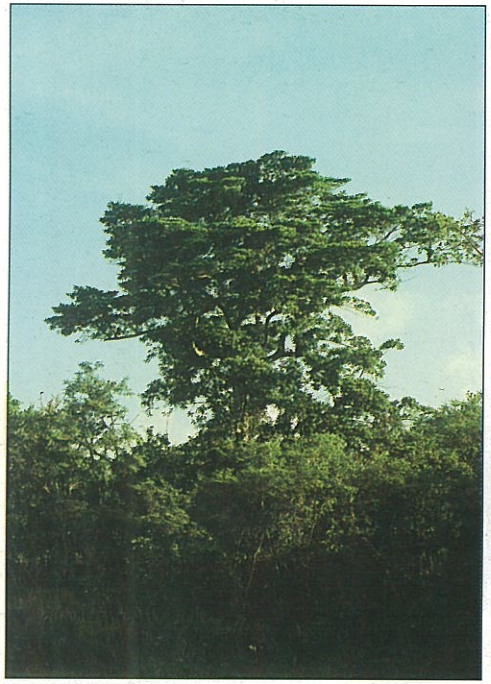
*Melochia villosissima* var. *compacta* (Hochr.) Fosb.
(*Melochia compacta* Hochr.)

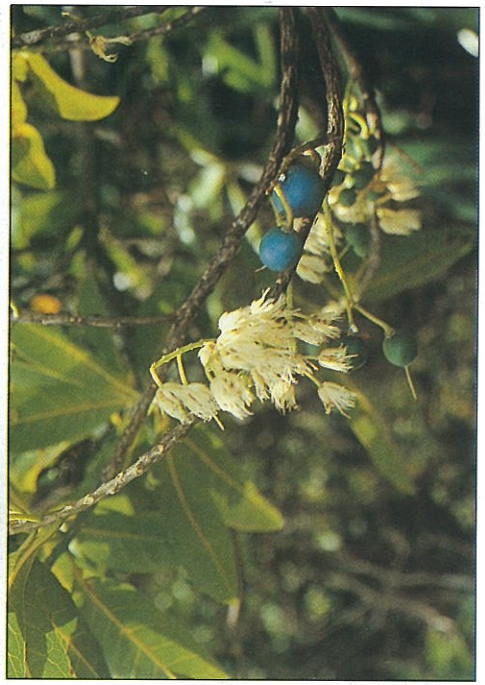
Sayafe'
Ghóssutil

STERCULIACEAE

Sayafe' is a large, tree-like shrub that is usually 1-2 m tall but can be to 4-5 m tall in forest sites. It has soft wood that is light gray to reddish brown, spreading branches and crown, and short downy hairs almost everywhere. The fairly large (5-15 cm long by 3-10 cm broad), soft and fuzzy heart-shaped leaves have three major veins and finely toothed margins. They are carried on moderately long (1-3 cm) fuzzy petioles. Numerous flowers with white-to-pink petals splotched at their bases with maroon are crowded onto spreading cymose panicles that extend from upper leaf axils on very long (to 40 cm) peduncles. Ghóssutil fruits are woody, hairy, egg-shaped capsules with five chambers. Seeds are 3.5 mm and rounded.

*Melochia villosissima* is one of 54 tropical species that are most numerous in the new world (American) tropics; this species is native to tropical Asia. It can be propagated by seeds and perhaps by cuttings and grows in open areas and fields and at forest edges. The listed variety grows primarily on limestone and might make a nice ornamental shrub if properly pruned. Another variety, *M. villosissima* var. *villosissima*, grows on clay soils and is densely covered with soft hairs.





*Elaeocarpus joga* Merr.
(*Elaeocarpus sphericus* Stone)
TILIACEAE (ELAEOCARPACEAE) **(WF)**

Yoga, Joga
Ghumar

Yoga is a large tree with a spreading crown, but is often pruned by storms so that it seldom attains a height of 15-16 m. The trunk is smooth, dark and often buttressed; the branches are reddish to gray, rounded in tiers and hold their leaves parallel to the ground. The small (5-12 cm long and 1.5-3.5 cm wide) shiny green leaves are crowded at branch ends on short (5-14 mm) petioles. They have finely toothed margins, 8-10 pairs of conspicuous veins and a midvein, and they turn red before falling. The white, feathery flowers develop on axillary racemes in clusters of 12-16 but by the time they mature, the leaves have fallen. Almost all flowers develop on one tree at one time and finish in 6-7 days. The fruits are spherical, marble-sized (15 mm in diameter) and blue. The blue color results from light refraction and there is no blue pigment involved.

