

Aegialitis rotundifolia

- **Bloom and Fruit Period:** May-August
- **Seed Collection Period:** June-July
- **Seed shape:** Bean
- **Habitat:** Grow in lawn area by channel outlet or near a limestone mountain or clay from the break limestone. The sea water floods occasionally.
- **Propagation:** Growing from sheath/pod
- **Characteristic:**
- Small tree shrub 1-2 m high, without any aerial roots, but the base of the trunk is swollen and fluted with spongy tissue.
- Leaves: simple, alternate, cauline, exstipulate, petiolate
- Flowers: small, adjoining to the fruits. The panicle branching out a niche as a short form.
- Fruit/Seed: pentagon shape. Long slender seed.



Avicennia alba

- **Bloom Period:** Jan.-April
- **Sheath Collection Period:** May-June
- **Seed shape:** Bean
- **Habitat:** They are the pilot species lead to the soft clay sea. Most are in the outermost with has good drainage. They help the sediment of soil causing the land regeneration. The sea water floods regularly. They are the lead plant and stay at the outside.
- **Propagation:** Planting: Growing from sheath in the plastic bag sized 4x6
- **Characteristic:**
- Standing timber 8-20m. Pencil-like pneumatophores emerge above ground from long shallow underground roots 15-30 cm. long
- Leaves: Shiny green above, underneath white and waxy.
- Flowers: Small, yellow, several together, forming a cross-shaped inflorescence, diameter 0.4-0.6 cm. long, 5 opposite sepals and 4 opposite petals 0.2-0.3 cm long.
- Fruits: Flat capsule 1.5-2 X 2.5-4 cm. containing one seed.



Avicennia officinalis

- **Bloom Period:** Jan.-May
- **Sheath Collection Period:** May-June
- **Seed shape:** Bean
- **Habitat:** Area with water flooded most of the time or sheltered coastal canals with slime or sludge in the sand. They are also the lead plant and stay at the outside.
- **Propagation:** Growing from sheath/pod
- **Characteristic:**
- Standing timber 8-25m. Grey and white. Smooth to rough bark.
- Leaves: Thick, leathery, spoon-like (rounded at tip with edges slightly rolled under), shiny green above, underneath slightly hairy.
- Flowers: Small, yellow, several together, forming a cross-shaped inflorescence.
- Fruits: Flat capsule 2.3 x 3-4 cm. yellow and green, containing one seed.



Bruguiera cylindrical

- **Bloom and Fruit Period:** All year round
- **Sheath Collection Period:** June-August
- **Seed shape:** Cylinder
- **Habitat:** Growth in shallow clay areas as coastal leathery and tough. Open lawn area that is not suitable for other plants. The sea water floods irregularly or there is the flood arrives at during the high tide.
- **Propagation:** Sheath or pod using for cultivation. The sheath/pod is small and short to handle (like handle a pen) and should be planted from root about one-third. Then stick to the soil to a depth of approximately 1 in 3 of the length of the sheath/pod.
- **Characteristic:**
- Standing Timber 8-15m tall. Smooth, grey bark. Kneed pneumatophores with buttress roots.
- Leaves: Thin, light green, pointed. 3-8 x 7-19 cm.
- Flowers: small greenish white, petals tipped with little tassels.
- Fruits: The seed germinates in the fruit forming a cigar-shaped seedling up to 0.4-0.6 x 7-14 cm

long. The seedling grows slightly curved and may be purplish. The green/yellow sepals stick out at right angles from the fruit.



Bruguiera gymnorrhiza

- **Bloom Period:** All year round
- **Sheath Collection Period:** June-July
- **Seed shape:** Cylinder
- **Habitat:** Found in marshy hard land and occasionally sea flooding(swamp). The sea water floods regularly.
- **Propagation:** Plant from root-sheath about one-third look like a pen handle. Then stick to the soil to a depth of approximately 1 in 3 of the length of the sheath. Select the mature sheath and protect from the insects. Protect the storage seed should always be moist to wet.
- **Characteristic:**
 - Standing timber 25-35 m high. Bark is rough and reddish-brown.
 - The tree develops short prop-roots rather than long stilt-roots.
 - Leaves: simple, opposite, green at the top, and red at the end.
 - Flowers are creamy-white soon turning brown. The sepals are persistent, narrow and slightly tapered.
 - When mature, the spindle-shaped fruits drop and become embedded in the mud in an upright position, where they rapidly develop roots.



