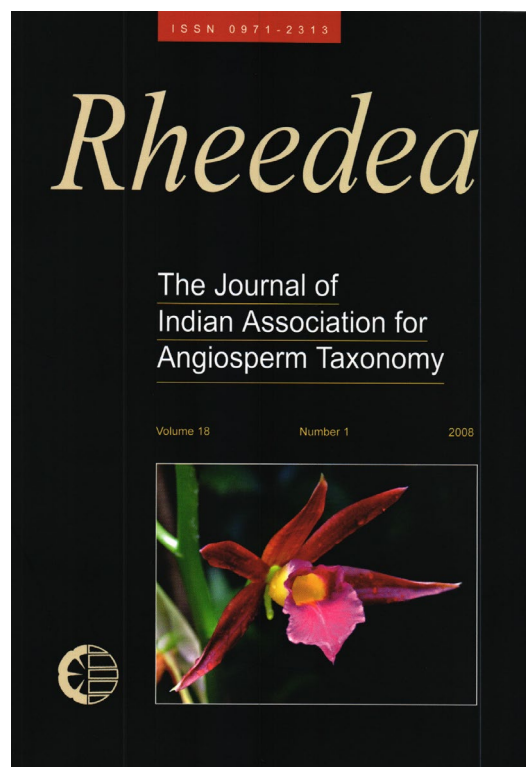




## The Genus *Xylocarpus* J. König (Meliaceae) in India

Arisdason W., Magesh C.R. & P. Venu



How to cite:

**Arisdason W., Magesh C.R. & P. Venu 2008.** The Genus *Xylocarpus* J. König (Meliaceae) in India. *Rheedeia* 18(1): 43-52.

<https://dx.doi.org/10.22244/rheedeia.2008.18.01.07>

*Received:* 14.03.2007

*Revised and accepted:* 02.10.2007

*Published in print:* 31.08.2008

*Published Online:* 31.08.2008

# The Genus *Xylocarpus* J. König (Meliaceae) in India

W. Arisdason, C.R. Magesh and P. Venu

Botanical Survey of India, Deccan Circle, Hyderabad 500 018, Andhra Pradesh, India.  
E-mail: drpvenu@yahoo.com

## Abstract

This taxonomic revision of *Xylocarpus* recognizes three species in the genus, viz.: *X. granatum*, *X. moluccensis* and *X. rumphii*. Detailed descriptions and illustrations are provided for the species based on fresh collections as well as holdings in herbaria. Additional characters overlooked by earlier workers in the field are also employed to determine the species. The taxonomic and nomenclatural tangle in each species is resolved and status indicated. The name *X. granatum* is lectotypified on t. 61 in Rumphius' *Herbarium Amboinense*.

Keywords: Revision, *Xylocarpus*, three species, taxonomy, India

## Introduction

Species of the genus *Xylocarpus* are distributed in tidal forests and seashores of the Old World tropics from East Africa to the Pacific Islands eastwards (Mabberley, 2005). Lamarck (1785) considered *Carapa* Aubl. (1775) and *Xylocarpus* J. König (1784) congeneric and recognized only the former. Pennington and Styles (1975) distinguished *Carapa* from *Xylocarpus* based on habitat, aestivation of calyx, nature of sarcotesta and number of diploid chromosomes. Noamesi (1958) revised the tribe Xylocarpeae and Mabberley (1982) who greatly relied on this work recognized three species in *Xylocarpus* viz.: *X. granatum*, *X. moluccensis* and *X. rumphii*.

Pierre (1897) described *X. mekongensis* from Vietnam, an intermediate form of *X. granatum* and *X. moluccensis*. Mabberley *et al.* (1995) contended that this species could be a hybrid between *X. granatum* and *X. moluccensis* and reduced it to a synonym under *X. moluccensis*. *X. granatum* var. *gangetica* Prain described from the Sunderbans (1903) was elevated to the status of a species by Parkinson, but Mabberley *et al.* (1995) reduced it to a synonym of *X. moluccensis*. Sinha (1997) reported the occurrence of *X. moluccensis* in Great Nicobar Island but description of the species obviously belongs to *X. rumphii* which seemingly does not occur on this island (Jayanthi, 2004).

## *Xylocarpus* J. König

*Xylocarpus* J. König, Naturforscher (Halle) 20: 2. 1784; Merr., Interpr. Rumph. Herb. Amboin. 306. 1917; Harms in Engl. & Prantl, Pflanzenfam. ed. 2, 19b, 1: 81. 1940; T.D. Penn. & Styles, Blumea 22: 525. 1975; Mabb., Malaysian Forester 45: 448. 1982; Toml., Bot. Mangr. 274. 1986; Mabb. *et al.*, Fl. Males. Ser. I, 12(1): 371. 1995; S.S. Jain & Bennet in Hajra *et al.*, Fl. India 4: 517. 1997.

Type: *X. granatum* J. König.

*Monosoma* Griff., Notul. 4: 502. 1854.

Type: *M. littorea* Griff.

*Carapa* auct. non Aubl. 1775, *p.p.*: Lam., Encycl. 1: 621. 1785; Hiern in Hook. f., Fl. Brit. India 1: 566. 1875; Prain, Rec. Bot. Surv. India 2(4): 292. 1903; Brandis, Indian Trees: 140. 1906; C.E. Parkinson, Forest Fl. Andaman Isl.: 118. 1923; Corner, Trees Malaya: 458. 1940.

Type: *C. guianensis* Aubl.

*Granatum* Rumph. [Herb. Amboin. 3: 92, tt. 61, 62. 1743] ex Kuntze, Revis. Gen. Pl. 1: 110. 1891, *p.p.*

Trees, littoral or intertidal, evergreen or semi-evergreen. Leaves alternate, paripinnate; leaflets opposite, (1-) 2-4(-5) pairs, glabrous. Inflorescence a

panicle, with lax or compact thyrsoid branches, axillary. *Flowers* bisexual; calyx 4-lobed, rarely 5-lobed, valvate; petals 4, much longer than calyx, contorted in bud, reflexed when mature, white or cream coloured; staminal tube urceolate-globose, 8 lobed at apex; lobes broadly orbicular-ovate, acute, shortly acuminate or 2 lobuled at apex; anthers 8, included, alternating with lobes of staminal tube, yellow, 2-loculed, dehiscing longitudinally; disc cushion-shaped, adnate to ovary at base, fleshy; ovary 4-grooved, 4-loculed, with 2-4(-6) ovules in each; style short; stigma discoid. *Fruit* a capsule, large, pendulous, subglobose to globose, dehiscing by 4 valves; seeds 4-14(-20), unequal, tetrahedral or not; testa corky.

