

Short Communication:
**Note on *Excoecaria indica* (Willd.) Muell.-Arg, 1863 (Euphorbiaceae),
from the Andaman and Nicobar Islands, India; a data deficient species**

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Abstract. Ragavan P, Ravichandran K, Mohan PM, Sxaena A, Prasanth RS, Jayaraj RSJ, Saravanan S. 2015. Note on *Excoecaria indica* (Willd.) Muell.-Arg, 1863 (Euphorbiaceae), from the Andaman and Nicobar Islands, India; a data deficient species. *Biodiversitas* 16: 22-26. *Excoecaria indica* (Willd.) Muell.-Arg was recorded from Middle Andaman and Great Nicobar Island representing a new addition to the mangrove flora of the, Andaman and Nicobar islands. This species is characterized by its thorny trunk, crenulate-lanceolate leaves and cherry-sized green fruits containing three seeds. Information about *E. indica* is inadequate, and it is recognized as data deficient species. Further studies and conservation measures are imperative for managing the mangrove diversity of the islands with regards to this species.

Key words: Andaman and Nicobar Islands, *Excoecaria*, India, new records.

INTRODUCTION

Mangrove forests are unique plant communities of the critical interface between terrestrial, estuarine, and near-shore marine ecosystems in tropical and subtropical regions (Polidoro et al. 2010; Hanum et al. 2013). Despite its ecological and economical values, globally mangrove areas are disappearing at the rate of approximately 1% per year (FAO 2003, 2007). The mangroves of Andaman and Nicobar (A & N) Islands are probably the best in India in terms of its density and growth (Mandel and Naskar 2008, Dagar et al. 1991). According to the latest estimate by the Forest Survey of India (Anon. 2013), the total mangrove area is about 4,628 km² in India, out of which, 604 km² occur in A & N Islands. Out of this 601 km² is in Andaman and only 3 km² found in Nicobar Islands. Total 13 km² area of mangrove stands has degraded as a consequence of massive earthquake and subsequent tsunami of 2004 in Andaman Islands in comparison with 2011 (Anon. 2013). However, after the tsunami distribution of some mangrove species, not recorded earlier in ANI, are reported (Dam Roy et al 2009; Nehru and Balasubramanian 2012; Goutham-Bharathi et al. 2012; Ragavan et al. 2014). The present study also adds the new distributional record of *Excoecaria indica* (Willd.) Muell.-Arg from this island.

The tropical indo-pacific genus *Excoecaria* L. belongs to the family Euphorbiaceae Juss., and includes several mangrove representatives (Duke 2006). It is distinguished

from related genera by a combination of characters including dioecious condition, axillary inflorescences, male flowers with 3 stamens, and the absence of a caruncle from the seed (Tomlinson 1986). The genus includes up to 40 species in the Indo-west pacific region, from tropical Africa and Asia to the western pacific. Two species occur in mangroves, including *Excoecaria indica* (Willd.) Muell.-Arg and *Excoecaria agallocha* L. In India *E. indica* is rare, classified as critically endangered (Kathiresan 2008) and known to occur only in Sundarban and Kerala (Kathiresan 2008). *E. indica* is categorized by the IUCN as data deficient (Polidoro et al. 2010), due to lack of adequate information. In contrast, *E. agallocha* is abundant, known to occur on both east and west coasts of India except Gujarat and it is among the mangrove species which is considered to be in the IUCN category of lesser risk (Kathiresan 2008). Though Goel and Chakrabarty (1990) reported the occurrence of *E. indica* from Andaman Islands, its occurrence was not reliable as other authors like Dagar et al. (1991) and Kathiresan (2008) reported that *E. indica* was not found in ANI. Moreover, authentic herbariums are not available for the occurrence of *E. indica* in ANI. Recent floristic surveys revealed the occurrence of *Excoecaria indica* from Middle Andaman and Great Nicobar Island, which we report herein as a new distribution record in the ANI along with a detailed taxonomical description as follows.