Bruguiera parviflora

- **Bloom and Fruit Period:** All year round
- **Sheath Collection Period:** June-August
- **Seed shape:** Cylinder
- **Habitat:** The inner side of the mangrove where water reaches all times. The sea water floods regularly.
- **Propagation:** Sheath using for cultivation. The sheath is small and short to handle and should be planted from root about one-third. Then stick to the soil to a depth of approximately 1 in 3 of the length of the sheath.
- **Characteristic:**
- Standing timber 10-20 m tall; bark grey, smooth; leaves opposite, blades yellowish green, elliptic; stipules light yellow.
- Flowers 3-7 per leaf angle, sepals yellow-green and remain pointing parallel to the long axis of the fruit.
- Fruit; seed germinates in fruit, hypocotyl cylindrical, 1.3-2.5 cm long, thinly pencil-like, smooth.



Cerbera odollam

- **Bloom and Fruit Period:** All year round
- **Seed Collection Period:** May-July
- **Seed shape:** Round
- **Habitat:** River, salt swamps and in marshy areas. The sea water floods occasionally.
- **Propagation:** Growing from seeds in plastic bags.
- **Characteristic:**
 - Small to medium-sized standing timber 6-12 m tall with dark foliage and showy.
 - White flowers which are very fragrant. The plant as a whole yields a milky white latex.
 - Leaves: simple, the whorled leaves are crowded near the ends of rather thickish branches with conspicuous leaf scars below.
 - Flowers: the fragrant white flowers have a yellow throat.
 - Fruits: often twinned, ellipsoid and speckled green. The seed coat is thin and after falling, soon decays, exposing fibrous tissue. On exposure to air, the white kernel turns violet, then dark grey.



Ceriops decandra

- **Bloom and Fruit Period:** All year round
- **Sheath Collection Period:** June-September
- **Seed shape:** Cylinder
- **Habitat:** Grow up in upland, dry soil. The sea water floods occasionally.
- **Propagation:** Sheath or pod using for cultivation. The sheath/pod is small and short to handle (like handle a pen) and should be planted from root about one-third. Then stick to the soil to a depth of approximately 1 in 3 of the length of the sheath/pod.
- **Characteristic:**
 - Standing timber 7 m tall forming small butteresses; branches thick.
 - Leaves: simple and opposite.
 - Flowers: bi-tri-chotomous in condensed axillary cymes.
 - Fruit: one celled one seeded. Forms thin knee-like pneumatophorh.



Xylocarpus granatum

- **Bloom and Fruit Period:** All year round
- **Seed Collection Period:** July-September
- **Seed shape:** Round
- **Habitat:** Growing well in the brackish water (sea water + fresh water) area. Found very little in a fresh water.
- **Propagation:** Growing from seeds: the seeds are large so directly grow in planting bags.
- **Characteristic:**
- Small-medium standing timber 8-20 m tall; buttresses long and snaking laterally, dark light brown, yellowish or greenish, smooth flaking off.
- Leaves pinnate, leaflets bright light green when young, dark green when old, narrowly drop-shaped, with rounded tips.
- Flowers fragrant, with white petals, about 3-8 mm across;
- Fruit: capsule woody, grapefruit- to small pomelo-sized.



Ceriops tagal

- **Bloom and Fruit Period:** All year round
- **Sheath Collection Period:** June-September
- **Seed shape:** Cylinder
- **Habitat:** Grow inside the mangrove forest territory of the coastal rivers that flood regularly and the soil has good drainage.
- **Propagation:** Sheath/pod should be planted from root about one-third of the length. And the bottom part of the sheath/pod handling in the thumb with the forefinger. Sticking the sheath/pod in the vertical is easier. Plant near the soil surface into the prepared hole, press the soil around the root sheath/pod To protect shaking, especially from the influence of strong currents and wind waves.
- **Characteristic:**
 - A small-medium standing timber 7-15 m glabrous shrub.
 - Leaves: simple and opposite.
 - Flowers: white in axillary cyme. 4-8 flowers per cyme.
 - Fruit: one celled one seeded. Forms thin knee-like pneumatophorh.



