Family Rhizophoraceae

Bruguiera cylindrica (L.) Blume

Local name: *pototan, busain* (Tagalog)

Small to medium-sized trees with rounded crown, reaching 10 m high and 20 cm DBH. *Bruguiera cylindrica* colonizes newly-established substrates behind the pioneering *Avicennia-Rhizophora* zone along estuarine riverbanks and tidal creeks. When found beside taller *Rhizophora* trees, the species appears short (hence the local name *pototan*). *B. cylindrica* is also found as single trees on compact muds of open, more inland sites. Among the *Bruguiera* species, it has the smallest leaves and flowers next to *B. parviflora* (Table 5). The stipules (at times called leaf sheaths) are pale green. The mottled bark becomes more dark and rough in older trees (see opposite page, bottom left photos). The short and thin pencil-like propagules bear a calyx cap whose lobes are reflexed. In the past, *B. cylindrica* timber was harvested for household and construction use. Present uses are limited to firewood and as source of tannin.

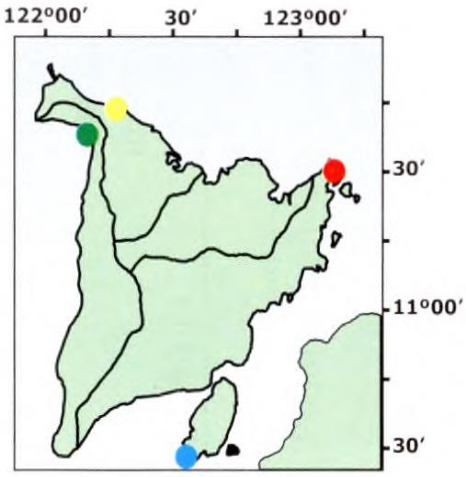
General

Substrate:	muddy, sandy-muddy
Tidal level:	middle
Found with:	*A. officinalis*, *A. rumphiana*, *C. decandra*

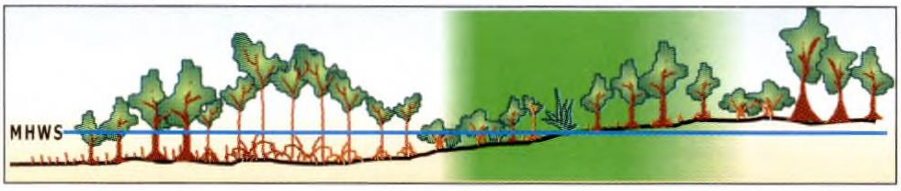
Form

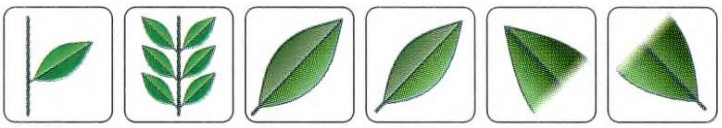
Shape:	tree
Height:	2-10 m
DBH:	10-20 cm
Bark:	slightly to very rough, light brown to grayish, few lenticels
Aerial roots:	knee roots, small buttresses

Sampling sites:
- Taklong Is., Guimaras
- Carles, Iloilo
- Ibajay, Aklan
- Pandan, Antique



FLOWERING	J	F	M	A	M	J	J	A	S	O	N	D
FRUITING	J	F	M	A	M	J	J	A	S	O	N	D





Leaves

Arrangement:	simple, opposite
Blade shape:	elliptic
Margin:	entire - smooth
Apex:	acute to acuminate
Base:	acute
Upper surface:	shiny, green
Undersurface:	smooth, light green
Size:	10 (6-17) cm long, 4 (2-8) cm wide
Others:	light green stipules

Flowers

Inflorescence:	cyme, axillary
Petals:	8, white, with brown hairs
Sepals:	8, light green, fused
Stamens:	8 pairs, brown tips
Size:	0.8-1 cm long, 1-1.2 cm diameter

Propagules

Shape:	cylindrical, short and thin
Color:	green to purple when mature
Texture:	finely rough, ridged
Size:	10.7 (7-15) cm long, 0.5-0.8 cm diameter
Others:	calyx slightly reflexed; viviparous

Family Rhizophoraceae

Bruguiera gymnorrhiza (L.) Lam.

Local names: *pototan; bakhaw* (Antique), *busain* (Tagalog)

Medium to large trees reaching 10 m high and 30 cm DBH, found on muddy substrate along riverbanks, sandy-muddy substrate in island mangroves, and compact mud in inner mangroves. They differ from the other *Bruguiera* species in that they have the largest leaves, flowers, propagules, and lenticels. *B. gymnorrhiza* has very heavy wood which was used in the past as timber for saltwater and foundation pilings, house posts, flooring, cabinetwork and furniture. It was also used as source of dyes for fishnets, ropes, sails and clothing and powdered bark (*baluk*) for the preparation of *tuba*, a popular drink made from coconut sap. Trees can survive partial debarking to obtain dye if limited to a small section of the trunk (see opposite page, bottom left photo). Present uses are charcoal and firewood, while the knee roots are utilized in planting rituals in Palanan, Isabela so cultivated tubers will grow big.