There are three species in this genus. All the three species in the world occur in India. Presence or absence of pneumatophores and buttresses, smooth or fissured nature of bark and the fruit size are essential for determination of *X. granatum* and *X. moluccensis*.

### Key to species

- 1a. Plants inhabiting neither with buttresses nor pneumatophores; leaflets ovate, rounded or cordate at base, acute to shortly acuminate at apex; capsules usually less than 5 cm across; seeds under 2.5 cm long ..... **X. rumphii**
- 1b. Plants either with buttresses or pneumatophores; leaflets obovate, cuneate or acute at base, obtuse, rounded or obtusely acute at apex; capsules over 7 cm across; seeds over 4 cm long ..... **2**
- 2a. Plants with pneumatophores but without buttresses; leaves usually bi- or trijugate, thin-coriaceous; panicles 7.5-8.5 cm long; flowers less than 1 cm across; pedicels slender, not swollen below calyx; staminal tube lobes not lobuled at apex; capsules 7-7.5 cm across; pericarp 2.5-3.5 mm thick..... **X. moluccensis**
- 2b. Plant with serpentine spreading buttresses without pneumatophores; leaves usually unijugate, thick-coriaceous; panicles 3.5-6.5 cm long; flowers more than 1 cm across; pedicels stout, swollen below calyx; staminal tube lobes 2 lobuled at apex; capsules 10-17 cm across; pericarp 10-13 mm thick..... **X. granatum**

***Xylocarpus granatum*** J. König, Naturforscher (Halle) 20: 2. 1784; Merr., Interpr. Rumph. Herb. Amboin.: 306. 1917; Mooney, Suppl. Bot. Bihar Orissa: 249. 1950; Mabb., Malayan Forester 45: 450.

1982; Mabb. & Pannell in Ng, Tree Fl. Malaya 4: 260, f. 12B. 1989; Rajan & N.C. Nair in N.C. Nair & A.N. Henry, Fl. Tamil Nadu 1: 69. 1983; Toml., Bot. Mangr.: 278, ff. B. 39, 42 & 43. 1986; L.K. Banerjee *et al.*, Mangr. India: 58. 1989; H.O. Saxena & Brahmam, Fl. Orissa 1: 285. 1994; Mabb. in Fosberg & Clayton, Rev. Handb. Fl. Ceylon 9: 299. 1995; Mabb. & al., Fl. Males. Ser. I, 12(1): 378, ff. 59, 60. 1995; M.R. Almeida, Fl. Maharashtra 1: 232. 1996; S.S. Jain & Bennet in Hajra & al., Fl. India 4: 518. 1997; Manna in Fl. W. Bengal: 406. 1997; Pullaiah & Chennaiah, Fl. Andhra Pradesh 1: 192. 1997; L.K. Banerjee *et al.*, Mangr. Godavari Krishna: 98. 1998; Sreek. & Kala, Indian Forester 124: 259. 1998; Debnath in Hajra *et al.*, Fl. Andaman & Nicobar: 243. 1999; Pullaiah & S.S. Rani, Trees Andhra Pradesh: 165. 1999; R.S. Rao *et al.*, Fl. E. Godavari: 258. 1999; Pullaiah *et al.*, Fl. Guntur: 92. 2000; N.P. Singh & Karth., Fl. Maharashtra 1: 512. 2000; L.K. Banerjee & T.A. Rao, Fl. Mahanadi: 113. 2001; L.K. Banerjee *et al.*, Divers. Coastal Pl. Commun. India: 190. 2002; Kothari & K.M. Rao, Bull. Bot. Surv. India 43: 127. 2002 & in N.P. Singh & P.S.N. Rao, Mangr. Goa 95. 2002; Ramasubr. *et al.*, Mangr. Andhra Pradesh: 43. 2003; J.S.S.N. Raju, Curr. Sci. 84: 879. 2003; V.S. Kumar, Proc. Natl. Seminar Reef Ecosyst.: 201. 2005; N.C. Nair & N.P. Balakr. in P. Daniel, Fl. Kerala 1: 667. 2005; S. Reddy *et al.*, Indian J. Forest. 132: 672. 2006.

**Fig. 1**

*Lectotype: Granatum litoreum parvifolium* Rumph., Herb. Amboin. 3: t. 61. 1743, *p.p.* (upper twig).

*Carapa obovata* Blume, Bijdr. 179. 1825; Brandis, Indian Trees 140, f. 66. 1906; Bourd., Forest Trees Travancore 79. 1908; Haines, Bot. Bihar Orissa 1: 181. 1921; T. Cooke, Fl. Bombay 213. 1902. Type: *Granatum litoreum parvifolium* Rumph., Herb. Amboin. 3: t. 61. 1743, *p.p.*

*Xylocarpus obovatus* (Blume) A. Juss., Mém. Mus. Hist. Nat. 19: 244, t. 9, f. 22. 1830; Gamble, Fl. Madras: 185(132). 1915. *Carapa moluccensis* auct. non Lam. 1785; Bedd., Fl. Sylv. S. India t. 136. 1871; Hiern in Hook.f., Fl. Brit. India 1: 567. 1875, *p.p.*; Rama Rao, Fl. Pl. Travancore: 76. 1914.

*Trees*, to 5 m high; pneumatophores absent; buttresses serpentine and spreading; bark smooth, greyish, peeling off when mature; young twigs slightly zigzag, prominently swollen at nodes, lenticellate; internodes 0.6-3 cm long. *Leaves* usually unijugate, sometimes bijugate, to 15 cm long; leaflets obovate or oblong-obovate, cuneate or acute at base, distinctly or faintly thick, entire, recurved at margin, obtuse or subretuse at apex, 5.5-9 x 2.8-4.2 cm, thick-

coriaceous, glabrous, slightly shiny and dark green above, granular white-dotted, pale and somewhat glaucescent beneath; midnerve slightly raised or impressed above, strongly raised beneath; lateral nerves 8-13 pairs, looping near margin; reticulation relatively prominent beneath; petioles 3-3.5 cm long, swollen at base; rachis to 5 cm long; interstice between leaflet pairs to 1.8 cm long, slightly swollen

at junction of leaflets; petiolules to 6 mm long, with a ring of grooves at base (junction), grooved adaxially or abaxially or planoconvex, adaxially flattened when fully mature. Peduncles 5-7 mm long; panicles 3.5-6.5 cm long; pedicels 6-9 mm long with a distinctly annular constriction, angled; pedicels gradually swollen towards calyx. Flowers 10-16 mm across; calyx c. 6 mm across, 4 lobed; lobes broadly