*Elaeocarpus joga* is one of about 350 species in the tropics and subtropics of the "old world" (excluding Africa). It is indigenous to the Mariana Islands and Palau (western Caroline Islands) and grows on limestone in open areas or in forests. It is common on the sabana and upper plateaus of Rota. Many seeds are produced each year, but they do not sprout when planted. Because they are a favored bird food, especially for pigeon-sized birds such as fruit doves or white-headed doves, it is likely that passage through the digestive system of such birds in necessary for seed viability.

Ghumar wood is not very durable, though it has been used to make oars. The entire tree is quite handsome; it holds epiphytes such as ferns and orchids and should be used for afforestation or as an ornamental in parks and gardens.



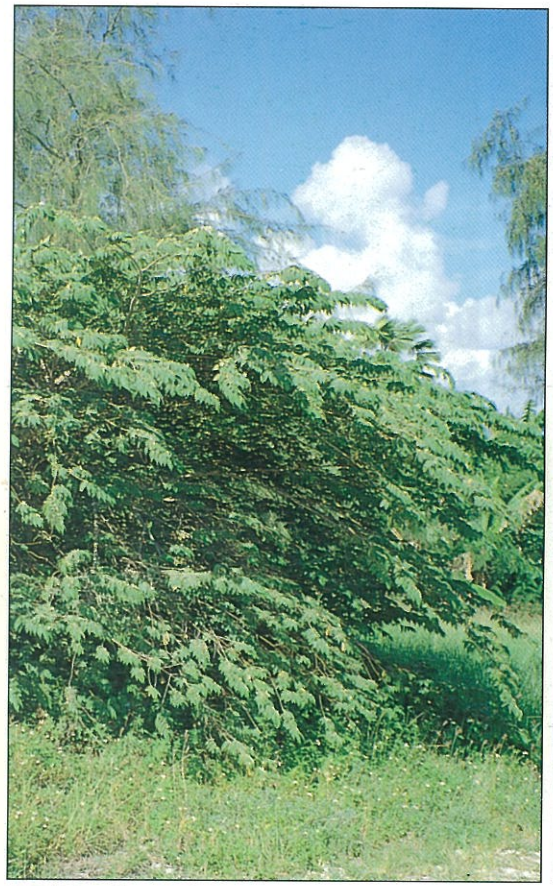
*Grewia crenata* (Forst.) Schinz & Guill.

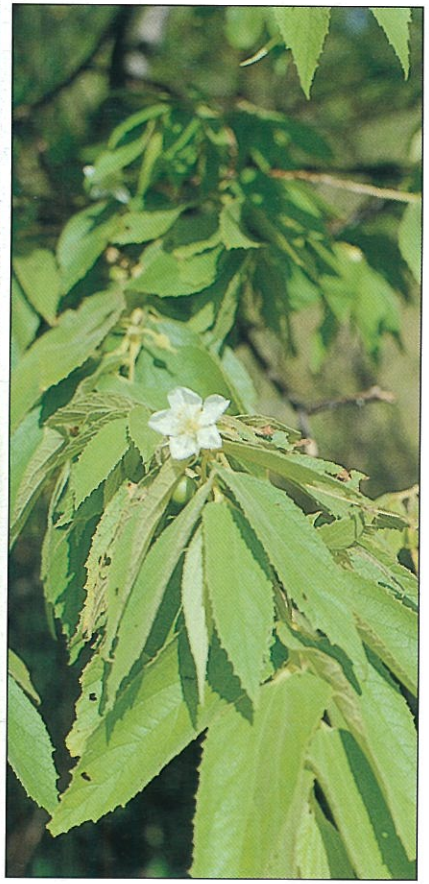
Angilao, Anilao

TILIACEAE **(WF)**

Angilao is a small tree with slender, round brownish branches that spread outward from the trunk. The alternate, two-ranked, lanceolate leaves are variable in shape and size (10-15 cm long by 4.5-8 cm broad). They are basally three-veined, slightly asymmetrical, and have crinkled-sawtooth margins. The dull white flowers are borne in sets of three on fuzzy, axillary peduncles that are about half as long as the leaves; the petals are half as long as the sepals. Fruits are fleshy purplish drupes the size of a small pea (1 cm diameter); each contains one seed.