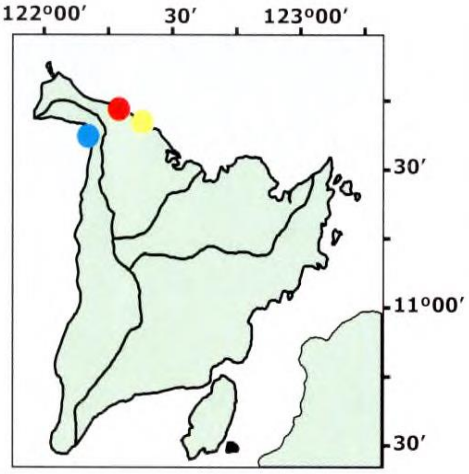
General

Substrate:	muddy, sandy-muddy
Tidal level:	middle, high
Found with:	*B. cylindrica*, *C. decandra*, *C. philippinensis*

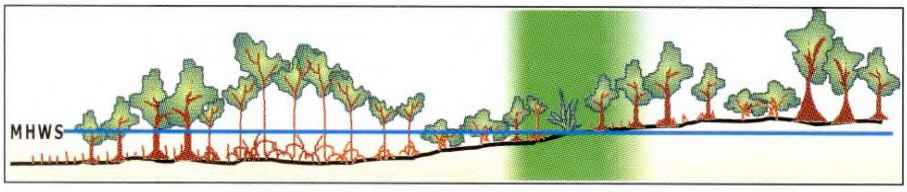
Form

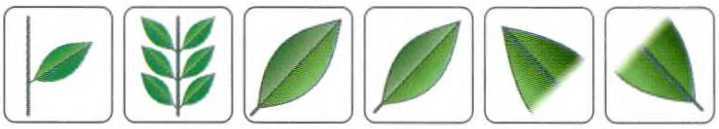
Shape:	tree
Height	2-10 m
DBH:	10-30 cm
Bark:	rough, dark brown; prominent lenticels
Aerial roots:	knee roots, small buttresses

Sampling sites:
- Pandan, Antique
- Ibajay, Aklan
- Makato River, Aklan



FLOWERING	J	F	M	A	M	J	J	A	S	O	N	D
FRUITING	J	F	M	A	M	J	J	A	S	O	N	D





Leaves

Arrangement:	simple, opposite
Blade shape:	elliptic
Margin:	entire - smooth
Apex:	acute to acuminate
Base:	acute
Upper surface:	smooth, dark green
Lower surface:	waxy, light green
Size:	15 (10-20) cm long, 6 (4-8) cm wide
Others:	reddish stipules

Flowers

Inflorescence:	single, axillary
Petals:	11-14, orange, notched, hairy
Sepals:	11-14, pink to red, fused
Stamens:	11-14 pairs
Size:	3-4 cm long

Propagules

Shape:	cigar-like, long and stout
Color:	dark green to purple when mature
Texture:	finely rough, ridged
Size:	21.7 (19-25) cm long, 1-1.7 cm diameter
Others:	calyx cap red, lobes free; viviparous

Family Rhizophoraceae

Bruguiera parviflora Wight and Arn. ex Griff.

Local names: *hangalai, langarai, mangalai* (Tagalog)

Bruguiera parviflora forms solid stands of slender, tall trees reaching 15 m high. Among *Bruguiera* species, it has the darkest trunk, the most delicate flowers, and the finest leaves that appear stellate or star-shaped from a distance. The slender propagules have a distinctive calyx appressed to the fruit, unlike other *Bruguiera* spp. At first green and erect, the propagules become brown and pendulous when mature. The yellow-green leaves form a golden canopy in full sunlight. Older trees have cracked bark with reddish interior (see opposite page, bottom left photo). Like other *Bruguiera* species, past uses include saltwater and foundation pilings, house posts, flooring, cabinetwork and as a source of tannin.

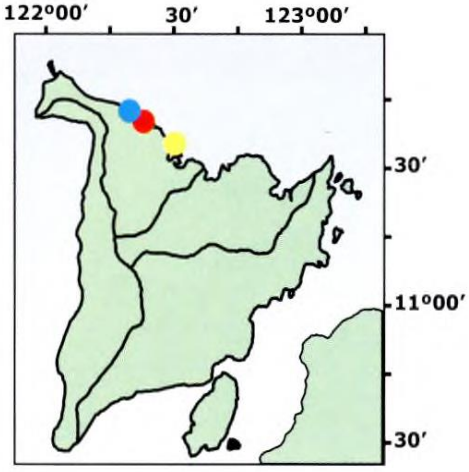
General

Substrate:	muddy
Tidal level:	middle
Found with:	*B. cylindrica,* *C. philippinensis* *S. caseolaris*

Form

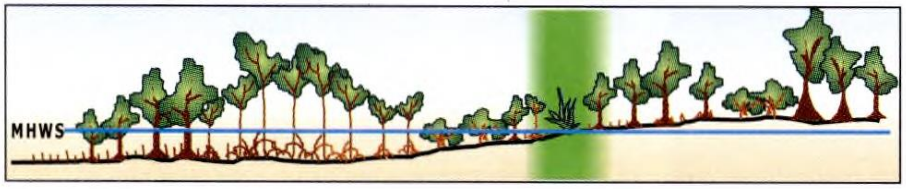
Shape:	tree
Height:	5-15 m
DBH:	15-25 cm
Bark:	rough, dark
Aerial roots:	dark knee roots, low buttresses

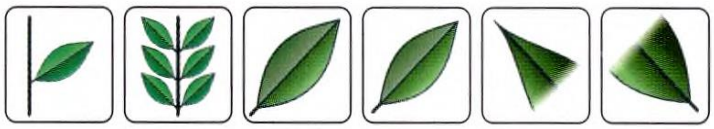
Sampling sites:
- Makato River, Aklan
- Altavas, Aklan
- New Washington, Aklan



FLOWERING J F M A M J J A S O N D

FRUITING J F M A M J J A S O N D





Leaves

Arrangement:	simple, opposite
Blade shape:	elliptic
Margin:	entire - smooth
Apex:	acuminate
Base:	acute
Upper surface:	smooth, light green
Undersurface:	waxy, pale green
Size:	8 (6-10) cm long, 3 (2-4) cm wide
Others:	whitish to light yellow stipules

Flowers

Inflorescence:	cyme, axillary
Petals:	white
Sepals:	8, yellow-green
Size:	0.9-1.3 cm long, 0.4-0.6 cm diameter

Propagules

Shape:	pencil-like, tapered but blunt tip
Color:	light green to brown when mature
Texture:	smooth
Size:	14 (11-19) cm long, 4-6 cm diameter
Others:	calyx fused, lobes appressed; viviparous

Family Rhizophoraceae

Bruguiera sexangula (Lour.) Poir.

