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Trees of Yap: A Field Guide

Marjorie V. Cushing Falanruw

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Cover photograph: *Serianthes kanehirae* var. *yapensis*, a tree endemic to Yap; known as "gumor" in Yapese. Photo by the author. All photos in this publication are by the author except as noted.

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Abstract

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Descriptions, drawings, and photographs are presented for trees found on the Yap Islands in the Federated States of Micronesia. Included are all recorded native trees and most introduced trees as well as new records of native and introduced trees. Additional information is provided on tree distribution, status, vernacular names in Micronesia, and English names when available, along with comments on the species and their uses. An index includes scientific names and their synonyms, including taxonomic updates, families, and vernacular and other common names to assist users in locating tree descriptions.

Keywords: Trees, Yap Islands, Micronesia, field guide.

Preface

There are no recent, comprehensive guides to the flora of Yap or of Micronesia as a whole, and information on Yap's trees is scattered and often out of date. At the same time, growing threats to Yap's trees make it increasingly urgent to learn more about the status of Yap's forest resources. This field guide assists with tree identification and classification, and should be helpful both to people who live and work with Yap's trees and seek a way to communicate information for the next generation, and to visitors to Yap.

This project was initiated to assist with forest inventory work in Yap by a team of U.S. Forest Service Forest Inventory and Analysis personnel and their counterparts in the Yap Division of Agriculture and Forestry. It is designed to be used as a field guide to assist people of different backgrounds with the identification of Yap's trees. For a description and map of vegetation types found on Yap, see Falanruw et al. (1987).

Using This Guide

Whitmore (1966) defined a tree as a woody plant with an erect perennial trunk at least 7.5 cm (3 in) in diameter at breast height, 1.4 m (about 4.5 ft), a definitely formed crown of foliage, and a height of at least 4 m (13 ft). This definition leaves out large plants such as bananas and bamboo. Some species included in this guide might not quite meet these size criteria but are included because of the average small stature of Yap's trees in general.

In this guide, each tree species or genus treatment is presented on a two-page spread that provides the following:

- The scientific name of the tree (genus, species, and authorities).
- Synonyms: other scientific names that have been applied to this tree (where appropriate).
- Its family and current status (native, endemic, or introduced).
- English and local names for the tree if known.
- Habitat, description of the tree in general, and characteristics of its leaves, flowers (or inflorescence), and fruit.

- Distribution of the tree in Micronesia and elsewhere (its distribution outside of Micronesia may not be a complete accounting).
- Comments: additional explanation and bits of information that may be of interest.

Species are arranged alphabetically by families, beginning with nonflowering plants, followed by flowering plants beginning with monocots (plants with one seed leaf and flower parts in 3s and 6s), and continuing with dicots (plants with two seed leaves and flower parts in 4s and 5s). This arrangement groups related species and also provides the value of beginning with some easily recognized groups: the cycad (a gymnosperm), palm trees, and *Pandanus* (monocots). The arrangement also allowed the guide to begin with Yap's ancient cycad, *Cycas micronesica*, a fitting choice given Yap's customary respect for elders. Throughout the guide, tree descriptions are organized alphabetically by family name, then alphabetically by genus and species within each family. Also included is an index that includes all families, species, synonyms, and Yapese or other common names so that trees can be located using any of these categories.

Recent advances in plant taxonomy have resulted in some changes in scientific names as well as realignment of some plant genera and families. To avoid confusion for those accustomed to names currently in use, trees described in this guide are arranged alphabetically by family names that are most widely used by local natural resource professionals in Micronesia, and which appear in the pertinent scientific literature (Fosberg et al. 1979, 1982, 1987) and Mabberley (1987). Other alternative family names are enclosed in parentheses. New names and realignments, largely from the third edition of Mabberly (2008), which will eventually become more familiar, are also presented in a checklist (page 257) and are included in the index. For species that are included in the U.S. Department of Agriculture PLANTS database (http://plants.usda.gov), the names and authors in that publication are followed. Descriptions are given for some of the more distinctive families with many genera, and species in some genera with more than three species, such as *Ficus* and *Citrus*, are treated together.

The determination of whether to indicate a species as **introduced**, **native**, or **endemic** draws on Fosberg et al. (op. cit.) and on Costion and Lorence (2012). The section on conservation of Yap's trees discusses Yap trees that are endemic to Yap alone ("only on Yap trees"), endemic to Yap and only one or a few other islands, or endemic to Micronesia.

Most of the photographs were taken by the author. The names of other contributors are appended to each photo. Where possible, space has been left at the end of species descriptions for field notes.

Caveats

Our knowledge of Yap's trees is not complete. The future will bring additions and revisions to the species covered here. This guide covers all native species recorded from Yap, most of the common introduced species, and some new records of both. Not all introduced trees are included, however, because new species are continually being introduced and the focus of this guide is on native and naturalized trees. For some genera, such as *Psychotria*, which are not well understood, and *Citrus*, which is cultivated and contains many species and varieties, a number of species are treated together. Readers may note that some of the photographed trees still exhibit their "typhoon architecture," with new growth located close to main stems rather than on fully extended branches, reflecting that the first draft of this guide was prepared shortly after Typhoon Sudal, in 2004, had extensively damaged Yap's trees.

As a field guide, this report is not intended to serve as a formal botanical tree flora of Yap. Common language has often been substituted for more technical terms, and descriptions emphasize vegetative parts that can more often be seen in the forest. At the same time, many botanical terms are included and a glossary of botanical terms is provided. To describe trees using common language throughout would have made the descriptions much longer, and Yapese and botanists do not necessarily use the same characterizations. Realistically, most local users will probably make most use of the photographs. With apologies to trained botanists for this mode of presentation, I invite non-botanists

to become familiar with at least some of the botanical terms, because it may help us better communicate our knowledge of trees.

To produce a field guide with as many species as this in a relatively short time, I used a variety of sources, such as Smith (1979, 1991) and others cited in the reference section. In some cases, when it was the only source available, I used portions of descriptions provided by Kanehira (1932, 1935), as it seems important to make these descriptions available so that we can continue to refine our knowledge. Time did not allow checking all descriptions and measurements in the field, but we had to start somewhere. I invite users of the guide to let me know about any discrepancies so that we can improve the guide for future editions.

Most local names included in the guide are gathered from the literature, such as the compilation by Falanruw et al. (1990) with Carolinian names coming from Raulerson and Rinehart (1991). As there is no official orthography for Yapese, diacritical marks such as glottal stops have generally been omitted. I realize that many of the local names may be considered to be misspelled. I felt that rather than not including local names of uncertain spelling, it was better to include what was available, so that users of the guide can contribute corrections and additions. This is a rather urgent matter, because names not recorded and corrected are likely to be forgotten by the current generation and lost to the next. Comments on Yap's trees have been included for clarification or to be of interest to the reader. Many bits of information from Yap were known to me while others were drawn from sources listed in the references. As noted, this is a field guide, not an ethnobotanical work; a more extensive and properly documented ethnobotany is anticipated to be published in the future. We invite our readers to take part in this project by contributing local names and reporting trees, especially "real Yap trees" that are not covered in this guide.

Conservation of Yap's Trees and Forests

There is need for improved stewardship of Yap's trees and forests. Yap has the lowest percentage of terrestrial native forest in the Federated States of Micronesia, with much of the original native forest converted

to agroforest and a large proportion of the island covered by secondary vegetation and savanna (*teid* in Yapese). The limited remnants of native forest face many threats including land moving operations, logging, agricultural clearing, wildfires, and typhoons. In 2004, Typhoon Sudal killed or more generally damaged many trees. In the wake of the typhoon, many surviving trees are being cut down to supply a growing number of sawmills. A survey of Yap's timber resources (MacLean et al. 1988) indicated that Yap does not have enough large trees to support a timber industry while also providing for traditional local needs.

Trees take a long time to grow, and we need to learn how to manage tree resources sustainably. Some tree species are found only on Yap and nowhere else in the world. It would be unfortunate if this unique heritage were lost. Trees are needed for their ecological services of soil protection and watershed function, and to provide materials for artisans and traditional uses. In addition, there are valuable yet to be developed uses for Yap's trees. For example, the Mayo Clinic recently found that an extract of our adid tree (*Atuna racemosa* Raf.) has antibiotic properties even against a resistant type of *Staphlococcus*. Recent studies of Yap's mangroves indicate that the 12 percent of Yap comprising mangroves sequesters some 34 percent of the carbon removed from the atmosphere by Yap's vegetation. Thus healthy living mangroves will be important for carbon credits and carbon trading in the near future. Allowed to live, our trees continuously produce food, clean water, oxygen, soil, habitat, medicines, and clear lagoons, and they moderate climate change and sea level rise.

Our current understanding is that about 20 trees are endemic to Yap ("only on Yap trees"), endemic to Yap and only one or a few other islands, or endemic to Micronesia. We haven't been able to collect Yapese names for nine of these trees. They are becoming forgotten. At least 10 of these trees are uncommon to rare. These special trees are in need of recognition, protection, and propagation as part of Yap's unique natural heritage.

In addition to endemic trees, Yap is home to trees that are becoming rare throughout the world. The International Union for Conservation

of Nature and Natural Resources (IUCN), through its Species Survival Commission, assesses the status of species and other taxa of the world in order to identify those that are threatened with extinction and in need of protection. Thus far, the IUCN has been able to assess only a small percentage of the world's trees, but the work is ongoing. The group publishes an international standard for species extinction risk called the IUCN Red List of Threatened Species (http://www.iucnredlist.org/). Although most of Yap's trees have not been assessed, Red List Version 2012.2 includes *Cycas micronesica*, ("faltir"); *Calophyllum inophyllum*, ("biyuuch"); *Dolichandrone spathacea*, ("rriyou"); *Intsia bijuga*, ("thorrot"); *Maranthes corymbosa*; *Pericopsis mooniana*, *Pterocarpus indicus*, ("lach"); *Scyphiphora hydrophyllaceae*, ("guad"); and *Xylocarpus granatum*, ("yamgur"). *Cycas micronesica* is listed as endangered and decreasing. *Intsia bijuga*, *Pericopsis mooniana*, and *Pterocarpus indicus* are listed as vulnerable, and *Calophyllum inophyllum*, *Dolichandrone spathacea*, *Maranthes corymbosa*, *Scyphiphora hydrophyllaceae*, and *Xylocarpus granatum* are described as decreasing and in need of updated information.

Based on these designations, the world recognizes that *Intsia bijuga*, *Pericopsis mooniana*, *Pterocarpus indicus*, and especially *Cycas micronesica* face a risk of global extinction in the wild. Thus Yap plays a role in assuring the survival of these species for the world. The risk of global extinction for *C. micronesica* is the highest, because it occurs naturally only in the Western Caroline islands (Yap and Palau) and the Marianas. The cycads of Guam are being killed by an introduced scale insect that may also have reached Palau. This makes the people of Yap the world's most important custodians of this unique ancient species.

I hope that this guide will help us learn and share information about Yap's trees so that we will come to a greater appreciation and improved stewardship of this heritage.

— Margie V. Cushing Falanruw
Yap Islands

Contents

GENUS / SPECIES / AUTHORITY

Cycas micronesica K.D. Hill

Synonyms:
Cycas rumphii Miq.; *Cycas circinalis* L.

Local and common names:
English: *cycad*. Yapese: *faltir.* Palauan: *remiang.*
Chamorro: *fadang; federico.*

Habitat and description:
A shrub to tree with pinnate leaves spirally arranged in a round crown at the top, like a palm. ***Leaves:*** Look like palm fronds with a 1-pinnate pattern, 1 to 2.5 m long, glossy dark green except for new flushes that are light green. ***"Flowers:"*** Cycads are gymnosperms and have cones rather than flowers. They are dioecious, having male and female cones on separate trees. Male trees bear an upright cone in the center of the leaves with wooly scales that produce pollen (see photo). ***Fruit:*** Female trees produce golden tan, serrated leaf-like structures bearing ovules that open outward and when pollinated develop into large, glossy, hard-shelled brown seeds that hang at the base of the leaves.

Distribution:
Endemic to the Marianas and Western Carolines.

Comments:
This species is listed on the International Union for Conservation of Nature (IUCN) endangered species list. In 2003, it was considered "near threatened" but has been reclassified as endangered because the Guam cycads are being wiped out by a scale insect that was introduced with ornamental cycads from Hawaii. This makes the cycads of Yap and Palau extremely valuable as the world's main natural populations of this ancient species. Cycads are the world's oldest seed-bearing plants, originating more than 200 million years ago in the age of dinosaurs. The male cones produce some of the largest sperm known. Seeds contain poisonous substances, but historically people in Guam and Yap and some other areas learned to wash out the toxins in order to use the large cycad seed for food. *Cycas micronesica* can be propagated by planting the seeds, which take 3 to 6 months to germinate, or by cuttings of either the whole trunk or just the concave scars on the trunk that can be cut out and planted. This cycad is used medicinally and for decoration but is not common, thus is at risk of being overharvested.

FAMILY	STATUS
Cycadaceae	Native

(A) Yap State Forester Pius Liyagel with tall cycad tree; (B) cone of male tree; (C) female structures.

GENUS / SPECIES / AUTHORITY

Araucaria heterophylla (Salisb.) Franco
Araucaria columnaris (G. Frost.) Hook.

Local and common names:
English: Norfolk Island pine; Cook pine.

Habitat and description:
A tall, pine-like tree that is so symmetrical it looks artificial. Branches radiate from the main stem in tiers; each branch has many branchlets arranged in one plane. ***Leaves***: twigs are surrounded on all sides with numerous, overlapping, curved awl, needle or scale-like leaves. ***Fruit***: the trees introduced to Yap do not seem to bear fruit.

Araucaria heterophylla and *A. columnaris* are quite similar, especially when young. The leaves of young trees and branches of *A. columnaris*, the Cook pine, are narrow, awl-shaped, pointed, and up to 13 mm long; Leaves on older branches are broader, triangle-shaped, and scale-like up to 6 mm long. *Araucaria heterophylla*, the true Norfolk Island pine, tends to have a wider crown of denser foliage and a more pyramidal appearance, although the overall shape may be affected by typhoons.

Distribution:
Araucaria heterophylla is originally from Norfolk Island; *A. columnaris* is native to New Caledonia and the Isle of Pines. The two are so similar that the name "Norfolk Island pine" has been applied to both. They have both been planted in many parts of the Pacific. Fosberg et al. (1982) listed *A. heterophylla* for Yap, but the seedlings distributed by Yap Forestry since at least the 1980s were grown from Cook pine seed from Hawaii.

Comments:
These species are planted ornamentally on Yap and are said to be good as supports for the vines of betel leaf (*Piper betle*) ("gabuiy" in Yapese). Used for Christmas trees, ornamental trees, and lumber. The wood of *Araucaria columnaris* is comparable in strength to that of Rocky Mountain Douglas-fir (*Pseudotsuga menziesii* var. *glauca*). It is lightweight, with a specific gravity of 0.44, and is used for attractive knotty pine paneling, tuned bowls, and bracelets (Little and Skolmen 1989).

FAMILY	STATUS
Araucaraiaceae	Introduced

(A) *Araucaria heterophylla*, top of tree; (B) close up of twigs with little awl-like leaves.

GENUS / SPECIES / AUTHORITY

Areca catechu L.

Local and common names:
English: Betel palm; betel nut palm; areca palm; areca nut palm.
Yapese: *buw.*
Palauan: *buuch.*
Chamorro: *pugua*.

Habitat and description:
A well-known and beloved small, slender palm common in agroforests and secondary forests. Trunk grey with conspicuous closely spaced rings. ***Leaves:*** 1-pinnate "palm fronds," with short petioles and a basal sheath that surrounds the trunk; leaflets irregularly notched at tip. ***Flowers:*** enclosed in boat-like sheath that opens into a much-branched yellowish green inflorescence up to 30 cm long, staminate flowers 5 mm long, female flowers 1.5 to 2 cm long, basal. ***Fruit:*** ovoid-oblong, about 4 cm long, green, maturing to yellowish or orange and brown.

Distribution:
Originally from Indo-Malaysia and now widely cultivated and naturalized; especially common in Yap.

Comments:
Beloved in Yap, with several locally recognized varieties; chewed with *Piper betle* leaves and quicklime; also widely used in Indo-Malaysia. In recent years, use has spread throughout Micronesia and betel nut has become Yap's biggest export. The sheath of the inflorescence is used to line baby baskets and as a sitting mat.

FAMILY	STATUS
Arecaceae (formerly Palmae)	Introduced

(A) *Areca catechu* tree with newly opened inflorescence; (B) cluster of young betel nut fruit.

GENUS / SPECIES / AUTHORITY

Cocos nucifera L.

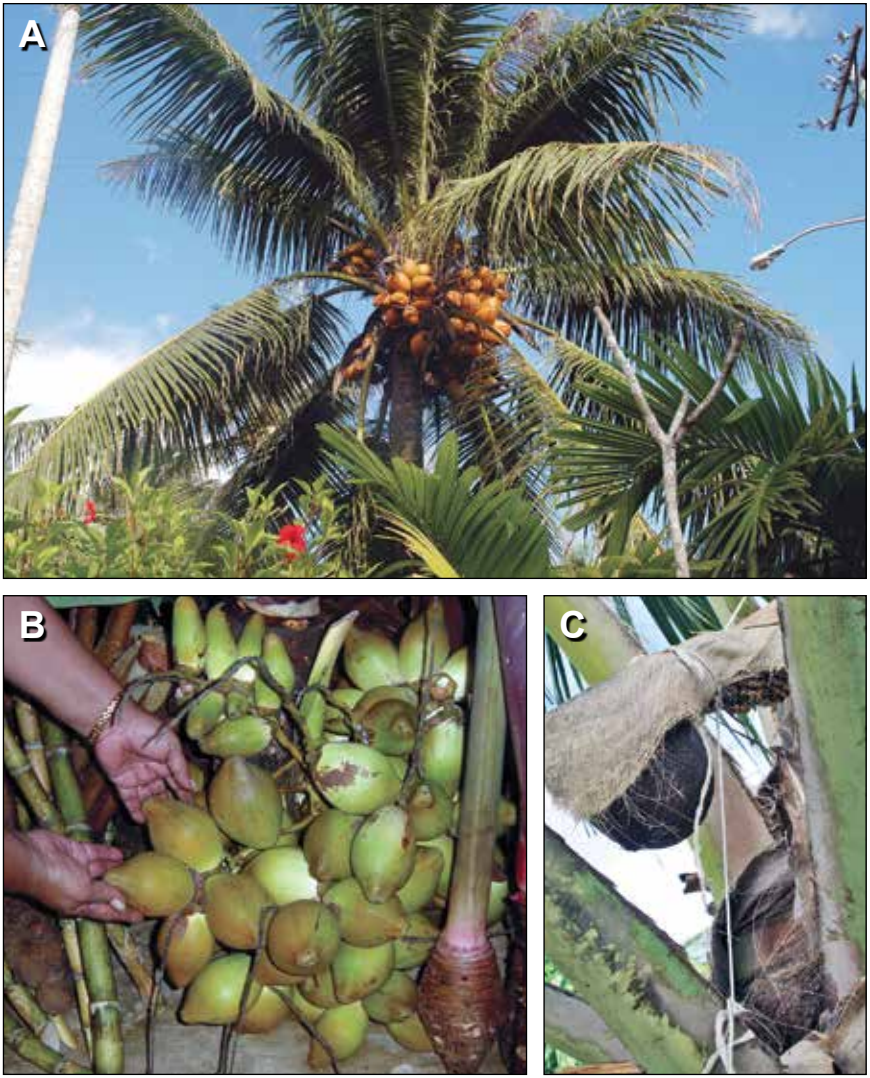
Local and common names:
English: coconut palm.
Yapese: *niew; nuy.*
Palauan: *lius.*
Carolinian: *luu.*
Chamorro: *nijog.*

Habitat and description:
A short to tall palm tree common in Yap's agroforests and coastal areas. ***Leaves*****:** 1-pinnate fronds about 6 m in length with a heavy midrib, arranged spirally to form the characteristic round crown of a palm tree. ***Flowers*****:** borne on many branched inflorescence emerging from a curved, boat-like sheath; flowers clustered in sets of three (two male and one female), with only male flowers produced toward the tip of the inflorescence. ***Fruit*****:** large ovoid, somewhat triangular coconut, maturing green to orangish to brown, size variable by variety, up to 30 cm or more, one hard-shelled seed within fibrous husk.

Distribution:
Origin not certain, but has traveled throughout the Pacific and tropical areas with human migration.

Comments:
There are a number of locally recognized varieties of coconut trees on Yap from trees with small to large nuts; thick, thin, and edible husks; and a local variety with an unbranched inflorescence. It is a very useful tree with many uses from medicines, beverages, food, fibers, decorations, and building materials.

FAMILY	STATUS
Arecaceae (formerly Palmae)	Introduced



(A) *Cocos nucifera* tree; (B) coconuts of Yapese variety "partagel" with tight clusters of small nuts along main rib of inflorescence; (C) coconut flowering bud being tapped for sap for production of "achief" toddy.

GENUS / SPECIES / AUTHORITY

Heterospathe elata Scheff.

Local and common names:
English: sagisi palm; palma brava.
Yapese: *buwog*.
Palauan (for variety *palauensis*): *demaile*.

Habitat and description:
A tall, slender, wild palm tree with a trunk to 20 cm in diameter, thicker near base, smooth with leaf scars visible near top. ***Leaves***: to 3.5 m long, arching gracefully and twisting about 90 percent near the end, with about 65 leaflets on each side; sheath smooth, dotted with brown scales, surrounding trunk at base only, not enclosing the trunk in a crown-shaft as with the betel-nut palm. ***Inflorescence***: white, aging tan, much branched, flowers usually in groups of three (two male and one female). ***Fruit***: almost round, about 6 to 7 mm in diameter.

Moore and Fosberg (1956) described two varieties: *palauensis*, native to Palau; and *elata*, native to the Philippines and introduced to Guam.

Comments:
The palma brava may have been introduced to Guam long ago. In the last 20 years or so, it has invaded and almost replaced native ravine forest species. The "buwog" of Yap is also spreading, one of the vectors being young boys who use the fruit as ammunition in blow guns, thus spreading it widely.

FAMILY	STATUS
Arecaceae (formerly Palmae)	Introduced

Heterospathe elata tree.

GENUS / SPECIES / AUTHORITY

Metroxylon amicarum (H.A. Wendl.) Becc.

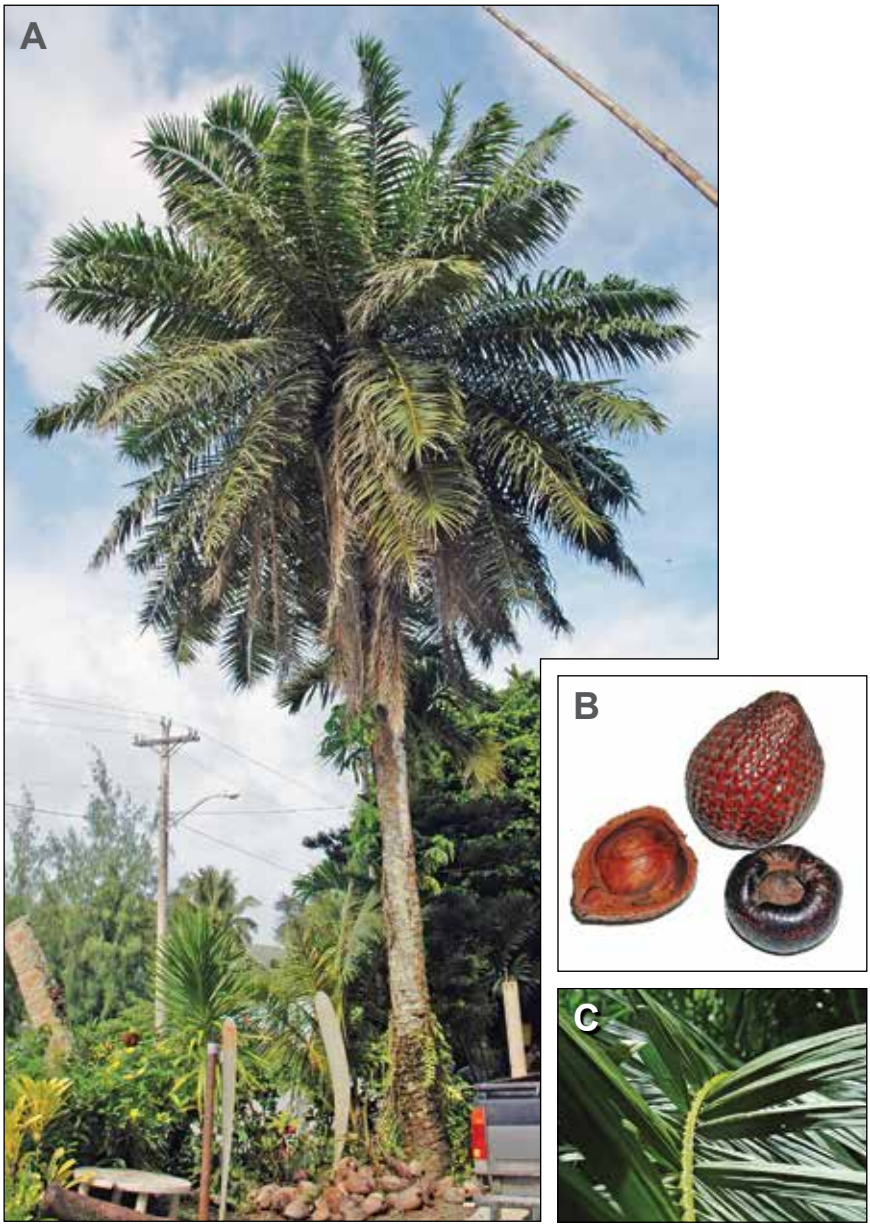
Local and common names:
English: Caroline ivory nut palm.
Palauan: *os.*

Habitat and description:
Potentially tall palm tree with massive trunk and short root spines; a swamp species in its native habitat in Chuuk and Pohnpei. A few trees have been planted in moist areas in Yap. ***Leaves***: 1-pinnate fronds to about 5 m long with about 85 pairs of leaflets; leaflets born in two planes with series of three to five or more borne in the same plane and then one leaflet at a different angle (see photo), giving the fronds a woolly appearance; sheaths spiny when young; petioles persist, giving the upper part of trunk a spiny appearance. ***Inflorescence***: borne among the leaves (unlike most other species in this genus with terminal inflorescence), about 125 cm long with bracteate branches and flowers in crowded spikes. ***Fruit***: roundish, about 7 to 12 cm in diameter, covered with glossy, firm, overlapping scales, about 1.2 cm tall and 2 cm broad; endosperm very hard, white to cream and gray.

Distribution:
Endemic to Chuuk and Pohnpei, but now planted occasionally throughout Micronesia.

Comments:
A swamp species in Chuuk and Pohnpei, now cultivated more widely for its "ivory nut" fruits used for carvings. *Metroxylon amicarum* is the only species in its genus that does not die after flowering. The related sago palm, *M. sagu* Rottb., from which edible starch is extracted from the trunk in Malaysia and New Guinea, has been planted in Palau and Pohnpei and perhaps elsewhere.

FAMILY	STATUS
Arecaceae (formerly Palmae)	Introduced



(A) *Metroxylon amicarum* tree; (B) nuts and inner kernel used for carving; (C) closeup of leaf showing two-tiered arrangement that gives tree its woolly appearance.

GENUS / SPECIES / AUTHORITY

Nypa fruticans Wurmb

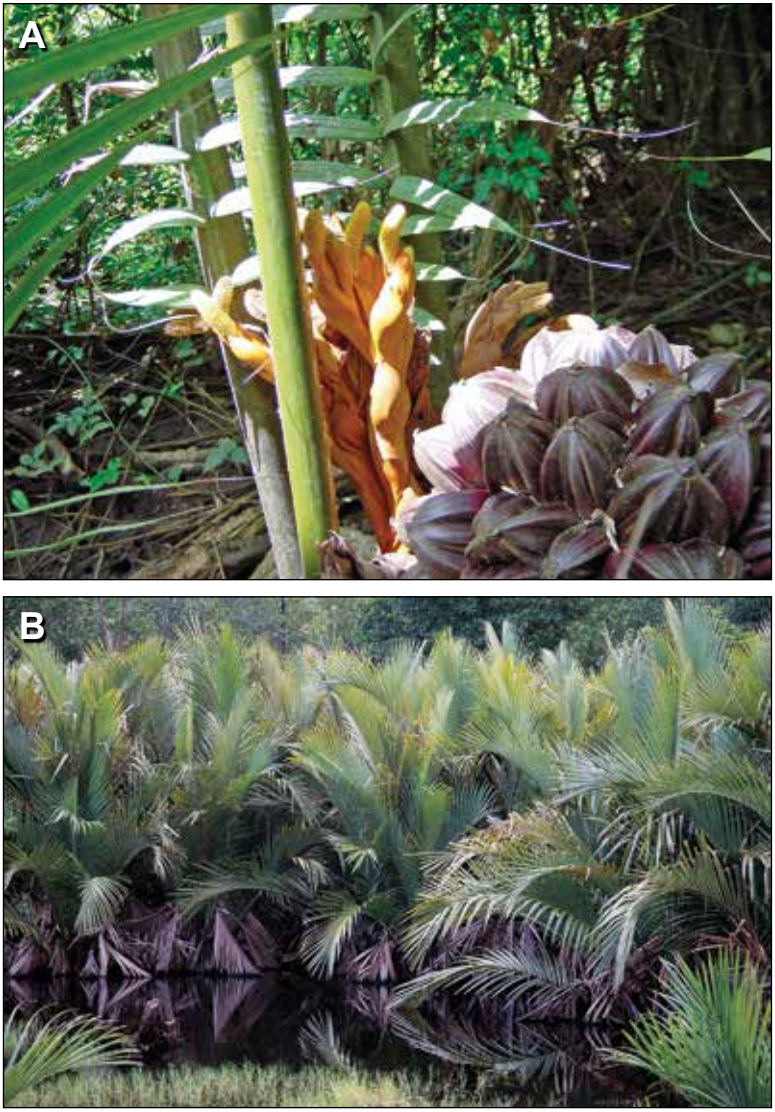
Local and common names:
English: nipa palm.
Yapese: *eang*; *ayeng*.
Palauan: *teuchel*.
Chuukese: *kuwa*; *kia*.
Pohnpean: *pahrum*.

Habitat and description:
A palm growing in estuaries, rivers, and the landward edge of mangroves where water is generally brackish, with a submerged trunk and with fronds arising from the mud as if trunkless. ***Leaves***: pinnate fronds, about 3 to 7 m long, growing erect. ***Inflorescence***: borne amid leaf bases; male flowers in golden cylindrical spike, female flowers in round head. ***Fruit***: a round mass about 12 to 30 cm in diameter made up of many fruits, each narrowing to a point, about 9 to 10 cm long and with two to four ridges.

Distribution:
Throughout Carolines, native to Philippines, and introduced and naturalized on Guam.

Comments:
Two varieties occur on Yap; the most common one having shorter fronds is believed to be more durable for thatching. This palm is important as a source of thatch for traditional buildings. The young flower can be tapped for sweet sap that can yield an alcoholic drink.

FAMILY	STATUS
Arecaceae (formerly Palmae)	Native?



(A) *Nypa fruticans*: golden male inflorescence on left and mature fruit in right foreground; (B) nipa palms growing in estuary.

GENUS / SPECIES / AUTHORITY

Pandanus tectorius Park; *Pandanus dubius* Spreng

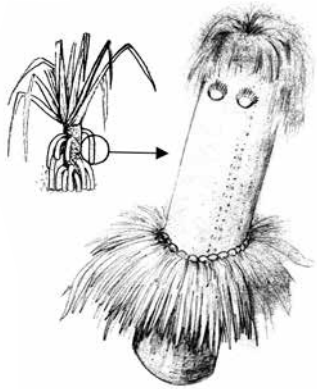
Local and common names:

For *Pandanus tectorius*—
English: thatch screwpine, pandanus.
Yapese: *choi* (general name, local varieties recognized).
Chamorro: *kafu*. Carolinian: *fashil*; *wal*.

For *Pandanus dubius*—Chamorro: *pahong*. Carolinian: *poghu*.

Habitat and description:

Small- to medium-size tree with erect trunk and often numerous prop roots, especially in wet soils. ***Leaves:*** have spines on both margins and midrib, long and spiny, spiraling around trunk to form rounded heads at the ends of branches, appearing like a "pineapple tree." ***Flowers***: male and female flowers are borne on separate trees and enclosed in large, light-colored bracts; male inflorescence is a fragrant, cylindrical spike; bracts about female inflorescence fall early. ***Fruit***: round and composed of numerous "keys," each of which contains one or more hard-shelled seeds. *Pandanus tectorius* is common and has smaller leaves, rarely over 8 cm wide, and 1 or more meters long, tapering to a thin point, with white bracts enclosing the flowers. *Pandanus dubius* is uncommon and is distinguished by its much broader leaves to 20 cm wide, which come to a tip more abruptly; there are bright lemon-yellow bracts about the flowers; the huge fruit often has a purplish waxy bloom, with keys that come to a single point and contain one seed. A number of varieties used for weaving occur on Yap.



Pandanus tectorius root doll with chewed fibers for hair and lifted fibers for eyelashes. Illustration by Stanley Kenrad.

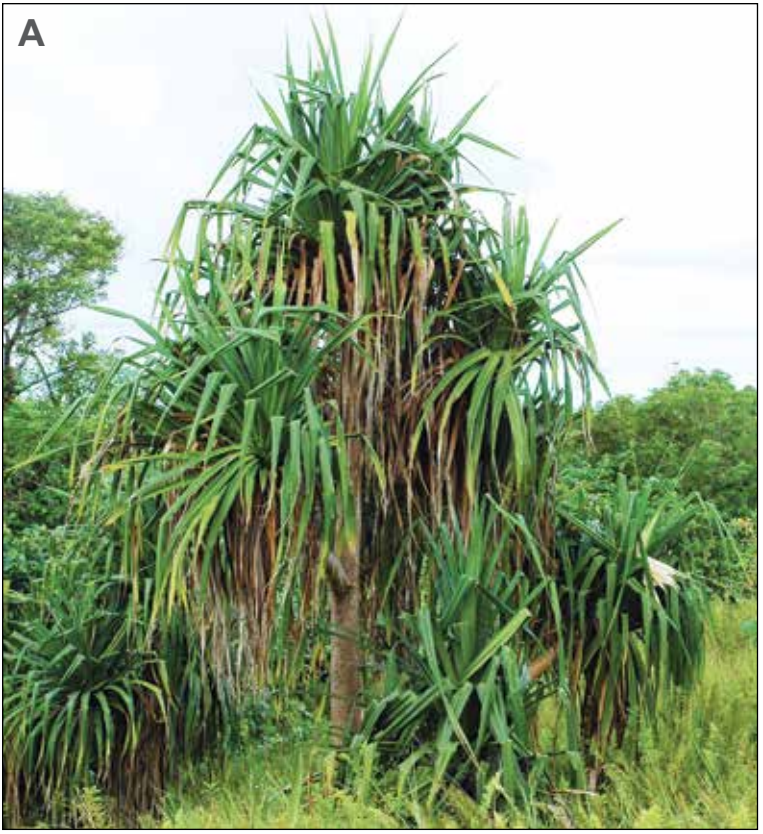
Distribution:

Throughout Micronesia.

Comments:

Pandanus tectorius is very common in savannas, secondary vegetation, and forest edges. Fruit bats feed on the ripe fruit and spread its seeds. *Pandanus dubius* and other varieties are much less common and grow more coastally. *Pandanus* leaves are very important for weaving, and were also used in the past for thatch.

FAMILY	STATUS
Pandanaceae	Native



(A) *Pandanus* tree in savanna; (B) ripe pandanus fruit; (C) white bracts about male flower.

GENUS / SPECIES / AUTHORITY

Pandanus yapensis Mart. ex Kaneh.

Local and common names:
Yapese: *tha*.

Habitat and description:
A small, erect or scandent tree growing in the forest understory. ***Leaves***: with two ridges on top forming an "M" in cross-section, the parallel midribs without spines; leaves spiral around trunk to form clusters at the ends of branches so that tree appears like a "pineapple tree;" trees growing in swampy areas may have leaves 3 m long. ***Flowers***: male and female flowers are borne on separate trees. ***Fruit***: round and composed of numerous "keys," small and bright red, often with a waxy bloom.

Distribution:
Only on Yap.

Comments:
Often scattered as low-growing lianas in secondary vegetation but producing fruit only when it stands erect under a forest canopy. The red fruit is generally concealed amid the terminal cluster of leaves. The long roots provide fibers for a variety of uses.

FAMILY	STATUS
Pandanaceae	Native, endemic

(A) *Pandanus yapensis* bright red fruiting bodies; (B) scandent tree; (C) leaf.

GENUS / SPECIES / AUTHORITY

Anacardium occidentale L.

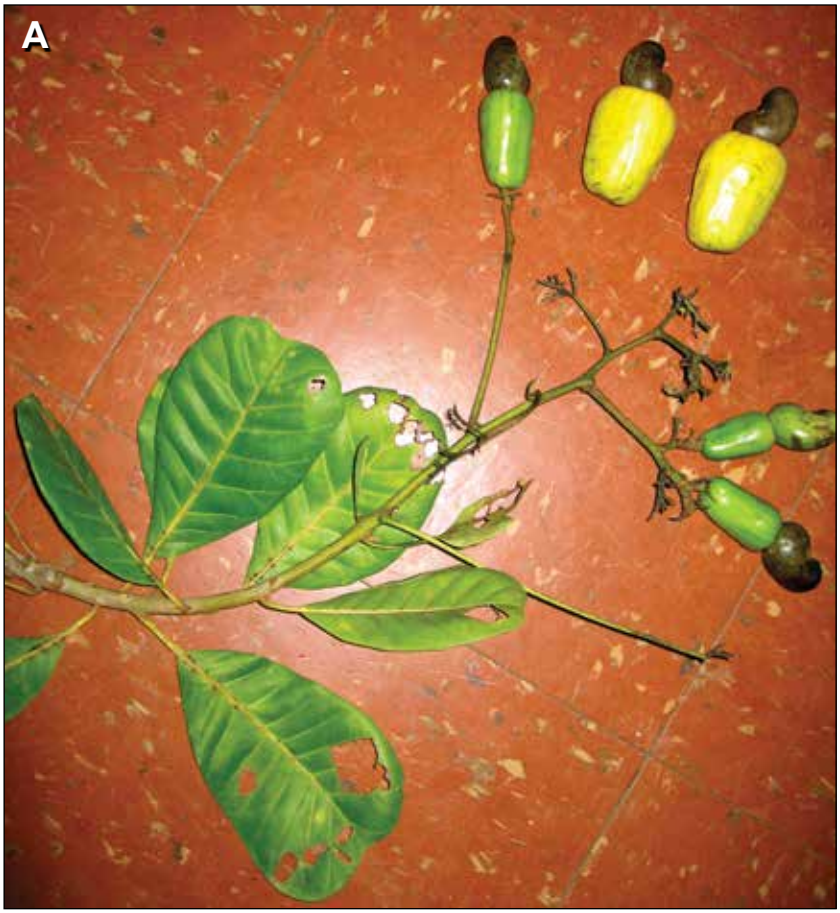
Local and common names:
English: Cashew.
Chamorro: *kasoe*.

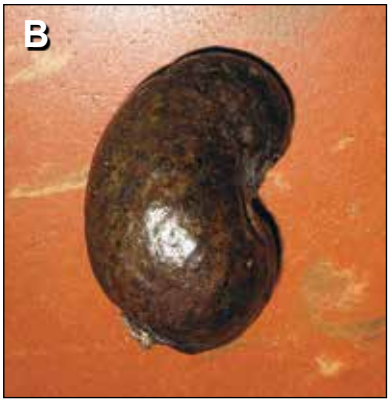
Habitat and description:
On Yap, a small spreading tree. ***Leaves:*** simple, entire, alternate, broad obovate, about 10 to 20 cm long and 5 to 10 cm wide. ***Flowers:*** panicles of pinkish-yellow, five-parted, fragrant flowers each about 0.8 cm in diameter. ***Fruit:*** with enlarged base 7 to 8 cm long and red to yellow with reddish kidney-shaped seed attached to this base.

Distribution:
Originally South American but now cultivated widely. Introduced to Yap.

Comments:
An introduced tree that has persisted since the Japanese occupation. The base of the seed swells into a "cashew apple" from which a drink is prepared in Brazil. Seeds are roasted for "cashew nuts." The sap of this tree may cause a rash in sensitive individuals. The fruit and seed contain gallic acid, anacardic acid, and cardole, which are caustic. Care should be taken when handling the leaves; the fruit and seed should not be eaten raw.

FAMILY	STATUS
Anacardiaceae	Introduced





(A) *Anacardium occidentale* branch with fruit; (B) seed; (C) roasted cashew nuts.

GENUS / SPECIES / AUTHORITY

Buchanania engleriana Volkens

Local and common names:
Palauan: *omail.*

Habitat and description:
Medium to large tree scattered in native forests. ***Trunk:*** generally straight, bark smooth. ***Petiole:*** 2 to 3 cm long, flat. ***Leaves:*** clustered at ends of branches, obovate, rounded at apex, 15 to 22 cm long, 7 to 12 cm wide, young leaves often reddish. ***Flower:*** small, on short terminal, panicle. ***Fruit:*** roundish, 1.5 cm in diameter.

There are seven genera of trees in the Anacardiaceae family on Yap, four with big oval or obovate leaves. The cashew nut is a small, uncommon tree with a very distinctive fruit. *Buchania engleriana* can be distinguished from *Campnosperma brevipetiolata* (Yapese = "ramlieu") by its longer petioles, leaves not as tightly whorled at ends of branches, and reddish young leaves. *Semecarpus venenosus* (Yapese = "changath") leaves are more pointed at the end and whitish below, and when cut the bark produces black sap that can cause severe itching, as with poison ivy.

Distribution:
Endemic to Yap and Palau.

Comments:
Kanehira (1933) listed this tree only for Yap, but Fosberg (1960) listed it for Palau as well. The two trees are similar in appearance. *Buchanania engleriana* is mainly found in Yap's limited areas of native forest. It can generally be distinguished by its smooth bark and reddish young leaves.

FAMILY	STATUS
Anacardiaceae	Native, endemic

(A) *Buchanania engleriana* terminal whorl of leaves—note reddish new leaves; (B) tree; (C) trunk.

GENUS / SPECIES / AUTHORITY

Campnosperma brevipetiolata Volkens

Local and common names:
Yapese: *ramlieu*.
Palauan: *kelelacharm*.
Kosraean: *elak*.

Habitat and description:
A large tree occurring in forests or swampy conditions. Shorter and more branched trees also occur in savannas. The tree can be identified in the forest by the rosettes of leaves in the canopy. ***Trunk*:** tall and tapering, branching on all sides to give one or more rounded to flat crowns so that a thicket of these trees gives a fine uniform texture on aerial photos; bark cream to grey, smooth. Large trees may have small thin, scurfy, squarish scales; sapwood white, heartwood straw-colored; buttresses low, rounded, spreading some distance from trunk. ***Leaves:*** simple, entire, oblanceolate leaves that clasp branch at base; spiraling to form rosettes at ends of branches. Leaves of saplings are much larger than those of mature trees, 20 to 60 cm long and 7 to 15 cm wide with 20 to 30 pairs of lateral veins. ***Flowers:*** small, green-yellow, borne on cream racemes at end of branch within rosette of leaves. ***Fruit:*** roundish, ripens to red to purple and black, size varies from east to western Carolines.

Distribution:
Throughout Carolines; Solomons, Malay Archipelago.

Comments:
Fruit eaten and transported by birds; a timber species with some potential as it grows readily in forest gaps and open areas. Source of parasiticidal tigasco skin oil in Papua.

FAMILY	STATUS
Anacardiaceae	Native

(A) *Campnosperma brevipetiolata* rosettes of leaves as seen from below; (B) small tree in savanna; (C) ripening fruit; (D) inflorescence.

GENUS / SPECIES / AUTHORITY

Mangifera indica L.

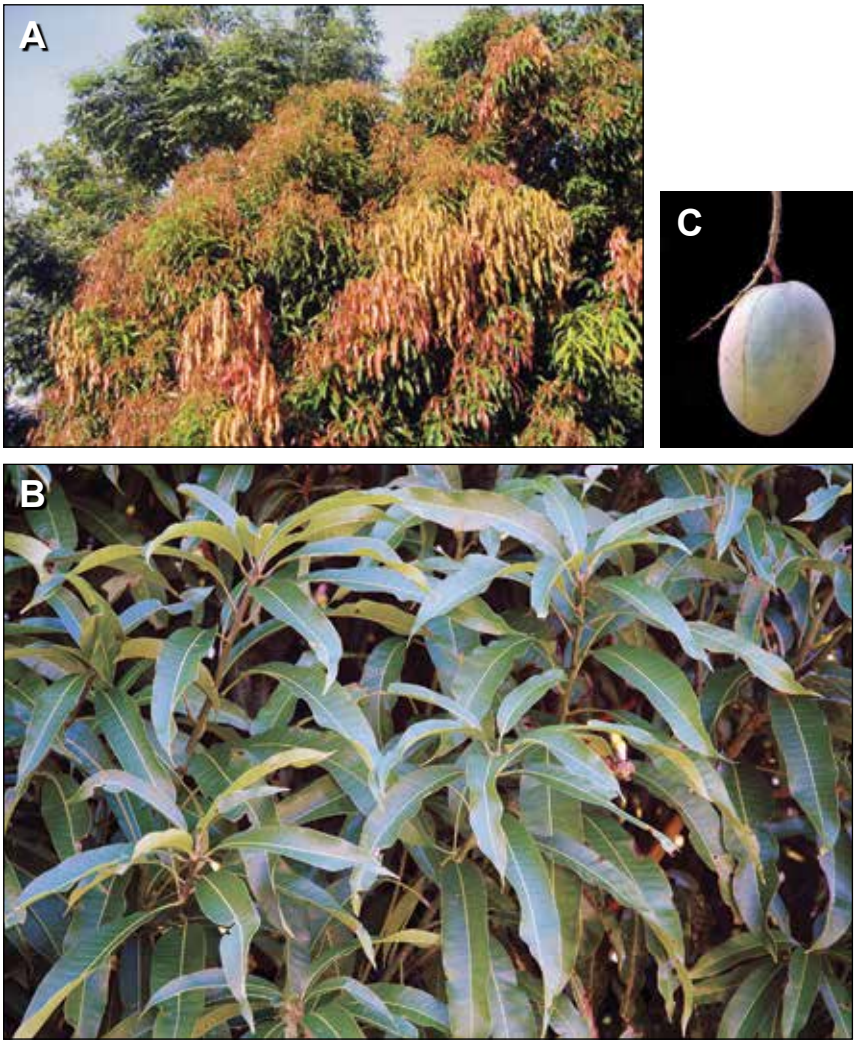
Local and common names:
English: mango.
Yapese: *manga.*
Chamorro: *manga.*
Palauan: *edel.*
Chuukese: *kangit; manko.*
Pohnpean: *kangit.*

Habitat and description:
A large tree with dense foliage, resinous throughout. ***Leaves:*** simple, entire, alternate, without stipules, thick and long to 33 cm; they smell like turpentine when crushed. Flushes of new leaves of most Yap trees are pink to red. ***Flowers:*** small pinkish-white or yellowish four- to five-parted flowers borne on axillary or terminal panicles. ***Fruit:*** a drupe with one large fibrous seed; ripens green to yellow-reddish.

Distribution:
Probably from India originally; now spread throughout the tropical world.

Comments:
About 500 varieties are known in India. Mangoes were introduced to Yap and said to have been uncommon several generations ago. Now they are quite common around village and secondary areas. Seeds are spread by fruit bats and children.

FAMILY	STATUS
Anacardiaceae	Introduced



(A) *Mangifera indica* tree with flushes of new leaves; (B) mature leaves; (C) fruit.

GENUS / SPECIES / AUTHORITY

Rhus taitensis Guill.

Local and common names:
English: sumac.
Yapese: *glad*.
Palauan: *eues*.
Chamorro: *lemayu; lamahu; sumac*.

Habitat and description:
Medium to large tree of forests and secondary vegetation; trunk straight with spreading canopy; bark smooth, grayish; branches smooth with prominent lenticels. ***Leaves:*** imparipinnate (1-pinnate with terminal leaflet), six to eight opposite leaflets almost sessile, 5 to 6 cm long, 2 to 3 cm wide, deep green and glossy above with lateral veins prominent on underside only. ***Flowers:*** inflorescence white, terminal panicle, corolla 2 to 3 mm in diameter. ***Fruit:*** roundish, about 4 mm in diameter.

Distribution:
Micronesia, Philippines, Polynesia, Melanesia.

Comments:
Rhus taitensis is a common "bandage tree" that grows in disturbed areas and secondary forests, covering the soil and reducing soil erosion. It exhibits strong apical dominance and resumes straight growth even if injured, making it a good "nurse species" that produces a broad canopy, which improves conditions for other species. It persists in secondary forests. Used in a special dye formula.

FAMILY	STATUS
Anacardiaceae	Native

(A) *Rhus taitensis* tree; (B) inflorescences.