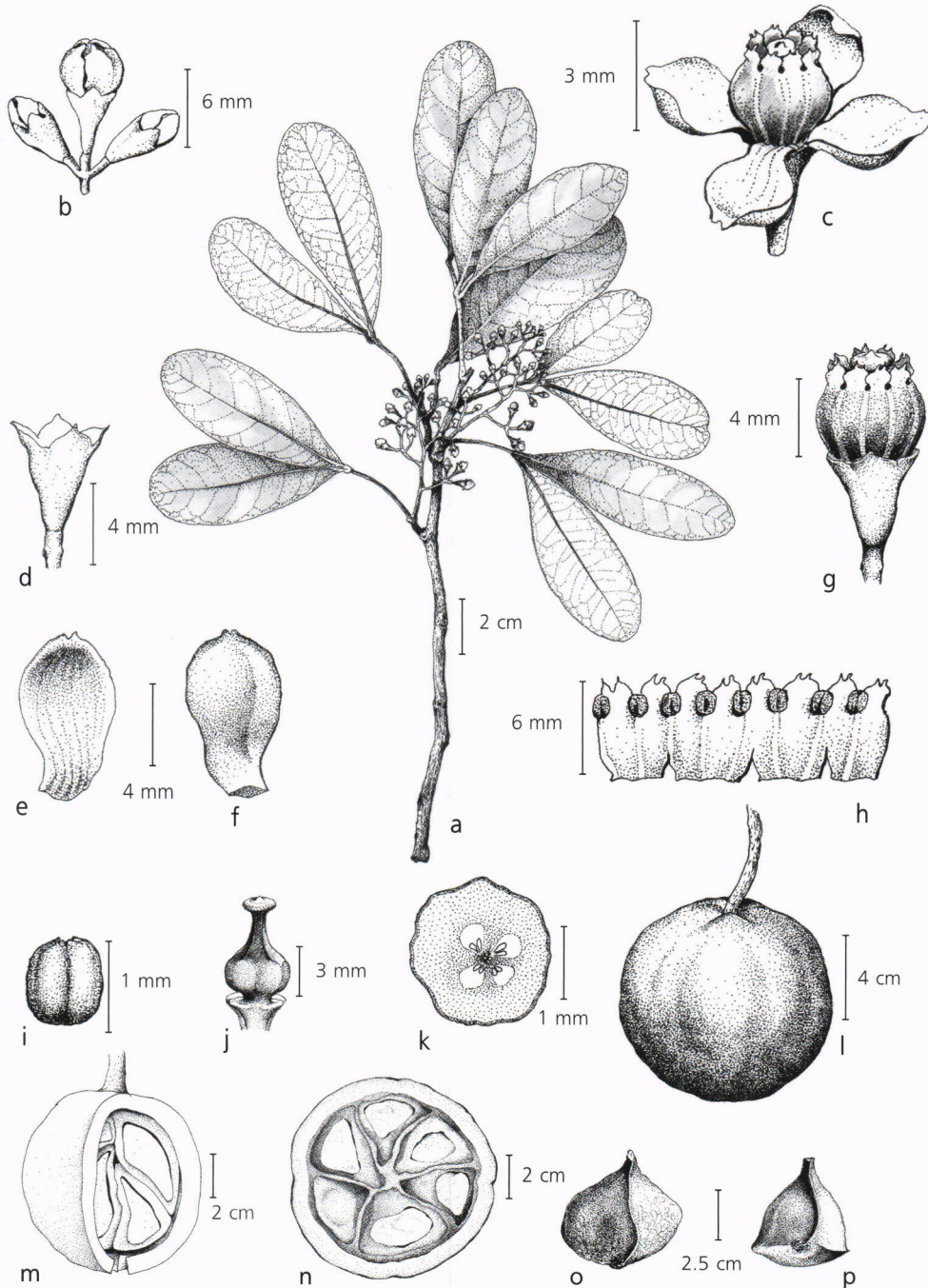


Figure 1. *Xylocarpus granatum* J. König – a. Flowering twig; b. Portion of inflorescence; c. Flower; d. Calyx with pedicel; e & f. Petal, adaxial and abaxial views; g. Calyx with staminal tube; h. Staminal tube split open showing anthers; i. Anther; j. Gynoecium; k. C.S. of ovary; l. Capsule; m. Cut open capsule showing seeds; n. Capsule C.S.; o & p. Seeds (C.R. Magesh et al. 00039).

ovate, acute, c. 2 x 3 mm, green; petals 4, obovate or spatulate, cucullate or concave, gradually narrowed at base, faintly thin at margin, obtuse or faintly notched at apex, 7.5-8 x 4-5 mm, spreading, white; staminal tube urceolate-globose, 5-6 x c. 5 mm, brown-red, 8-nerved, 8-lobed; lobes orbicular-ovate, acutely 2-lobed at apex, c. 1.6 x 1.3 mm, slightly keeled at middle; anthers 8, attached immediately below and alternating with lobes, oblong, slightly broad at base, c. 1 x 0.5 mm, yellow, 2-loculed, dehiscing longitudinally; disc cushion-shaped, c. 1.5 x 4 mm, pinkish orange-dotted; ovary globose-ovoid, c. 1.5 x 4 mm, tapering above, 4-lobed and loculed, stalk c. 1 mm long; style stout, 3-5 mm long, ribbed or angled; stigma discoid, c. 2 mm across, with a faintly erupt central acute point, c. 0.5 mm thick, faintly angled, minutely granular-dotted. Capsules subglobose, 10-17 x c. 11.3 cm; pericarp 10-13 mm across, yellowish brown outside, pinkish inside; seeds 4-13, unequal, c. 8 x 5.6 cm, tetrahedral or not, covered with a thin layer of aril, thick and corky outside, fibrous inside, dark brown.

*Note:* Fruit wall remains attached to parent tree even after dissemination of seeds. Seeds inside when germinate exert pressure on the fruit wall that results in its dehiscence into four leathery valves from apex. Fully mature seed has a dark purple-red hypocotyle of c. 1.8 cm thick and many small white rootlets of c. 5 mm long over it. The corky and fibrous outer testa of seeds enables them to float a little below the water surface and disperse.

*Flowering & Fruiting:* Throughout the year.

*Habitat:* Mangroves, associated with *Bruguiera gymnorhiza*.

*Distribution:* India (Andaman & Nicobar Islands, Andhra Pradesh, Goa, Gujarat, Maharashtra, Orissa, Tamil Nadu and West Bengal); Tropical Africa, N. Australia, continental Asia, Fiji Islands, Indonesia, Myanmar, Malesia to Tonga and Sri Lanka.

*Etymology:* The specific epithet '*granatum*' refers to the fruit that is packed with seeds.

