FLORA OF BANGLADESH

NO. 80

RUTACEAE

EDITOR

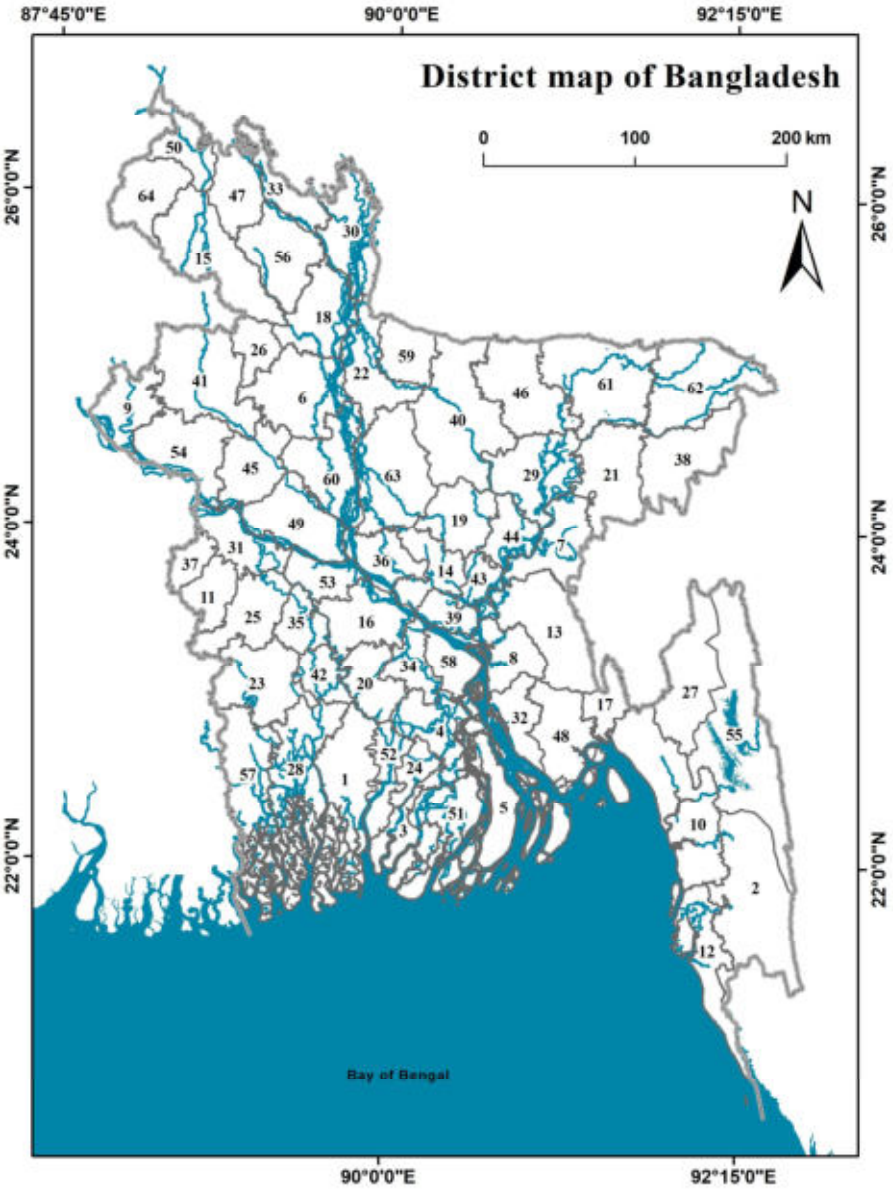
SARDER NASIR UDDIN

June 2022

By

SARDER NASIR UDDIN
And
KHANDAKAR KAMRUL ISLAM

BANGLADESH NATIONAL HERBARIUM
MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE
GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH


District map of Bangladesh
0
100
200 km
N
87°45'0"E
90°0'0"E
92°15'0"E
26°0'0"N
24°0'0"N
22°0'0"N
Bay of Bengal

List of Districts

The serial numbers correspond to those given in the map.

1. Bagerhat
2. Bandarban
3. Barguna
4. Barishal
5. Bhola
6. Bogura
7. Brahamanbaria
8. Chandpur
9. Chapainawabganj
10. Chattogram
11. Chuadanga
12. Cox's Bazar
13. Cumilla
14. Dhaka
15. Dinajpur
16. Faridpur
17. Feni
18. Gaibandha
19. Gazipur
20. Gopalganj
21. Habiganj
22. Jamalpur
23. Jashore
24. Jhalakathi
25. Jhenaidaha
26. Joypurhat
27. Khagrachhari
28. Khulna
29. Kishoreganj
30. Kurigram
31. Kushtia
32. Lakshmipur
33. Lalmonirhat
34. Madaripur
35. Magura
36. Manikganj
37. Meherpur
38. Moulvibazar
39. Munshiganj
40. Mymensingh
41. Naogaon
42. Narail
43. Narayanganj
44. Narsingdi
45. Natore
46. Netrokona
47. Nilphamari
48. Noakhali
49. Pabna
50. Panchagarh
51. Patuakhali
52. Pirojpur
53. Rajbari
54. Rajshahi
55. Rangamati
56. Rangpur
57. Satkhira
58. Shariatpur
59. Sherpur
60. Sirajganj
61. Sunamganj
62. Sylhet
63. Tangail
64. Thakurgaon

LIST OF FAMILIES PUBLISHED

	Fl. No.		Fl. No.		Fl. No.
Acoraceae	67	Dichapetalaceae	23	Phytolaccaceae	1
Aizoaceae	34	Dilleniaceae	36	Plumbaginaceae	42
Alangiaceae	68	Dipterocarpaceae	25	Polemoniaceae	2
Annonaceae	52	Elatinaceae	39	Pontederiaceae	24
Araceae	75	Fumariaceae	3	Potamogetonaceae	40
Aristolochiaceae	78	Flagellariaceae	3	Pontederiaceae	24
Asclepiadaceae	48	Gesneriaceae	65	Punicaceae	22
Averrhoaceae	18	Haloragaceae	8	Rhamnaceae	61
Avicenniaceae	31	Hydrocharitaceae	28	Rhizophoraceae	7
Basellaceae	2	Hydrocotylaceae	44	Ruppiaceae	19
Bignoniaceae	70	Hydrophyllaceae	1	Rutaceae	80
Bixaceae	35	Juncaceae	29	Sabiaceae	62
Boraginaceae	77	Lamiaceae	58	Salicaceae	20
Bromeliaceae	74	Linaceae	26	Sapindaceae	59
Buddlejaceae	13	Lecythidaceae	60	Solanaceae	53
Burmanniaceae	38	Loranthaceae	33	Sonneratiaceae	12
Butomaceae	2	Malvaceae	54	Stemonaceae	41
Burseraceae	36	Martyniaceae	1	Sphenocleaceae	5
Cannabidaceae	14	Melastomataceae	76	Stylidiaceae	32
Cannaceae	73	Meliaceae	71	Taccaceae	72
Capparaceae	57	Menispermaceae	51	Tiliaceae	64
Caricaceae	1	Menyanthaceae	49	Trapaceae	27
Cassythaceae	43	Molluginaceae	17	Tropaeolaceae	3
Casuarinaceae	1	Moringaceae	2	Turneraceae	3
Celastraceae	79	Nymphaeaceae	9	Typhaceae	69
Ceratophyllaceae	10	Ochnaceae	3	Urticaceae	66
Combretaceae	50	Onagraceae	6	Vitaceae	63
Commelinaceae	4	Orobanchaceae	21	Xyridaceae	46
Convolvulaceae	30	Oxalidaceae	15	Zannichelliaceae	11
Costaceae	45	Pedaliaceae	2	Zygophyllaceae	16
Cuscutaceae	55	Periplocaceae	47		

Ministry of Environment, Forest and Climate Change

ISBN: 978-984-34-1053-5

Illustration: Sabiha Sultana and Mahmuda Akhter

Price: Taka 70.00
US$ 7.00
£ 5.00

Published by: Bangladesh National Herbarium
Chiriakhana Road, Mirpur-1, Dhaka-1216, Bangladesh.
Phone: +880258054802, E-mail: bnh_mirpur@yahoo.com

Printed at: SRL Printing Press
Babupura, Nilkhet, Dhaka-1205

RUTACEAE A.L. de Juss.

Sarder Nasir Uddin and Khandakar Kamrul Islam

Trees, shrubs, woody climbers, or rarely herbs. Branches often armed with spines or prickles, aromatic; pellucid glands containing fragrant essential oil present on leaves, young branchlets, inflorescences, flower parts, fruit, or cotyledons. Stipules absent. Leaves alternate, opposite or whorled, simple, pinnately compound, digitately trifoliolate, pinnatisect, uni-or bifoliolate; petioles often articulated at base of blade (mostly as in unifoliolate leaves), cylindric, marginate, or sometimes winged. Inflorescences terminal, axillary, paniculate, cymose, racemose, or rarely of solitary flower. Flowers bracteate, often fragrant, bisexual or unisexual, usually 3-5-merous, actinomorphic or rarely zygomorphic, hypogynous [or rarely perigynous]. Perianth in 2 series, with clearly differentiated calyx and corolla or sometimes in 2 irregular series or 1 series, with undifferentiated tepals. Sepals 5 or 4, (rarely 2 or 3), rarely undifferentiated, distinct or connate at base, imbricate or valvate. Petals as many as (rarely absent) and alternate with sepals, distinct, or rarely connate into a tubular corolla, imbricate or valvate, variously coloured as greenish, white, cream, yellow, or purplish, glandular or not. Stamens usually as many as or twice as many as petals or sometimes more numerous; filaments distinct or sometimes monadelphous or irregularly polyadelphous; anthers dithecous, tetrasporangiate, longitudinally dehiscent, often dorsifixed; connectives usually gland-tipped; pollen grains (2-) 3-6 (-8)-colporate, binucleate or rarely trinucleate. Disk within androecium, nectariferous, annular or cupulate or hourglass-shaped, sometimes modified into an elongated gynophore, rarely obsolete. Gynoecium (2)4 or 5, or rarely up to 20 carpels or sometimes only one carpel completely united to form a multilocular, entire or apically indented ovary terminated with single style, or only partly united at base or free with coherent styles, or rarely septa of carpels incompletely united into unilocular ovary with intruded parietal placentae or sometimes reduced as pistillodes; ovules 1 or 2, or rarely many in each locule, superposed, collateral or rarely biseriate. Fruits of various types, *viz*. drupaceous or hesperidia, baccate, capsular, follicular. Seeds 1 or 2, or many per fruit, variable in shape, size and colour; cotyledons large, straight or curved, convolute or conduplicate; endosperm abundant or rarely lacking.

About 155 genera and c. 1600 species nearly cormopoliton; but mainly distributed in tropical and subtropical regions of the world (Zhang *et al*., 2008). In Bangladesh, the family is represented by 18 genera and 35 species.

References

Ghani, A. 2003. Medicinal Plants of Bangladesh (Second Edition). Asiatic Society of Bangladesh, Dhaka. pp. 1-603.

Kirtikar, K.R., Basu, B.D. and An, I.C.S. 1935 (Second Editions). Indian Medicinal Plants. Vols. 1-4. Bishen Singh Mahendra Pal Singh, Dehra Dun, India.

Kumar, V. and Subramaniam, B. 1986. Chromosome Atlas of Flowering Plants of the Indian Subcontinent. Vol. 1. Dicotyledons. Botanical Survey of India, Calcutta. pp. 1-464.

Nair, K.N. and Nayar, M.P. 1997. Rutaceae. In: Hajra, P.K., Nair, V.J. and Daniel , P. (eds.). Flora of India, Vol. 4 (Malpighiaceae - Dichapetaceae). Botanical Survey of India, Calcutta, India. p. 325.

Van Valkenburg, J.L.C.H. and Bunyapraphatsara, N. (eds.). 2002. Plant Resources of South-East Asia, No. 12 (2). Medicinal and Poisonous Plants 2. Prosea Foundation, Bogor, Indonesia. 782 pp.

Zhang, D., Hartley, T.G. and Mabberley, D.J. 2008. In: Wu, Z.Y., Raven, P.H. & Hong, D.Y. Flora of China, Vol. II (Oxalidaceae through Aceraceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis. pp. 51-98.

Abbreviations used in the text

BCSIR= Bangladesh Council of Scientific and Industrial Research Herbarium
BFRI = Bangladesh Forest Research Institute Herbarium
CUH= Chittagong University Herbarium
DACB= Bangladesh National Herbarium

KEY TO THE GENERA

1.	Leaves opposite	**2**
+	Leaves alternate	**5**
2.	Leaves mostly odd-pinnate; inflorescences terminal or/and axillary; plants dioecious	**Tetradium**
+	Leaves digitately 3-foliolate or 1-foliolate; inflorescences axillary or basal to leaves; plants usually monoecious or dioecious	**3**
3.	Usually subshrub or shrubs, inflorescences racemes; stamens 4, filaments sublinear	**4**
+	Shrubs or trees; inflorescences corymbose or paniculate cymes; stamens 8, filaments gradually tapering from broad base to subulate apex	**Acronychia**
4.	Fertile stamens 4; fruit follicles; seeds verrucose	**Evodia**

+	Fertile stamens 2; fruit schizocarp; seed rough	**Ravenia**
5.	Functional stamens as many as petals (except in *Zanthoxylum*); fruit follicular or drupaceous; endocarp cartilaginous or leathery; seeds with endosperm	**6**
+	Stamens at least 2 × as many as petals or rarely fewer; fruit baccate; endocarp membranous or fleshy; seeds without endosperm	**7**
6.	Leaves odd-pinnately 3-31 foliolate; functional gynoecium with distinct carpels or carpels basally connate; fruit a follicle	**Zanthoxylum**
+	Leaves digitately 3-foliolate; functional gynoecium syncarpous; fruit a drupaceous berry	**Toddalia**
7.	Twings unarmed; leaf-rachis non-articulate; fruits without pulp-vesicles, semidry or slightly juicy	**8**
+	Twings armed with axillary, single or paried spines; leaf-rachis articulate; fruits usually juicy with well developed pulp-vesicles, or glandular-leathery (Atalantia and Citrus) or woody (Aegle and Limonia)	**11**
8.	Petals valvate; ovary locules twisted along their radial walls; cotyledons thin, foldd	**Micromelum**
+	Petals imbricate; ovary locules not twisted; cotyledons thick, fleshy, plano-covax	**9**
9.	Buds densely covered with rusty reddish brown hairs; leaves imparipinnate with 5-7, or 2 or 3 equilateral leaflets or rarely unifoliolate or simple; style very short, often not clearly demarcated from ovary, persistent	**Glycosmis**
+	Buds glabrous or if pubescens hairs grey or whitish; leaves imparipinnate with 5 to 9 or more than 15, sometimes up to 27, asymmetric leaflets; style as long as or longer than ovary, distinctly demarcated from ovary; often caduceus	**10**
10.	Flowering buds c. 6 mm long, subglobose; staminal filaments much dilated and hollow at base; ovary borne on a distinct, hourglass-shaped gynophore	**Clausena**
+	Flowering buds 8-15 mm long, cylindric or long-ovoid; staminal filaments linear-subulate; ovary borne directly on an annular or cylindric fleshy disk	**Murraya**
11.	Woody climbers, stem with recurved spines in leaf axils	**12**
+	Trees or erect shrubs, stem with recurved spines in leaf axils	**13**
12.	Mature leaves trifoliate on long and stiff petioles; inflorescence racemose or paniculate	**Luvunga**

+	Mature leave unifoliate (or simple) on short, slender and twisted petioles; inflorescence more usually solitary or in 2 or 3 nate cluster	**Paramignya**
13.	Fruits large, up to 15 cm across, with a thick, hard and woody pericarp; seed woolly-pubescent	**14**
+	Fruits small to large (up to 12 cm across or more as in some species of Citrus), with a thin or soft skin or a coriaceous, glandular pericarp; seeds glabrous	**15**
14.	Leaves imparipinate; petioles and rachis marginate or narrowly winged; leaflets 5 or 7, small (c. 3 × 2 cm); stamens 10-12; filaments free, wooly-pubescent below; ovary incompletely septate, unilocular with 5 or 6 parietal ovules	**Limonia**
+	Leaves pinnately trifoliolate; petioles wingless; leaflets up to 13 × 7 cm; stamens many (30-40); filaments irregularly united at base, glabrous; ovary 8-12 (-20)-locular with many, biseriate ovules	**Aegle**
15.	Fruits thin-skined soft berries; locules filled with mucilaginous gum without pulp-vesicles	**Triphasia**
+	Fruits with an outer leathery glandular pericarp; locules with or without pulp-vesicles, semidry or juicy	**16**
16.	Leaves simple, thick, fleshy with rather indistinct venation; fruits without pulp-vesicles	**Merope**
+	Leaves uni-or trifoliolate, thin, moderately corioceous, with rather prominent venation; fruits with well developed pulp-vesicles	**17**
17.	Stamen 4 or more times as many as the petals, often irregularly polyadelphous; ovary 8-20-locular with 4 or more ovules in each locule; fruit a hesperidium	**Citrus**
+	Stamens twice as many as petals, often free (rarely polyadelphous); ovary 2-5-locular with 1 or 2 ovules in each locule; fruit a juicy berry	**Atalantia**

Acronychia J.R. Forster & G. Forster, Char. Gen. Pl. 27. 1775.
Type species: *Acronychia acidula* F. Muell.

Evergreen shrubs or small to medium trees. Leaves opposite, 1 or 3-foliolate; leaflets entire. Inflorescences axillary or basal to leaves, corymbose or paniculate cymes, rarely reduced to solitary flower. Flowers bisexual. Sepals 4, free or basally connate, imbricate, persistent or caducous. Petals 4, valvate in bud, persistent or caducous. Stamens 8, distinct, alternately long and short; filaments gradually tapering from broad

base to subulate apex, becoming reflexed, ciliate toward base, adaxially pilose at middle, or rarely glabrous, gland-dotted; anthers ovoid or ellipsoid, obtuse or mucronulate. Disk pulvinate, deeply 8-lobed. Ovary 4-carpellate, 4-loculed; ovules superposed, 2 per locule; style terminal, twice as long as ovary; stigma punctiform or capitellate, 4-lobed. Fruit a 4-loculed drupe or capsule, with or without septicidal fissures; exocarp fleshy; mesocarp spongy-crustaceous or woody; endocarp cartilaginous to pergamentaceous. Seeds ellipsoid to pyriform, dull to shiny, smooth or finely tuberculate to rugose; endosperm copious; embryo straight or nearly so; cotyledons ovate to elliptic, flattened; hypocotyl superior.