GENUS / SPECIES / AUTHORITY

Semecarpus venenosus Volkens

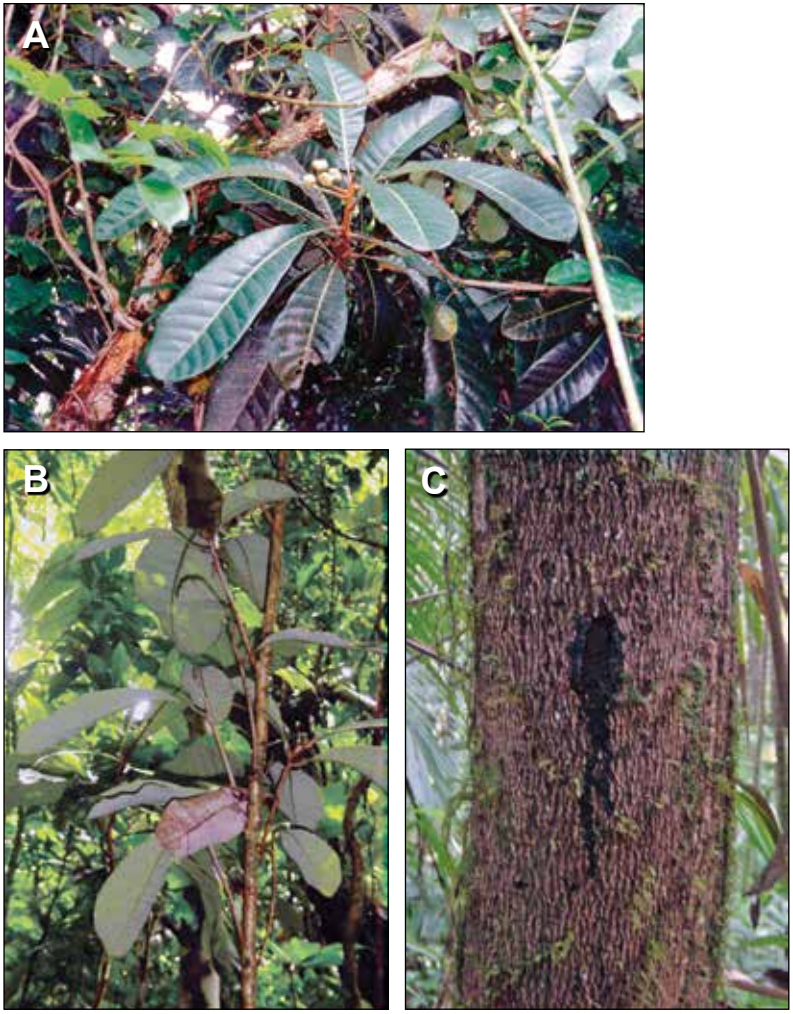
Local and common names:
Yapese: *changath*.
Palauan: *tonget*.

Habitat and description:
A medium to large tree common in forests of Yap, especially secondary forests; trunk straight, bark smooth; when injured, oozes sap that turns black. ***Leaves:*** alternate, oblanceolate, about 40 cm long and 12 cm wide, whitish beneath. ***Flowers:*** terminal panicle. ***Fruit:*** roundish, lobed drupe, red when ripe, seed hard and bony. Seedlings may be numerous on forest floor and can be distinguished by whitish undersides. Trees can be distinguished from *Campnosperma* by black sap and leaves whitish below and less tightly clustered at tips of branches, with long, somewhat looping petioles.

Distribution:
Endemic to Western Carolines (Yap and Palau).

Comments:
The black sap, and even contact with leaves and other parts of the tree, or for sensitive individuals, standing under the tree in the rain, can cause severe contact dermatitis similar to that of poison ivy/poison oak. Fruit is used medicinally.

FAMILY	STATUS
Anacardiaceae	Native, endemic



(A) *Semecarpus venenosus* branch with developing fruit; (B) whitish undersides of leaves of sapling; (C) black sap.

GENUS / SPECIES / AUTHORITY

Spondias pinnata (L. f.) Kurz

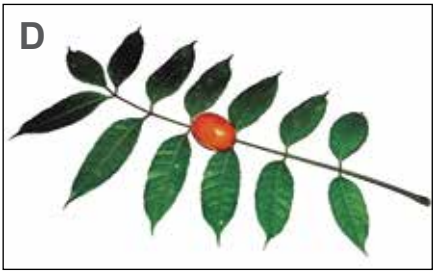
Local and common names:
English: hog plum.
Yapese and Palauan: *titimer*.

Habitat and description:
Medium to large trees planted or naturalized around residences. ***Leaves:*** imparipinnate (1-pinnate with single terminal leaflet), alternate, with intra marginal nerve along leaf edge. ***Flowers:*** borne in terminal or distally axillary panicle. ***Fruit:*** a round to oval drupe covered with thin skin with a juicy mesocarp over a spiny seed. At least two species occur in Yap, the most common being *S. pinnata* with yellow to orange fruit 3- to 5-cm long, smelling like overripe apples; the seed is a fibrous stone. *Spondias dulcis*, the iwi or ivi apple, is present but rare. Another species, *S. lutea* L. (*S. mombin* L.), with corky spines and knobs on the trunk and smaller fruit 3 cm long, is present on other islands and may be on Yap but is rare.

Distribution:
Pantropical; probably planted throughout Micronesia.

Comments:
An introduced tree that has naturalized. It is planted from cuttings and grows readily from fallen fruit and is somewhat invasive. Young leaves are used as flavoring in fish soup, and the juicy mesocarp of ripe fruit is squeezed and mixed with water for a refreshing drink.

FAMILY	STATUS
Anacardiaceae	Introduced



(A) *Spondias pinnata* tree; (B) trunk; (C) comparison of the fruits of *S. pinnata* and *S. dulcis*: (D) leaf and fruit of *P. pinnata*.

GENUS / SPECIES / AUTHORITY

Annona muricata L.; *Annona* spp.

Local and common names:

For *Annona muricata*:
English: soursop. Yapese: *sausau*. Chamorro: *laguana* (from Spanish: *guanabana*).

For *Annona reticulata*:
English: custard-apple; bullocks-heart. Chamorro: *annonas*.

For *Annona squamosa*:
English: sweetshop. Chamorro: *atis*.

For *Annona cherimola*:
Spanish: *cherimoya*.

Habitat and description:

Small trees producing delicious fruit. ***Leaves:*** simple, entire, alternate, elliptic, pointed at tip, more rounded or narrowed at base, about 12 to 16 cm long by 5 to 8 cm wide. ***Flowers:*** green, with three thick, squat sepals. ***Fruit:*** oblong and curved, up to 30 cm long, with well-spaced, short, soft, curved spines; flesh whitish, sweet and acid, with abundant shiny black seeds. There have been at least three other *Annona* species on Yap that are now rare. They can be distinguished from one another as follows:

Annona reticulata is a larger tree with larger leaves: leaves to 20 cm long by 6 cm wide, lance-oblong. ***Flowers:*** greenish, in groups of two to three, three-parted. ***Fruit:*** ovoid cordate, 7 to 13 cm, with a reticulated, slightly bumpy skin, sweet, with acidic pulp and many seeds.

Annona squamosa is a small tree with leaves that are thin, oblong-ovate, 7 to 14 cm long by 4 to 5 cm wide. ***Flowers:*** greenish, three-parted. ***Fruit:*** globose (almost round), about 8 to 10 cm broad, and with soft bumps, creamy yellow, soft, with sweet pulp and numerous black seeds.

Annona cherimola has leaves that are more round and velvety beneath. ***Flowers:*** three-parted and squat. ***Fruit:*** roundish, a bit narrower at the end, with a reticulated pattern, about 10 to 15 cm wide and with a fragrant, sweet-acidic, especially delicious pulp.

Distribution:

All originate in tropical America and are now widespread.

Comments:

Crushed leaves have the characteristic smell of the genus. The seeds of *Annona muricata* can be crushed, mixed with shampoo, and used to kill head lice. Leaves and bark are used medicinally.

FAMILY	STATUS
Annonaceae	Introduced

(A) *Annona muricata* leaves; (B) and (C) flowers; (D) fruit.

GENUS / SPECIES / AUTHORITY

Cananga odorata (Lam.) Hook. F. & Thomson

Local and common names:
Yapese: *mara*.
Philippines: *ilang-ilang*.
Chamorro: *alang-ilang*.
Carolinian: *lengileng*.
Palauan: *irang*.

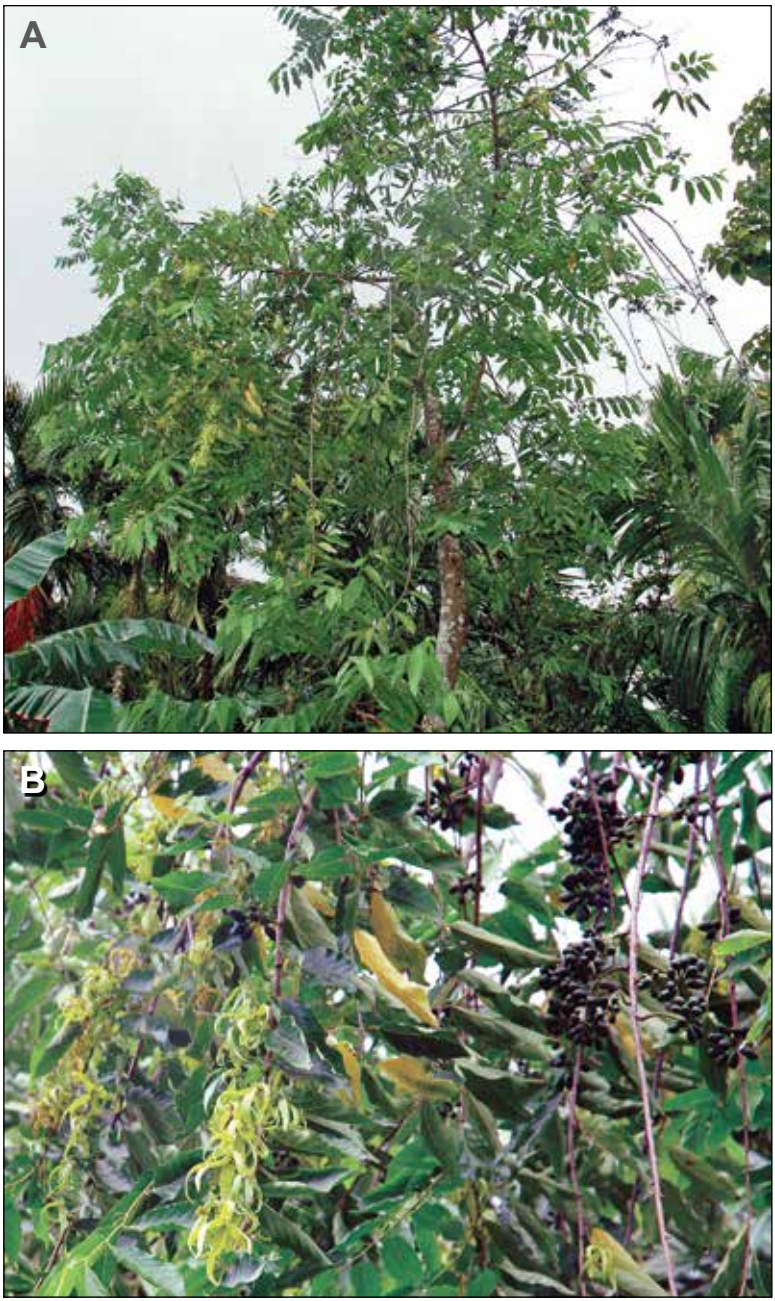
Habitat and description:
A medium-size tree with long, thin branches that bend when laden with flowers and fruit, resulting in a somewhat scraggly form; bark rough, dark, and scaly. ***Leaves:*** simple, entire, alternate and oblong, medium-green with a conspicuous lighter midrib and veins. ***Flowers:*** consist of three long petals hanging down rather like banana peels, green, maturing to yellowish and very fragrant. ***Fruit:*** a long black ovoid pod with constrictions between sections.

Distribution:
Now planted and often naturalized throughout Micronesia; native from tropical Asia to Australia.

Comments:
A very fragrant if not especially pretty flower that becomes more fragrant as it wilts; is mixed in with other flowers for nunuw leis and garlands, and mixed with coconut oil and sometimes other scents for perfume. It takes about 5 kg of flowers to make just 25 g of distilled cananga oil that is used as a base for a number of commercial perfumes.

Cananga is in the same family as *Annona*, and the *Annona* flower is a short, squat version of the *Cananga* flower.

FAMILY	STATUS
Annonaceae	Introduced



(A) *Cananga odorata* tree; (B) drooping branches with flowers and fruit.

GENUS / SPECIES / AUTHORITY

Cerbera manghas Linn.

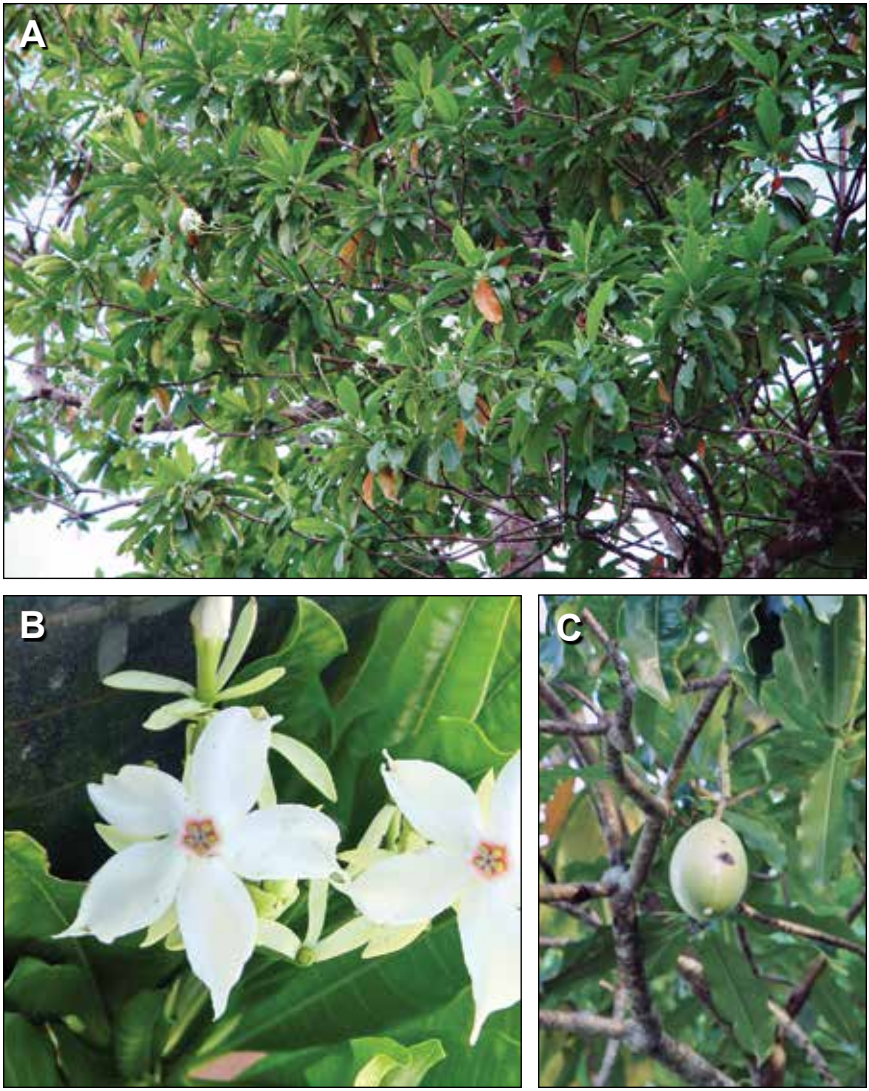
Local and common names:
English: sea mango.
Yapese: *riya*.
Palauan: *chemeridech*.
Kosraean: *sos*.

Habitat and description:
A small- to medium-size tree found in agroforests, secondary vegetation, and edges of forest. ***Leaves:*** simple, entire, alternate, with milky sap, forming whorls at ends of branches; narrowly obovate, 16 to 35 cm long by 3 to 8 cm wide, with a shiny surface, 10 to 22 lateral veins, petioles 2 to 6 cm long. ***Flowers:*** clusters of white, fragrant flowers are borne on a terminal cyme, each flower being about 4 to 6 cm wide with a red throat, with a five-parted corona in the center. ***Fruit:*** are oval drupes, 6 to 8 cm long by 4 to 6 cm wide, green maturing to red and black.

Distribution:
Throughout Micronesia and tropical Asia, Indo-Malaysia, Australia, and Pacific islands.

Comments:
Rather like a wild plumeria tree. The Yapese name literally means "danger." Sap is used medically.

FAMILY	STATUS
Apocynaceae	Native



(A) *Cerbera manghas* tree; (B) flowers; (C) fruit.

GENUS / SPECIES / AUTHORITY

Ochrosia oppositifolia (Lam.) K. Schuman

Synonym: *Neisosperma oppositifolia* (Lam.) Fosb. & Sachet.

Local and common names:
Yapese: *mow*.
Fais and Ulithian: *mo*.
Ifaluk: *umo*.
Woleaian: *umwa*.
Chamorro: *fago*.

Habitat and description:
Medium-size coastal tree uncommon on mainland Yap but more common in outer islands, with smooth gray bark and horizontal branches that form layers of whorls ("pagoda branching"). ***Leaves:*** simple, entire, opposite or whorled, dark green, oval, about 10 to 26 cm long by 6 to 13 cm wide with prominent light-colored midribs and numerous straight lateral veins. They exude a milky sap when broken. ***Flowers:*** small, white, windmill shaped and fragrant, borne at tips of branches. ***Fruit:*** oblong drupes about 5 cm long, green, maturing to dull yellow, with two flat seeds; after they fall to the ground, the fruit pulp decays, leaving a fibrous network.

Distribution:
Throughout Micronesia, especially on outer atolls; also on islands from the Indian Ocean through the Malay Peninsula.

Comments:
Used medicinally; the seed may also be eaten by cutting the fruit into two halves along the longitudinal midrib mark. The thin seeds taste somewhat like mature coconut meat.

FAMILY	STATUS
Apocynaceae	Native

(A) *Ochrosia oppositifolia* (illustration by Martin Faimau); (B) and (C) rosettes of leaves.

GENUS / SPECIES / AUTHORITY

Plumeria rubra (L.); *Plumeria obtusa* (L.)

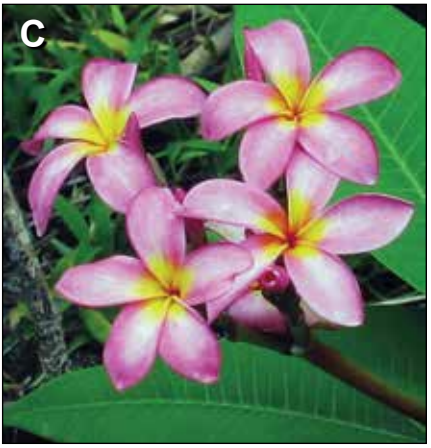
Local and common names:
English: plumeria.
Yapese: *sawur.*
Palauan: *chelilairangebard* (or *ellilairangebard*, the foreign ellilai).

Habitat and description:
A shrub to small tree with thick, easily broken branches with milky sap. ***Leaves:*** simple, entire, opposite but close and crowded at tips of branches, mostly elliptic, acute-acuminate, tapered at base, commonly 20 to 35 cm long by 6 to 12 cm wide, petioles 4 to 9 cm long. ***Flowers:*** flower stalks 4 to 15 cm long, flowers white with yellow eye; pink, red, large, and fragrant. ***Fruit:*** uncommon, long, narrowly ovoid opposite pods. *Plumeria obtusa* L. is similar but less common and differs in having more knobby branches, dark glossy obovate -rounded leaves, and white flowers with a fainter scent.

Distribution:
Native to tropical America, now widely cultivated.

Comments:
It is interesting that the Yapese name for this species is "sawur," a cognate of the name used in the Eastern Carolines for the fragrant native *Fagraea*. Other islands of Micronesia except Yap have species and varieties of *Fagraea*. It appears that Yap may have lost its native *Fagraea*, during the past time of dense population and deforestation, but today retains the name and applies it to the fragrant introduced *Plumeria*. The Palauan name for the introduced *Plumeria* is "the foreign ellilai" or *Fagraea berteriana* var. *galilai*, a very fragrant small tree that still occurs on Palau.

FAMILY	STATUS
Apocynaceae	Introduced



(A), (B), and (C) *Plumeria rubra* leaves and flowers.

GENUS / SPECIES / AUTHORITY

Meryta senfftiana Volkens

Local and common names:
Palauan: *omechidel*.

Habitat and description:
Small, erect trees scattered in native forests or forest edges; trunk generally unbranched, inflorescences generally hidden amid top leaves. ***Leaves:*** simple, entire, alternate and whorled at tip of branch, oblanceolate or obovate, large, 30 to 50 cm long by 8 to 16 cm wide, deep green, smooth, petiole 8 to 20 mm. ***Flowers:*** trees are dioescious (male and female flowers borne on separate plants); male flowers in a terminal or axillary panicle, female flowers clustered in heads on succulent pedicles, calyx none, five petals, five stamens, a few staminodes present. ***Fruit:*** aggregated into irregular clusters to 20 cm long; each fruitlet ovoid, acute, longitudinally canaliculate with a persistent style.

Distribution:
Endemic to Micronesia.

Comments:
An unusual morphology for the family Araliaceae.

FAMILY	STATUS
Araliaceae	Native

(A) *Meryta senfftiana* top of tree with fruit; (B) whole tree; (C) fruit.

GENUS / SPECIES / AUTHORITY

Barringtonia asiatica (L.) Kurz

Local and common names:
Yapese: *biuwol*.
Ulithian: *hul*.
Fais: *gol*.
Ifaluk and Woleaian: *gul*.
Satawales: *kul*.
Palauan: *bduul*.
Chamorro: *puting*.

Habitat and description:
A potentially large strand tree with stout branches and gray bark. ***Leaves:*** Simple, entire, crowded at branch ends, long and leathery, 15 to 50 cm long by 8 to 24 cm wide, obovate, dark green and shiny. ***Flowers:*** large fragrant flowers bloom in evening, fall the next morning, with four white petals 7 to 8 cm long by 3 to 4 cm wide and a mass of white stamens that are pink at the tips and united at the base. ***Fruit:*** large, 10 to 12 cm, squared and box-like at the top and angled to a blunt tip with a persistent calyx.

Distribution:
Throughout Micronesia and from east Africa through tropical Asia to the Pacific, but not as far as Hawaii.

Comments:
More common in outer islands than on mainland Yap; seeds and other parts contain saponin, which is toxic to fish. Used in some medicines. The petals and stamens of the flowers fall off in the morning.

FAMILY	STATUS
Barringtoniaceae (now Lecythidaceae)	Native

(A) *Barringtonia asiatica* flower buds; (B) leaves and fruit.

GENUS / SPECIES / AUTHORITY

Barringtonia racemosa (L.) Spreng.

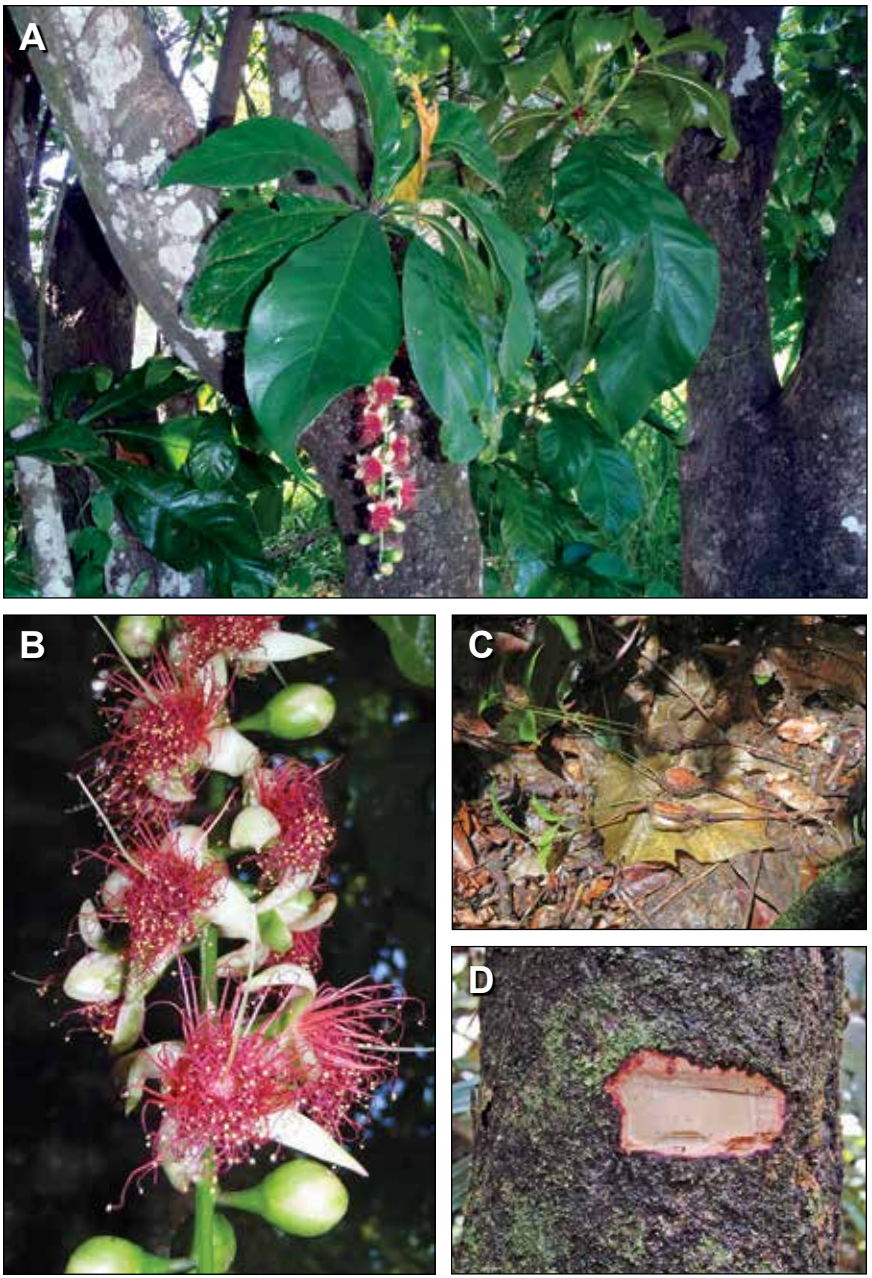
Local and common names:
Yapese: *wathol*; *watol*.
Palauan: *koranges*.
Chamorro: *langasat*.
Chuukese: *kun*; *guon*; *sun*.
Pohnpean: *winmarr*.
Kosraean: *kaiengal*.

Habitat and description:
A small- to medium-size tree found in wet areas, along streams, freshwater swamps, and the landward edge of mangroves if there is fresh water. ***Leaves:*** simple, entire, crowded at branch ends, about 15 to 45 cm long by 6 to 18 cm wide, elliptic-obovate, acuminate. ***Flowers:*** on long hanging racemes, with white to pink petals and numerous pink to red, and sometimes white, stamens with yellow anthers. ***Fruit:*** ellipsoid, about 4 to 7 cm long, somewhat angled (squarish), with two to four persistent sepals at the end.

Distribution:
Throughout Micronesia and from east Africa through Indo-Malaysia to Polynesia.

Comments:
The flower stamen color varies from white to dark red with white petals. Children use fruits used to produce "soap bubbles." *Barringtonia edulis* has been introduced to Yap but is not common.

FAMILY	STATUS
Barringtoniaceae (now Lecythidaceae)	Native



(A) *Barringtonia racemosa* rosette of leaves, with inflorescence; (B) flowers; (C) sprouted seeds; (D) trunk.

GENUS / SPECIES / AUTHORITY

Dolichandrone spathacea (L.f.) K. Schum.

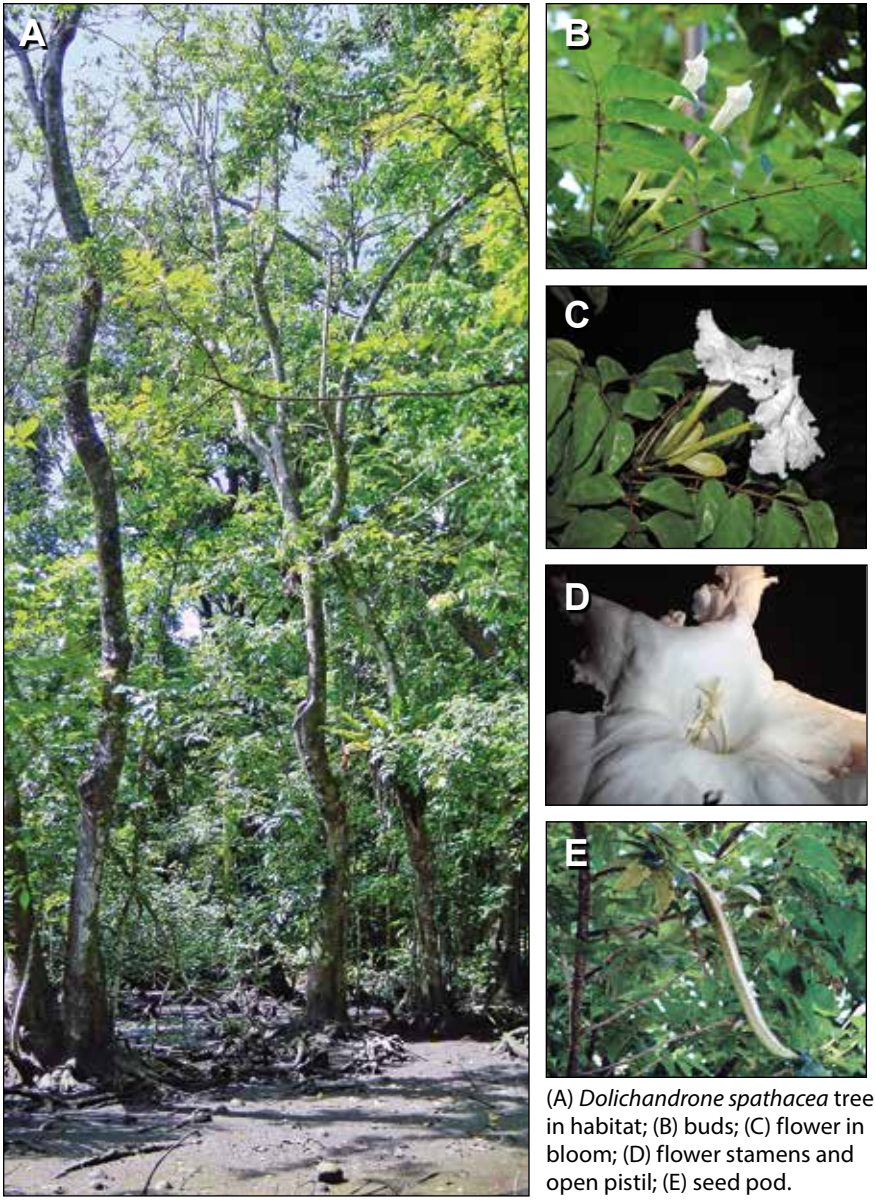
Local and common names:
Yapese: *rriyou*.
Palauan: *rriu*.

Habitat and description:
A rangy, medium-size tree growing along the inner margin of mangroves and other brackish and fresh water areas subject to tidal influence. Trunk often tall and narrow, deeply furrowed. ***Leaves:*** compound: one imparipinnate (one pinnate with odd leaf at tip), with seven to nine leaflets, each about 6 to 22 cm long by 3 to 10 cm across. ***Flowers:*** long, white, tubular and funnel shaped, about 20 cm long, divided into 5 segments at the tip. ***Fruit:*** a long flattened pod about 25 to 60 cm long by 2 to 3 cm across, becoming brown and splitting at maturity to release flat squarish seeds with winged margins.

Distribution:
Within Micronesia occurring naturally only in Yap and Palau; outside of Micronesia, India through Malaysia to New Guinea.

Comments:
An indicator of brackish to fresh water swamps. *Rriyou* is a night bloomer. Flowers open toward dusk and remain open all night. The long tubular corolla falls off the next morning, leaving a long style with the ovary that develops into the seed pod. It is thought to be cross-pollinated but the pollinator is not known. The stigma (see photo D) closes if touched and remains closed for a while, after which it reopens.

FAMILY	STATUS
Barringtoniaceae (now Lecythidaceae)	Introduced



(A) *Dolichandrone spathacea* tree in habitat; (B) buds; (C) flower in bloom; (D) flower stamens and open pistil; (E) seed pod.

GENUS / SPECIES / AUTHORITY

Spathodea campanulata Beauv.

Local and common names:
English: African tulip tree.

Habitat and description:
A medium-size tree with a tall, fluted trunk and short branches resulting in a narrow crown; planted or naturalized and growing in areas of secondary vegetation and at edges of forests, now mostly eradicated as an invasive species on Yap. ***Leaves:*** compound, 1-pinnate with odd leaflet at tip, large, to 45 cm long, bearing 7 to 19 large leaflets elliptic or ovate with conspicuous veins. ***Flowers:*** large, clusters of showy red flowers borne above leaves. ***Fruit:*** flattened blackish capsules 15 to 20 cm long by 4 to 5 cm wide, containing heart-shaped seeds with thin wings.

Distribution:
Native to tropical Africa but now planted widely as an ornamental.

Comments:
A fast-growing tree that has become naturalized and is spreading. It grows from seeds, which may be windborne, from cuttings, and by resprouting from damaged trunks, becoming invasive on many islands. This tree may have been eradicated from Yap but is included for reference.

FAMILY	STATUS
Bignoniaceae (formerly Lecythidaceae)	Introduced

(A) and (B) *Spathodea campanulata* tree.

GENUS / SPECIES / AUTHORITY

Ceiba pentandra (L.) Gaertn.

Local and common names:
English: kapok tree.
Yapese: *batey* (cotton).
Palauan: *kalngebard*.
Chamorro and Carolinian: *algodon* (derived from Spanish for cotton).

Habitat and description:
A tall tree with a straight spiny trunk and layers of horizontal branches ("pagoda branching" less obvious after typhoon damage). ***Leaves:*** palmately compound with five to nine lanceolate leaflets that fall just before the fruits ripen. ***Flowers:*** clusters of cream or pale pink five-parted flowers clustered on branchlets. ***Fruit:*** oblong pods that hang from leafless tree and split open to release flattened round seeds embedded in cottony fibers.

Distribution:
The genus is thought to be of tropical American origin, spreading to West Africa; the commonly cultivated and naturalized variety is thought to be a hybrid. Widespread in Micronesia and elsewhere in the Pacific.

Comments:
A tall tree that drops its leaves, leaving fruit pods hanging like drying fish. The cotton-like fiber from the fruit is buoyant and used for pillows, insulation, and life vests. Trunk yields fiber and lightweight lumber. Used medicinally, and young pods are eaten. Oil is extracted from seeds.

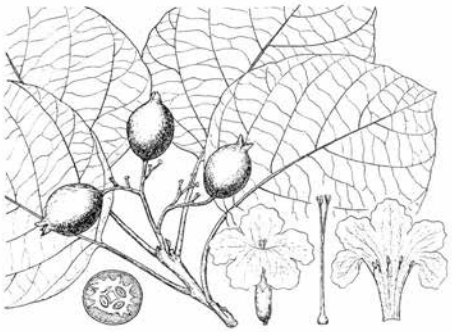
FAMILY	Bombacaceae (now a subfamily of Malvaceae)	STATUS	Introduced

(A) *Ceiba pentandra* tree; (B) tree with mature pods showing white fibers.

GENUS / SPECIES / AUTHORITY

Cordia subcordata Lam.

Local and common names:
Yapese: *gonow*.
Ulithian: *halau*.
Woleaian: *gulu*.
Ifaluk: *galu*.
Satawalese: *alu*.
Chamorro: *niyoron*.



Habitat and description:
Small- to medium-size tree, generally along coast, with orange flowers. ***Trunk:*** pale grey with slightly fissured bark. ***Leaves:*** simple, juvenile leaves with toothed margin; mature leaves with entire to wavy margins, medium to light green, ovate to elliptic, 5 to 20 cm long by 4.5 to 15 cm wide, four to six lateral nerves; petiole 2 to 8 cm. ***Flowers:*** orange, tubular with flared petals, in few-flowered corymbs borne on branches or terminally. ***Fruit:*** ellipsoid, 2 to 3 cm long, with persisting sepals and two to three corky seeds.

Distribution:
A coastal plant found throughout Micronesia, Indomalaysia-Pacific, East Africa, and Madagascar.

Comments:
An attractive tree with flowers. Wood is soft but durable and has alternating light and dark bands, making interesting carvings. Tree should be planted more. Propagated by seeds or cuttings.

FAMILY	STATUS
Boraginaceae	Native

(A) *Cordia subcordata* tree; (B) flower and fruit.

GENUS / SPECIES / AUTHORITY

Tournefortia argentea L.

Synonyms:
Messerschmidia argentea (L.) I. M. Johnst.;
Heliotropium foertherianum Diane & Hilger.

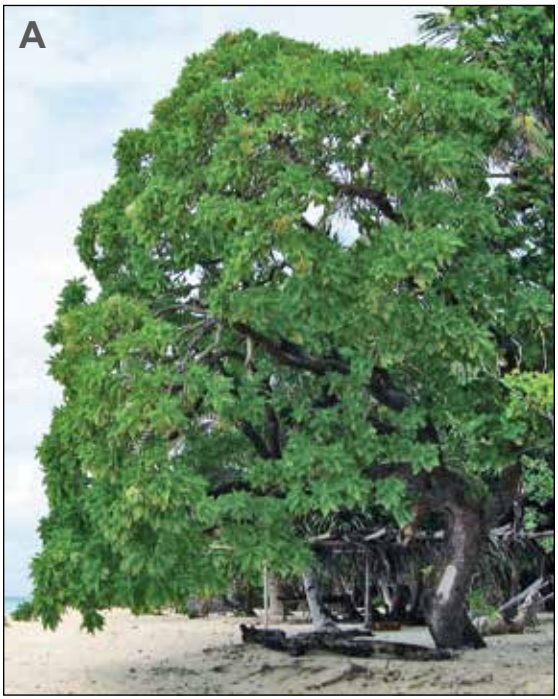
Local and common names:
English: velvet leaf, tree heliotrope.
Yapese: *chen*.
Ulithian, Fais, Woleaian, Ifaluk, and Satawalese: *chel*.
Palauan: *rirs*.
Carolinian: *tchel*.
Chamorro: *hunik*.
Chuukese: *amoneset*.
Pohnpean: *titin*.
Kosraean: *sral*.
Marshallese: *kiden*.
Hawaiian: *tahinu*.

Habitat and description:
A shrub to medium-sized strand tree with a characteristically curved trunk and thick counterpoint torqued branches, like an overgrown bonsai tree; bark deeply furrowed, crown rounded. ***Leaves:*** simple, entire, spiralled into rosettes at tip of branches, silvery white with fine pubescence, soft and fleshy. ***Flowers:*** terminal inflorescence with "fiddlenecks" of small white flowers with black anthers. ***Fruit:*** small and round with two seeds.

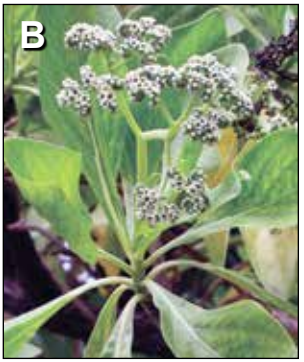
Distribution:
Throughout Micronesia, especially on atolls and along beaches, a widespread Indo-Malaysia strand plant.

Comments:
Uncommon on mainland Yap but a hardy survivor on atolls, where it is common in the beach strand.

FAMILY	STATUS
Boraginaceae	Native



(A) *Tournefortia argentea* tree; (B) terminal rosette of leaves with inflorescence; (C) bark; (D) trunk showing branching pattern.



GENUS / SPECIES / AUTHORITY

Crataeva religiosa G. Forst

Synonym:
Crateva speciosa Volk.

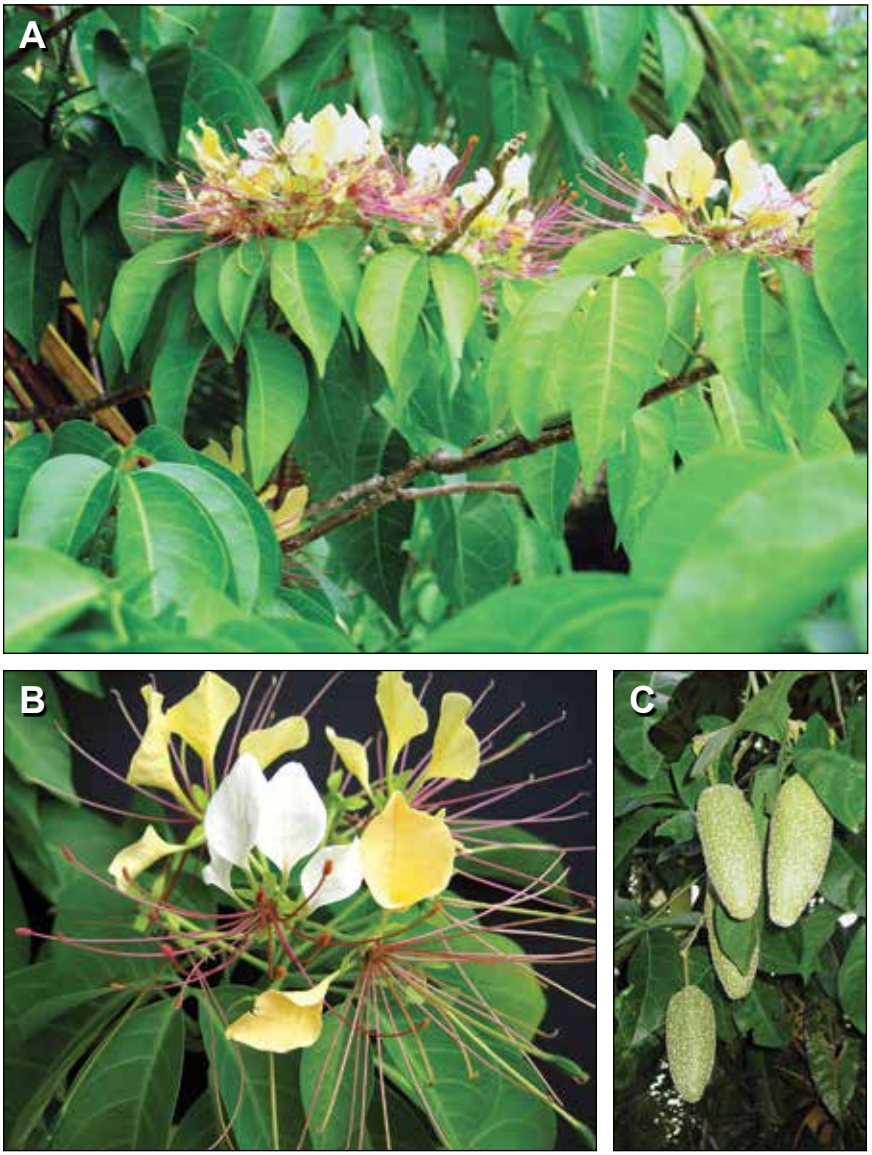
Local and common names:
English: garlic pear.
Yapese: *abiuuch*; *abiich*.
Palauan: *edebsungel*.
Ulithian: *iabwuch*.
Woleaian: *yafuch*.
Satawalese: *afur*.
Chuukese: *abuts*.
Pohnpean: *apoot*.

Habitat and description:
A small tree found in coastal villages, along paths, and in agroforest; especially common in Yap's atolls where the fruit is appreciated. Branches with conspicuous lenticels. ***Leaves:*** compound tripinate, petiole 10 to 15 cm long, leaflets ovate acute, rounded at base, about 10 cm long by 4 cm wide, petioles of leaflets short, about 2 to 3 mm. ***Flowers:*** in terminal or axillary corymbs near ends of branches, borne above leaves; petals white, ovate, unequal in size, stalked; largest petal about 3.5 cm in length; stamens numerous, unequal in length, longer than petals. ***Fruit:*** ovoid to elongate cylindrical, 6 to about 15 cm long, seeds enveloped in fleshy pulp; large varieties generally seedless.

Distribution:
Throughout Micronesia but especially common in Yap and other Caroline atolls; also from Himalayan India and Burma to Malaysia and Tuamotus.

Comments:
A lovely tree of agroforests, spectacular when in flower, but blooming for only a short period. New flowers are white, becoming cream-colored, sometimes used in nunu leis. There are two main varieties on Yap: a variety with small fruits with seeds used medicinally, and a seedless variety with larger fruit. Fruit has a sweet, musky garlic smell. Delicious boiled with coconut milk; especially appreciated in Yap atolls.

FAMILY	STATUS
Capparidaceae (now Capparaceae)	Native



(A) *Crataeva religiosa* flowering branch: (B) flower; (C) fruit.

GENUS / SPECIES / AUTHORITY

Casuarina equisetifolia L.

Synonym:
Casuarina litorea L.

Local and common names:
English: ironwood tree.
Yapese: *natch*.
Palauan: *ngas*.
Carolinian: *weighu*.
Chamorro: *gago*.
Chuukese and Pohnpean: *weku*.

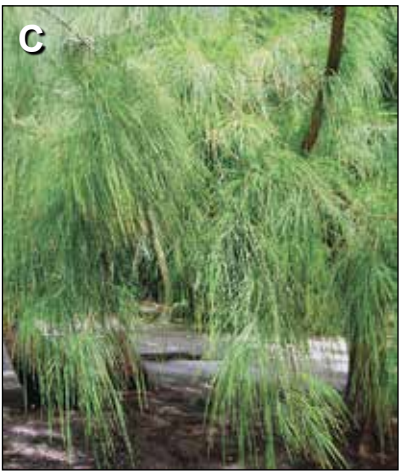
Habitat and description:
Generally a coastal tree but also found in savannas and disturbed areas, tall and pine-tree-like in appearance. ***Leaves:*** small and scale-like, formed between jointed stems that appear like "pine needles" but are actually photosynthetic branches. ***Flowers:*** separate but often borne on same branch; male flowers are in catkins at the ends of branches, female flowers are borne along the branch and form little cone-like fruits that open to release winged seed.

Distribution:
Native from Pacific islands to India, Australia, and islands of Malesia.

Comments:
Wood is very heavy, red, and hard to work, but makes good fuel. Used medicinally. Known to children as "the singing tree" because of the sound produced as the wind blows through its leaves.

FAMILY	STATUS
Casuarinaceae	Native

(A) *Casuarina equisetifolia* trees; (B) seed cones; (C) branchlets with scale-like leaves.



GENUS / SPECIES / AUTHORITY

Atuna racemosa Raf.

Synonyms:
Cyclandrophora laurina (A. Gray) Kosterm.;
Parinarium laurina A. Gray;
Paranari glaberrimum sensu auct. non Hassk.

Local and common names:
Yapese: *adid*.
Palauan: *agritin*.
Chuukese: *ais*; *gritin*.
Pohnpean: *ais*.

Habitat and description: A medium- to large-size tree of lowland forest, often growing together in thickets. ***Trunk:*** short, crown dense. ***Leaves:*** leathery, glabrous, lustrous, elliptic, base rounded, tip generally pointed, 10 to 15 cm long, 3 to 6 cm wide, 10 to 15 pairs side nerves, young leaves tinged pink and pendant, petiole dark, 5 cm, pubescent. ***Flowers:*** short axillary racemes, hairy, showy, to 2.5 cm across, fragrant, stamens 20 to 30, filaments connate at base; calyx greenish brown with long hairs; to 2.5 cm across. 5-cleft, woody, tomentose. ***Fruit:*** large, globose to ellipsoidal nut 5 to 10 cm long, brown with small warts; thick wall containing a hard kernel.

Distribution:
In Micronesia: Palau, Yap, Chuuk, Pohnpei, and Kosrae. Also found in the Philippines, Borneo, Malesia, Tonga, Solomon Islands, and Fiji.

Comments:
The Yapese name "yalad" is used for a similar tree with smaller fruit. In Yap, oil from seed is used in a special body lotion; in Palau, oil is mixed with red earth and used in painting canoes. The leaves adhere to twigs indefinitely, and, in Fiji, leafy branches are used for thatching outside walls of houses. The Mayo Clinic has recently tested an alcohol extract from this species and found that it has antibacterial properties against gram-positive bacteria including methicillin-resistant *Staphylococcus aureus*.

FAMILY	STATUS
Chrysobalanaceae	Native

(A) *Atuna racemosa* tree with fruit; (B) leaves, (C) mature fruit; (D) underside of leaves.

GENUS / SPECIES / AUTHORITY

Maranthes corymbosa Bl.

Synonym:
Parinari corymbosa (Bl.) Miq.