*Grewia crenata* is one of about 150 species in warm areas of the old world (Africa, Asia, etc.). This species is indigenous to Micronesia and Polynesia (Tonga, Fiji, Samoa and the Society Islands) and grows on limestone soil at forest edges. It can probably be propagated by the seeds/fruits, which are likely wildlife food.





*Muntingia calabura* L.

Panama cherry
Mansanita, Manzanilla

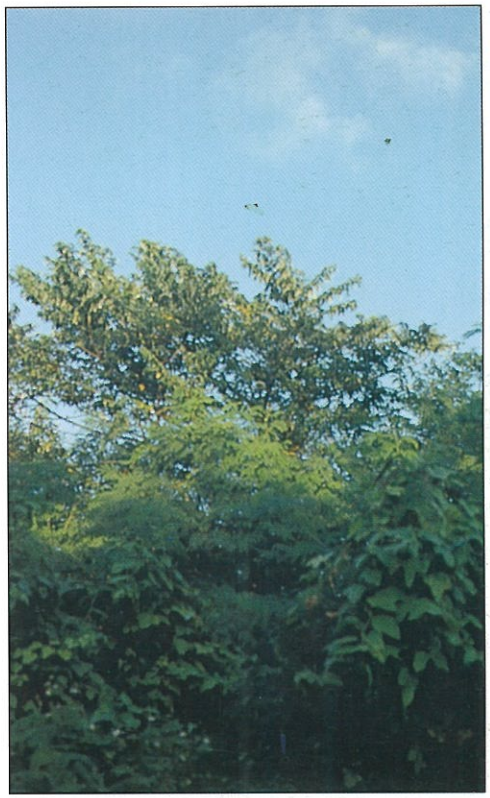
TILIACEAE **(WF)**

Mansanita is a small tree (to 4-5 m) with slightly drooping tiered branches that spread into a dome-shaped crown. The numerous alternate simple leaves are carried in two ranks parallel to the ground. They are soft, somewhat sticky, asymmetrical and have toothed margins. The white flowers are borne singly on 2-3 cm long axillary pedicels and have many stamens. Fruits are light red, fleshy and grape-like. They are sweet and juicy and contain many grayish-yellow seeds.

*Muntingia calabura* is the only species in the genus and is native to tropical central America. It has been introduced to and naturalized in the Marianas. It can be propagated by seeds and probably by cuttings, and seems to thrive on limestone soils in open fields, forest edges, on roadsides and in gardens.

The wood can be used for firewood, and the bark is fibrous, tough and suitable for cordage. A tea-like drink can be made from mansanita leaves, and the fruits are eaten raw by birds, bats and people. Cooked fruit can be made into jam or preserves. The small trees are fast-growing and make shading ornamentals, but typhoon winds easily uproot them.





*Trema orientalis* (L.) Bl.