Acronychia pedunculata (L.) Miq., Fl. Ned. Ind., Eerste Bijv. 3: 532. 1861; Brandis, Indian Trees: 116. 1906 (Repr. 1984); Ahmed *et al*. (eds.), Fl. Fauna Bangladesh 10: 160. 2009; Uddin & Hassan, Vas. Fl. Chittagong & CHT. 3: 238. 2018. *Jambolifera pedunculata* L., Sp. Pl. 1: 349. 1753. *Acronychia apiculata* Miq., Fl. Ned. Ind., Eerste Bijv. 3: 532. 1861. *Acronychia arborea* Blume, Bijdr. Fl. Ned. Ind. 5: 244. 1825. *Acronychia barberi* Gamble, Bull. Misc. Inform. Kew 1915(7): 345. 1915. *Acronychia elliptica* Merr. & L.M. Perry, J. Arnold Arbor. 22: 56. 1941. *Acronychia laurifolia* Blume, Cat. Gew. Buitenzorg (Blume) 27. 63. 1823; Hook.f., Fl. Brit. India 1: 498. 1875; Kurz, Forest Fl. Brit. Burma 1: 184. 1877 (Repr. 1974); Prain, Beng. Pl. 1: 300. 1903; Heinig, List Pl. Chitt. Coll. & HT.: 9. 1925. *Clausena simplicifolia* Dalzell, Hooker's J. Bot. Kew Gard. Misc. 3: 180. 1851. *Cyminosma pedunculata* (L.) DC., Prodr. [A. P. de Candolle] 1: 722. 1824. *Gela lanceolata* Lour., Fl. Cochinch. 1: 232. 1790. *Jambolifera resinosa* Lour., Fl. Cochinch. 1: 231. 1790. *Laxmannia ankenda* Raeusch., Nomencl. Bot. [Raeusch.] ed. 3, 99: 1797. *Selas lanceolatum* Spreng., Syst. Veg., ed. 16 [Sprengel] 2: 216. 1825. *Ximenia lanceolata* DC., Prodr. [A.P. de Candolle] 1: 533. 1824. **Fig. 1**

Bengali: *Bon-jamir, Jamir*

English: Claw Flowered Laurel, Laka Wood, Indian Aspen

Evergreen trees, up to 20 m tall. Branchlets cylindric to quadrangular, glabrous or with white pubescence hairs; bark grey, glossy, smooth or lenticellate. Leaves opposite, unifoliolate; leaf blades elliptic or oblong or elliptic-oblong, or subobovate, 4-20 × 2-8 cm, cuneate or sometimes rounded or attenuate at base, apex acute or obtusely acuminate, margins entire, glossy, chartaceous to coriaceous, glabrous, midnerve prominent on both sides, lateral nerves 12 to 20 pairs, anastamosing to fine reticulation; petioles 1-5 cm long, grooved above, swollen at ends, glabrous or shortly pubescent. Inflorescences axillary, paniculate or corymbose cymes, 5-18 cm long, few to many flowered; peduncle terete or compressed, glabrous to finely pubescent. Flowers bisexual,

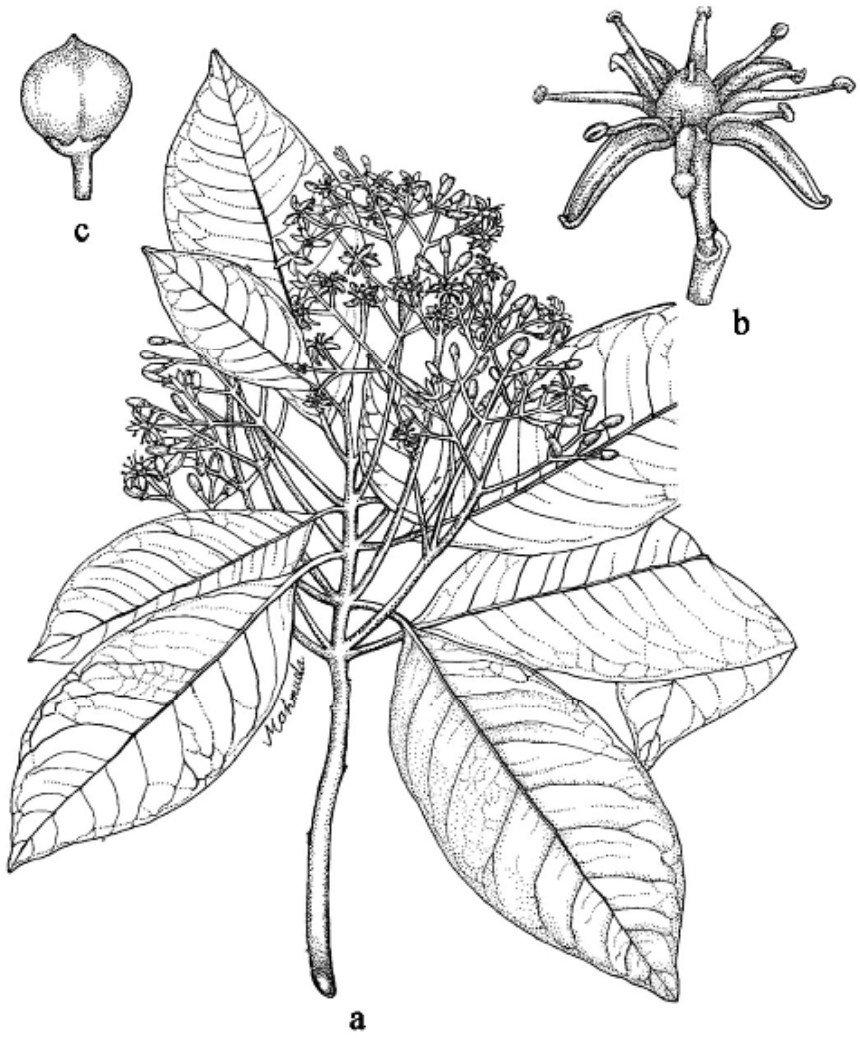


Figure 1: **Acronychia pedunculata** (L.) Miq.: a) Flowering shoot; b) flower; and c) fruit.

8-12 mm diameter; bract and bracteoles minute, lanceolate; pedicels slender, 5-10 mm long, glabrescent. Sepals 4, suborbicular, obtuse, c. 1.0 × 1.5 mm, pubescent, imbricate, connate below, persistent. Petals 4, linear-oblong from a broader base, 4-10 × 1.5-2.0 mm, apex obtuse, concave, glabrous abaxially, valvate, cream-yellowish. Stamens 8,

inserted at base of disk; filaments 4-8 mm long, subulate, inner surface villous towards base; anthers ovoid or ellipsoid, c. 1 mm long, basifixed. Disk 8-angled, 2-3 mm diameter, pubescent or villous. Ovary 4-lobed, ellipsoid or ovoid, 3-4 × 1.5-1.8 mm, glabrous to tomentose, 4-locular, each with 2 superposed ovules; style filiform, c. 2 mm long, pubescent at base, otherwise glabrous; stigma capitate, 4-lobed. Fruit a drupe, subglobose or ellipsoid, pyriform, or broadly conic, 1.0-1.5 × 0.8-1.2 cm, with or without apical septicidal fissures, glabrate to finely pubescent, apex apiculate, green when ripe, dark-brownish turning to black on drying. Seeds 2-4, ovoid, 3-7 mm diameter, bottle green to black. 2n = 36 (Kumar and Subramaniam, 1986). *Fl. & fr.*: 1-11. *Primary and secondary forests, woods or thickets on lower hills and coastal scrubs; near sea level to 600 m altitude*.

Bandarban: Rajvilla Forest Range, Bandarban sadar, 13 xi 2016, *Imam et al.* IH-1627 (DACB 68040). **Chattogram:** Hazarikhil, 6 x 1997, *M.A. Rahman* (CUH 1971); Panerchara, 12 ix 1999, *Rahman et al.* (CUH 5872); Goalmara beat, Chunati range, Lohagara, 3 viii 1990, *Khan et al.* K. 8385 (DACB 12513); Eastern Hill, near BFRI campus, 27 ix 1997, *Munir et al.* (BFRI); Chunati, 26 vii 1966, *Das et al.* (BFRI 75); Russain Hill, 17 ii 1982, *Akter et al.* (BFRI 4233); Khaiyachara, Mirsori, 5 i 2017, *Tajul et al.* TOK. 2628 (DACB 54579); Hajarikhil Wildlife Sanctuary, 18 viii 2014, *S.N. Uddin* N. 5350 (DACB 43306). **Cox'x Bazar:** Upper Rezu, 5 viii 1997, *Yusuf and Hossain* (CUH 1697), Chakaria, Medakachchapia, 20 viii 1981, *Mia et al.* M-584 (DACB 12514); Upper Rezu, 15 xi 1997, *Rahman and Uddin* (CUH 2355); Bangabandhu Dulahazra Safari Park, 1 xi 2017, *Niyamul et al*. NK. 4964 (DACB 59794); Panerchara, Moheshkhali, 21 ii 1971, *Khan et al*. K. 2511 (DACB 2666). **Moulvibazar:** Lawachara, Kamalganj, *Farid Ahsan* (BFRI 720). **Rangamati:** Sitapahar westrange, Kaptai, 18 xi 1975, *Jaher et al.* (BFRI 140); Fring Keong forest beat, Karnaphuli Forest Range, Kaptai, 3 viii 2000, *S.N. Uddin* N. 4366 (DACB 44942); Ali Khiang, Pharua reserve forest, Bilaichari, 24 vii 2009, *S.N. Uddin* N. 3847 (DACB 6660).

Bhutan, China, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Papua New Guinea, Philippines, Sri Lanka, Thailand and Vietnam.

Root is applied to rheumatism and as a fish poison. Stem bark is used as a tonic and for treatment of itch, scabies, sores and ulcers. It is also used for caulking boats and toughening fishing nets. Leaves yield an aromatic essential oil. Tender leaves are sometimes eaten as a condiment and to promote digestion. The leaves contain volatile aromatic oil, which is used in stimulating baths. Wood is used for making poles, furniture and tool handles. It produces good quality charcoal and used as firewood. Fruits are edible.

Aegle Corrêa, Trans. Linn. Soc. London. 5: 222. 1800.
Type species: *Aegle marmelos* (L.) Corrêa

Deciduous trees, with straight axillary spines. Leaves alternate, odd-pinnately (1 or) 3 (or 5)-foliolate; leaflets subcrenulate, membranous. Inflorescences terminal and axillary, loosely fasciculate or racemose, 1-few flowered. Flowers bisexual, white, fragrant. Calyx cupular, 4- or 5-lobed, deciduous. Petals 4 or 5, spreading, imbricate in bud. Stamens 30-50 or more, inserted outside an inconspicuous disk; filaments short, subulate, free or irregularly coherent at base; anthers linear-lanceolate. Disk columnar or bell-shaped. Ovary ovoid, 8-20-loculed, syncarpous, ovules numerous, 2-seriate in each locule; style short, thick; stigma capitate, cylindric, oblong or fusiform, longitudinally grooved. Berry globose to ellipsoid to pyriform; exocarp thin, parenchymatous; mesocarp woody; endocarp fleshy, soft and pulpy, becoming hard and reddish orange when dry, composed largely of elongate sessile pulp vesicles which are lacking within seed locules. Seeds depressed ovoid, oblong, woolly when ripe, embedded in a glutinous substance that becomes hard when dry; seed coat fleshy; endosperm lacking; embryo solitary, straight; cotyledons ovate, plano-convex; hypocotyl partly included between cotyledons.

Aegle marmelos (L.) Corrêa, Trans. Linn. Soc. London 5: 223. 1800; Hook.f., Fl. Brit. India 1: 516. 1875; Kurz, Forest Fl. Brit. Burma 1: 199. 1877 (Repr. 1974); Prain, Beng. Pl. 1: 305. 1903; Brandis, Indian Trees: 119. 1906 (reprint, 1984); Heinig, List Pl. Chitt. Coll. & HT.: 10. 1925. Ahmed *et al.* (eds.), Encycl. Fl. Fauna Bangladesh 10: 161. 2009; Uddin & Hassan, Vas. Fl. Chittagong & CHT. 3: 240. 2018. *Crateva marmelos* L., Sp. Pl. 1: 444. 1753. *Aegle marmelos* (L.) Correa var. *mahurensis* Zate in Indian J. For. 5: 35. 1982. **Fig. 2**

Bengali: *Bel* English: Bael Fruit, Bengal Quince, Wood apple

Deciduous trees, up to 15 m tall. Branches cylindric or slightly angular, armed with straight, stout, sharp, solitary or paired spines, pubescent to glabrous; bark bluish-grey, irregularly broken. Leaves alternate, pinnately trifoliolate, rarely 5-foliolate, dimorphic; leaflets ovate-elliptic or elliptic-lanceolate, 4-12 × 2-6 cm, terminal ones larger; base rounded to narrowly cuneate, apex acuminate or acute, margin crenulate, thin, membranous to chartaceous, surfaces glandular-punctate, glabrous; petioles slender, up to 6 cm long, glabrous or puberulous. Inflorescences axillary and terminal, racemose or cymose, few-flowered, up to 5 cm long; peduncles densely puberulent; pedicels 2-4 mm long, densely puberulent. Flowers subglobose in bud, fragrant. Calyx cupular with 5 small deltate or suborbicular teeth, puberulent, caducous. Petals 4 or 5, ovate-oblong, 10-

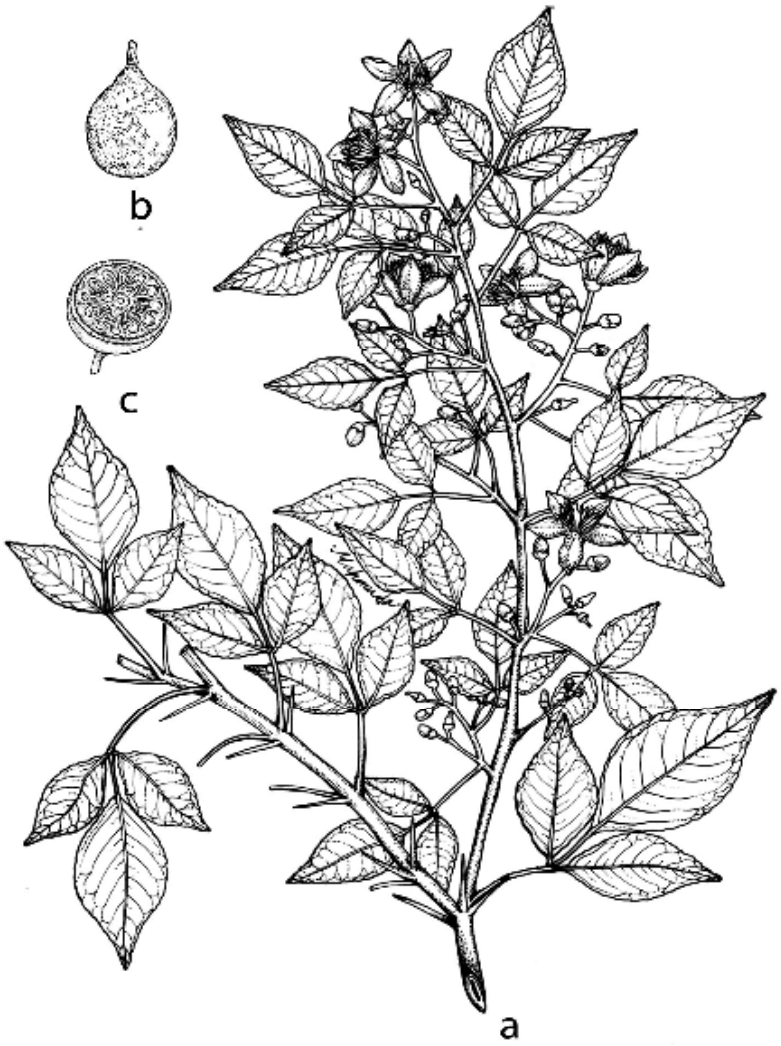


Figure 2: **Aegle marmelos** (L.) Corrêa: a) Flowering shoot; b) fruit; and c) T.S. of fruit.

12 × 4-6 mm, obtuse, glandular, coriaceous, glabrous, greenish-white. Stamens numerous, 30-45 in irregular 2-3 series, irregularly connected at base or free, unequal; filaments subulate, 6-8 mm long, glandular, glabrous; anthers linear-oblong, apiculate, 6-9 mm long. Disk cylindric, c. 1 mm long, greenish, glabrous. Ovary ovoid-oblong, 3-5 mm long, faintly ridged, glabrous, greenish, 8-12 (-20)-locular; locules with many biseriate ovules; style very short, glabrous; stigma cylindric or bluntly conical, longitudinally grooved, light greenish, often sticky. Berry subglobose to ellipsoid to

pyriform, 10-15 cm diameter, 8-20-locular; pericarp hard, woody, grey or yellowish, depressed above, many seeded. Seeds oblong, flattened, woolly-pubescent, embedded in a thick, orange mucilaginous pulp; testa white, woolly-pubescent. 2*n* = 18, 36 (Kumar and Subramaniam, 1986). *Fl. & fr.:* 2-12. *Cultivated lands, moist deciduous forests, dry hillsides; up to1000 m altitude.*

Bandarban: Thanapara, Ruma, 25 iii 2019, *K.K. Islam,* KKI-3451 (DACB 48294). **Chattogram:** Fatehpur, Hathazari, 10 v 2017, *Tajul et al.* TAK-4843 (DACB 51792); Chittagong University campus, 29 viii 2016, *Tajul et al.* TOK-299 (DACB 48663). **Cox'x Bazar:** Dulahazra Safari Park, 16 xi 2014, *Rahman & Hassan* M-145 (CUH 11365). **Dhaka:** Ramna Park, 17 v 1980, *Momtaz Begum,* MB-392 (DACB 25150). **Dinajpur:** Birganj National Park, Birganj, 2 xii 2020, *K.K. Islam,* KKI-4016 (DACB 65933); Singra National Park, 3 ii 2019, *Sultana et al.,* DMS-2577 (DACB 57298). **Faridpur:** Goalando, 16 vi 1981, *Mia et al.,* M-543 (DACB 25151). **Jamalpur:** Tulshipur, 15 xi 2019, *Kanis Fatema,* (DACB 55766). **Mymensingh:** Panihata, Haluaghat, 23 v 1989, *Mia et al.,* M-2056 (DACB 12512). **Patuakhali:** Kuakata, Kalapara, 14 x 2019, *M. Sultana* DMS-2952 (DACB 59938). **Satkhira:** Nakirpur old Zamidar bari, Samnagar, 13 xii 1989, *Huq et al*. H-9435 (DACB 12511).

Native to India, China, Myanmar, Pakistan, Sri Lanka, South-East Asia, tropical Africa and the United States.

Roots are used for cure of intermittent fever, palpitation, indigestion and bowel inflammation. Leaves are used in treatment of ophthalmia, catarrhs and fever. Unripe fruits are astringent, stomachic, digestive and good remedies for chronic diarrhoea and dysentery. Ripe fruits are sweet, nutritious, cooling and laxative. The pulp of ripe fruits is eaten fresh and used for preparing juice. The mucilaginous substance surrounding the seeds is used as a varnish and water-colour paints. The wood takes fine polish and is used for making agricultural implements, pestles for oil & sugar mills and for tool handles. The Hindus regard this plant as sacred and its leaves are used for various rituals.

Atalantia Corrêa, Ann. Mus. Natl. Hist. Nat. 6: 383. 1805.
Type species: *Atalantia monophylla* (L.) DC. (*Limonia monophylla* L., typ. cons.)

Shrubs or small trees, unarmed or with straight axillary spines. Leaves alternate, foliolate or simple; blades shiny, coriaceous, prominently nerved with frequent reticulations between lateral nerves; petiolesshort, grooved above, wingless, often articulated. Inflorescences axillary or rarely terminal, fasciculate, racemose, or

paniculate. Flowers bisexual, fragrant, pedicellate. Sepals 3-5, connate at base to nearly their full length, or calyx splitting irregularly into 2 or 4 segments. Petals 3-5, imbricate in bud. Stamens 6-10, equal or unequal, free or monadelphous; filaments coherent in phalanges; anthers small, ovoid. Disk fleshy, annular, cup-shaped, or columnar. Ovary oblong to subglobose, glabrous, 2-5-locular, syncarpous, each locule with 1 or 2 ovules; style cylindric, as long as or longer than ovary, deciduous; stigma capitate, subglobose or truncate. Berry subglobose to globose, yellowish when ripe, 2-5-locular, usually with pulp vesicles, with or without mucilaginous pulp; endocarp membranous. Seeds 2-4, oblong-ellipsoid, occasionally polyembryonic, membranous coat; endosperm lacking; embryo straight; cotyledons elliptic, plano-convex; hypocotyl partly included between cotyledons.