Local names: *pototan*, *karakandang* (Antique)

A medium tree up to 10 m tall in the compact sandy-muddy substrate of landward mangroves; with limited distribution in Panay. *Bruguiera sexangula* groves are found in the innermost portion of the mangroves in Bugtong Bato, Ibajay, Aklan and Lipata, Culasi, Antique. The species has big flowers with yellow-orange petals and sepals, short and stout propagules, and prominent buttress and knee roots with lenticels. Bark is light brown with large corky lenticels (see opposite page, bottom left photo) and sometimes covered with lichens. Presently used for firewood and charcoal. Past uses include piles, mine timber and house posts. Roots and leaves were used to treat burns, leaves have alkaloids that are tumor inhibitors, and a lotion made from the fruit was used to treat sore eyes. Young leaves and fruits were cooked as vegetables, fruits used as betel nut substitutes, and roots made into incense wood.

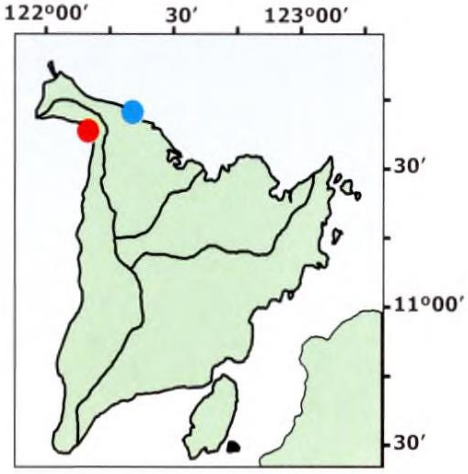
General

Substrate:	hard mud, sandy-muddy
Tidal level:	high
Found with:	*H. litoralis, L. racemosa, B. gymnorrhiza*

Form

Shape:	tree
Height:	5-10 m
DBH:	10-25 cm
Bark:	rough, brown; lenticellate
Aerial roots:	knee roots, low buttresses

Sampling sites: ● Ibajay, Aklan ● Pandan, Antique



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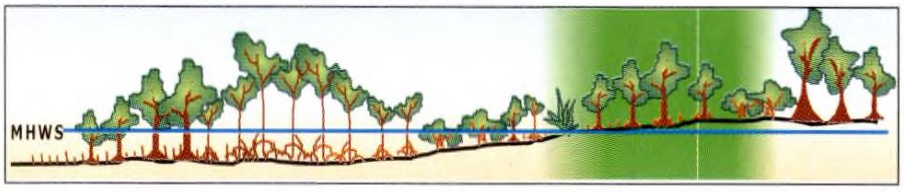
FLOWERING												
FRUITING												



Leaves

Arrangement:	simple, opposite
Blade shape:	elliptic
Margin:	entire - smooth
Apex:	acuminate
Base:	acute
Upper surface:	smooth, green
Undersurface:	waxy, yellow-green
Size:	12 (8-15) cm long, 4 (3-6) cm wide
Others:	pale green to yellowish stipules

Flowers

Inflorescence:	single, axillary
Petals:	10-11, orange to brown
Sepals:	10-12, yellow-orange, fused
Stamens:	10-11 pairs
Size:	3-3.2 cm long, 1-2 cm diameter

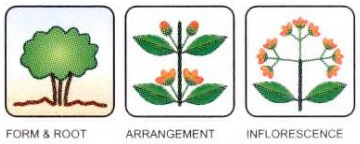
Propagules

Shape:	cigar-like, short and stout
Color:	green to purple when mature
Texture:	finely rough, ridged
Size:	7.7 (4-9) cm long, 1-2 cm diameter
Others:	calyx lobes spreading; viviparous

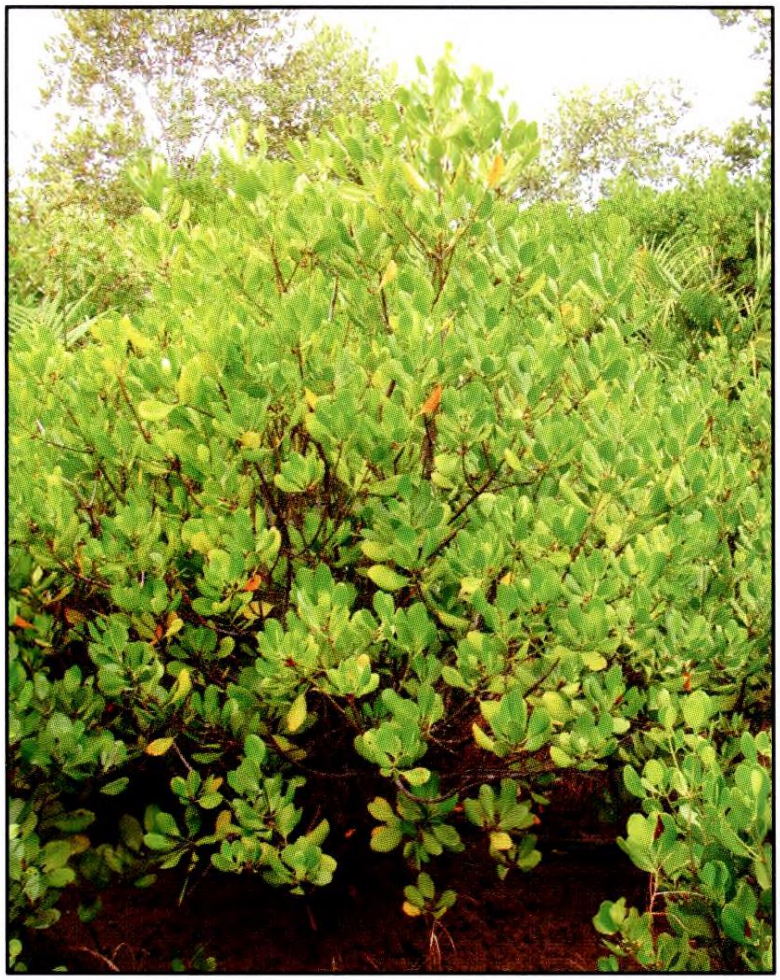
Family Rhizophoraceae

Ceriops decandra (Griff.) Ding Hou

Local names: *baras-baras*, *lapis-lapis*, *malatangal* (Tagalog)