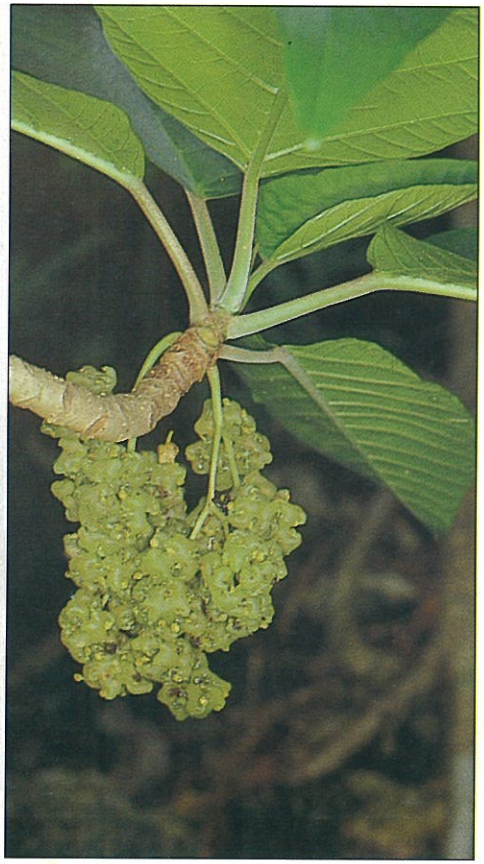
ULMACEAE

Tal amama

Tal amama is a small to medium sized tree (6-8 m tall) with shrubby, downward arching branches and red brown to grayish rather smooth bark. The asymmetrical leaves are about 10 cm long and 5 cm wide, toothed, ovate-lanceolate and have three main veins from the somewhat heart-shaped base. The leaves alternate and line up in one plane on either side of branches. There are two distinct varieties in the Marianas: *T. orientalis* var. *argentea* (Pl.) Laut., which has silky-silvery leaf undersides; and *T. orientalis* var. *viridis* Laut. which has leaves that are bright green on both top and undersides. Flowers for both varieties are greenish, small and occur in clusters (cymes) in leaf axils on short pedicels. Fruits are globose drupes about 4 mm in diameter that bear the two persistent stigmas at their tips.

This species is native from southern Japan and China west to Malaysia and India and east to islands of the Pacific. Both varieties occur on clay and limestone soils. In the Marianas, the silvery variety (*argentea*) is more common than the green (*viridis*) and is more abundant on the volcanic northern islands (Anatahan, Guguan, etc.) than on the limestone southern islands. Both varieties can be propagated by seeds and cuttings.

The wood is used for tanning fish nets (in west Africa and elsewhere) and for charcoal. Suruhanas use parts of *T. orientalis* var. *argentea* as ingredients in local herbal medicines.



*Dendrocnide latifolia* (Gaud.) Chew

URTICACEAE **(WF)**

*Dendrocnide* is a small to medium sized tree (to 10 m) with gray bark and somewhat massive branches. Some trees are male and bear only male flowers, female trees bear female flowers and fruits. The light green leaves are elliptical, 15-30 cm long and 5-15 cm wide, with wavy margins and 8-13 pairs of conspicuous lateral veins. Leaves are crowded on branch ends, are not hairy or fuzzy, and have petioles 5-10 cm long. The unisexual flowers have four parts and are carried on branched axillary racemes that may be 15 cm long. Female flowers have 4-lobed perianths and irritant hairs; male flowers do not. Fruits are flat, smooth, tiny (2.2 X 2 cm) achenes that remain on the persistent perianth, which looks gelatinous.

*Dendrocnide latifolia* is one of 30 Indomalay and Pacific species. It is native to New Caledonia, Vanuatu and the Mariana, Caroline, Solomon and Loyalty Islands. Most species of this genus have stinging hairs, but only the female flowers have irritating hairs in this local species, which is a component of forests on limestone. It can be propagated by seeds or by cuttings.

The wood is weak and generally useless; the fruits may be wildlife food.



*Pipturus argenteus* (Forst. *f.*) Wedd.

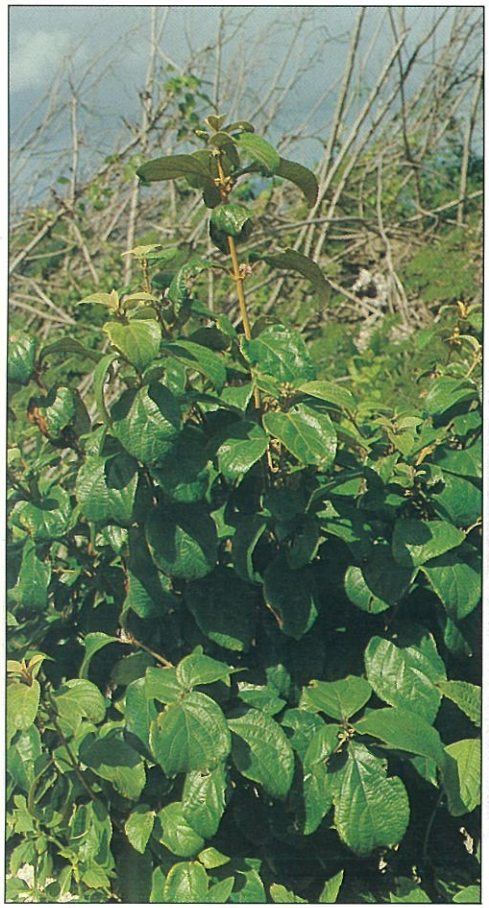
Silvery Pipturus
Amahadyan, Atmahayan
Ghasooso

URTICACEAE

Amahadyan is a small tree to 5-6 m with reddish brown branches and a dome-shaped crown. The ovate-acuminate leaves are of two sizes, the larger are about 15 cm long and 8 cm wide. They are light green above and silvery gray below, with three conspicuous veins and coarsely toothed margins. Petioles are of two different sizes, and they alternate on branches, as do the leaf sizes. The tiny flowers, which lack petals, grow in axillary clusters or on interrupted axillary spikes. Each flower is either male or female (not both), but both sexes occur in one axillary cluster. Ghasooso fruits are nutlike achenes that are closely surrounded by the roundish, white-gelatinous flower remains.