*Vernacular Names:* *Dhundul*, *Pohar*, *Pusur* (Bengali); *Pussur* (Hindi); *Somunthri*; (Malayalam); *Chepa*, *Pitmari*, *Sisu*, *Sisumar*, *Susumber*, *Susumaro* (Oriya); *Kanlolanyey*, *Somanthiri* (Tamil); *Senugu* (Telugu); *Puzzle fruit tree* (English).

*Typification:* Merrill (1917) interpreted t. 61 in Rumphius' Herb. Amboin. (1743) as representing *X. granatum*. Mabberley (1982) attributed the whole of t. 61 to *X. moluccensis*. However, Mabberley *et al.*

(1995) opined that the said tabula represented 2 different species. They lectotypified the name *Carapa moluccensis* Lam. on the lower twig in the tabula as it matches well with the description by Lamarck. The upper (larger) twig in the tabula (but for the leaflet tips) with majority of leaves unijugate, short, stout and less lax inflorescence and the much larger woody capsule perfectly agrees with the description of *X. granatum*. As the entire nomenclature hinges on Rumphius' work and the type of *X. granatum* J. König is not traceable (Mabberley, 1982), the upper larger twig in t. 61 is selected here as the lectotype of *X. granatum*. Herb. Amboin. appeared prior to König's work.

*Status:* Beddome (1871) reported *X. granatum* from the Malabar Coast while Bourdillon (1908) and Rama Rao (1914) from Travancore. Anupama and Sivadasan (2004) in their inventory for Kerala excluded this species as they could not re-collect it. This might be attributed to the depletion of populations. This species, once found in large numbers in the mangroves of Pichavaram on the East Coast of Tamil Nadu, is reported to have totally disappeared from the region (Caratini *et al.*, 1973).

*Specimens Examined:* INDIA, without precise locality, *Wight* 964 (MH). **Andaman & Nicobar Islands**, South Andaman, Wright Myo, 4 m, 13.1.1959, *K. Thothathri* 9053 (MH); South Andamans, Sipighat, 9.5.1973, *N.P. Balakrishnan* 120; South Andamans, Peeple Dehra, Havelock Island, 5.9.1977, *R.K. Premanath* 6153 (PBL). **Andhra Pradesh**, East Godavari distr., Godavari Estuary, Balusdhibba to Pora, 30.3.2006, *C.R. Magesh et al.* 119595 (DH). Guntur distr., Repally, Krishna Estuary, Kothapalem R.F., 17.9.2006, *C.R. Magesh et al.* 000039 (DH). **Tamil Nadu**, South Arcot distr., Oct. 1886, *F.R. Chamberlain s.n.* (MH). **West Bengal**, Sunderbans, without date & collector's name 81715; Sunderbans, 12.9.1959, *S.K. Mukherjee* 5212; Sunderbans, Afzalmali Block, 11.4.1961, *S.K. Mukherjee* 4759; Sunderbans, 1966, without collector's name 81721; Sunderbans, Dulivasani, Ajnali Block, 11.4.1961, *Sengupta* 2037 (CAL).

**Xylocarpus moluccensis** (Lam.) M. Roem., Fam. Nat. Syn. Monogr. 1: 124. 1846; Merr., Interpr. Rumph. Herb. Amboin.: 307. 1917, *p.p.*; Mabb., Malayan Forester 45: 450. 1982; Mabb. & Pannell in Ng, Tree Fl. Malaya 4: 260, f. 12C. 1989; L.K. Banerjee *et al.*, Mangr. India: 61. 1989; Mabb. *et al.*, Fl. Males. Ser. I, 12(1): 376, ff. 56d, e & 58. 1995; M.R. Almeida, Fl. Maharashtra 1: 232. 1996; S.S. Jain & Bennet in Hajra *et al.*, Fl. India 4: 519. 1997; Sreek. & Kala, Indian Forester 124: 259. 1998; B.K. Sinha in Hajra

& P.S.N. Rao, Fl. Great Nicobar: 178. 1999, excl. descr.; N.P. Singh & Karth., Fl. Maharashtra 1: 512. 2000; L.K. Banerjee & T.A. Rao, Fl. Mahanadi: 114. 2001; Ramasubr. et al., Mangr. Andhra Pradesh: 44. 2003; V.S. Kumar, Proc. Natl. Seminar Reef Ecosyst. 201. 2005; S. Reddy et al., Indian J. Forest. 132: 672. 2006.

*Lectotype: Granatum litoreum parvifolium* Rumph., Herb. Amboin. 3: 93, t. 61. 1743, p.p. (lower twig) (vide Mabberley et al., 1995).

*Carapa moluccensis* Lam., Encycl. 1: 621. 1785.

*Type: Granatum litoreum parvifolium* Rumph., Herb. Amboin. 3: t. 61. 1743.

