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# MANGROVES OF THE NORTHERN TERRITORY, AUSTRALIA:

## *IDENTIFICATION and TRADITIONAL USE*

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**EXTRACT: *Avicennia* (pp. 50–55)**

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## ***Avicennia***

## **VERBENACEAE**

**DERIVATION:** In honour of celebrated Arabian physician and scientist aub-Ali al-Husayn ibn-Sina (known as Avicennia) 980-1037 AD.

A genus of about 11 species worldwide, two of which occur in Australia, both are known from NT tidal areas. *Avicennia integra* is the only mangrove species that is endemic to the NT.

**DESCRIPTION:** Shrubs or trees; cryptoviviparous. Leaves simple, decussate, entire, petiolate, discolorous. Inflorescence cymose, terminal. Flowers sessile, subtended by 1 bract and 2 bracteoles. Calyx lobes 5, with quincunial aestivation. Corolla shortly tubular. Stamens epipetalous, inserted at apex of corolla tube. Ovary superior, unilocular, ovules 4, colaterally suspended on central placenta, upper ovary and style with short glandular tomentum. Capsule compressed-ovoid, fleshy, bracts and calyx persistent; dehiscing via dorsal suture. Seed solitary, embryo with 2 large cotyledons.

### **KEY TO SPECIES:**

1. Leaf apex blunt; bark brown; flower 6–8 mm diameter..... *A. integra*
1. Leaf apex acuminate; bark greenish; flower 3–4 mm diameter.....*A. marina*

## ***Avicennia integra* N.C.Duke**

## **Northern Territory Mangrove**

**DERIVATION:** The Latin 'integra' refers to the entire margins of the calyx and bracts of this species, which is unique within the genus *Avicennia*.

**DESCRIPTION:** Shrub or tree to 6 m; bark brown, smooth; aerial roots copious from stem base; pneumatophores conical, pencil-like. Leaf lamina elliptic, 5.6–14.7 x 2.1–6.0 cm, apex blunt, base cuneate; petiole 1.0–3.1 cm. Inflorescence terminal, cymose; peduncles stout, 3 mm wide; bract entire, orbicular, 8 x 7 mm, shallowly 3-lobed; bracteoles entire, broadly elliptic, 7 x 6 mm, blunt. Corolla tube 3–4 mm long, lobes 5 (–6), broadly ovate, 6 x 5 mm, obtuse, exterior of lobes and upper tube shortly tomentose. Stamens 5; filaments 2–3 mm long; anthers 1.5 mm long, basifixed. Capsule 1.5 x 2.0 cm.

**HABITAT:** *Avicennia integra* occurs on poorly consolidated muds along the margins of tidal rivers, particularly those that remain brackish for a period each year. Associates include *Sonneratia alba*, *Acanthus ilicifolius*, *Avicennia marina* and *Aegiceras corniculatum*.

**DISTRIBUTION:** *Avicennia integra* is sporadically distributed across the northern coast of the NT, and is more common in western areas of the north coast. It is the only traditional accepted mangrove species that is endemic to the Northern Territory.

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**DISTINCTIVE FEATURES:** Smooth, brown bark; conical pneumatophores and aerial roots from stem base; leaves elliptic, apex blunt; flowers orange, 6–8 mm diameter.

***Avicennia marina*** (Forssk.) Vierh.  
var. ***eucalyptifolia*** (Zip.) N.C.Duke

**Grey Mangrove**

**DERIVATION:** The Latin 'mare' means sea, and refers to the coastal habitat occupied by this species; the Latin 'eucalypti' and 'folia' (leaves) refers to the long, narrow eucalypt-like leaves characteristic of this variety.

**DESCRIPTION:** Shrub or tree to 15 m, erect or spreading; bark smooth, green-grey mottled; pneumatophores pencil-like, erect. Leaf lamina lanceolate to ovate, 5.4–11 x 1.8–3.5 cm, apex acuminate, base attenuate; petiole 1.2–2.5 cm. Peduncle rigid, angular, 1.5 mm wide; bract deltoid, 1 mm long, blunt; bracteoles deltoid, 0.7 mm long, blunt. Calyx lobes ovate, 2 mm long, blunt. Corolla tube 1.5 mm long; lobes 4(5), ovate, 1 mm long, blunt. Stamens 4(5), anthers sessile, 1 mm long. Style stout, 1.5 mm long; stigma inconspicuously 2-lobed. Capsule 1.5 x 2.0 cm.

