

## The Button Mangrove *Conocarpus erectus* (Combretaceae) is naturalised in Western Australia

Greg J. Keighery<sup>1,2</sup> and Vicki Long<sup>3</sup>

<sup>1</sup>Department of Primary Industries and Regional Development,  
Locked Bag 4; Bentley Delivery Centre, Western Australia, 6983

<sup>2</sup>Research Associate, Western Australian Herbarium, Biodiversity and Conservation Science,  
Department of Biodiversity, Conservation and Attractions,  
Locked Bag 104, Bentley Delivery Centre, Western Australia, 6983

<sup>3</sup>Vicki Long and Associates, P.O. Box 713, Karratha, Western Australia, 6714  
Corresponding author: bjkeighe@it.net.au

### SHORT COMMUNICATION

*Conocarpus* L. (Combretaceae) comprises two species of tall shrubs to small trees. *Conocarpus lancifolius* Engelm. is native to and restricted to seasonal rivers and coastal sites around the Red Sea from Somalia to Yemen, and coastal riverine sites in southern Asia (Thulin 1993). *Conocarpus erectus* L. is native to coastal sites in southern Florida, Bermuda, the Bahamas, the West Indies and Mexico, as well as the Atlantic coast of Brazil, the Pacific coast from Mexico to Peru including the Galapagos Islands, and the west coast of Africa from Senegal to the Democratic Republic of the Congo (Barwick 2004). Both species are widely planted throughout the Middle East, Africa and south-west Asia.

*Conocarpus erectus* (Button Mangrove or Button Wood) is a dense, multi-trunked shrub or tree to 20 m high that normally grows in brackish water and tidal lagoons but is sometimes found in inland riverine areas in Central America. It has two currently recognised named forms, the Green Buttonwood (var. *erectus*), which has hairless to sparsely hairy leaves, and the Silver Buttonwood (var. *sericeus* Fors ex DC.), which has densely hairy, silver leaves. Both have been widely cultivated as medicinal, ornamental and reclamation plants, especially in India and the Middle East (Barwick 2004).

In its native habitat, *C. erectus* appears to occupy the zone between the mangrove species inundated by salt water and the dry land behind. In cultivation, it thrives on dry soils (away from indigenous mangroves), calcareous clays with a high, brackish water table, and poor sandy soils. Established plants are very drought tolerant and can form extensive thickets by sprawling and rooting where stems touch the ground; even large stems broken by cyclones and floods are capable of rooting on damp ground (Barwick 2004). Plants bear wind pollinated flowers that can produce a large number of small seeds (7,441–23,267 seeds/m<sup>2</sup>) that are wind and water dispersed, with plants flowering and fruiting throughout the year (Hernandez & Lanza Espino 1999).

### *Conocarpus* in Western Australia

Button Mangrove was probably introduced into Western Australia as part of the North-West Tree Scheme, a State government initiative that aimed to ‘Green the North’. The scheme encouraged widespread planting of trees and other plants in private gardens and reserves and along streets to provide plant

stock suitable for the North-West, control dust and increase shade in the growing population centres of the north. To undertake this initiative, the Broome Tree Nursery was established in the 1960s by the Department of the North-West. The nursery obtained many tropical plants as seeds from overseas and gave away thousands of plants, including native species, citrus trees and tropical fruit trees (Department of Planning, Lands and Heritage 2017-2021).

Material of both species have been imported from overseas into Australia, for many years. For example, the Queensland Acclimatisation Society imported seeds of *Conocarpus* in 1881 (The Queenslander, Brisbane; 17 September 1881, p. 372) and *C. lancifolius* was well established at Woomera and 16 metres tall by 1951 grown from seeds imported from Somalia ('Strangers' settle in Rocketland, Melbourne Herald, 21 February 1951). The town of Karratha, established in 1971, had many shade and amenity trees planted during establishment and subsequently (Edgecombe 1983). No doubt *Conocarpus* was supplied to Karratha as part of the North-West Tree Scheme in the 1970s, either from Australian or overseas material. After searching known collections of ephemeral literature we have been unable to locate any early lists of trees circulated by the Broome Nursery or any records of what seeds were imported or what was planted around Karratha. Broome Nursery lists for 1979, 1984, 1985, 1986 and 1990 were located but *Conocarpus* is not mentioned.

In 2018, one of us (VL) noticed that an unusual, non-native tree species was spreading in creeklines around Karratha and requested that the shire remove the individuals. Subsequently, a naturalised occurrence of over 50 *Conocarpus* plants in a semi-saline creekline was discovered (Figure 1) and vouchered by Jennifer Green (DPIRD, PERTH 09363475). We have identified this material as *C. erectus* due to the presence of salt glands (Figure 2) on the leaf petiole, which are absent in *C. lancifolius* (Barwick 2004; EfloraofIndia 2007-; Hegozy *et al.* 2008), and have assigned it to var. *erectus* on account of its glabrous leaves. Interestingly, soft sparsely hairy to glabrous leaved populations of this variety have been recorded by Semple (1970) from West Tropical Africa and the Atlantic and Pacific coasts of North and South America, suggesting the two varieties may intergrade.