Fig. 2

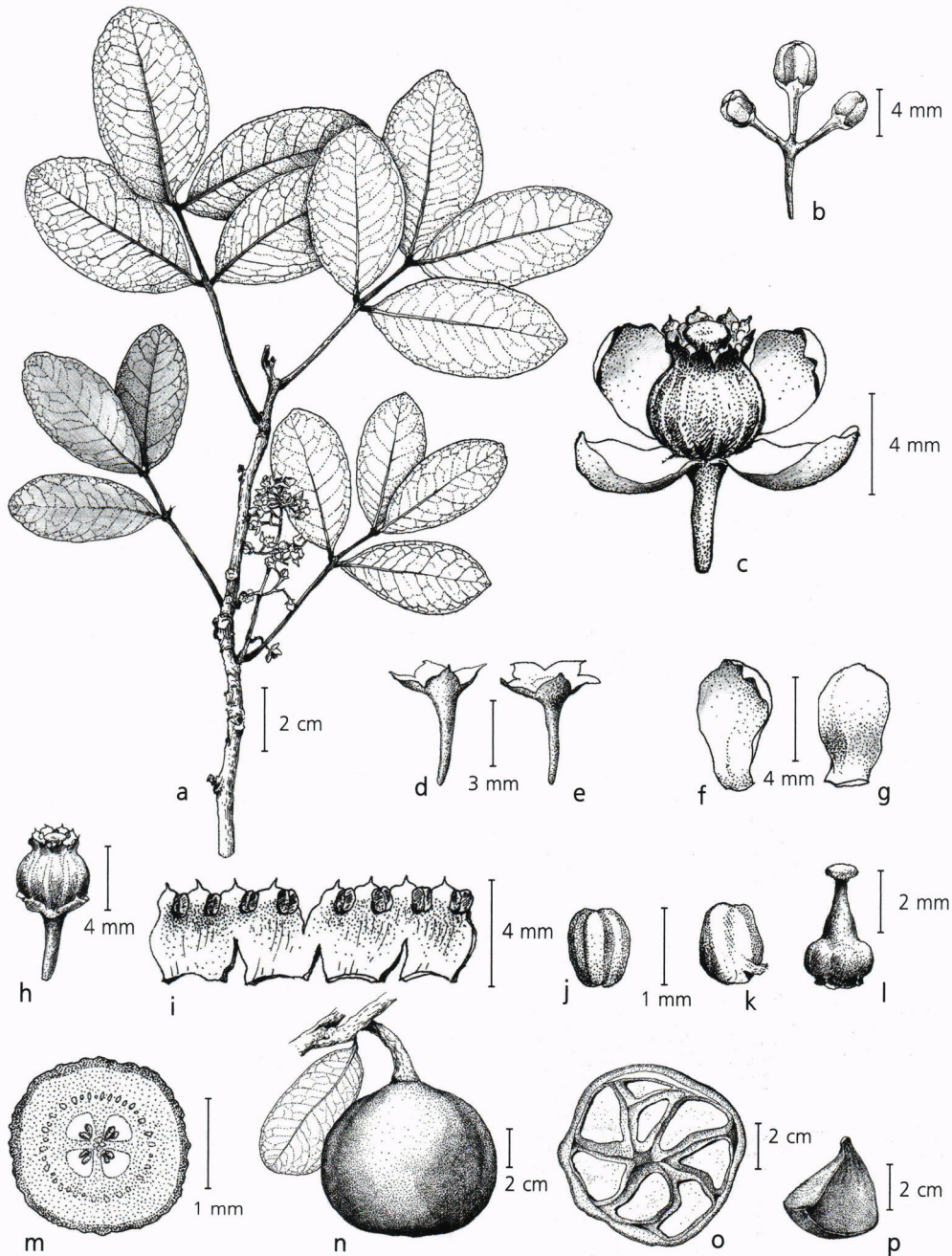


Figure 2. *Xylocarpus moluccensis* (Lam.) M. Roem. – a. Flowering twig; b. Portion of inflorescence; c. Flower; d & e. Calyx (4-lobed); f & g. Petal adaxial and abaxial views; h. Calyx with staminal tube; i. Staminal tube split open showing anthers; j & k. Anther adaxial and abaxial views; l. Gynoecium; m. C.S. of ovary; n. Capsule; o. Capsule C.S.; p. Seeds (C.R. Magesh et al. 00039).

*Xylocarpus mekongensis* Pierre, Fl. For. Cochinch. 5: t. 359B. 1897; Krishnam. *et al.*, Bull. Bot. Surv. India 23: 117. 1981; Toml., Bot. Mangr.: 281, f. 5.7, B40 & 41. 1986; L.K. Banerjee *et al.*, Mangr. India: 60. 1989; Debnath in Hajra *et al.*, Fl. Andaman & Nicobar 244. 1999; L.K. Banerjee & T.A. Rao, Fl. Mahanadi 113. 2001; L.K. Banerjee *et al.*, Divers. Coastal Pl. Commun. India: 190. 2002; J.S.S.N. Raju, Curr. Sci. 84: 879. 2003; V.S. Kumar, Proc. Natl. Seminar Reef Ecosyst. 201. 2005, *p.p.*; S. Reddy *et al.*, Indian J. Forest. 132: 672. 2006.

*Type*: Vietnam, Mekong Delta, Pierre 460 (NY, P).

*X. granatum* J. König var. *gangeticus* Prain, Rec. Bot. Surv. India 2(4): 292. 1903.

*Syntypes*: Arpangassia (Malesia), *Heinig s.n.*, *Lace s.n.*

*X. gangeticus* (Prain) C.E. Parkinson, Indian Forester 60: 140, t. 17. 1934; Mooney, Suppl. Bot. Bihar Orissa: 249. 1950; H.O. Saxena & Brahmam, Fl. Orissa 1: 285. 1994; S.S. Jain & Bennet in Hajra *et al.*, Fl. India 4: 518. 1997; Manna in Fl. W. Bengal: 406. 1997; Debnath in Hajra *et al.*, Fl. Andaman & Nicobar 243. 1999; V.S. Kumar, Proc. Natl. Seminar Reef Ecosyst. 201. 2005.

*Granatum litoreum parvifolium* Rumph., Herb. Amboin. 3: 93, t. 61. 1743.

*Trees*, 5-7(-12) m high; pneumatophores oblong, broad at base, obtuse at apex, somewhat laterally compressed, 3-25.5 × 1.8-10 cm, lenticellate; bark c. 5 mm thick, rough, longitudinally fissured, grey outside, purple-red inside; branchlets glabrous, greyish or brown. *Leaves* bi- or tri-jugate, to 16.5 cm long; leaflets oblong-obovate or oblong-elliptic-obovate, acute or faintly cuneate at base, faintly thickened, entire at margin, obtuse or obtusely acute at apex, 6-9.3 × 2.2-3.5 cm, coriaceous, glabrous, shiny; midnerve impressed and sulcate above, prominently raised beneath; lateral nerves 7-11 pairs, prominently reticulate; petioles to 4.7 cm long, canaliculate above, slightly swollen at base; petiolules to 3 mm long; interstice between leaflet pairs 2.5-2.8 cm long. *Peduncles* 1.2-2.4 cm long; panicles 7.5-8.5 cm long; pedicels 3.5-6 mm long; flower buds oblong-globose or subglobose to globose, 2.5-4 mm long; calyx usually 4-lobed, rarely 5-lobed; lobes suborbicular or broadly orbicular-ovate, slightly thickened, entire or sometimes minutely ciliolate at margin, broadly obtusely acute at apex, 1.5-1.8 × 1.5-2 mm, adnate to petals, green; petals 4, obovate or oblong-obovate, narrowed at base, entire or sometimes minutely ciliolate at margin, obtuse at apex, 5-6 × 2.8-3.7 mm, faintly

keeled in middle outside, 5-nerved, white; staminal tube urceolate-globose, c. 4 × 3.5-4 mm, 8-lobed at apex, somewhat faintly longitudinally grooved outside, markedly 8-nerved inside; lobes broadly ovate, shortly acuminate, c. 1 × 1 mm; anthers 8, attached immediately below and alternating with lobes, oblong, somewhat flat at apex, c. 1 × 0.7 mm, yellow, 2-loculed, dehiscing longitudinally; disc broadly subglobose-discoid, c. 1.5 × 2.5 mm, rugose, dark purplish maroon; gynoecium as long as staminal tube; ovary broadly subglobose, 1.5-2 × c. 3 mm, 4-loculed with 2 ovules in each; style stout, c. 2 mm long, broad at base, terete, somewhat ribbed and grooved; stigma discoid, c. 1.6 mm across, with minute protrusions. *Capsules* subglobose, 7-7.5 × 7.2-8 cm; pericarp 2.5-3.5 mm thick, green outside, white inside; fruiting stalk c. 8 cm long; seeds 5-7, unequal, 4-5 × 4.2-5.2 cm, tetrahedral or not, thick and corky outside, fibrous inside, dark brown.

