



### First substantiated record of *Ceriops decandra* (Rhizophoraceae) in Sri Lanka

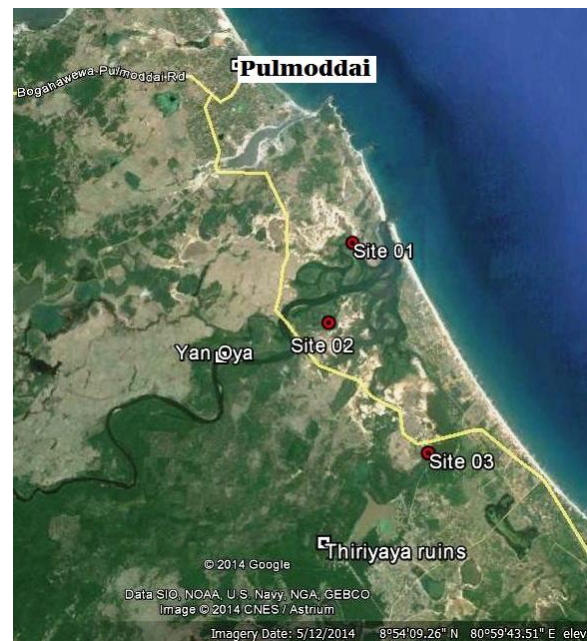
In Sri Lanka there are 20 true mangrove plant species and Rhizophoraceae is the most diverse family represented by six species (Jayatissa *et al.*, 2002). Of these the genus *Ceriops* Arn., has five: *C. australis* (C.T. White) Ballment, T.J. Sm. & J.A. Stoddart; *C. decandra* (Roxb. ex Wight & Arn.) W. Theob.; *C. pseudodecandra* Sheue, H.G. Liu, C.C. Tsai & Yuen P. Yang; *C. tagal* (Perr.) C.B. Rob.; and *C. zippeliana* Blume.

Trimen (1894), Abeywickrema (1960), Macnae & Fosberg (1981), De Silva & Balasubramaniam (1984–85), Jayewardene (1986), Pinto (1986), Rao (1987), and De Silva & De Silva (1998, 2006) have listed *C. decandra* as a member of the Sri Lankan mangrove flora, while Arulchelvam (1968), CCD (1986), Nanayakkara (1986), Pemadasa (1997), Jayatissa *et al.* (2002), Ranawana & Prasanna (2007), and Prasanna (2008) have not mentioned it in their lists of Sri Lankan mangrove species.

None of those accounts of *C. decandra* has been substantiated by a reference to an herbarium specimen. Literature survey shows that the listing of this species in the Sri Lankan flora has been based on anecdotal evidence or other unclear sources. The earliest record by Trimén (1894) mentions its occurrence in Koddigar Bay (Trincomalee District) based on verbal information and no specimen was seen by the author. Consultation of the National Herbarium in Peradeniya (PDA) confirmed that no specimen has been collected in Sri Lanka. Jayatissa *et al.* (2002) have attempted to resolve the issue by way of reviewing the relevant literature on *Ceriops* in Sri Lanka, herbarium surveys and repeated field exploration for collection of voucher specimens from previous site records. The study concluded that *C. tagal* is the only *Ceriops* species represented in the Sri Lankan flora and that the previous listings of *C. decandra* for Sri Lanka was due to errors in

identification and a wrong interpretation of floral photographs. However, that study excluded the northern and eastern parts of the country where most of dry zone mangroves occur.

When conducting botanical field surveys in the mangrove forests of the Pulmoddai Lagoon area (8°54'50.27"N, 81°00'39.80"E), Trincomalee District, in the previously neglected north-eastern part of the country, we discovered a small population of *C. decandra*. Further detailed exploration of the area showed that the species occurs in three sites as small, isolated and scattered populations intermixed with other mangrove plants (Fig. 1).



**Figure 1:** The distribution of *Ceriops decandra* in Sri Lanka (source: Google earth, 2014).

**Site 1:** Located at 8°54'50.27" N, 81°0'39.80" E; 54 individuals above 1.5 m in height were found growing within a 1–2 m × 30 m linear area, flanked by *Rhizophora mucronata* Poir. (towards the water's edge of the lagoon) and *Avicennia marina* (Forssk.) Vierh. on the landward side. Fruiting was observed in 18 individuals. The foliage of most of the plants was damaged due to browsing by goats.

**Site 2:** Located at 8°54'5.80" N, 81°0'27.40" E; five individuals (two fruit bearing mature plants and three juvenile plants) above 1.5 m height were located by the side of a narrow canal intrusion of the lagoon. Plants were widely spaced along a linear strip of 1 × 25 m and were always associated with large trees (12 m) of *R. mucronata*.