Shrubs reaching 3 m tall that grow on the compact mud or sandy-mud of inner mangroves. This pioneer species occurs as monospecific stands that provide the leading edge of mangrove invasion of grasslands, up to the high tide limit (see opposite page, bottom left photo), but may also form the understory portion of a mixed mangrove community. *Ceriops decandra* differs from *C. tagal* by its shorter height, multiple stems, and shorter fruits (with red cotyledonary collar) that point in all directions. Roots have small flaky buttresses that give the trunk a swollen appearance. Commonly used as firewood, and as Christmas trees in Luzon. The bark of mature trees is harvested for the *baluk* powder used in making local *tuba*, although the preferred species is *C. tagal*.



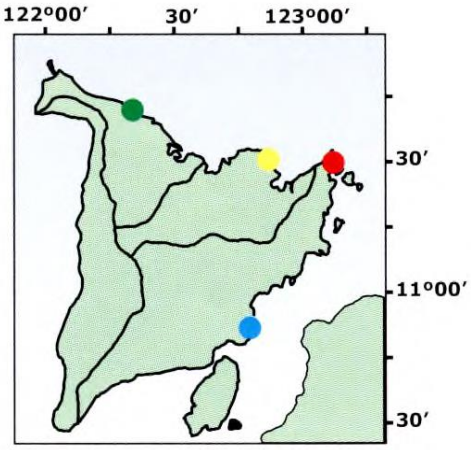
General

Substrate:	sandy, muddy
Tidal level:	middle, high
Found with:	*A. officinalis*, *A. rumphiana*, *N. fruticans*

Form

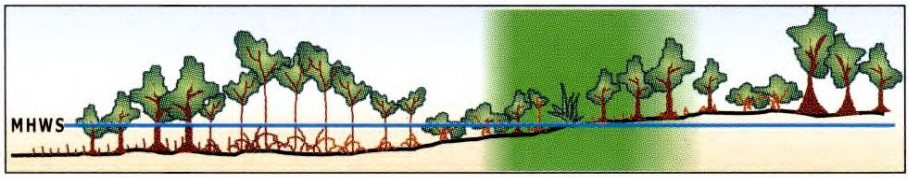
Shape:	shrub
Height:	2-3 m
Bark:	rough, gray to brown, few lenticels
Aerial roots:	small, buttress-like

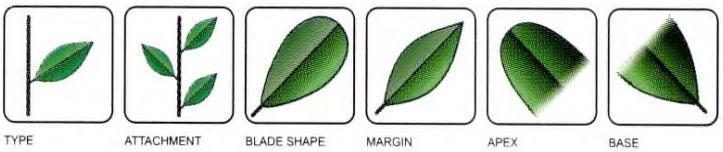
Sampling sites:
- Barotac Nuevo, Iloilo
- Carles, Iloilo
- Pan-ay, Capiz
- Ibajay, Aklan



FLOWERING J F M A M J J A S O N D

FRUITING J F M A M J J A S O N D





Leaves

Arrangement:	simple, opposite
Blade shape:	mostly obovate
Margin:	entire - smooth
Apex:	round to emarginate
Base:	acute
Upper surface:	smooth, green
Undersurface:	smooth, light green
Size:	7 (4-10) cm long, 4 (3-8) cm wide

Flowers

Inflorescence:	cyme, axillary
Petals:	5, white, with hairs
Sepals:	5, light green, fused
Size:	0.3-0.5 cm diameter
Others:	6-8 flowers per cluster, on short thick stalks

Propagules

Shape:	cylindrical, pencil-shaped
Color:	green to brown when mature
Texture:	smooth, slender, slightly ribbed
Size:	13.5 (10-18) cm long, 0.5-0.9 cm diameter
Others:	reddish brown cotyledonary collar (see inset)

Family Rhizophoraceae

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

Local names: *tungog*, *tangal*, *tagasa* (Tagalog)

Small trees reaching 6 m tall, on firm sandy to muddy substrates of inner mangroves. Compared to *C. decandra*, trees are taller with a single straight trunk, and longer fruits point downwards. Leaves turn yellowish green in sunlight. Roots have small flaky buttresses; knee roots appear in older trees. Among the Rhizophoraceae, the dried *C. tagal* bark gives the best quality *baluk* powder used in making *tuba*, *bahalina* (a special *tuba* variety in Leyte and Samar), and *basi* (rice wine), and in dyeing fish nets and clothing. Wood is used for fuel, charcoal, poles for *baklad* (fish corrals) and house posts. In the past, big trees provided hard, fine-textured wood for furniture and house construction. The bark was used to treat hemorrhages and ulcers; older folks chewed on dried bark. Only isolated trees of *C. tagal* are found in Panay, aside from a small 20-year old plantation in Naisud, Ibajay, Aklan (see opposite, bottom left photo).