Heritiera littoralis

- **Bloom Period:** March-May and October-November
- **Seed Collection Period:** October-November
- **Seed shape:** Round
- **Habitat:** Found in sea water + fresh water area at sandy estuaries.
- **Propagation:** Growing from seeds in 4x6 plastic bags.
- **Characteristic:**
- Low, much branched, standing timber, to 5-20 m tall; bark pinkish gray, smooth becoming flaky when older.
- Leaves: simple, leaf blades dark green above and silvery white below, withering dull orange-yellow, oblong to elliptic, leathery.
- Flowers” in hanging yellowish tassels.
- Fruits: purple-brown, woody, shiny with a stiff keel on one side.



Lumnitzera littorea

- **Bloom Period:** March-May and October-November
- **Seed Collection Period:** October-November
- **Seed shape:** Cylinder
- **Habitat:** Locally gregarious on the inland margin of mangrove forest and sandy estuaries, and also above the tide level.
- **Propagation:** Growing from seeds in 4x6 plastic bags.
- **Characteristic:**
- Medium-large standing timber with buttresses to about 30 m tall, Bark dark brown, fissured.
- Leaves: alternate, almost stalkless, dark green, narrowly drop-shaped.
- Flowers: bright red flowers in leaf angles.
- Fruits: 0.4 x 1.3-2 cm. brownish red.



Nypa fruticans

- **Bloom Period:** All year round
- **Seed Collection Period:** June-September
- **Seed shape:** Round
- **Habitat:** Grows in soft mud, usually where the water is calmer, but where there is regular inflow of freshwater and nutritious silt. They can be found inland, as far as the tide can deposit the Palm's floating seeds. It can tolerate infrequent inundation, so long as the soil does not dry out for too long.
- **Propagation:**
 1. Growing from seeds in plastic bags.
 2. Separation of shoot offspring
 - Separate the small mangrove shoot for planting in the bag.

Characteristic:

- Fronds emerge from the ground and the palm appears trunkless.
- Palm grows up to 9m tall.
- Leaves: Similar to coconut leaves but stickier and wider, Large up to 9m long.
- Flowers: A globular inflorescence of female flowers at the tip with catkin-like red or yellow male flowers on the lower branches.
- Fruits: Woody seeds, several compressed into a ball.



Rhizophora apiculata



- **Bloom Period:** December-January
- **Fruit-ripening Period:** May-July
- **Sheath Collection Period:** May-July
- **Seed shape:** Cylinder
- **Habitat:** Mangrove forests; sea level. Gregarious on deep soft mud of estuaries flooded by high tides.
- **Propagation:** Direct planting of the propagules: choose the healthy mature propagules (the interval of the propagule and fruit is yellow and white, approximate length of 1 cm., yellow, or float in the water) Planting: in the plastic bag sized 4x6, soil cultivation using ground soil mixed with soil organic fertilizer. Beware of mold. When the sprout has 2 leaves then move or plant in plastic bags that should be 1x1 or 1.5x1.5 m. of gab area. The surviving

rate is more than 90%.