KEY TO THE SPECIES

1.	Small tree; inflorescence corymbose or umbelliform; calyx hollow or cupular rupturing into 2-4 irregular scarious lobes at anthesis	**A. monophylla**
+	Shrubs; inflorescence racemose or fascicled; calyx differentiated into normal sepals	**A. simplicifolia**

Atalantia monophylla DC., Prodr. 1: 535. 1824; Hook.f., Fl. Brit. India 1: 511. 1875; Kurz, Forest Fl. Brit. Burma 1: 194. 1877 (Repr. 1974); Prain, Beng. Pl. 1: 304. 1903; Brandis, Indian Trees: 121. 1906 (reprint, 1984); Heinig, List Pl. Chitt. Coll. & HT.: 9. 1925; Hajra *et al.,* Fl. India 4: 266. 1997; Uddin & Hassan, Vas. Fl. Chittagong & CHT. 3: 241. 2018; Ahmed *et al*. (eds.), Encycl. Fl. Fauna Bangladesh 10: 163. 2009. *Atalantia carissoides* Wall., Numer. List 6354. 1832. *Atalantia floribunda* Wight, Icon. Pl. Ind. Orient. 4: t. 1611, 1850. *Atalantia malabarica* (Raf.) Yu. Tanaka, J. Indian Bot. Soc. 16: 233. 1937. *Atalantia platystigma* Wight, Ill. Ind. Bot. 1: 108. 1838. *Atalantia umbellata* M. Roem., Fam. Nat. Syn. Monogr. 1: 37. 1846. **Fig. 3**

Evergreen, aromatic shrubs or trees, up to 12 m high. Branchlets cylindric, with single, axillary, stout spine, or rarely unarmed, pubescent or glabrous; bark lenticellate, grey. Leaves unifoliolate; leaf-blades ovate to ovate-lanceolate or elliptic-oblong, 3-10 × 1.5-4.0 cm, base cuneate, apex obtuse, emarginate, margins entire, upper surface glossy dark green, lower surface pale green, coriaceous, glabrous; secondary nerves 8-14 pairs, faint above, prominent beneath; petioles up to 1 cm long. Inflorescences axillary, racemose, corymbose or umbelliform, shorter or longer than leaves; peduncle slender, puberulous or glabrous; bracteoles subulate, c. 1.5 mm long, hairy, caducous; pedicels filiform, 8-15 mm long, pubescent or glabrous. Flowers up to 2 cm across, fragrant, bud

Figure 3: **Atalantia monophylla** DC.: a) Flowering shoot; b) flower; and c) fruit.

ovoid or oblong. Calyx cup shaped, splitting irregularly into 2-4 lobes at anthesis; lobes obtuse, 0.5-1.5 mm long, densely pubescent to glabrous, persistent. Petals 4 or 5, oblong-elliptic, 7-10 × 3-4 mm, rounded, white, glabrous. Stamens 8 or 10, alternately short and long, connect into a tube almost 3/4 of their entire length, glabrous; anthers ovoid, c. 1 mm long, yellowish. Disk annular, obscurely 8-10-lobed, c. 1 ×1.5 mm, fleshy, whitish. Ovary ovoid, 2.5-4.0 × 1.0-1.5 mm, 3- or 4-locular; smooth, 1- or 2-ovules per locule; style cylindric, as long as ovary; stigma irregularly 3- or 4-lobed, capitate, caducous. Berries globose, 2-5 mm diameter, 3- or 4-locular, greenish-yellow; each locule filled with tapering pulp-vesicles; rind densely glandular. Seeds 1, oblong-ellipsoid, endosperm lacking. *Fl. & fr.*: 1-12. *Coastal scrub jungles, evergreen forests, up to 600 m altitude*.

Cox's Bazar: Hnila, Teknaf, 27 v 2017, *Kamrul Islam,* KI-102 (DACB 56654). **Rangamati:** Sitapahar, Kaptai, 12 vii 2005, *S.N. Uddin,* N-2730 (DACB 40427); Sitapahar, Kaptai, 20 xii 2004, *S.N. Uddin* N-2668 (DACB 40424); Kaptai, 2 x 2014, *Md. Monirul Islam* (CUH 9279).

South and South-East Asia.

Wood is used for cabinet work and furniture. Fruit yields oil, which is used for treatment of chronic rheumatism and paralysis. Fresh leaves are applied as an antidote to snake bite.

Atalantia simplicifolia (Roxb.) Engl. in Engl. & Prantl, Nat. Pflanzenfam. 3(4): 192. 1896; Hajra *et al.,* Fl. India 4: 271. 1997. *Atalantia simplicifolia* (Roxb.) Tanaka in J. Bot. 68: 232. 1930, comb. superfl. *Amyris simplicifolia* Roxb., Fl. Ind. 2: 244. 1832. *Sclerostylis roxburghii* Wight, Icon. Pl. Ind. Orient. 1: 72. 1840. *Atalantia roxburghii* (Wight) Oliver in J. Linn. Soc., Bot. 5. Suppl. 2: 25. 1861. *Atalantia caudata* Hook.f., Fl. Brit. India 1: 513. 1875; Kurz, Forest Fl. Brit. Burma 1: 194. 1877 (Repr. 1974); Brandis, Indian Trees: 121. 1906 (Repr., 1984); *Atalantia roxburghiana* Hook.f., Fl. Brit. India 1: 513. 1875; Uddin & Hassan, Vas. Fl. Chittagong & CHT. 3: 242. 2018. *Atalantia kwangtungensis* Merrill, Philipp. J. Sci. 21: 496. 1922; Uddin *et al*., Bull. Bangladesh National Herb. 4: 80. 2015. *Atalantia roxburghiana* Hook.f. var. *kwangtungensis* (Merrill) Swingle, J. Arnold Arbor. 21: 129. 1940. *Atalantia hainanensis* Merrill & Chun *ex* Swingle, J. Arnold Arbor. 21: 20. 1940. **Fig. 4**

Shrubs 1-2 m tall high. Branchlets slender, slightly flat, ridged glabrous, green. Leaves unifoliolate; elliptic-lanceolate, or rarely obovate-elliptic, 7-13 × 1-5 cm, base cuneate, apex caudate-acuminate, margin sinuate, coriaceous, pale green, abaxially

grayish yellow when dry, oil glands pellucid, conspicuous; secondary nerves c. 10 pairs; petioles 5-10 mm long, horizontally grooved above, articulate with base of blade, glabrous. Inflorescences axillary, fascicle like racemes, up to 2.5 cm long, with 3 to several flowers; pedicels slender, 5-7 mm long, glabrous. Flowers 4-merous, small.

Figure 4: **Atalantia simplicifolia** (Roxb.) Engl.: a) Flowering shoot; b) flower bud; c) corolla & stamens; and d) flower with petals and stamens removed, showing pistil and disk.

Calyx with 4 minute, acute sepals. Petals obovate-oblong, 3-5 mm long, white. Stamens 8, monadelphous or filaments coherent in phalanges; anthers ovoid. Ovary seated on an annular disk, 2-locular; each locule with 2 collateral ovules; style as long as ovary; stigma slightly clavate. Berry globose or ellipsoid, 1.2-1.5 × 0.7-1.3 cm, 2-locular, smooth, with large oil glands, 1-3-seeded; exocarp c. 0.5 mm thick. Seeds narrowly ovoid, 1.0-1.5 cm; embryo solitary. *Fl. & fr.*: 4-1. *Moist and shady places in evergreen broad-leaved forests; between 100-400 m altitudes*.

Chattogram: Paranjuran, Dhopachari, 3 vi 1998, *Rahman et al.* (CUH 3034). **Cox's Bazar:** Himchari National Park area, 29 iv 1997, *Rahman & Uddin* (CUH 1413). **Moulvibazar:** Madhabkunda Eco-park, Barlekha, 23 ix 2011, *S.N. Uddin,* N-4833 (DACB 41834).

China, India, Indo-China, Malay, Peninsula, Sumatra and Thailand.

Citrus L., Sp. Pl. 2: 782. 1753.
Type species: *Citrus medica* L.

Evergreen or rarely deciduous, shrubs or small trees. Young branches flat and angled, usually with axillary single (rarely paired) spines. Leaves alternate, unifoliolate or 3-foliolate or simple; petiole usually articulated with base of leaf blade, winged; leaf blade subleathery to leathery, with dense pellucid fragrant oil dots, margin crenulate or rarely entire. Inflorescences axillary, racemose, or cymose or of a solitary or in small fascicles. Flowers hermaphrodite or male, fragrant. Calyx cupular or urceolate with 3 or 5 sepals subglabrous. Petals (3-)4 or 5(-8), white or outside pinkish red, imbricate, thick. Stamens numerous, 4 times or more as many as petals (20-40), free or basally coherent. Disk annular or short, with nectary glands. Ovary depressed-subglobose, 4-18-loculed, each locule with 2-8 or more ovules in 2 collateral rows; style cylindric, caducous; stigma globose or capitate, glandular-sticky. Fruit a berry (hesperidium) with sarcocarp segments of pulp vesicles, variable size and shape; pericarp leathery; outer layer densely glandular, often glossy, yellowish or orange; inner layer white; endocarp spongy; interior of locules filled with numerous stalked, soft or firm, purple vesicles containing sweet, sour or acidic juice. Seeds angular-obovoid, smooth or ridged, mono-or polyembryonic; cotyledons milky white, green, or rarely yellowish, germination hypogeous.

KEY TO THE SPECIES

1.	Petioles wingless, marginate or narrowly winged; wings never exceeding more than 3/4 of breadth of blade; stamens usually polyadelphous; pulp-vesicles of fruits free of acrid oil droplets	**C. hystrix**
+	Petioles broadly winged; wings as broad as blade; stamens usually free; pulp-vesicles of fruits contain acrid oil droplets	**2**
2.	Petioles wingless, not or imperfectly articulate at base of blade; fruits longer than broad	**C. medica**

+	Petioles marginate or narrow to broadly winged, articulate at base of blade; fruit not longer than broad	**3**
3.	Petioles narrowly marginate	**C. limon**
+	Petioles narrowly to broadly winged	**4**
4.	Flowers 20-25 mm across; fruits up to 5 cm across; pericarp thin, leathery	**C. aurantifolia**
+	Flowers 40-45 mm across; fruits more than 6 cm across; pericarp thick	**5**
5	Petioles broadly winged; wings 15-25 mm broad	**6**
+	Petioles marginate or narrowly winged; wings up to 6 mm broad	**7**
6.	Petiolar wings oblong-spathulate or obcordate; fruits 10-20 cm diameter, green to yellow; mesocarp very thick and spongy	**C. maxima**
+	Petiolar wings oblong-obovate; fruits up to 8 cm diameter, reddish-vermilion; mesocarp scanty, fibrous	**C. aurantiium**
7.	Leaflet apex tapering; fruits with loosely attached pericarp	**C. reticulata**
+	Leaflet apex obtusely emarginate; fruits with adherent pericarp	**C. sinensis**

Citrus aurantiifolia (Christm.) Swingle, J. Wash. Acad. Sci. 3. 18: 465. 1913; Hajra *et al.,* Fl. India 4: 278. 1997; Ahmed *et al.* (eds.), Encycl. Fl. Fauna Bangladesh 10: 164. 2009; Uddin & Hassan, Vas. Fl. Chittagong & CHT. 3: 243. 2018. *Limonia aurantiifolia* Christm., Vollst. Pflanzensyst. 1: 618. 1777. *Citrus acida* Pers., Syn. Pl. 2: 73. 1806. *Citrus notissima* Blanco, Fl. Filip. 607. 1837. *Citrus javanica* Blume, Catalogus 95. 1823. *Citrus webberi* var. *montana* Wester, Philipp. Agric. Rev. 8: 13. 1915. *Citrus voangasay* (Bory) Bojer, Hortus Maurit. 49. 1837. *Citrus spinosissima* G. Mey., Prim. Fl. Esseq. 247. 1818. *Citrus pseudolimonum* Wester, Philipp. Agric. Rev. 8: 24. 1915. *Citrus papaya* Hassk., Cat. Hort. Bot. Bogor. 218. 1844. *Citrus nipis* Michel, Traité Citronier 44. 1816. *Citrus medica* var. *acida* Brandis, Forest Fl. N.W. India 52. 1874. *Citrus macrophylla* Wester, Philipp. Agric. Rev. 8: 16. 1915. *Citrus medica* f. *aurantiifolium* (Christm.) M. Hiroe, Forest Pl. History Jap. Is. 1: 219. 1974. *Citrus limonellus* Hassk., Flora 25 (Beibl. 2): 43. 1842. *Citrus limettioides* Yu. Tanaka, J. Indian Bot. Soc. 16: 236. 1937. *Citrus lima* Macfad., Bot. Misc. 1: 300. 1830. *Citrus hystrix* ssp. *acida* Engl., Nat. Pflanzenfam. 3(4): 200. 1896. *Citrus excelsa* Wester, Philipp. Agric. Rev. 8: 26. 1915. **Fig. 5**

Bengali: *Kaghazi lebu, Lebu, Pati lebu, Patinebu*

English: Lime, Sour Lime, Common Lime

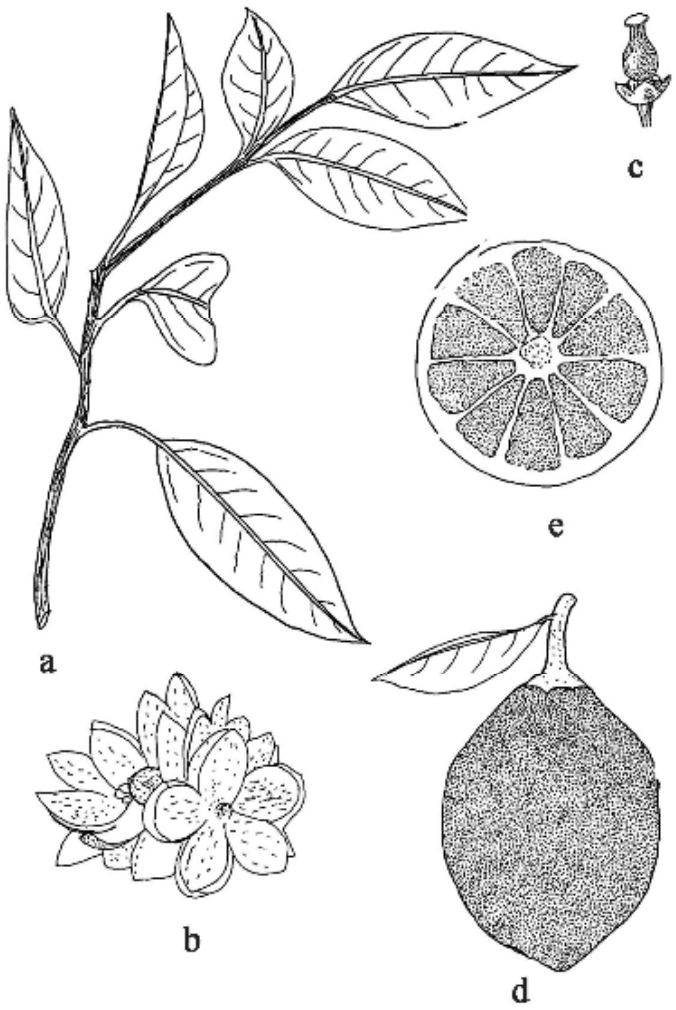


Figure 5: **Citrus aurantiifolia** (Christm.) Swingle: a) Leafy shoot; b) flowers; c) pistil; d) fruit; and e) T.S. of fruit.

Evergreen shrubs or small trees, up to 4 m high. Branchlets numerous and irregular, angular when young, with sharp, stout spines. Leaves alternate, slightly stiff with a short, conspicuous petiole; leaf blades broadly ovate to elliptic-oblong, 5-8 × 2-5 cm, base rounded, apex obtusely acute, sometimes mucronate, margin crenulate; petioles narrowly winged; wings spathulate to obcordate, up to c. 15 × 13 mm, articulate above with the base of blade. Inflorescences axillary, laxly racemes, 2-7-flowered, or rarely of

a solitary flower. Flowers bisexual and staminate, 20-25 mm across, white. Calyx cup-shaped, 4 or 5-lobed, greenish-white; lobes deltoid, acute, glandular. Petals 4 or 5, oblong, 1.0-1.2 cm long, acute, thick, glandular, white. Stamens 20-28; filaments polyadelphous, white; anthers oblong, yellowish. Ovary depressed-globose, greenish; style cylindric, as long as stigma, white; stigma capitate. Fruits globose, ellipsoid, or obovoid, 4-6 × 4-5 cm, smooth, with prominent oil glands, pitted, glossy, green to greenish-yellow, apex with a papilla; pericarp thin, coriaceous, strongly adherent; mesocarp spongy, white; sarcocarp with 9-12 segments, strongly adherent, centre solid, pulp-vesicles slender, fusiform, greenish-white; juice abundant, very acidic. Seeds ovoid, smooth, plump, pale; cotyledons milky white. $2n = 18, 27$ (Kumar and Subramaniam, 1986). *Fl. & fr.*: 1-12. *Trailsides roadsides, garden; at low altitude*.

Bandarban: Betchari Forest Range, 15 i 2017, *Imam et al.*, IH-3280 (DACB 67891). **Chattogram:** Chittagong University campus, 29 viii 2016, *Tajul et al.*, TOK-82 (DACB); Sandwip, Rahamatpur, 11 ii 1988, *Mia & Mahfuz,* M-1579 (DACB 12517); Kumira, Sitakunda, 31 i 2017, *Tajul et al.*, TOK-3653 (DACB 53173). **Moulvibazar:** Lawachara, Kamalganj, 2 ii 2009, *Bushra & Momtaz*, BM-1324 (DACB 3448). **Satkhira:** Debhata, 2 v 1992, *A.B. Siddique* (BFRI 436).

Probably a native of Malaysia. Cultivated throughout the tropics and subtropical countries

Fruit juice is antiscorbutic, appetizer, stomachic and anthelmintic. It is used in the treatment of dyspepsia, flatulence, biliousness, nausea and irritations of skin. It is also used for culinary purposes, beverages and lime juice. Leaves are used as a flavouring agent in tea and curies.

.

Citrus aurantium L., Sp. Pl. 783. 1753. Hook.f., Fl. Brit. India 1: 515. 1875; Kurz, Forest Fl. Brit. Burma 1: 197. 1877 (Repr., 1974); Prain, Beng. Pl. 1: 307. 1903; Brandis, Indian Trees: 123. 1906 (Repr., 1984); Heinig, List Pl. Chitt. Coll. & HT.: 10. 1925; J. Sinclair, Bull. Bot. Soc. Beng. 9(2): 89. 1955; Hajra *et al.,* Fl. India 4: 279. 1997; Ahmed *et al.* (eds.), Encycl. Fl. Fauna Bangladesh 10: 165. 2009; Uddin & Hassan (eds.), Vas. Fl. Chittagong & CHT. 3: 243. 2018. *Citrus madraspatana* Hort. *ex* Tanaka in J. Indian Bot. Soc. 16: 238. 1937. *Aurantium acre* Mill., Gard. Dict. ed. 8, 1. 1768. *Aurantium bigarella* Poit. & Turpin, Pomol. Franç. 2: t. 106 1873. *Aurantium corniculatum* Poit. & Turpin, Pomol. Franç. 2: t. 45. 1873. *Aurantium coronatum* Poit. & Turpin, Pomol. Franç. 2: t. 14. 1873. *Aurantium humile* Mill.*,* Gard. Dict. ed. 8, 5. 1768. *Aurantium myrtifolium* Descourt., Fl. Méd. Antilles 3: 308. 1827. *Aurantium orientale* Mill., Gard. Dict. ed. 8, 3. 1768. *Aurantium silvestre* Pritz., Icon. Bot. Index 1: 127. 1854. *Aurantium*

sinense (L.) Mill., Gard. Dict. ed. 8, 2. 1768. *Aurantium variegatum* Barb. Rodr., Hort. Flumin. 1893: 51. 1895. *Citrus amara* Link, Handbuch 2: 346. 1831. *Citrus aurata* Risso, Essai Hist.-Nat. Orangers 1: 409. 1813. C*itrus bigaradia* Loisel., Traité Arbr. Arbust. nouv. ed., 7: 99. 1819. *Citrus calot* Lag., Gen. Sp. Pl. 17. 1816. *Citrus communis* Poit. & Turpin, Pomol. Franç. 2: t. 274. 1873. *Citrus dulcimedulla* Pritz., Icon. Bot. Index 1: 275. 1854. *Citrus dulcis* Pers., Syn. Pl. 2: 74. 1806. *Citrus vulgaris* Risso, Ann. Mus. Hist. Nat. 20: 190. 1813. *Citrus yatsushiro* Yu. Tanaka, Stud. Citrol. 1(1): 37. 1927. *Citrus yatsushiro* Yu. Tanaka, Stud. Citrol. 1(1): 37. 1927. *Citrus yuge-hyokan* Yu. Tanaka, Icon. Jap. Citrus Fruits 2: 251. 1948. *Citrus truncata* Yu. Tanaka, Stud. Citrol. 9: 15. 1939. *Citrus tosa-asahi* Yu. Tanaka, Icon. Jap. Citrus Fruits 1: 194. 1946. *Citrus tankan* f. *koshotankan* Hayata, Icon. Pl. Formosan. 8: 27. 1919. *Citrus tangelo* J.W. Ingram & H.E. Moore, Baileya 19: 169. 1975. *Citrus taiwanica* Yu. Tanaka & Shimada, Bull. Sc. Hort. Inst. Kyushu Imp. Univ. 2: 54. 1926. *Citrus sinensis* f. *sekkan* Hayata, Icon. Pl. Formosan. 8: 25. 1919. *Citrus bigaradia* Loisel., Traité Arbr. Arbust. nouv. ed., 7: 99. 1819. *Citrus bigaradia* Risso & Poit., Hist. Nat. Orang. 72, pl. 30. 1818. *Citrus bigaradia* var. *cyathifera* Risso & Poit., Hist. Nat. Orangers 1: 81. 1819. *Citrus aurantium* ssp. *amara* (Link) Engl., Nat. Pflanzenfam. 3(4): 198. 1896. *Citrus aurantium* var. *amara* L., Sp. Pl. 783. 1753. **Fig. 6**

Bengali: *Karun-jamir, Komola*

English: Bigarade, Bitter Orange, Seville Orange, Sour Orange

Small, evergreen trees, up to 10 m tall, much-branched. Branches with spines up to c. 8 cm long. Leaves unifoliolate; petiole with winged spathulate to oblong-obovate, 1-3 × 0.6-1.5 cm, base narrow; leaf blades ovate or ovate-elliptic, base cuneate or rounded, apex tapering with emarginate tip, margins undulate or slightly crenulate, subcoriaceous, gland-dotted, aromatic, dark green. Inflorescences axillary racemes, with few to single flower. Flowers bisexual and staminate by complete abortion of pistil, fragrant; bud's ellipsoid to subglobose. Calyx cupular, lobes 4 or 5, deltoid, acute, glabrous to pubescent, ciliate along margins. Petals oblong, 12-15 × 2-4 mm, attenuate, coriaceous, glandular, white. Stamens 20-25, polyadelphous or, 1 or 2 sometimes free; filaments 6-10 mm long, white; anthers oblong, c. 3 mm long, yellow. Ovary barrel-shaped; style cylindric, white; stigma capitate. Fruits globose to oblate, depressed at base and apex, 4-8 cm across, surface coarse, pitted, orange to reddish; pericarp thick, closely adherent, sometimes difficult to remove; mesocarp white, scanty, fibrous; endocarp segments 9-12; pulp-vesicles orange coloured with acidic juice; sarcocarp with 10-13 segments, acidic and sweet or sometimes bitter. Seeds numerous, ovoid with ridges, smooth, end rugose, chalazal and red; embryo(s) solitary to numerous; cotyledons milky white. $2n$ =18 (Kumar and Subramaniam, 1986). *Fl. & fr.*: 5-12. *Cultivated in gardens and hill slopes*.