**HABITAT:** Capable of colonising many tidal habitats, *A. marina* is one of the most ubiquitous members of the tidal flora. *A. marina* may be found in association with most other mangrove species, on a variety of substrate types. It may also form monospecific stands. Wells (1982) notes *A. marina* withstanding salinities up to 83 ppt, and freshwater inundation of 1 m depth for up to 3 months of the year.

**DISTRIBUTION:** Widespread and common around the NT coastline, this species occurs in all Australian states except Tasmania. Extra-Australian distribution encompasses Africa, Asia, South America and New Zealand. Refer to notes section for the distribution of *A. marina* var. *eucalyptifolia*.

**ETHNOBOTANY:** *Avicennia marina* is widely and variously used by Aboriginal groups in the coastal areas of the NT.

The fruit may be roasted in hot ashes and then eaten, but this food source is rarely used now being more important in the past. The roasting removes the bitter taste from the fruit. This use is reported by Tiwi (Puruntatameri et al. 2001), Anindilyakwa (Levitt 1981), Nunggubuyu (Hughes 1971, Heath 1980), Emi and Batjamal (Smith & Wightman 1990) and Djambarrpuyngu (Wightman & Smith 1989) people in the Top End. It is also reported by various groups in other parts of Australia (e.g., Cribb & Cribb 1981, Smith & Kalotas 1985). Marine turtles are also known to eat the fruit (Galpagalpa et al. 1984).

Several edible animal species are associated with *Avicennia marina*. Mangrove worms (*Bactronophorus thoracites* and *Bankia australis*) are found in the wood and are considered excellent food by most Aboriginal groups, but are thought inedible by some groups. Native bees make hives, which contain honey, pollen

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and wax, in this tree and possums can also be found in the hollow trunks (Levitt 1981, Davis 1984, Galpagalpa et al. 1984). Edible witchetty grubs may also be found in the wood (Galpagalpa et al. 1984).

The leaves may be used to flavour mussels when they are being cooked prior to eating (Levitt 1981).

*Avicennia marina* is also widely used for medicinal purposes. Djambarrpuyngu people from Milingimbi rub the pale, inner bark onto stingray stings to relieve the pain and help heal the wound, some of the bark may also be eaten for the same affect (Wightman & Smith 1989, Aboriginal Communities of the NT 1993). Alternatively some of the bark may be chewed and applied with saliva onto stingray stings (Smith 1991).

Rirratjingu people burn the old, dry wood to ash and charcoal, and this is mixed with seawater to form a paste which is applied to ringworm infections, boils, skin sores and other skin conditions (Aboriginal Communities of the NT 1993, Yunupingu et al. 1995, Smith 1991). Djambarrpuyngu people take leaves from near the base of the trunk and chew them, the juice and saliva is applied to stings from stone fish or stingrays to relieve the pain (Aboriginal Communities of the NT 1993).

Tiwi people boil the green bark and leaves. When it is cool it is washed over skin sores and leprosy. It dries the sores and assists in healing (Puruntatameri et al. 2001).

Mayali people consider the timber to be good firewood (Russell-Smith 1985), while Djambarrpuyngu people prefer this wood for cooking tubers of *Tacca leontopetaloides* (Galpagalpa et al. 1984). The timber is considered excellent firewood by Iwaidja speakers and has long lasting coals, while the fruit were used as medicine in the past (Blake et al. 1998).

Djambarrpuyngu use the fresh green leaves to signal neighbours, the leafy twigs produce a lot of grey smoke (Smith 1991).

Ngaliwurru and Jaminjung people have no specific use for this plant and the name, mammurru, can be used for mangroves in general (Wightman unpubl. notes).

Larrakia people consider this species an excellent place to find mangrove worms (*Bactronophorus thoracites*), the term moerlma can refer to mangroves in general (pers. obs.).

Sharpe recorded the fruit being eaten by Alawa and Mara people (Sharpe 2001). Flowering signals that green turtles are coming close to shore to feed (Heath 1980).