*Pipturus argenteus* is one of 40 species that are native between the Mascarene Islands and Polynesia. It is indigenous from Malaysia through Micronesia and Polynesia (including Hawaii), south to Australia. It can be propagated by seeds or by cuttings, and grows on beaches or in open sites on limestone, or along edges.

The inner bark provides fibers of fine texture and great strength, but they are difficult to prepare. In Samoa, these fibers are used to make red, shaggy rug-like mats, nets and fishing lines. Some bark is used to make a brown dye, and some can be used to make bark-cloth.



*Callicarpa candicans* (Burm. *f.*) Hochr.

Hamlag
Lighitar, Atiyat

VERBENACEAE

Hamlag is a sprawling woody shrub with dense, pale hairs. Its opposite, oblong or ovate leaves are 7-12 cm long and 3-6.5 cm wide, medium green above and silvery beneath. Petioles are short (10-15 mm) and the five pairs of lateral veins are conspicuous. Flowers are small and light purple or mauve; they occur in short many-flowered cymes that cluster around stems in leaf axils. Lighitar fruits are about the size of BB's (2-4 mm diameter) and subglobose. They form green, then turn red and finally mature a dark magenta purple.

*Callicarpa candicans* is one of 140 tropical and subtropical species of *Callicarpa*. It is part of a taxonomic complex native between south Asia and the eastern Caroline Islands. *C. candicans* var. *paucinervia* (Merr.) Fosb. is probably endemic to the Mariana Islands, and grows on beaches and on limestone in open or edge areas. It can be propagated by seeds and probably by cuttings.

This plant could make an attractive border plant, with its pink-purple flowers and deep purple fruits. The leaves are a common ingredient of medicinal combinations of local curers.



*Lantana camara* L.

Lantana, Shrub verbena
Lantana

VERBENACEAE **(WF)**

Lantana is a sprawling shrub with squared, rambling branches. Some varieties have thorns on the stems and branches; others lack thorns. The coarse, opposite, ovate leaves are 4-8 cm long and 2-5.5 cm wide. They are stiffly papery and their margins are toothed. Petioles are 1-3 cm long and the leaves, when crushed, give off a distinctive spicy-pungent odor. The small, colorful flowers grow in flat, headlike or corymbose spikes; the heads form a "bullseye" pattern, with outer flowers opening first. Because the petals change color (either as the flowers age or after they are pollinated) from yellow to orange to red, the flower head will have a yellow center and a red margin. Fruits are green berries (which are poisonous) that mature to a purple-black, non-poisonous fruit containing seeds.

*Lantana camara* is one of about 150 tropical species; it is native to tropical America and has become naturalized in many of the Mariana Islands. It grows in open areas and along edges on limestone and on clay, and is propagated by seeds. In the U.S., Hawaii and in New Caledonia, it is labelled an aggressive and obnoxious weed and it is a problem on Aguiguan Island and in some pastures on Saipan and Tinian where it is quite thorny and unpleasant. The fruits are eaten -and dispersed - by wildlife.

*Premna obtusifolia* R. Br.

VERBENACEAE

False elder
Ahgao
Yóór

Ahgao is a small to medium sized tree (to 10 m) with white-tan bark and ascending branches with prominent lenticels on new growth. The broadly ovate, entire, opposite, thin leaves have a pointed tip and are somewhat glossy. They are moderately large (6-12 cm long and 4-8 cm wide) and have 4 to 7 pairs of conpicuous lateral veins and long (1-3 cm) petioles. The leaves typically have holes and galls (tumors) that may cover most of their sufaces. The tiny whitish-green flowers are crowded into much-branched, flat topped inflorescences (corymbs) near branch tips. Fruits are small (3 mm) and globular, and are green maturing to purple-black.

*Premna obtusifolia* is one of 200 species native to warm and tropical areas of the "old world" (Africa-Asia-India) and is found from Malaysia to islands of the Pacific, including the Marianas. It can be propagated by seeds and cuttings, and is a forest edge species that easily inhabits disturbed pastures on limestone. It also occurs near the beach.