*Flowering & Fruiting*: Almost throughout the year.

*Habitat*: Mangroves; associated with *Bruguiera gymnorrhiza* and *Derris trifoliata*.

*Distribution*: India (Andaman & Nicobar Islands, Andhra Pradesh, Orissa and West Bengal), Malesia to tropical Australia.

*Etymology*: The specific epithet '*moluccensis*' refers to its type locality, the Moluccan Islands.

Vernacular names: Pitakura, Pitamari (Oriya); Senugu (Telugu).

*Note*: Parkinson (1923) used leaf and fruit characters to distinguish *X. moluccensis* sensu Parkinson (= *X. rumphii*) from *X. granatum*. In fact the characters chosen such as ovate leaves with acute apex and smaller fruits of c. 5 cm across are the salient features of *X. rumphii* and this was well elucidated by Mabberley (1982). Indian workers (Sinha, 1999; Banerjee & Rao, 2001; Banerjee *et al.*, 2002), except Sreekumar and Kala (1998), ignored the clarification given by Mabberley (*l.c.*) on this count.

*Status*: This species was excluded from the Flora of Andhra Pradesh (Pullaiah & Chennaiah, 1997) as well as from that of E. Godavari, Guntur and Krishna districts (Lakshminarayana *et al.*, 1997; Banerjee *et al.*, 1998; Rao *et al.*, 1999; Pullaiah *et al.*, 2000). Raju (2003) reported its occurrence in the Godavari Estuary but under the name *X. mekongensis* and stressed its rarity in the area. The present survey confirms that *X. moluccensis* and *X. granatum* are common in both the Godavari and Krishna Estuaries. Rajan and Nair (1983) excluded *X. moluccensis* from the flora of Tamil Nadu in spite of

its reported occurrence in Pichavaram by Krishnamurthy *et al.* (1981) though under the name *X. mekongensis*.

*Specimens Examined*: INDIA, **Andaman & Nicobar Islands**, Andamans, without precise locality, 14.4.1916, C.E. Parkinson 1188 (CAL); Little Andaman, MSL, 18.4.1964, J.L. Ellis & K. Ramamurthy 18879 (MH); Middle Andamans, Rampur, near Mayabunder, 3.5.1974, N.P. Balakrishnan 1315 (PBL); North Andamans, Austin I, 5 m, 23.4.1964, J.L. Ellis & K. Ramamurthy 18903 (MH). **Andhra Pradesh**, East Godavari distr., Badugandu Kaluva, 3.8.2005, C.R. Magesh *et al.* 119521; Coringa R.F., 5.8.2005, C.R. Magesh *et al.* 119540, 119542; On way to Sarcomento Light House, 6.8.2005, C.R. Magesh *et al.* 119565 (DH). Guntur distr., Kothapalem R.F., 17.9.2006, C.R. Magesh *et al.* 000044 (DH). Krishna Distr., Gulalamodha to Nachugunta, 10.9.2006, C.R. Magesh *et al.* 000013; Nachugunta R.F., 12.9.2006, C.R. Magesh *et al.* 000029 (DH). **Orissa**, Hukitola End Point, 1.2.1961, G. Panigrahi 23632 (CAL). **West Bengal**, Sunderbans, 6.1.1903, without collector's name 2625 (CAL).

**Xylocarpus rumphii** (Kostel.) Mabb., Malaysian Forester 45: 450. 1982; Mabb. *et al.*, Fl. Males. Ser. I, 12(1): 375, ff. 56 a-c & 57. 1995; Mabb. in Fosberg & Clayton, Rev. Handb. Fl. Ceylon 9: 297. 1995; Sreek. & Kala, Indian Forester 124: 260, f. 1. 1998.

### Fig. 3

*Carapa rumphii* Kostel., Allg. Med. Pharm. Fl.: 5. 1836.

*Lectotype*: *Granatum litoreum latifolium* Rumph., Herb. Amboin. 3: t. 62. 1743 (*vide* Mabberley, 1982).

*Carapa moluccensis* auct. non Lam. 1785: Brandis, Indian Trees: 141. 1906, *p.p.*; C.E. Parkinson, Forest Fl. Andaman Isl.: 118. 1923 & Indian Forester 60: 142. 1934. *Xylocarpus moluccensis* auct. non (Lam.) M. Roem. 1846: Merr., Interpr. Rumph. Herb. Amboin.: 307. 1917, *p.p.*; Ridley, Bull. Misc. Inform. 291. 1938; Backer & Bakh.f., Fl. Java 2: 118. 1965, *p.p.*; Toml., Bot. Mangr.: 282. 1986; L.K. Banerjee *et al.*, Mangr. India 61. 1989, *p.p.*; Debnath in Hajra & al., Fl. Andaman & Nicobar 244. 1999; L.K. Banerjee *et al.*, Divers. Coastal Pl. Commun. India 190. 2002, *p.p.*; V.S. Kumar, Proc. Natl. Seminar Reef Ecosyst. 201. 2005, *p.p.*

*Granatum litoreum latifolium* Rumph., Herb. Amboin. 3: 92, t. 62. 1743.

Trees, 5-10 m high; branchlets with somewhat prominent leaf scars, sometimes with 2 or 3 annular

18 cm long; petioles 4.3-4.7 cm long, slightly thickened at base; petiolules 0.5-4 mm long, strongly grooved above; rachis 6.5-12 cm long; leaflets 2 or 3 pairs, opposite, ovate, rounded and subcordate at base, entire (and faintly thick-lined-like) at margin, shortly obtusely acute or shortly acuminate at apex, 4.8-10.3 x 3.2-5.7 cm, thin-coriaceous, shiny, dark green above and pale beneath when fresh, olive or grey-green above and drying brown or grey-brown beneath; midnerve impressed or faintly raised above, strongly raised beneath; lateral nerves to 13 pairs, webbing near margin, thin but prominently reticulate, slightly more so beneath. *Panicles* to 12.5 cm long; lateral branches to 10, 1.8-4.5 cm long; flower buds globose, to 4 mm; pedicels to 5 mm long, slender; bracts subulate, acute, *c.* 0.8 mm, keeled; calyx *c.* 3 mm across, 4-lobed; lobes broadly suborbicular, 1-1.2 mm, connate for *c.* 0.8 mm, distinctly nerved near margin; petals 4, oblong-obovate, obtuse/rounded at apex, somewhat hooded, *c.* 5 x 3 mm, nerved (with middle 3 (-5) prominent), white; staminal tube broadly urceolate-globose, *c.* 3.8 x 4.5 mm, constricted at *c.* 3.6 mm above from base, 8-lobed at apex, 8-nerved; lobes orbicular-ovate, *c.* 1 x 0.8 mm, acutely 2-lobed at apex; anthers 8, oblong, slightly broad at base, *c.* 0.8 x 0.5 mm, yellow, 2-loculed, dehiscing longitudinally.; gynoecium as long as staminal tube; ovary broadly subglobose, *c.* 1.3 x 2 mm, 4-loculed with 2 ovules in each; style swollen at base, stout and columnar above, *c.* 1.6 mm long; stigma *c.* 1 mm across, with very minute protrusions. *Capsules* subglobose/globose, 4-4.5 cm across; pericarp 1-1.2 mm thick, green outside, cream-coloured inside; seeds 4-9, unequal, 1.8-2.1 x 2.2-2.6 cm, angled, brown.