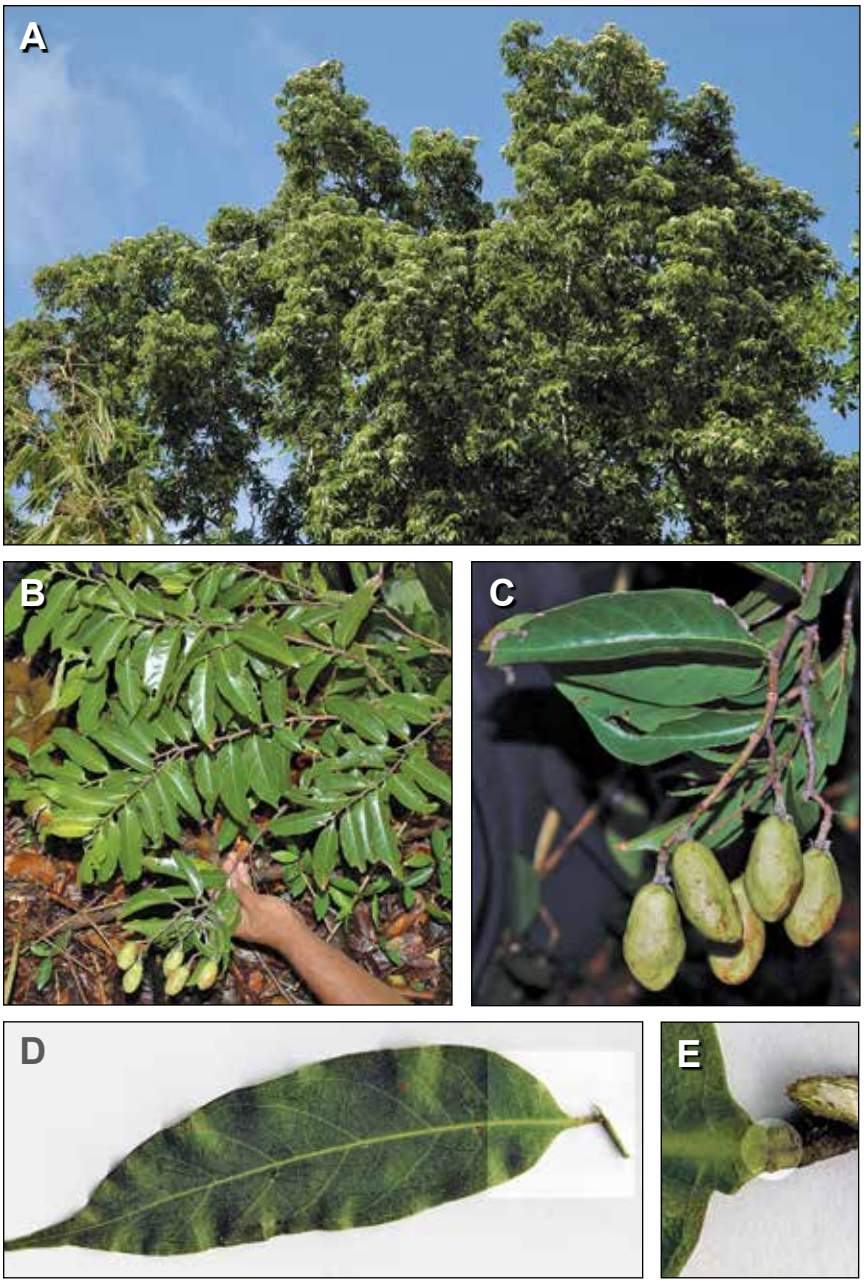
Local and common names:
Yapese: not confirmed; *yalad* and *pigau* have been suggested.
Palauan: *bkau*.

Habitat and description:
A potentially large tree of native forests, with a slightly tapering bole, buttresses not pronounced and deep rounded crown often of dense subcrowns. Bark: fawn to grey, scaly with large squares or elongate, thin, loose-hanging scales: large lenticels. Inner bark: hard, gritty, deep purplish red or brownish red, heartwood red, merging into narrow fawn sapwood; very hard and dense. Twigs black with pale lenticels, young branches and leaves pubescent. ***Leaves:*** simple, entire, alternate, leathery, with a small pair of nectar glands at the connection with petiole (see photo); on tightly clustered twigs, leaves closely overlapping, almost like a broom. Petiole 5 mm long, leaf lanceolate to ovate-lanceolate about 10 by 2.5 cm, base rounded, apex with long narrow point, both sides of leaf often fold upward from midrib, about 10 pairs of lateral veins connected at extremities, veins distinct on both sides of leaf. ***Flowers:*** in big axillary, corymbose panicles, about 5 by 5 cm, showy, 0.8 cm across, white, scented. ***Fruit:*** a cylindrical ellipsoidal nut to 20 mm long, 15 mm in diameter, larger toward tip, with persistent calyx. Ripens yellow green then dries black.

Distribution:
In Micronesia: Yap and Palau; also Australia, Papua New Guinea, Indonesia, Malaysia, Thailand, and other areas. Although widely distributed, it is not common and this tree is on the IUCN Red list of threatened species.

Comments:
This tree is found only in Yap's dwindling native forest so these few areas of remnant forest and this tree should be protected. The fruit is a favorite food of pigeons, which are also becoming rare.

FAMILY	STATUS
Chrysobalanaceae	Native



(A) *Maranthes corymbosa* crown of tree; (B) branch with fruit; (C) fruit; (D) single leaf; (E) enlargement showing tiny nectaries at the sides where leaf connects with petiole.

GENUS / SPECIES / AUTHORITY

Calophyllum inophyllum L.

Local and common names:
English: Alexandrian laurel; beach mahogany.
Yapese: *biyuuch*; the name "ftow" is applied to a locally recognized form.
Ifaluk: *rangich*.
Palauan: *btaches*.
Chamorro: *da'ok*.
Chuukese: *rakich*.
Pohnpean: *isou*; *lipas*.
Kosraean: *eet*; *itu*.
Marshallese: *lukwej*.
In the Philippines, sometimes called *palo Maria*.

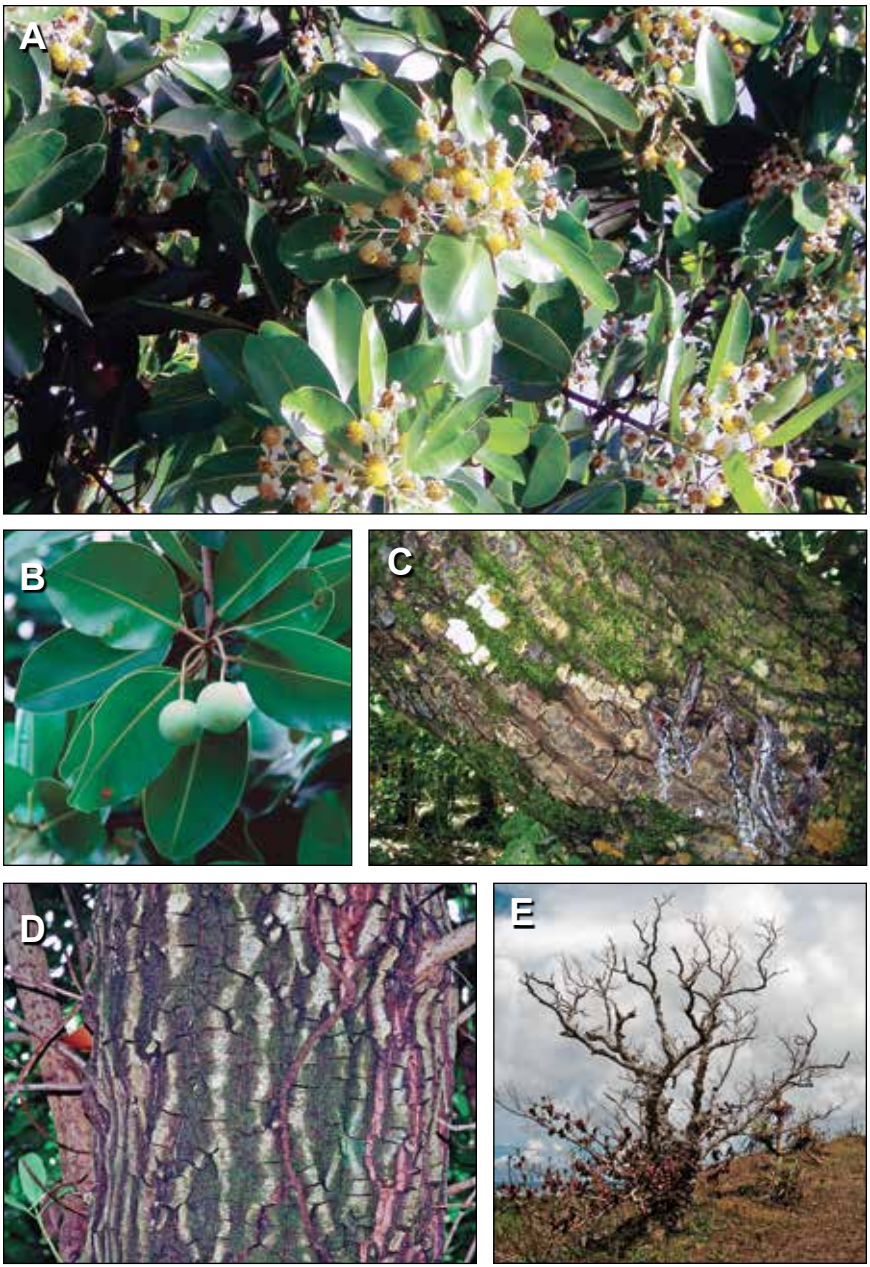
Four members of the Clusiaceae family occur on Yap: *Calophyllum inophyllumm* ("biyuuch"); *Gacinia rumiyo*, *Garcinia volkensii*, and *Mammea odorata* ("lubodol"). All have resinous latex and oil glands, lack stipules, and have opposite or verticillate (appearing spiraled) simple leaves.

Habitat and description:
Grows to a large tree with a rough, fissured trunk and thick white to yellow resin. ***Leaves:*** Simple, entire, opposite, up to about 16 by 9 cm, thick slightly obovate to oblong leaves with numerous parallel secondary veins on each side of the midrib. Petiole: 1 to 2 cm; apical bud composed of reduced pair of leaves. ***Flowers:*** white with numerous yellow stamens, fragrant. ***Fruit:*** Round, 3 to 4 cm, with thick rind over one round seed.

Distribution:
Widespread, throughout Micronesia, Indomalaysia, Africa, Pacific Islands; may have been aboriginal introduction to Hawaii.

Comments:
Some large trees served for many generations as markers of boundaries and historical sites until they were recently cut down for sawmills. *Biyuuch* is Yap's most important hardwood species. Used for canoes, community and family house posts, handicraft, and carvings. Increasingly sawn for lumber. Fruit used medicinally; soot of burnt fruit used in tattoo "ink." Fragrant flowers may be woven into "nunuw" garlands. Children often learn to juggle using *biyuuch* fruit. Fruit bats eat the fruit rind and spread the seed resulting in inland groves of *biyuuch* trees.

FAMILY	STATUS
Clusiaceae (formerly Guttiferae)	Native



(A) *Calophyllum inophyllum* tree in bloom; (B) fruit; (C) trunk showing sap; (D) trunk of form called "ftow," (E) old tree killed by typhoon and wildfire showing branching pattern.

GENUS / SPECIES / AUTHORITY

Garcinia rumiyo Kaneh.

Local and common names:
Palauan: *tilol*.

Habitat and description:
A medium-size tree with an erect narrow crown scattered or sometimes clustered in moist native forest. This tree is characterized by its aerial roots arising from the base of the trunk before penetrating the soil. ***Leaves:*** simple, entire, obovate in shape, arranged opposite, up to about 16 by 9 cm long, 3 to 4 cm wide, thick and leather-like, round at tip, tapering toward base and acute near petiole, lateral veins irregular, almost obscure, petiole 8 to 10 mm long, base dilated. ***Flowers:*** male flowers axillary, in threes to fives, 4-merous, peduncle 2 to 3 mm long, petals membraneous, elliptical, acute, concave, 3 mm long; stamens numerous, coalesced into a globular mass encircling a rudimentary style. ***Fruit:*** oblong, 30 mm long, 18 mm in diameter.

Distribution:
The species is endemic to Yap and Palau, with each island having its own endemic variety.

Comments:
The species name for this tree may be based on the Yapese name often applied to *Pentaphalangium volkensii*. The two trees have a similar crown, but *P. volkensii,* "remo," lacks the prop roots and differs in other ways.

FAMILY	STATUS
Clusiaceae (formerly Guttiferae)	Native, endemic

(A) *Garcinia rumiyo* tree crown; B) trunk with prop roots; (C) leaves and prop roots on young trees.

GENUS / SPECIES / AUTHORITY

Garcinia volkensii (Ltb.) Kosterm.

Synonym:
Pentaphalangium volkensii Lauterb.

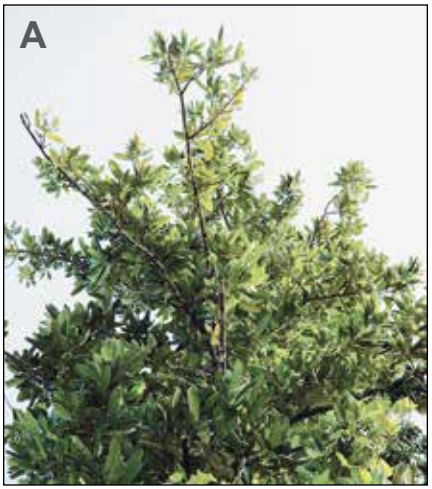
Local and common names:
Yapese: *rame*; *rumea*; *rimo*.

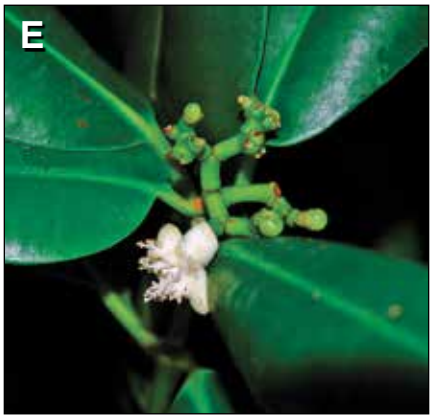
Habitat and description:
An uncommon tree, occasional in native forest growing to about 25 m tall, 50 to 80 cm in diameter, with fairly straight trunk without buttresses and thick round, stout branches with prominent leaf scars; bark if injured secretes aromatic resin. ***Leaves:*** simple, entire, oblong or obovate, dark green on upper surface, 12 to 18 cm long, 6 to 8 cm broad, *with leaves from base of tree up to 30.3 by 13.8 cm, entire, thick and coriaceous, rounded at apex, acute at base, those subtending inflorescence may be asymmetric and uneven at base, midrib prominent underneath, lateral veins numerous, irregular, almost at right angles to midrib, branching toward edge of leaf rather than joining into marginal looped vein, almost obscure above, petiole long, 3 to 4 cm long, clasping branch with fleshy lobe on upper side. Leaves opposite and generally decussate (arising from branch at alternating right angles), but several leaves may be decussate and then torque to another angle (see photo). ***Flowers:*** dioecious, male tree with flowers on a short dichotomously jointed (see photo) dichasial cyme. Calyx five, petals five, milky white, stamens five, filaments branched, attached to petals. Female flowers axillary, solitary, shortly stalked, petals with abortive stamens inside, ovary ovoid, 4-locular, each loculus with one ovule. ***Fruit:*** ovoid at base, curved and tapering to tip, fleshy, aromatic, about 7.5 cm long (8.5 measured on outer curve) with conspicuous pistil scars at narrow tip. (*Descriptions in italics are based on recent collections MVCF 12,654 male tree, and 12,655 female tree).

Distribution:
This endemic species is found only in Yap.

Comments:
The original scientific name of this tree was *Pentaphalangium volkensii*; however, the genus *Pentaphalangium* has been combined with the genus *Garcinia* so that botanists now call this tree *Garcinia volkensii*. This is a vulnerable tree and to preserve it we must protect both male and female trees so that the flowers can be pollinated. The fruit is fragrant, and is used in nunuws.

FAMILY	STATUS
Clusiaceae (formerly Guttiferae)	Native, endemic



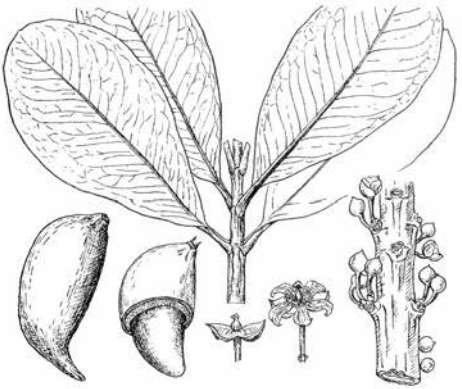


(A) *Pentaphalangium volkensii* crown of tree extending above forest canopy; (B) dark trunk without buttresses or prop roots; (C) decussate leaves arising at right angles and then torqued; (D) flush of new red leaves; (E) male inflorescence: (F) fruit.

GENUS / SPECIES / AUTHORITY

Mammea odorata (Raf.) Kosterm.

Local and common names:
Yapese: lubodol.
Palauan: odebisech.
Chamorro: chopak.
Pohnpean: luwas.



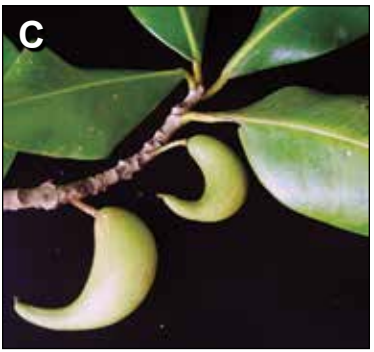
Habitat and description:
Small to large tree generally growing in coastal areas. ***Trunk:*** rather erect with a straight muscled trunk with light-colored bark and thick, warty branches angled upward. ***Leaves:*** simple, entire, opposite, leathery, obovate, rounded at tip and narrow toward base, with short (to 13 mm) petioles, midrib broad, yellowish and prominent; veins are pinnate and joined into loops near leaf margin; lower leaf lighter than upper leaf, which is medium green and glossy. ***Flowers:*** borne on branches below leaves and even on trunk, fragrant, with two persistent sepals 7 to 9 mm, six white petals 10 to 17 mm, and numerous yellow stamens. Although they look alike, female flowers have sterile stamens and male flowers have sterile pistils. ***Fruit:*** obliquely ellipsoid to ovoid, wide at base and pointed and curved at tip (see photo), curved, 5 to 10 cm when mature, one seed.

Mammea odorata can be distinguished from *Pentaphalangium* by the presence of terminal leaf buds; lighter, glossier leaves and lighter bark; and fruit without pistil scars at tip.

Distribution:
Coastal throughout Micronesia and areas of Malesia from Java to Philippines and east to Fiji.

Comments:
On Yap, this tree was often left to grow near stone platforms of community houses, possibly for its fragrant fruit. Bark is used medicinally. Wood hard, light on outside of trunk with reddish heartwood that can be used to produce a dye; said to be used in Fiji to dye hair orange-brown.

FAMILY	STATUS
Clusiaceae (formerly Guttiferae)	Native



(A) *Mammea odorata* small tree; (B) terminal bud; (C) fruit; (D) bark; (E) Melinda Pinnfen wearing nunuw (lei) with a fragrant lubodol fruit.

GENUS / SPECIES / AUTHORITY

Lumnitzera littorea (Jack) Voigt

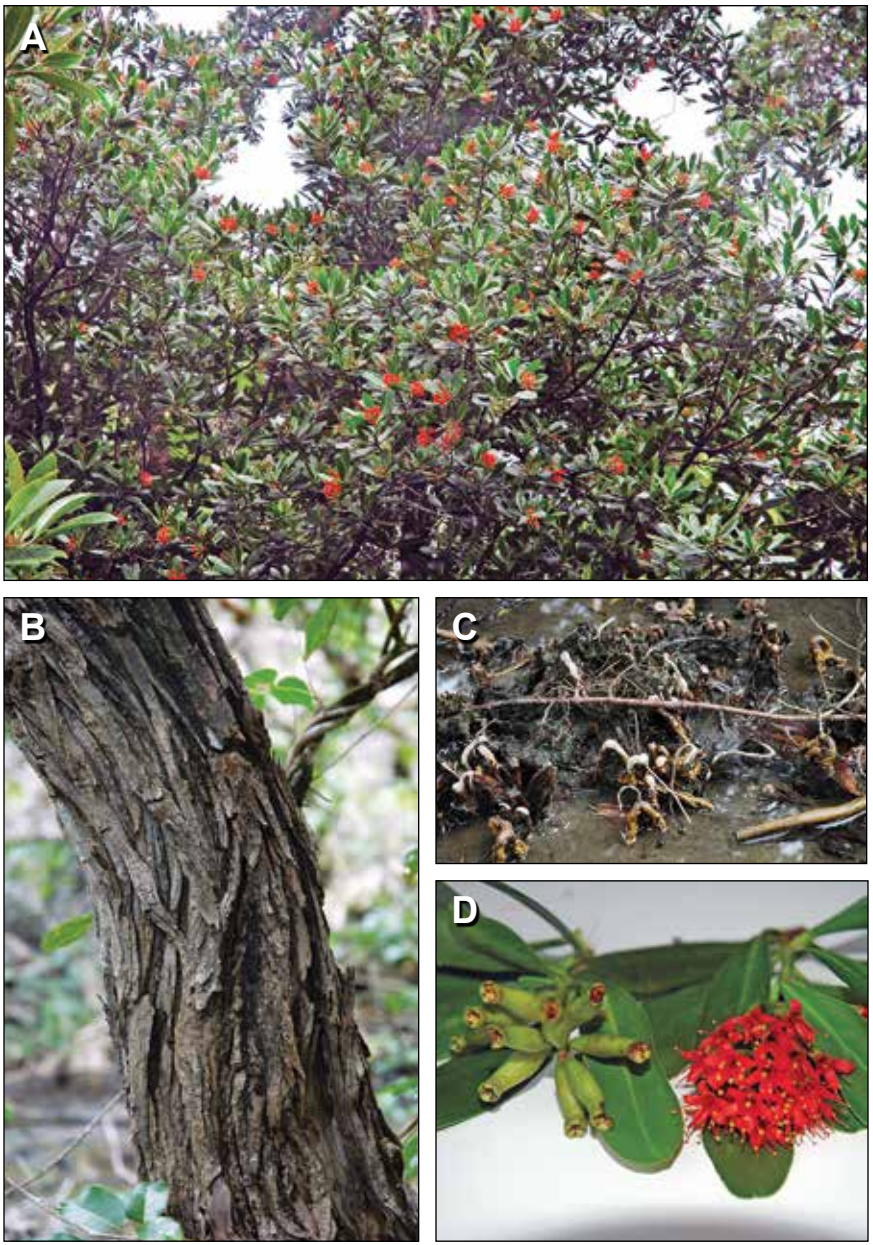
Local and common names:
Yapese: *yiy*.
Woleaian: *wei*.
Palauan: *ngemoel*; *mekedad*.
Chamorro: *nana*.
Chuukese: *acioro*; *wei*.
Pohnpean: *wengal*.
Kosraean: *oi*.

Habitat and description:
A small- to medium-size tree with dark bark and slender reddish knee-shaped pneumatophore roots covered with pores. ***Leaves:*** simple, entire, alternate, oblanceolate, rounded at the end and often notched, about 8 to 12 cm long by 1.5 to 2 cm wide, glabrous, glossy, semi-succulent. ***Flowers:*** clusters of bright red tubular flowers at ends of branches. ***Fruit:*** ellipsoid and vase-like, ribbed, green maturing black, about 2 cm long with persistent calyx at the distal end.

Distribution:
Throughout Carolines, Marianas, Marshalls, and Indo-Malaysian region.

Comments:
Ben Stone's comments in the *Flora of Guam* (Stone 1970) bear repeating: "When in flower (this tree) is exceedingly handsome." The brilliant red flowers are used in woven nunuw leis.

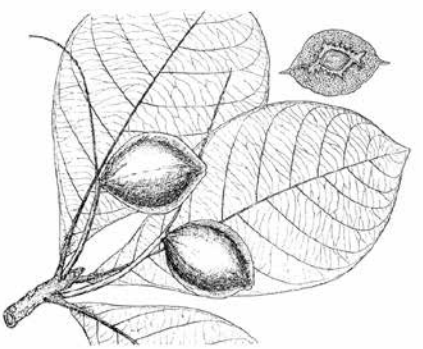
FAMILY	STATUS
Combretaceae	Native



(A) *Lumnitzera littorea* tree in bloom; (B) fissured trunk; (C) pneumatophore roots; (D) green fruit and red flowers.

GENUS / SPECIES / AUTHORITY

Terminalia catappa L.; *Terminalia samoensis* Reichinger



Synonym:
Terminalia littoralis Seemann.

Local and common names:
Yapese and Ulithian: *kel*.
Woleaian: *gilgul*. Ifaluk: *kasas*.
Palauan: *miich*. Chamorro: *talisai*.
Philippines: *talisai*. Chuukese: *asas*.
Pohnpean: *thipwopu*.

Habitat and description:
Terminalia catappa is a medium to large coastal tree, with branches in whorls resulting in "pagoda branching"(less pronounced in typhoon-damaged trees). The branches grow horizontally, then turn up at the tip where leaves grow in a tight spiral forming a rosette. The main shoot stops growing but two other branches arise behind the cluster of leaves, one on each side, and grow away from each other in the same flat plane. They turn up and form a rosette of leaves, and the process is repeated, resulting in "terminalian branching." Among Yap's trees this type of branching is also seen in *Vavaea pauciflora* Volk. ***Leaves:*** large, 20 to 30 cm long by about 8 to 12 cm wide, rough, rounded at tip and tapering to very short petioles. They cluster near the branch tips and whither red before they fall. ***Flowers:*** clustered without pedicels on axillary flowering spike 6 to 18 cm long, small and whitish. ***Fruit:*** one-seeded drupes, 3 to 6 cm or more long and 3 to 4 cm or more wide, obovoid, compressed and often with a keel along both sides.

Terminalia samoensis (called "kiel" in Ulithian) is similar but a smaller tree or shrub with a small fruit about 2 cm long by 8 mm wide, compressed and without a keel (see photo C).

Distribution:
Terminalia catappa occurs throughout Micronesia and is widespread in the Asian-African tropics. *Terminalia samoensis* is a Pacific island plant that mainly occurs in the outer islands.

Comments:
The ripe fruit of both species encloses a delicious nut, the "Pacific almond." Fruitbats eat the rind of the fruit and spread the seeds.

FAMILY	STATUS
Combretaceae	Native

(A) *Terminalia catappa* whole tree, showing reddish old leaves; (B) *Terminalia catappa* fruit; (C) *Terminalia samoensis* with ripening fruit partially eaten; (D) inflorescence.

GENUS / SPECIES / AUTHORITY

Diospyros elliptica (Forst.) P.S. Green

Synonym:
Diospyros ferrea sensu auct. non (Willd.) Bakh.

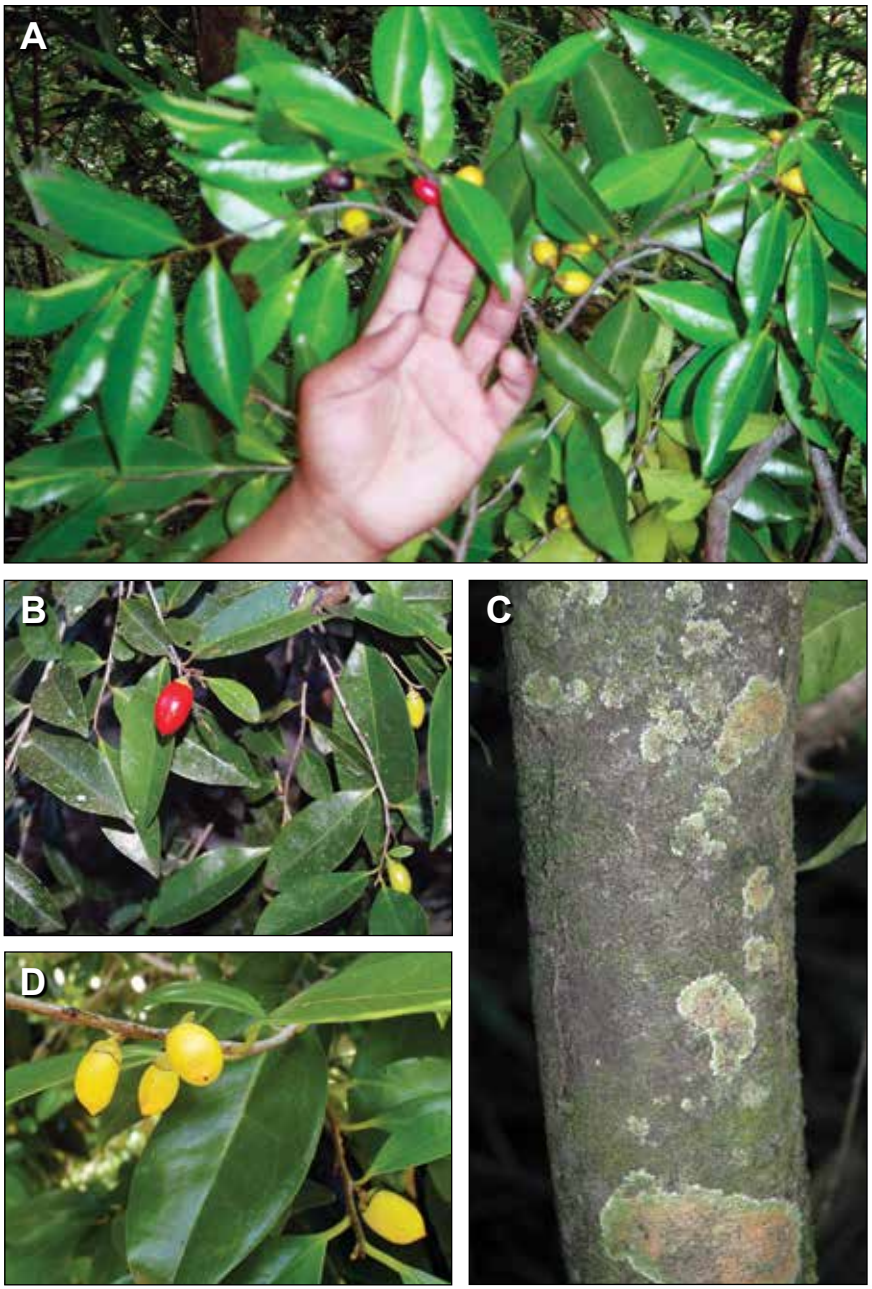
Local and common name:
Yapese: *achingal*.

Habitat and description:
Small tree with numerous branches and twigs scattered in native forests and thickets, mature bark black; sapwood pale yellowish white, heartwood deep black, close grained, polishes well. ***Leaves:*** simple, entire, alternate, leathery, ovate, elliptic or obovate, smooth, unequal in size, 4 to 8.5 mm or more long, lateral veins faint, petiole 2 to 5 mm long. ***Flowers:*** dioecious (male and female flowers born on separate plants), three-parted. ***Fruit:*** ellipsoidal, ripens from green to yellow to red, 1 cm diameter, one-seeded.

Distribution:
Yap and Palau in Micronesia; elsewhere tropical Africa and Asia, Malaysia to tropical Australia. Micronesian varieties may be unique to Yap and Palau.

Comments:
A kind of ebony, but Yap's trees are generally too small for most uses.

FAMILY	STATUS
Ebenaceae	Native



(A) *Diospyros elliptica* branch with fruit; (B) ripe red fruit; (C) trunk; (D) close up of yellow fruit.

GENUS / SPECIES / AUTHORITY

Drypetes yapensis Tuyama

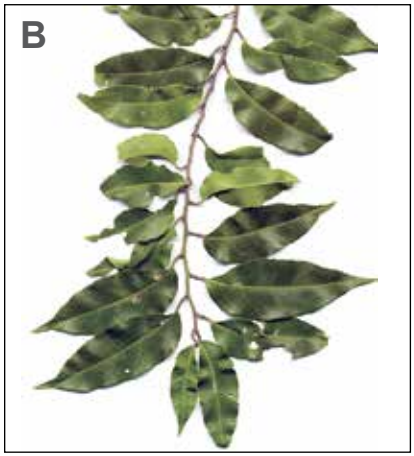
Synonym:
Drypetes carolinensis Kaneh.

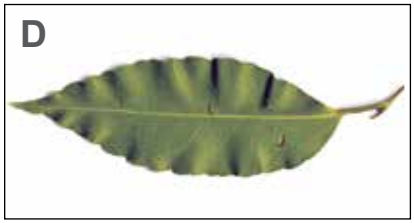
Habitat and description:
A shrub to medium-size tree of native forest. ***Leaves:*** simple, shallowly serrated, with undulating margin, alternate, coriaceous, elliptic, tapering to a narrow tip and uneven at base, blade slightly assymetric with two sides being slightly unequal in size, mature leaves 7.8 to 9.7 cm long by 2.9 to 3.3 cm wide, lateral veins faint, about six to eight, slender, curved-ascending, becoming faint before reaching margin of leaf blade, petiole about 1 cm long. ***Flowers:*** in axillary clusters, male flowers with central interstaminal disk, ovary 1-locular, style unlobed and dilated (flower characteristics of genus from Smith [1981]). ***Fruit:*** axillary, apparently solitary, oblong-elliptic 2.8 cm long by 1.1 cm wide when still green; pedicels about 0.9 cm long.

Distribution:
Endemic to Yap.

Comments:
The description above gives characters of specimen, MVCF 12,658, combined with some characteristics of the genus given in Smith (1981) for features of the genus, including flowers that were not available from the specimen.

FAMILY	Euphorbiaceae (now Putranjivaceae)	STATUS	Native, endemic





(A) *Drypetes* branch: (B) branch showing uneven size leaves uneven at base; (C) fruit; (D) underside of single leaf showing undulating margin and faint veination.

GENUS / SPECIES / AUTHORITY

Excoecaria agallocha L.

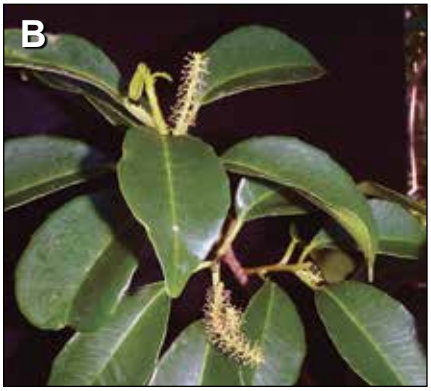
Local and common names:
English: blinding mangrove; milky mangrove.
Yapese: *bat'*.
Palauan: *ias*.
Chuukese: *losus*; *rosus*.

Habitat and description:
Small tree of coasts, often near mangroves where there is a firm substrate. ***Trunk:*** Whitish with vertical furrows, soft, with acrid milky sap. ***Leaves:*** simple, entire, alternate, ovate to obovate, 6 to 11 cm by 3.5 to 7 cm wide, dark green and glossy above, base with a gland on each side of the petiole; old leaves turn orange, and at times most leaves of tree turn orange-red and fall. ***Flowers:*** Male and female flowers borne on separate trees (dioescious), aromatic, male flowers born in catkins, 3.5 to 10 cm long, female flowers born in racemes 1.5 to 3.5 cm long. ***Fruit:*** a 3-lobed capsule, 8 mm in diameter.

Distribution:
Yap, Palau, Chuuk, Marianas, and from India to Polynesia.

Comments:
If the bark is scratched or leaves broken, irritating latex is secreted; the sap or even smoke from burning wood of this tree is very irritating to the eyes.

FAMILY	STATUS
Euphorbiaceae	Native



(A) *Excoecaria agallocha* leaves and bark; (B) male inflorescence; (C) female tree with fruits; (D) female tree with senescent leaves turning orange as fruit develops.

GENUS / SPECIES / AUTHORITY

Glochidion ramiflorum Forst. f

Synonym:
Phyllanthus sp.

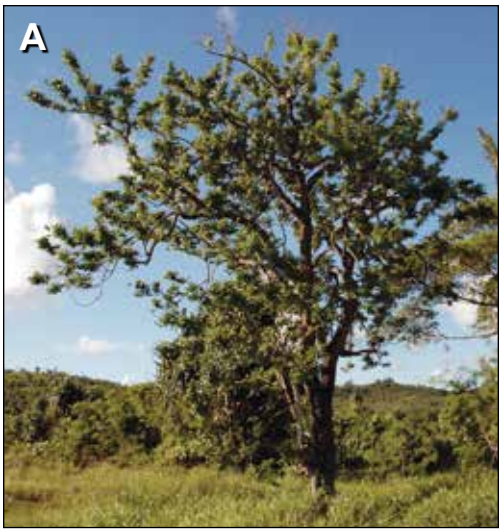
Local and common names:
Yapese: *ngumol*.
Palauan: *ngolm*.
Pohnpean: *mwehk*.

Habitat and description:
A small- to medium-size tree growing in open areas, forest edges, and within agroforests and native forest, generally densely foliated with a rounded or irregular crown. ***Leaves:*** simple, entire, alternate, elliptic, may be unequal in size and variable generally about 5 to 12 cm in length, sometimes asymmetric, petiole 3 to 10 mm, sometimes reddish, young leaves reddish. ***Flowers:*** small and yellow. ***Fruit:*** a flattened round capsule divided into sections, and splitting to reveal red seeds.

Distribution:
Yap, Palau, Chuuk, Pohnpei.

Comments:
Glochidion ramiflorum, as this tree has generally been known, is a variable species that some botanists split into a number of species. It is treated here as one, somewhat variable, species. A second rare species may occur on Yap. Palau and Pohnpei have more distinct species. It is used medicinally and, because of its rough bark, is a good support for growing Piper betle ("gabuey" or pepper leaves) vines to chew with betel nut. Based on DNA studies, this tree may be in the genus *Phyllanthus* in the family Phyllanthaceae and the species yet to be confirmed.

FAMILY	Euphorbiaceae (now Phyllanthaceae)	STATUS	Native



(A) *Glochidion ramiflorum* tree showing branching pattern (with leaves re-sprouting from main branches after defoliation by Typhoon Sudal); (B) fissured trunk; (C) closeup of leaves with flowers; (D) branches with flowers and ripe fruit.

GENUS / SPECIES / AUTHORITY

Macaranga carolinensis Volkens

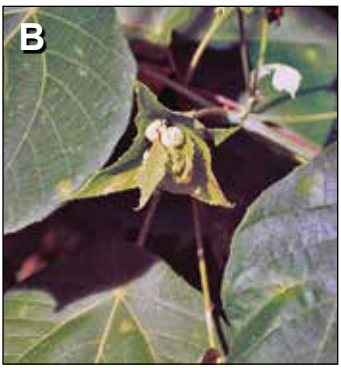
Local and common names:
Yapese: *bith*.
Palauan: *bedel*.
Chuukese: *aput*.

Habitat and description:
A common small- to medium-size tree of disturbed areas and forest edges; irregularly branched shrubby trees with peltate leaves. ***Leaves:*** simple, with shallowly toothed and somewhat wavy margins, alternate; generally shallowly tri-lobed, about 10 to 20 cm long, soft and hairy, peltate (petiole joining leaf blade within margins rather than at edge), with three main veins radiating from point of attachment. ***Flowers:*** Trees are dichotomous (male and female flowers on separate trees), both axillary, with male trees bearing tiny whitish pollen bearing flowers on stalks, and female trees bearing inflorescence within small modified leaves (see photos); seeds a multiparted capsule about 1 cm wide.

Distribution:
Yap, Palau, Chuuk, with another variety found in Pohnpei and Kosrae.

Comments:
Macaranga carolinensis is a common secondary "bandage tree" that grows up in disturbed areas, rapidly forming a canopy and reducing soil erosion. Small plain white-eye birds (*Zosterops conspicillatus*) often chatter about in this tree and may be responsible for its pollination and widespread occurrence. In Palau, the name of the tree is the same as the bird. Used medicinally, and also known as the "toilet paper tree."

FAMILY	STATUS
Euphorbiaceae	Native



(A) *Macaranga carolinensis* tree; (B) female inflorescence with maturing capsules; (C) male inflorescence; (D) leaves from below with light shining through, showing veination; (E) scan of underside of leaf.

GENUS / SPECIES / AUTHORITY

Mallotus papillaris (Blanco) Merr.

Synonym:
Mallotus tiliifolius (Blume) Müll.-Arg.

Local and common name:
Yapese: *burr*.

Habitat and description:
A shrub to small tree, 1.5 to 10 m high, growing in coastal and open areas. Lacks the copious milky sap characteristic of the family. ***Leaves:*** simple, toothed, opposite, broadly ovate with truncate base and acuminate tip, granulose-glandular below, the first pair of basal nerves arising at junction with petiole with descending nerves to leaf margin, dotted with stellate (star-shaped) hairs, young leaves densely hairy. ***Flowers:*** inflorescences terminal at inception but soon appearing axillary or lateral, pilose, sepals three to five, pale green to yellow, male flowers with numerous stamens, female flowers with usually 3-parted ovary, each with a single ovule, styles short, connate, stigmas spreading. ***Fruit:*** three-parted, hairy; seeds roundish with fleshy covering.

Distribution:
Yap, Palau, Chuuk and Pohnpei, Formosa, Phillipines, western Malesia east to Fiji.

Comments:
Superficially like *Macaranga* ("bith"), but can be distinguished by a petiole that meets the leaf blade at the margin and the truncated leaf base. Trees have a musty smell like that of *Pteropus* fruit bats (magalaw) and are thus sometimes called "burr," the name applied to a locally named variety of *Pteropus mariannensis yapensis*.

FAMILY	STATUS
Euphorbiaceae	Native

(A) *Mallotus papillaris* flowering branches; (B) leaf veination; (C) inflorescence; (D) leaf with truncated base.

GENUS / SPECIES / AUTHORITY

Acacia auriculifolia A. Cunn., *Acacia mangium* Willd., *Acacia confusa* Merr., *and Acacia* spp.

Local and common names:
Yapese: *akasia*.

Habitat and description:
Small- to medium-size introduced trees. ***Leaves:*** bipinnate as seedlings, becoming phylodes (a leaf-like petiole) in adult trees, appearing like simple, entire, alternate, often falcate, leathery leaves. ***Flowers:*** in cylindrical spikes with many exerted stamens. ***Fruit:*** pods.

A number of species have been introduced to Yap, the most common recent introductions being *Acacia auriculifolia* A. Cunn., and less common *A. mangium* Willd. *Acacia confusa* Merr., a nicely shaped small tree with small leaves was introduced earlier. A group of about 10 other acacias were planted near the sports complex and at Touplaiy.

Distribution:
A very large genus with those recently introduced to Yap in the subgroup Heterophyllum, which are mainly from Australia. *Acacia confusa* was introduced before World War II. It is from the northern Philippines but is naturalized extensively in Taiwan, Okinawa, and Rota.

Comments:
Acacia confusa can be found in a few scattered areas where it was planted. It does not seem to set seeds and spread on Yap and Palau. On Saipan and Rota, however, where seeds were widely scattered for erosion control, this tree is very common in some areas. *A. auriculifolia* produces many seeds that germinate readily after a fire, forming dense thickets in some places.

FAMILY / SUBFAMILY	STATUS
Fabaceae / Mimosoideae (family formerly was Leguminosae)	Introduced

(A) *Acacia auriculifolia* tree; (B) *A. auriculifolia* trunk; (C) *A. auriculifolia* flowering branch; (D) *A. mangium* trunk; (E) *A. mangium* leaves; (F) *A. confusa* crown.

GENUS / SPECIES / AUTHORITY

Adenanthera pavonina L.

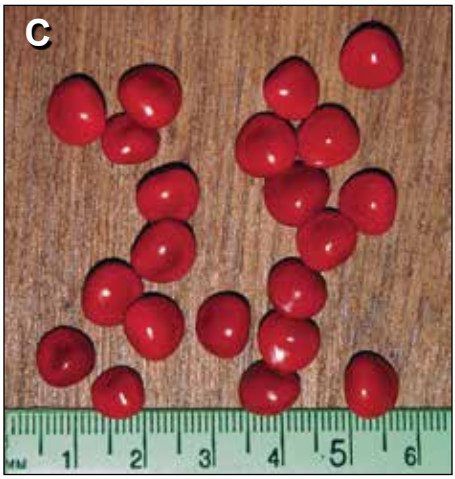
Local and common names:
English: red sandalwood tree; false wiliwili.
Yapese: *churruwa*.
Chamorro: *kolales*.
Hawaii: *hua'-'ula'ula*.

Habitat and description:
A potentially large spreading tree. ***Leaves:*** even bipinnate with three to five pinnae, each with five to nine pairs of leaflets about 1.5 to 4.5 cm long by 1.2 to 2.3 cm wide. ***Flowers:*** with white to pale yellow petals and stamens, stamens numerous forming puff ball as is characteristic of the mimosoideae group of legumes. ***Fruit:*** a curled pod containing bright red lens-shaped seeds almost 1 cm in diameter.

Distribution:
Introduced throughout Micronesia; Originally from southeastern Asia and Malesia but now widely cultivated and naturalized, and producing many seedlings.

Comments:
A somewhat invasive species that can form thickets where seed falls, but reported to be good for timber. The bright red seeds are used as beads and were used as weights by Arab goldsmiths, being nearly 4 grains each. Branches are somewhat brittle and easily broken by storms. Trunk may appear twisted (see photo).

FAMILY / SUBFAMILY	STATUS
Fabaceae / Mimosoideae (family formerly was Leguminosae)	Introduced



(A) *Adenanthera pavonina* upper branches showing even bipinnate leaves; (B) trunk; (C) seeds with scale in millimeters.

GENUS / SPECIES / AUTHORITY

Albizia lebbeck (L.) Benth., and *Albizia* spp.

Local and common names:
English: siris tree; white monkeypod; "mother in law's tongue."
Chamorro: *trongkon-kalaskas*.
Carolinian: *schepil kalaskas*.

Habitat and description:
A medium to large introduced tree with ascending branches forming a rounded crown, trunk grey or brown, produces gum. ***Leaves:*** compound, evenly bipinnate, with two to four pairs of pinnae and six to eight pairs of leaflets. ***Flowers:*** borne in loose heads above leaves, white, aging cream, fragrant, about 4 to 5 cm in diameter; ***Fruit:*** broad leathery pods, about 30 cm long and 5 to 6 cm wide, that show the seed outline on both sides.

At least two other species of *Albizia* are reported from Yap: *A. retusa*, and *A. rotundata* Bl. ex. Miq. *Albizia* are characterized by their bipinnate leaves, petiole and rachis with glands, and heads of globose flowers, which, if you look carefully, are generally 5-merous, usually bisexual, calyx toothed, petals connate to or beyond the middle, stamens 10 (per flower), connate basally, exerted. ***Fruit:*** an indehiscent flat pod.

Distribution:
Introduced in Micronesia, a paleotropical species, Africa, tropical Asia, Australia.

Comments:
When the pods mature, the tree may lose its leaves, leaving the loose seeds in the pods chattering in the wind, thus the name "mother in law's tongue." The wood is used for cabinet work, like walnut but heavier. In Java, the powdered bark is used for soap; in India, bark, seeds, and flowers are used medicinally and the leaves used for fodder.

FAMILY / SUBFAMILY	STATUS
Fabaceae / Mimosoideae (family formerly was Leguminosae)	Introduced

(A) *Albizia lebbeck* tree; (B) flower; (C) branches with mature seed pods.

GENUS / SPECIES / AUTHORITY

Caesalpinia sappan L.

Synonym:
Biancaea sappan Todaro.

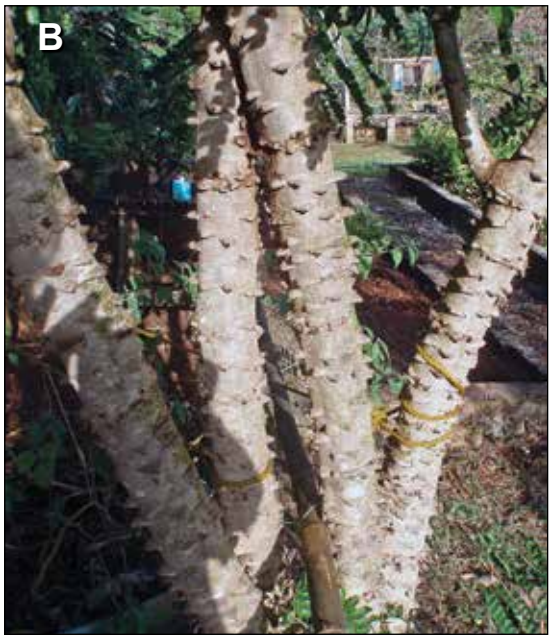
Local and common names:
English: Indian brazilwood.
Yapese and in the Philippines, Marianas, and Guam: *sibucao*.

Habitat and description:
Small introduced tree now rare on Yap. Trunk and branches have distinctive raised prickles (see photo), similar to *Caesalpinia pulcherrima*, the bushy ornamental "caballero" or "pride of Barbados," called "long tail" on Yap. ***Leaves:*** even bipinnate up to 50 cm in length, with about 20 pairs of pinnae, each with 10 to 15 pairs of small, medium-green leaflets, each less than 2 cm long. ***Flowers:*** long terminal racemes of showy yellow or red and yellow flowers. ***Fruit:*** Seed pod is large with a distinctive beak at the far tip (see photo), about 7.5 to 10 cm long by 4 cm wide, hard and glossy, with three to four seeds.

Distribution:
Native to India but introduced to other areas for its showy flowers and red heartwood, which is used to make dyes. It is also used medicinally.

Comments:
The name "sibucao" used by old timers on Yap may have been derived from the name used in the Marianas or Philippines. This small tree was probably introduced to Yap in the 1800s during the Spanish administration of Yap. Its wood is said to have been exported from Yap to Japan prior to World War II. When the wood is boiled in water, the water becomes red. It is used medicinally and to make dyes and ink.

FAMILY / SUBFAMILY	STATUS
Fabaceae / Caesalpinioideae (family formerly was Leguminosae)	Introduced



(A) *Caesalpinia sappan* leaves and immature seed pods; (B) spiny trunk; (C) beaked seed pod and seeds.

GENUS / SPECIES / AUTHORITY

Cynometra ramiflora L.