Yóór wood is hard and durable and larger logs are much used in construction, but the wood is often knotty and crooked. The bark, steeped in water, is used as a remedy for neuralgia, and the leaves are boiled into tea which is used as a medicine to relieve muscle pains, especially backaches. Branches are often cut for cattle forage during times when grass is limited.



*Vitex negundo* var. *bicolor* (Wild.) Lam.
(*Vitex incisa* Lam.)

VERBENACEAE

Agalondi
Schåll

Lagundi is a shrub or very small tree that has fine hairs and 4-cornered erect branches. The palmately compound leaves have 3 or 5 linear-lanceolate leaflets; the two lowest leaflets are smaller and almost unstalked while the others have 7.5-10 cm "petioles". Leaflets have entire margins and the upper surface is green while the lower surface is white or silvery. They are pleasantly aromatic when crumpled. The small, lilac-blue flowers are carried on very short pedicels in crowded terminal paniculate cymes. Schåll fruits are nearly globular black drupes less than 6 mm in diameter; each contains one seed.

*Vitex negundo* is one of 250 species that occur world-wide in both tropical and temperate regions. This species is an Indomalayan-Pacific species native to the Marianas. It occurs along beaches and on rocks near the sea and can be propagated by seeds or cuttings.

Leaves and roots are used medicinally as tonic ingredients. In India, pillows are stuffed with the leaves which are said to relieve headaches.

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## GLOSSARY

**achene** - a single-seeded dry fruit not opening at maturity, with separate seed coat and pericarp

**anastomose** - join together to form a network, as leaf veins (or roads on a map)

**anther** - pollen-bearing region of a male flower part (stamen)

**argillaceous** - limestone rock with much clay in it; produced when reef materials are found in areas where volcanic materials wash onto them, and then are uplifted and become rock

**aril** - a partial covering around a seed, often colored

**auricle** - flap or ear

**axil** - interior angle formed by a stem and petiole or pedicel coming from it

**backstrand** - the tree/shrub-shaded area behind a beach (strand); may be rocky or sandy

**bipinnate** - refers to a leaf that is twice-pinnately compound

**bract** - a tiny leaf usually associated with a flower or group of flowers

**calyx** - the group of sepals

**capsule** - a dry fruit that opens to release seeds

**catkin** - a hanging group of small flowers that usually lack petals and have bracts

**corolla** - the group of petals

**corymb** - a flat- or round-topped flower cluster in which flowers are on pedicels of different lengths

**crenulate** - with a wavy margin, as a leaf

**cyme** - a cluster of flowers in which the oldest (first opening) are in the center or at the top

**D-shaped** - deltoid, or triangular

**dichotomous** - diverging by pairs, forked

**dimorphic** - to have two shapes or forms or sizes

**drupe** - a fleshy fruit that does not split open; its single seed is surrounded by a stony pericarp

**endemic** - found only in the designated place

**endosperm** - the food material within a seed or fruit

**epiphyte** - something, usually another plant, that uses a plant for support, but does not feed on the plant or damage it

**exotic** - not native in the site and not reproducing on its own

**fascicle** - a tight bundle or cluster

**frond** - leaf of a fern or palm

**fruit** - the mature ovary containing seeds and surrounding material; it may include a rind, food material, etc.

**gamete** - a sex cell; egg cell or sperm cell

**gametophyte** - the plant or part of the plant that produces gametes

**globose** - spherical; round like an orange

**halophyte** - a plant that tolerates high salt concentrations

**herb** - a non-woody plant

**indigenous** - native to a place or habitat

**inflorescence** - the arrangement of flowers into a group

**lamina** - leaf blade; flat, extended part of a leaf

**lanceolate** - shape, usually of a leaf; widest in the middle, tapering toward both ends

**lenticel** - opening, usually in a stem or branch that permits oxygen and carbon dioxide to enter or leave

**loment** - a fruit with definite constrictions between the seeds; a special kind of legume

**Malesia** - that area encompassing Malaysia and Indonesia

**mangrove** - either a community where freshwater and salt water mix, or a plant that inhabits such a swamp

**marsh** - a water community dominated by herbaceous vegetation

**midvein** - the major, middle vein of a leaf; sometimes the midrib



**mycorrhizae** - a special fungus that lives in plant roots and extends into the soil; improves survival for the plant

**naturalized** - process by which a non-native species adjusts to a new place well enough to survive and reproduce and make the new place its home