*Flowering & Fruiting* : September to March and May to July, persisting till September.

*Habitat*: Rocky seashores.

*Distribution*: India (Andaman & Nicobar Islands), Tropical East Africa to Malesia and Sri Lanka.

*Etymology*: The specific epithet '*rumphii*' refers to Rumphius.

*Note*: Lamarck (1785) described *Carapa moluccensis* based on the description in Rumphius' *Herbarium Amboinense* (1743: 92). He included t. 61 which is apparently an error as it does not match with the characters of this species. In fact it matched with t. 62. Merrill (1917) who pointed out this discrepancy failed to fix the identity of t. 62. Mabb. *et al.* (1995)



*Status:* *Xylocarpus rumphii* could not be re-collected in recent surveys from South Andamans by Karthigeyan (2004) and from Great Nicobar Island by Jayanthi (2004). This might be due to its rarity or depletion of populations.

*Specimens Examined:* INDIA, **Andaman & Nicobar Islands:** Andaman Islands, without precise locality & date, King 528; Great Cocos Island, 1889, D. Prain s.n.; Long Island, 30.11.1915, C.E. Parkinson 747; Rutland Island, 12.1.1916, C.E. Parkinson 863;

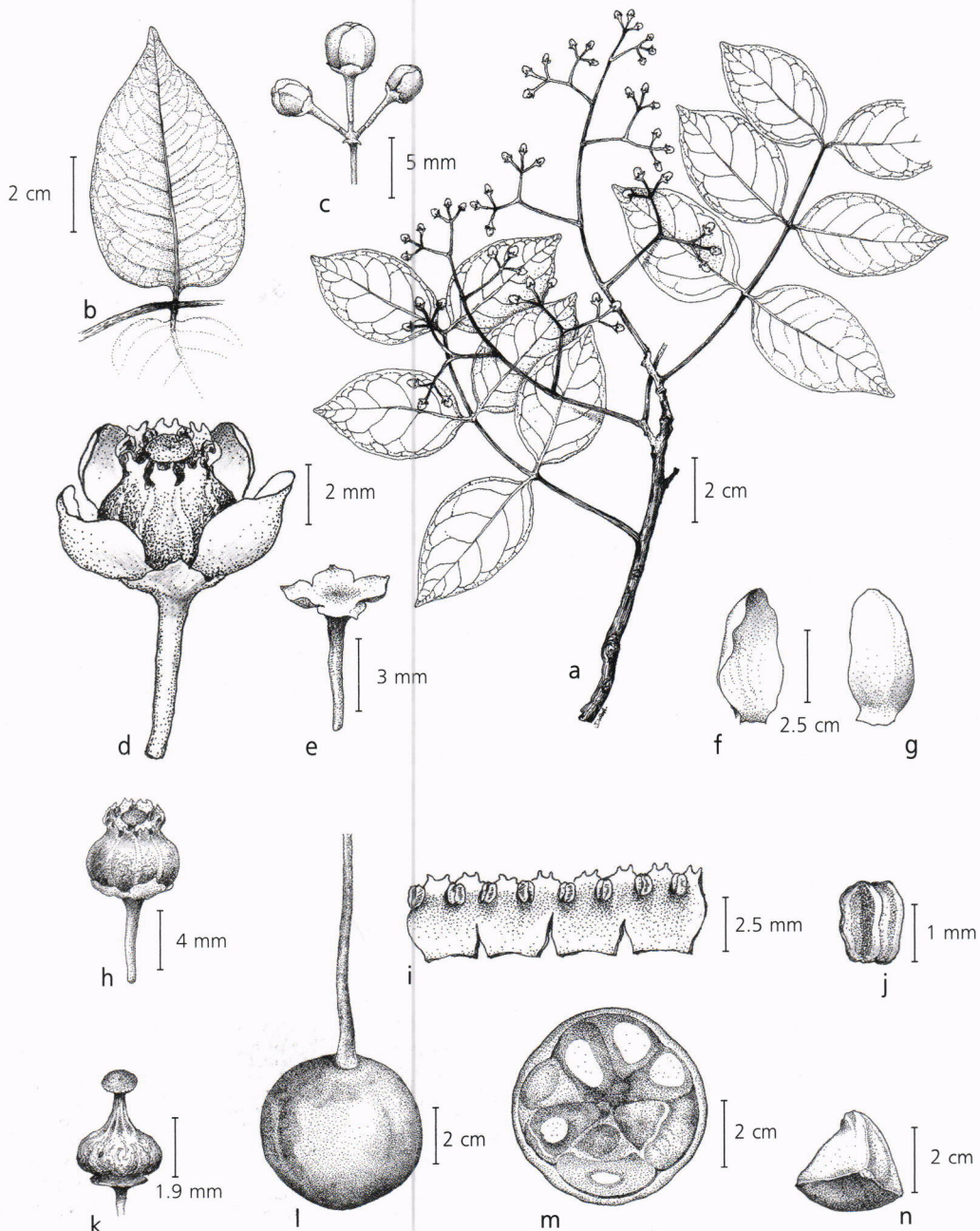


Figure 3. *Xylocarpus rumphii* (Kostel.) Mabb. – a. Flowering twig; b. Variable leaflet with rounded-subcordate base; c. Portion of inflorescence; d. Flower; e. Calyx with pedicel; f. & g. Petal adaxial and abaxial views; h. Calyx with staminal tube; i. Staminal tube split open

Rutland Island, 15.1.1916, C.E. Parkinson 876 (CAL); Kimus, Car Nicobar, MSL, 10.6.1974, N.G. Nair 1591 (PBL); North Nicobar, East Bay, Katchal Islands, 19.12.1974, P. Chakraborty 2208 (CAL); Little Andaman, Dugong Creek, 5.9.1976, N. Bhargava 4401; Little Andaman, Dugong Creek, 2.2.1981, R.K. Premanath 8382 (PBL).