Local and common names:
Yapese: *manbul*.
Palauan: *kalengui*; *ketenguit*.
Chamorro: *gulos*.

Habitat and description:
A medium to large shrubby tree generally growing in wet areas such as inner edge of mangroves and along rivers and other undisturbed areas. ***Leaves:*** 1-pinnate with four leaflets, one large pair at tip of leaf, and another pair of small leaves at the base of the leaf. Leaflets are not symmetric with outer margin more curved than inner margin like a goats foot; young leaves often limp and whitish or pink (see photo C of seedling). ***Flowers:*** white, in short axillary racemes or on stem. ***Fruit:*** roundish, about 3 to 4 cm in diameter and with ridges and grooves that make them resemble little brains.

Distribution:
Yap, Palau, Marianas, Pohnpei, Kosrae, and from Malaysia to Western Pacific.

Comments:
A different species, *Cynometra yokotai*, is listed for Chuuk.

FAMILY / SUBFAMILY	STATUS
Fabaceae / Caesalpinioideae (family formerly was Leguminosae)	Native

Agnes Rinehart

(A) *Cynometra ramiflora* tree; (B) flowers; (C) seedling showing blush of new leaves; (D) trunk; (E) leaves and seed.

GENUS / SPECIES / AUTHORITY

Delonix regia (Boj.) Raf

Local and common names:
English: flame tree.
Spanish/Chamorro: *arbol* (or *atbut*) *del fuego*.
Carolinian: *fayarbaw*.
French: royal poinciana.

Habitat and description:
A medium-size tree with light gray bark and a rounded spreading crown. ***Leaves:*** even bipinnate, whole leaf about 30 to 60 cm long, with 10 to 20 pairs of pinnae, each with 25 to 35 pairs of leaflets; stipules bipinnate with three to six pairs of leaflets. ***Flowers:*** large, fiery red flowers with the uppermost petal all red or yellow or white with red streaks, born in clusters at branch tips. ***Fruit:*** a large, flat pod, about 50 to 60 cm long, containing numerous grey-brown seeds.

Distribution:
Planted and generally naturalized throughout Micronesia, originally from Madagascar but now planted widely in the tropics.

Comments:
An increasingly planted ornamental tree on Yap with spectacular red flowers.

FAMILY / SUBFAMILY	STATUS
Fabaceae / Caesalpinioideae (family formerly was Leguminosae)	Introduced

(A) *Delonix regia* branch in bloom; (B) flowers, (C) petals below tree; (D) tree in bloom.

GENUS / SPECIES / AUTHORITY

Dendrolobium umbellatum (L.) Benth.

Synonym:
Desmodium umbellatum (L.) DC.

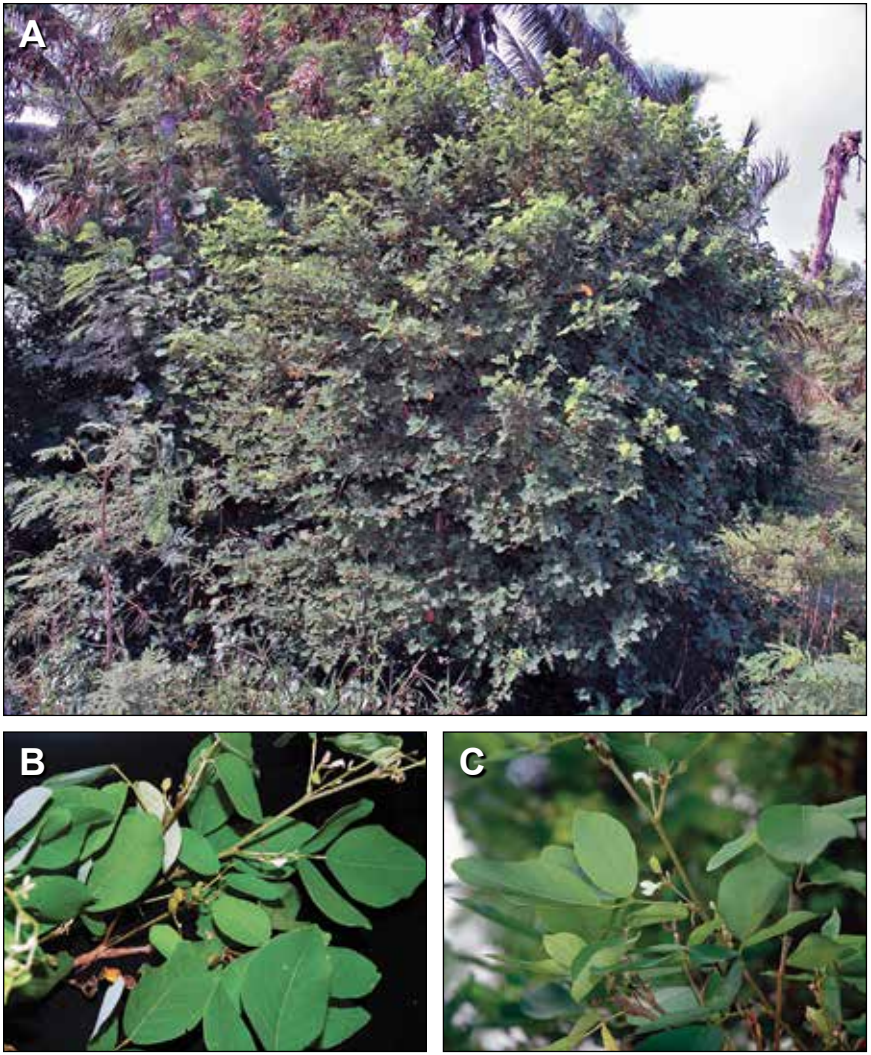
Local and common names:
Chamorro: *palaga hititai*.

Habitat and description:
A shrub to shrubby small tree generally growing in rocky coastal areas. ***Leaves:*** trifoliate (compound with three leaflets), on 2 to 4 cm long petioles, each leaflet ovate-oblong or oblong-elliptic, light grayish green below, about 4 to 8 cm long by 3 to 5 cm wide, middle leaflet larger than side leaflets. ***Flowers:*** small and white pea-shaped flowers. ***Fruit:*** flat pods 2 to 3 cm long by about 5 mm wide, 1- to 5-jointed, pods constricted on both sides between multiple joints containing seeds.

Distribution:
Yap and throughout Micronesia and elsewhere from Tropical Asia north to Taiwan and Okinawa.

Comments:
A large bush to bushy small tree sometimes seen along causeways or rocky coasts in Yap and more common elsewhere in Micronesia. The seeds stick to clothing, helping the plant to be spread.

FAMILY / SUBFAMILY	STATUS
Fabaceae / Papilionoideae (family formerly was Leguminosae)	Introduced



(A) *Dendrolobium umbellatum* tree; (B) and (C) leaves and flowers.

GENUS / SPECIES / AUTHORITY

Erythrina variegata var. *orientalis* (L.) Merr.; *Erythrina fusca* Lour.

Local and common names for *Erythrina variegata* var. *orientalis*:
English: coral tree, catclaw tree.
Yapese: *rarr*.
Chamorro: *gaogao*.

Habitat and description:
Medium to large tree with spiny gray trunk and branches.

Erythrina variegata: ***Leaves:*** tripinnate, with long petiole 10 to 12 cm long, three leaflets each about 10 to 15 cm long and broad. ***Flowers:*** about 6 cm long, in long racemes up to 20 cm, with dark to scarlet red petals, very unequal. ***Fruit:*** a knobby, irregularly swollen pod bearing red seeds about 1.5 cm long.

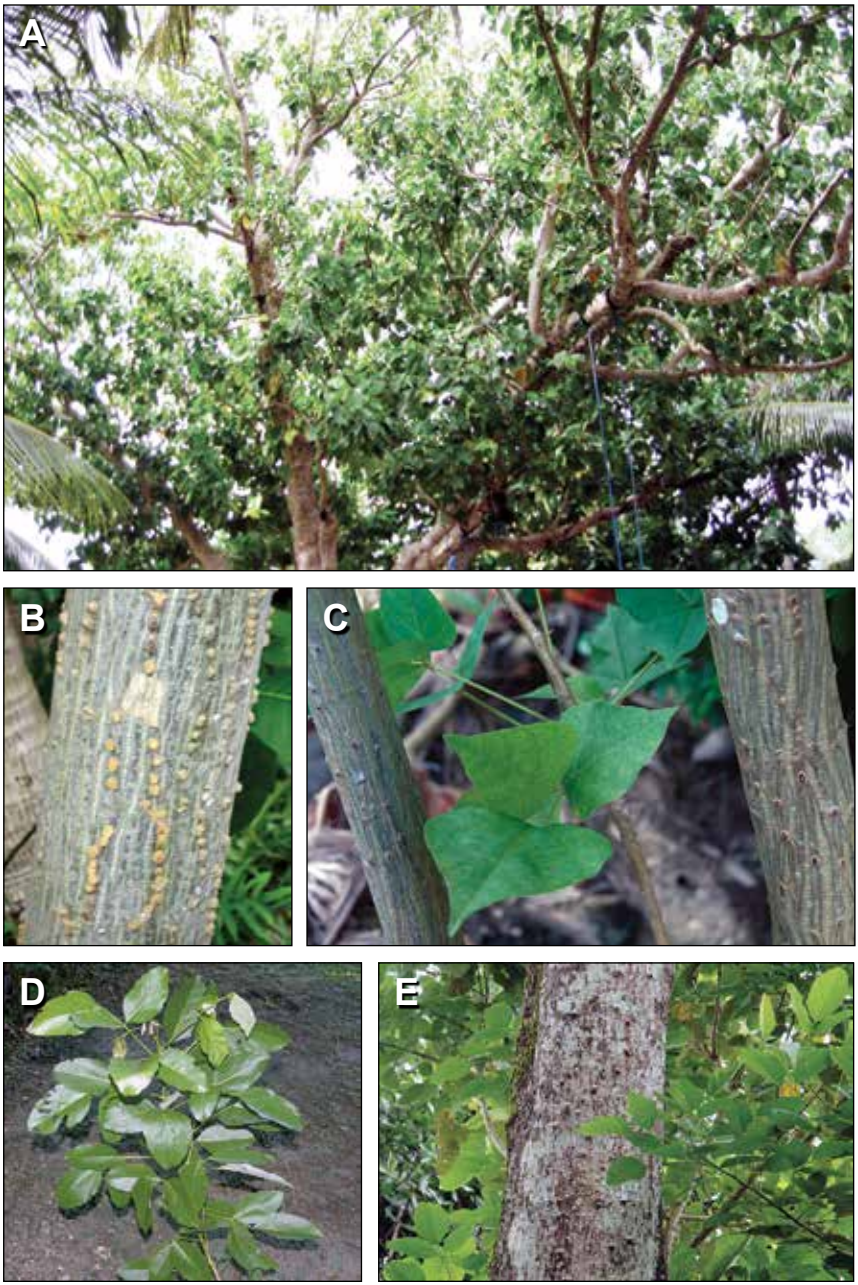
Erythrina fusca is less common and can be distinguished by the rounded tips of the leaflets (see photo D), and dark, almost purple flowers.

Distribution:
Erythrina variegata: Throughout Micronesia, especially in outer atolls; native to India, found in Asia and many parts of Pacific.

Erythrina fusca: In Micronesia: Yap, Palau, Kapingamarangi, Pohnpei, Kosrae, and North Malaya.

Comments:
Deciduous, sometimes dropping all of its leaves, and then bearing a mass of bright red flowers. Sometimes used as an indicator of season. The variety *variegata*, which has leaves that are mottled with yellow, was introduced to Pohnpei as an ornamental. This is the first record of *Erythrina fusca* for Yap. Readily sprouts from cutting.

FAMILY / SUBFAMILY	STATUS
Fabaceae / Papilionoideae (family formerly was Leguminosae)	Native



(A) crown of *Erythrina variegata*; (B) base of *E. variegata*; (C) leaves of *E. variegata;* (D) leaves of *E. fusca*; (E) trunk of *E. fusca.*

GENUS / SPECIES / AUTHORITY

Falcataria moluccana (Miq.) Barneby & J.W. Grimes

Synonyms:
Paraserianthes falcataria L.,
Albizia falcataria (L.) Fosb.,
Albizia moluccana Miq.

Local and common names:
English and Yapese: albizia.
Pohnpean: *tuhke karisihn* (kerosene tree).

Habitat and description:
A tall tree with layered subcrowns and mostly smooth, light gray bark planted about inhabited areas and in secondary vegetation, not yet common on Yap. ***Leaves:*** even bipinnate, alternate, whole leaf about 23 to 30 cm long, with gland below lowest pair of leaflets, 10 to 12 pairs of pinnae (side branches bearing leaflets), each with 30 to 40 sessile (no stalk), oblong leaflets about 6 to 13 mm long by 3 to 5 mm wide with midrib offset to one side. ***Flowers:*** in large, branched clusters (panicles), 20 to 25 cm long, flowers sessile (no stalk), about 13 mm long, whitish, with light green bell-shaped five-toothed calyx, greenish white corolla 6 mm, with five lobes and many stamens. ***Fruit:*** narrow, flat pods 10 to 13 cm long, 2 cm wide, green maturing brown and splitting open; seeds 15 to 20 oblong bean-like seeds about 6 mm long.

Distribution:
Recorded by Fosberg et al. (1979) from Palau, but now also found in Yap. In Pohnpei it has spread widely in lowlands. Originally from Moluccas, New Guinea, New Britain, and Solomon Islands and introduced to other areas. The botanical name has gone through a number of changes in recent years.

Comments:
Introduced to Hawaii and Micronesia as a timber and reforestation species. It is very fast-growing, has naturalized, and in Pohnpei is spreading. Said to be called "mother of gardens" in New Guinea because it springs up on abandoned local gardens and improves soil fertility for the next garden cycle.

FAMILY / SUBFAMILY	STATUS
Fabaceae / Mimosoideae (family formerly was Leguminosae)	Introduced

(A) *Falcataria moluccana* tree; (B) flowers; (C) branches with seed pods.

GENUS / SPECIES / AUTHORITY

Gliricidia sepium Steud.

Local and common names:
Spanish: *madre de cacao.*

Habitat and description:
Small introduced tree generally planted along roads. Bark pale, stems ascending. ***Leaves:*** 1-pinnate with six to eight pairs of leaflets and a terminal leaflet at end, about 3.5 to 8.5 cm long by 2 to 5 cm wide, smooth. ***Flowers:*** borne on short stiff racemes about 10 cm long, pedicles 8 to 12 mm long, jointed at tip, pea-shaped as is characteristic of this subfamily of legumes, about 2 cm long, petals light to dark pink with yellow stripes on standard (broad forward fused petals), dorsal side slightly hairy. ***Fruit:*** pods 8 to 16 cm long by 1.5 to 1.9 cm wide, with two to nine seeds.

Distribution:
Widely introduced in Micronesia generally through agricultural programs; originally from Mexico, Central America, and Northern South America, now widespread.

Comments:
Widely introduced as an ornamental, green manure, living fence, and for shade. The Spanish name "madre de cacao," (mother of cacao) relates to its use as a nurse/shade tree when starting cacao seedlings. Sometimes called "mata raton;" seeds and bark used as a rat or mouse poison. Fast growing.

FAMILY / SUBFAMILY	STATUS
Fabaceae / Papilionoideae (family formerly was Leguminosae)	Introduced

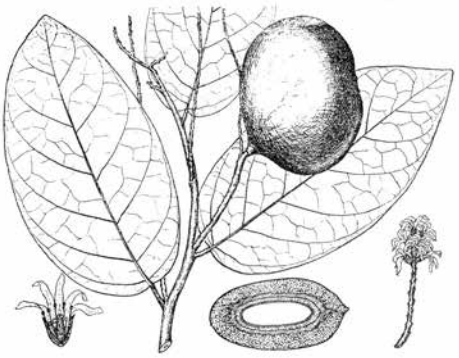
(A) *Gliricidia sepium* branches; (B) flowers; (C) leaves.

GENUS / SPECIES / AUTHORITY

Inocarpus fagifer (Park.) Fosb.

Synonym:
Inocarpus edulis J.R. Forst. & G. Forst.

Local and common names:
Yapese: *buoy*.
Palauan: *keam*.
Chamorro: *buoy* .
Chuukese: *kurrat*.
Pohnpean: *marup*.
Kosraean: *clark*.
Marshallese: *kulak*.
Fiji: *ivi*.

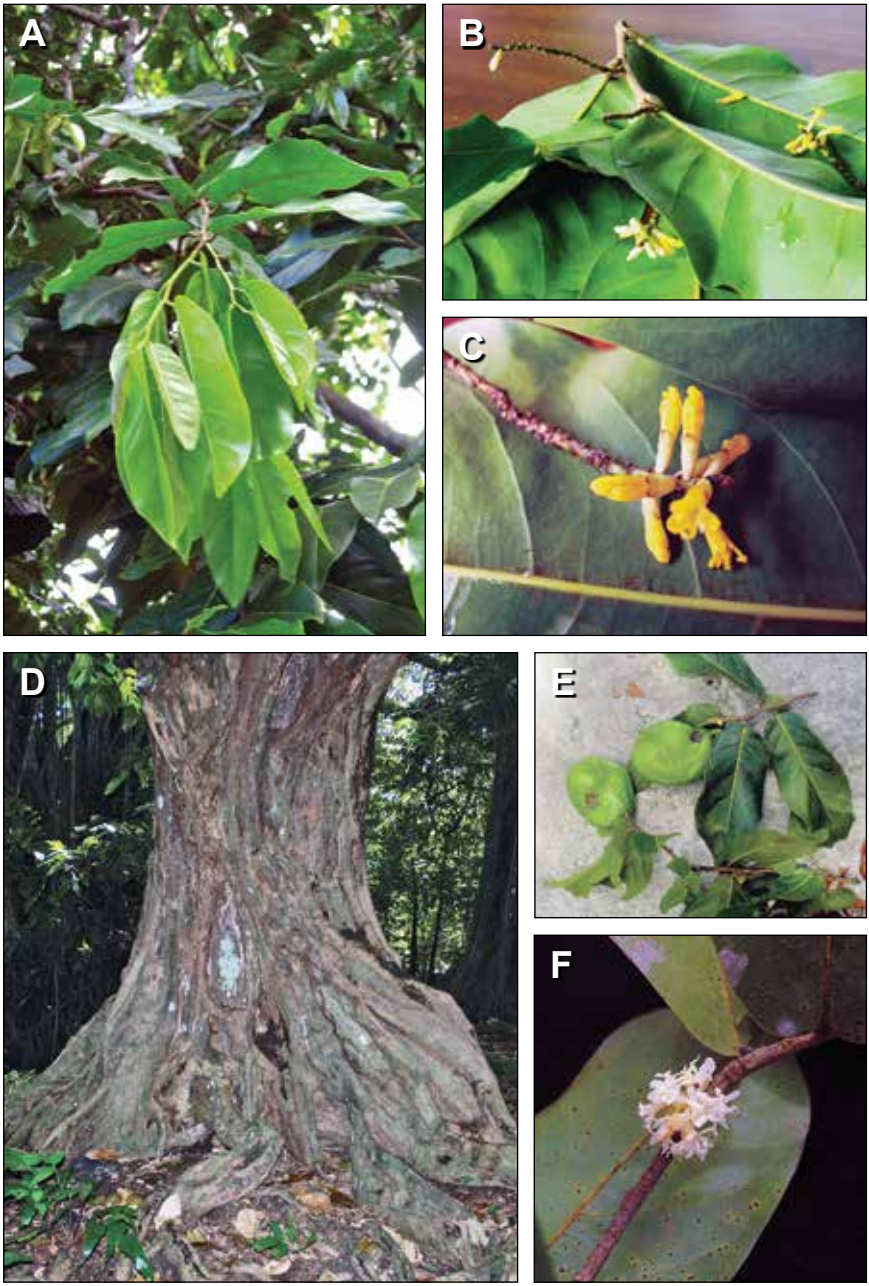


Habitat and description:
A large tree with a gnarled, fluted, and buttressed trunk with lots of character; common in agroforests, along streams, and in wet areas, bearing large round flat bean pods; branches long and drooping. ***Leaves:*** simple, entire, alternate, oblong, smooth and leathery, 15 to 30 cm long by 8 to 14 cm broad, with short petioles. ***Flowers:*** born on spikes, small, white to yellowish, fragrant; calyx with two to three rounded lobes, petals connected at base, male flowers born in clusters close to branch. ***Fruit:*** a large flattened round pod with 1 seed about 7 to 10 cm long by about 7 cm wide and 4 to 5 cm thick, with considerable variation between local varieties.

Distribution:
Throughout Micronesia and Malaysia to Polynesia; probably distributed by people.

Comments:
An important food tree in Yap, the nut being roasted or boiled for food, providing a good source of both protein and carbohydrates. Trees bearing only staminate flowers are uncommon and are used for medicine. The Chamorro name given in Stone (1970–1971) is probably derived from the Yapese name for the few trees present on Guam.

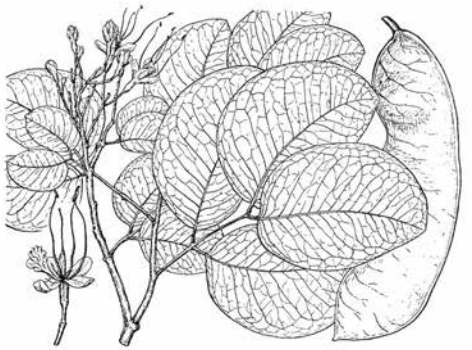
FAMILY / SUBFAMILY	STATUS
Fabaceae / Papilionoideae (family formerly was Leguminosae)	Introduced



(A) *Inocarpus fagifer* branch; (B) and (C) leaves and flowers; (D) gnarled old trunk; (E) fruit; (F) staminate flowers.

GENUS / SPECIES / AUTHORITY

Intsia bijuga (Colebr.) O. Ktze



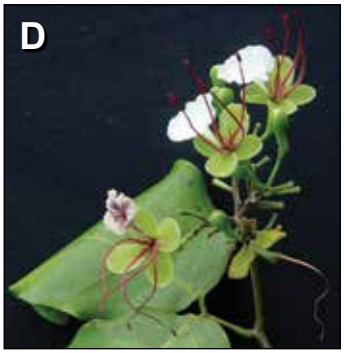
Local and common names:
Yapese: *thorrot*.
Carolinian: *iifil*.
Palauan: *dort*.
Chamorro: *ifil*; *ifet*.
Chuukese: *kuren*; *tuamis*.
Pohnpean: *choyo*; *show*.
Marshallese: *kubok*.
Fiji: *vesi*.

Habitat and description:
A medium to large uncommon tree growing at forest edges and in secondary areas, with tall, smooth-barked trunk and branches crowded toward top producing a rounded crown. ***Leaves:*** compound, even pinnate with four entire to wavy-margined leaflets 8 to 15 cm long, elliptic and asymmetric, medium to dark green with a light midrib. ***Flowers:*** borne on axillary or terminal panicles, each flower having one flamboyant white to pink petal, a long curved style, and three long pink stamens above a four-parted green calyx. ***Fruit:*** a large, thick, leathery pod 10 to 30 cm long, elliptic-oblong; with three to six rounded compressed, somewhat kidney shaped seeds, about 2.5 cm broad.

Distribution:
Throughout Micronesia, native from Indian Ocean east to Polynesia. Listed as vulnerable in the IUCN Red List of Threatened Species.

Comments:
A fine tree, especially valued for its hard and reddish-brown wood that is so dense it will not float in seawater. Valued for carvings, bowls, and historically, Fijian clubs. Objects made of iifil wood are termite-resistant, durable, and can be passed down for generations.

FAMILY / SUBFAMILY	STATUS
Fabaceae / Caesalpinioideae (family formerly was Leguminosae)	Native



(A) *Intsia bijuga* tree with flowers and seed pods; (B) smooth trunk; (C) leaves; (D) new and old flowers.

GENUS / SPECIES / AUTHORITY

Leucaena leucocephala (Lam.) De wit.

Synonym: *Leucaena glauca* (L.) Benth.

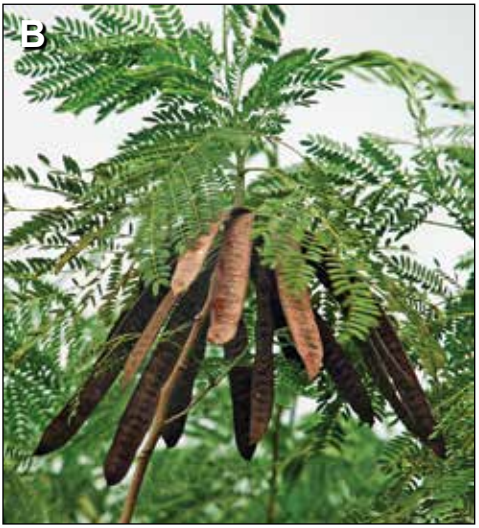
Local and common names:
Yapese: *ganinityuwan*.
Palauan: *telengtungd*.
Chamorro: *tangan-tangan*.

Habitat and description:
A common shrub to small- or medium-size rangy tree growing in disturbed areas. ***Leaves:*** compound, even bipinnate, up to about 25 cm long with 4 to 9 pairs of pinnae (side branchlets), each with 11 to 17 pairs of small leaflets. ***Flowers:*** white "puff balls" up to about 3 cm in diameter, made up of many flowers with short petals and long white stamens. ***Fruit:*** long flat pods about 10 to 20 cm long by about 2 cm wide, which mature from green to brown, with many flat, oval, shiny dark brown seeds.

Distribution:
Originally from Tropical America, now widespread and found throughout Micronesia, especially on limestone soils.

Comments:
An introduced species which has naturalized and spread widely, especially in the limestone Marianas. It resprouts from cut stumps, grows readily from both seeds and cuttings, and tends to produce pure stands. It is used for firewood, charcoal, and green manure (fertilizing mulch). It can also be used as an animal fodder, but contains mimosine, a chemical that can affect pigs and other animals if they eat it extensively. A giant variety has been introduced to Yap, and a native small shrub to well-formed small tree species occurs on Guam. The Yapese name for this species refers to its tiny leaflets.

FAMILY / SUBFAMILY	STATUS
Fabaceae / Mimosoideae (family formerly was Leguminosae)	Introduced



(A) *Leucaena leucocephala* leaves and flowers; (B) leaves and mature seed pods; (C) trunk.

GENUS / SPECIES / AUTHORITY

Millettia pinnata (L.) Panigrani

Synonym:
Pongamia pinnata (L.) Merr.

Local and common names:
Yapese: *ngelak*.
Palauan: *kisaks*.

Habitat and description:
Small- to medium-size tree generally growing in coastal areas. ***Trunk:*** relatively straight, bark dull gray, smooth to slightly fissured. ***Leaves:*** compound, 1-pinnate with a single leaflet at the tip, about 25 cm long, with five to nine or two to three pairs of leaflets, each about 8 to 15 cm long; glabrous, elliptic-oblong, acuminate (coming to a tip), relatively light green. ***Flowers:*** white, pale pink or lilac, 1.5 to 2 cm long, in large racemes to 20 cm. ***Fruit:*** elliptic-oblong pale brown pods with curved beak, 3 to 5 cm long with two 2-cm-long seeds.

Distribution:
Throughout Micronesia and the Indian to Pacific Oceans.

Comments:
Medicinal; can be propagated by seeds or cuttings.

FAMILY / SUBFAMILY	STATUS
Fabaceae / Papilionoideae (family formerly was Leguminosae)	Introduced

(A) *Millettia pinnata* tree; (B) seedling; (C) mature leaf.

GENUS / SPECIES / AUTHORITY

Ormocarpum cochinchinense (Lour.) Merr.

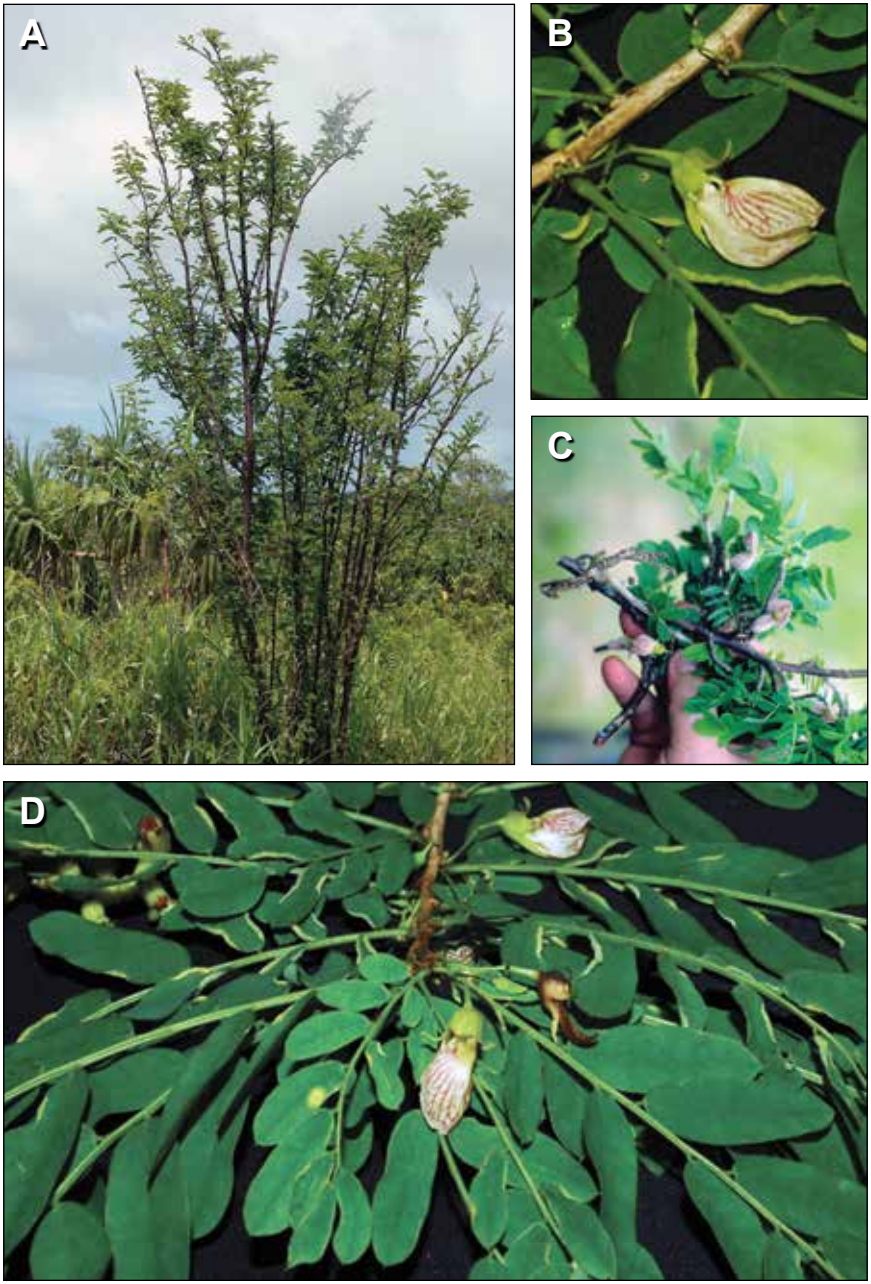
Local and common names:
Yapese: *gangich*; *lal*.
Palauan: *kenges*.

Habitat and description:
A shrub to small erect tree, generally of more open areas and planted along paths as a hedge. ***Leaves:*** 1-pinnate with leaflets 10 to 20 mm by 3 to 10 mm; dark green. ***Flowers:*** white with purplish tinge with dark veins in petals. ***Fruit:*** pods constricted between seeds.

Distribution:
Yap, Palau, Chuuk in Micronesia; also in Indochina.

Comments:
The popular name "lal" likens the dark-veined petals to fly wings. Introduced to Yap and often planted as a hedge along paths in agroforest and in savanna, where it persists and serves to mark the trail. Though hardy and persistent, it doesn't seem to be invasive. Has a strong smell of bean plants. Chewed as a treatment for lime burn of the mouth resulting from the use of quicklime when chewing betel nut.

FAMILY / SUBFAMILY	STATUS
Fabaceae / Papilionoideae (family formerly was Leguminosae)	Introduced



(A) *Ormocarpum cochinchinense* whole shrub; (B) flower; (C) branch tip; (D) leaves and flowers.

GENUS / SPECIES / AUTHORITY

Pericopsis mooniana Thw.

Synonym:
Pericopsis ponapensis (Hosok.) Hosok.

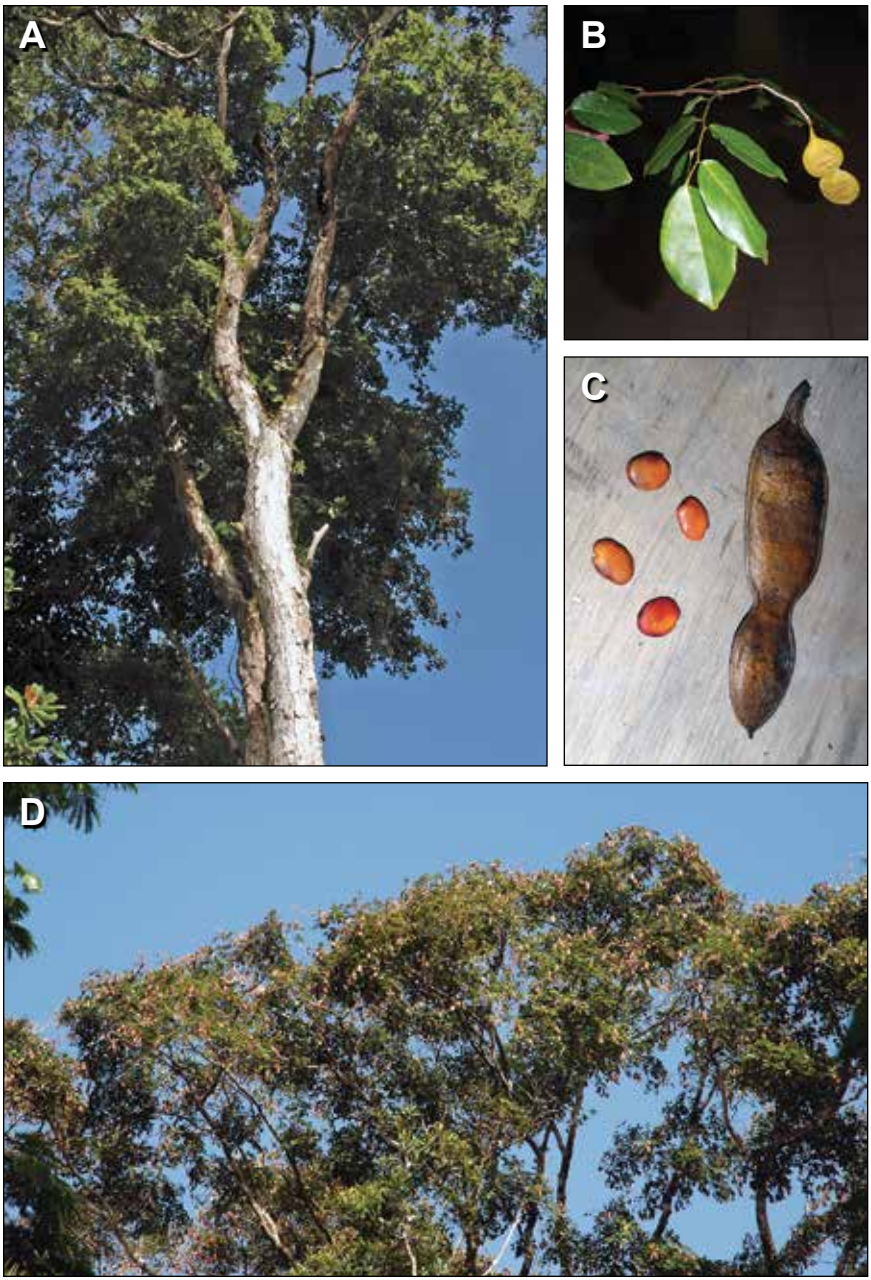
Local and common names:
English: nedun tree.
Palauan: *kamanois*.

Habitat and description:
Medium to large trees generally growing along rivers and coast, with thin, flaking bark. ***Leaves:*** alternate, 1- pinnate, with single tip leaflet (imparipinnate) with a slight knee-like swelling at the base of the petiole, five to nine leaflets generally alternate, 3 to 9 cm by 2.5 to 5 cm, three (on seedling) rounded at base, pointed at tip, smooth (glabrous), may be somewhat unequal in size and slightly asymmetric, with about four to six veins prominent; petiolule (petiole of leaflet) may be curved or straight. ***Flowers:*** borne in group axillary or terminal, falling early; flowers about 2 cm long. ***Fruit:*** a large thick pod often constricted between seeds into one to three lobes, seeds about 9 to 13 mm, round to elliptical, orange brown with a notch at one end (see photo).

Distribution:
Yap, Palau, and Pohnpei in Micronesia. Also Indonesia, Malaysia, Papua New Guinea, and Sri Lanka. It has been so heavily harvested that it is now listed as vulnerable on the IUCN Red List of Threatened Species.

Comments:
Uncommon to rare on Yap. This tree should be protected and planted. It has beautiful wood. This tree was initially considered to be endemic to Pohnpei by the Japanese botanist Hosokawa, who named it *Pericopsis ponapensis*. The genus is tropical and contains but three species: two in tropical Africa, and one species found from Sri Lanka to Micronesia.

FAMILY / SUBFAMILY	STATUS
Fabaceae / Papilionoideae (family formerly was Leguminosae)	Native



(A) *Pericopsis mooniana* trunk; (B) leaves; (C) seed pod and seeds; (D) crown with seed pods.

GENUS / SPECIES / AUTHORITY

Pterocarpus indicus Willd.

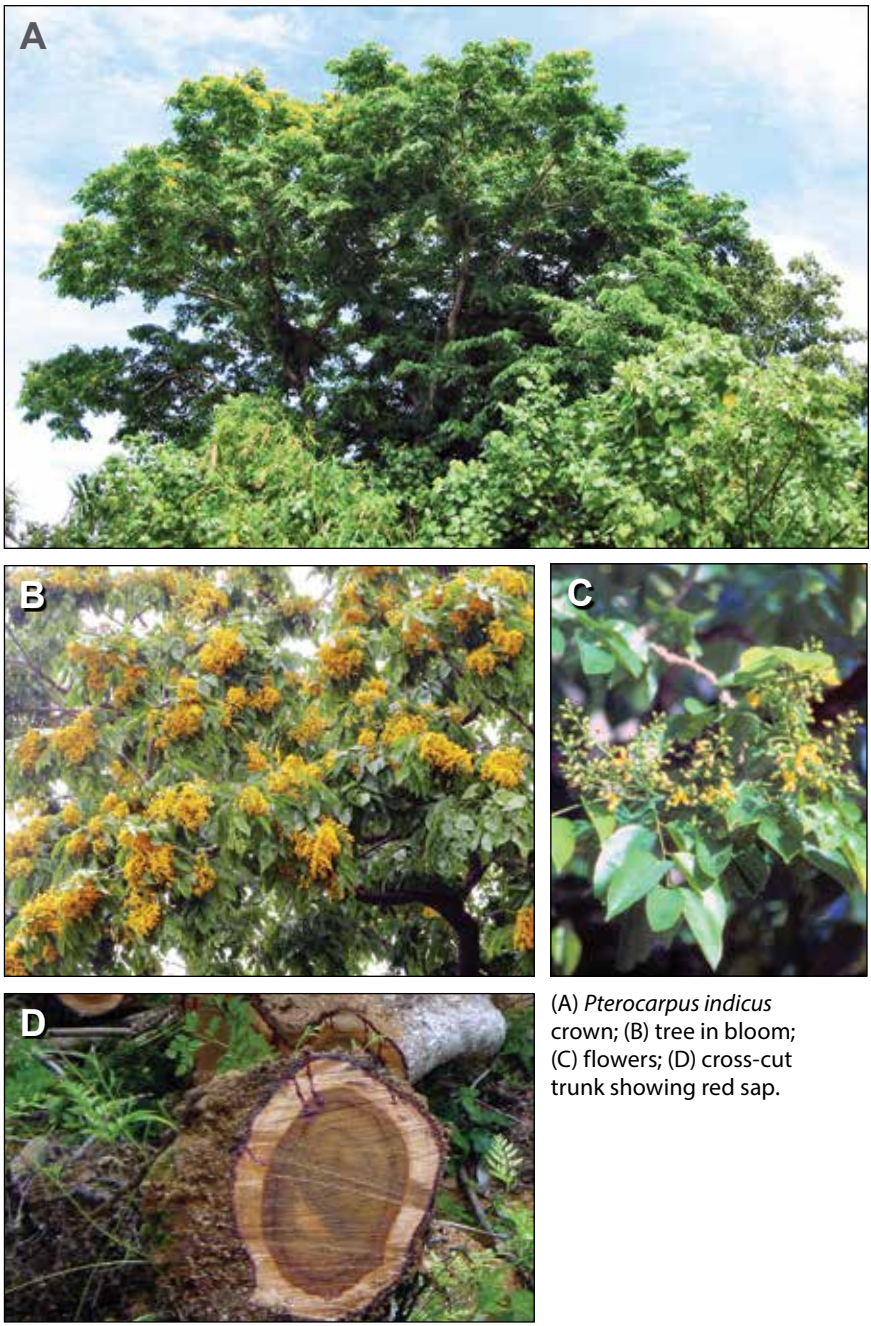
Local and common names:
English: rosewood.
Yapese: *lach*.
Palauan: *las*.
Chamorro: *nana*.
Philippines: *narra*.
Malay: *angsana*.

Habitat and description:
A medium to large tree with stout trunk, often buttressed, and spreading, rounded crown. ***Leaves:*** Compound, 1-odd pinnate, up to about 30 cm long, with 6 to 12 alternate oval leaflets, each about 7 to 11 cm long, 3.5 to 5.5 cm wide, and pointed at the tips. ***Flowers:*** bright yellow, fragrant, born in clusters above leaves. ***Fruit:*** round pods thick in the center with thin edges, bearing one to three seeds.

Distribution:
Indigenous to western Carolines, planted and naturalized in eastern Carolines, and widespread in tropical Asia, Malaysia, and the Philippines.

Comments:
A fine, strong hardwood, with sticky red sap that "bleeds" when cut (see photo D); listed as vulnerable on the IUCN Red List of Threatened Species.

FAMILY / SUBFAMILY	STATUS
Fabaceae / Caesalpinioideae (family formerly was Leguminosae)	Native



(A) *Pterocarpus indicus* crown; (B) tree in bloom; (C) flowers; (D) cross-cut trunk showing red sap.

GENUS / SPECIES / AUTHORITY

Samanea saman (Jacq.) Merr.

Synonyms:
Pithecellobium saman (Jacq.) Benth. in Hook);
Albizia saman (Jacq.) F. Muell.

Local and common names:
English: monkeypod.
Chamorro: *trongkon-mames* (bean tree).
Carolinian: *filinganga*.

Habitat and description:
A very large, spreading tree with a straight thick trunk and dome-shaped crown above robust branches. Crown is often broader than the tree is tall. The huge tree in Colonia is a monkeypod tree. ***Leaves:*** deep green, 2-even pinnate, each leaf with two to eight pairs of pinnae, and each pinna with four to seven pairs of ovate leaflets, 3 to 6 cm long; ***Flowers:*** borne on loose heads that rise above leaves and appear pink because of the numerous bright pink stamens; ***Fruit:*** thick pods with a lumpy black surface, about 20 cm long by 2 cm wide, containing a sweetish pulp and numerous seeds.

Distribution:
Introduced throughout Micronesia, native to tropical America. Brought to Guam by Safford in the early 1900s, and widely planted as a shade tree.

Comments:
The leaves of this tree droop down at night and on cloudy, rainy days; wood is used for carving.

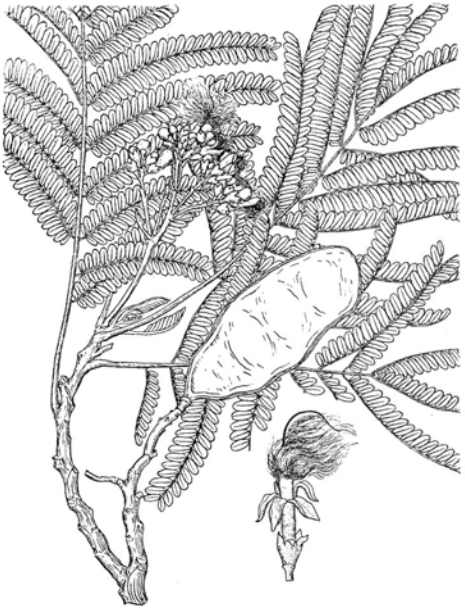
FAMILY / SUBFAMILY	STATUS
Fabaceae / Mimosoideae (family formerly was Leguminosae)	Introduced

(A) *Samanea saman* tree;
(B) blooming branches;
(C) leaf and flower.

GENUS / SPECIES / AUTHORITY

Serianthes kanehirae var. *yapensis* Fosb.

Local and common names:
Yapese: *gumor*.
Palauan: *ukall*; *ugal*.



Habitat and description:
A tall, robust tree with a straight, erect trunk, in lowland forest; young branches, petioles and inflorescences pubescent with rusty brown hairs. ***Leaves:*** even bipinnate with 8 to 12 pinnae, each with 15 to 25 leaflets that are elliptical, 12 mm long by 5 mm wide and almost sessile. ***Flowers:*** white to cream, borne in short terminal panicles, calyx brown, funnel shaped, 3- or 4-cleft, pubescent externally, corolla tubular, 2 cm long, 5-cleft, stamens numerous, bases united into a tube. ***Fruit:*** a large thick, compressed woody pod, 10 to 15 cm long, 5 cm wide; seeds two to five per pod.

Distribution:
This variety is endemic to Yap; another variety, *Serianthes kanehirae* var. *kanehirae* occurs in Palau. The species occurs nowhere else in the world.

Comments:
A fine big tree scattered in lowland forests and along roads where they have not been cut; the trunks are prized for making canoes in Palau.

FAMILY / SUBFAMILY	STATUS
Fabaceae / Mimosoideae (family formerly was Leguminosae)	Endemic

(A) *Serianthes kanehirae* var. *yapensis* tree; (B) flower; (C) trunk; (D) seed pod.

GENUS / SPECIES / AUTHORITY

Sesbania grandiflora (L.) Pers.

Local and common names:
English: the pink variety is sometimes called "hummingbird tree."
Phillipines: *katuri*.

Habitat and description:
A sparsely branched small tree with cracked gray bark. ***Leaves:*** one even-pinnate to 30 cm long and without hairs, with about 20 to 40 pairs of opposite, grayish green blunt leaflets about 2 to 3 cm long on short stems. ***Flowers:*** hang down from leaf axils, white or deep pink, 7 to 9 cm long. ***Fruit:*** slender, cylindrical pods 25 to 55 cm long, with many seeds.

Distribution:
Introduced to Marianas, Palau, Pohnpei, and now Yap. This is the first record from Yap. Elsewhere occurs naturally in India and tropical Asia.

Comments:
A recently introduced tree to Yap, becoming common along roads. There are white- and deep pink-flowered varieties of this species. The flowers and young pods are edible.

FAMILY / SUBFAMILY	STATUS
Fabaceae / Papilionoideae (family formerly was Leguminosae)	Introduced

(A) *Sesbania grandiflora* tree; (B) leaves; (C) flower buds; (D) flowers in bloom.

GENUS / SPECIES / AUTHORITY

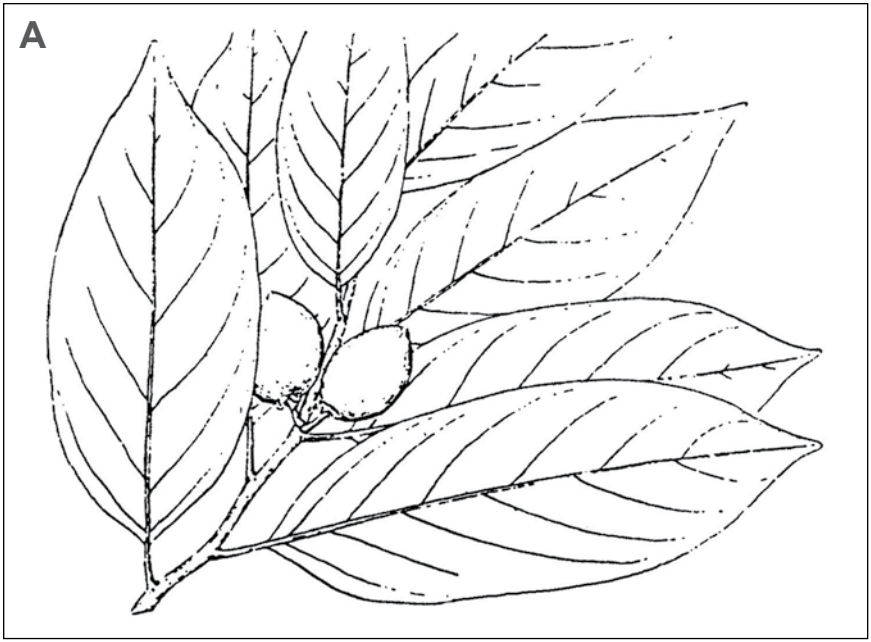
Casearia cauliflora Volkens

Habitat and description:
Uncommon small tree of forests, with slender branches that hang downward. Small branches are smooth and bent slightly in a zigzag pattern. ***Leaves:*** simple, entire, alternate, arranged in two tiers (levels), ovate-oblong, 9 to 15 cm long by 4 to 6 cm wide, wavy along margin, pointed at tip, rounded at base with fine serrations along margin and small pellucid glands in leaf; lateral veins about eight, with veins extending to the apex of the teeth along margins which are tipped by a circular gland or hair; petiole 1 to 1.5 cm long, small stipules falling early. ***Fruit:*** one or two shortly stalked, globose or ellipsoidal drupes borne in leaf axils, 1.5 cm in diameter with persistent calyx.