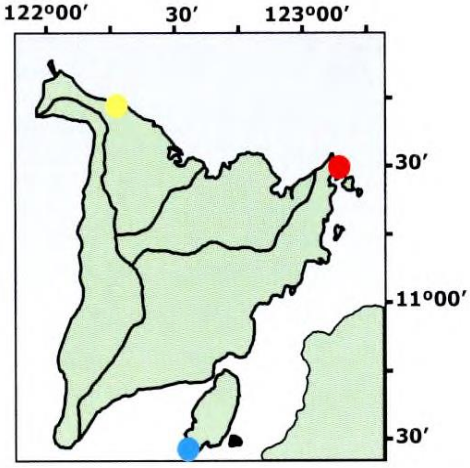
General

Substrate:	sandy, muddy
Tidal level:	middle, high
Found with:	*A. corniculatum*, *A. rumphiana*, *R. apiculata*, *S. alba*

Form

Shape:	tree, shrub
Height:	2-6 m
DBH:	5-10 cm
Bark:	rough, light brown to gray; flaky
Aerial roots:	knee roots, low buttresses

Sampling sites:
- Taklong Is., Guimaras
- Carles, Iloilo
- Ibajay, Aklan



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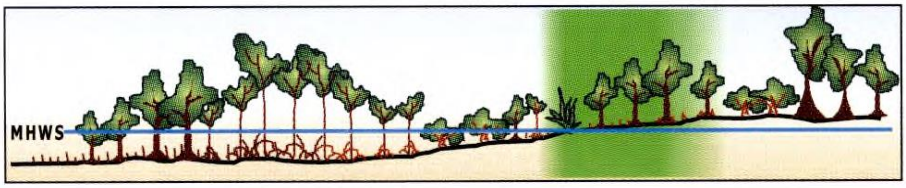
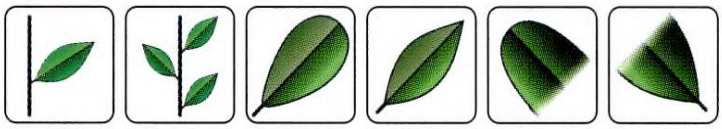




Leaves

Arrangement:	simple, opposite
Blade shape:	mostly obovate
Margin:	entire - smooth, curl downwards
Apex:	round
Base:	acute
Upper surface:	smooth, green to yellow green
Undersurface:	smooth, yellow green
Size:	8 (5-12) cm long, 4 (2-6) cm wide
Others:	leaves directed upward, brittle

Flowers

Inflorescence:	cyme, axillary
Petals:	4-6, white, with brown hairs
Sepals:	4-6, light green, fused
Stamens:	4-6, brown tip
Size:	0.6-0.9 cm long, 0.6-0.9 cm diameter

Propagules

Shape:	cylindrical, pencil-shaped
Color:	dark green to brown when mature
Texture:	ridged, with a few warts
Size:	20.5 (16-30) cm long, 0.6-1 cm diameter
Others:	pendulous, calyx spread, yellow cotyledonary collar (inset)

Family Rhizophoraceae

Rhizophora apiculata Blume

Local names: *bakhaw, bakhaw lalaki, bulubaladaw* (Antique)

Medium to tall trees reaching 20 m on loose mud of tidal rivers and creeks, and sandy mud of the seaward zone behind the outer *S. alba-A. marina* band where *Rhizophora apiculata* forms monospecific stands. Its wide distribution in Panay and elsewhere in the Philippines is due to its pioneering nature and popularity for replanting. It is the preferred species for plantations because of availability of propagules and fast growth. The inflorescence usually bears 2 sessile flowers on a very short peduncle. The buds are compact and used by children as bullets for toy guns. The fruits are long, smooth and viviparous. The leaves are dark green and flat, and may be fed to pigs (see opposite page, bottom left photo); the interpetiolary stipules are dark pink to red. Other differentiating features are found in Table 6.

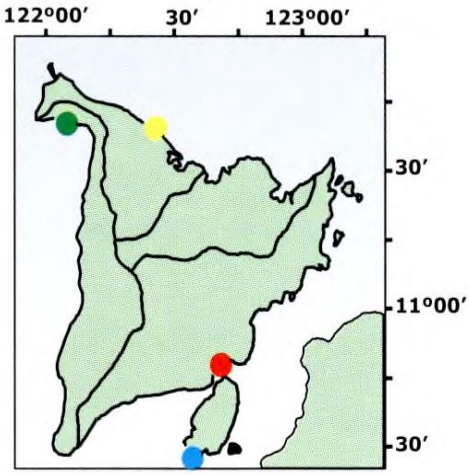
General

Substrate:	muddy
Tidal level:	low, middle
Found with:	*A. marina, S. alba, R. stylosa, R. mucronata*

Form

Shape:	tree
Height:	4-20 m
DBH:	10-40 cm
Bark:	rough, grayish to brown
Aerial roots:	prop roots

Sampling sites:
- Taklong Is., Guimaras
- Zarraga, Iloilo
- Kalibo, Aklan
- Libertad, Antique



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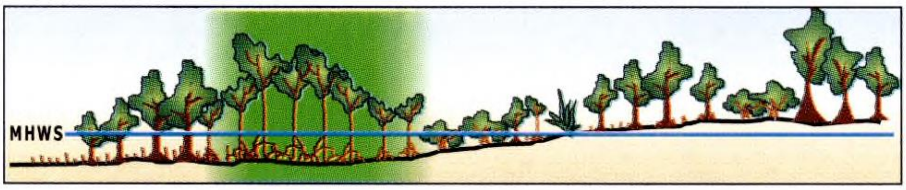
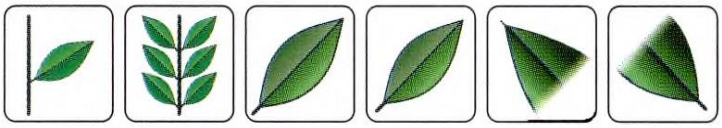
FRUITING J F M A M J J A S O N D