## Acknowledgements

This work was carried out under a project entitled "Studies on the Mangroves of Krishna and Godavari Estuaries" funded by the MoEF, Government of India, New Delhi. WA and CRM are grateful to the Ministry of Environment & Forests for financial assistance. Authors thank Dr M. Sanjappa, Director, BSI, for facilities, Dr P.G. Diwakar (PBL) for loaning specimens, Director (K) and Dr S.K. Srivastava, IBLO at K for literature and Dr P. Daniel, formerly JD, BSI, Coimbatore for critical reading of the manuscript.

## Literature Cited

- Anupama, C. & M. Sivadasan 2004. Mangroves of Kerala. *Rheedea* 14: 9-46.
- Aublet, J.B.C.F. 1775. *Hist. Pl. Guiane Franç.* Vols. 1-4. Londres, Pierre - Françoise Didot Jeune, London & Paris.
- Banerjee, L.K. & T.A. Rao 2001. *Flora of the Mahanadi Delta, Orissa*. BSI, Calcutta.
- Banerjee, L.K., Ghosh, D. & A.R.K. Sastry 1998. *Mangroves, Associates and Salt Marshes of the Godavari and Krishna Delta, Andhra Pradesh, India*. BSI, Calcutta.
- Banerjee, L.K., Rao, T.A., Sastry, A.R.K. & D. Ghosh 2002. *Diversity of Coastal Plant Communities in India*. BSI, Kolkata.
- Beddome, R.H. 1869-1874. *Flora Sylvatica for Southern India*. Vols. 1 & 2. Gantz Brothers, Madras.
- Bourdillon, T.F. 1908. *Forest Trees of Travancore*. Government Press, Trivandrum.
- Caratini, C., Blasco, F. & G. Thanikaimoni 1973. Relation between the Pollen Spectra and the Vegetation of a South Indian Mangrove. *Pollen et Spores* 15: 281-292.
- Hajra, P.K., Nair, V.J. & P. Daniel (Eds) 1997. *Flora of India*. Vol. 4. BSI, Calcutta.
- Hajra, P.K., Rao, P.S.N. & V. Mudgal (Eds) 1999. *Flora of Andaman-Nicobar Islands*. BSI, Calcutta.
- Jayanthi, J. 2004. *Flora of Campbell Bay National Park, Andaman & Nicobar Islands*. Project Report, BSI, Kolkata (unpublished).
- Karthigeyan, K. 2004. *Flora of Mahatma Gandhi Marine National Park, Andaman & Nicobar Islands*. Project Report, BSI, Kolkata (unpublished).
- König, J.G. 1784. *Xylocarpus*. *Naturforscher (Halle)* 20: 2.
- Krishnamurthy, K., Kannan, L., Jeyaseelan, M.J.P., Palaniappan, R. & M.A.S. Ali 1981. A Floristic Study of Halophytes with Special Reference to Mangroves. *Bull. Bot. Surv. India* 23: 114-126.
- Lakshminarayana, K., Venkanna, P. & T. Pullaiah 1997. *Flora of Krishna District, Andhra Pradesh, India*. M. D. Publications, New Delhi.
- Lamarck, J.B.A.P. Monnet de 1783-1817. *Encyclopédie Méthodique, Botanique*. Vols. 1-13. incl. 5 Suppl. Panckoucke & Liege Publishers, Paris.
- Mabberley, D.J. 1982. Notes on Malesian Meliaceae for the Flora of Malaya. *Malayan Forester* 45: 448-455.
- Mabberley, D.J. 2005. *The Plant Book (A Portable Dictionary of Vascular Plants)*. Cambridge University Press, London.
- Mabberley, D.J., Pannell, C.M. & A.M. Singh 1995. *Flora Malesiana Ser. I, 12: 1-407*. Rijksherbbarium / Hortus Botanicus, Leiden, The Netherlands.
- Merrill, E.D. 1917. *An Interpretation of Rumphius's Herbarium Amboinense*. Department of Agricultural and Natural Resources, Bureau of Science, Manila.
- Noamesi, G. K. 1958. *A Revision of the Xylocarpeae*. Ph.D. Thesis, University of Wisconsin, USA (unpublished).
- Parkinson, C.E. 1923. *A Forest Flora of the Andaman Islands*. Government Central Press, Dehra Dun.
- Parkinson, C.E. 1934. The Indian Species of *Xylocarpus*. *Indian Forester* 60: 136-143.
- Pennington, T.D. & B.T. Styles 1975. A Generic Monograph of the *Meliaceae*. *Blumea* 22: 419-540.
- Pierre, J.B.L. 1880-1907. *Fl. For. Cochinch.* Vols. 1-4. Dillon & D. Dillon, Paris.
- Prain, D. 1903. Flora of the Sundribuns. *Rec. Bot. Surv. India* 2: 231-370.
- Pullaiah, T. & E. Chennaiah 1997. *Flora of Andhra Pradesh (India)*. Vol. 1. Scientific Publishers, Jodhpur.
- Pullaiah, T., Ramakrishnaiah, V., Sandhya Rani, S. & P.N. Rao. 2000. *Flora of Guntur District, Andhra Pradesh, India*. Regency Publications, New Delhi.
- Rajan, R. & N.C. Nair 1983. *Meliaceae*. In: Nair, N.C. & A.N. Henry (Eds), *Fl. Tamil Nadu, India, Series 1: 65-69*. BSI, Coimbatore.
- Raju, J.S.S.N. 2003. *Xylocarpus (Meliaceae): A less-*

known Mangrove taxon of the Godavari Estuary, India. *Curr. Sci.* 84: 879-881.

**Rama Rao, M. 1914.** *Flowering Plants of Travancore.* Government Press, Trivandrum.

**Rao, R.S., Sudhakar, S. & P. Venkanna 1999.** *Flora of East Godavari District, Andhra Pradesh, India.* Indian National Trust for Art & Cultural Heritage (INTACH), Hyderabad.

**Rumphius, G.E. 1741-1750.** *Herbarium Amboinense.* Vols. 1-6. Amstelaedami: Apud Fransicum

Changuion, Joannem Catuffe, Hermanum Uytwerf, Amsterdam.

**Sinha, B.K. 1999.** In: Hajra, P.K. & P.S.N. Rao (Eds). *Flora of Great Nicobar Island.* BSI, Calcutta.

**Sreekumar, P.V. & N. Kala 1998.** Critical Notes on *Xylocarpus* Koen. (Meliaceae) in Andaman & Nicobar Islands. *Indian Forester* 124: 259-261.

---

Received : 14.3.2007

Accepted : 2.10.2007