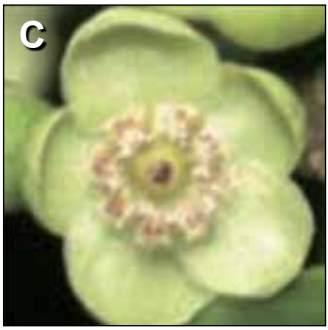
Distribution:
Endemic to Yap.

Comments:
This tree is relatively rare, and because it is an endemic species it should be conserved as part of Yap's unique natural heritage. Look for small pellucid (transparent) glands in the leaves—as is characteristic of this family. *Pangium edule*, "rowal," is also in the same family. Kanehira (1931) indicated that this species is found in Yap and Palau but Fosberg et al. (1987) listed it only from Yap, and another species, *C. hirtella* Hosok. as being from Palau. We have not yet found and photographed this tree so provide a drawing of *C. cauliflora* and a photograph of the Palau species, *C. hirtella* Hosok. Photos by Ann H. Kitalong (Kitalong, DeMeo, and Holm 2008). Used by permission.

FAMILY	STATUS
Flacourtiaceae (now Salicaceae)	Native, endemic



Ann H. Kitalong



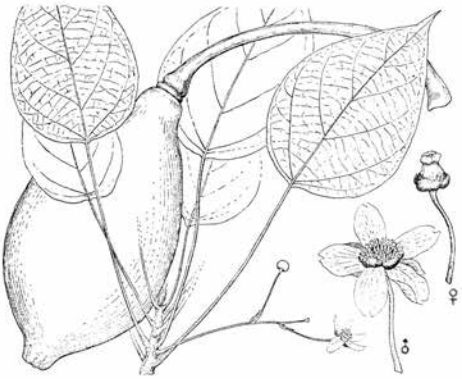
Ann H. Kitalong

(A) *Casearia cauliflora* drawing; (B) and (C) photographs of *Casearia hirtella* of Palau.

GENUS / SPECIES / AUTHORITY

Pangium edule Reinw. ex. Bl.

Local and common names:
English: pangi fruit, often called "football fruit."
Yapese: *rowal*.
Palauan: *riamel*.
Chamorro: *lasret*; *rauel*.
Pohnpean: *durien*.



Habitat and description:
A medium to large tree growing in village agroforests and mixed with secondary forest. ***Leaves:*** simple, entire or with three or more lobes, alternate, clustered at ends of branches, cordate to ovate, about 15 to 30 cm long, with long, round petiole equal to the length of the leaf blade. ***Flowers:*** unisexual, male flowers borne in clusters, female flowers solitary, about 5 cm wide, with two to three calyx lobes, five to six petals; male flowers with many stamens, female flowers with five to six staminodes (nonfunctional stamen) alternate with the petals, stigma sessile. ***Fruit:*** large and ovoid, 15 to 30 cm long and about half as wide, with rough brown skin, filled with pulp that is yellow when ripe, with a somewhat musky smell but delicious; many large compressed seeds about 5 cm long are embedded in the pulp.

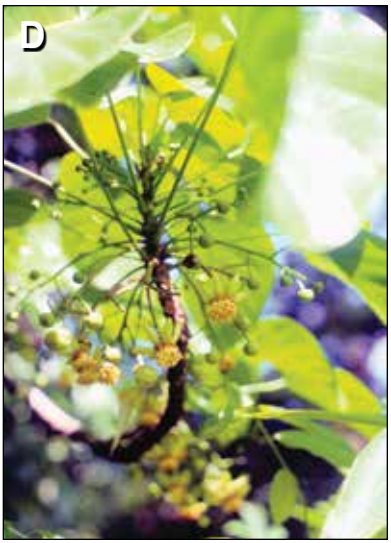
Distribution:
Yap, Palau, Pohnpei, Marianas; originally from Malaysia.

Comments:
Sometimes called "durian," perhaps because it tastes mildly like durian, but the durian fruit is spiny and much stronger smelling. The pulp of the ripe fruit is delicious; however, the seeds, unripe fruit, and other parts contain prussic (hydrocyanic) acid, which is quite poisonous. Nonetheless, Yapese of the past learned to leach the poison out of the seeds in running water and by cooking to produce a tasty food. In Malay and the Moluccas, oil is expressed from the seed, and the crushed seed has been used as an insecticide. It has also been used medicinally.

FAMILY	STATUS
Flacourtiaceae (now Achariaceae)	Introduced

Agnes Rinehart

Agnes Rinehart



Agnes Rinehart

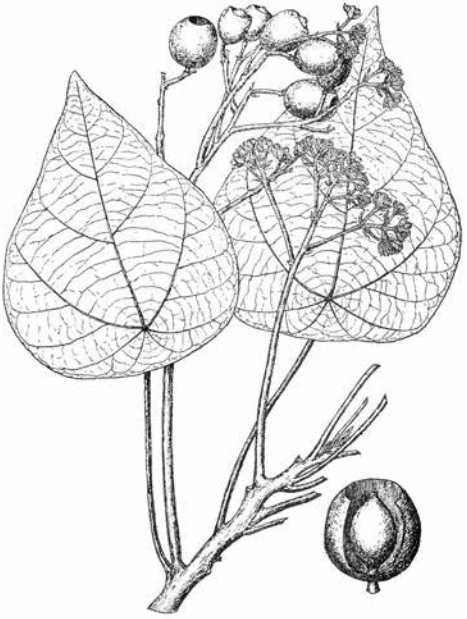
(A) *Pangium edule* branch; (B) flower; (C) fruit; (D) inflorescences.

GENUS / SPECIES / AUTHORITY

Hernandia nymphaeifolia (Presl.) Kubitski

Synonyms:
Hernandia peltata Meissn.;
Hernandia sonora sensu non L.

Local and common names:
Yapese: *gachal*; *gichal*.
Palauan: *doko*.
Chamorro: *nonag*.

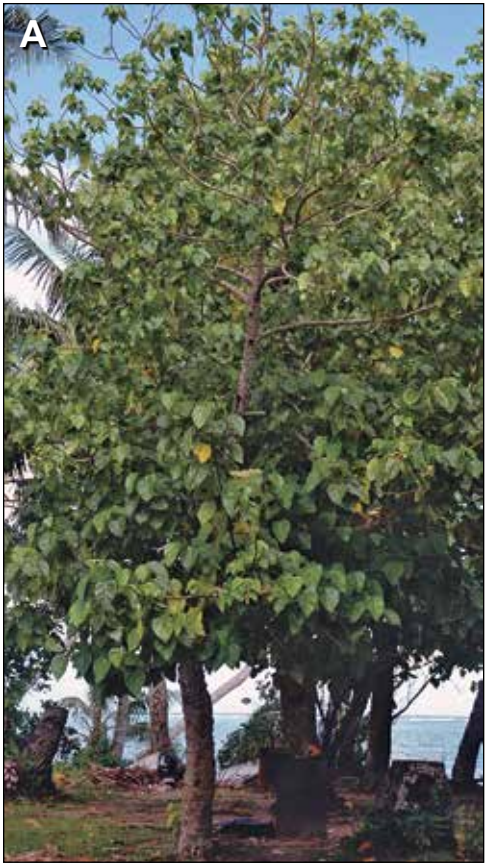


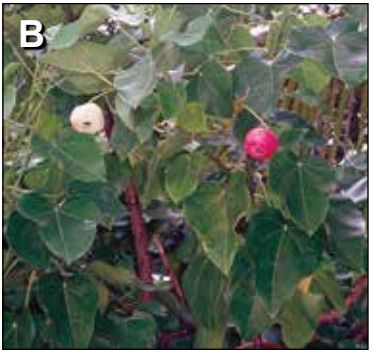
Habitat and description:
A large, handsome tree of coastal areas, especially atolls. ***Trunk:*** silvery gray, slightly fissured or smooth, short basal buttresses and a spreading rounded crown. ***Leaves:*** simple, entire, alternate, cordate (heart-shaped), glossy and peltate (with petiole meeting leaf within the margin), often with a red dot where petiole and leaf join, 12 to 40 cm long by 10 to 30 cm wide, petioles 10 to 40 cm. ***Flowers:*** creamy white to silver white in axillary clusters on short stem, with fleshy bracts. ***Fruit:*** one black elliptical nut about 2.5 cm, within a round sphere with a round hole in the end that ripens from greenish to white and pinkish, and is fragrant like apples.

Distribution:
Native to coastal strand throughout Micronesia and also occurs from Africa to Asia, Australia and Polynesia.

Comments:
Occasionally found in coastal areas on mainland Yap, more commonly in outer islands. Wood is soft and light.

FAMILY	STATUS
Hernandiaceae	Native





(A) *Hernandia nymphaefolia* tree; (B) branch with pink spherical "lantern" bracts; (C) cluster of fruit; (D) seedling with red dot where petiole meets leaf; (E) trunk.

GENUS / SPECIES / AUTHORITY

Pemphis acidula Forst.

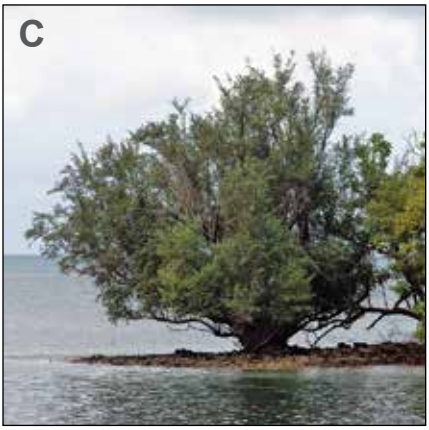
Local and common names:
Yapese: *gangiy*.
Palauan: *ngis*.
Chamorro: *nigas*.
Marshallese: *kone*; *kungi*.

Habitat and description:
A shrub to small tree of rocky coasts. Much branched and often sculpted by wind and salt spray. ***Leaves:*** simple, entire, opposite, small and narrow oblong, elliptic leaves about 1 to 2.5 cm long by up to 1.5 cm wide; dull, gray green, crowded on branches. ***Flowers:*** delicate and ephemeral, borne singly in axils, about 1.5 cm wide, white with a bell-shaped calyx-tube, with six thin, white, wavy petals and 12 stamens in two series. ***Fruit:*** an obovoid leathery capsule about 6 to 7 mm long, opening by a lid, containing many angular, smooth seeds.

Distribution:
Throughout Micronesia, especially on atolls and limestone islands; ranges from East Africa to the Pacific.

Comments:
This plant is the essence of windswept rocky beaches and coasts, surviving wind and salt-spray and generally sculpted by these forces into low, semi-prostrate shrubs with strong root systems gripping the rocks. Because it often occurs within the intertidal zone, this tree is technically a mangrove. In milder conditions it can grow into a small tree. The wood is very hard and was used in the past for hooks and spears.

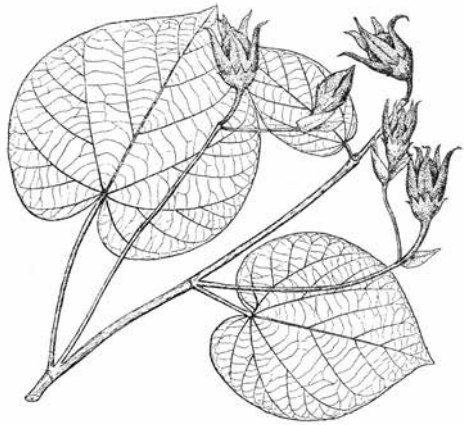
FAMILY	STATUS
Lythraceae	Native



(A) *Pemphis acidula* shrubs along shore; (B) flower and seed pods; (C) small tree at water's edge.

GENUS / SPECIES / AUTHORITY

Hibiscus tiliaceous L.



Local and common names:

English: sea hibiscus. Yapese: *gal'*. Palauan: *ermal*. Chamorro: *pago*. Chuukese: *shrifa; sinifu*. Pohnpean: *kalau*. Marshallese: *loo; ko*.

Habitat and description:

A small to medium-size tree common in secondary vegetation, secondary forest, and wet areas. Trunk generally twisted with many low branches growing in all directions, making it difficult to walk through a hibiscus thicket. Wood is soft and lightweight with a fibrous, mucilaginous bark. ***Leaves:*** Simple, entire, alternate, cordate, with palmate veination, with a velvety pubescence (fine hairs) when young and about 20 cm by 20 cm when mature, dark green above and greyish-white below with fine stellate (branched like a star) hairs below, petioles 3 to 12 cm long. ***Flowers:*** in terminal or axillary cymes, about 10 cm wide, yellow with a maroon-purple eye when newly opened; with petals becoming pink to salmon after they fall; stipules, bracts and 10- to 12-bracted epicalyx conspicuous, pedicles 1 to 3 cm long. ***Fruit:*** capsules ovoid-globose, about 2.5 cm long by 2 cm wide, pubescent, gray-brown, seeds brownish black, about 15. At least two varieties are recognized locally.

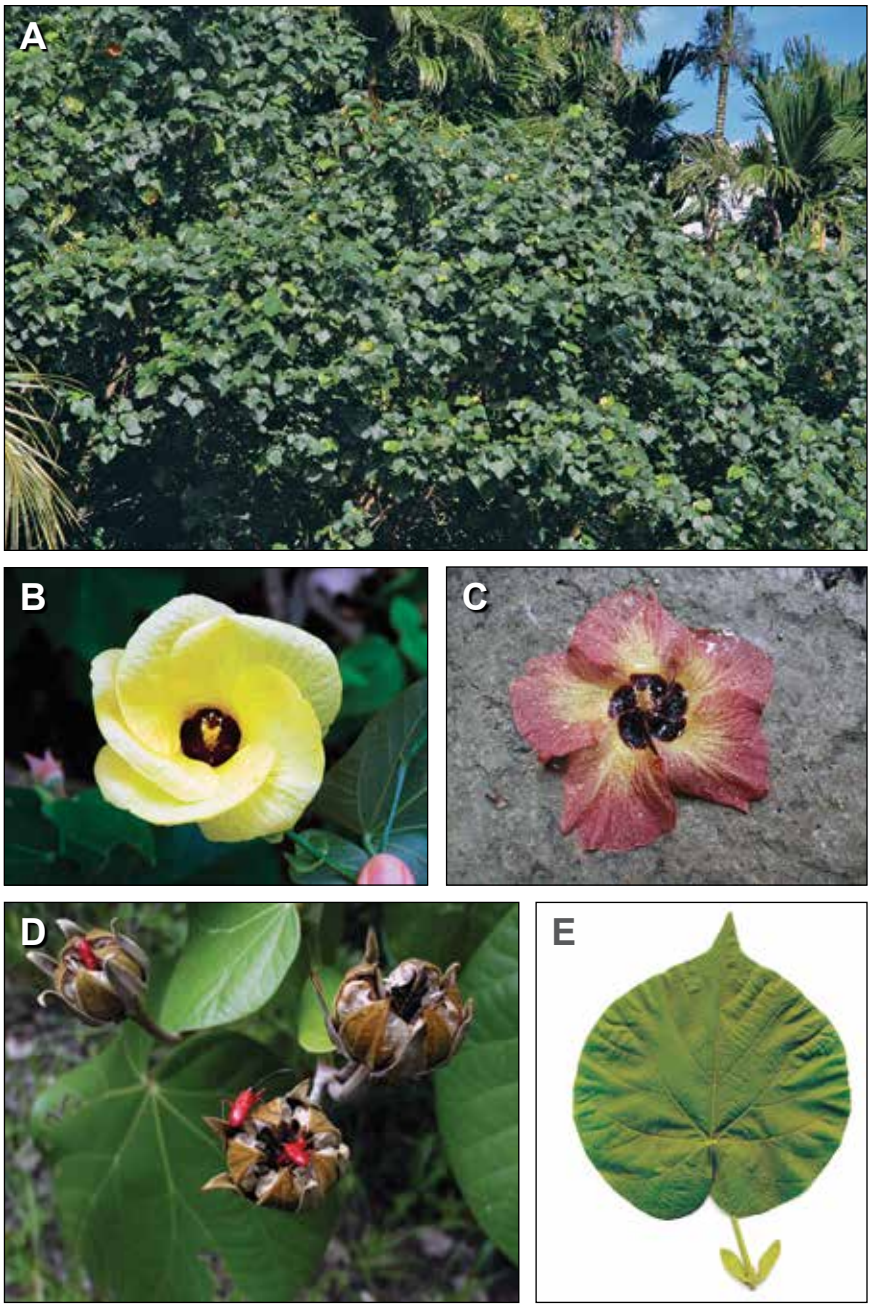
Distribution:

Throughout Micronesia and pantropical.

Comments:

The fibrous bark is used throughout the Pacific for cordage. Uses in Yap include fibers for nets and dancing "grass" skirts. In outer islands, *gal'* fibers are combined with banana fibers in the garment known as a lava-lava. Bark is used to squeeze coconut cream in Kosrae and to squeeze pounded *Piper methysticum* roots to make sakau in Pohnpei. Widely recognized by Pacific peoples for its contributions to soil fertility. The old fallen flower is as beautiful as the newly opened flower.

FAMILY	STATUS
Malvaceae	Native



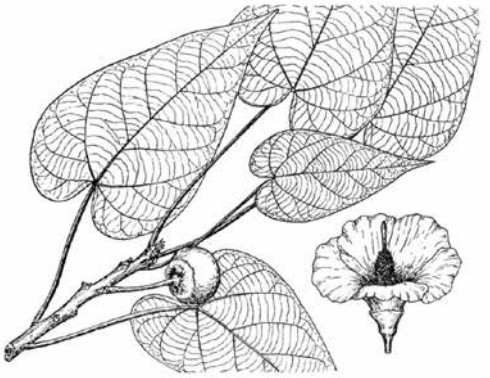
(A) *Hibiscus tiliaceous* tree; (B) new flower; (C) fallen flower; (D) seed pods; (E) leaf.

GENUS / SPECIES / AUTHORITY

Thespesia populnea (L.) Sol. ex Correa

Local and common names:

English: Portia tree.
Yapese: *bungbeng; bengbeng; gabengbeng.*
Palauan: *baderirt.*
Chamorro: *banalo.*
Carolinian: *pule.*
Hawaiian: *milo.*



Habitat and description:

A small- to medium-size tree generally of coastal areas, whitish bark with dark furrows, and a thick crown. ***Leaves:*** rather stiff, heart-shaped, 7 to 12 cm long and with the midrib and two basal veins beginning where the long 2.5- to 7.5-cm petiole connects to the leaf. ***Flowers:*** large and yellow, with or without dark red marking at center, similar to *Hibiscus tiliaceous* but not opening as wide, fading to pink and remaining attached to branch at the end of the day. ***Fruit:*** roundish, flattened top to tip, about 2 to 4 cm in diameter, containing a yellow sap.

Distribution:

Throughout Micronesia and widespread in old world (Africa, India, Asia) tropics.

Comments:

Wood is reddish and hard; a stick can be pushed through the flattened top and out the bottom of the rounded fruit to make a top, and the cut fruit can be used to print circles with yellow latex. Can be planted by cuttings.

FAMILY	STATUS
Malvaceae	Native

(A) *Thespesia populnea* tree; (B) faded old flower; (C) all-yellow flower; (D) flower with red markings at center.

GENUS / SPECIES / AUTHORITY

Swietenia macrophylla King; *Swietenia mahagoni* (L.) Jacq

Local and common names:

English: for *Swietenia macrophylla*, Honduras mahogany (the source of most commercial *Swietenia* mahogany); large-leaved mahogany; for *S. mahagoni*: West Indian mahogany, small-leaved mahogany, Spanish mahogany.

Habitat and description:

Large, straight-growing trees, *S. macrophylla* recorded up to 60 m high, with a trunk to 2 m, and *S. mahagoni* to 25 m high with a trunk to 1.5 m elsewhere. ***Leaves:*** compound, usually 1-even pinnate, leaflet blades glabrous, entire. ***Flower:*** with 4- to 5-lobed calyx and four to five petals, anthers in tube, partly exerted, borne on few-branched axillary inflorescence. ***Fruit:*** large, woody, erect, ovoid to obovoid capsules splitting along five seams, releasing flattened, winged seeds. The two species can be distinguished by the size of the leaves, leaflets, and fruit capsules, which are larger for *S. macrophylla*.

***Swietenia macrophylla*—**
Leaves: 14 to 40 (usually 16 to 30) cm long, leaflets two to eight (usually three to six) pairs, with blades 8 to 18 cm (usually 9 to 13 cm) by 2.5 to 5.5 cm (usually 2.5 to 4 cm) wide. ***Fruit:*** capsules 12 to 22 cm (usually 12 to 15 cm) long; seeds 7.5 to 10 cm long.

***Swietenia mahagoni*—**
Leaves: 10 to 28 cm (usually 12 to 15 cm) long, leaflets two to five (usually two to four) pairs; with blades 4 to 8 cm (usually 5 to 6 cm) long by 1.5 to 3.25 cm (usually 2.5 to 3 cm) wide. ***Fruit:*** capsules 6 to 10 cm long, seeds 2 to 5 cm long.

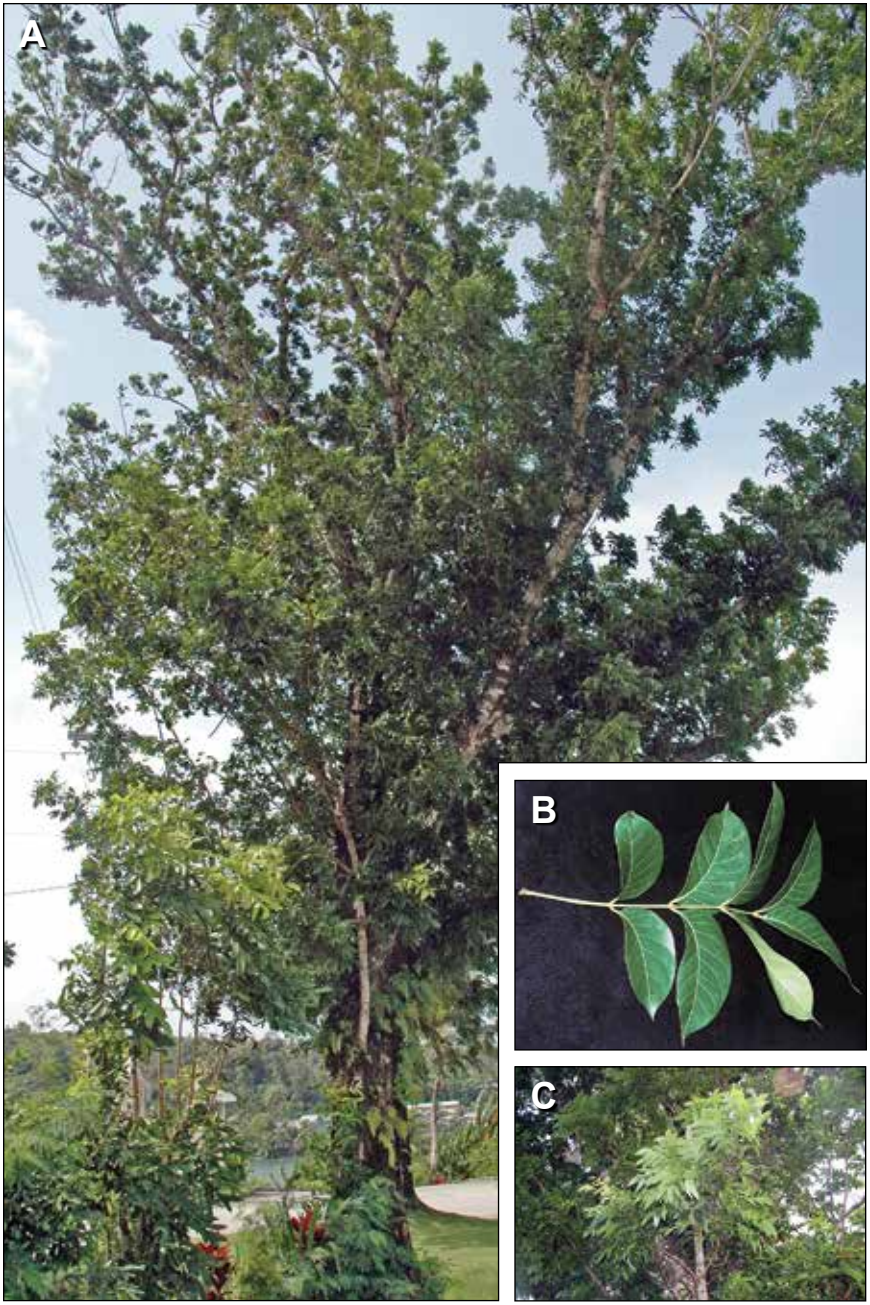
Distribution:

Swietenia macrophylla is originally from Honduras, now distributed throughout tropical America and widely grown elsewhere; *S. mahagoni* is originally from the West Indies, from southern Florida to Trinidad and Tobago, and is now planted widely.

Comments:

Introduced to Micronesia as a timber species, the wood being hard, heavy, and valuable, especially for fine furniture. The English name "mahogany" is often misapplied to *Calophyllum inophyllum*, ("biyuuch" on Yap). Mahogany trees have naturalized on Yap and are spreading into other forests.

FAMILY	STATUS
Meliaceae	Introduced

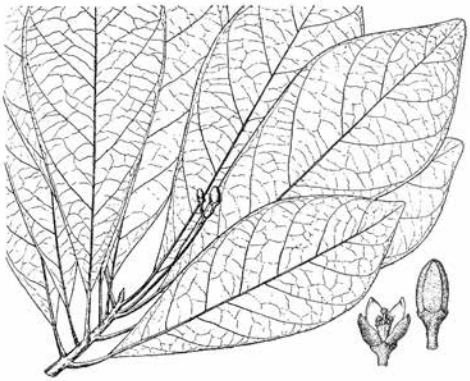


(A) *Swietenia macrophylla* tree; (B) leaves; (C) sapling.

GENUS / SPECIES / AUTHORITY

Vavaea pauciflora Volkens

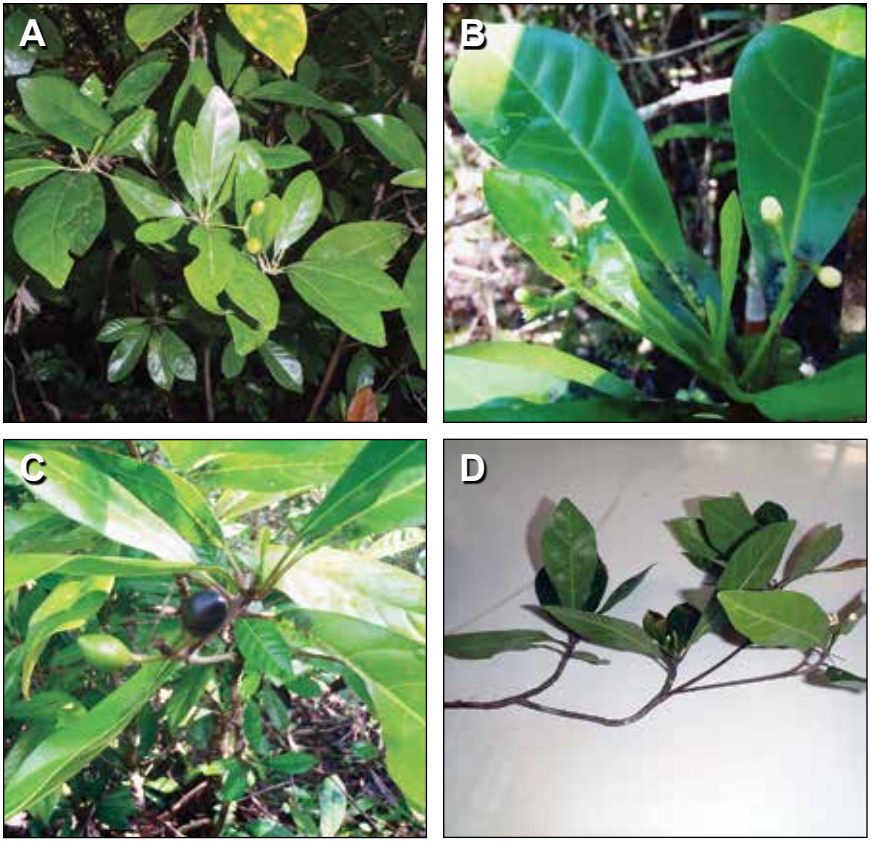
Local and common names:
Not known. Kanehira (1933) indicates its name as "mesei."

Habitat and description:

Small tree growing in native forests, 2 to 4 m or more in height, 5 to 15 or more cm diameter. ***Branches:*** smooth, exhibiting terminalian branching: shoot turns up and produces whorl of leaves, then two stems arise behind and to each side of the cluster of leaves and grow at an angle in the same plane until they turn up and produce a whorl of leaves. ***Leaves:*** simple, entire, alternate, clustered near the tip of branchlets, obovate, 10 to 14 cm long by 4 to 5 cm wide, obtuse, cuneate, glabrous; petiole about 1 cm long. ***Flowers:*** two to six born on a simple peduncle arising in the axil of a leaf near the tip of branch, 3 mm in diameter, calyx white to cream, campanulate, four-parted, dentate; four petals, white with woolly grayish-white hairs; stamens tubular. ***Fruit:*** a smooth globular berry maturing from green to black generally with one, but sometimes several, seeds when fruit is bilobed.

Distribution:
Endemic to Yap.

Comments:
Kanehira (1933) says the wood is aromatic and used as incense. This little tree is not well known to science, and its species name is considered unresolved. There are no species in the genus *Vavaea* reported from elsewhere in Micronesia, although other unresolved species occur in the Philippines, Papua New Guinea, Indonesia, and Australia. So far, we have found this tree in only a few places on Yap. As it is recorded only from Yap in all of Micronesia, it may be endemic and it would be good to plant it more widely as a possible "only on Yap" tree, not found anywhere else in the world.

FAMILY	STATUS
Meliaceae	Native, endemic



(A) *Vavaea pauciflora* plant with young fruit; (B) inflorescence with buds and open flower; (C) plant with green and ripe fruit; (D) branch showing "terminalian branching."

GENUS / SPECIES / AUTHORITY

Xylocarpus granatum Koen.

Local and common names:

English: cannonball mangrove or puzzle nut tree.
Yapese: *yamgur*.
Palauan: *meduulokebong*.
Chamorro: *lalanyog*.
Chuukese: *punopun*, *pulbum*.
Pohnpean: *pwulok*.

Habitat and description:

Generally a medium- to large-size gnarled tree on Yap, with a smooth whitish trunk, red wood, and impressive snake or curtain-like buttressed roots. It occurs along rivers and the landward edge of mangroves where there is fresh water. ***Leaves:*** evenly 1-pinnate, with four to six leaflets about 8 to 20 cm by 4 to 10 cm wide, glabrous with rounded to obtuse apex. ***Flowers:*** about 7 cm long, cream to pink, with stamens joined into a tube. ***Fruit:*** a large round capsule, green, maturing to golden brown and enclosing 6 to 15 angled seeds.

Distribution:

From Palau to Yap to the eastern Carolines and throughout the Indo-Malaysian region.

Comments:

In the same family as mahogany, this tree's beautiful reddish wood is prized for carving. The fruit is sometimes referred to as a "puzzle nut" because it contains numerous angled seeds fitting together within the thick-skinned round capsule, which, once released, are difficult to fit back into a sphere.

FAMILY	STATUS
Meliaceae	Native

(A) *Xylocarpus granatum* tree at water's edge with characteristic buttressed roots; (B) leaves and fruit.

GENUS / SPECIES / AUTHORITY

Artocarpus altilis (Park.) Fosb.; *Artocarpus* spp.

Synonyms: *Artocarpus communis* Forst.; *Artocarpus incisus* (Thunb.) L.f.

Local and common names:
English: breadfruit. Yapese: *thow*. Palauan: *meduu*. Chamorro: *lemae*. Chuukese: *mei*. Marshallese: *ma*.

Habitat and description:
A potentially large tree found in agroforests of Yap. Trunk massive with thick milky sap. ***Leaves:*** large, to 90 cm long, deeply incised or more shallowly pinnately lobed, thick and leathery, with about five to seven wide to narrow lobes varying with variety, the midrib raised beneath, dark green above, lighter below. ***Flowers:*** the male fruit spike is about 10 to 20 cm or more long; female flowers are borne inside a rounded-oblong compound fruit that is borne, axillary on small branches. ***Fruit:*** round to oblong, up to 30 cm, with reticulations, bumps, or small soft spines depending on variety; green ripening to yellowish-green, pulp white and firm, ripening creamy, soft and fragrant, usually seedless. *Artocarpus altilis* is the main breadfruit on Yap and there are many locally recognized varieties; *A. mariannensis*, which occurs more in the coralline outer island, is seeded. *Artocarpus* that have been reported from Yap can be distinguished as follows:

1. Fruits born on branches, moderate in size
   2. Leaves pinnately lobed, lower surface without hairs, fruit often over 20 cm long, usually seedless ..... *Artocarpus altilis*
   2. Leaves simple, generally entire or with few shallow, lobes lower surface hairy, fruit mostly 15 to 20 cm long and with seeds ..... *A. mariannensis*

1. Fruits borne on lower part of main trunks, cylindrical, often 30 to 40 cm long, leaves not lobed or only slightly lobed
   2. Fruits often over 35 cm long, twigs and stems with stiff hairs (English: jak-fruit; Chamorro: *nangka*) ..... *A. heterophyllus* Lam.
   2. Fruits up to 30 cm long, twigs and leaves without hairs (Chamorro: *lemasa*; Malay: *chempedak* ..... *A. integer* (Thunb.) Merrill

Distribution: *Artocarpus mariannensis*: endemic to Micronesia; *A. altilis*: Malaysian and Pacific area; Marianas and Carolines; *A. heterophyllus* and *A. integer*: Indo-Malaysia.

Comments: *Artocarpus altilis* is a very important food and multipurpose tree cultivated and naturalized, spreading via root sprouts. It hybridizes with the wild *A. mariannensis*, producing intermediates. *Artocarpus heterocarpus* and *A. integer* are not common on Yap.

FAMILY	STATUS
Moraceae	Introduced

Lonnie Fread

Lonnie Fread

GENUS / SPECIES / AUTHORITY

Artocarpus mariannensis Trecul

Local and common names:
Carolinian: *meiyas*.
Palauan: *chebiei*; *dugdug*.
Woleaian: *maifai*; *sowing*.

Habitat and description:
A potentially large tree found occasionally in agroforests and secondary forest of mainland Yap but more common in outer islands. Trunk often tall and straight with buttresses and thick milky sap. ***Leaves:*** simple, alternate, variable ranging from about 10 to 30 cm long, broadly obovate to elliptic in shape, entire to variously shallowly lobed, upper surface glabrous, dark green and somewhat shiny, lower leaf with brown hairs on veins and midrib. ***Flowers:*** hollow male spike about 8 to 10 cm long. ***Fruit:*** generally small with reticulated texture of skin from individual flowers borne inside, and bumpy from seeds; has less pulp compared to *A. altilis*, and large roundish seeds; fragrant when ripe.

Distribution:
Originally endemic to Micronesia; Marianas, Palau, Yap, and Chuuk; Central Carolines, Marshalls, and Kiribas. Now planted elsewhere.

Comments:
A wild, seeded species of breadfruit of limestone forests of Guam, Palau, Chuuk. Uncommon on mainland Yap but more common in outer islands of Yap and Chuuk (Central Carolines). This species may hybridize with *Artocarpus altilis*, forming intermediate types. Boiled or roasted seeds provide a rich, tasty food.

FAMILY	STATUS
Moraceae	Native

(A) *Artocarpus mariannensis* branch; (B) and (C) leaves; (D) fruit showing seeds.

Ficus spp.

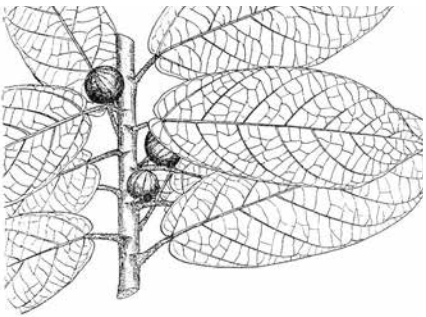
Ficus elastica Roxb. (Introduced)
Ficus microcarpa L.f.
Ficus prolixa **Forst.** f. var. ***carolinensis*** (Warb.) Fosb.
Ficus senfftiana Warb.
Ficus tinctoria Forst. f.
Ficus tinctoria var. ***neo-ebudarum*** (Summerh.) Fosb.

Local and common names:

Ficus senfftiana: Yapese: *weche.*
Ficus elastica: English: rubber tree; India rubber tree. Yapese: *gakiy ni goma* (i.e., rubber tree). Palauan: *komunoki.*
Ficus prolixa: English: banyan tree. Yapese: *aw.* Palauan: *lulk.* Chamorro: *nunu.* Carolinian: *ghiliau.*
Ficus tinctoria: Yapese: *wacheguy.* Palauan: *osked.* Chamorro: *tagete.* Carolinian: *awall.*

Synonyms:

Ficus copiosa sensu auct. non Stued.—probably a specimen of *F. senfftiana*; *F. virens*—probably a specimen of *F. prolixa.*

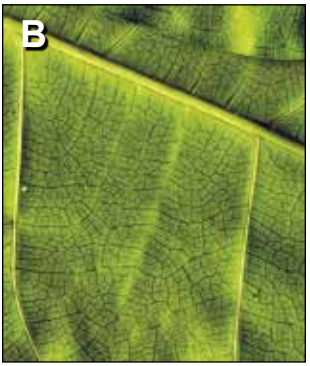


Habitat and description:

Ficus species on Yap vary from scandent shrubs to huge multi-trunked banyan trees. The following are the characteristics common to all of Yap's *Ficus* trees. ***Trunk***: most parts with copious (lots of) thick milky sap (except for *F. senfftiana*), bark smooth with a ring-like scar left from the stipules that usually enclose the leaf buds, twigs sometimes hollow, generally multiple trunks and aerial roots, except for *F. senfftiana*. ***Leaves***: simple, entire, alternate, may be unequal-sided, with characteristic venation forming little boxes (see photo). ***Flowers***: borne inside the round developing fruit (like a fig). ***Fruit***: compound with many small seeds. The list of species given above is from Fosberg et al. (1979). Revisions may be in order. The following provisional key distinguishes between these species:

(*continued on p. 156*)

FAMILY	STATUS
Moraceae	Native and introduced



(A) Large banyan tree, *Ficus prolixa* var. *carolinensis*; (B) characteristic leaf veination; (C) characteristic aerial roots.

Ficus spp. (*continued*)

1. Trunk and leaves without lots of thick milky sap, generally a single trunk and relatively thin leaves that feel like sandpaper. Leaves with three veins (first, second lateral veins, and midrib) prominent at base of leaf, fruit on branches or trunk ..... *Ficus senfftiana*

1. Trees with copious thick milky white sap coming from injured leaves and bark:

   2a. Large introduced tree with thick, glossy leaves 15 to 25+ cm long, midrib reddish, large 10+ cm pinkish stipules (sheaths) enclose leaf buds but fall early; introduced planted trees like the big India rubber tree growing near Yap Legislature building ..... *F. elastica*

   2b. Growing into large, multi-trunked tree with leaves about 9 by 5 cm, elliptic and coming to a sharp point (mucronate or cuspidate) ..... *F. microcarpa*

   2c. Growing into large, multi-trunked tree with ovate leaves about 15 by 8 cm, oblong, with cystoliths (little hard spots) on lower surface ..... *F. prolixa*

   2d. Scandent (with long, leaning branches) shrub or often bushy tree often with long proproots, leaves 8 to 15 cm by 4.5 to 8 cm, with copious milky sap, often asymmetric at, base and midrib not centered, with three to nine lateral veins almost at right angles to midrib, fruit ripens to yellow and then reddish ..... *F. tinctoria*

Distribution:
Ficus senfftiana is recorded only for Yap and Palau. *Ficus microcarpa* var. *microcarpa, F. prolixa* var. *carolinensis*, and *F. tinctoria* are widespread in Micronesia, with a second variety of *F. tinctoria* being less widespread or less collected. The large, introduced *F. elastica*, or India rubber tree, has been planted in urban areas as near the Yap Legislature building

Comments:
Fruits of *Ficus senfftiana* were once an important food on Yap. Big banyan trees are associated with spirits on Yap and elsewhere. Fruit bats eat *Ficus* fruit and spread the seed.

FAMILY	STATUS
Moraceae	Native and introduced

(A) *Ficus tinctoria* tree with ripe fruit; (B) *F. tinctoria* fruit; (C) *F. senfftiana* leaves; (D) fruit borne on trunk.

GENUS / SPECIES / AUTHORITY

Eugenia reinwardtiana DC

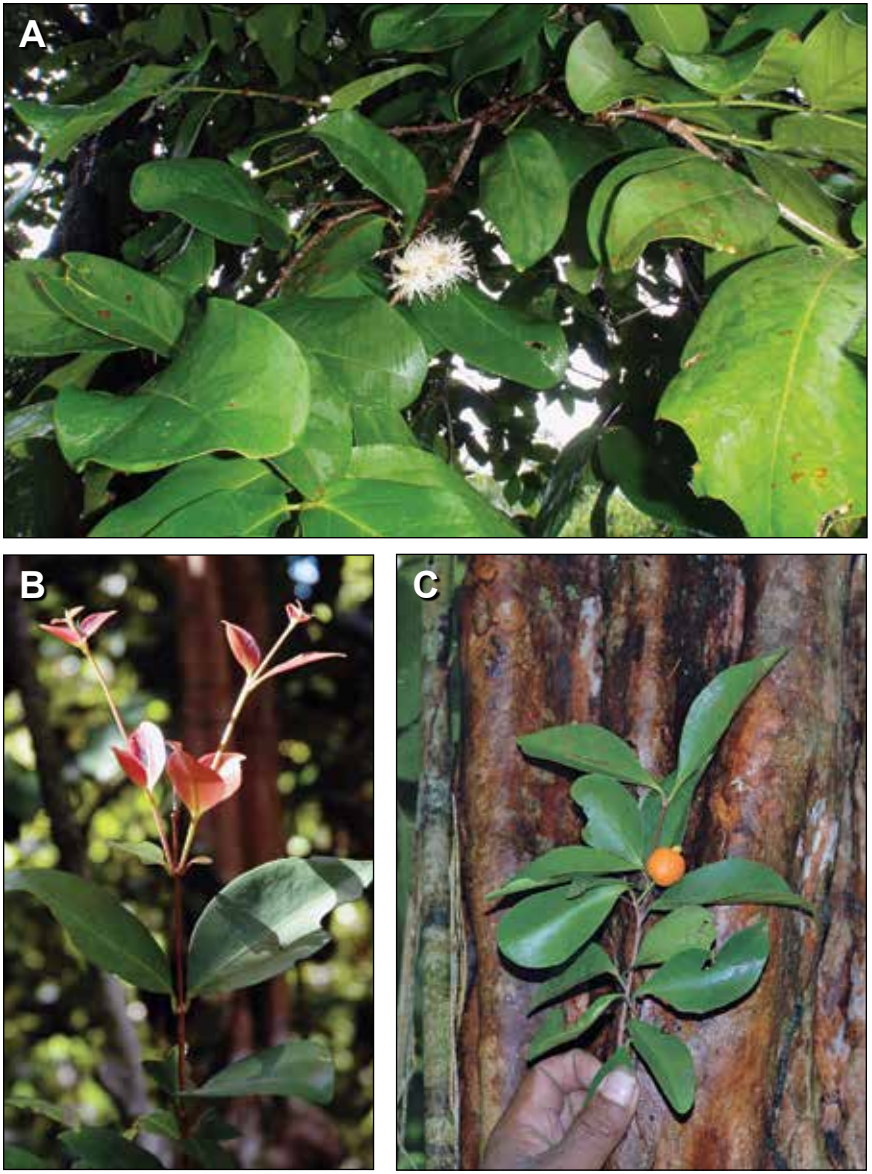
The genus *Eugenia* has been split into *Eugenia*, including most of the small fruited species, and the genus *Syzygium*, containing most of the bigger fruited species that have been introduced to Yap and elsewhere in Micronesia. The *Syzygium* (often called arfath ("apples") are treated later.

Habitat and description:
Shrubs to medium-size trees in forest understory. ***Leaves:*** simple, entire, opposite, elliptic, about 6 to 9 cm long by 3 to 5 cm wide, thick, dark glossy green, lower surface duller, with 7 to 8 pairs of veins that meet in loops along the margin. ***Flowers:*** solitary, in leaf axils, on stems 2 to 2.5 cm long, often turned 180 degrees from plane of leaves, with two small bracts at base of calyx, a hairy, four-lobed calyx, four white ephemeral petals about 1.5 cm long with many white stamens. ***Fruit:*** roundish, about 1.2 cm long, capped by persistent calyx, ripens orange, with one seed.

Distribution:
Yap, Palau, Guam, and Chuuk, and elsewhere from Malaya to Moluccas and some Pacific islands.

Comments:
Where this tree occurs, there are often many seedlings and saplings about.

FAMILY	STATUS
Myrtaceae	Native



(A) *Eugenia reinwardtiana* branches and flower, (B) new leaves; (C) fruit and trunk.

GENUS / SPECIES / AUTHORITY

Melaleuca quinquenervia (Cav.) Blake

Local and common names:
English: paperbark tree.

Habitat and description:
An introduced, medium-size tree characterized by its flaking "paperbark," tea oil smell of crushed leaves, and woody seed capsules on branches alternating with leaves. ***Leaves:*** simple, entire, alternate, narrow, about 4 to 12 cm long by 1 to 6 cm wide, leathery, grayish green, with fragrance like "Vicks" (mentholatum) when crushed. ***Flowers:*** cylindrical spikes, 3 to 10 cm long, of white flowers with numerous stamens. ***Fruit:*** woody capsules about 0.4 cm in length and width, persistent up to a year.

Distribution:
Introduced to Yap, Palau, Guam, and Pohnpei; originally from Australia.

Comments:
This tree is known to be invasive in some areas. It was introduced to Yap many years ago and is spreading slowly.

FAMILY	STATUS
Myrtaceae	Introduced

(A) *Melaleuca quinquenervia* tree; (B) "paperbark" trunk; (C) "bottle brush" flower with old seed capsules borne below leaves.

GENUS / SPECIES / AUTHORITY

Pimenta dioica (L.) Merr.

Local and common names:
English: allspice tree.
Spanish: *malaqueta*.

Habitat and description:
A small, dark, erect tree with many branches, elliptic, leathery leaves, 6 to 16 cm long by 3 to 6 cm wide, with 12 to 16 pairs of veins prominent beneath, spicy smell. ***Flowers:*** on axillary cymes with long peduncles about 3 to 7 cm long, white flowers 6 to 10 mm wide, calyx four-lobed, four petals, many stamens. ***Fruit:*** round, 5 to 7 mm, ripening dark purple.

Distribution:
Introduced to Yap; native to West Indies and possibly southern Mexico and parts of Central America; now widely cultivated and naturalized. This tree has been recorded from Yap, but we have not located it. It is included as a possible invasive species.

Comments:
A spice tree with berries that yield "allspice," which seems to combine the flavors of cinnamon, nutmeg, and cloves, used to flavor food and in perfume. A relative, *Pimenta acris* Kostel., the bay rum tree, is similar but has five sepals and yields an oil from which perfume and bay rum are prepared. The bay rum tree has been introduced in Guam, where it has spread into native forests. Both species are considered invasive.

FAMILY	STATUS
Myrtaceae	Introduced

Species 2000 (http://www.species2000.org/)

Pimenta dioica.

GENUS / SPECIES / AUTHORITY

Psidium guajava L.