Leaves

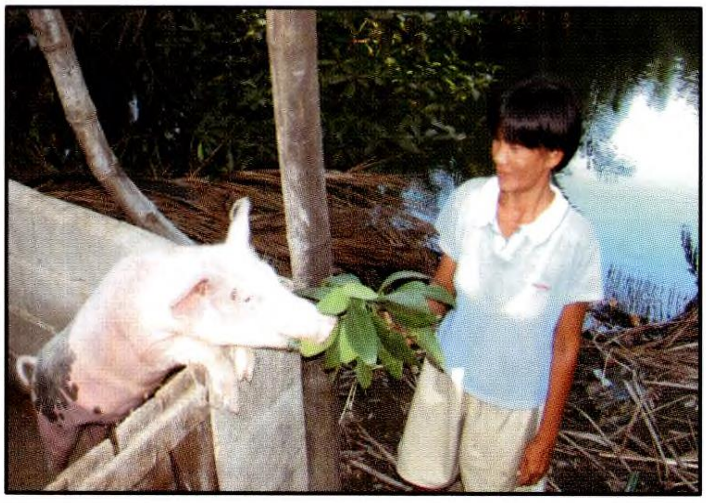
Arrangement:	simple, opposite
Blade shape:	elliptic
Margin:	entire - smooth
Apex:	apiculate
Base:	acute
Upper surface:	smooth, dark green
Undersurface:	smooth, green
Size:	13 (9-19) cm long, 5 (4-7) cm wide
Others:	stipules dark red

Flowers

Inflorescence:	cyme, axillary
Petals:	4, white
Sepals:	4, yellow to red outside
Stamen:	12, brown
Size:	1.2-1.4 cm long
Others:	2 flowers per cluster, no style

Propagules

Shape:	cylindrical, straight
Color:	dark green
Texture:	smooth
Size:	24 (22-26) cm long, 0.9-1 cm diameter
Others:	viviparous; short (~1 cm) peduncle so the upper part tends to be curved; yellowish cotelydonary collar

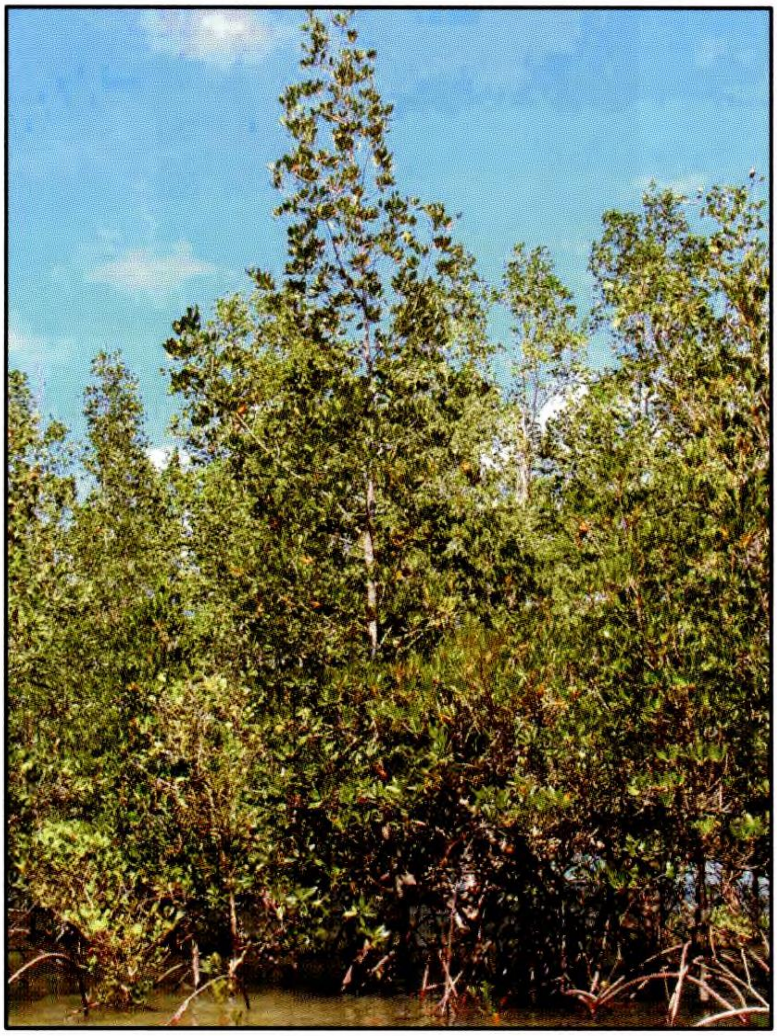


Family Rhizophoraceae

Rhizophora x lamarckii Montr.

Local name: *bakhaw*

A sterile hybrid of *Rhizophora apiculata* x *R. stylosa*, this species can be found on the sandy-muddy substrate along the seaward fringe of protected islands. The trees are usually isolated but close to the parent plants. The characters are the same as *R. apiculata* – reddish interpetiolary stipules but slightly longer peduncles with two flowers each which never develop into fruits. The buds look like those of *R. apiculata* and the style is shorter than in *R. stylosa*. A single specimen has been found in the Taklong Island National Marine Reserve, Nueva Valencia, Guimaras (10°24'22.46" N, 122°30'46.26" E). This hybrid has also been reported by Yao (1999) from various sites in central Visayas – Okiot, Dewey Is., Bais and Tinguib, Ayongon both in Negros Oriental; Pagangan Is., Calape and Handayan Is., Getafe both in Bohol; and Taug, Carcar, Cebu. Uses of the various *Rhizophora* species are similar (see opposite page).