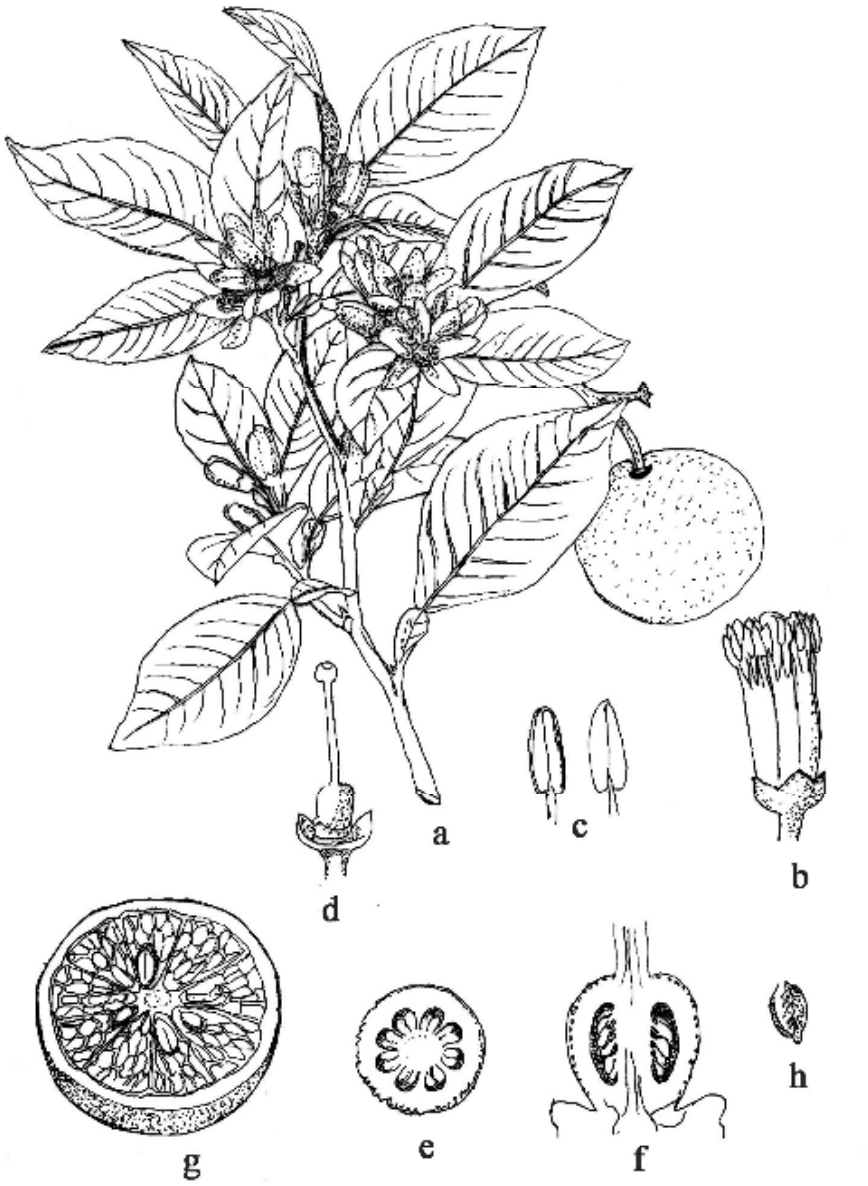


Figure 6: **Citrus aurantium** L.: a) Flowering shoot; b) anther column; c) anther; d) pistil; e) T.S. of ovary; f) L.S. of ovary; g) T.S. of fruit; and h) seed.

Probably a native of China and Indochina. Cultivated in many tropical and subtropical countries.

Fruits have medicinal properties and used against stomach pains, gall bladder problems, colds and influenza. It is used in the preparation of confections, liquors and other soft drinks. The outer peel of fruits is a flavouring agent and used extensively in manufacturing of citrus marmalade. Fresh flowers yield high quality fragrant oils, commercially known as oil of Neroli Bigarade and orange flower water. Leaves and young shoots yield oil of petit grain. Wood is used in cabinet works. The seedling is used as a rootstock for grafting sweet oranges and lemons.

Citrus hystrix DC., Cat. Pl. Horti Monsp. 97. 1813; Kurz, Forest Fl. Brit. Burma 1: 196. 1877 (Repr. 1974); Ahmed *et al.* (eds.), Encycl. Fl. Fauna Bangladesh 10: 160. 2009. *Citrus tuberoides* J.W. Benn., Rare Curious Fruits Ceylon t. 1. 1842. *Citrus auraria* Michel, Traité Citronier 43. 1816. *Citrus boholensis* (Wester) Yu. Tanaka, Syst. Pomol. 140. 1951. *Citrus celebica* Koord., Meded. Lands Plantentuin 19: 639. 1898. *Citrus combara* Raf., Sylva Tellur. 142. 1838. *Citrus hyalopulpa* Yu. Tanaka, Stud. Citrol. 10: 81. 1941. *Citrus kerrii* (Swingle) Yu. Tanaka, Syst. Pomol. 140. 1951. *Citrus macroptera* Mon., Mém. Acad. Roy. Sci. Lyon, Sect. Sci. n.s., 10: 187. 1860. *Citrus papeda* Miq., Fl. Ned. Ind. 1(2): 530. 1859. *Citrus papuana* F.M. Bailey, Contr. Fl. Brit. N. Guin. 1. 1901. *Citrus southwickii* Wester, Philipp. Agric. Rev. 8: 16. 1915. *Citrus torosa* Blanco, Fl. Filip. 609. 1837. *Citrus tuberoides* J.W. Benn., Select. Rare Curious Fruits Ceylon t. 1. 1842. *Citrus ventricosa* Michel, Traité Citronier 43. 1816. *Fortunella sagittifolia* K.M. Feng & P.Y. Mao, Acta Bot. Yunnan. 6: 69. 1984. **Fig. 7**

Bengali: *Satkora* English: Kaffir Lime, Leech-lime, Mauritius Papeda

Evergreen trees, up to 10 m tall, densely foliaged. Branchlets compressed and angled, armed with short and stiff spines. Leaves unifoliolate, alternate, red when young; leaf blade ovate, elliptic or lanceolate, 5-10 × 2.5-4.5 cm, base obtuse, apex narrowly obtuse, retuse, emarginate, margin entire or sparsely crenate, coriaceous, punctate with oily gland-dot, tertiary veins conspicuous; petiole winged, equal to or longer than leaflets, obcordately obovate or oblanceolate, portion of petioles below wings 5-8 mm long, channelled or margined, apex rounded to truncate. Inflorescences axillary, 3-8-flowered glomerate cymes or solitary; peduncle 1-5 mm long. Flower bisexual and staminate by aborting pistil, sessile, buds globose, white or light purplish, fragrant; pedicels up to 5 cm long. Calyx copular, lobes 4 or 5, broadly triangular, c. 4 × 6 mm. Petals 4 or 5, ovate or oblanceolate, 8-10 × 5-8 mm, white but pinkish red outside. Stamens 20-30 or more; filaments distinct, stout, free, white, glabrous; anthers linear, 2-3

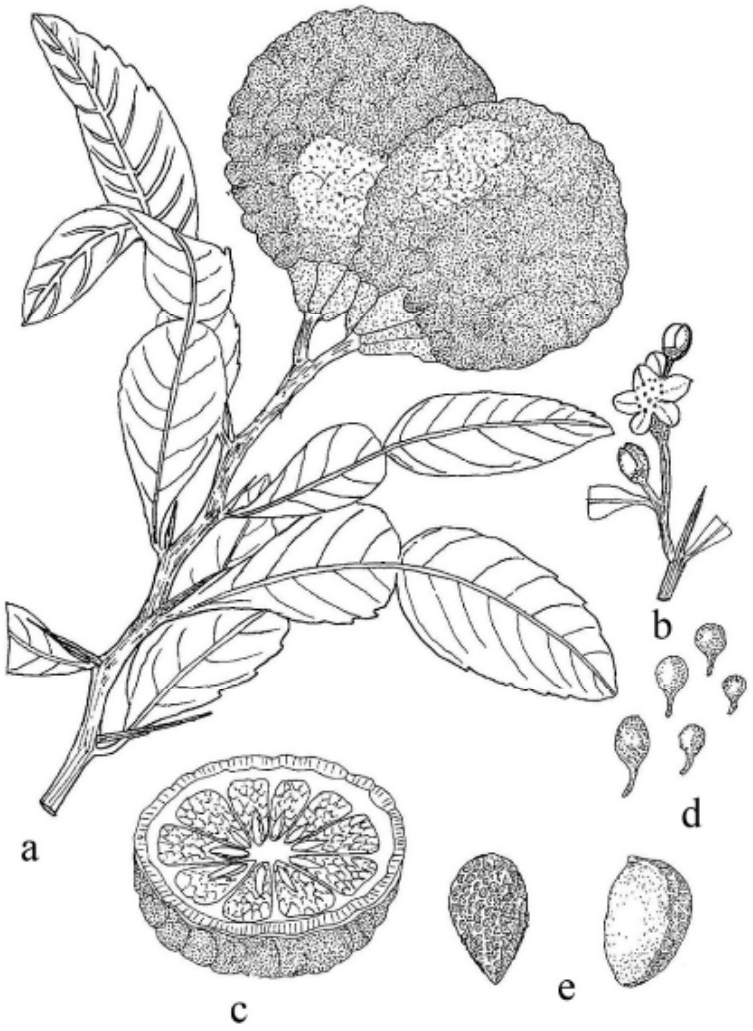


Figure 7: **Citrus hystrix** DC.: a) Fruiting shoot; b) flowering shoot; c) T.S. of a fruit; d) floweringt bud; and e) seed.

mm long. Ovary oblate to globose, 13-15-locular; glabrous; style 3-5 mm long, thick, cylindric, white; stigma capitate. Berries oblate to pyriform or rarely subglobose, 5-10 × 6-12 cm, lemon yellow, apex rounded; pericarp thick, pitted, papillate, irregularly very bumpy, strongly adherent, prominent oil dots numerous; mesocarp spongy, tasteless,

white; sarcocarp in 10-13 segments, pulp vesicles stalked, ovoid to obovoid, obtuse, small; juice abundant, greenish-white, bitterly sour. Seeds triangular, numerous 1.5-1.8 × 1-1.2 cm, ridged; embryo solitary; cotyledons milky white. 2n = 18 (Kumar and Subramaniam, 1986). *Fl. & fr.*: 3-12. *Hilly evergreen and moist deciduous forests; sometimes planted in homestead gardens also*.

Moulvibazar: Kulaura, Brahmanbazar, *K.R. Rahman*, Rahman-67105 (DACB). **Sylhet:** Locality unknown, 23 i 2021, *S.R. Talukder.*, SRT-001 (DACB 64631).

Leaves are used as a spice and for various flavouring purposes. Fruits are edible and used in culinary purpuses. Fruit juice is used in preparation of food and beverages. Extracted oil from fuit rind is used in cosmetics products.

China, Indonesia, Malaysia, Myanmar, New Guinea, Philippines, Sri Lanka, Thailand.

Citrus limon (L.) Burm.f., Fl. Ind. 173. 1768; Hajra *et al.,* Fl. India 4: 282. 1997; Ahmed *et al*. (eds.), Encycl. Fl. Fauna Bangladesh 10: 167. 2009; Uddin & Hassan, Vas. Fl. Chittagong & CHT. 3: 244. 2018. *Citrus medica* L. var. *limonum* (Wight & Arn.) Hook.f., Fl. Bit. India 1: 515. 1875; Prain, Beng. Pl. 1: 306. 1903; Heinig, List Pl. Chitt. Coll. & HT.: 10. 1925. *Citrus limonum* Risso, Ann. Mus. Hist. Nat. 20: 201. 1813. *Citrus aurantium* ssp. *bergamia* (Risso & Poit.) Engl., Nat. Pflanzenfam. 3(4): 198. 1896. *Citrus aurantium* var. *mellarosa* (Risso) Engl., Nat. Pflanzenfam. 3(4): 198. 1896. *Citrus bergamia* Risso & Poit., Hist. Nat. Orangers t. 53-56. 1819. *Citrus bergamia* ssp. *mellarosa* (Risso) D. Rivera *et al.,* Varied. Trad. Frut. Cuenca Río Segura Cat. Etnobot. 108. 1998. *Citrus bergamota* Raf., Sylva Tellur. 141. 1838. *Citrus limodulcis* D. Rivera, Obón & F. Méndez, Varied. Trad. Frut. Cuenca Río Segura Cat. Etnobot. 125. 1998. *Citrus limonelloides* Hayata, Icon. Pl. Formosan. 8: 16. 1919. *Citrus limonia* Osbeck, Reise Ostindien 250. 1765. *Citrus medica* var. *limon* L., Sp. Pl. 782. 1753. *Citrus medica* f. *limon* (L.) M. Hiroe, Forest Pl. History Jap. Is. 1: 218. 1974. *Citrus medica* ssp. *limonia* (Risso) Hook.f., Nat. Pflanzenfam. 3(4): 200. 1897. *Citrus medica* var. *limonum* (Risso) Brandis, Forest Fl. N.W. India 52. 1874. *Citrus mellarosa* Risso, Fl. Nice 81. 1844. *Citrus meyeri* Yu. Tanaka, Icon. Jap. Citrus Fruits 1: 91. 1946. *Citrus limonum* Risso, Ann. Mus. Hist. Nat. 20: 201. 1813. *Citrus aurantium* L. var. *limonum* Wight & Arn., Prodr. 98. 1834. **Fig. 8**

Bengali: *Gora Lebu, Goranebu, Karna Lebu* English: Lemon

Shrubs or small trees, up to 4 m high. Branches spiny, glabrous; bark green. Leaves unifoliolate, reddish or purplish when young; blades ovate or elliptic-oblong, 5-12 × 2-6 cm, base obtuse to rounded, apex subacute or obtuse, mucronate, margins glandular-serrulate; petioles marginate or narrowly winged, often articulate. Inflorescences axillary, dense racemes or fascicles, usually solitary or 5-7-flowered. Flowers bisexual or staminate by complete abortion of pistil, 5-merous, purplish in buds; shortly pedicellate. Calyx cup-shaped or urceolate; sepals 4 or 5, suborbicular, minute, glabrous. Petals 5, ovate-oblong, obtuse, 15-20 × 3-5 mm, coriaceous, glabrous, outside purplish, inside white. Stamens 20-30 or more; filaments monadelphous or irregularly polyadelphous at base, free above, glabrous or pubescent; anthers oblong, 4-6 mm long, apiculate, greenish-yellow. Disk annular, fleshy, c. 3 mm wide, glandular, glabrous, greenish-white. Ovary barrel-shaped or subcylindric, 5-7 × 3-4 mm, greenish; style thick, c. 4 mm long, caducous; stigma clavate. Fruit ellipsoid to ovoid, up to c. 6 cm across, narrowed at both ends, yellow, surface usually coarse, lemon scented, apex usually with a mammilla; pericarp thick, strongly adherent, difficult to remove; sarcocarp in 8-12 segments, pulp-vesicles pale green to yellowish; juice acidic. Seeds ovoid, 5-10 × 5-6 mm, apex acute; seed coat smooth; embryo usually solitary but sometimes numerous; cotyledons milky white. $2n$ = 18, 36 (Kumar and Subramaniam, 1986). *Fl. & fr.*: 1-11. *Gardens, high lands, roadsides, hill slopes; up to 1000 m altitudes*.

Bandarban: Poly Forest Range, 25 i 2017, *Imam et al.,* IH-3647 (DACB 72416). **Chattogram:** Halda river, Hathazari-Raozan, 27 ix 2016, *Tajul et al.,* TOK-589 (DACB 50031). **Cox's Bazar:** Bhomoriaghona, Cox's Bazar sadar, 21 iii 2018, *Niyamul et al.,* NK-7242 (DACB 57488); Ranghajhiri, Ramu, 26 x 2016, *Moniruzzaman & Mehedi,* NK-1288 (DACB). **Mymensingh:** Kadigar National park, Bhaluka, 3 iii 2022, *K.K. Islam* KKI-5043 (DACB).

Native of South East Asia, cultivated throughout tropical and subtropical countries.

Fruits are used in the preparation of pickles, squash, lemonade, sherbet and culinary purposes. It is a good source of vitamin C, vitamin B1 and carotene. It is used for the preparation of citric acid, pectine and lemon oil. It is used for scurvy, rheumatism, dysentery, stomachic, nausea, vomiting, cold and diarrhoea. It is also an antiseptic, antirheumatic, antibacterial and antitoxidant. Fruit juice is popularly used as an appetizer.