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## Recorded Aboriginal language names

Andjunggurruk (Mayali)	Lhalgurr / Rlirral (Nunggubuyu)
Mungunmungun (Djambarrpuyngu)	Mandoorrk (Kunwinjku)
Manyarr [tree], Nayawuda [fruit] (Djambarrpuyngu)	Manyarr (Gupapuyngu)
Manyarr (Rirratjingu)	Manyarr (Yolngu Matha)
Mammurru (Jaminjung)	Mirirrwin (Batjama)
Mulawurungkwurra (Anindilyakwa)	Thinbir (Emi)
Artama [tree], Pupwurrupwani [pneumatophores] (Tiwi)	Moerlma (Larrakia)
Marrawarra (Iwaidja)	Mammurru (Ngaliwurru)
Gurdjbal (Alawa, Mara)	Ma-warnjarrngu (Yanyuwa)

In New Zealand, *Avicennia marina* var. *australasica*, has been used for a variety of purposes by Maori people (Crisp et al. 1990), including as a good place to collect shellfish and to trap and hunt fish, the wood was used as firewood, but not for smoking fish. The mangrove mud darkened by the mangrove leaves was used to dye fibrecrafts made from kiekie (*Freycinetia baueriana*) and harakeke (*Phormium tenax*). The roots were used to make a mallet-like tool for pounding fern roots in preparation for eating.

In China, *A. marina* var. *marina*, salted seeds are eaten as a breakfast food (Chang & Peng 1987), while in the Philippines it is a source of pollen and honey (Jara 1987). The leaves are used as fodder in Indonesia (Soegiarto & Soemodihardjo 1987) and in Pakistan (Tirmizi 1987), in Pakistan it is also used for fishing poles and tannin. The powdered leaves and twigs are used to treat bone fractures in Sumba, Indonesia (Astuti et al. 2001), and the timber is used to make machete handles and for construction.

In Vietnam the timber from large trees is made into planks and these are used to build houses, the leaves are used as fodder especially for goats and also as a green fertiliser that helps protect crops from diseases and parasitic fungi (Hong & San 1993); in times of hardship the fruit can be eaten.

**DISTINCTIVE FEATURES:** Smooth greenish bark; pneumatophores pencil-like; leaves bifacial, lanceolate to ovate, apex generally pointed; flowers orange, 3–4 mm diameter.

**GENUS NOTES:** *Avicennia marina* flowers from October to February, fruit appear from January to March; *A. integra* flowers from October to December and fruits in December and January.

The small, dark orange flowers of *A. marina* produce a strong rotten fruit odour, which may be noticed some distance from the tree. Large populations of *A. marina* produce a noticeable odour when in flower, for example, the Rapid Creek area near Trower Road in Darwin's northern suburbs (C. Dunlop pers.com.). *A. integra* has larger, paler flowers which have a weak, sweet scent. Both species produce nectar in reasonable quantities and bees and other small flying insects have been observed visiting *A. integra* flowers. Tomlinson (1986) notes a degree of protandry in *Avicennia* spp., which restricts self-pollination.

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Fruit of both species are eaten by ants (*Polyrhachis* sp.) A narrow line of flesh along the dorsal suture is eaten, which may expedite unfolding of the cotyledons.

The timber of *Avicennia marina* has distinctly cross-hatched grain pattern which is especially obvious in dead wood that has begun to deteriorate.

The taxonomy of *Avicennia* is complex and has been confused in the past. *Avicennia integra* was relatively recently described as a new species (Duke 1988); previously it was confused with *A. officinalis*.

The occurrence of *Avicennia integra* is important for two reasons. Firstly, it is the only traditionally accepted mangrove species recognised to be endemic to Australia, and in fact the Northern Territory. And secondly, its distribution does not include the floristically rich mangrove areas of north-east Queensland (Duke 1988).

*Avicennia marina* has had a confused nomenclatural history, many workers applying varietal names to different entities. Analysis of allozyme variation within the genus by Duke (1991) has clarified the intraspecific variation within the species, though more genetic research is needed to clearly determine taxonomic boundaries and geographic ranges. However, all NT populations are *A. marina* var. *eucalyptifolia* (Zip.) N.C.Duke, which occurs in north Australia from Wyndham, Western Australia to Mackay, Queensland and also appears to occur from the southern Philippines and western Indonesia to the south-western Pacific Islands (Duke 2006).

References: Duke 1988, 1990, 1991 and 2006.