TAXONOMIC TREATMENT

Key to *Excoecaria* species in ANI

1. Leaf margin serrated, bark smooth, trunk with thrones, monoecious, fruits rounded with three seeds *E. Indica*
2. Leaf margin entire to wavy, bark fine fissured with lenticels, dioecious, fruits three lobed *E. agallocha*

Description

Excoecaria indica (Willd.) Muell.-Arg.

Excoecaria indica (Willd.) Muell.-Arg, Airy Shaw, H.K., The Euphorbiaceae of Borneo. Kew Bulletin Additional Series IV, Her Majesty's Stationary Office, London, 245 pp. (1975); Aksornkoae, S. Ecology and Management of Mangroves. IUCN Wetlands Programme. IUCN, Bangkok, Thailand, 176 pp. (1993); Heyne, K. De Nuttige Planten van Indonesië. Publishers W. vanHoeve, TheHague/Bandung, 2 volumes, 1660 pp. & CCXLI. (1950); Ng, P.K.L and Sivasothi, N. eds. A guide to the Mangroves of Singapore. Volume 1. The Ecosystem and Plant Diversity. Singapore Science Centre, Singapore, 160 pp. (1999); Tomlinson, P.B. The Botany of Mangroves. Cambridge University Press, Cambridge, U.K., 419 pp. (1986). (Figure 1).

Tree 10-15m, high with upright branches and more or less drooping twigs; thorny trunk without buttress; bark fissured; greyish brown in colour; no above ground roots. Leaves simple, alternate, elliptic or lanceolate, 7-14 x 3-4 cm, base obtuse, margins conspicuously serrate, apex sub-acuminate to acuminate with two small glands at the base of the blade; lateral veins 18-24; petiole 7-20 mm long and reddish. Inflorescences solitary, raceme-like, to 10 cm, axis pilose, petal absent; flowers unisexual, male or staminate flowers are numerous with 3 prominent stamens; stamen filaments 0.5-0.6 mm at anthesis, nearly absent in bud; anthers 0.4-0.5 mm; female or pistillate flowers are 1 or 2; solitary with 3 long styles; styles ca. 1.5 mm; stigmas 4-6 mm. Fruit is a round, woody capsule, 2.5-3 cm in diameter, green; black when dries, 3-seeded. Fruit stalk 8-22mm. Seeds 11-13 by 7-8.5 mm, keeled on the back, medium to pale brown, not spotted, without caruncle.

Distribution. From south and east India throughout Southeast Asia to the Solomon Islands. In Southeast Asia so far not (yet) recorded in the Philippines. In India it was known from west Bengal and Kerala In this study it was recorded first from ANI at Panchwati and Campbell bay.

Habitat and ecology. The distribution and habitat ecology of *E. indica* is poorly known. Generally it is known to occur in primary *Nypa* forest in sea water, tidal river banks and sea shores (Giesen et al. 2006) and in primary and advanced secondary forests of swampy and seasonally inundated places (Esser 1999). Also occurs in freshwater swamp forests, along rivers and in evergreen lowland forest up to an altitude of 250 m.

Phenology. Flowering: March to June; Fruiting: July to October.

Specimen examined. India, Middle Andaman, Rangat, Betapur (92°57'39.7" E, 12°34'31.3"N) 6/9/2013 P.Ragavan (s n 30758PBL). 16 trees were observed in the

muddy soil, along the tidal creek on the landward margin of mangroves in association with *Heritiera littoralis*, *Sonneratia griffithii* and *Dolichandrone spathacea*.

Excoecaria agallocha L.