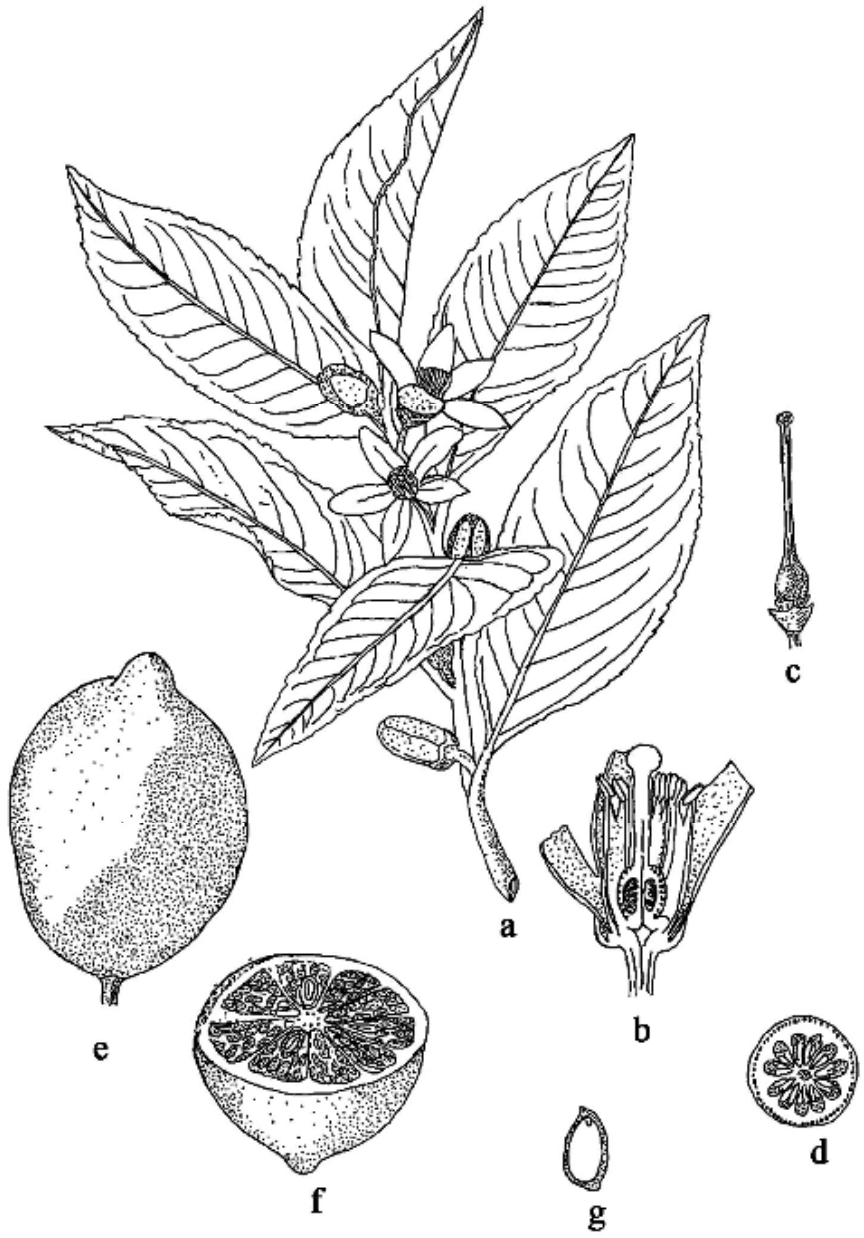


Figure 8: **Citrus limon** (L.) Burm.f. : a) Flowering shoot; b) L.S. of flower; c) pistil; d) T.S. of ovary; e) fruit; f) T.S. of fruit; and g) seed.

Citrus maxima (Burm.) Merr., Interpr. Herb. Amboin. 296. 1917; J. Sinclair, Bull. Bot. Soc. Beng. 9(2): 89. 1955; Hajra *et al.,* Fl. India 4: 283. 1997; Ahmed *at el.* (eds.), Encycl. Fl. Fauna Bangladesh 10: 167. 2009; Uddin & Hassan (eds.), Vas. Fl. Chittagong & CHT. 3: 245. 2018. *Citrus decumana* L., Syst. Nat. ed. 12, 508. 1767; Hook.f., Fl. Brit. India 1: 516. 1875; Prain, Beng. Pl. 1: 307. 1903; Heinig, List Pl. Chitt. Coll. & HT.: 10. 1925. *Citrus grandis* (L.) Osbeck, Dagb. Ostind. Resa 98. 1757. *Aurantium decumana* (L.) Mill., Gard. Dict. ed. 8, 4. 1768. *Aurantium maximum* Burm., Auctuar. sign. Z, 1, verso 1755. *Aurantium maximum* Burm. in Rumph. & Burm., Herb. Amboin. Actuar. 7: p. 16. 1755. *Citrus aurantium* var. *grandis* L., Sp. Pl. 783. 1753. *Citrus costata* Raf., Sylva Tellur. 142. 1838. *Citrus grandis* f. *buntan* Hayata, Icon. Pl. Formosan. 8: 17. 1919. *Citrus grandis* var. *sabon* (Siebold) Karaya, Sborn. Nauchn. Trudov Prikl. Bot. Genet. Selekts. 112: 65. 1987. *Citrus grandis* var. *yamabuki* (Tanaka) Karaya, Sborn. Nauchn. Trudov Prikl. Bot. Genet. Selekts. 112: 65. 1987. *Citrus obovoidea* Yu. Tanaka, Stud. Citrol. 7: 73. 1935. *Citrus pompelmos* Risso, Fl. Nice 83. 1844. *Citrus sabon* Siebold *ex* Hayata, Icon. Pl. Formosan. 8: 18. 1919. *Citrus yamabuki* Yu. Tanaka, Icon. Jap. *Citrus Fruits* 1: 224. 1946. *Citrus aurantium* L. var. *decumana* L., Sp. Pl. ed. 2, 2: 1101. 1763, *nom. illeg.* **Fig. 9**

Bengali: *Batabi lebu, Jambura, Solom* English: Bitter Orange, Pomelo, Shaddock

Evergreen trees, 5-10 m tall. Young parts grey-pubescent; bark grey-brownish, lenticellate; branches purplish, flat with ridges. Leaves unifoliolate; leaf blade broadly ovate or elliptic, 6-15 × 4-8 cm, base rounded, apex rounded to obtuse, sometimes mucronate, margins crenate along, thick, dark green, softly pubescent beneath, turning glabrate; petiole broadly winged; wings oblong-spathulate or obcordate, 2-4 × 0.5-3 cm or less. Inflorescences axillary, solitary or racemes with a cluster of few flowers, softly pubescent; pedicels up to 2.5 cm long, pubescent. Flowers bisexual, bud oblong, purplish or milky white. Calyx cupular, c. 1.0 × 1.5 mm, irregularly 3-5-lobed, lobes pubescent, greenish-white. Petals oblong-obovate, 1.5-2.0 × 0.8-1.0 cm, obtuse, concave, glandular, glabrous, cream. Stamens 25-35, some undeveloped; filaments irregularly polyadelphous at base, free above, subulate, white; anthers oblong, c. 1.0 mm long, apiculate. Disk annular, c. 6 mm diameter, greenish-white. Ovary obovoid, inserted in the disk, 4-5 × 5-7 mm, greenish white, glabrous, 10-14-locular; locules with many ovules; style cylindric, thick, dilated above; stigma capitate, glandular-sticky. Fruit globose, oblate, pyriform, or broadly obconic, up to 20 cm across, pale yellow to yellowish green, with large prominent oil dots, numerous seeded or seedless; pericarp spongy; sarcocarp with 10-15(-20) segments, pulp-vesicles numerous, firm, easily separable, pink, reddish, or milky yellow, acidic or sweet. Seeds irregularly shaped, with conspicuous ridges, wrinkled; embryo solitary; cotyledons milky white. $2n = 18, 36$ (Kumar and Subramaniam, 1986). *Fl. & fr.*: 1-12. *Roadsides, homestead gardens and hilly areas*.

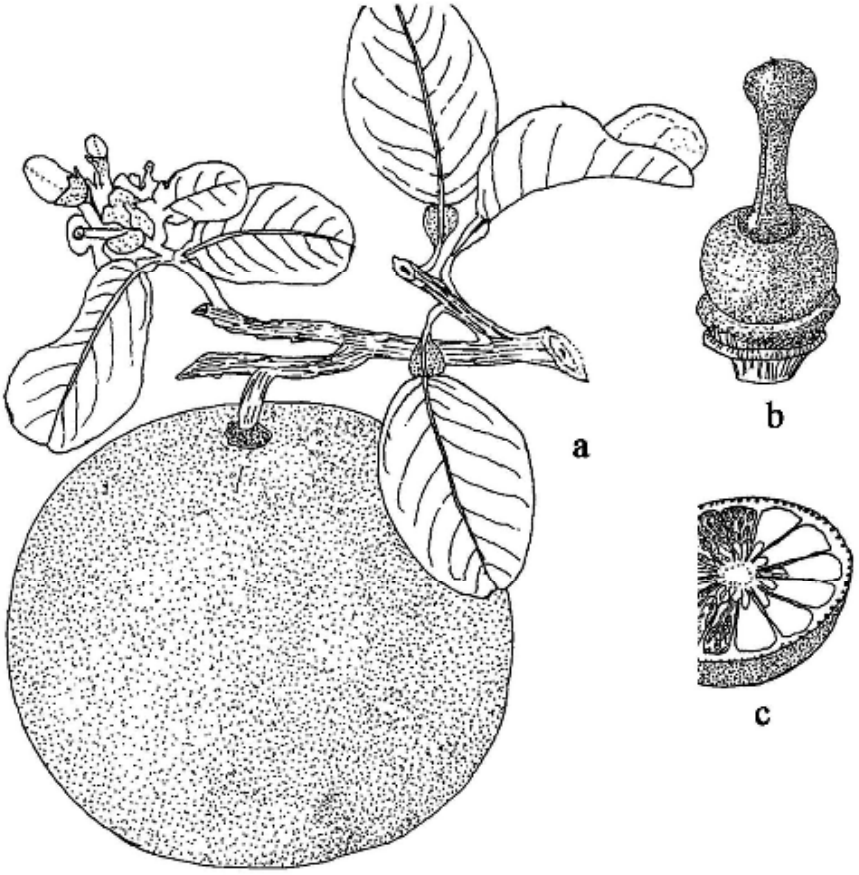


Figure 9: **Citrus maxima** (Burm.) Merr.: a) Fertile shoot; b) pistil; and c) T.S. of fruit.

Bandarban: Paindu Forest Range, 7 ii 2017, *Iman et al.*, IH-3900 (DACB 72419). **Barishal**: Baluganj, 6 xii 1993, *Md. Mohiuddin* (BFRI 636). **Cox's Bazar:** Ali Fokir, Deile, Kutubdia, 29 iv 2016, *Niyamul et al.*, NK-1802 (DACB 56657). **Cumilla:** Sharail, 18 i 1992, *S. Islam* (BFRI 120); Sultanpur, 12 ii 1976, *Huq & Rahman* H-2217 (DACB 12524). **Dhaka:** Ramna Park, 19 ii 1980, *Momtaz Begum* MB-244 (DACB 12519). **Jamalpur:** Nakshi, 6 v 1982, *Mia et al.*, M-767 (DACB 12520). **Moulvibazar:** Jenkinchara, Lawachara, Kamalganj, 3 ii 2009, *Bushra & Momtaz,* B-1331 (DACB 34234); Jenkichara, Lawachara, Kamalganj, 3 ii 2009, *S.N. Uddin,* N-3333 (DACB 43022). **Panchagarh:** Tetulia, 25 ii 1984, *Mia et al.,* M-1030 (DACB 12521). **Pirojpur:** Kaukhali, 4 iii 1985, *Huq & Mia,* H-5780 (DACB 12523). **Rangamati:** Dudukchara Forest, Langadu, 21 iii 2017, *S.K. Chakma* SKC-184 (DACB 65493). **Satkhira**:

Debhata, 24 vi 1992, *A.B. Siddique* (BFRI 409). **Sirajganj**: Brammangati, 5 x 1990, *M.K. Guha* (BFRI 6792). **Thakurgaon**: Baliadangi, 11 iv 1994, *Mohiuddin and Azad* (BFRI 1044).

Probably a native of S.E. Asia and cultivated in India and various other subtropical countries.

Fruits are edible. Favored for festival decoration. Fruit juice is refrigerant, nutritive, cardiotonic and used in influenza and catarrh. Flowers are used to make perfume. The wood is used for tool handles.

Citrus medica L., Sp. Pl. 2: 782. 1753; Hook.f., Fl. Brit. India 1: 514. 1875; Kurz, Forest Fl. Brit. Burma 1: 197. 1877 (Repr. 1974); Prain, Beng. Pl. 1: 306. 1903; Brandis, Indian Trees: 123. 1906 (Reprint, 1984); Heinig, List Pl. Chitt. Coll. & HT.: 10. 1925; Hajra *et al.,* Fl. India 4: 284. 1997; Ahmed *at el.* (eds.), Encycl. Fl. Fauna Bangladesh 10: 168. 2009; Uddin & Hassan (eds.), Vas. Fl. Chittagong & CHT. 3: 246. 2018. *Citrus aurantium* L. var. *medica* Wight & Arn., Prodr. 98. 1834. *Citrus alata* (Tanaka) Yu. Tanaka, Syst. Pomol. 140. 1951. *Citrus aurantium* var. *tamurana* Yu. Tanaka, Bot. Mag. (Tokyo) 26: 203. 1912. *Citrus balotina* Poit. & Turpin, Pomol. Franç. 2: t. 349. 1873. *Citrus bicolor* Poit. & Turpin, Pomol. Franç. 2: t. 379. 1873. *Citrus bigena* Poit. & Turpin, Pomol. Franç. 2: t. 378. 1873. *Citrus cedra* Link, Handbuch 2: 346. 1831. *Citrus cedrata* Raf., Sylva Tellur. 141. 1838. *Citrus crassa* Hassk., Cat. Hort. Bot. Bogor. 217. 1844. *Citrus fragrans* Salisb., Prodr. Stirp. Chap. Allerton 378. 1796. *Citrus gongra* Raf., Sylva Tellur. 142. 1838. *Citrus hassaku* Yu. Tanaka, Icon. Jap. Citrus Fruits 2: 312. 1948. *Citrus hiroshimana* Yu. Tanaka, Icon. Jap. Citrus Fruits 1: 191. 1946. *Citrus kizu* Yu. Tanaka, Icon. Jap. Citrus Fruits 2: 411. 1948. *Citrus kwangsiensis* Hu, J. Arnold Arbor. 12: 153. 1931. *Citrus limetta* Risso, Ann. Mus. Hist. Nat. 20: 195. 1813. *Citrus limonimedica* Lush., Indian Forester 36: 348. 1910. *Citrus lumia* Risso, Essai Hist.-Nat. Orangers 1: 414. 1813. *Citrus odorata* Roussel, Fl. Calvados 144. 1796. *Citrus nana* (Wester) Yu. Tanaka, Syst. Pomol. 140. 1951. *Citrus medica* var. *tarung* Yu. Tanaka, Trop. Hort. 7: 8. 1937. **Fig. 10**

Bengali: *Aitta lebu, Bura Lebu, Begpura, Pani lebu, Bara limbu* English: Citron

Shrubs or small trees, up to 3 m tall. Branches angular, purplish when young, glabrous, armed with sharp, stout, axillary spines. Leaves simple or rarely 1-foliolate; leaf blade elliptic to ovate-elliptic, 8-20 × 3-9 cm or larger, base obtuse or rounded, apex rounded, obtuse, or rarely mucronate, margin serrate to crenate, glabrous; petiole c. 10 mm long, wingless or marginate. Inflorescences axillary, few-flowered racemes or sometimes solitary. Flowers bisexual or staminate, oblong in bud, pink or purplish.

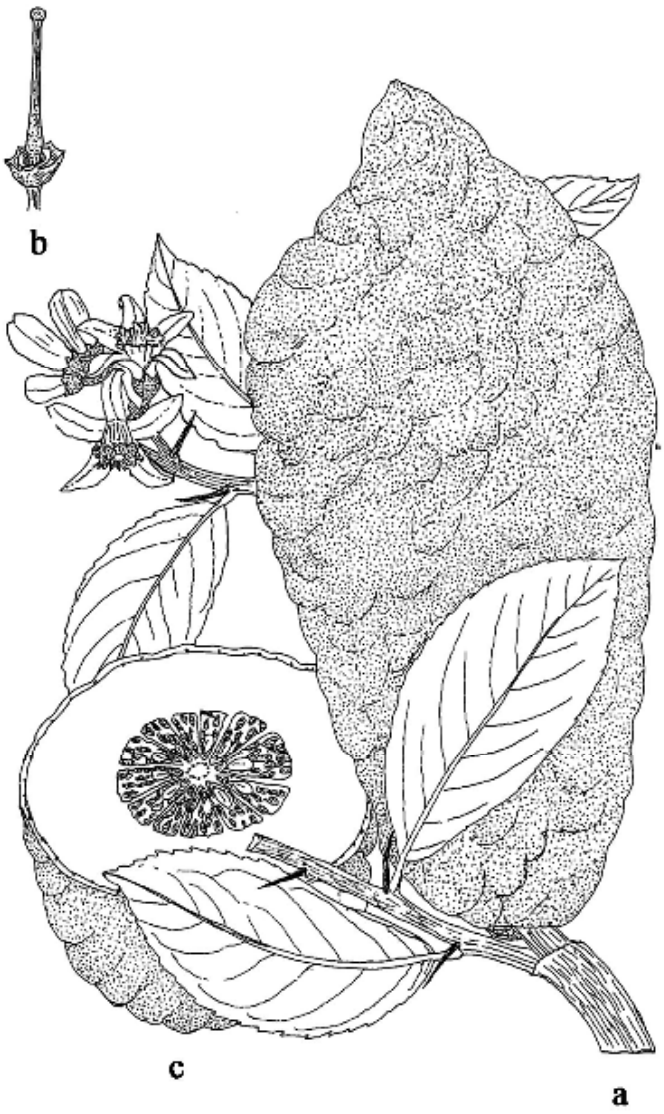


Figure 10: **Citrus medica** L.: a) Fertile shoot; b) pistil; and c) T.S. of fruit.

Calyx urceolate, 4 or 5-lobed; lobes 3-4 mm long. Petals 5, oblong or oblanceolate, 2-4 × 1.0-1.5 cm, glandular, pink or purplish abaxially. Stamens 30-50; filaments polyadelphous, pubescent, white; anthers linear, 4-5 mm long, yellowish. Ovary cylindric, 6-8 × 3-4 mm, 12-14-locular; style cylindric, 1.0-1.5 cm long, thick; stigma

clavate, pinkish, sticky. Fruit ovoid-oblong, elliptic to subglobose, 10-20 × 5-14 cm, surface coarse or warty, pale yellow, apex obtuse or mamillate; pericarp white to pale yellow, soft within; sarcocarp 10-15 segments, colorless, thicker, strongly adherent, glandular, foveolate, aromatic; pulp-vesicles pellucid to milky-yellow, acidic or sweetish, fragrant. Seeds numerous, acute, 8-12 × 4-6 mm; seed coat smooth; embryo(s) solitary to several; cotyledons milky white. $2n = 18, 20$ (Kumar and Subramaniam, 1986). *Fl.& fr.*: 4-11. *Evergreen and semi-evergreen forests, moist, well-drained, deep and fertile soil.*

Chattogram: Kumari Khal, Sarkarhat, Hathazari, 23 xi 2016, *Tajul et al.*, TOK-2026 (DACB 49994); Dupachari, Chandanaish, 8 ii 2017, *Tajul et al.*, TOK-3382 (DACB 51789). **Moulvibazar**: Madhabkundu eco-park, Barlekha, 20 v 2014, *S.N. Uddin*, N-5296 (DACB 44870); Kulaura, Brahmanbazar, *K.R. Rahman*, Rahman-67104 (DACB). **Sylhet:** Khadim Nagar National Park, 15 iii 2019, Sultana and Rahman DMS-2798 (DACB 57405).

China, India west ward to Iran, Myanmar, most tropical countries and Europe.

Fruits yeild a fragrant oil called ‘cedrat’ which is used in manufacturing perfume. The rind is preserved in sugar and used for remedy of dysentery. Citron is a good source for candied peel, used in confections and cakes.

Citrus reticulata Blanco, Fl. Filip. 610. 1837; Fl. India 4: 287. 1997; Ahmed *et al.* (eds.), Encycl. Fl. Fauna Bangladesh 10: 169. 2009; Uddin & Hassan (eds.), Vas. Fl. Chittagong & CHT. 3: 247. 2018. *Citrus crenatifolia* Lush., Indian Forester 36: 343. 1910. *Citrus crenatifolia* var. *lycopersiciformis* Lush., Indian Forester 36: 343. 1910. *Citrus chrysocarpa* Lush., Indian Forester 36: 344. 1910. *Citrus poonensis* Yu. Tanaka, Int. Rev. Sci. Pract. Agric. n.s., 1: 34. 1923. *Citrus aurantium* f. *deliciosa* (Ten.) M. Hiroe, Forest Pl. History Jap. Is. 1: 226. 1974. *Citrus aurantium* ssp. *suntra* Engl., Nat. Pflanzenfam. 3(4): 199. 1877. *Citrus aurantium* var. *tachibana* Makino, J. Jap. Hort. Soc. 75: 2. 1896. *Citrus aurantium* var. *tachibana* Makino, Nilon Engei-Kwei Zasshi 75: 2. 1896. *Citrus crenatifolia* Lush., Indian Forester 36: 343. 1910. *Citrus daoxianensis* S.W. He & G.F. Liu, Acta Bot. Yunnan. 12: 287. 1990. *Citrus deliciosa* Ten., Index Seminum (NAP) 1840: 9. 1840. *Citrus depressa* Hayata, Icon. Pl. Formosan. 8: 16. 1919. *Citrus erythrosa* Yu. Tanaka, Stud. Citrol. 3: 184. 1930. *Citrus himekitsu* Yu. Tanaka, Icon. Jap. Citrus Fruits 2: 269. 1948. *Citrus koozi* (Sieb. *ex* Yu. Tanaka) Yu.