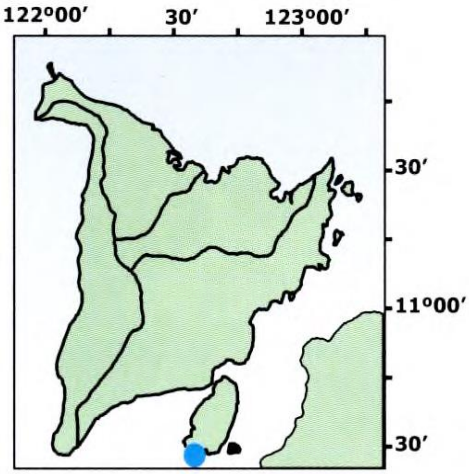
General

Substrate:	sandy-muddy
Tidal level:	low
Found with:	*A. marina, S. alba, R. stylosa, R. apiculata, R. mucronata*

Form

Shape:	tree
Height:	12 m
DBH:	15 cm
Bark:	rough, grayish to brown
Aerial roots:	prop roots

Sampling site: ● Taklong Is., Guimaras



	J	F	M	A	M	J	J	A	S	O	N	D
FLOWERING												
FRUITING												

Leaves

Arrangement:	simple, opposite
Blade shape:	elliptic
Margin:	entire - smooth
Apex:	apiculate
Base:	acute
Upper surface:	waxy, dark green
Undersurface:	smooth, yellow green
Size:	13-15 cm long, 5-6 cm wide
Others:	stipules reddish

Flowers

Inflorescence:	cyme, axillary
Petals:	4, white, hairy
Calyx:	4, yellowish
Size:	1.1-1.4 cm long
Others:	2 flowers per cluster, longer (2-3 cm) peduncle, sterile

USES OF *RHIZOPHORA* SPECIES

As in the past, *Rhizophora* species are popular at present for firewood and charcoal because of their high heating value and little smoke. At the turn of the century, thousands of hectares around Manila Bay were planted with *Rhizophora* to provide household fuel. They are also used for posts, frames and flooring of coastal houses, furniture, *banca* (small boat) outrigger, and fishing poles of *baklad* (fish corrals). The original *taku* (cue stick) used by Efren "Bata" Reyes, the country's first world-class billiard player, was made of *bakhaw* wood, most probably *R. apiculata*. Tender *bakhaw* leaves are fed to pigs, goats and other livestock. The *baluk* from *Rhizophora* can also be used in preparing tuba, if the preferred *C. tagal* is not available. Fishers wash jellyfish with *bakhaw* bark solution before eating, or apply the bark directly to affected skin, to neutralize the sting. A bark decoction is used to heal scabies and other skin infections. Coastal folks seek decaying branches of *bakhaw* and other mangroves for *tamiluk*, or shipworms (right) which are a highly-prized delicacy. Past uses of *bakhaw* include timber for railroad ties, mine posts, wharves, beams and joists. *Bakhaw* wood is especially suited for use as foundation piles because it is resistant to salt water.

DARIO NOVELLINO (inset)

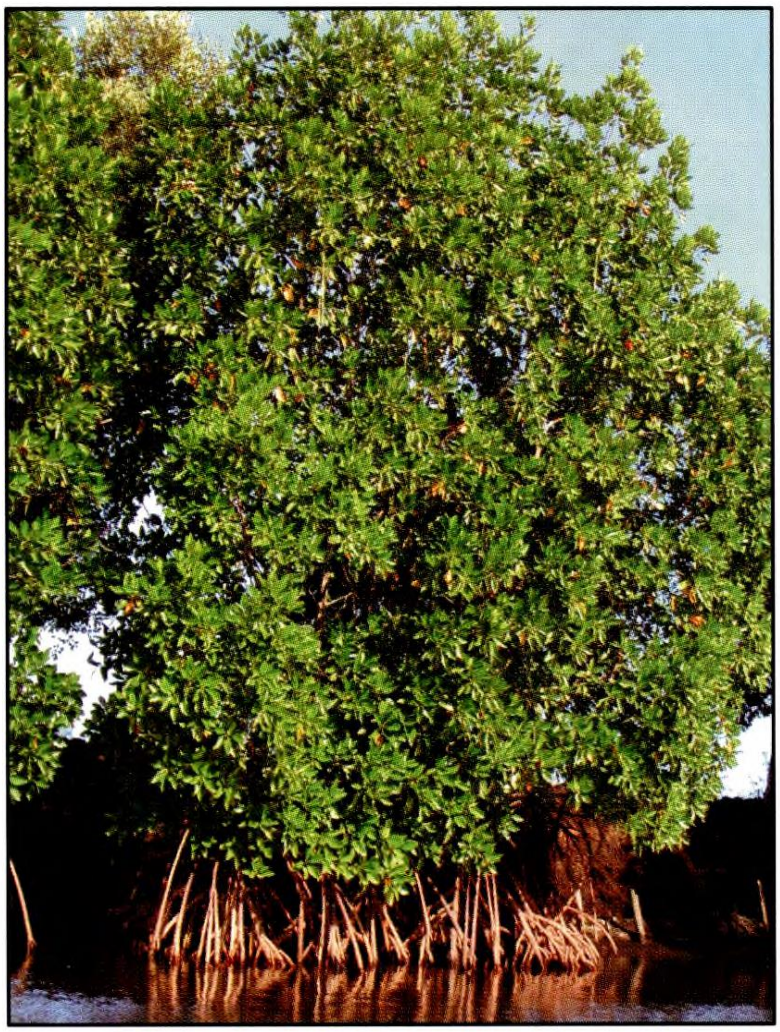
SABINE SCHOPPE

Family Rhizophoraceae

Rhizophora mucronata Lam.

Local names: *bakhaw, bakhaw babae*

Medium to big trees reaching 15 m in Panay (but 30 m in Aurora and other provinces). Its wide distribution overlaps with other *Rhizophora* species although *R. mucronata* is more strongly associated with the soft muds of estuarine rivers and tidal creeks. In the seaward fringe, it is typically found behind *R. apiculata*, the "front-line" species. *R. mucronata* has broader leaves with yellow to light green stipules, pendulous flowers, and long warty propagules. It is favored for fuelwood and charcoal because of its high heating value, like other *Rhizophora* species. In the past, it was cultivated with *R.apiculata* in fuelwood plantations around Manila and sold on the street (see opposite, bottom left photo). The dried hypocotyls were smoked as cigars. In the 1950s-70s, wood chips from these two species were exported from the Philippines, Malaysia and other Southeast Asian countries to Japanese rayon fiber factories.