Excoecaria agallocha L.; Linnaeus, C. von, Systema Naturae ed. 10: 1288 (1759). Type: Tropical Asia, Malaya and Pacific Islands. Ng, P.K.L and Sivasothi, N. eds. A Guide to the Mangroves of Singapore. Volume 1 The Ecosystem and Plant Diversity. Singapore Science Centre, Singapore, 160 pp (1999). (Figure 2)

Tree up to 10-15m high, columnar or spreading, mutli-stemmed, dioecious, deciduous; bark grey, rough, fissured on maturity, pustular with lenticels. Stem simple, occasionally slight buttresses. Root above ground, serpentine like. Leaves simple, alternate, elliptic, green, apex acute to acuminate, base cuneate, margin variably serrate to entire, 5-15cm L, 2-6cm W, L/W ratio is >2; petiole green, terete 1-3.5cm L, 0.2cm W. Inflorescences axillary; male inflorescence 5-10cm L, flowers arranged spirally with bract, calyx lobes 3; stamens 3, yellow, 0.3-0.5cm L, pistillode absent; Female inflorescence 2-4cm L, peduncle 0.5cm L, bract glandular, basal bracteoles 2, calyx lobes 3, staminodes absent, ovary tri-locular; styles 3, 0.3cm L. Fruit 3-lobed capsule, 1-1.5cm W, green becoming brown on maturity, three seeded; seeds are rounded, black or dark brown, streaked, up to 0.5cm W.

Distribution. Occurs in the Asian tropics, from India and Sri Lanka throughout Southeast Asia, to southern China, Taiwan, Southern Japan, Australia and the west Pacific. Except Gujarat it was known to occur in other places. In ANI it was recorded from both Andaman Islands and Nicobar islands.

Habitat and Ecology. It is commonly found on the landward margin of mangroves but in Andaman Islands this species was observed from downstream to upstream estuarine position and mid and high intertidal regions. Like other common mangrove species this is also flooded by tidal fluctuations.

Phenology. Flowering: June to August; Fruiting: September to November.

Specimen examined. India, Middle Andaman, Rangat, Betapur (92°57'39.7" E, 12°34'31.3"N) 6/9/2013 P.Ragavan (s n 30935 & 30936PBL).

Discussion

Both *E. indica* and *E. agallocha* are characterized with simple leaves, absences of petals, trilocular ovary with 1 ovule per loculus, inarticulate laticifers with white latex, and biglandular bracts on the inflorescences (Tomlinson 1986). However, *E. indica* is distinguished from *E. agallocha* by its thorny trunk, crenulate-lanceolate leaves and green fruits the size of cherry with three seed (Duke 2006) and most importantly *E. indica* is monoecious whereas *E. agallocha* is dioecious (Table 1). Though it is native to India, Biswas et al. (2007) categorized it as a weed with potential environmental impacts to the Sundarbans because it accumulates allelopathic toxins in the soil, affecting biota, including poisoning of animals. The present record of *E. indica* from Andaman and Nicobar



Figure 1. *Excoecaria indica*. A. Habitat, B. Lanceolate leaves with serrated margin, C. Characteristic thorny trunk, D. Cat-kin like inflorescences, E. Male flowers, F. Female flower, G. Small green globose fruit, H. Mature fruit black in color, I. Cross section of fruit showing three locus arrangement.