**Site 3:** Located at 8°52'59.30" N, 81°1'19.60" E; 57 individuals above 1.5 m height were located within an area of 25 m × 25 m. Among them 34 mature plants were fruit bearing. They were inter-mixed with *Bruguiera gymnorhiza* (L.) Savigny, *Excoecaria agallocha* L., and *Lumnitzera racemosa* Willd.

Agro-ecologically the area is located in DL1d mini-ecological zone and identified as a severe drought prone area (Chithranayana & Punyawardena, 2008). As per local informants, the lagoon receives a huge amount of water from the seasonal river Yanoya during the November–January period, thus becoming seasonally hyposaline. The substratum is rich with alluvial deposits of silt and clay. Under such ecological circumstances, *C. decandra* in observed sites, grows as a minor floristic component of the mangrove understory.

Poor regeneration was observed in sites 1 and 2, while in site 3 the occurrence of seedlings and saplings (below 1.5 m height) was appreciably higher as per visual estimates. Specimens with reproductive and vegetative parts were collected and made into herbarium specimens. The specimens (Y21, Y23) have been deposited in PDA. In the absence of reference herbarium specimen in PDA the identification was entirely based on Hou (1958) and Sheue *et al.* (2009, 2010). Extra care was taken in differentiating *C. decandra* from two other morphologically similar species (*C. zippeliana* and *C. pseudodecandra*). However, the prominent field character, the blunt apex of the hypocotyl, easily sets it aside from the two others which have hypocotyls with acute apices. So far, *C. zippeliana* and *C. pseudodecandra* have not been recorded for the south Asian region. *Ceriops decandra* is distributed in India and Bangladesh and through Myanmar to southeastern Thailand (Sheue *et al.*, 2009, 2010) and Langkawi of Malaysia (Wan Juliana *et al.*, 2014).

**Taxonomy:** *Ceriops decandra* (Roxb. ex Wight & Arn.) W. Theob., in Mason, *Burmah*, ed. 3, 2: 480. 1883; Ding Hou, *Fl. Males.* I, 5: 471. 1958, excl. *C. zippeliana* Blume, isonym; Mabberley, *Taxon* 34: 154. 1985. —*Rhizophora decandra* Roxb. [Hort. Beng.: 36. 1814, nomen] ex Wight & Arn., *Prodr.*: 311. 1834; ex Griff., *Not. Pl. Asiat.* 4: 663. 1854, isonym. —*Bruguiera decandra* (Roxb. ex Wight & Arn.) Griff., *Trans. Med. Soc. Calcutta* 8: 10. 1836. —*Ceriops roxburgiana* Arn., *Ann. Mag. Nat. Hist.* 1: 364. 1838, nom. superfl. —Lectotype: Roxb. *Icon. Ined.* 1140 (K, holo; CAL), designated here.

**Diagnostic description:** Shrub or small tree, 2–5 m tall; bark light-gray, peeling off into thin flakes, stilt roots developed at base. Leaves oval to obovate, 4–9 cm × 2.5–6 cm, apex obtuse, rounded to emarginate, base obtuse to cuneate, lateral veins 8–10 (–11) pairs; petiole 1.2–1.8 cm long. Stipules 1.2–2.4 cm, style 2.5–3.0 mm long, stigma 1, very shortly trifid. Persistent calyx tube hemi-globular, 5–9 mm in height, persistent lobes 5, 4 mm × 1.6–2.0 mm, ascending. Fruit ovoid, 0.6–1.0 cm × 0.5–0.6 cm. Hypocotyl clavate, 8–13 cm × 0.5–0.7 cm, ridged and sulcate, width approximately the same, slightly tapering towards a blunt apex (root tip), erect to pendant; epicotyl 2–3 mm long.

The visual aspects of *C. decandra* in Sri Lanka are shown in Figs. 2–5. The present collections from the mangroves of Pulmoddai are the first record of *C. decandra* for Sri Lanka. Currently, these populations are under severe threat of human pressures caused by habitat disturbance, extractive practices and browsing of the plant by goats. Therefore, it is proposed that appropriate effective protection mechanisms are required to be put in place at this biologically sensitive mangrove site. The conservation status of *C. decandra* is categorized as a nationally Critically Endangered (CR) species under the IUCN Red List (MOE, 2012).

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## PLATE 14



**Figure 2:** Fruiting shoot of *Ceriops decandra*.



**Figure 3:** Close up view of ridged and sulcate hypocotyls tapering to blunt apices.

# PLATE 15



**Figure 4:** Flowering shoot of *Ceriops decandra*.



**Figure 5:** Habitat of *Ceriops decandra* (Note the heavily browsed shoots).