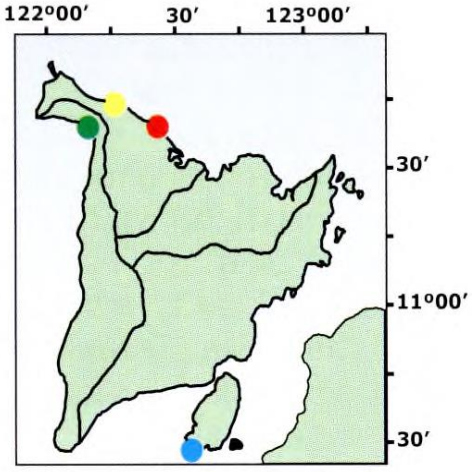
General

Substrate:	sandy, muddy
Tidal level:	low
Found with:	*A. marina, R. apiculata, R. stylosa, S. alba*

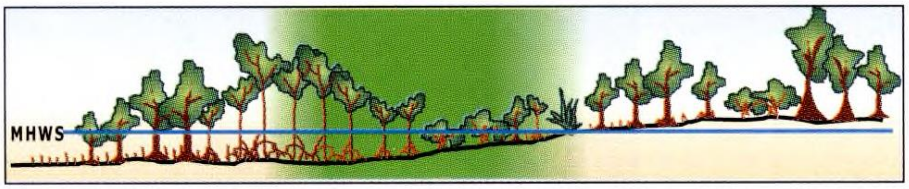
Form

Shape:	tree
Height:	4-15 m
DBH:	8-20 cm
Bark:	rough, grayish to brown
Aerial roots:	prop roots

Sampling sites:
- Taklong Is., Guimaras
- Kalibo, Aklan
- Ibajay, Aklan
- Pandan, Antique



	J	F	M	A	M	J	J	A	S	O	N	D
FLOWERING												
FRUITING												



Leaves

Arrangement:	simple, opposite
Blade shape:	elliptic
Margin:	entire - smooth
Apex:	mucronate
Base:	acute
Upper surface:	smooth, dark green
Undersurface:	smooth, yellow green
Size:	14 (11-19) cm long, 7 (6-10) cm wide
Others:	black dots, light green stipules

Flowers

Inflorescence:	cyme, axillary
Petals:	4, white, hairy
Sepals:	4, light yellow
Stamens:	8, brown
Size:	1.2-2 cm long, 1-1.5 cm diameter
Others:	3-5 cm long peduncle, 2-6 flowers per cluster, 1 mm style

Propagules

Shape:	cylindrical
Color:	dark green
Texture:	warty
Size:	57 (34-70) cm long, 1-2 cm diameter
Others:	viviparous; yellow collar

FROM BROWN & FISCHER (1920)

Family Rhizophoraceae

Rhizophora stylosa Griff.

Local names: *bakhaw, bakhaw bato, bangkao*

Small to medium trees up to 10 m high. Widely distributed, *Rhizophora stylosa* overlaps with the habitat of *R. apiculata* but prefers sandy and rocky intertidal shores. Leaves have sides which typically curl or roll downward, differentiating it from other *Rhizophora* species; the leaves on terminal branches slant or point upward. Like other mangroves, the roots are often overgrown by epiphytic algae (see opposite page, bottom right photo). Uses for fuelwood and dyes are similar to other *Rhizophora* species. It is also favored for planting – the provincial government of Antique provided funds for the almost yearly procurement from 1995 to 2001 of more than 70,000 *R. stylosa* propagules from Semirara Island for planting in Lipata, Culasi by the people's organization OMMMALI (see Table 13).

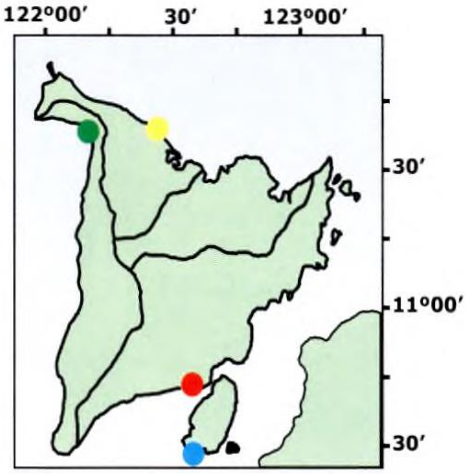
General

Substrate:	sandy, muddy
Tidal level:	low, middle
Found with:	*A. marina, R. apiculata, R. mucronata, S. alba*

Form

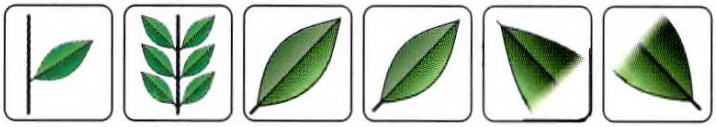
Shape:	tree
Height:	3-10 m
DBH:	6-15 cm
Bark:	rough, grayish to brown
Aerial roots::	prop roots

Sampling sites:
- Taklong Is., Guimaras
- Oton, Iloilo
- Kalibo, Aklan
- Pandan, Antique



FLOWERING J F M A M J J A S O N D

FRUITING J F M A M J J A S O N D



Leaves

Arrangement:	simple, opposite
Blade shape:	elliptic
Margin:	entire - smooth
Apex:	apiculate
Base:	acute
Upper surface:	waxy, light green
Undersurface:	smooth, yellow green
Size:	11 (8-14) cm long, 5 (3-7) cm wide
Others:	leaves point upward, sides curling; stipules light green

Flowers

Inflorescence:	cyme, axillary
Petals:	4, white, hairy
Sepals:	4, light yellow
Stamen:	8, brown
Size:	1.1-1.5 cm long, 1.4-2 cm diameter
Others:	~7 flowers per cluster, long peduncle, 6 mm style

Propagules

Shape:	cylindrical, straight
Color:	light green to green
Texture:	warty
Size:	34 (26-42) cm long, 1-2 cm diameter
Others:	viviparous; greenish collar