**nut** - a one-seeded fruit that is dry, hard and does not split open at maturity

**obovate** - an inverted egg-shape

**ovule** - egg; if fertilized, it will become a seed

**paleotropical** - tropical regions of the "old world": Africa, India, Asia, Indonesia, etc.

**palmate** - lobed or divided in the pattern of a hand

**panicle** - a raceme with many branches and a flower at the end of each

**pantropical** - found in all tropical regions

**pedicel** - the stalk that supports one flower

**peltate** - refers to an umbrella-like leaf; the stalk attaches to the middle (or off-center); not the edge

**pericarp** - the wall of a fruit; it sometimes has layers

**petal** - a colored, leaf-like part of a flower

**petiole** - the stalk of a leaf

**phloem** - conducting tubes that transport plant food

**photosynthesis** - the process by which plants make food using the energy of sunlight

**phyllode** - a petiole that is enlarged and flattened like the blade of a leaf

**pinna** - one leaflet of a compound leaf

**pinnate** - with leaflets arranged along both sides of a common axis

**pinnatifid** - with deep lobes along both sides of a common axis - like a mid rib - but no leaflets

**pistil** - female portion of a flower; includes stigma, style and ovary

**pneumatophores** - special breathing devices on the roots or trunks of plants that live partly covered by water, such as mangrove species

**pollen** - tiny, usually round structures that contain male gametes and are produced on anthers

**pubescent** - downy and fuzzy, with short hairs

**punky** - wood that lacks structure, is light and soft, and cannot be made into boards, ie. palm wood

**purgative** - a substance, usually medicinal and made from plants, that is taken to clear the digestive tract and/or induce vomiting

**raceme** - an elongated cluster of flowers on pedicels that start flowering from the bottom of the cluster

**rachis** - the axis of a flower cluster, pedicels of flowers attach to it

**radicle** - the embryonic root of a germinating seed; conspicuous in some mangrove species

**rhizome** - a prostrate stem, often underground; may look like a root but has stems and leaves coming from it

**rosette** - an arrangement in which parts of a plant (leaves, flowers, etc.) extend in a circular pattern from a central area

**sabana** - refers to the upper limestone surrounding a small exposed volcanic area on Rota

**savanna** - a vegetation community that consists of grassy plants and a few trees

**seed** - a reproductive structure consisting of an embryo, some food material and an outside coat; an early sporophyte stage

**sepal** - the outside part of a flower, usually green and leaf-like or bract-like; one part of a calyx

**shrub** - a woody plant that has several trunks or stalks and is usually shorter than a tree

**sporophyte** - the plant, plant part or stage of a plant life cycle that produces spores

**stamen** - the male portion of the flower; consists of an anther and a filament



**stellate** - star-shaped

**stipe** - the petiole of a frond; can be the stalk of the pistil

**stipule** - structures (usually two) at the base of a petiole; considered to be a part of a leaf (blade, petiole, stipules)

**strand** - community of sandy beaches; contains plants and animals that tolerate high winds and sunlight intensity, salt spray and a lack of freshwater

**subglobose** - basically spherical (round), but flattened in one or more areas

**substrate** - the underlying material, as in "clay (and volcanic rock) is the substrate of island savannas"

**subtropics** - region between the temperate zone and the tropics, characterized by warm weather most of the year

**swamp** - a wetland dominated by woody vegetation, such as a mangrove swamp

**tannin** - a weak acid that can be produced by soaking some kinds of wood and/or leaves in water; tea-colored; used as a preservative for animal skins (lengthens useful life and prevents fur/hair loss)

**tree** - a woody plant that has a single trunk and is usually taller than a shrub

**tropics** - warm areas of the earth near the equator; technically 30 of latitude north and south of the equator

**umbel** - a cluster of flowers that is usually flat-topped; the flower pedicels usually extend from a common point, and may branch; the outside flowers bloom first

**understory** - refers to plants (usually woody) that are short, tolerate shade and reach maturity under taller forest plants

**valvate** - meeting by the edges without overlapping; having valves

**vine** - a woody or herbaceous plant with a long, flexible stem (trunk? branch?) bearing leaves that are usually widely separate; lies on the ground or uses other plants for support

**xerophyte** - a plant that is tolerant of dry places, including exposed sand or rock

**xylem** - plant conducting tubes that carry water from the soil to all parts of the plant

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