Tanaka, Mem. Tanaka Citrus Exp. Sta. 1(1): 32. 1927. *Citrus mangshanensis* S.W. He & G.F. Liu, Acta Bot. Yunnan. 12: 288. 1990. *Citrus nippokoreana* Yu. Tanaka, Stud. Citrol. 12: 58. 1951. *Citrus papillaris* Blanco, Fl. Filip. 610. 1837. *Citrus papillaris* var. *chrysocarpa* (Lush.) Alston, Handb. Fl. Ceyl. 6: 41. 1931. *Citrus ponki* Yu. Tanaka, Mem. Tanaka Citrus Exp. Sta. 1(1): 31. 1927. *Citrus succosa* Yu. Tanaka, Stud. Citrol. 1: 37. 1927. **Fig. 11**

Bengali: *Kamala, Komla, Komla lebu*

English: Indian Loose Jacket Orange, Mandarins, Orange

Small trees. Branchlets slender, erect or spreading, spinous. Leaves 1-foliolate; leaf blade lanceolate, elliptic or broadly ovate, 5-10 × 2.5-3.5 cm, basal articulated part to leaf blade usually narrow or only a remnant, base acute or rounded, apex tapering, sometimes with emarginate tip, margins irregularly crenate or crenulate or rarely entire, midvein furcate near apex; petioles short, slightly marginate, c. 2 mm broad, articulate above. Inflorescences axillary, solitary to 2-3 in a fascicle. Flowers bisexual. Calyx irregularly (3-)5-lobed; sepals 5, light greenish, glabrous. Petals 5, oblong, 1.2-1.5 cm long, glandular, pure-white. Stamens 15-25; filaments polyadelphous, usually 2 or 3, free, white; anthers yellow. Disk annular, fleshy. Ovary globose or oblate; style cylindric, greenish-white; stigma clavate. Fruit soblate to subglobose, variable in size, smooth or coarse, pale yellow, orange, red, or carmine; pericarp very thin to thick, loosely attached, baggy; sarcocarp with 7-14 segments or rarely more, juice sweet to acidic, sometimes bitter, with few to many seeds or rarely seedless; pulp-vesicles orange-coloured, plump, short, rarely slender, long. Seeds usually ovoid, base rounded, apex narrow and acute; embryos numerous, rarely solitary; cotyledons dark green, pale green, or milky white; chalaza purple. $2n = 18, 27, 36$ (Kumar and Subramaniam, 1986). *Fl. & fr.*: 4-12. *Cultivated in gardens, hilly areas*.

The fruit is eaten fresh and used for making refreshing drink like cordials and squashes. Fruit and flowers yield essential oils, which is used in flavouring and perfumery. Fruits are used intreating fever, blood purification, dyspepsia, vomiting, intestinal worms, skin diseases and improving appetite.

Native of S. E. Asia. Cultivated in all tropical and subtropical regions of the world.

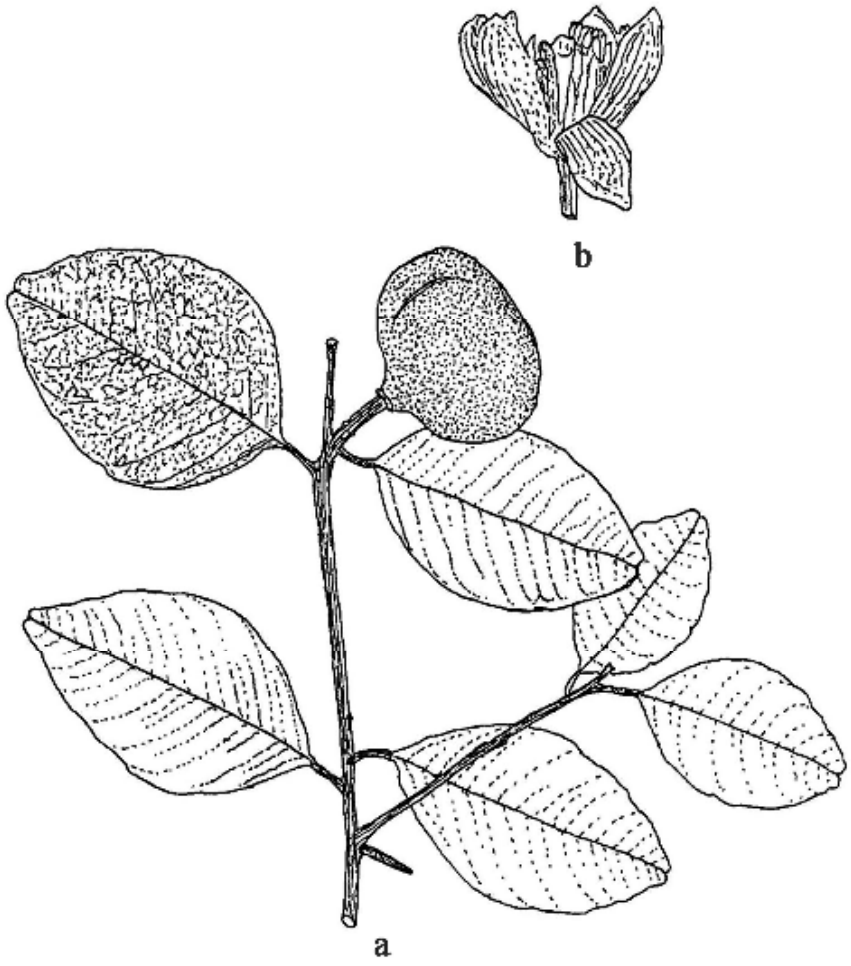


Figure 11: **Citrus reticulata** Blanco: a) Fruiting shoot; and b) flower.

Citrus sinensis (L.) Osbeck, Dagb. Ostind. Resa 41. 1775; Fl. India 4: 287. 1997. *Citrus aurantium* L. var. *sinensis* L., Sp. Pl. 782. 1753. **Fig. 12**

Bengali: *Malta, Musambi, Narungi* English: Blood Orange, Sweet Orange

Medium-sized, evergreen trees. Branchlets angular when young, spinous. Leaves unifoliolate; leaf blades ovate to elliptic, 7-10 × 3.5-5.0 cm, base cuneate, apex emarginate, margin obtusely crenate; petioles to 2 cm long, narrowly winged; wings

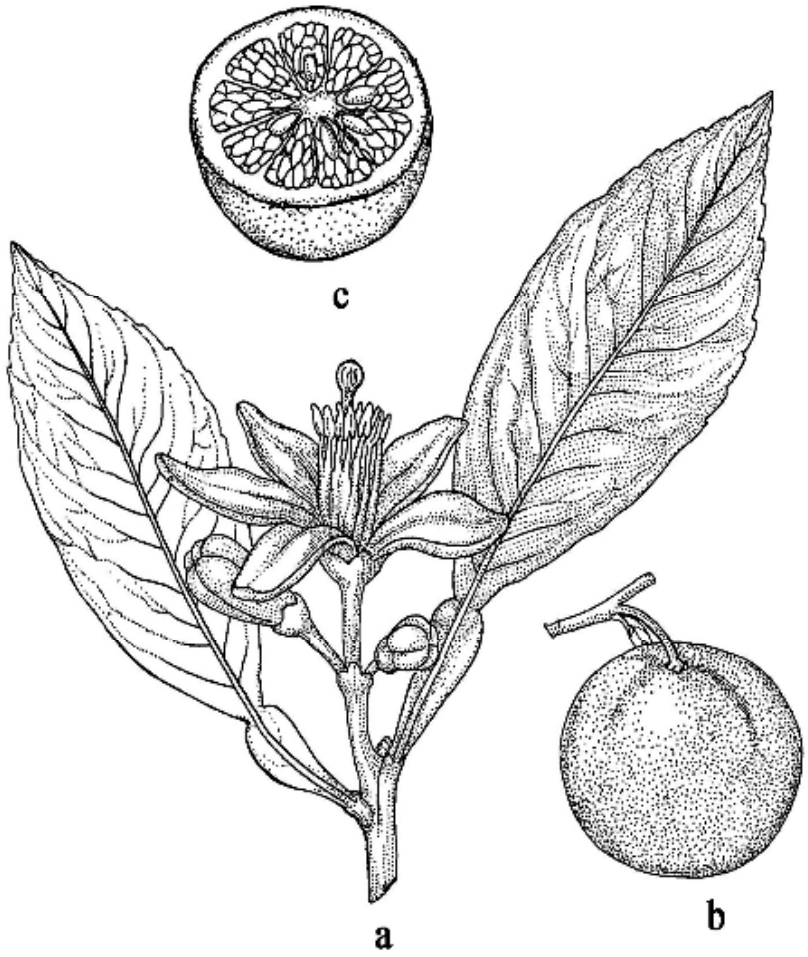


Figure 12: **Citrus sinensis** (L.) Osbeck: a) Flowering shoot; b) fruit; and b) T.S of fruit.

oblong-spathulate, c. 3 mm broad on either side. Inflorescences axillary, 5-7-flowered racemes or solitary; pedicels 7-12 mm long, glabrescent. Flowers bisexual. Calyx 4 or 5-lobed; sepals suborbicular, acuminate, membranous, ciliolate, glandular. Stamens 18-25; filaments polyadelphous, unequal in length; anthers linear-oblong, obtuse, cordate below. Disk annular, c. 2.5 mm diameter. Ovary globose; style cylindric, white; stigma capitate. Fruits subglobose to oblate, surface smooth, pitted, glossy, greenish-yellow to orange; pericarp thin, adherent; mesocarp white, mildly sweet; centre solid; endocarp segments 10-13; pulp-vesicles yellow to orange, stalked, fusiform, cuneate-obovoid, tip

acute, rough marginate plane surface, white. *Fl. & fr.*: 2-12. *Cultivated in gardens, hilly areas*.

Chattogram: Napittachora, Mirsori, 25 ii 2018, *Moniruzzaman et al*., MAK-7762 (DACB 54583). **Mymensingh:** Kadigar National park, Bhaluka, 3 iii 2022, *K.K. Islam* KKI-5033. **Sylhet:** A.R.I. Jaintiapur, 2 ii 1979, *A.M. Huq*, H-4202 (DACB 12526).

China, India and Indochina.

The fruit is a good source of vitamin C.

Clausena N.L. Burman, Fl. Indica 87, 243. 1768.
Type species: *Clausena excavata* Burm.f.

Shrubs or small trees, unarmed, usually aromatic. Leaves alternate, imparipinnate; rachis terete, marginate or winged; leaflets alternate, oblique, asymmetric (except terminal one). Inflorescences terminal or axillary, paniculate or loosely racemose. Flowers fragrant, bisexual or rarely female, globose to pyriform or rarely ovoid in bud. Calyx cupular; sepals 4 or 5, connate, green. Petals 4 or 5, imbricate in bud, cream-white or pale yellowish, glandular. Stamens 8 or 10, distinct, alternately unequal in length; filaments abruptly dilated toward base, straight or geniculate, glabrous; anthers ovoid or oblong, glandular. Disk columnar, conic, or bell-shaped. Gynoecium 2-5-loculed, syncarpous; pubescent or glabrous, radial walls of locules straight; ovules 2 per locule; style cylindric, 0.5-2.5 × as long as ovary, caducous; stigma truncate or capitate. Berry subglobose to oblong or ovoid, yellow or reddish or black when ripe, 1-seeded; pericarp glandular, endocarp membranous. Seeds with membranous seed coat; aromatic, endosperm lacking; embryo straight; cotyledons elliptic, plano-convex, hypocotyl partly included between cotyledons.

KEY TO THE SPECIES

1.	Inflorescence exlusively axiliary	**C. anisata**
+	Inflorescence terminal and/or axillary, from uppermost leaf axils	**2**
2.	Ovary pilose or hirsute	**3**
+	Ovary glabrous or rarely slightly hairy	**C. heptaphylla**
3.	Leaflets 15-30; filaments excavate and papillose at base; gynophore hourglass shaped; ovary hirsute	**C. excavata**
+	Leaflets (1-) 5-9-foliolate; filaments plane, smooth, dilated at base; gynophore cylindric; ovary pilose	**C. lansium**

Clausena anisata (Willd.) Hook.f. *ex* Benth. in Hook., Niger Fl. 256. 1849; Hajra *et al.,* Fl. India 4: 321. 1997; Uddin & Hassan (eds.), Vas. Fl. Chittagong & CHT. 3: 248. 2018. *Clausena suffruticosa* (Roxb.) Wight & Arn., Prodr. Fl. Ind. Orient. 96. 1834; Hook.f., Fl. Brit. India 1: 506. 1875; Kurz, Forest Fl. Brit. Burma 1: 189. 1877 (Repr. 1974); Prain, Beng. Pl. 1: 301. 1903; Brandis, Indian Trees: 115. 1906 (Reprt., 1984); Heinig, List Pl. Chitt. Coll. & HT.: 9. 1925; Ahmed *et al*. (eds.), Encycl. Fl. Fauna Bangladesh 10: 172. 2009. *Amyris anisata* Willd., Sp. Pl. ed. 4(2): 337. 1799. *Clausena dentata* (Willd.) M. Roemer, Syn. Mem. Hesper. 44. 1846. *Clausena willdenowii* Wight & Arn., Prodr. 96. 1834; Hook.f., Fl. Brit. India 1: 506. 1875. *Amyris nana* Roxb., Fl. Ind. 2: 249. 1832. *Clausena willdenowii* Wight & Arn. var. *nana* (Roxb.) Balakr. in Bull. Bot. Surv. India 22: 173. 1982. *Clausena pubescens* Wight & Arn., Prodr. 96. 1834. *Clausena willdenowii* Wight & Arn. var. *pubescens* (Wight & Arn.) Hook.f., Fl. Brit. India 1: 506. 1875. *Cookia dulcis* Beddome in Madras J. Lit. Sci. ser. 2, 22: 73. 1861. *Clausena willdenowii* Wight & Arn. var. *dulcis* (Beddome) Beddome, Fl. Sylv. S. India 45. 1871. *Clausena dentata* (Willd.) M. Roemer var. *dulcis* (Beddome) Swingle, J. Wash. Acad. Sci. 28: 532. 1938. *Clausena anisata* (Willd.) Hook.f. *ex* Benth. var. *paucijuga* (Kurz) J.F. Molino in Bull. Mus. Hist. Nat. (Paris) 16: 132. 1994. *Clausena suffruticosa* (Roxb.) Wight & Arn. *ex* Steudel var. *paucijuga* Kurz, J. Asiat. Soc. Bengal Pt. 2, Nat. Hist. 44: 133. 1875. *Amyris suffruticosa* Roxb., Fl. Ind. 2: 250. 1832. **Fig. 13**

Bengali: *Kalomaricha*

Shrubs or subshrubs, up to 2 m high. Branchlets cylindric, softly pubescent to tomentose or glabrous. Leaves imparipinnate, 25-40 cm long; leaflets 11-17 foliolate, 2-4 × 1-2 cm, lower ones subopposite, upper one's alternate, sometimes acute, ovate-lanceolate or ovate-oblong, base oblique, unequal, apex obtuse or caudate-acuminate, sometimes blunt at tip, margin entire; secondary nerves 6-10 pairs, prominent, finely reticulate; petiolules slender, upto 9 mm long, densely soft pubescent when young, glabrescent when older. Inflorescence simple, axillary racemes or slender panicles, shorter than leaves, confined to apices of branchlets, 8-15 cm long, pubescent. Flowers small, 4-merous, greenish-white, globose in bud, bracteolate, pedicels slender, 4-10 mm long, pubescent. Sepals 4, ovate-deltate, acute or obtuse, 0.4-2.0 mm long, glandular, puberulous. Petals 4, white, imbricate, oblong, obtuse, puberulous, concave, 2.4-5.0 × 1.6-3.5 mm, prominently nerved, glabrous. Stamens 8; filaments linear, subulate above, 1.5-5.0 mm long, glabrous; anthers ellipsoid or oblong, base cordate, apex obtuse, glandular-apiculate, 1-2 mm long. Gynophore rather distinct, 1.2 mm long, narrow below, glandular, glabrous. Ovary ovoid-oblong, 1.5-3.0 × 1.0-2.4 mm, sulcate, 4-grooved, tuberculate glandular, glabrous, 4-locular, with one ovule in each locule, ovules superposed; style cylindric, short, merging into depression of ovary lobes above,

glabrous; stigma capitate, 4-lobed, not marked. Fruits oblong, globose, ovoid or fusiform, 0.7-1.0 × 2.6 cm, drooping, glandular, greenish-white but bright orange when ripe, succulent, 1-seeded. Seeds green. *Fl. & fr.*: 3-8. *Evergreen forests along river sides, up to 800 m altitude.*

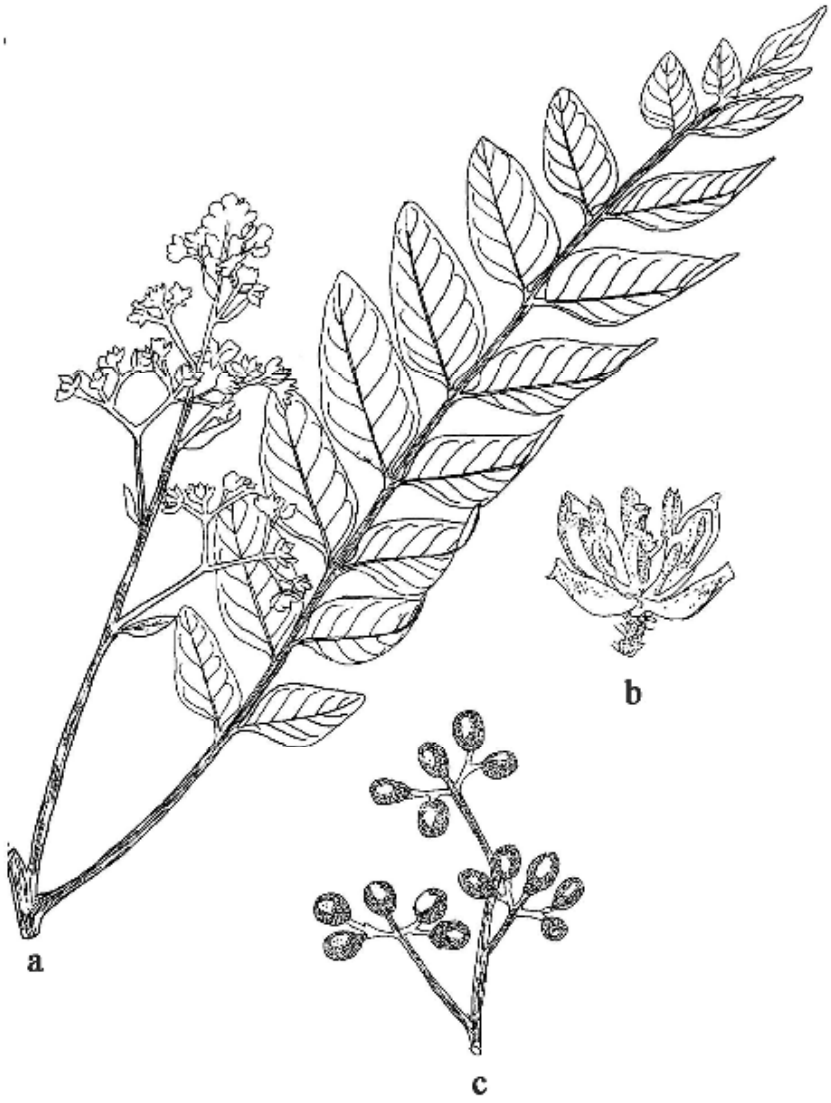


Figure 13: **Clausena anisata** (Willd.) Hook. f.: a) Flowering shoot; b) flower; and c) fruiting shoot.