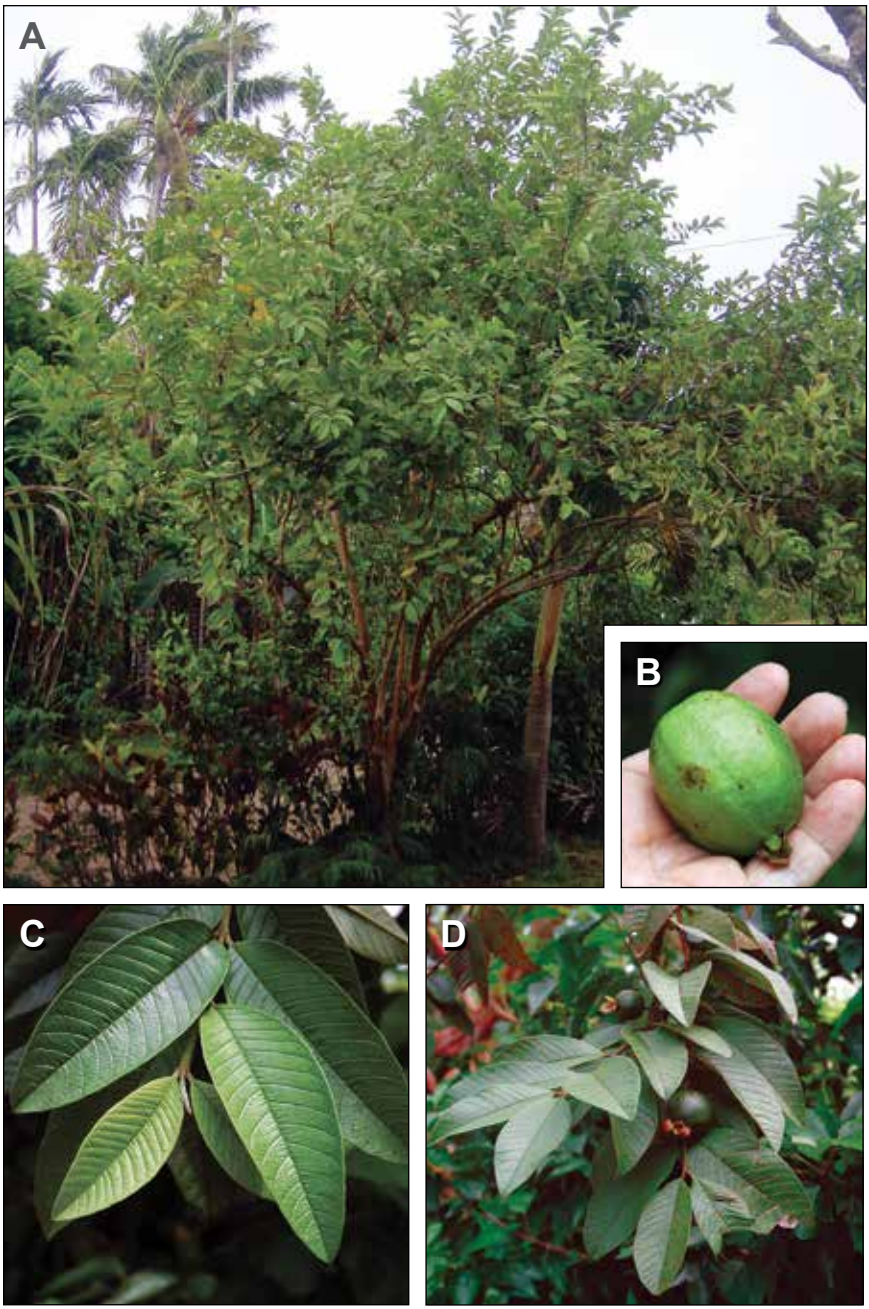
Local and common names:
English: guava.
Yapese: *abas*.
Chamorro: *abas*.
Carolinian: *abwas*.
Palauan: *kuabang*.

Habitat and description:
A small, rangy tree cultivated or naturalized in agroforests and sometimes secondary vegetation. Characteristically has smooth bark with thin scales that peel off in irregular shapes; light, young branches angled and with reddish brown pubesence. ***Leaves:*** simple, entire, opposite, oblong, brittle, with prominent midrib, and side veins, two sides often folded inward into wide V-shape, about 7 to 15 cm long by 3 to 5 cm wide, on short petioles. ***Flowers:*** white, with numerous stamens and petals that fall early, about 3 cm in diameter. ***Fruit:*** round to ovoid, 2.5 to 10 cm in diameter with a persistent calyx at end, green, maturing yellow or pinkish, pulp sweet and granular with many hard seeds.

Distribution:
From tropical America; now distributed widely and throughout Micronesia.

Comments:
Introduced and naturalized, mostly in the form of wild-growing small trees with relatively small fruits. Often grown around households for medicinal use.

FAMILY	STATUS
Myrtaceae	Introduced



(A) *Psidium guajava* tree; (B) fruit; (C) leaves; (D) branch with fruit and leaves.

GENUS / SPECIES / AUTHORITY

Syzygium malaccense (L.) Merr. & Perry
Syzygium sp.

Local and common names:
English: mountain apple (in Hawaii), wax apple, Malay apple.
Yapese: *arfath*.
Palauan: *kidel*.

The genus *Eugenia* has been split into *Eugenia*, including most of the small fruited species, and the genus *Syzygium*, containing most of the bigger fruited species that have been introduced to Yap and elsewhere in Micronesia. Two species of *Syzygium* have been reported for Yap. *Syzygium malaccense* is described below, but other species are present.

Habitat and description:
Medium to large-size trees planted in agroforests and yards. ***Leaves:*** simple, entire, opposite, glossy, elliptic to oblong-ovate, 10 to 18 cm or up to 25 cm long, by 6 to 8 or up to 12 cm wide, with short petioles to 10 mm, so that leaves tend to be crowded together. ***Flowers:*** in clusters on older branches and trunk, with four reddish petals about 8 mm long that fall off early; many red stamens. ***Fruit:*** obovoid, about 7 by 6 cm, glossy red, white or striped, succulent and crisp, usually with one seed about 2 cm in diameter.

Syzygium samarangense is similar, also with large leaves 10 to 25 cm long by 5 to 12 cm wide, oblong-elliptic, but with shorter petioles 3 to 5 mm long, flowers in clusters in leaf axils, white, 2.5 to 3.5 mm wide. ***Fruit:*** roundish or somewhat pear-shaped, greenish or white, waxy and edible.

Distribution:
Syzygium malaccense is an Indomalaysian cultivar that has been spread to many areas. *Syzygium samarangense* may be native in the Carolines.

Synonym for *S. malaccense* = *Eugenia malaccensis* L.

Synonym for *S. samarangense* = *Eugenia javanica* Lam.

Comments:
The fruit is crisp, not too sweet, and good to eat. A number of varieties and species of *Syzygium* have been introduced to Yap.

FAMILY	STATUS
Myrtaceae	Introduced, possibly native

Species 2000

Species 2000

Species 2000

(A) *Syzygium* sp. tree; (B) leaves; (C), (D), and (E) fruit.

GENUS / SPECIES / AUTHORITY

Pisonia grandis R. Br.

Local and common names:
English: Grand devil's-claws; grand Pisonia.
Ulithian: *umo*.
Palauan: *mesbesibech*; *emoi*.
Chamorro: *umumu*.

Habitat and description:
A coastal tree that is more common in outer islands than in mainland Yap. ***Trunk:*** light-colored; may be gnarled and wide, with soft wood; branches irregular. ***Leaves:*** simple, entire, opposite to whorled, crowded at branch ends, pale green, soft and with conspicuous veins; often insect-eaten. ***Flowers:*** clustered in cymes at branch tips or leaf axils, male and female flowers similar with greenish to whitish sepals and petals. ***Fruit:*** short, about 1 cm long and cylindrical, with short sticky spines.

Distribution:
Throughout Micronesia, especially on atolls and coral islands, and from Madras to Polynesia and Australia.

Comments:
This tree is important as a roosting tree for seabirds that gather on small, generally uninhabited islets. These islets with their large *Pisonia* trees are important to maintaining populations of seabirds. The sticky seeds of *P. grandis* are then likely to be transported to other islets by seabirds. *Pisonia grandis* can be propagated by seed or cuttings. The tree's adaptation to typhoons is to lose its soft branches easily, but then to resprout from the trunk. This sometimes results in old trees that are only moderately tall but have wide gnarled trunks with a lot of character.

FAMILY	STATUS
Nyctaginaceae	Native

(A) *Pisonia grandis* leaves and inflorescence; (B) trunk.

GENUS / SPECIES / AUTHORITY

Pisonia umbellifera (J.R. Forst. & G. Forst.) Seem.

Synonym:
Ceodes umbellifera Forst.

Local and common names:
Yapese: *adaburru*.
Palauan: *udeuidar bekai*.

Habitat and description:
Small- to medium-size uncommon tree of forested areas. Trunk and branches soft, smooth, and easily broken. ***Leaves:*** variable, obovate to oblanceolate, large, up to 30 cm long. ***Flowers:*** salmon-pink, in clusters. ***Fruit:*** elongate and sticky.

Distribution:
Yap, and found throughout Micronesia although uncommon; widely distributed in the Pacific.

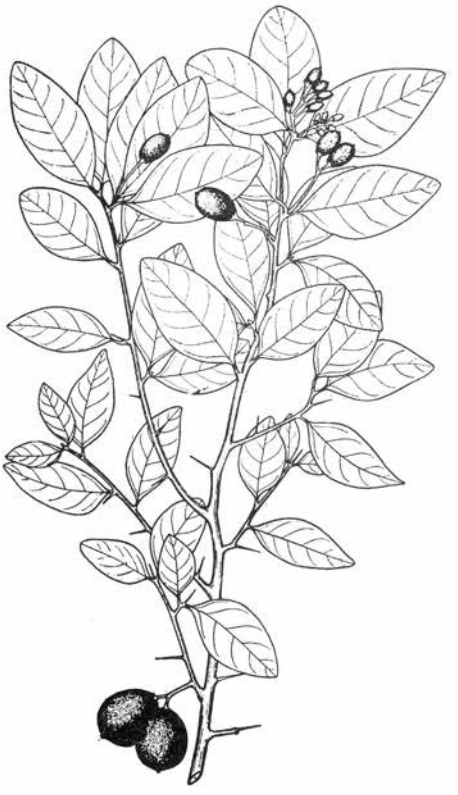
Comments:
The popular Yapese name "adaburru" likens the long sticky seeds to geckoes with their clinging toes.

FAMILY	STATUS
Nyctaginaceae	Native

(A) *Pisonia umbellifera* leaves; (B) trunk.

GENUS / SPECIES / AUTHORITY

Ximenia americana L.



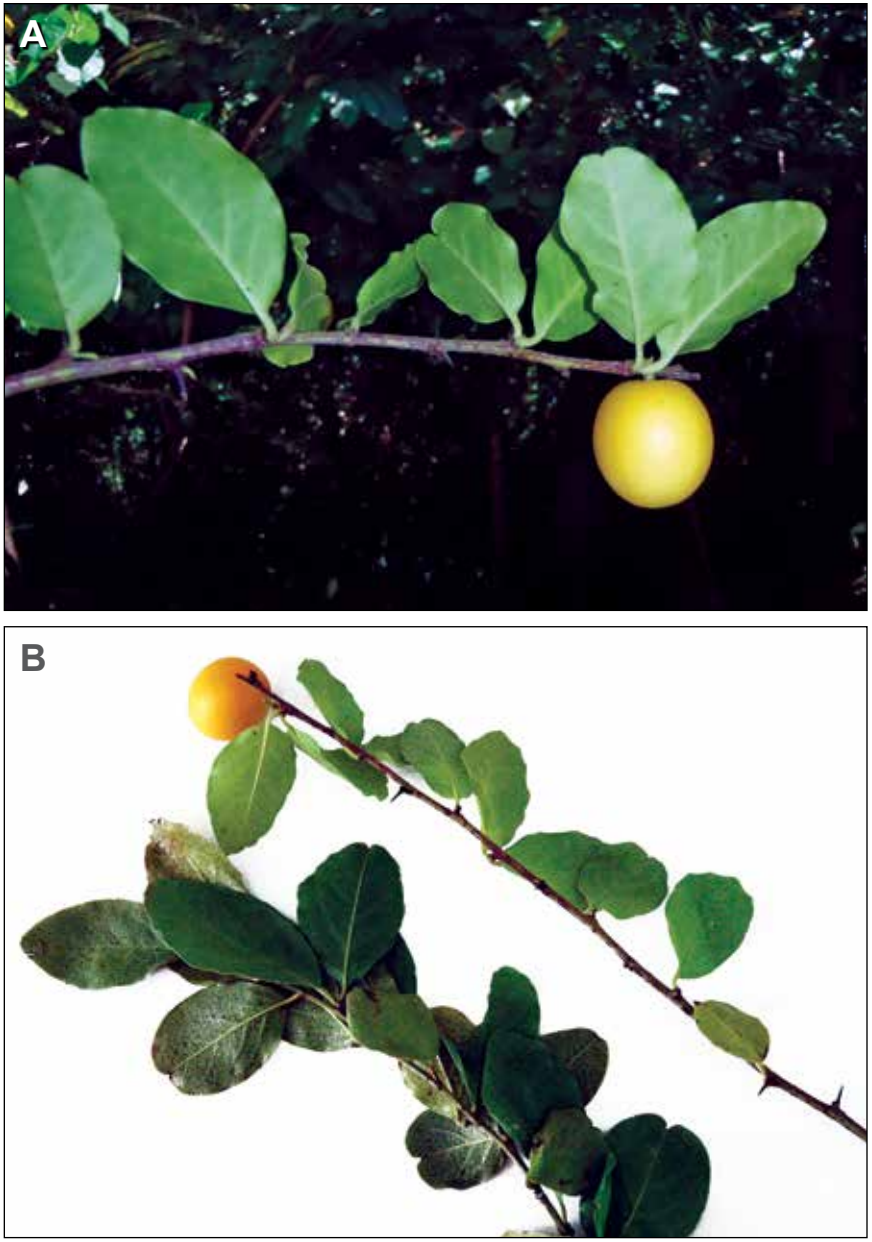
Local and common names:
English: tallow wood, sourplum.
Yapese: *gooneg*.
Palauan: *kerekuriechol*.
Chamorro: *piut*.

Habitat and description:
A small, spiny tree, with long branches somewhat zig-zag between spines, generally growing along coast. ***Leaves:*** simple, entire, or with a notch at the tip, alternate but often with two or more leaves arising at a node; smooth, yellowish green, about 4 to 7 cm long by 2.5 to 3.5 cm wide; short petioles. ***Flowers:*** four-parted, white, fragrant, hairy within, in short axillary racemes. ***Fruit:*** a fleshy round drupe about the size of an olive, often with a tip at the end and one large seed.

Distribution:
A pantropical strand plant.

Comments:
Fruit is edible but sour; relished by children; seeds are toxic.

FAMILY	STATUS
Olacaceae	Native



(A) *Ximenia americana*; (B) branches showing notched leaf tips and thorns; fruit.

GENUS / SPECIES / AUTHORITY

Averrhoa bilimbi L.; *Averrhoa carambola* L.

Local and common names:

Averrhoa bilimbi:
English: picklefruit.
Yapese: *kumim*, *uler.*
Palauan: *imegurs*.

Averrhoa carambola:
English: starfruit. Spanish: *carambola*.

Habitat and description:
Averrhoa bilimbi: a small tree frequent occurring in agroforests, around villages, and in secondary vegetation. Often with multiple trunks and crown made up of numerous sub crowns of rosettes of pinnate leaves. ***Leaves:*** compound, 1-pinnate with odd leaf at tip, light to medium green with young leaflets tinged reddish, leaves up to 60 cm long, with 20 to 36 leaflets about 3 to 9 cm long, pointing downward. ***Flowers:*** attached to stems and trunk sometimes in dense clusters, red with white centers. ***Fruit:*** smooth, succulent and oblong-cylindrical fruit born on trunk and branches, about 7 cm long, ripening yellow green, crisp and acid.

Averrhoa carambola, the starfruit, differs from *A. bilimbi* by having only four to five pairs of leaflets per leaf, more pinkish flowers, and larger star-shaped fruit with five large ridges.

Distribution:
Throughout Micronesia and pantropical, often cultivated.

Comments:
Both species of *Averrhoa* produce edible fruit. When ripe, the starfruit is sweet enough to eat as it is, while the picklefruit ("kumim" in Yapese) is very sour even when ripe, but beloved by children who often eat it with salt and hot peppers. The kumim leaves and fruit may also be added to fish soup, or the fruit blended with water and sugar to make a refreshing drink called "uler cooler."

FAMILY	STATUS
Oxalidaceae	Introduced

(A) *Averrhoa bilimbi* tree; (B) fruit borne on trunk; (C) clusters of flowers on trunk.

GENUS / SPECIES / AUTHORITY

Alphitonia carolinensis Hosok.

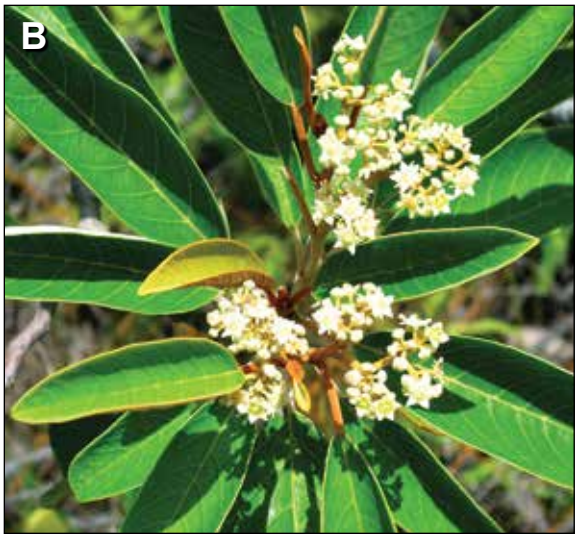
Local and common names:
English: root beer tree.
Yapese: *k'ing*.
Palauan: *elbiob*.

Habitat and description:
A lovely small- to medium-size tree scattered in savannas and at forest edges, where it may grow to a larger size. Branches, petioles, lower side of leaves, and inflorescence are covered with small, golden, rusty brown hairs. The peeled bark is fragrant. ***Leaves:*** Simple, entire, alternate, oblong, 8 to 11 cm long by 3 to 5 cm wide, obtuse at both ends, midrib caniculate above, prominent below. ***Flowers:*** in short terminal cymes, five-parted, complete. ***Fruit:*** round about 1 cm in diameter with one seed.

Distribution:
Endemic to Yap and Palau.

Comments:
This shrub to small tree is easily identified from the golden brown underside of leaves, and because the peeled bark has a fragrant smell similar to root beer. The sapwood is red and heartwood is reddish brown and hard. As a result of frequent wildfires, this tree is now uncommon. Planting and protection of this endemic tree are recommended.

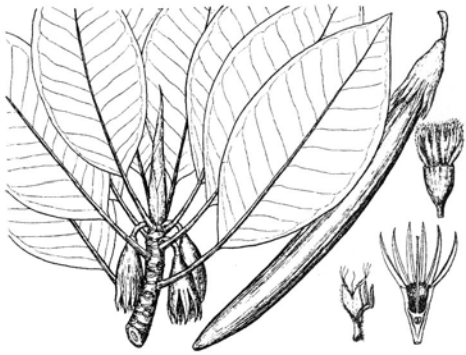
FAMILY	STATUS
Rhamnaceae	Native, endemic



(A) *Alphitonia carolinensis* small tree; (B) leaves and flowers.

GENUS / SPECIES / AUTHORITY

Bruguiera gymnorrhiza (L.) Lam.



Local and common names:
English: oriental mangrove.
Yapese: *rok*; *yangach*.
Palauan: *dengues*; *kodengues*.
Chamorro: *manglen lahi*.
Chuukese: *buru*; *ong*; *bun*.
Pohnpean: *rhom*; *sohmw*.
Kosraean: *schrael*; *alol*.

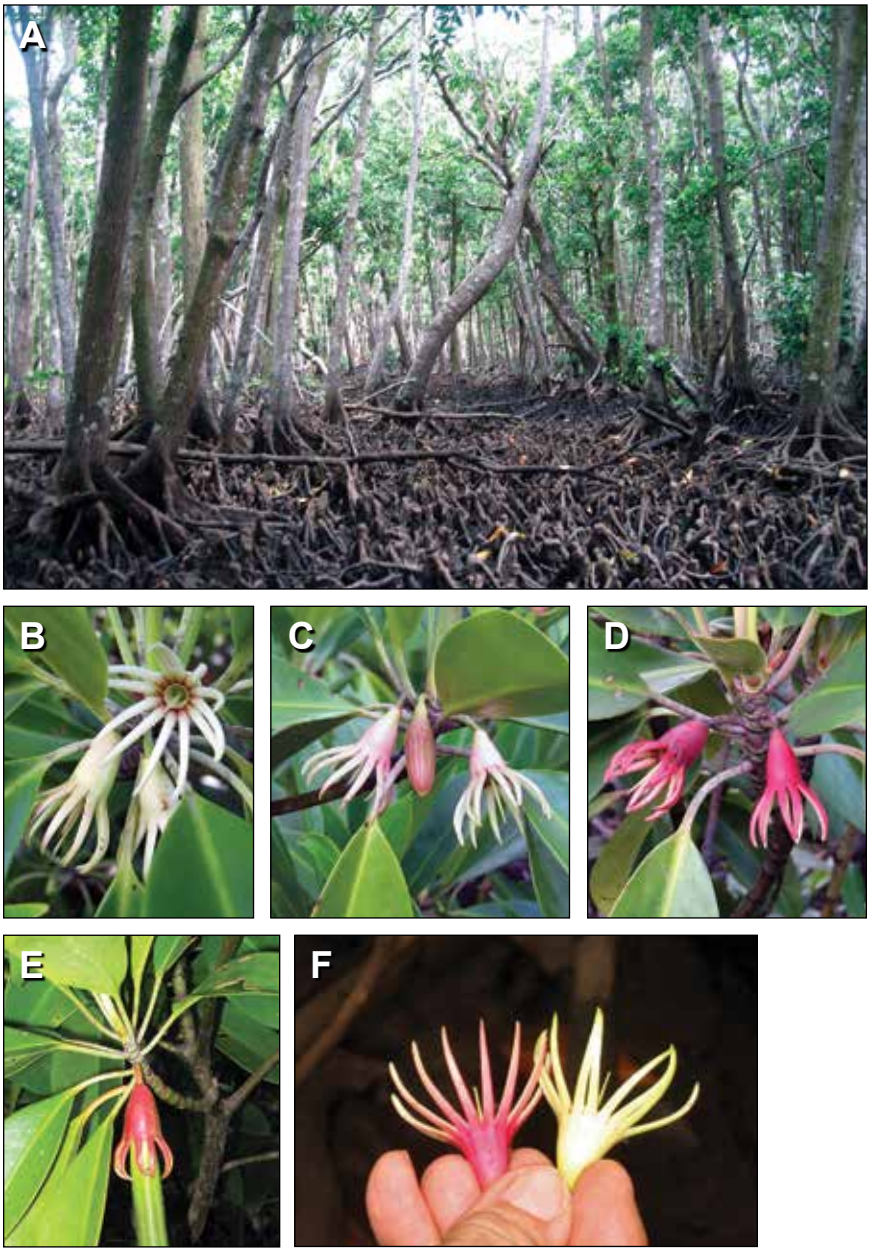
The "mangrove family," Rhizophoraceae, includes 16 genera and about 120 species. Four genera are found exclusively in mangroves and are viviparous (producing "propagules" [called "blukuy" in Yapese] that sprout while still on the tree.) Three of these mangrove genera are found on Yap: *Bruguiera* (Yapese = rok), *Ceriops*, and *Rhizophora* (Yapese = roway).

Habitat and description:
A common, often tall and nicely formed mangrove tree, with a stout trunk, generally growing toward the interior of mangrove or along rivers, sometimes growing in central depressions on uninhabited islets of atolls; tree has flying buttresses adjacent to trunk and knee-like pneumatophores further from trunk. ***Leaves:*** simple, entire, opposite, leathery, oval, pointed at both ends, 9 to 20 cm long by 4 to 9 cm wide, somewhat olive green and glossy above, petioles and stipules about new leaves often red. ***Flowers:*** solitary in leaf axils, with conspicuous red to pink or white calyx as long as petals; 10 to 14 dull orange petals, hairy. ***Fruit:*** develops into angled hypocotyl that may reach 15 to 25 cm long by 1.5 to 2 cm broad before falling.

Distribution:
Throughout Micronesian mangroves and from Indo-Malaysia to the Pacific but introduced in Hawaii.

Comments:
Trees with all three colors of calyces—dark red, pink, and white—can be found in Yap, often in the same general area. Thickets of *Bruguiera gymnorrhiza* often have trees well spaced with a relatively open understory. The heartwood is dark red and heavy.

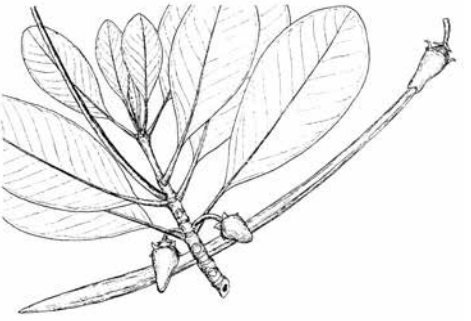
FAMILY	STATUS
Rhizophoraceae	Native



(A) *Bruguiera gymnorrhiza* grove of trees; (B), (C), and (D) white, pink, and red calyces; (E) developing propagule; (F) red and white calyces.

GENUS / SPECIES / AUTHORITY

Ceriops tagal (Perr.) C. B. Rob.



Local and common names:
Palauan: *biut*.

Habitat and description:
A small to medium-size mangrove tree growing along channel and inner edge of mangroves in Yap. ***Leaves:*** simple, entire, opposite, leathery, obovate to elliptic, rounded at end and pointed toward base, with margins slightly rolled under, average size about 5 to 10 cm by 3 to 6 cm, on relatively long petioles. ***Flowers:*** yellow-green, five-parted, 0.7 to 1 cm long, borne in 4 to 10 flowered clusters. ***Fruit:*** germinates to produce a long, thin propagule about 1 cm wide by 15 to 35 cm long.

Distribution:
Occurs in Yap and Palau in Micronesia and from Africa to Melanesia.

Comments:
An uncommon mangrove tree in Yap, recognized by its long, thin propagules. Trees are said to have been introduced to Atelieu from Palau about a generation ago, but may be native in other localities on Yap. Actively planted in the Philippines for coastal erosion control. Should be propagated and spread on Yap. Grows readily from propagule placed in water and can be planted in moist areas as an ornamental, as it has a nice shape and pleasant-smelling propagule.

FAMILY	STATUS
Rhizophoraceae	Native

(A) *Ceriops tagal* tree; (B) propagules; (C) sprouting fruit; (D) flowers.

Rhizophora spp.

Rhizophora stylosa Griff.

Rhizophora mucronata Lam.

Rhizophora apiculata Blume

Rhizophora* × *lamarckii Montrouz.

Local and common names:
Yapese: *roway*. In Palau, *R. apiculata* may be distinguished as "bngaol" and other *Rhizophora* known as "tebechel."

Habitat and description:
Rhizophora spp. are small to large mangrove trees with stilt or prop roots above mud. Three species and a hybrid occur on Yap. The most common, *R. stylosa*, is described first, with diagnostic characteristics of other *Rhizophora* following.

Leaves: simple, entire, opposite, elliptic, about 6.5 to 12.5 cm long by 3.5 to 6.5+ cm wide, pointed at both ends with a mucronate (abrupt, pointed) tip (characteristic of all *Rhizophora* spp.); thick, glossy, dark green above, lighter below, and clustered at branch tips, with young leaves enclosed within terminal stipules, petioles 2.5 to 3.5 cm long.

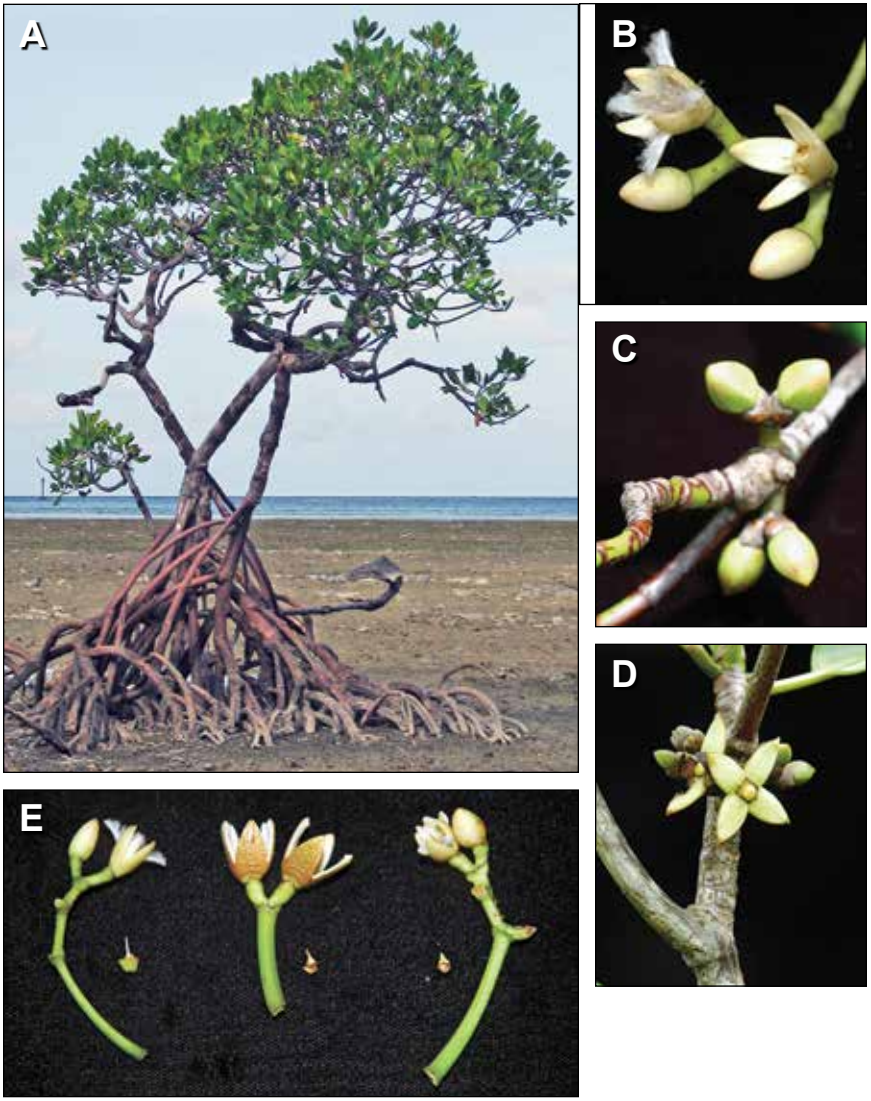
Flowers: borne one to five leaf nodes down from the apical (tip) shoot, generally within the leaves, on inflorescences that are forked three to four times and bear two to eight flowers (depending on how many have fallen off); small white flowers with ephemeral petals with thick woolly hairs (see photo) borne within four thick persistent calyces, eight stamens with a style about 4 to 6 mm long (see photo).

Fruit and propagules: the Rhizophorace have fruit that germinates while it is still on the tree, into long, cylindrical, somewhat curved hypocotyls or "propagules" that fall into the mud and begin to grow or float to a suitable habitat and then begin to root. The dimensions of hypocotyls range from 14 to 80 cm long and 1 to 2 cm at the widest part. Dimensions are variable and not consistently species-specific.

Rhizophora mucronata is quite similar to *R. stylosa*, with propagules borne a bit further from the apical shoot at nodes four to seven. Perhaps the surest way to differentiate between the two is to pull a mature bud apart and note the length of the style, about 4 to 6 mm in *R. stylosa*, and

(*continued on page 184*)

FAMILY	STATUS
Rhizophoraceae	Native

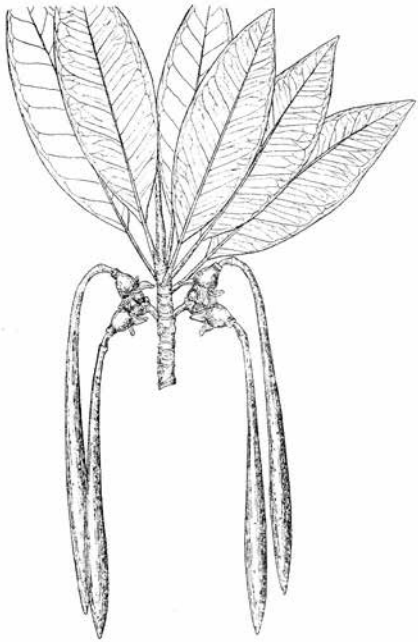


(A) *Rhizopora stylosa* tree; (B) *R. stylosa* flowers; (C) buds of *R. apiculata*; (D) non-reflexed calyx of *R. apiculata*; (E) comparisons of inflorescences and styles of *R. stylosa* (on left with longest style, 6 mm long by 1.5 mm wide), *R.* × *lamarkii* in middle, and *R. mucronata* on right with shortest style (3.5 mm long by 4.5 mm wide).

(*from page 182*)

shorter in *R. mucronata* (see photos). *Rhizophora mucronata* and *R. stylosa* are quite similar, and *R. stylosa* may someday be changed back to *R. mucronata* var. *stylosa* (Griff.) Schimper.

Rhizophora apiculata generally occurs upstream where water is less saline. It is more distinctive with slightly longer leaves, more tapering at the ends, with mature buds and flowers that are borne about 6 to 11 nodes down from the apical (tip) shoot, and fruit borne about 8 nodes below the apical shoot. By the time the hypocotyls matures, the twig has grown longer so that it is borne 9 to 13 nodes below the apical shoot, below the leaves. The petals of *R. apiculata* flowers lack hairs, and have non-reflexed calyx lobes. Perhaps the most distinctive characteristic of *R. apiculata* are the corky bracts beneath the calyx lobes and above the hypocotyls and the generally paired flowers and fruit borne close to the stem (see photos).

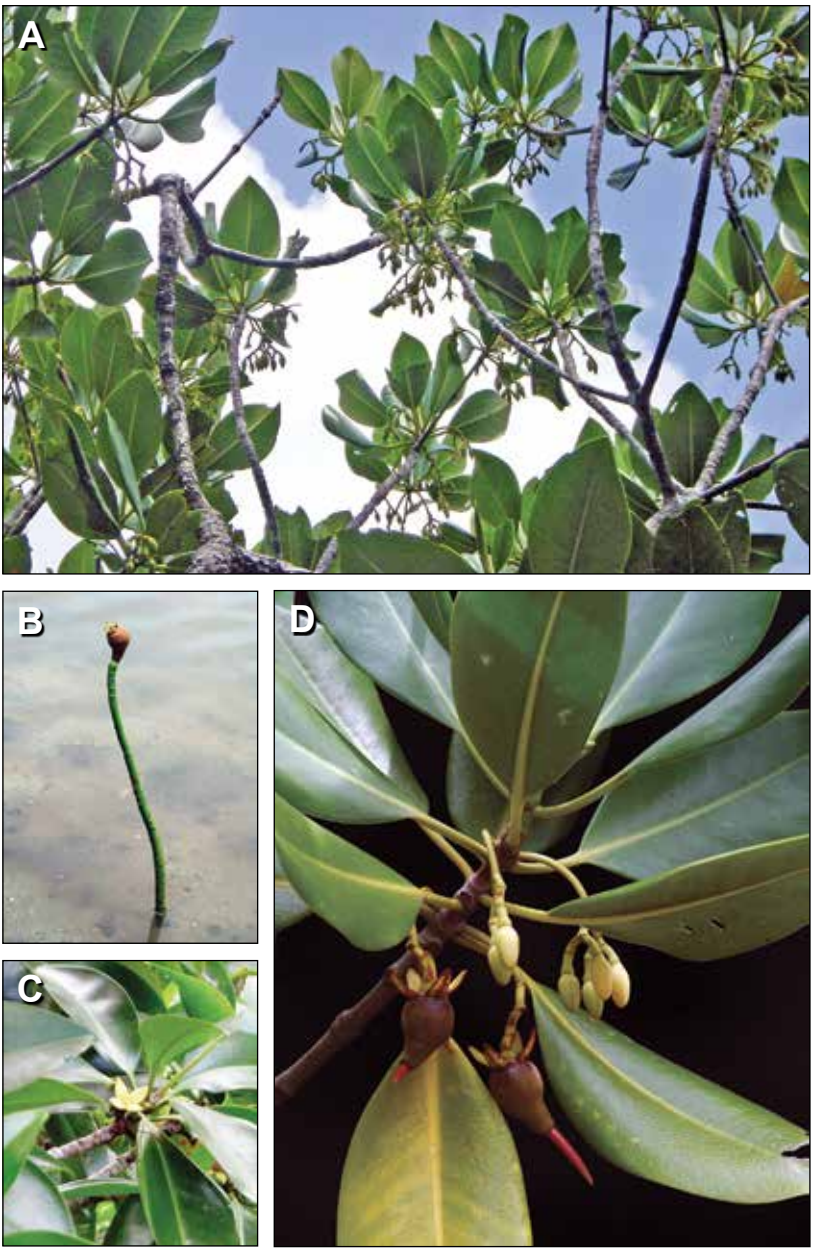


Rhizophora × *lamarckii*, is a hybrid, probably of *R. stylosa* and *R. mucronata*. It is a robust tree with characteristics between the parent species, with flowers (see photos) borne about three to six nodes from the apical shoot.

Distribution:
Rhizophora are found in estuarine and coastal mangroves throughout Micronesia and Southeast Asia to Australia.

Comments:
The *Rhizophora*, and mangroves in general, are important in preventing coastal erosion and reducing siltation of lagoons. They provide habitat for young fish and their leaves provide a slow release of nutrients in waters beyond mangroves.

FAMILY	STATUS
Rhizophoraceae	Native



(A) abundant clusters of flowers of *Rhizophora stylosa*; (B) fallen propagule ready to grow; (C) *R.* × *lamarkii* hybrid with the "happy face flower"; (D) buds and sprouting propagules.

GENUS / SPECIES / AUTHORITY

Aidia racemosa (Cav.) Tirvengadum

Synonym:
Aidia cochinensis auct. non Lour.

Local and common names:
Yapese: *gathemach* (?)
Palauan: *kerumes*.
Chamorro: *sumac*.
Pohnpean: *kahmaut*, *kehnman*.

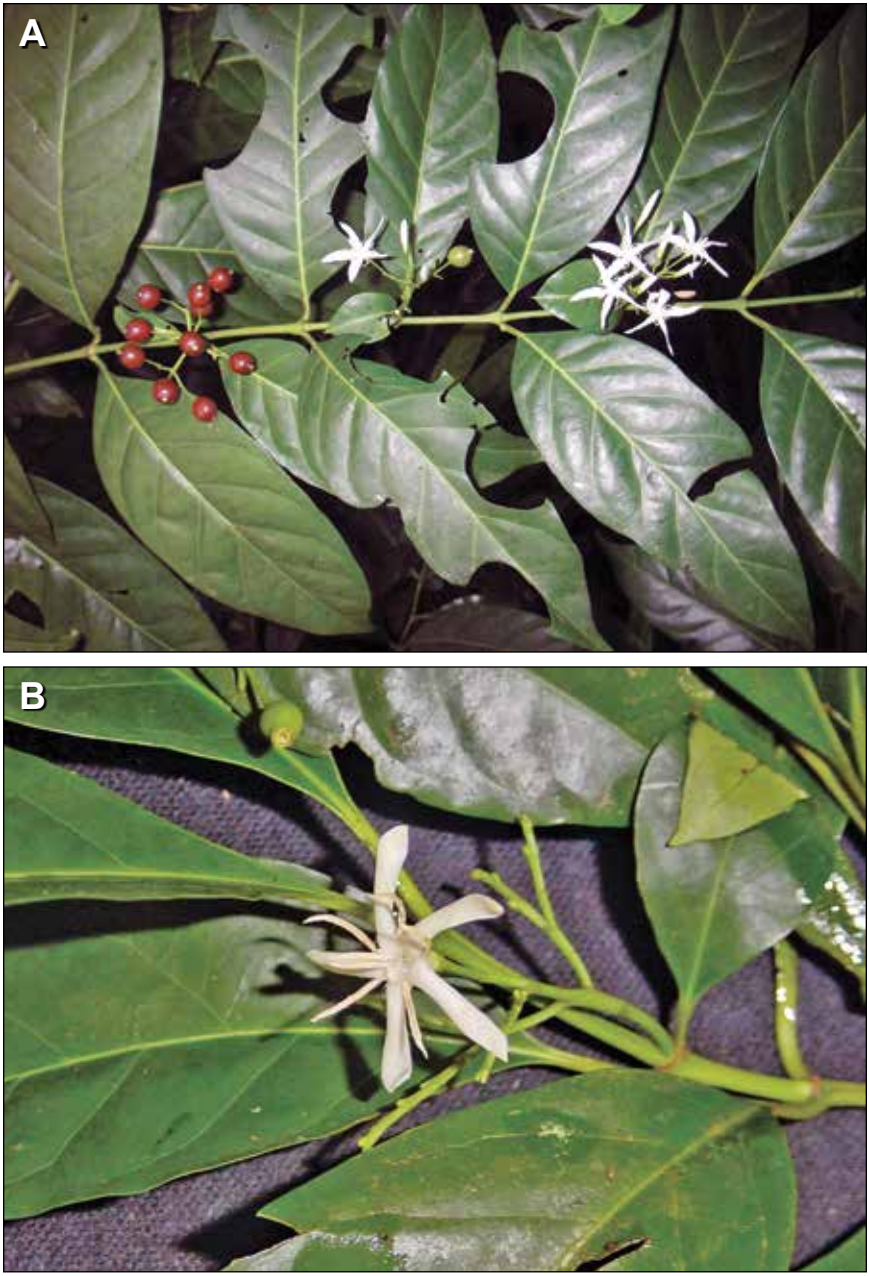
Members of the large family Rubiaceae are fairly easy to recognize. They have opposite leaves and a stipule scar that extends around the stem. The ovary is below the flower parts, and there is often a scar at the tip of the fruit where the flower parts have fallen off (see photo of coffee fruit).

Habitat and description:
Small understory tree in forests. ***Branches:*** smooth; petioles moderately long, 1 to 2 cm. ***Leaves:*** simple, entire, opposite, with wavy margins, glossy, oblong-lanceolate, size variable in shade and sun, averaging about 13 cm by 6 cm with four or more conspicuous veins. ***Flowers:*** in axillary cymes, long pedicels, white with exerted stamens and pistil, fragrant. ***Fruit:*** 1 to 2.5 cm, with persistent calyx, maturing reddish to black.

Distribution:
Tropical Asia through Pacific Islands but not as far as Hawaii.

Comments:
The name "gathemach" seems to be applied or misapplied to more than one species. Used medicinally.

FAMILY	STATUS
Rubiaceae	Native



(A) *Aidia racemosa* leaves, flowers and fruit; (B) flower.

GENUS / SPECIES / AUTHORITY

Coffea sp.

Local and common names:
English: coffee.

Habitat and description:
Planted shrubs to small trees, youngest branches compressed. ***Leaves:*** with stipules usually between petioles, leaf blades simple, opposite. ***Flowers:*** with 5- to 8-toothed calyx, tubular, five to eight lobed corolla, lobes twisted in bud, filaments very short, stigma bifid. ***Fruit:*** a drupe that ripens red, with two seeds flat on the side where they meet, and rounded on the outer sides with a groove on the flat side. Liberian coffee, *Coffea liberica* Bull ex Hiern. has fruit about 1.5 to 3 cm long with a thick skin, while *C. arabica L.*, Arabian coffee, the most commonly cultivated coffee, has a fruit about 0.5 to 1.5 cm long with a thin covering.

Distribution:
Introduced to Yap but generally uncommon.

Comments:
Both species have been introduced to Yap and some persist but are not cultivated or harvested commercially.

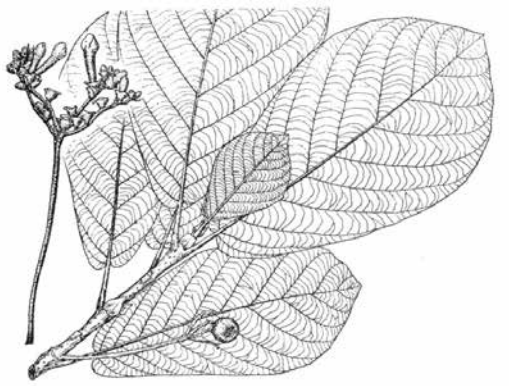
FAMILY	STATUS
Rubiaceae	Introduced

Coffea sp. leaves and immature fruit.

GENUS / SPECIES / AUTHORITY

Guettarda speciosa L.

Local and common names:
Yapese: *blaw*.
Palauan: *belau*.
Ulithian: *iuth*.
Fais: *outh*.
Ifaluk: *ot*.
Woleaian: *wuut*.
Carolinian: *mwesor*.
Chamorro: *panao*.
Chuukese: *mosor*.
Pohnpean: *eet*, *iht*.
Kosraean: *korn lahk*.
Marshallese: *utilomar*; *wut*.

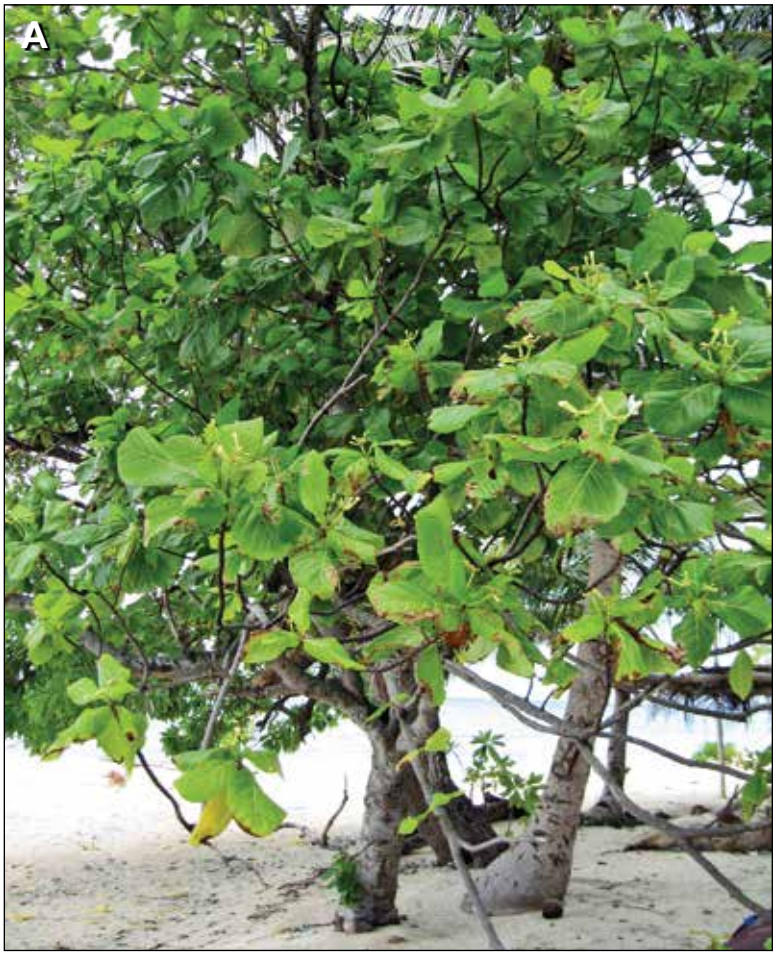


Habitat and description:
A small tree generally growing along the coast. Short thick branches with prominent leaf scars. Stipules between petioles fall early. ***Leaves:*** simple, entire, opposite or sometimes in whorls of three, glossy green, ovate, about 10 to 25 cm by 8 to 18 cm, midrib and 7 to 10 pairs of veins prominent on both sides. ***Flowers:*** on cymes generally arising in axil of fallen leaf, peduncle 5 to 10 cm long and forked, calyx sessile, pubescent, about 1 cm long; corolla 2.5 to 5 cm long, tubular and very fragrant. ***Fruit:*** a roundish drupe about 1.5 to 3 cm wide, slightly ribbed and with a circular rim at the apex, ripening whitish to pinkish and containing four to six seeds.

Distribution:
Widespread, throughout Micronesia to Pacific equatorial islands and Tuamotus, and eastern Africa.

Comments:
A common coastal tree with very fragrant flowers that may become more fragrant after they fall and wilt a bit. Although they bruise easily, they are a favorite flower for weaving into "nunu/marmar" leis for their persistent fragrance. The seeds float, resulting in their coastal distribution.

FAMILY	STATUS
Rubiaceae	Native



(A) *Guettarda speciosa* tree; (B) branches with inflorescence and fruit; (C) flower.

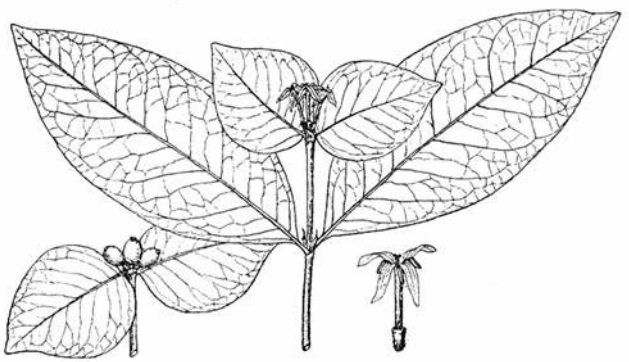
GENUS / SPECIES / AUTHORITY

Ixora triantha Volk.

Habitat and description:
A shrub to small tree in the understory or at the edge of native forests. ***Leaves:*** simple, entire, opposite and glossy, 8 to 15 cm long by 4 to 6 cm on short petioles 3 to 6 mm; with a looping network of veins forming a pattern within the leaf blade. ***Flowers:*** unstalked and enclosed in two terminal large bract-like leaves. ***Fruit:*** three lined up in bract-like leaves with light area below fruit. Ripens from green to purple black.

Distribution:
Endemic to Yap and the Marianas.

Comments:
A relative of the more showy red "gachiow" (*Ixora casei*), this seldom-noticed *Ixora* has three white fragrant blossoms lined up in a pair of bract-like leaves. When the buds bloom, the middle flower opens first, and the side blossoms open a day later. By this time the side buds have grown a bit longer so that when they open, the petals overlap nicely without interfering with one another. Easy to identify by the three white flowers or fruits in a row, and when these have fallen, by the light centers of the bract-like terminal leaves (see photo B).



FAMILY	STATUS
Rubiaceae	Native

(A) *Ixora triantha* flowers; (B) light centered bract-like terminal leaves after fruit has fallen.

GENUS / SPECIES / AUTHORITY

Morinda citrifolia L.