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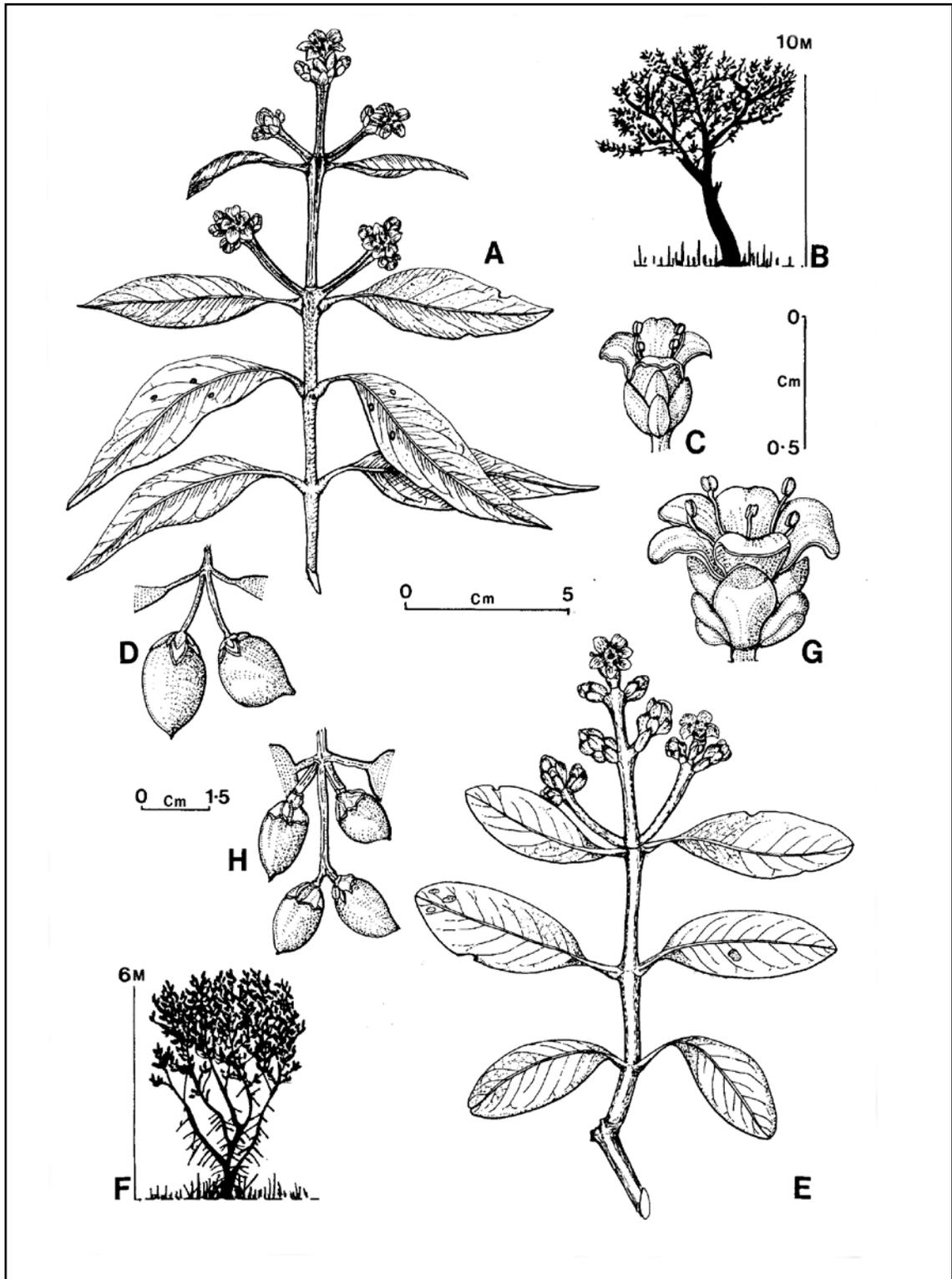


Figure 14. *Avicennia*. A–D, *A. marina*. A, flowering branch; B, habit; C, flower; D, fruit (M. Parker 688 & G. Wightman 821, DNA). E–H, *A. integra*. E, flowering branch; F, habit; G, flower; H, fruit (G. Wightman 822 & G. Wightman 976, DNA).