Bandarban: Bandarban sadar, 29 viii 2016, *Imam et al.*, IH-160 (DACB 71570); Naikhongchhari Forest Range, 26 iv 2017, *Imam et al.*, IH-5341 (DACB 69992); Kuhalong Forest Range, 24 v 2017, *Imam et al.*, H-5629 (DACB 71571); Matamuhuri Forest Range, Alikodom, 15 v 2017, *Imam et al*., IH-5479 (DACB 69696); Lama Forest Range, 4 iv 2017, *Imam et al*., IH-5215 (DACB 69700); Gharowmukh, Rowangchari, 27 iii 2017, UMM Rasel, UAMR-010 (DACB 670304); Thana para, Ruma, 25 iii 2019, *K.K. Islam*, *KKI*- 3441 (DACB 48155). **Chattogram:** Chittagong University campus, 2 iv 1990, *D.K. Das* (BFRI); Thandachari, 24 iv 1979 *Jaher et al.* (BCSIR 76); Chunati, 31 iii 1968, *D.K. Das* (BFRI); Maghachari, Isamoti, 29 iv 1984, *Das and Alam* (BFRI 3921); Bariarchara, 28 iii 1998, *Rahman and Wilcock* (CUH 2602); Chunati, East Lohagara, 27 iv 2017, *Tajul et al.* TAK-4446 (DACB-54563); Hajarikhil, 7 iii 2017, *Mannan* MM-81 (DACB 54562); Isamoti, Ranghunia, 5 v 2017, *Aman Uddin* AU-294 (DACB 54561); Mohamaya, Mirsori, 9 v 2018, *Moniruzzaman & Kawsar* MK-8417 (DACB 54560); Monglerhat, Dhopachori, Chandanaish, 12 iv 2017, *Tajul et al*., TAK-4198 (DACB 48689); Balukhali, Ukhia, 23 iv 2017, *Mofiz Uddin* MU-124 (DACB 56628); Chunati, East Lohagara, 26 iv 2017, *Tajul et al.*, TAK-4375 (DACB 51783); Fatehpur, Hathazari, 10 v 2017, *Tajul et al*., TAK-4821 (DACB 51779); Mithachora, Fatehpur, Hathazari, 1 iii 2017, *Iqbal Mahmud* IM-594 (DACB 51780); Kumaria, Sitakundda, 12 vii 2017, *Shahidul et al.*, SAK-5252 (DACB 51757); Chandranath Hill, Sitakunda, 21 viii 1987, *Khan et al.*, K-7765 (DACB 24421). **Cox's Bazar:** Faishiakhali, Chakaria, 10 iv 2017, *Nazim Uddin* NU-37 (DACB 62503); Domdomia Natural Park, Teknaf, 23 iii 2017, *Niyamul et al.*, NK. 5040 (DACB 62502); Teknaf Forest Range, Teknaf, 16 vi 1991, *Khan et al.*, K-8480 (DACB 24592); Dhua Palong, 21 iv 1996, *Khan et al*., K-9257 (DACB 39132); Kutupalong, Ukhia, 23 iv 2017, *Niyamul et al.*, NK-4313 (DACB 59789); Dineshpur, Moheshkhali, 2 v 2017, *Niyamul et al.*, NK-3646 (DACB 57489); Fasiakhali, Chakaria, 9 v 2017, *Niyamul et al*., NK-3763 (DACB 59788); Soankhali, Inani, 25 iii 2017, *Monir Ahmed* MA-44 (DACB 59124); Teknaf Forest Range, Teknaf, 16 vi 1991, *Khan et al*., K-8476 (DACB 24594). **Habiganj:** Rama Kalenga, Chunarughat, 13 x 2005, *Rokeya Begum* (DACB 31233); Kalenga beat, 14 iv 2000, *Khan et al*., K-10386 (DACB 80665). **Moulvibazar:** Madhabkunda Eco-park, Barlekha, 19 v 2014, *S.N. Uddin* N-5315 (DACB 43453); Lawachara, Kamalganj, 11 v 2009, *S.N. Uddin* N-3589 (DACB 43049); Lawachara Forest area, Kamalganj, 6 iv 1988, *Mahfuz et al.*, MZ-91 (DACB 24417. **Panchagarh:** Tetulia, 9 v 1984, *Das et al.* (BFRI 5141). **Rangamati:** Bangcharipara, Kaptai, 19 ix 1988, *M.K. Alam* EB-95 (BFRI); Kamalchari, 14 vi 1987, *M.K. Alam* (BFRI 5832); Boro Kharikata, Langadu, 6 iv 2017, SU Chakma, SKC-287 (DACB 66556); Monlovichara, Pharua Reserve Forest, 18 iv 2009, *Bushra et al.*, B-1456 (DACB 34898); Karnaphuli Sadar Beat, Kaptai, 23 iii 2010, *S.N. Uddin* N-4144 (DACB 36712); Jomchug pahar, Rangamati sadar, 5 iii 2017, *KT Chakma,* KTC-157 (DACB 64271); Sitapahar Reserve Forest, 15 v 2017, *Joyanta et al.,*

JCR-5492 (DACB 64272); Kaptai Mukh Beat, Kaptai, 22 iii 2010, *S.N. Uddin* N-4105 (DACB 46738); Chandranath, Sitakundo, 17 iv 2017, *Tajul et al.*, TAK-4216 (DACB 59132); Madhabchara, Rampahar, Kaptai, 27 v 2003, *S.N. Uddin* N-1862 (DACB 36789); Ansar Camp, Rampahar, Kaptai, 16 vi 2001, *S.N. Uddin* N-1006 (DACB 36179); Sitapahar, Kaptai, 22 ix 1997, *Rahman et al.*, (CUH 1001).

China, India and Myanmar.

Fruits are eaten sometimes.

Clausena excavata Burm.f., Fl. Indica 89. 1768; Hook.f., Fl. Brit. India 1: 504. 1875; Kurz, Forest Fl. Brit. Burma 1: 188. 1877 (Repr. 1974); Prain, Beng. Pl. 1: 301. 1903; Brandis, Indian Trees: 114. 1906 (Reprt. 1984); Heinig, List Pl. Chitt. Coll. & HT.: 9. 1925; Hajra *et al.,* Fl. India 4: 325. 1997; Ahmed *at el.* (eds.), Encycl. Fl. Fauna Bangladesh 10: 170. 2009; Uddin & Hassan, Vas. Fl. Chittagong & CHT. 3: 249. 2018. *Amyris graveolens* Buch.-Ham. *ex* Steud., Nom. Bot. ed. 2, 1: 81. 1840. *Amyris punctata* Roxb. *ex* Colebr., Trans. Linn. Soc. London 15: 366. 1827. *Amyris sumatrana* Roxb., Fl. Ind. 2: 250. 1824. *Clausena excavate* var. *lunulata* (Hayata) Yu. Tanaka, J. Bot. 68: 228. 1930. *Clausena excavate* var. *villosa* Hook.f., Fl. Brit. India 1: 505. 1875. *Clausena javanensis* Raeusch. *ex* DC., Prodr. 1: 538. 1824. *Lawsonia falcata* Lour., Fl. Cochinch. 229. 1790. *Cookia punctata* Retz., Observ. Bot. 6: 29. 1791. *Cookia graveolens* Wight & Arn., Prodr. Fl. Ind. Orient. 95. 1834. *Clausena tetramera Hayata,* Icon. Pl. Formosan. 6: 12. 1916. *Clausena sumatrana* (Roxb.) Wight & Arn. *ex* Steud., Nom. Bot. ed. 2, 1: 378. 1840. *Clausena punctata* (Roxb.) Wight & Arn. *ex* Steud., Nom. Bot. ed. 2, 1: 378. 1840. *Clausena moningerae* Merr., Philipp. J. Sci. 23: 247. 1923. *Clausena lunulata* Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30(1): 51. 1911. *Clausena javensis* J.F. Gmel., Syst. Nat. 610. 1791. *Clausena javanensis* Raeusch. *ex* DC., Prodr. 1: 538. 1824. **Fig. 14**

Bengali: *Narasigha, Pan-karpur, Sam-sweng* English name: Clausena

Aromatic shrubs or small trees, up to 6 m tall. Branchlets cylindric, shortly pubescent to grey-tomentose, rarely glandular-pubescent. Leaves imparipinnate, 20-40 cm long, young leaflets silky pubescent; leaflet 11-30, subopposite to alternate, ovate, ovate-oblong to lanceolate, 3-8 × 1.5-3.5 cm, asymmetric, base oblique and cuneate, apex acute or acuminate, margin entire or slightly dentate, undulate or obscurely crenate, often with pubescent glands along margins, repand, membranous to chartaceous, glands often dimorphic, both surfaces pubescent or adpressedly tomentose or glabrescent, secondary nerves 4-7 pairs, faint above, prominent beneath; petiolules 2-5 mm long,

tomentose or glabrescent. Petiole and rachis 13-28 cm long, silky pubescent, softly tomentose or glabrescent. Inflorescences terminal paniculate cymes, up to 30 cm long;

Figure 14: **Clausena excavata** Burm.f. : a) Fruiting shoot.

pedicels very short, to 1 mm long, pubescent; peduncle and lateral branches densely white or greyish-pubescent; bracts opposite. Flowers 4-merous, borne in cymes, globose in bud. Sepals 4, ovate, to 1 mm long, acute or obtuse, ciliate. Petals broadly elliptic, elliptic-ovate to obovate, concave, obtuse, 2-4 × 1-2 mm with few pellucid glands, greenish to yellowish-white, pilose abaxially. Stamens 8, alternately short and long, 2.0-3.5 mm long, greenish-white, subulate above, basally dilated, geniculate at middle, with a prominent hump on abaxial surface, concave adaxially, papillate or glabrous; anthers

orange-yellow, ellipsoid or subcordate, versatile. Gynophore hourglass-shaped, greenish, glabrous, c. 1 × 1 m, which further expands into a cupular top with its edges often having glandular projections where it joins the base of ovary. Ovary ovoid or subglobose or globose, hirsute, often with a few pellucid glands at point of attachment of style, 4-locular with 2 ovules in each locule, thick, acute, glabrous, up to 1.7 mm long; stigmas subcapitate, minute, scarcely broader than style. Fruit an oblong berry, 1.3-1.7 × 0.7-1.6 cm, greenish-white when young but pink when mature, glandular-punctate, 1 or 2-seeded. Seeds solitary, oblong, large. 2n =36 (Kumar and Subramaniam, 1986). *Fl. & fr.:* 4-10. *Tropical evergreen or mixed forests or brushwood and disturbed areas around villages; up to 600 m altitude.*

Chattogram: Puma, Betagi, 13 iv 1990, *D.K. Das* (BFRI 6593); Bhomariaghona, 28 iv 1977, *M. Osman Gani* (BFRI 54). **Moulvibazar:** Lawachara, Kamalganj, 12 iv 1978, *Md. Akram Hossain* (BFRI 10).

Bhutan, China, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, New Guinea, Philippines, Thailand, Taiwan and Vietnam.

The plant is used as a diuretic, tonic, indigestion and astringent. Leave is used for muscular pain, paralysis, stomach troubles, after childbirth and as spice for flavouring curries (Hajra *et al*., 1996). Root is used for decayed teeth (Kirtikar *et al*., 1935), malarial fever, sores, including ulceration of the nose, or sometimes for jaws. The leaves are also insecticidal. The timber is used for making handles of axes (van Valkenburg and Bunyapraphatsara, 2002).

Clausena heptaphylla (Roxb.) Wight & Arn., Prodr. Fl. Ind. Orient. 95. 1834; Hook.f., Fl. Brit. India 1: 504. 1875; Kurz, Forest Fl. Brit. Burma 1: 188. 1877 (Repr. 1974); Prain, Beng. Pl. 1: 301. 1903; Brandis, Indian Trees: 115. 1906 (Reprt. 1984); Heinig, List Pl. Chitt. Coll. & HT.: 9. 1925; Sinclair, Bull. Bot. Soc. Beng. 9(2): 89. 1955; Hajra *et al.,* Fl. India 4: 326. 1997; Ahmed *at el*. (eds.), Encycl. Fl. Fauna Bangladesh 10: 171. 2009; Uddin & Hassan (eds.), Vas. Fl. Chittagong & CHT. 3: 250. 2018. *Amyris heptaphylla* Roxb., Fl. Ind. 2: 248. 1831. *Amyris anisata* Roxb. *ex* Steud., Nom. Bot. ed. 2, 1: 81. 1840. *Amyris heptaphylla* Roxb. *ex* DC., Prodr. 2: 82. 1825. *Clausena heptaphylla* var. *engleri* (Tanaka) Swingle, J. Wash. Acad. Sci. 32: 26. 1942. *Clausena macrophylla* Hook.f., Fl. Brit. India 1: 504. 1875. **Fig. 15**

Bengali: *Panbahar, Karan phal, Pan-kafur*

Small trees or undershrubs, up to 7 m tall. Leaves imparipinnate, up to 43 cm long; Petioles to 5 mm long, petioles and rachis cylindric or rarely in young leaves obscurely marginate between internodes, puberulous; leaflets 9-11, subopposite or alternate, lower ones smaller, 7-12.0 × 4-5 cm, terminal one often largest, 11-15 × 4-7 cm, elliptic-oblong, or ovate to ovate-lanceolate, asymmetric, base cuneate, apex acuminate, acumen 5-15 mm long, margins undulate or obscurely crenate, membranous to chartaceous, upper surface dark green, glossy, light green beneath, gland-dotted profusely, glands dimorphic appearing as white dots above greenish beneath, glabrous except puberulent midnerve above; secondary nerves 5-11 pairs, impressed above, raised beneath; spreading, inarching near margins, tertiaries reticulate. Inflorescence axillary or terminal, corymbose, or paniculate cymes, up to 25 cm long, peduncles and branches densely puberulent. Flowers 4-5 merous, to 5 mm long; pedicels short, to 3 mm long, glabrous. Sepals 4-5, to 1.2 mm long, deltate, ciliate, acute, often with a terminal gland. Petals imbricate, oblong, rarely suborbicular, rounded or obtuse, concave, 3.0-4.0 × 1.0-2.0 mm, greenish-yellow or white, pellucid-punctate, glabrous. Stamens 8, subequal in length; filaments subulate above, dilated below, glabrous, to 2 mm long; anthers rhombohedral or oblong, to 1 mm long, yellow, occasionally with a terminal gland at tip of connective. Gynophore distinct, hourglass-shaped, narrowed below, joining at base of ovary, narrowed below, to 1 mm long, glabrous. Ovary cylindric, ovoid or tetragonal, sulcate, 4-lobed, 4-locular, each with 2 superimposed ovules, glandular, often with a medium sized gland at top of each locule; styles cylindric, glabrous, sunken in depression of ovarian lobes, to 1 mm long; stigmas truncate, as broad as styles. Fruit a berry, oblong or ovoid, 10-15 mm long, apex truncate, orange, yellowish or red when ripe, finely glandular, 1-2 seeded. Seeds ovoid, strongly aromatic. 2n = 36 (Kumar and Subramaniam, 1986). *Fl. & fr.:* 1-12. *Undergrowth of evergreen forests; up to 800 m altitudes.*

Banbarban: Lama Forest Range, Quantum, 13 iii 2018, *Shahidul & Rashed* MSI-7160 (DACB 70998); Naikhongchhari Forest Range, 05 iv 2018, *Shahidul & Rashed* MSI-7306 (DACB 71003), Betchora Forest Range, 16 i 2017, *Hossen et al*. IH-3322 (DACB71572); Bogalake, Ruma, 03 xii 2018, *K.K. Islam,* KKI-3138, (DACB 62720); Kuhalongpara, Kuhalong, 14 iv 2017, *Mong & Marma* UMN-203, (DACB71098); Rijukchara, Ruma, 12 v 2018, *K.K. Islam,* KKI-2921 (DACB 61055); Gumdum, Naikhongchhari, 05 v 2017, *Ukchain Chakma* UC-252, (DACB 71816); Betchara Forest Range, Rawangchari, 03 iii 2018, *Shahidul & Rashed* MSI-7109 (DACB 70815); Naikhongchhari Forest Range, 25 iv 2017, *Imam et al.* IH-5312 (DACB 69703); Lama Forest Range, 04 iv 2017, *Imam et al.* IH-5223, (DACB 69699); Poly Forest Range, Ruma, 15 iii 2017, *Imam et al*. IH-4951 (DACB 69698); Betchara Forest Range, Rawangchari, 29 ix 2016, *Imam et al.* IH-543 (DACB 72410); Rawangchari, 4 v 2017,

Figure 15: **Clausena heptaphylla** (Roxb.) Wight & Arn.: a) Flowering shoot; b) flower; c) pistil; d) seed; and e) fruit.

UMM Rasel UAMR-59 (DACB 73587); Shuknachari, Rawangchari, 166 v 2017, *UMM Rasel* UAMR- (DACB 73586); Rawangchari, 4 v 2017, *UMM Rasel* UAMAR-74 (DACB 73664); Kuhalong Para, Kuhalong, 24 v 2017, *Mong & Marma* UMN-50 (DACB 73184); Kuhalong, Para, Kuhalong, 7 iv 2017, *Mong & Marma* UMN-19 (DACB 73183); Kuhalong Para, Kuhalong, 24 iv 2017, *Mong & Marma,* UMN-106 (DACB 73181); Minjhiri Para, Ruma, 4 xi 2017, *Ang Sa Puru Marma* ASPM-145 (DACB 73180); Noapara, 24 viii 1999, *S.B. Uddin* (CUH 5339). **Chattogram:** Chittagong university campus, 5 vi 2015, *Dulal Uddin* (CUH 02); S.W. Chunati range, 27 iii 1998, *Wilcock et al.* (CUH 2561). Kalapanichara, Hajarikhil, Fatikchori, 22 v 2017,

Tajul et al., TAK-5159 (DACB 54549); Napittachara, Mirsori, 25 ii 2018, *Moniruzzaman et al.*, MAK-7750 (DACB 54547); Dudhpukuria, Ranghunia, 4 iv 2018, *Moniruzzaman & Kawsar* MK-8126 (DACB 54548); Andhermanik, Rawjan, 4 iv 2017, *Siraj Mia* SM-552 (DACB); Monglerhar, Dhopachori, Chandanaish, 12 iv 2017, *Tajul et al.*, TAK-4159 (DACB 48690); Dudhpukuria Ranghunia, 17 v 2017, *Tajul et al.*, TAK-4995 (DACB 51772); Dudhpukuria Ranghunia, 17 v 2017, *Tajul et al.*, TAK-5011 (DACB 51773); Chunati, East Lohagara, 26 iv 2017, *Tajul et al.*, TAK-4376 (DACB 51771); Boroghona, Dhopachori Chandanaish, 11 iv 2017, *Tajul et al.*, TAK- 4134 (DACB 51770); Kalapanichora, Hajarikhil, 05 iv 2017, *Md. Mannan* MM-114 (DACB 51769); Kumarikhal, Sarkerhar, Hathazari, 17 iii 2017, *Elias* E-437 (DACB 51768); Kalapanichara, Hajarikhil, 9 iii 2017, *Md. Mannan* MM-98 (DACB 54557); Chunati, East Lohagara, 27 iv 2017, *Tajul et al.*, TAK-4443 (DACB 54556); Napittachora, Mirsori, 16 v 2018, *Moniruzzaman & Kawsar* MK-8522 (DACB 54555); Hajarikhil, Fatikchori, 16 iv 2018, *Moniruzzaman & Kawsar* MK-8179 (DACB 54554); Tonkkabari, Lohagara, 12 iii 2018, *Moniruzzaman & Kawsar* MK-7908 (DACB 54553); Jaliashiapahar, Dhopachori, 18 iii 2018, *Moniruzzaman & Kawsar* MK-7979 (DACB 54552); Shatghor, Chunati, Lohagara, 25 iii 2018, *Moniruzzaman & Kawsar* MK-8020 (DACB 54551); Lalutia, Dhopachori, Chandanaish, 20 iii 2018, *Moniruzzaman & Kawsar* MK-8011 (DACB 54550); Dulahazara, Malumghat, 12 vi 1979, *Khan et al.*, K-5602 (DACB 12542); Himchori, Lalutia, 10 vi 2001, *S.N. Uddin* N-950 (DACB 34054); Chunati, Lohagara, 28 viii 2017, *Shahidul et al.*, SMAK-5506 (DACB 51774); Teknaf, 18 vi 1983, *Huq et al.* H-5917 (DACB 12543); Hazarikhil, 21 iii 2000, *Khan et al.*, K-10337 (DACB 29067). **Cox's Bazar**: Eidghaon, 30 iii 1978, *Akram* (BFRIH 2067); Kutapalong, Ukhia, 7 v 1974, *Das and Akram* (BFRI 5115); Dulahazra Safari Park, 27 iv 2014, *Shanta Dutta* (CUH 17); Dulahazra Safari Park, 14 viii 2014, *Rahman and Hassan* (CUH 10900); Bangabandhu Safari Park, 17 iv 2017, *Niyamul et al.*, NK-3238 (DACB 59133); Soankhali, Inani, 25 iii 2017, *Monir Ahmed* MA-43 (DACB 59134); Hoyaikong, Teknaf, 25 v 2017, *Niyamul et al.*, NK-4493 (DACB 59490); Shilkhali beat, Teknaf, 23 i 2018, *Niyamul & Mehedi* NK-6874 (DACB 59787); Fasiakhali, Chakaria, 10 iv 2017, *Niyamul et al.*, NK- 4345 (DACB 62508); Damdamia Wildlife Sanctuary, Teknaf, 29 iii 2017, *Niyamul et al.*, NK-3000 (DACB 62951); Joarianala, Ramu, 04 iv 2017, *Niyamul et al.* NK-4503 (DACB 60532); Monkhali, Jaliapalong, Ukhia, 12 iii 2018, *Nuyamul & Mehedi* NK-7139 (DACB 61744); Bhomoriaghona, 21 iii 2018, *Niyamul & Mehedi* NK-7265 (DACB 61679); Teknaf range, 16 vi 1991, *Khan et al.*, K-8483 (DACB 24591); Palongkhali, Ukhia, 04 iv 2017, *Mofiz Uddin* MU-35 (DACB 56629); Hnila, Teknaf, 27 v 2017, *Kamrul Islam* KI-93 (DACB 57483); Whykong, Teknaf, 25 iv 2017, *Kamrul Islam* KI-35 (DACB 57484); Thaing-khali, Ukhia, 04 v 2017, *Niyamul et al.*, NK-4242 (DACB 57485); Fasiakhali, Chakaria, 10 v 2017, *Niyamul et al.*, NK-3850 (DACB 57887); Joarianala, Ramu, 04 iv 2017, *Niyamul et al.*, NK- 3176 (DACB 57886);