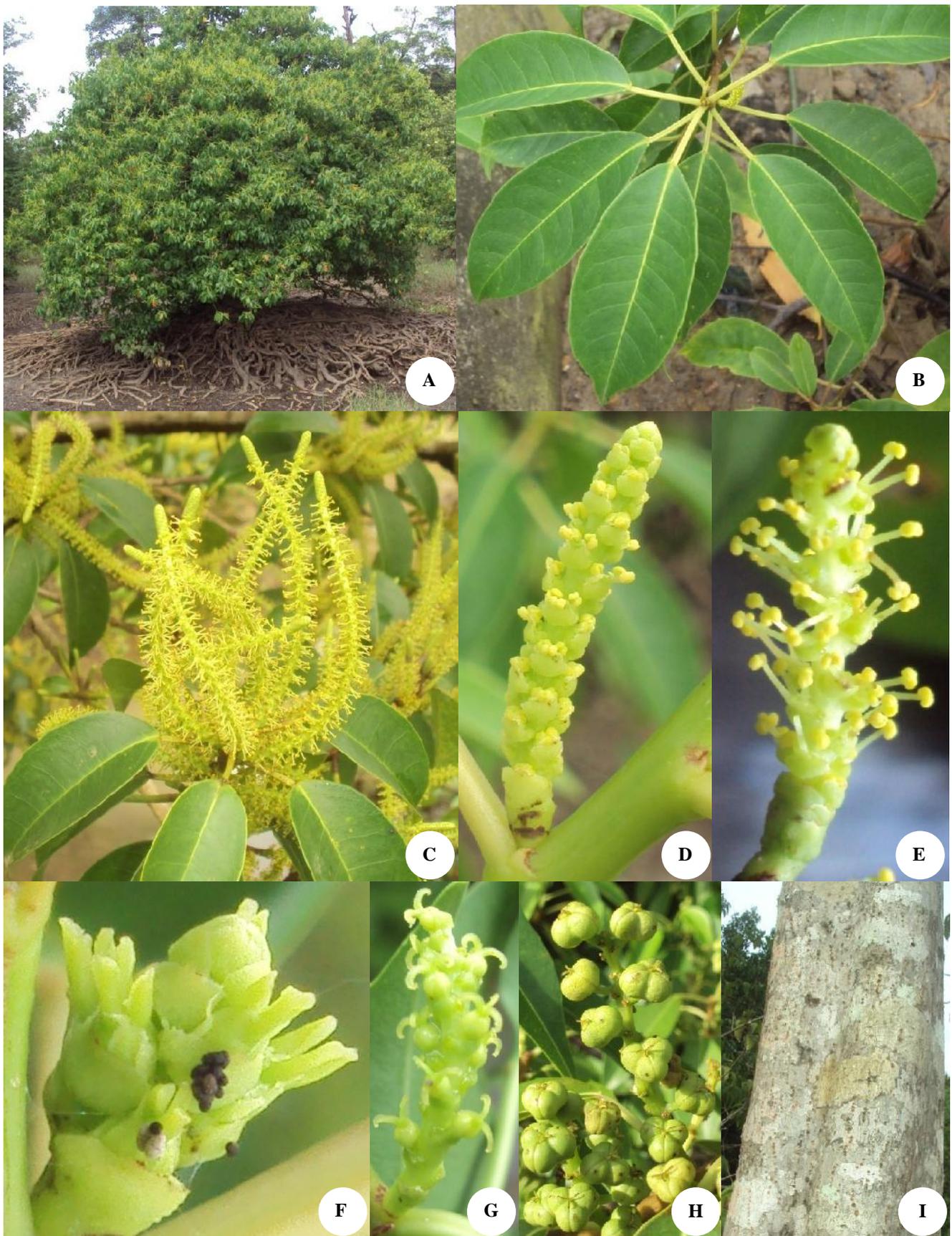


Figure 2. *Excoecaria agallocha*. A. Habit, B. Leafy rosette, C. Male inflorescences, D. Young male inflorescences, E. Male flowers with three stamens, F. Female inflorescences, G. Female flowers with three style, H. Three lobed fruits, I. Bark.

Table 1. Key diagnostic characters of *Excoecaria* spp in ANI

Characters	<i>E. agallocha</i>	<i>E. indica</i>
Leaf shape	Broadly elliptic to lanceolate	Lanceolate
Leaf apex	Acute to acuminate	Acuminate
Leaf base	Attenuate	Cuneate
Leaf margin	Variably serrate to entire	Serrated
Bark	Pale grey, finely fissured, trunk smooth	Grayish brown, fissured, trunk with prominent thrones
Inflorescences	Axillary, Male and female inflorescences on different individual	Axillary, male and female flowers on same inflorescences
Male inflorescence	Long, flowers with three long stamens	Numerous with three long stamens
Female inflorescence	Small, flowers with three style	One or two at the base of inflorescences with prominent style.
Fruits	Three lobed, three seeded	Rounded, three seeded

Islands represents a new addition to the mangrove flora of the islands, and highlightens its floristic affinities with Southeast Asian countries. Further, it suggests the need for periodical floristic survey to update information on the extent and status of mangroves in the Andaman and Nicobar Islands. Since *E. indica* is categorized as data deficient, immediate efforts should be taken to generate information about its habitat ecology, distribution and conservation.

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