Local and common names:

English: Indian mulberry.
Yapese: *mangeluag*.
Palauan: *ngel*.
Fais: *iol*.
Ifaluk: *lel*.
Woleaian: *leer*.
Satawalese: *lan*; *leen*.
Carolinian: *leel*.
Chamorro: *chada*.
Chuukese: *arin*; *napur*.
Pohnpean: *weipul*.
Kosraean: *ee*; *hi*.
Marshallese: *nen*; *nin*.

Habitat and description:

A bushy shrub to small tree with a rounded crown common in many habitats from open savannas to forests. ***Leaves:*** simple, entire, opposite and somewhat crinkled, dark glossy green leaves; shape and size are highly variable from elliptic to broad oval and to 15 to 25 or more cm long by 6 to 18 cm or more wide. Branches have thick light green petioles and large D-shaped stipules between the petiole bases on the squarish stem. ***Flowers:*** borne in groups on short 2- to 3-cm stems. They are white with five points. As the first flowers are pollinated, the fruit begins to develop and often bears newer flowers on the developing fruit (see photo). ***Fruit:*** oblong to round varying considerably in size from about 2.5 to 8 or more cm wide when mature, with a warty appearance, ripening from green to whitish, with a fetid smell when ripe and containing multiple seeds.

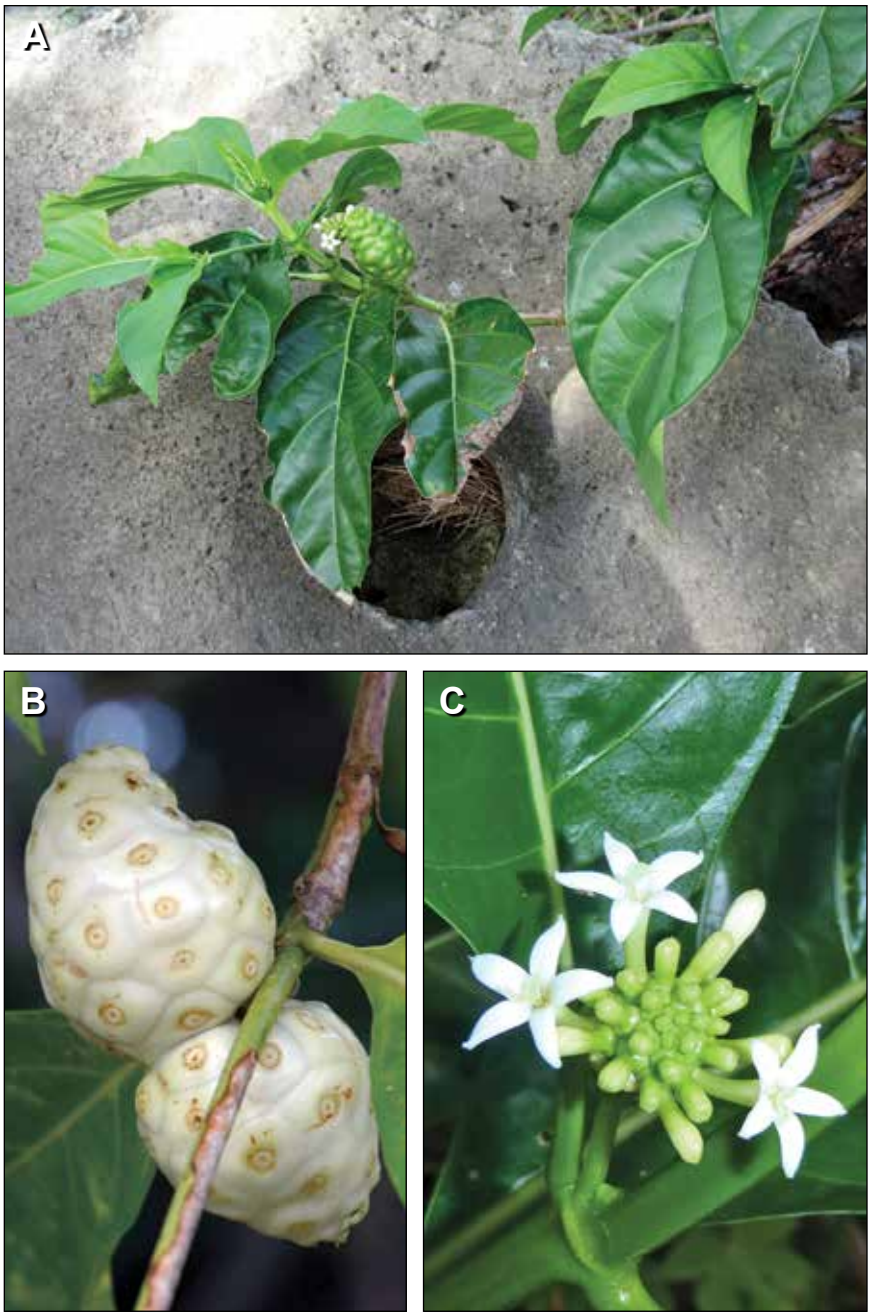
Distribution:

Widespread from west coast of Africa to India and Malaysia to Pacific islands and throughout Micronesia.

Comments:

A valued plant growing both in the wild and left to grow in village areas because of its usefulness. Uses include a number of medicines and yellow and red dye. It may also be eaten as a "famine food" after typhoons when nothing else is available.

FAMILY	STATUS
Rubiaceae	Native



(A) *Morinda citrifolia* branch with fruit over stone money; (B) ripe fruit; (C) flowers.

GENUS / SPECIES / AUTHORITY

Mussaenda frondosa L.

Habitat and description:
A shrub to small tree growing in open areas and forest edges, easily distinguished by its white phyllodes; bark light with conspicuous lenticles. ***Leaves:*** simple, entire to wavy, opposite, elliptical, pointed at both ends, 8 to 16 cm long by 4 to 6 cm wide, petiole 0.9 to 1.2 cm long. ***Flowers:*** on terminal panicles, with an occasional calyx lobe enlarged about 5 to 8 cm in length into a striking white leaf-like structure; flowers are small, about 2 cm wide, gold, tubular with five lobes. ***Fruit:*** are elliptical, 10 to 17 mm long, with a persistent calyx, ripening green to almost black.

Distribution:
Palau, Yap, Philippines, and Malaysia.

Comments:
A beautiful wild shrub. Used medicinally.

FAMILY	STATUS
Rubiaceae	Native

Mussaenda frondosa.

GENUS / SPECIES / AUTHORITY

Psychotria mariana Bartl. ex DC; *Psychotria leptothrysa* Miq. var. *longicarpa* Val.; *Psychotria arbuscula* Volkens

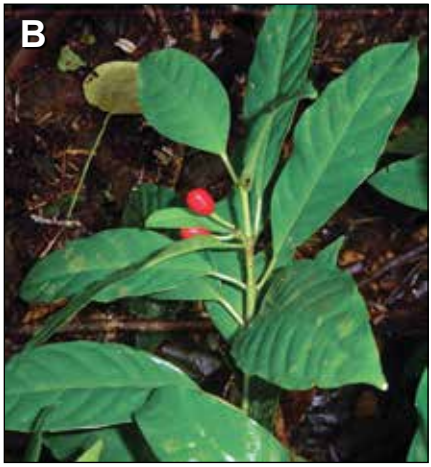
Local and common names:
Yapese: *gathemach*. Chamorro: *aplokhating*.

Habitat and description:
For *P. mariana*: A small dark tree within and at edge of native forests with glabrous branchlets angled slightly upward. ***Leaves:*** opposite, simple, entire, oblong to slightly obovate and clustered near ends of branches, about 7 to 10 cm by 2.5 to 4 cm, rather leathery; lateral nerves, six to eight pairs and distinct and prominent on both sides of leaf; petiole short, 3 to 5 mm long with stipules between bases of petioles that fall off early. ***Flowers:*** borne on terminal cymes, calyx usually five-toothed, 3 mm long; flower white, five-lobed, with 6 to 8 mm tube, four to five lobes 4 to 5 mm with hairy throat and five stamens, style 4 mm, exerted with two very short stigmatic lobes. ***Fruit:*** a roundish drupe about 5 to 8 mm long ripening from green to orange to red to purplish with a green calyx rim persisting at the end, containing one to two seeds.

Distribution:
Psychotia arbuscula is endemic to Yap, and *P. mariana* is endemic to Micronesia.

Comments:
There are at least two to three other *Psychotria* on Yap. Based on descriptions of Kanehira (1935) and Stone (1970–1971) *P. arbuscula* and *P. mariana* are quite similar with *P. arbuscula*, being shrubs rather than small trees, having slightly larger leaves (8 to 10 cm long, 3 to 4.5 cm broad, compared to about 7 to 10 cm by 2.5 to 4 cm for *P. mariana*), eight lateral nerves (as compared to six to eight pairs for *P. mariana*), a longer petiole, 5 to 12 mm long (as compared to 3 to 5 mm for *P. mariana*), with corolla tube 6 mm long (as compared to 6 to 8 mm for *P. mariana*), triangular acute corolla lobes (as compared to oblong) and fruit ellipsoidal, 6 to 8 mm long as compared to ellipsoidal-subglobose, 5 to 8 mm long. *Psychotria leptothrysa* var. *longicarpa* has larger fruit that matures shiny red. Taxonomic work is needed on Yap's *Psychotria*, especially because *P. mariana* is listed as endemic to Micronesia and *P. arbuscul*a is listed as endemic to Yap.

FAMILY	STATUS
Rubiaceae	Native, endemic



Psychotria spp.

GENUS / SPECIES / AUTHORITY

Scyphiphora hydrophyllacea Gaertn.

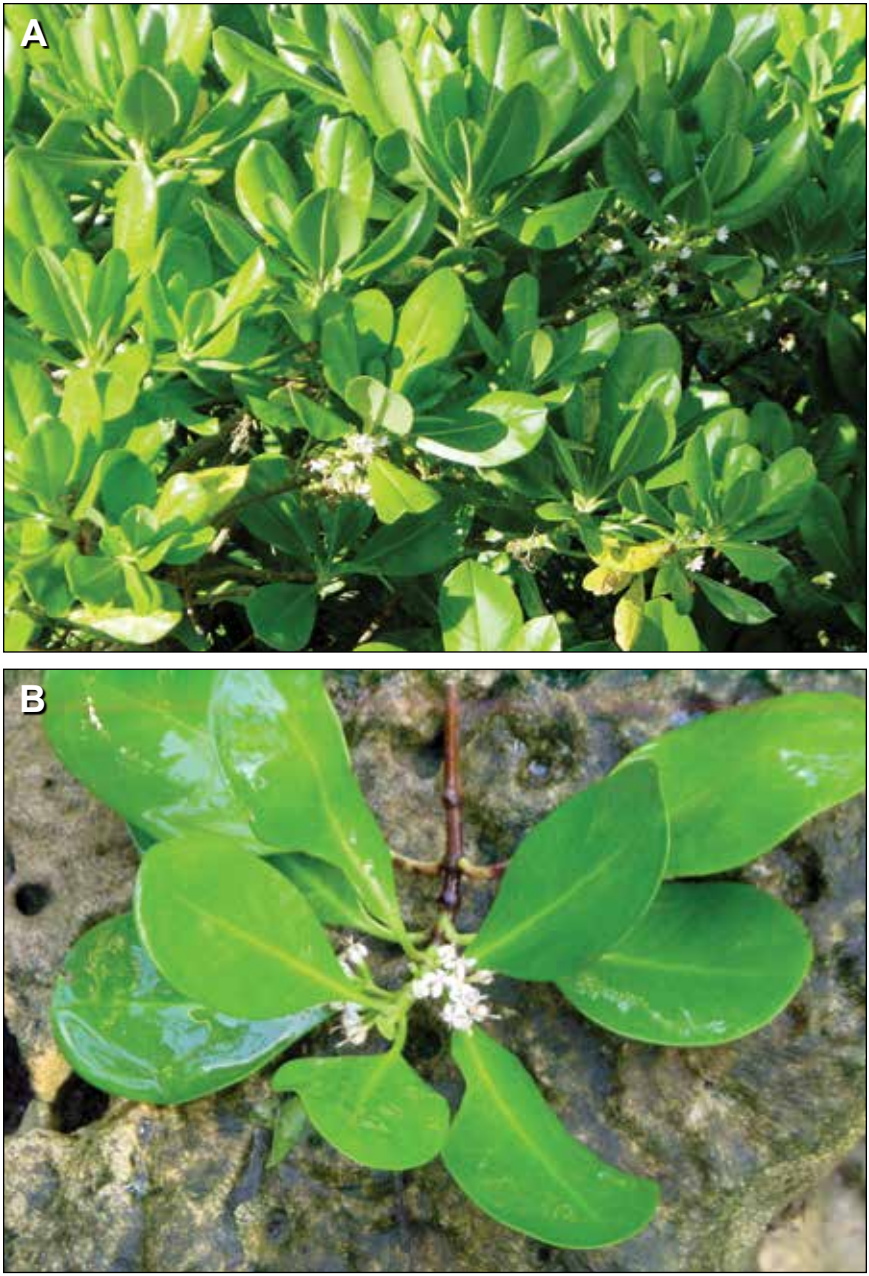
Local and common names:
Yapese: *guad*.
Palauan: *kuat*.

Habitat and description:
Shrub or small tree growing in mangrove areas generally on the landward side, along channels, and along rocky piers. ***Leaves:*** opposite, simple, entire, broad ovate, about 4 to 8 cm by 2 to 5 cm, glossy and thick, often with edges turned under; stipules 2 mm persistent between petioles. ***Flowers:*** borne in clusters, pink to whitish, 10 to 12 mm long including green calyx tube, petals and four sepals. ***Fruit:*** 5 to 11 mm long, cylindrical and ridged, greenish with the persistent calyx at the end.

Distribution:
Malaysia to New Caledonia. In Micronesia, found only in Yap and Palau.

Comments:
Not as common as major mangrove species; has been killed off in some areas. With its glossy leaves and pink flowers, this species would be good for landscaping rocky coasts for protection from storm waves.

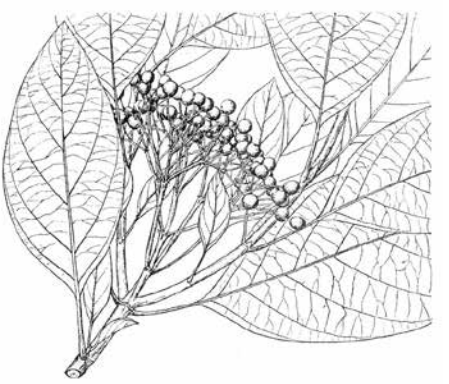
FAMILY	STATUS
Rubiaceae	Native



(A) *Scyphiphora hydrophyllacea* plant; (B) flowers.

GENUS / SPECIES / AUTHORITY

Tarenna sambucina (Forst) Dur.



Local and common names:
Chamorro: *sagdara*; *sumac*.

Habitat and description:
Shrub to small tree growing in and at the edge of forests and in open areas. Bark pale, ascending branches with enlarged nodes; young branch ends four-angled. ***Leaves:*** opposite, simple, entire, ovate-elliptic, 10 to 20 cm by 5 to 9 cm and tapering at both ends; seven to eight pairs of conspicuous veins; petioles 1 to 3 cm long, D-shaped stipules persist between the bases of the petioles. ***Flowers:*** creamy white, numerous and crowded in terminal corymbose cymes. Inflorescence expands during flowering and fruiting so that fruit is more widely spaced than flower buds. ***Fruit:*** roundish berries about 5 to 6 mm in diameter, green maturing to purple-black, with about eight seeds each.

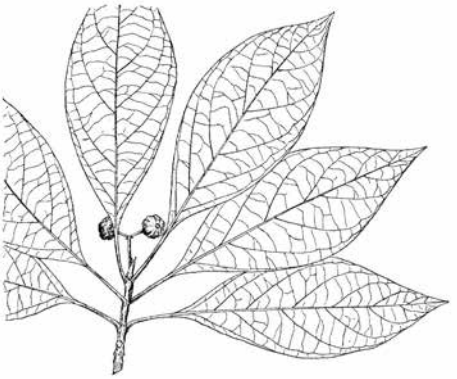
Distribution:
Yap, Palau, Marianas, Melanesia, and southern Polynesia.

FAMILY	STATUS
Rubiaceae	Native

Tarenna sambucina branch with immature fruit.

GENUS / SPECIES / AUTHORITY

Timonius albus Volk.



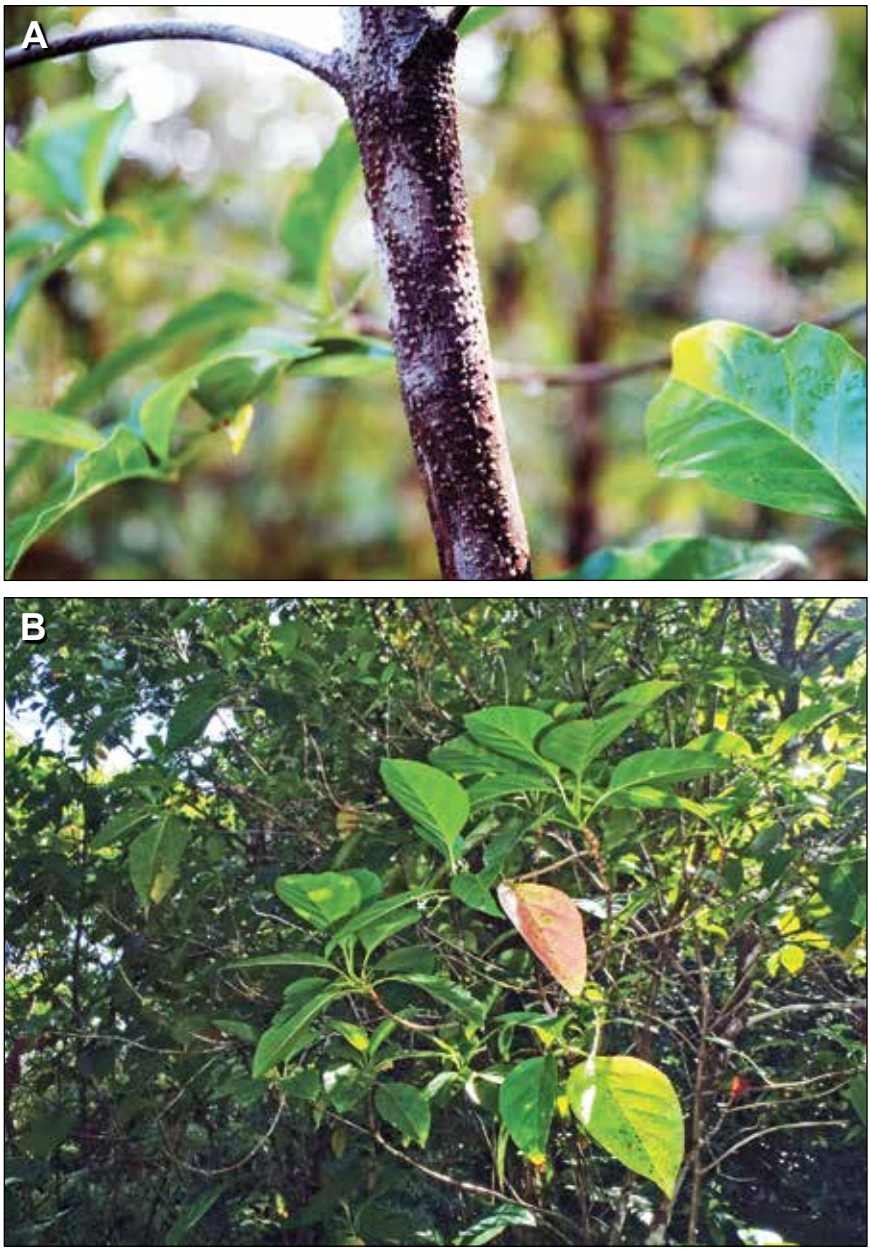
Local and common names:
Sometimes called a type of "gathemach."

Habitat and description:
A small, rangy tree or shrub in the understory or edge of native forest, occasionally in savannas. Trunk dark and rough (see photo), twigs terete. ***Leaves:*** crowded at ends of branches, elliptical, pointed at both ends, 9 to 13 mm by 5 to 6 cm, five to six pairs of lateral veins, petiole 2 to 3 cm long, glabrous. ***Flowers:*** disposed in short cyme born in axil of terminal leaves, smooth, stipules triangular; calyx tube slightly hairy externally, shallowly dentate. Corolla tube white, hairy externally. ***Fruit:*** compressed globose, 10 mm in diameter.

Distribution:
Endemic to Yap.

Comments:
Older leaves at base of leaf cluster are often reddish. Yap is the only known place on Earth on which this tree is found.

FAMILY	STATUS
Rubiaceae	Native, endemic



(A) *Timonius albus* trunk; (B) branch showing flower and older reddish leaf.

GENUS / SPECIES / AUTHORITY

Citrus spp.

Local and common names:

Citrus aurantifolia (Christm.) Swingle
English: lime. Yapese: "lime."

Citrus aurantium L.—
English: sour orange.
Yapese: *gurgur nu Waab*.

Citrus grandis (L.) Osbeck—
English: pomelo; shaddock.
Yapese: "pamelo."

Citrus hysterix (L.) Burm. f.—
English: lemonlime.
Yapese: *remong ngabchey*.

Citrus macroptera Montr.—
English: orange.
Yapese: *gurgur*, *marathal*.

Citrus microcarpa /
Citrus mitis /
Citrofortunella mitis—
English: kalamansi.
Yapese: *gingang*.

Citrus paradise—
English: grapefruit.
Yapese: "grapefruit."

Citrus reticulata Blanco.—
English: tangerine; mandarin.
Yapese: *goligaw*.

Citrus sinensis (L.) Osbeck—
English: sweet orange.
Yapese: *gurgur*.

Habitat and description:

These small trees are common in Yap's agroforests. Those listed above have been reported from Yap, but additional species and hybrids are probably present. Although the specific characteristics of the many species, varieties and hybrids vary, some common characteristics include the following: young green twigs are often angled, later becoming rounder, young and sometimes older branches and trunk with single spines. ***Leaves:*** simple, some serrate or wavy, with transparent glands that produce characteristic citrus scent, petioles somewhat to markedly winged, some, such as "remong nu Waab" so much that they look like a leaf blade, and the leaf looks like it is lobed, but there is a joint between the winged petiole and the true leaf. ***Flowers:*** single or a few borne in leaf axils, calyx 4- to 5-lobed, petals four to eight, usually five, stamens four to six, sometimes up to 10, times as many as petals, stigma round. ***Fruit:*** round and sectioned like an orange and other citrus fruit; seeds angular and flattened.

Distribution:

Quite a number of species and varieties of *Citrus* have been introduced to Yap both in the distant past and more recently, and some appear to have hybridized on island. Because they are cultivars with a complicated taxonomy, they are here treated together only in general.

Comments:

Most of Yap's citrus fruits are green or partly green, even when ripe.

FAMILY	STATUS
Rutaceae	Introduced

(A) and (B) *Citrus* spp.

GENUS / SPECIES / AUTHORITY

Allophyllus timoriensis (DC) Blume

Synonym:
Allophyllus ternatus (Forst.) Radlk.

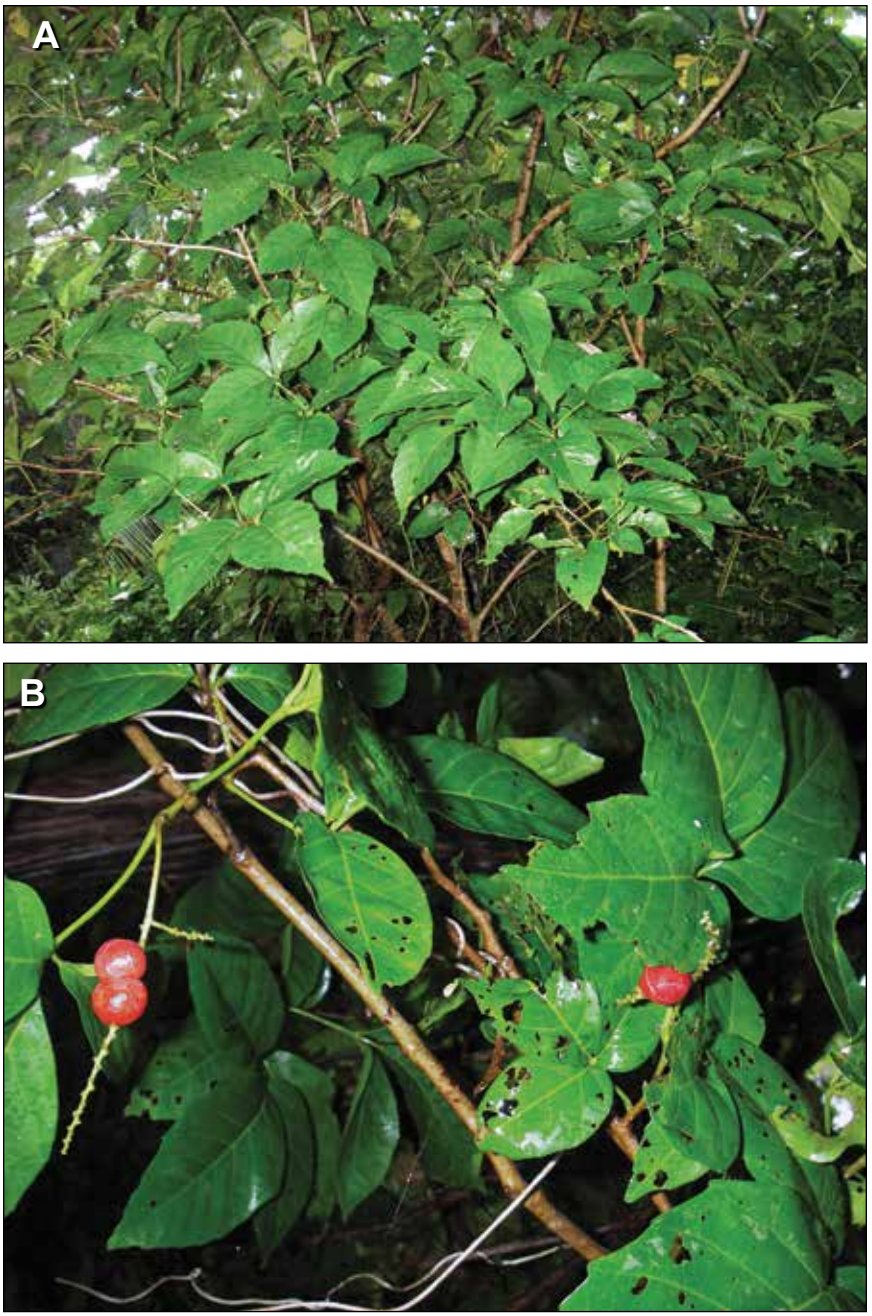
Local and common names:
Yapese: *angel*.
Palauan: *chebeludes*; *ebeludes*.
Chuukese: *ngo*.
Kosraean: *lah*.
Marshallese: *kutaak*.

Habitat and description:
A scandent shrub to small tree growing in coastal areas. ***Leaves:*** trifoliate, with shallowly toothed margins, alternate, ovate to elliptic and pointed at each end sometimes cordate at base; light green and not very glossy. Leaflet petioles very short, almost sessile. ***Flowers:*** white and tiny on a spike that is seldom branched and longer than the leaves, male and female flowers on same stalk**.** ***Fruit:*** roundish 1 to 4 cm in diameter, ripening from green to red.

Distribution:
Throughout Micronesia and widespread in tropics.

Comments:
Used medicinally.

FAMILY	STATUS
Sapindaceae	Native



(A) *Allophyllus timoriensis* small tree; (B) fruit.

GENUS / SPECIES / AUTHORITY

Pouteria obovata (R. Br.) Baehni

Synonym:
Planchonella obovata (R. Br.) Baehni.

Local and common names:
Yapese: *there* (?)
Palauan: *elangel*.
Chamorro: *lalaha* (on Saipan); *lala* (on Rota).

Habitat and description:
A shrub to shrubby medium-size tree to 15 m or more, with scanty milky sap, growing in forests and at forest edges in Yap in Palau, and also in thickets of secondary vegetation in the Marianas, 5 to 12 m tall, 30 to 60 cm in diameter, bark dark and rugose, inner bark pink. Branches don't spread very far from trunk, resulting in a rounded bushy appearance of trees growing in full sun with young branches; underside of leaves, petiole, and peduncle coated with golden brown pubesence. ***Leaves:*** simple, entire, alternate, dark green above, lighter and coppery underneath; old leaves wither dark yellow-orange, highly variable in size and shape, (5 to 20 cm long by 2 to 10 cm wide, generally obovate to rounded-elliptic, 8 to 12 cm long, 3.5 to 5 cm wide), generally apex obtuse or rounded, base generally acute, tapering toward the petiole, midrib prominent underneath, lateral veins 10, distinct on both surfaces; petiole 1.5 to 3 cm long. ***Flowers:*** whitish, about 7 mm wide, one to six singly or in clusters on branch, pedicles short. ***Fruit:*** oval to oblong, about 10 mm in diameter, 12 to 16 mm in length, dark purple-black when ripe, with one or sometimes two seeds.

Distribution:
Yap, Palau, Marianas, Chuuk, and elsewhere from Malaysia to Polynesia.

Comments:
Pouteria obovata can look quite different under different conditions. In the forest understory it generally has large leaves without hints of the golden undersides. In full sun, leaves are much smaller and closer, and when the wind blows, they display their golden underside (see photos). Sometimes called "there" on Yap, a name that should be verified.

FAMILY	STATUS
Sapotaceae	Native

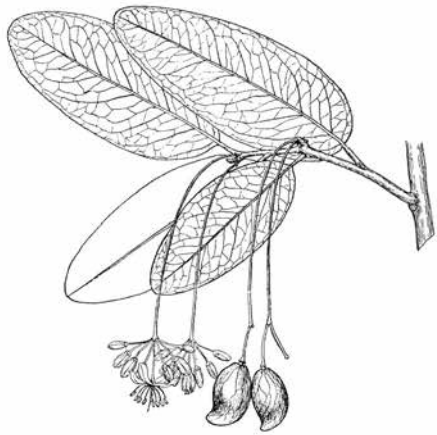
(A) *Pouteria obovata* tree in full sun with leaves blowing in the wind; (B) tree within forest; (C) tree in full sun with no wind.

GENUS / SPECIES / AUTHORITY

Quassia indica (Gaertn.) Nooteboom

Synonym:
Samadera indica Gaertn.

Local and common names:
Palauan: *eskeam*.



Habitat and description:
A medium-size tree found along rivers and at edge of mangrove in Palau, and recently found also on Yap; trunk is straight with swellings at base. ***Leaves:*** simple, entire, alternate, oblong, 16 to 20 cm long by 8 to 12 cm wide, lustrous deep green, obtuse (rounded) at both ends, petiole 2 to 3 cm long. ***Flowers:*** borne on long drooping axillary peduncle, calyx four, petals four, pink, 1.8 cm long by 0.5 cm wide, stamens eight, style slender. ***Fruit:*** flattened, shaped like a cross between a "bu'oy" (*Inocarpus fagifer*) nut and a mango seed; fruit ripens shiny red to brown.

Distribution:
Palau, Yap, India, Malaya, Philippines, northern New Guinea, Bismark Archipelago.

Comments:
This is a new plant record for Yap; the Palauan name likens this tree to "keam," the *Inocarpus fagifer* tree. The wood is light and soft and used like cork as a filling material in junctures of canoes.

FAMILY	STATUS
Simaroubaceae	Native

Agnes Rinehart

Samadera indica branch and fruit.

GENUS / SPECIES / AUTHORITY

Soulamea amara Lam.

Local and common names:
Palauan: *dekemerat*.
Ulithian: *merat*.
Ifaluk: *merat*.
Woleaian: *marat*.
Chuukese: *maras*.
Marshallese: *kabujiling*.

Habitat and description:
A bush to small tree, rare if present on mainland Yap but present on outer islands. ***Leaves:*** Simple, entire, alternate, more closely spaced at ends of branches, glossy green above, lighter below, oblong or oblong-obovate, about 13 to 15 cm long by 4 to 6 cm wide, petiole about 7 to 10 cm long. ***Flowers:*** borne on a raceme up to 20 cm long, in leaf axils; male flowers in clusters on stems about 5 mm long, with hairy secondary bracts; calyx two-parted, hairy on the outside; four petals about 3 mm in diameter when open with four to six stamens; female flowers with two stigmas and sterile stamens. ***Fruit:*** a curiously shaped achene, flat, obovate and shield-like, with keel along edges ending in two hooks over notch at tip (see photo).

Distribution:
Occasional to rare; mainly on coralline islands and atolls of Carolines and Marshalls, Papua New Guinea, and the Bismark archipelago.

Comments:
An uncommon tree with curiously shaped fruit and seeds. This is a first published record of this tree in Yap State.

FAMILY	STATUS
Simaroubaceae	Native

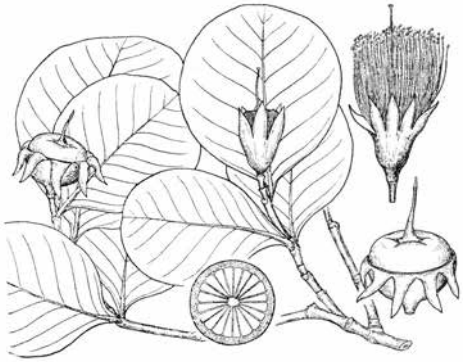
Rachael Nash

Rachael Nash

(A) *Soulamea amara* sapling; (B) fruit.

GENUS / SPECIES / AUTHORITY

Sonneratia alba J.E. Sm.



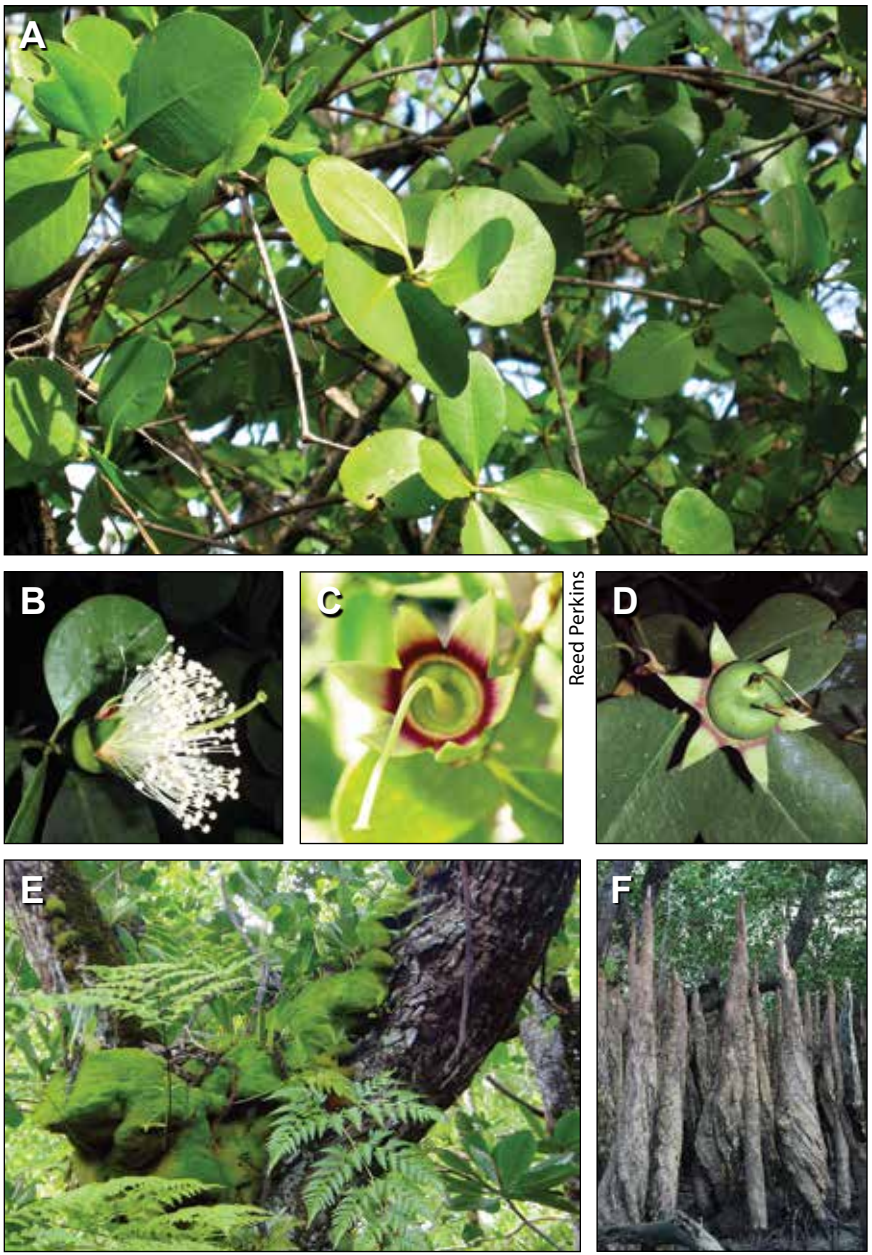
Local and common names:
English: mangrove apple.
Yapese: *abrur*; *afrur.*
Palauan: *urur.*
Chuukese: *saras.*
Pohnpean: *kotho.*
Kosraean: *flo fol.*

Habitat and description:
A common mangrove tree growing at outer edge or within Yap's mangroves, often emerging from the mangrove canopy. Trunk can be tall and straight or short and multi-branched. It is most easily distinguished by the numerous spike-like penumatophore "peg roots" emerging from the mud or silty sand. ***Leaves:*** simple, entire, opposite, round, thick, 6 to 12 cm by 5 to 8 cm. ***Flowers:*** about 5 to 7.5 cm long with a mass of white stamens borne at end of branches; blooms in evening and stamens fall by next morning, leaving a heavy calyx that encloses the developing fruit. ***Fruit:*** round, flattened from top to bottom, about 3 to 4 cm.

Distribution:
Throughout the Caroline Islands and Marshalls, and widespread in Indo-Malaysia to the western Pacific.

Comments:
Easily recognized by its spike-like pneumatophore breathing roots and round, relatively light green leaves, and in evening to early morning, from the white masses of stamens of flowers in the calyx cup, from which you can sometimes get a sip of nectar. Often the tallest trees in mangroves, and supporting many epiphytic mosses, ferns, and orchids.

FAMILY	STATUS
Sonneratiaceae (now Lythraceae)	Native



(A) *Sonneratia alba* leaves; (B) flower in bloom; (C) calyx cup with persistent pistil after stamens have fallen; (D) developing fruit; (E) trunk with epiphytes; (F) spike-like pneumatophores.

GENUS / SPECIES / AUTHORITY

Commersonia bartramia (L.) Merr.

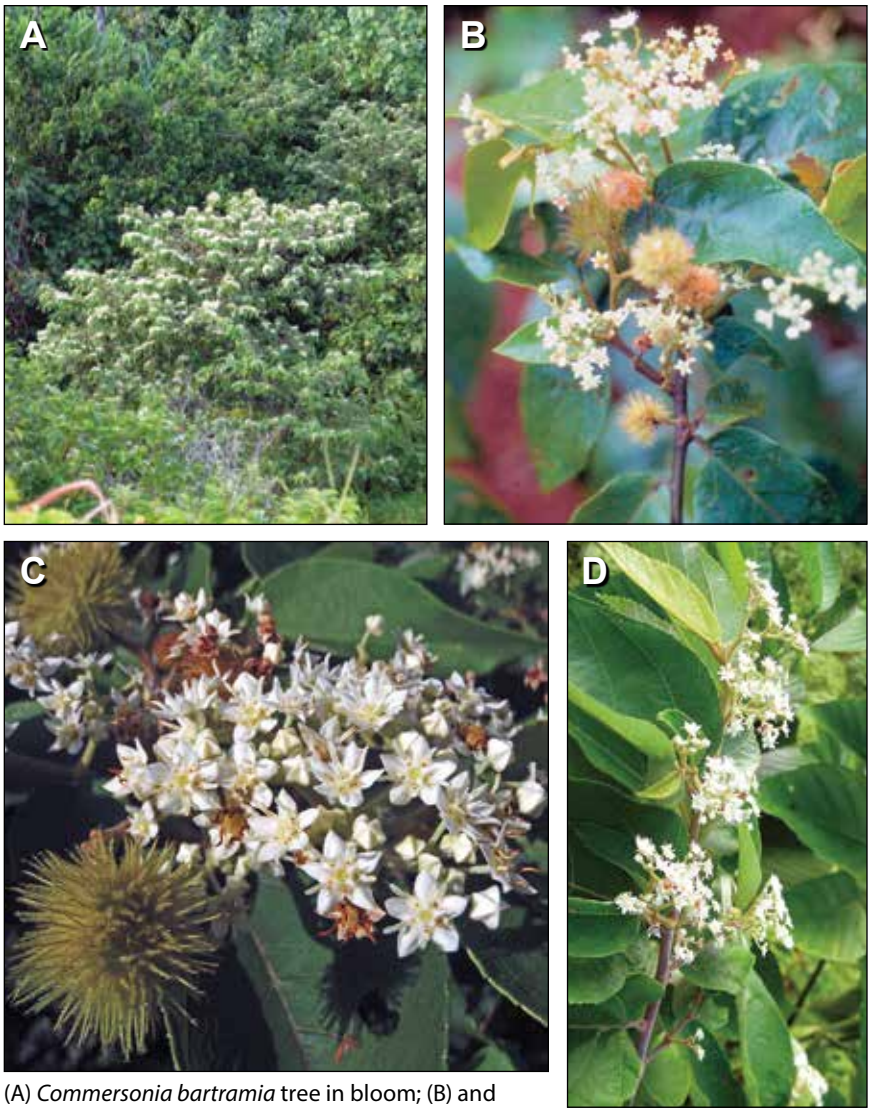
Local and common names:
English: brown kurrajong.
Yapese: *guguw* (the name "wapof" is sometimes applied to this tree—and both names are sometimes applied to *Melochia*, which has a similar habit and white to pink flowers).
Ulithian: *halu*.
Ifaluk: *galu*; *kelau*.
Woleaian: *gulu*.
Satawalese: *alu*.
Chuukese: *on*.
Pohnpean: *acarido*; *kahil*.
Palauan: *chermallueang*.

Habitat and description:
Commersonia bartramia occurs as a shrub or small to medium-size tree found in secondary forests and savanna areas. It is adapted to savannas and often flowers and fruits at a small size. ***Leaves:*** medium size, simple, toothed, alternate, with stellate pubescence. ***Flowers:*** white, borne in clusters above leaves. ***Fruit:*** round with soft bristles, appears burr-like, brown when ripe, one to two seeds.

Distribution:
Native to Yap and also found throughout Micronesia and Southeast Asia through Malesia, eastern Australia, and parts of Polynesia.

Comments:
This is a one of the fast-growing set of secondary "bandage trees" that grow up in disturbed areas, covering soil and reducing erosion. It is adapted to harsh conditions and frequent fires in savannas, resprouting from the base when burned and often flowering and fruiting while shrub-sized. Sometimes used for house posts.

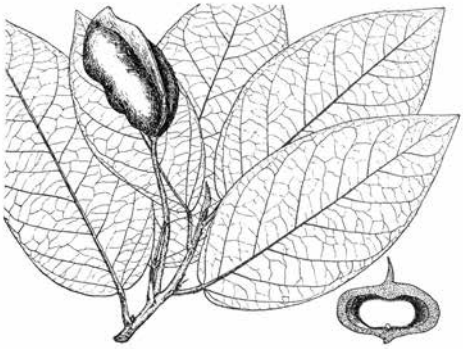
FAMILY	STATUS
Sterculiaceae (now Malvaceae)	Native



(A) *Commersonia bartramia* tree in bloom; (B) and (C) flowers and developing fruit; (D) flowers and flowering branch.

GENUS / SPECIES / AUTHORITY

Heritiera littoralis Dry.



Local and common names:
English: looking-glass tree.
Yapese: *rung*.
Palauan: *chebibech*.
Chamorro: *ufa*.
Chuukese: *zwobott*.
Pohnpean: *marapwenseth*.

Habitat and description:
A medium to large tree found at the landward edge of mangroves and along rivers. Distinguished by white undersides of leaves. ***Leaves:*** simple, entire, alternate, 8 to 35 cm long, 3 to 12 cm wide, ovate to elliptic, lower surface silvery white. ***Flowers:*** 4 to 6 mm long, borne in axillary panicles. ***Fruit:*** an oval boat shaped nut with a tall keel on one side about 8.5 cm long by 4.5 cm wide.

Distribution:
Throughout the Carolines and Marianas; Southeast Asia, and the Pacific,

Comments:
Used in canoe building, carving, and medicine. The lightweight seeds fall into the water and float along like little sailboats (see photo D) to be distributed along coasts.

FAMILY	STATUS
Sterculiaceae (now Malvaceae)	Native

(A) *Heritiera littoralis* tree, (B) whitish underside of leaf; (C) fruit; (D) floating fruit dispersion.

GENUS / SPECIES / AUTHORITY

Klienhovia hospita (L.)

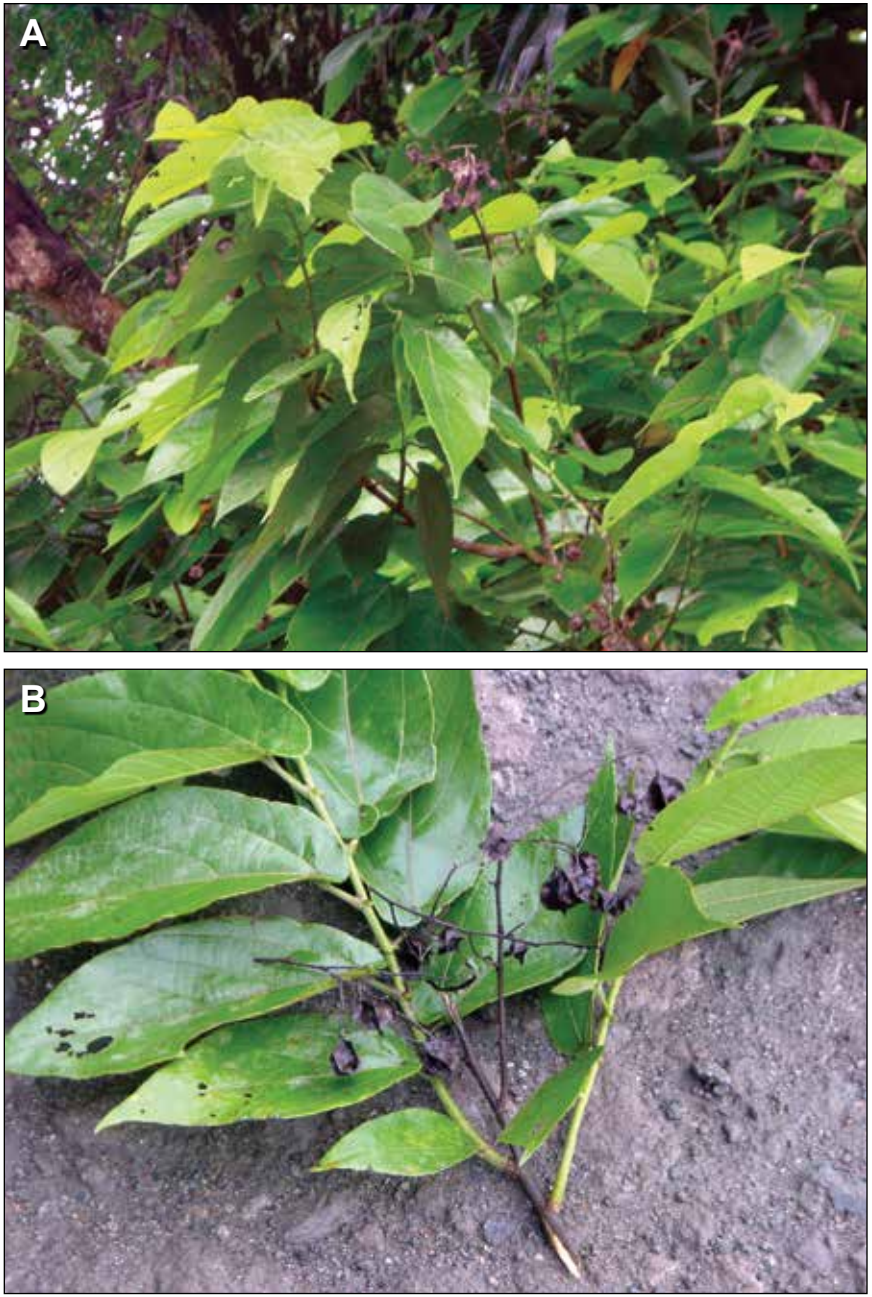
Local and common names:
Palauan: *madudiu*.

Habitat and description:
Small to medium irregular trees with fibrous bark uncommon at forest edges and in low areas, around taro patches. ***Leaves:*** simple, with irregular shallow indentations along edge, alternate; petioles long, leaves suborbicular-ovate, cordate to sagitate at base, acuminate at tip, three- to seven-nerved at base. ***Flowers:*** large, freely branched terminal panicle, pink and yellow, five-parted, slightly irregular. ***Fruit:*** a membranous, inflated, reticulate-veined, five-lobed, five-valved capsule.

Distribution:
India to tropical Africa, Malesia, Pacific, and Australia; reported to occur throughout Caroline Islands of Micronesia.

Comments:
Listed for Yap but not common.

FAMILY	STATUS
Sterculiaceae (now Malvaceae)	Native



(A) *Kleinhovia hospita* sapling; (B) branch with fruit.