- **Characteristic:**
- Standing timber up to 20 m tall.
- Leaf blades elliptic, tiny black-spotted below, leaf stalks and stipules often tinged red.
- Stalkless flowers cream-coloured, in pairs, on a short, stout, dark grey stalk.
- Fruit brown, upside-down pear-shaped, crowned by the persistent sepals.
- Seedling viviparous, hypocotyl about 30 cm long, smooth, with somewhat rounded tip

Rhizophora mucronata



- **Bloom Period:** December-January
- **Fruit-ripening Period:** May-July
- **Sheath Collection Period:** May-July
- **Seed shape:** Cylinder
- **Habitat:** Mangrove forests; sea level. Gregarious on deep soft mud of estuaries flooded by high tides.
- **Propagation:** Direct planting of the propagules: choose the healthy mature propagules (the interval of the propagule and fruit is yellow and white, approximate length of 1 cm., yellow, or float in the water). Planting: in the plastic bag sized 5x8, ground soil mixed with soil organic fertilizer. The soil should not be too soft and beware of mold.
- **Characteristic:**
- Standing timber 20–30 m high, with numerous branching arching stilt roots. Bark brown or blackish, smoothish, with horizontal fissures.
- Leaves opposite, elliptical to oblong, 8–18 cm long, 5–13 cm wide, acute, entire, without visible veins, thick and leathery, glabrous, black-dotted beneath. Petiole 2.5-5.5 cm long. Stipules paired, leaving ring scar.
- Flower clusters axillary, 2–3 times forked, with 2–12 flowers. Bell-shaped hypanthium with 4 pale yellow, pointed leathery sepals and 4 cream-colored petals 1 cm. long. Stamens 8, stalkless, anthers 0.5-0.8 cm long, 4 opposite sepals and 4 opposite petals. Ovary half-inferior, conical, 2-celled, with 2 ovules in each cell, 2-lobed style.
- Berry ovoid or conical, brown, leathery. Seed 1, viviparous, becoming cigar-shaped, to 36-90 cm long and 1.5-3 cm in diameter

Caesalpinia crista

- **Bloom Period:** June-August
- **Seed Collection Period:** September-November
- **Seed shape:** Round
- **Habitat:** Grow in hard clay and open space area.
- **Propagation:** Growing from seeds.
- **Characteristic:**
- Nest tree 4-6 m tall, large straggling, very thorny vine. The branches are armed with hooks and straight, hard, yellow prickles
- Leaves: bipinnate, stipules foliaceous. Pinnae 2-4 pairs, leaflets 2-4.
- Flowers: pale yellow in color, in supra-axillary racemes at the top.
- Fruits: inflated pods, covered with prickles, 2.5-3 x 4-7 cm, 1-2 seeds per pod. The seeds are globular, hard, bluish grey with a smooth shiny surface.



Sonneratia caseolaris

- **Bloom Period:** August-December
- **Fruit-ripening Period:** October-February
- **Seed Collection Period:** October-February
- **Seed shape:** Round
- **Habitat:** Soft but stable mud banks low on the tidal mudflats, near the banks of tidal rivers in brackish water.
- **Propagation:** Growing from seeds; the seeds are small and should plant in the rack first, then move to the sprout bag plant.
- **Characteristic:**
 - Standing timber 20m tall, thick cone-shaped pneumatophores. Cream, grey to brown bark, slight vertical fissures bark. The bark of young *Sonneratia* is covered with a layer of wax, probably to protect it against water loss and attacks by creatures great and small. No buttresses or prop roots.
 - Leaves: Rounded, leathery, opposite, upper and underside of leaf similar.
 - Flowers: red petals, young branches that hang down like those of the weeping willow. White, pom-pom-like, open only for one night.
 - Fruits: Large (4 cm) green, leathery berries with a star-shaped base. Contains 100-150 tiny seeds that are white, flattened and buoyant.



Dolichandrone spathacea

- **Bloom Period:** All year round, but mostly in April-May
- **Fruit-ripening Period:** July-September
- **Seed Collection Period:** July-September
- **Seed shape:** Cylinder
- **Habitat:** The back-mangrove zone and banks of tidal rivers and estuaries.
- Typically found in the intertidal zone at the water's edge.
- **Propagation:** Growing from seeds in plastic bags.
- **Characteristic:**
- Small standing timber, to 4-10 m tall
- Leaves: pinnate, with terminal leaflet and 2-4 pairs of opposite leaflets, young leaves slightly pinkish.
- Flowers: bisexual, very long tubular white flowers
- Fruits: up to 60 cm long, flattened, curved like a bean pod; seeds dark grey, with thick corky wings.