Interestingly, *Conocarpus* is not listed as a permitted genus for importation to Western Australia (Department of Primary Industries and Regional Development 2021). Under the Biosecurity and Agricultural Management Act, all non-native plant species are regarded as an unlisted (s14) organism that are not permitted entry to Western Australia. They must be assessed for weed risk before being permitted for entry (Department of Primary Industries and Regional Development 2021). A current weed risk assessment of *C. erectus* would have denied importation of this species.

Currently there are two specimens of *C. erectus* naturalised in creeks around Darwin at the Northern Territory Herbarium from 2008 and 2010 (Wirf, 539 & Westaway, 3411). There is also a cultivated specimen from Derby, collected in 1999 (Mitchell, 5681), which was determined as *C. lancifolius* (this requires validation).

Button Mangrove has escaped from plantings in Hawaii on the islands of Oahu, Maui, Kauai and the Midway Atoll (Lorence & Flynn 1997; Allen 1998; Wagner *et al.* 1999; Starr & Starr 2008). It has also been recorded as naturalised in Kiribati (Fosberg & Stoddart 1994). Hawaii had no mangroves until 1902 when Red Mangrove (*Rhizophora mangle* L.) was introduced to stabilise mud flats on Oahu. Since then, five mangrove species have been imported and three (*C. erectus*, *Bruguiera gymnorhiza* (L.) Lam. and *R. mangle*) have become naturalised (Allan 1998). Button Mangrove has negative impacts on archaeological sites (fishponds), colonises habitats to the detriment of native Hawaiian species (especially waders and endemic fish), invades *Hibiscus tiliaceus* L. forests and mudflats, and



Figure 1: *Conocarpus erectus*. A – flowers and fruits; B – typical low dense shrub along Jennifer Creek, Karratha. Voucher: L. Martin 1. Image: V. Long.



Figure 2: *Conocarpus erectus* leaves showing salt glands on petiole and green glabrous lamina. Image: V. Long.

causes serious drainage issues. It is listed as a highly invasive species by the Hawaiian State Alien Species co-ordinator and it is recommended that it is not grown anywhere in Hawaii (Randall 2017).

The recording of a weedy mangrove in northern Western Australia is alarming since there are large areas of potential habitat from Carnarvon to the Kimberley for this species to invade. Although the potential impact of this species in Western Australia is unknown, it would be wise not to find out. Every effort to eradicate this population should be undertaken before it can spread further.

### Acknowledgments

Constructive comments by Juliet Wege greatly improved the flow and information in this paper.

### References

- Allen, J.A. (1998). Mangroves as alien species: the case of Hawaii. *Global Ecology and Biogeography Letters* 7(1): 61–71.
- Barwick, M. (2004). *Tropical and Sub-Tropical Trees-A Worldwide Encyclopaedic Guide*. (Thames and Hudson: London.)
- Department of Planning, Lands and Heritage (2017–2021). Our heritage places number 26330. <http://inherit.stateheritage.wa.gov.au> [Accessed 8 July 2021].
- EfloraofIndia (2007–). Database of Plants of the Indian Subcontinent. <https://efloraofindia.com/> [Accessed 20 September 2021].
- Edgecombe, W. (1983). Pilbara gardens for functional beauty. *Landscape* 28: 3–9.
- Fosberg, F.R. & Stoddart, D.R. (1994). Flora of the Phoenix Islands, central Pacific. *Atoll Research Bulletin* 393: 1–60.

- Hegozy, S.S., Aref, I.M., Al-Mefrarrej, H. & El-Juhany, L.I. (2008). Effects of spacing on the biomass production and allocation in *Conocarpus erectus* L. trees grown in Riyadh, Saudi Arabia. *Saudi Journal of Biological Science* 15: 315–322.
- Hernandez, C.T. & Lanza Espino, G. de la (1999). Ecología, producción y aprovechamiento del mangle *Conocarpus erectus* L., en Barra de Tecoaapa Guerrero, Mexico. [Ecology, production and use of the mangrove *Conocarpus erectus* L. from Barra de Tecoaapa Guerrero, Mexico.] *Biotropica* 31: 121–134.
- Lorence, D.H. & Flynn, T.W. (1997). New naturalized plant records for Kaua'i. *Bishop Museum Occasional Papers* 49: 9–13.
- Randall, R.P. (2017). *A Global Compendium of Weeds*, Third Edition. (R.P. Randall: Perth, Western Australia.)
- Semple, J. (1970). The distribution of pubescent-leaved individuals of *Conocarpus erectus* (Combretaceae). *Rhodora* 72: 544–547.
- Starr, F. & Starr, K. (2008). Botanical survey of Midway Atoll. Prepared for: United States Fish and Wildlife Service.
- Thulin, M. (1993, updated 2008). *Flora of Somalia*, Vol.1. (Royal Botanic Gardens, Kew: London.)
- Wagner, W.L., Herbst, D.R. & Sohmer, S.H. (1999). *Manual of the flowering plants of Hawai'i*. Revised Edition, Bernice P. Bishop Museum special publication. (University of Hawai'i Press/Bishop Museum Press: Honolulu.)
- Department of Primary Industries and Regional Development (2021). *Western Australian Organism List*. <https://www.agric.wa.gov.au/organisms> [Accessed 19 October 2021].