GENUS / SPECIES / AUTHORITY

Melochia villosissima Presl.; *Melochia compacta* Hochr.

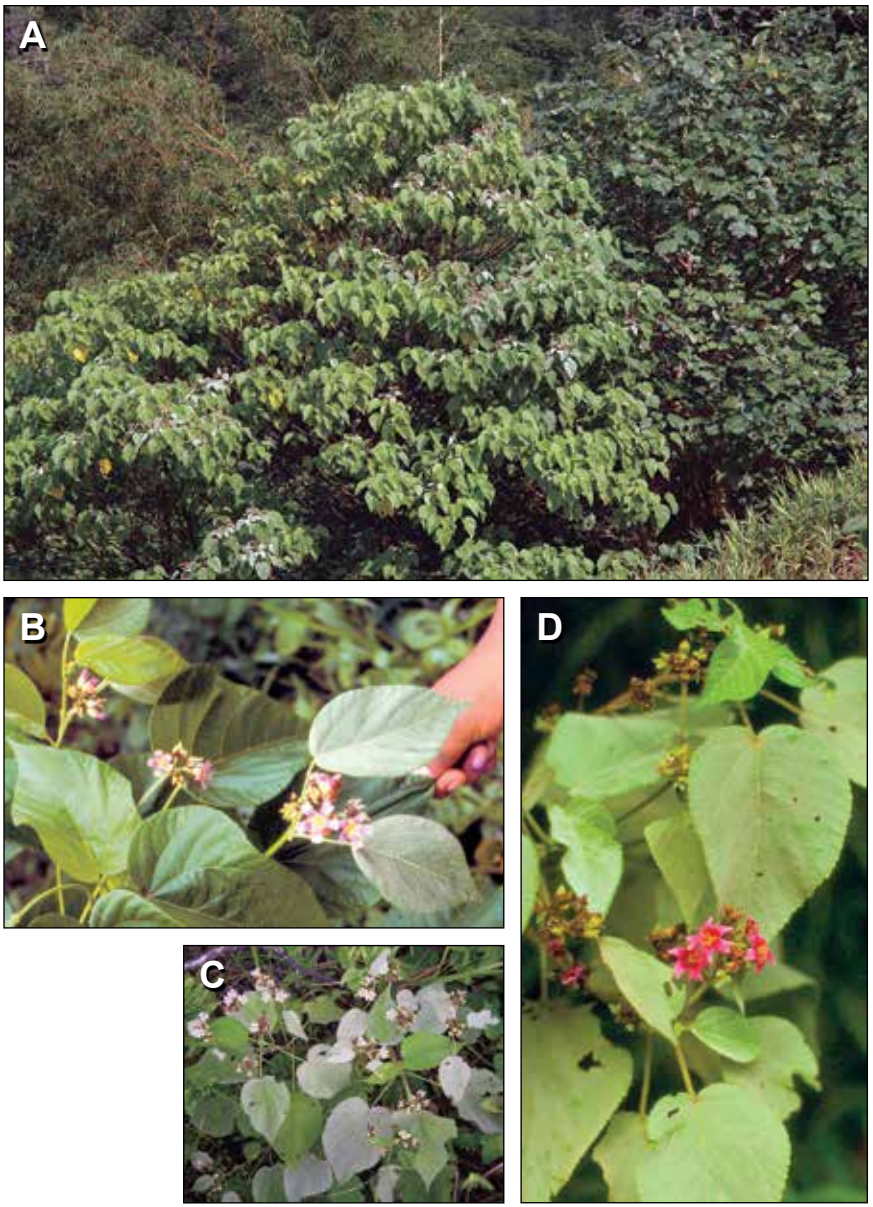
Local and common names:
Yapese: *guguw*.
Palauan: *chermallucheang*.
Ulithian: *huruwel*.
Chamorro: *sayafe*.
Carolinian: *ghossutil*.
Pohnpean: *kotol*.

Habitat and description:
Shrub to small trees growing in secondary vegetation and at edges of forest. ***Leaves:*** simple, toothed, alternate, cordate (heart-shaped), 5 to 15 cm long by 3 to 10 cm wide with proportions varying by species or variety. *Melochia villosissima* is covered with fine hairs, many of them stellate (star-shaped as seen with lens), giving the leaf a silvery appearance; *M. compacta* has fewer hairs. ***Flowers:*** on panicles that extend beyond the leaves on long stems, petals pink with dark centers, to almost white. ***Fruit:*** woody, hairy, egg-shaped capsules with five chambers, seeds about 3.5 mm and rounded.

Distribution:
Melochia villosissima is considered endemic to Micronesia. Other species of *Melochia* are found in Micronesia and tropical Asia.

Comments:
There appear to be at least two species of *Melochia* on Yap as well as varieties and perhaps hybrids, but as this is not established, they are treated together here. Photos show a range of types. The Palauan name likens this small tree to *Hibiscus tiliaceous*. The Yapese name "guguw" is also applied to *Commersonia bartramia*.

FAMILY	STATUS
Sterculiaceae (now Malvaceae)	Native



(A) *Melochia* spp. whole tree; (B), (C), and (D) trees with varying flower color and degrees of hairiness of leaves.

GENUS / SPECIES / AUTHORITY

Theobroma cacao L.

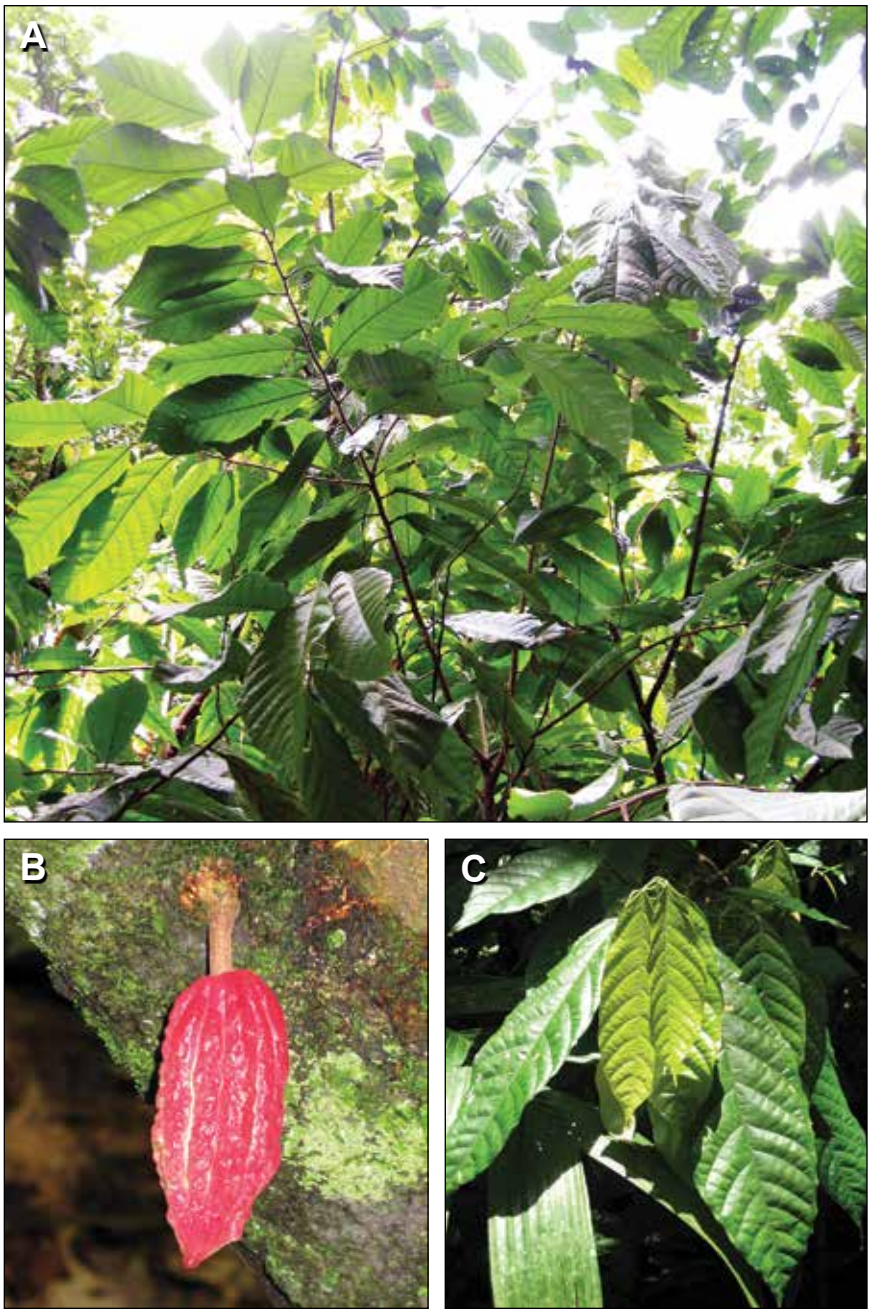
Local and common names:
English: cocoa.
Yapese: *kakaw*.
Spanish: *cacao*.
Chamorro: *kakao*.
Palauan: *sukalatei*.

Habitat and description:
Small trees scattered in agroforests. ***Leaves:*** simple, with wavy margins, oblong, up to 30 cm long, reddish when young, and limply hanging down, becoming firm when older. ***Flowers:*** on trunk and older branches, several flowers on short pedicels, calyx pink, five-parted, corolla yellow, petals concave at base, at apex with a strap like appendage, ten stamens , stigma five-lobed. ***Fruit:*** oblong, cylindrical, 15 to 25 cm long, longitudinally ribbed, ripening yellow or red, with a thick leathery rind and large seeds embedded in sweet pulp.

Distribution:
Introduced throughout Micronesia; originally from South America.

Comments:
Introduced to Yap and naturalized, persisting in agroforests; the seeds are the source of chocolate.

FAMILY	STATUS
Sterculiaceae (now Malvaceae)	Introduced



(A) *Theobroma cacao* small tree; (B) fruit; (C) leaves.

GENUS / SPECIES / AUTHORITY

Muntingia calabura L.

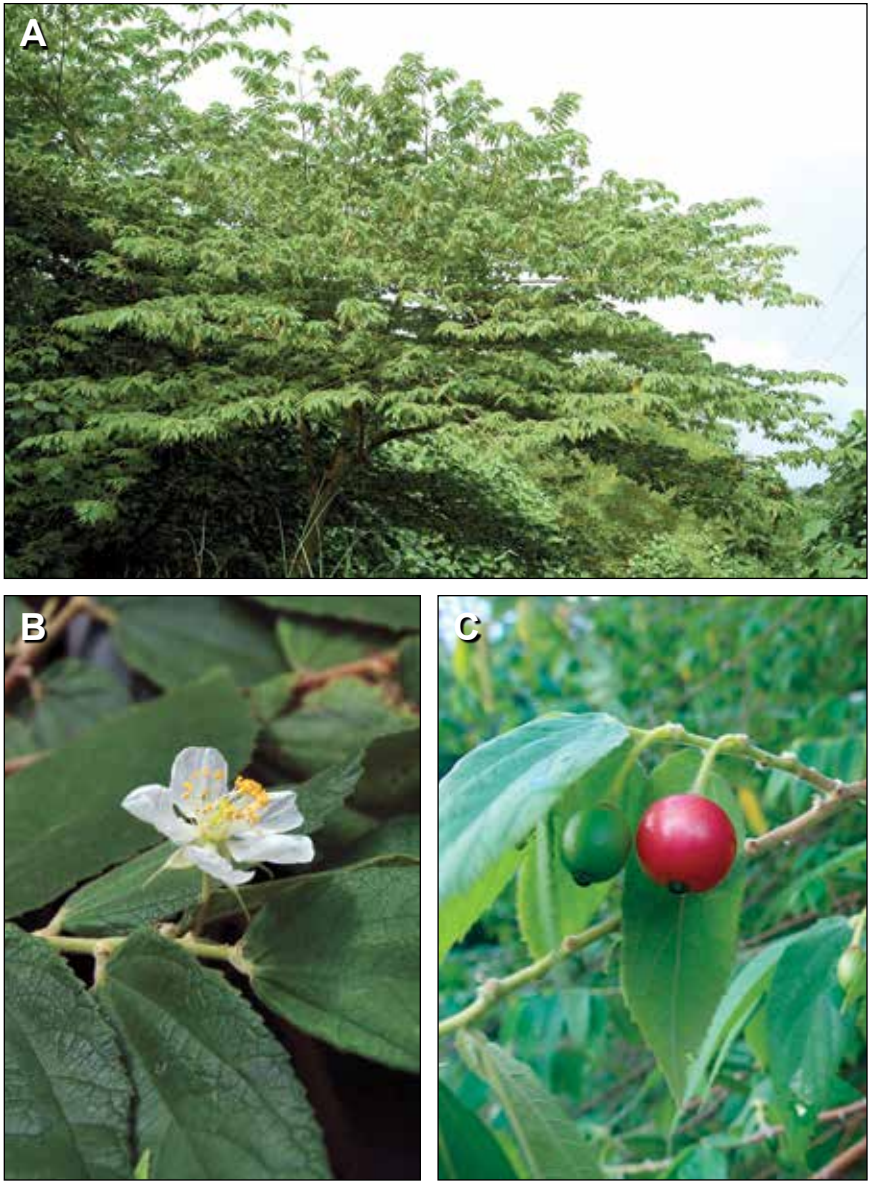
Local and common names:
English: Panama cherry.
Yapese: *budo'*.
Palauan: *budo*.
Spanish/Chamorro: *mansanita*.

Habitat and description:
A small tree with tiers of branches that form a spreading crown, scattered in secondary vegetation and residential areas. ***Leaves:*** simple, asymmetrical, alternate, with toothed edges, 2.5 to 15 cm long by 1 to 6.5 cm wide, soft and borne in two vertical rows in the same plane, parallel to the ground. ***Flowers:*** white with many yellow stamens, borne singly on 2 to 3 cm axillary pedicels. ***Fruit:*** round, with a persistent stigma forming a star at the tip, green maturing red, and containing many tiny seeds about 0.5 mm in diameter in a sweet juice.

Distribution:
Marianas, Palau, and Yap and probably elsewhere in Micronesia; originally from tropical America.

Comments:
A lovely little tree, beloved by small birds and children attracted to the sweet fruit. A tea-like drink can be brewed from leaves, and the bark is fibrous, tough, and suitable for cordage.

FAMILY	STATUS
Tiliaceae (now Malvacea)	Introduced



(A) *Muntingia calabura* tree; (B) flower; (C) fruit.

GENUS / SPECIES / AUTHORITY

Trichosperma ikutai Kaneh.

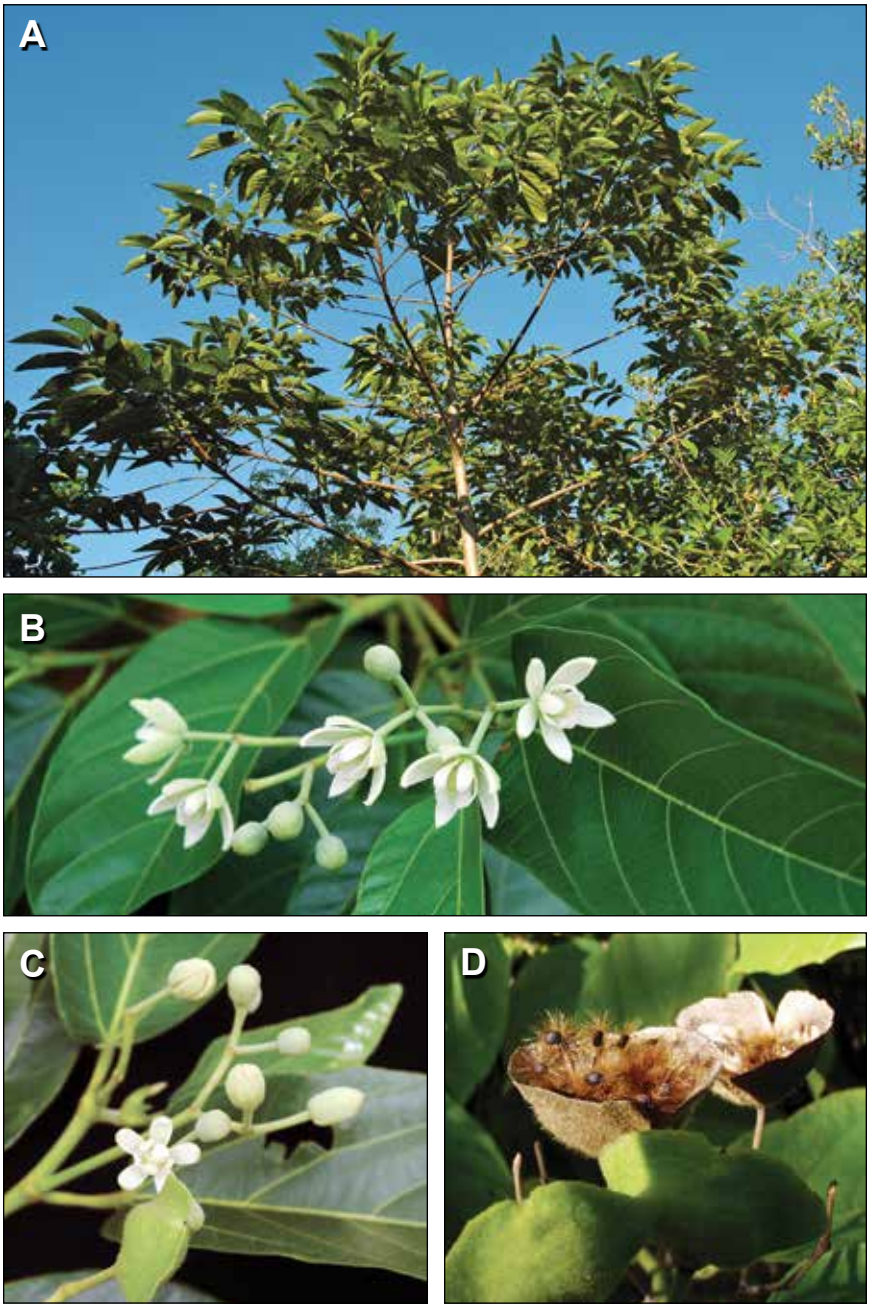
Local and common names:
Yapese: *wapof.*

Habitat and description:
A medium-size tree common in savannas and also found in secondary forests and forest edges, with smooth bark and ascending branches, with stellate (star-like) pubescence (fine hairs) on young branches, petioles, leaves, and inflorescences. ***Leaves:*** simple, alternate, oblong-ovate about 8 to 15 cm long, 6 to 7.5 cm wide, entire or shallowly toothed, unequal at base of leaf, lateral veins seven, straight, with a pair of nectar glands near the petiole; petiole 1 to 1.5 cm long. ***Flowers:*** borne in terminal cymes about 10 cm long, with five sepals covered with white scales, numerous stamens, style short, hairy. ***Fruit:*** a clam shell like capsule with wings about 2 cm long and 3 cm wide, covered with hairs and opening at top rather like a clam.

Distribution:
Endemic to Yap.

Comments:
A common tree on Yap that is found nowhere else in the world. Another species, *Trichosperma ledermanni*, the "elsau" tree of Palau, is endemic to Palau. It has smaller smooth leaves and three main veins rising from the base.

FAMILY	STATUS
Tiliaceae (now Malvacea)	Native, endemic



(A) *Trichosperma ikutai* tree; (B) and (C) flowers; (D) seed pods.

GENUS / SPECIES / AUTHORITY

Celtis paniculata Planch.

Local and common names:
Yapese: *zahle* (Kanehira 1933).

Habitat and description:
Medium to large tree to 10 m in height and 50 cm in diameter, in native forests. ***Trunk:*** erect, bark smooth, branchlets smooth. ***Leaves:*** simple, entire, alternate, long ovate, 10 to 12 cm long, 4 to 5 cm broad, acuminate, blunt at base, often unequal, lateral veins four on each side, petiole 5 to 10 mm long. ***Flowers:*** in a cyme arising in leaf axil at end of branchlet, inflorescence shorter than the leaf. Flowers have a calyx of four to eight sepals and no petals, four to eight stamens, two styles. ***Fruit:*** ovoid, tapering at tip, 6 mm long.

Distribution:
In Micronesia, reported only from Yap, Palau, and Chuuk; also found in Australia and some Pacific islands.

Comments:
Uncommon to rare.

FAMILY	STATUS
Ulmaceae (now Cannabacea)	Native

(A) and (B) *Celtis paniculata* flowering and fruiting branches of Australian trees.

GENUS / SPECIES / AUTHORITY

Trema orientalis var. *viridis* Laut.
Trema cannabina Lour.

Local and common names:
Yapese: *wunin*.

Habitat and description:
A shrub to small tree growing at forest edges and in disturbed areas, with fine hairs on branches, rather smooth bark. ***Leaves:*** simple, alternate, toothed along margins, ovate-lanceolate, cordate at base, up to 10 by 5 cm, three nerves, silky hairs on underside. ***Flowers:*** tiny, greenish, born in axillary cymes. ***Fruit:*** round, about 4 mm in diameter with remnants of two stigmas at tip.

Two varieties of *Trema cannabina* Lour. (**Synonym:** *Trema amboinensis* (Willd.) Bl.) are listed for Yap: *cannabina* and *scabra*. This is a smaller tree with long branches. ***Leaves:*** simple, fine toothed, alternate, on short petioles, long-ovate, with unequal sides, arranged in two rows, rough above, soft and hairy below, about 7 to 15 cm long with a slender tip and three prominent nerves at the heart-shaped or rounded base. ***Flowers:*** numerous and tiny in clusters, five-parted. ***Fruit:*** ovoid, black, hairy, slightly fleshy, and about 3 mm long.

Distribution for *Trema orientalis* var. *viridis*:
Yap, Palau, Marianas; southern Asia through Malaysia.

Distribution for *Trema cannabina* var. *cannabina*:
Yap, Palau, Rota; for *Trema cannabina* var. *scabra*: Yap and Palau. The species is originally from India, south China, and the Pacific.

Comments:
This small tree is a common secondary "bandage tree" that grows up in cleared areas and reduces soil erosion. Then when it is topped over by taller trees, it generally declines and dies out. Used to cover harvested produce in Yapese gardening baskets.

FAMILY	STATUS
Ulmaceae (now Cannabacea)	Native

(A) *Trema* sp. bushy small tree; (B) flowering branch.

GENUS / SPECIES / AUTHORITY

Pipturus argenteus (Forst. f.) Weddell

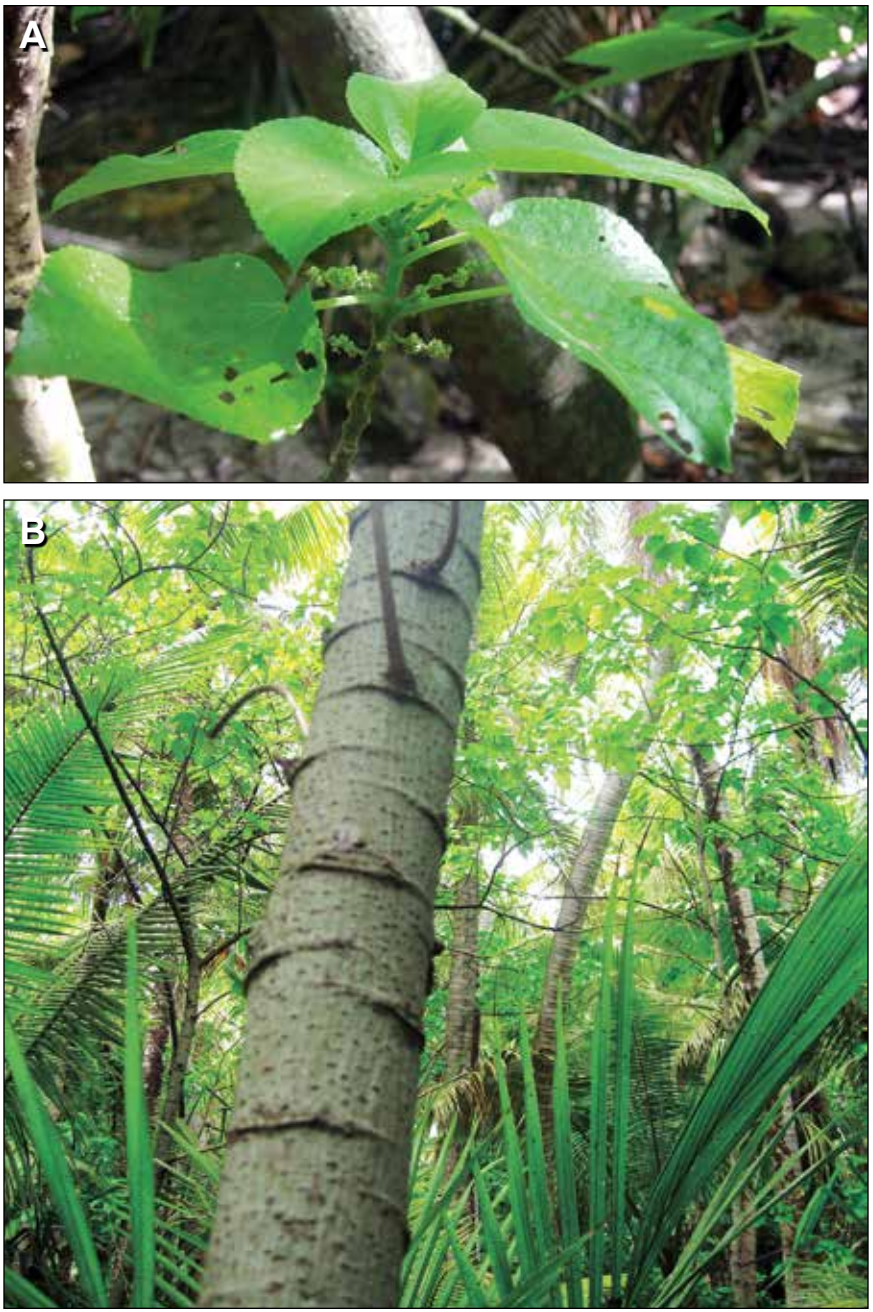
Local and common names:
Satawalese and Ifaluk: *aroma*.
Ulithian: *iourama*.
Woleaian: *yaroma*.
Chamorro: *amahadyan*.

Habitat and description:
Shrub to small tree, of limestone islands and atolls, especially common on atolls on ocean side between beach strand and atoll forest. Branches dark reddish brown with prominent leaf scars and lenticels, easily broken. ***Leaves:*** alternate, shiny light green above, silvery grey puberulent below, ovate-acuminate, obtuse or acute at base, petioles of different sizes, large and small leaves often born alternately, largest up to 15 cm long by 8 cm wide; margins coarsely serrate, petioles thin, 5 to 8 cm long. ***Inflorescence:*** short spike, borne below leaves; flowers tiny and without petals, either male or female borne in cluster. ***Fruit:*** small, embedded in roundish, whitish, gelatinous mass.

Distribution:
Malaysia to Polynesia; native to Micronesia.

Comments:
This shrub to small tree is rare to absent from mainland Yap but is common on outer islands. The inner bark provides strong fibers.

FAMILY	STATUS
Urticaceae	Native



(A) *Pipturus argenteus* leaves and inflorescence; (B) trunk.

GENUS / SPECIES / AUTHORITY

Avicennia alba Bl.

Synonym:
Listed in Fosberg et al. (1979) as *Avicennia marina* var. *alba* (Bl.) Bakh.

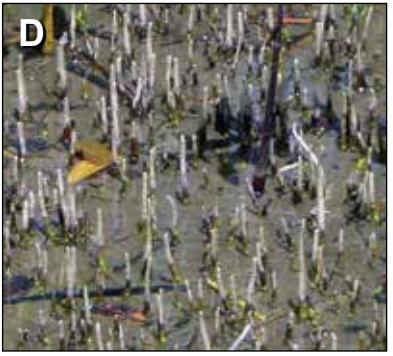
Local and common names:
Palauan: *dadait*.

Habitat and description:
An uncommon mangrove tree in Yap, growing along brackish river and shore. Distinguished by thin erect pencil-like pneumatophores (breathing roots) and small leaves. ***Leaves:*** simple, entire, opposite, oblong-elliptic or lanceolate, about 3 to 16 cm long by 1.5 to 5 cm wide, medium or olive green above, whitish underneath. ***Flowers:*** yellow, corolla with four to uncommonly five petals on Yap trees, 4 to 7 mm long by 5 to 8 mm wide. ***Fruit:*** a curved gray green pod shaped rather like an apostrophe.

Distribution:
In Micronesia, occurs only in Yap and Palau; elsewhere, Malaysia and other Pacific islands.

Comments:
Uncommon in Yap; more common on the east coast of Babeldaob, Palau. *Avicennia alba* can be distinguished from *A. marina* by the fruit that is whitish and more bulbous in *A. marina*, which has pale orange flowers as compared to the yellow flowers of *A. alba*.

FAMILY	STATUS
Verbenaceae (now Lamiaceae)	Native



(A) *Avicennia alba* tree; (B) fruit; (C) leaves; (D) pneumatophores.

GENUS / SPECIES / AUTHORITY

Premna serratifolia L.

Synonyms:
Premna obtusifolia R. Br.;
Premna taitensis Schauer.

Local and common names:

Yapese: *arr.*	Satawalese: *eariar.*
Palauan: *osem.*	Chamorro: *ahgao.*
Ulithian: *iar.*	Chuukese: *noir.*
Fais: *iar.*	Pohnpean: *topwuk.*
Woleaian: *yaalu.*	Kosraean: *fienkek.*
Ifaluk: *aroyar.*	Marshallese: *kaar.*

Habitat and description:
A shrub to small tree, bark light grey often with prominent lenticels on new growth. ***Leaves:*** Simple, entire, opposite, ovate to cordate, pointed at the tip, relatively light green, about 6 to 12 cm long by 4 to 8 cm wide, with 4 to 7 pairs of conspicuous lateral veins, long petioles 1 to 3 cm. Leaves sometimes with galls (wart-like growth). ***Flowers:*** small white flowers in corymbs near tip of branch. ***Fruit:*** small and round, about 3 mm, green maturing to purple-black.

Distribution:
Throughout Micronesia and widespread Malaysia to Pacific.

Comments:
A common shrub in savannas and areas of secondary vegetation to a small to moderate-size tree in forests. This little tree is adapted to disturbance; the small tree shown to the right was knocked down by typhoon Sudal and resprouted and flowered within 4 weeks after the typhoon. It is also adapted to fire in savannas where it resprouts from trunk and roots within weeks of the fire. Leaves have a subtle pleasant smell. Used medicinally, and the flowers in "nunu" leis.

FAMILY	STATUS
Verbenaceae (now Lamiaceae)	Native

(A) *Premna serratifolia* bush; (B) inflorescences sprouting from storm damaged tree.

GENUS / SPECIES / AUTHORITY

Tectona grandis L.f.

Local and common names:
English: teak.

Habitat and description:
A large introduced tree that has naturalized around urban areas, trunk tall and straight, light colored and smooth. ***Leaves:*** simple, opposite, ovate-elliptic and very large, 30 to 75 cm long by 15 to 40 cm wide, pubescent with branched hairs dorsally, petiole to 6 cm. ***Flowers:*** in large panicles 30 to 50 cm long, flowers on very short stems, corolla about 1 cm wide, white or pink. ***Fruit:*** a drupe 3 cm wide by about 1.5 cm thick.

Distribution:
Recorded from Guam and Palau but also present on Yap and planted elsewhere; originally from Southeast Asia and Indonesia.

Comments:
Easily distinguished by the large leaves and large panicles of small flowers. A valuable timber species.

FAMILY	STATUS
Verbenaceae (now Lamiaceae)	Introduced

(A) *Tectona grandis* tree;
(B) leaf and trunk.

GENUS / SPECIES / AUTHORITY

Vitex negundo L. var. *bicolor* (Willd.) Lam

Local and common names:
Palauan: *klesechedui*.
Chamorro: *agalondi*.
Carolinian: *schall*.

Habitat and description:
A shrub to small tree in urban and village areas, with scandent (long, leaning) branches that are somewhat four-angled. ***Leaves:*** compound, usually with three leaflets but sometimes more. Linear-lanceolate, unequal in size, the larger ones being about 11 cm, with petioles of different lengths, underside of leaves with very fine silvery hairs, upper surface green, leaves fragrant when crushed. ***Flowers:*** born in terminal clusters of small lilac flowers. ***Fruit:*** small, round drupes that ripen black, 5 to 6 mm in diameter and containing one seed.

Distribution:
Widespread in Micronesia and tropics.

Comments:
Used as a mosquito repellent.

FAMILY	STATUS
Verbenaceae (now Lamiaceae)	Native

(A) *Vitex negundo* branch with fruit; (B) leaves; (C) buds, flowers, and immature fruit.

GENUS / SPECIES / AUTHORITY

Rinorea benghalensis (Wall.) O. Ktze.

Synonyms:
Rinorea palaucica Kaneh. & Hatus.;
Rinorea carolinensis Kaneh.

Habitat and description:
Small to medium-size tree growing in native forest and edges of forests. Trunk has distinctive knobby branch scars. Branches spiral about main branch clockwise so that the fourth branch lines up between first and second branches at about 405 degrees so that leaves don't overlap much (see photo B). ***Leaves:*** appear pinnate from afar but are simple and entire; mature leaves of upper branches of Yap specimen are oblong, being about 9 to 10 cm long and 8 to 9 cm wide; stipules are about 11 mm long. New leaves sprouting from base of trunk are about 13.5 cm long and 6 cm wide, petiole 1.5 to 2 cm long with minute pubescence. ***Flowers:*** axillary, arising from twig where leaves have fallen or in clusters in old branch scars on trunk; greenish white and about 7 mm across with five sepals. ***Fruit:*** a capsule.

Distribution:
Palau, Yap, India.

Comments:
The trunk and limbs of this tree are sometimes used in decorative furniture because of the unusual knobs. This tree seems to grow only in secondary and mature native forests.

FAMILY	STATUS
Violaceae	Native

(A) *Rinorea benghalensis* canopy; (B) branching pattern; (C) trunk; (D) fruit; (E) flowers.

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Glossary

Acuminate—Gradually and concavely tapering to a narrow, sharp point.

Acute—sharp point.

Alternate—One leaf per node.

Apex—Tip.

Axillary—Situated between the leaf petiole and stem.

Berry—A small fleshy fruit with two or more seeds.

Bipinnately—Compound: two times pinnate.

Bisexual—Having male and female organs in the same flower.

Bract—Modified leaf.

Bracteole—A secondary modified leaf.

Calyx—Outer whorl of the flower enclosing the flower bud.

Campanulate—Bell like.

Chartaceous—With a papery texture, usually not green.

Compound—Leaves divided into leaflets.

Cordate—Heart-shaped.

Coriaceous—Leathery texture.

Corolla—Flower petals.

Corymb—A flattened and short flower cluster with younger flowers in the center.

Corymbose—Flat-topped or convex flower cluster.

Crenate—Rounded tooth.

Cuneate—Wedge-shaped, with narrow part at point of attachment.

Cyme—Cluster of flowers with the oldest ones at the end or center.

Dioecious—Male and female flowers on separate plants.

Drupe—A fleshy fruit with one seed inside in a hard shell, like *Cerebera*.

Elliptic—Shape wih wides part in the center and the two ends are equal.

Emarginate—Leaf with a notch at the tip.

Endocarp—Inner layer of a fruit.

Entire—Continuous leaf margin without teeth or lobes.

Exserted—Sticking out.

Glabrous—Hairless, smooth.

Globose—Spherical.

Impairpinnate—Odd pinnate or unequal leaflets.

Inferior—Sepals above ovary or fruit.

Inflorescence—Flower cluster.

Internode—Between the nodes.

Interpetiolar—Between two leaf stalks.

Jugous—In pairs.

Lanceolata—Oblong.

Lanceolate—Lance- or spear-shaped.

Leaflet—A division of a compound leaf.

Lenticels—Openings on stem for air exchange.

Merous—Parts.

Monoecious—Male and female flowers on same plant.

Nectary—A gland or tissue that secretes nectar.

Node—Point of attachment of a leaf or stem.

Oblanceolate—Inversely lance-shaped.

Oblong—Longer than wide.

Obovate—Oval with widest part towards tip, inversely egg-shaped.

Obovoid—Inversely ovoid.

Obtuse—Rounded.

Odd pinnate—Pinnately compound leaf divided into leaflets that are unpaired at the tip.

Opposite—Two leaves attached at node directly across from each other.

Ovary—Female part of flower with embryos and seeds.

Ovate—Egg-shaped.

Palmate—Lobed or hand-like.

Panicle—Branched cluster of stalked flowers that bloom from the outside toward the center and may produce new flowers indefinitely borne upon the secondary branches.

Pedicel—Flower stalk.

Peduncle—Stalk of a single or cluster of flowers.

Perianth—Petals and sepals.

Pericarp—Outer wall of a ripe ovary or fruit.

Persistent—Remaining attached to a part of a plant.

Petal—One of the individual parts of the corolla.

Petiole—Leaf stalk.

Petiolule—Leaflet stalk.

Petiolule—Stalk of a leaflet.

Pinna—Leaflet of a compound leaf.

Pinnate—Compound leaf with leaflets arranged along both sides of an elongated axis.

Pinnately—Resembling a feather, having similar parts arranged on opposite sides of an axis like the small veins off the main vein of a leaf.

Proximal—At the base.

Pyramidal—Pyramid shape.

Raceme—A simple long group of flowers with stalked flowers on a main axis.

Rachis—Axis of a compound leaf or flower cluster.

Sepal—One of the individual parts of the calyx.

Serrate—Tooth like margins.

Sessile—Lacking a stalk.

Shrub—A perennial woody plant or relatively small stature, with several stems arising from the base.

Stamen—Male flower part.

Staminate—Unisexual flower with stamens but no female parts.

Staminode—A modified stamen that does not produce pollen.

Stipules—Two appendages at the base of the leaf stalk.

Style—Slender stalk that connects the stigma to the ovary.

Subglobose—Nearly globe-shaped.

Subsessile—Nearly stalkless.

Subtend—Attached below.

Succulent—Fleshy.

Superior—Sepals below ovary or fruit.

Syncarp—A fruit formed from fused ovaries of more than one flower.

Synconium—Flower or fruit that the receptacle forms a globe-like structure with flowers inside.

Terete—Round in cross section.

Terminal—At the end.

Trifoliate—Compound leaf with three leaflets.

Tripinnate—With leaflets divided into even small leaflets or three times pinnate.

Truncate—Appears cut off.

Umbel—Flat or round flower cluster with flower stalks from a single origin and the oldest flowers in the center.

Unisexual—Flowers without either stamens or an ovary.

Whorled—More than two leaves per node.

Field Guide Checklist

This section conveys scientific names of species in the order in which they appear in this guide. Current species names are in bold italics, whereas synonyms (other scientific names that have been used for a species), are in normal italics, as follows:

Family
Genus / species
Synonym(s)

Recent advances in plant taxonomy have resulted in changes in scientific names and realignment of some plant genera and families. To avoid confusion for those accustomed to names in current use, trees described in this guide are arranged alphabetically by the scientific names more familiar to local foresters and used in locally available literature. New names and alignments that will eventually become more widely known are presented in brackets. To search for new names alphabetically, use the index.

An asterisk (*) indicates species that have been introduced to Yap.

Gymnosperms

Cycadaceae
Cycas micronesica K.D. Hill
C. rumphii sensu auct. non Miq.
C. circinials L.

Araucariaceae (Palmae)
* ***Araucaria heterophylla*** (Salisb.) Franco

Monocots

Arecaceae
* ***Areca catechu*** L.
* ***Cocos nucifera*** L.
* ***Heterospathe elata*** Scheff. var. ***palauensis*** (Becc.) Becc.
* ***Metroxylon amicarum*** (H. Wend.) Becc.
Nypa fruticans Wurmb.

Pandanaceae
Pandanus dubius Spreng.
Pandanus tectorius Parkinson
Pandanus yapensis Mart. Ex. Kaneh.

Anacardiaceae
- * ***Anacardium occidentale*** L.
- ***Buchanania engleriana*** Volk.
- ***Campnosperma brevipetiolata*** Volk.
- * ***Mangifera indica*** L.
- ***Rhus taitensis*** Guill.
- ***Semecarpus venenosus*** Volk.
- * ***Spondias pinnata*** Kurz.
- * ***Spondias dulcis*** Forst. f.

Annonaceae
- * ***Annona cherimola*** Mill
- * ***Annona muricata*** L.
- * ***Annona reticulata*** L.
- * ***Annona squamosa*** L.
- * ***Cananga odorata*** (Lam.) Hook. f. & Thoms.

Apocynaceae
- ***Cerbera manghas*** L.
- ***Ochrosia oppositifolia*** (Lam.) K. Schum.
  - *Neisosperma oppositifolium* (Lam.) Fosb. & Sachet
- * ***Plumeria obtusa*** L.
- * ***Plumeria rubra*** L.

Araliaceae
- ***Meryta senfftiana*** Volk.

Barringtoniaceae (Lecythidaceae)
- ***Barringtonia asiatica*** (L.) Kurz
- ***Barringtonia racemosa*** (L.) Spreng.

Bignoniaceae [now included in Lecythidaceae]
- ***Dolichandrone spathacea*** (L. f.) K. Schum.
- * ***Spathodea campanulata*** Beauv.

Bombacaceae [now a subfamily in Malvaceae]
- * ***Ceiba pentandra*** (L.) Gaertn.

Boraginaceae
- ***Cordia subcordata*** Lam.
- *Tournefortia argentea* L. f.
  - *Messerschmidia argentea* (L. f.) I. M. Johnst.
  - [***Heliotropium foertherianum*** Diane & Hilger]

Capparidaceae [Capparaceae]
Crateva religiosa Forst. f.
Crateva speciosa Volk.

Casuarinaceae
Casuarina equisetifolia L.
Casuarina litorea L.

Chrysobalanaceae
Atuna racemosa Raf.
Cyclandrophora laurina (A. Gray) Kosterm.
Parinari laurina A. Gray
Parinarium glaberrimum sensu auct. non Hassk.
Maranthes corymbosa Bl.
Parinari corymbosa (Bl.) Miq.

Clusiaceae (formerly Garciniaceae)
Calophyllum inophyllum L.
Garcinia rumiyo Kaneh.
Garcinia volkensii (Ltb.) Kosterm.
Pentaphalangium volkensii Lauterb.
Mammea odorata (Raf.) Kosterm.

Combretaceae
Lumnitzera littorea (Jack) Voigt
Terminalia catappa L.
Terminalia samoensis Rech.

Ebenaceae
Diospyros elliptica (Forst.) P.S. Green
Diospyros ferrea sensu auct. non (Willd.) Bakh.

Euphorbiaceae
Drypetes yapensis Tuyama [now in Putranjivaceae]
Drypetes carolinensis Kaneh.
Excoecaria agallocha L.
Glochidion ramiflorum Forst. [now in Phyllanthaceae]
Macaranga carolinensis Volk.
Mallotus papillaris (Blanco) Merr.
Mallotus tiliaefolius Muell.-Arg.

Fabaceae (formerly Leguminosae)
* ***Acacia auriculifolia*** A. Cunn.
* ***Acacia confusa*** Merr.
* ***Acacia mangium*** Willd.
* ***Acacia* spp.**

Fabaceae (formerly Leguminosae)—continued:

* ***Adenanthera pavonina*** L.
* ***Albizia lebbeck*** (L.) Benth.
* ***Albizia retusa*** Benth.
* ***Albizia rotundata*** Bl. ex Miq.
* ***Caesalpinia sappan*** L.
Cynometra ramiflora L.
* ***Delonix regia*** (Boj.) Raf.
Dendrolobium umbellatum (L.) Benth.
Desmodium umbellatum (L.) DC.
Erythrina variegata L. var. ***orientalis*** (L.) Merr.
Erythrina fusca Lour.
* ***Falcateria moluccana*** (Miq.) Barneby and Grimes
* *Paraserianthes falcataria* (L.)
* *Albizia falcataria* (L.) Fosb.
* *Albizia moluccana* Miq.
* ***Gliricidia sepium*** (Jacq.) Steud.
* ***Inocarpus fagifer*** (Parkinson) Fosb.
Intsia bijuga (Colebr.) Kuntze
* ***Leucaena leucocephala*** (Lam.) de Wit
Millettia pinnata (L.) Panigrani
Pongamia pinnata (L.) Merr.
* ***Ormocarpum cochinchinense*** (Lour.) Merr.
Pericopsis mooniana (Thw.) Thw.
Pterocarpus indicus Willd.
* ***Samanea saman*** (Jacq.) Merr.
Albizia saman (Jacq.) F. Muell.
Serianthes kanehirae Fosb. var. ***yapensis*** Fosb.
* ***Sesbania grandiflora*** (L.) Pers.

Flacourtiaceae

Casearia cauliflora Volk. [now in Salicaceae]
* ***Pangium edule*** Reinw. ex Bl. [now in Achariaceae]

Hernandiaceae

Hernandia nymphaeifolia (Presl) Kubitski
Hernandia peltata Meissn.
Hernandia sonora sensu non L.

Lythraceae

Pemphis acidula Forst.

Aceae [now expanded to include Bombacaceae, Sterculiaceae, and Tiliaceae]
Hibiscus tiliaceus L.
Thespesia populnea (L.) Sol. ex Correa

Meliaceae
* ***Swietenia macrophylla*** King
* ***Swietenia mahagoni*** (L.) Jacq.
Vavea pauciflora Volk.
Xylocarpus granatum Koen.

Moraceae
* ***Artocarpus altilis*** (Parkinson) Fosb.
Artocarpus communis Forst.
Artocarpus incisus (Thunb.) L.f.
* ***Artocarpus heterophyllus*** Lam.
Artocarpus mariannensis Trec.
* ***Ficus elastica*** Roxb.
Ficus microcarpa L.f.
Ficus prolixa Forst. f. var. ***carolinensis*** (Warb.) Fosb.
Ficus senfftiana Warb.
Ficus copiosa sensu auct. non Steud.
Ficus tinctoria Forst. F.

Myrtaceae
Eugenia reinwardtiana (Bl.) DC.
* ***Melaleuca quinquenervia*** (Cav.) Blake
* ***Pimenta dioica*** (L.) Merr.
* ***Psidium guajava*** L.
* ***Syzygium malaccense*** (L.) Merr. & Perry
Eugenia malaccensis L.
Syzygium samarangense (Bl.) Merr. & Perry
Eugenia javanica Lam.

Nyctaginaceae
Pisonia grandis R. Br.
Pisonia umbellifera (Forst.) Seem.
Ceodes umbellifera Forst.

Olacaceae
Ximenia americana L.
Ximenia elliptica Forst.

Oxalidaceae
* ***Averrhoa bilimbi*** L.
* ***Averrhoa carambola*** L.

Rhamnaceae
Alphitonia carolinensis Hosok.

Rhizophoraceae
Bruguiera gymnorrhiza (L.) Lam.
Ceriops tagal (Perr.) C.B. Rob.
Rhizophora apiculata Bl.
Rhizophora mucronata Lam.
Rhizophora stylosa Griff.
Rhizophora mucronata Lam. var. *stylosa* (Griff.) Schimper
Rhizophora X lamarckii Montr.

Rubiaceae
Aidia racemosa (Cav.) Tirvengadum
Aidia cochinchinensis auct. non Lour.
* ***Coffea arabica*** L.
Guettarda speciosa L.
Ixora triandra Volk.
Morinda citrifolia L.
Mussaenda frondosa L.
Psychotria arbuscula Volk.
Psychotria leptothrysa Miq. var. ***longicarpa*** Val.
Psychotria mariana Bartl. ex DC.
Scyphiphora hydrophyllacea Gaertn.
Tarenna sambucina (Forst. f.) Dur. ex Drake
Timonius albus Volk.

Rutaceae
* ***Citrus*** spp. (10 species)

Sapindaceae
Allophylus timoriensis (DC.) Bl.
A. ternatus (Forst.) Radlk.

Sapotaceae
Pouteria obovata (R. Br.) Baehni
Planchonella obovata (R. Br.) Pierre

Simaroubiaceae
Quassia indica (Gaertn,) Nooteboom
Samadera indica Gaertn.
Soulamea amara Lam.

Sonneratiaceae [now in Lythraceae]
Sonneratia alba J.E. Sm.

Sterculiaceae
Commersonia bartramia (L.) Merr.
Heritiera littoralis Dry.
Kleinhovia hospita L.
Melochia compacta Hochr.
Melochia villosissima (Presl) Merr.
* ***Theobroma cacao*** L.

Tiliaceae
* ***Muntingia calabura*** L.
Trichospermum ikutai Kaneh.

Ulmaceae
Celtis paniculata Planch. [now in Cannabaceae]
Trema cannabina Lour. [now in Cannabaceae]
Trema amboinensis (Willd.) Bl.
Trema cannabina Lour. [now in Cannabaceae]

Urticaceae
Pipturus argenteus (Forst. F.) Wedd.

Verbenaceae (now included in Lamiaceae)
Avicennia alba Bl.
Premna serratifolia L.
Premna obtusifolia R. Br.
Premna taitensis Schauer
* ***Tectona grandis*** L. f.
Vitex negundo L. var. ***bicolor*** (Willd.) Lam
Vitex trifolia L.

Violaceae
Rinorea benghalensis (Wall.) O. Ktze
Rinorea palaucica Kaneh. & Hatus.
Rinorea carolinensis Kaneh.

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Species scientific names (including synonyms) are listed alphabetically, followed by Yapese and English names, if available. An asterisk (*) follows some scientific names to indicate species that have been introduced to Yap.

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