Chepotkhali, Jaliapalong, Ukhia, 20 ii 2018, *Niyamul & Mehedi* NK-7086, (DACB 63355); Sisabil, Khuniapalong, Ramu, 09 iv 2018, *Niyamul & Mehedi* NK-7269, (DACB 62504); Sisabil, Khuniapalong, Ramu, 10 iv 2018, *Niyamul & Mehedi* NK-7564, (DACB 62506); Shilkhali beat, Teknaf 22 iv 1996, *Khan & Mia* K-9284 (DACB 38976); Harbang Goakmara block, Nalbunia, 26 xii 1988, *Khan et al.*, K-7913 (DACB 27013); Dulahazra Safari park, 16 iv 2004, *S.N. Uddin* N-2277 (DACB 43401); Dulahazra Safari Park, 19 vi 2004, *S.N. Uddin* N-2474. **Dhaka**: Dhaka University, Botanical Garden, 30 v 1973, *A.M. Huq* H-924 (DACB 12531); Botanical Garden, Mirpur, 14 viii 1988, *Rezia Khatun* RK-374 (DACB 23954). **Moulvibazar:** Madhabkunda Eco-park, Barlekha, 19 v 2014, *S.N. Uddin* N-5307 (DACB 43777); Juri, 24 vi 2014, *Bushra et. al.*, B-3272 (DACB 41067). **Rangamati:** Sitapahar, 07 x 1974, Yusuf 178 (DACB 12527); Pablakhali-Amtali, 29 iv 1977, *Huq & Rahman* H-3224 (DACB 12533); Sitapahar, Kaptai, 03 x 2016, *Joyanta et al.*, JCR-693 (DACB 64391); Kaptai Range, 25 iv 1997, *Khan et al.*, K-9876, (DACB 28164); Mainimukh, 28 iv 1977, *Huq & Rahman* H-3202 (DACB 12541); Ghagra, 27 iv 1976, *Rahman & Mia* H-2478 (DACB 12529); Kaptai, *Huq et al.*, H-5811 (DACB 12534); Rampahar, Kaptai, 29 v 2003, *S.N. Uddin* N-1937 (DACB 36478); Sitapahar, Kaptai, 31 v 2003, *S.N. Uddin* N-1966 (DACB 36806); Karnaphuli Sadar Beat, Kaptai, 23 iii 2010, *S.N. Uddin* N-4129 (DACB 36725); Madhabchara, Rampahar, Kaptai, 27 v 2003, *S.N. Uddin* N-1861 (DACB 36790). **Sylhet**: Chundee Cheera, 17 iv 1985, *Huq & Mia* H-6876 (DACB 12530); Khadimnagar National Park, Sylhet Sadar, 11 v 2018, *Sultana & Rahman* DMS-2298 (DACB 57390).

India, Myanmar, Thailand, Cambodia, Laos, Vietnam, Indonesia and the Philippines.

Fresh leaves of the plant are chewed with betle leaves. It is also used for flavouring tobacco. The essential oil obtained from the leaves is used to flavour alcoholic beverages (Van Valkenburg and Bunyapraphatsara, 2002).

Clausena lansium (Lour.) Skeels, Bull. Bur. Pl. Industr. U.S.D.A. 168: 31. 1909; Hajra *et al.,* Fl. India 4: 330. 1997; Rahman *at el*., Bull. Bangladesh National Herb. 6: 91. 2018. *Clausena wampii* (Blanco) Oliv., Linn. Soc. Bot. 5: Suppl. 2: 34. 1861; Hook.f., Fl. Brit. India 1: 505. 1875; *Aulacia punctata* Raeusch., Nom. Bot. ed. 3: 119. 1797. *Clausena wampi* (Blanco) Oliv., Fl. Hongk. 50. 1861*;* Kurz, Forest Fl. Brit. Burma 1: 189. 1877 (Repr. 1974); Prain, Beng. Pl. 1: 301. 1903. *Cookia punctata* Sonn., Voy. Indes Orient. 3: 258. 1782. *Cookia wampi* Blanco, Fl. Filip. 358. 1837. *Quinaria lansium* Lour., Fl. Cochinch. 272. 1790. *Sonneratia punctata* (Sonn.) J.F. Gmel., Syst. Nat. 2(1): 675. 1791 **Fig. 16**

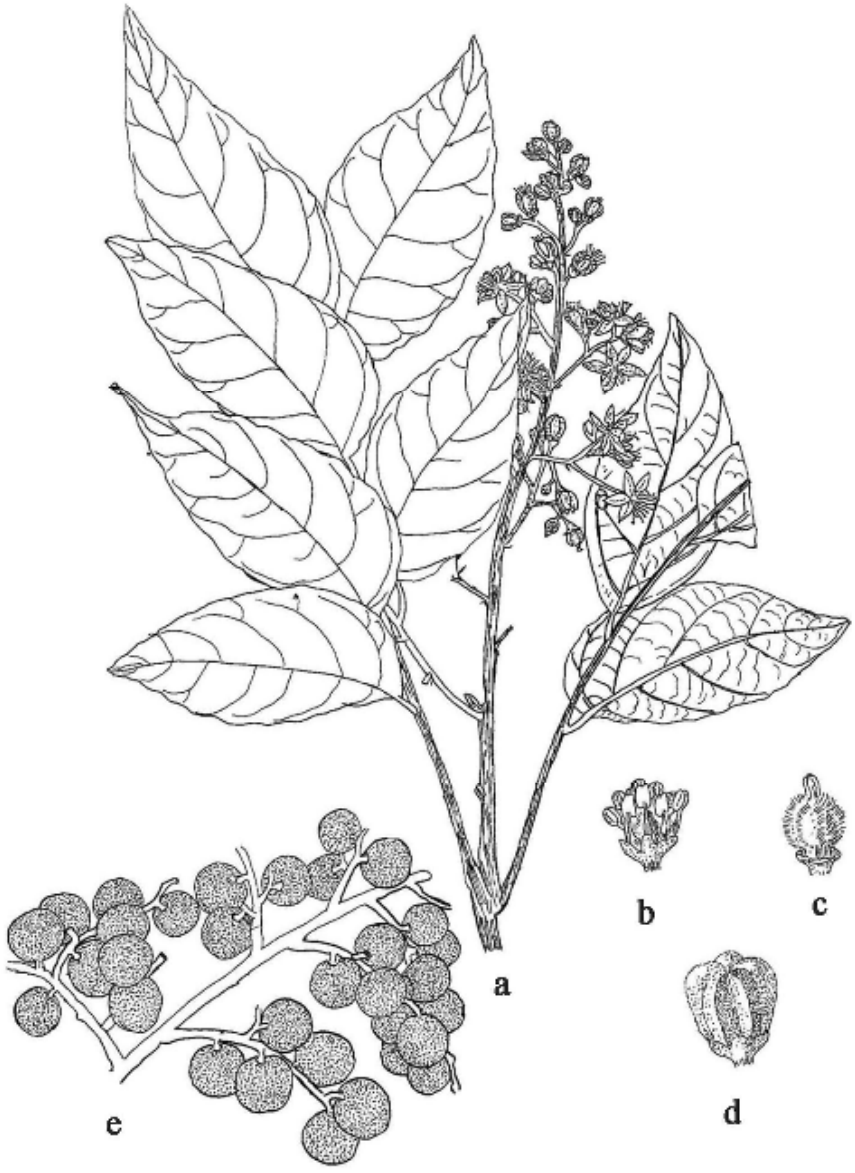


Figure 16: **Clausena lansium** (Lour.) Skeels.: a) Flowering shoot; b) flower with petals removed; c) pistil; d) flower bud; and e) Fruiting branch.

Evergreen trees, up to 10 m high. Branchlets, petiole and inflorescences glandular pustulate. Leaves up to 30 cm long; leaflets 5-9-foliolate; alternate, ovate to ovate-elliptic, elliptic lanceolate, 6-12 × 3-6 cm, base oblique, rounded to broadly cuneate, obtuse or acuminate at apex, margin entire or crenulate, repand, coriaceous, glabrous, secondary nerves 6-8 pairs, spreading, midvein often pubescent; petiolules 4-8 mm glandular pustulate. Inflorescences axillary and terminal panicles, branching at base, up to 20 cm long, densely puberscent. Flowers obovoid, globose in bud, to 6 mm long; pedicels stout, short. Calyx 5-lobed, to 1.1 mm long, lobes ovate, acute, pubescent. Petals oblong-elliptic, to 4.5 × 2.5 mm long, obtuse at apex, base narrowed, white, glandular, puberulent abaxially, glabrous adaxially. Stamens 10; filaments linear, subulate above, dilated below, to 4.5 mm long, glabrous; anthers oblong, to 1.5 mm long. Gynophore c. 1 mm high and broad, cupular, glandulose, glabrous. Ovary globose, 5-lobed, to 2.0 × 2.0 mm, pilose, 5-locular, each with 2 superimposed ovules; style short, to 1 mm long, glandular, glabrous; stigma capitate, 5-lobed. Fruits berries, globose, subglobose, ellipsoid, or broadly ovoid, downy, 1.5-3.0 × 1-2 cm, yellowish, 1-5-seeded. Seeds oblong-ovoid. $2n = 18$ (Kumar & Subramaniam, 1986). *Fl. & fr.:* 3-7. *Evergreen forests; up to 800 m altitudes*.

China, India and Vietnam.

Moulvibazar: Madhabkunda Eco-park, Barlekha, 20 v 2014, *S.N. Uddin*, N-5265 (DACB).

Fruits edible and used for making jams.

Evodia J.R. & G. Forst., Char. Gen. Pl. 7. 1775.
Type species: *Evodia aromatica* Pers.

Sub-shrubs or shrubs, evergreen, unarmed. Trichomes simple. Leaves opposite, trifoliolate or simple. Inflorescences compound to simple racemes, axillary. Flowers bisexual, 4-merous. Sepals basally connate, persistent in fruit. Petals valvate. Stamens 4; filaments sublinear. Gynoecium subapocarpous, 4-carpelled; ovules 2 per locule; style subapical; stigma capitate, punctiform, or becoming inconspicuously 4-parted. Fruit of 1-4 basally connate follicles, these asymmetrically ovoid to ellipsoid, usually with short stylar beak; exocarp subwoody; abortive carpels persistent; ventral endocarp membranaceous to subfleshy, tearing free from rest of endocarp and persistent on seed as an ovate to elliptic piece of tissue; dorsilateral endocarp cartilaginous, glabrous, separate and usually expelled from dehisced fruit. Seeds solitary or in pairs, ovoid or ovoid-

ellipsoid, expelled from dehisced fruit; testa thin and brittle, lustrous, verrucose, with sclerotesta; endosperm copious. Embryo straight, cotyledons flattened, elliptic; hypocotyl terminal, considerably narrower than cotyledons.

Evodia hortensis J.R. Forst. & G. Forst., Char. Gen. Pl. 7. 1775. *Ampacus hortensis* (J.R. Forst. & G. Forst.) Kuntze, Revis. Gen. Pl. 1: 98. 1891. *Evodia hortensis* f. *aureovariegata* Lauterb., Bot. Jahrb. Syst. 55: 232. 1918. *Evodia hortensis* var. *longifolia* (A. Rich.) Lauterb., Bot. Jahrb. Syst. 55: 233. 1918. *Evodia hortensis* f. *monophylla* Lauterb., Bot. Jahrb. Syst. 55: 233. 1918. *Evodia hortensis* var. *odorifera* (K. Schum.) Engl., Nat. Pflanzenfam. 3(4): 121. 1896. *Evodia hortensis* var. *simplicifolia* Rech., Denkschr. Kaiserl. Akad. Wiss., Wien. Math. -Naturwiss. Kl. 85: 294. 1910. *Evodia hortensis* var. *sinuata* Lauterb., Bot. Jahrb. Syst. 55: 232. 1918. *Evodia longifolia* A. Rich., Voy. Astrolabe 2: 61. 1834. *Evodia schullei* var. *simplicifolia* Guillaumin, J. Arnold Arbor. 12: 234. 1931. *Fagara euodia* L.f., Suppl. Pl. 125. 1782. *Herzogia odorifera* K. Schum., Fl. Kais. Wilh. Land 60. 1889. *Evodia suaveolens* Scheff., Ann. Jard. Bot. Buitenzorg 1: 11. 1876. **Fig. 35**

Bengali: *Minhiri* English: Lacy Lady Aralia, Zodia

Sub-shrubs or shrubs, up to 3 m tall. Branches low-down. Leaves simple, opposite, decussate, trifoliolate, with pungent fragrance, glossy, dark green, slender-oval, 15-20 × 10-1.5 cm, tapering gradually to round tip, margin rough; petiole 1-2 cm long, swollen at both junctions. Inflorescences axillary, compound or simple paniculate racemes, slender cluster to 8 cm long; peduncle pubescent, 3-5 cm long. Flowers bisexual, 4-merous, fragrance, 4 mm diameter, white. Sepals basally connate, persistent in fruit. Petals 4, valvate, sharp, white. Stamens 4; filaments sublinear. Gynoecium subapocarpous, 4-carpelled; ovules 2 per locule; style subapical; stigma capitate, punctiform, or becoming inconspicuously 4-parted. Fruit a dehiscent capsule, ovoid to ellipsoid, 4-5 × 2-3 mm, green, one seeded; exocarp subwoody; abortive carpels persistent; ventral endocarp membranaceous to subfleshy. Seeds ovoid or ovoid-ellipsoid, expelled from dehisced fruit; testa thin and brittle, lustrous, verrucose, with sclerotesta; endosperm copious. *Fl. & fr.:* 2-5. *Thickets, lowland forests, fallow forests and tree groves; up to 600 metres altitude*.

Dhaka: BNH Campus, Mirpur-1, 20 ii 2022, *S.N. Uddin* N-5734 (DACB).

Perhaps native to the southwest Pacific Islands. Australia, New Guinea, India.

The plant is used as a medicine and perfume. It is commonly planted in home gardens and around villages as an ornamental or ceremonial plant and boundary marker. It is also often planted in cemeteries or burial grounds. The leaves are antiinflammatory, emmenagogue, febrifuge and laxative. They are chewed as a remedy for toothache or stomach pains. An infusion is used to reduce fever. The crushed leaves are used to prepare a remedial bath. Liquid from the leaves is used as a remedy for swollen testicles. The leaves are crushed, mixed with oil and applied to sore gums. The leaves are also used to cure headache and earache, and are heated then rubbed onto bruises. The bark is sometimes part of an internal remedy that is used to relieve thrushlike conditions, to retard menstruation, and to relieve pain in childbirth. Fluid from the bark is used to treat a disease whose symptoms are yellow eyes and yellow urine. The bark may be chewed with betel nuts and rubbed onto aching body parts. Liquid from the stem is used in treating children with convulsions. The plant contains essential oils, menthofuran, evodone, hortensol, berberine, and furoquinoline and acridone alkaloids. The branches are placed near gardens to ward off pigs. The leaves are highly scented with a pleasing odour. When crushed between the fingers they give out a strong perfume, somewhat between a lemon scented verbena and a mint. They are used in several different ways to impart a pleasant smell to the body, either crushed and used to anoint the body, wrapped up and strung as necklaces, boiled in coco-nut oil and dried in the sun then worn, or merely dried without preparation and then worn; they are used especially by males when dancing in order to attract a female. The leaves and flowers are used in garlands, worn behind the ear, and used to scent coconut oil.

Glycosmis Corrêa, Ann. Mus. Natl. Hist. Nat. 6: 384. 1805.
Type species: *Glycosmis pentaphylla* Corrêa

Shrubs or trees, unarmed, evergreen, often inodorous; with rust-colored villosus indumentum on terminal and axillary buds and usually on young inflorescences; bracteoles and sepals densely ferruginously-tomentulose, mature parts glabrescent. Leaves alternate, or rarely opposite, usually imparipinnate, 1-foliolate or simple; leaflets alternate or opposite, entire or serrate-crenate to denticulate to subentire, equilateral, pinnately veined, nerves usually prominent; petiolules often articulated at base. Inflorescences terminal or terminal and axillary, sometimes paniculate, compoundly racemose, or reduced to 1 or a few flowers. Flowers bisexual, fragrant or not, globose to ellipsoid in bud. Sepals 4 or 5, imbricate, distinct or connate at base. Petals 4 or 5, imbricate in bud, greenish to creamy-white, often glandular, glabrous or minutely puberulent or scurffy abaxially. Stamens 8 or 10, distinct, alternately unequal in length; filaments linear, subulate above, flatted or sometimes with a central ridge at inner face near apex, glabrous or rarely pubescent; anthers ovoid-cordate, glandular-apiculate. Disk

annular, minute, fleshy, glabrous pulvinate, columnar, conic, or bell-shaped. Ovary smooth or pitted glandular, ovoid-cylindric, fusiform or ellipsoid, glabrous, disciform and broader than ovary, or sometimes, ovary seated on a distinct gynophore or on a minute, annular, fleshy disc, 2-5-locular, radial walls of locules straight; ovules 1-2 per locule; style to nearly as long as ovary, cylindric, glabrous or rusty puberulent or tomentulose, persistent in fruit; stigma broad, obtuse, depressed or sometimes subcapitate or subglobose. Fruits small to medium sized berries, subglobose, oblate, oblong-ellipsoid or obovoid, 1-3-seeded, with mucilaginous pulp or dry, without pulp vesicles, smooth or pitted-glandular or mamillate rind, creamy-white to salmon-reddish or purplish-black or blueish-black when ripe; endocarp membranous. Seeds with membranous seed coat; endosperm lacking; embryo straight; cotyledons elliptic, plano-convex, neither convolute nor folded; hypocotyl partly included between cotyledons.

KEY TO THE SPECIES

1.	Leaves simple or 1-foliolate	**G. cochinchinensis**
+	Leaves 2-7-foliolate	**2**
2.	Ovary seated on a distinct gynophore	**G. mauritiana**
+	Ovary seated on a minute, annular, fleshy disc	**3**
3.	Berries creamy-white or salmon-reddish when ripe, outer rind mamillate	**G. pentaphylla**
+	Berries blueish-black when ripe, outer rind smooth or pitted glandular	**G. cyanocarpa**

Glycosmis cochinchinensis (Lour.) Pierre *ex* Engl., Nat. Pflanzenfam. 3(4): 185. 1896; Uddin & Hassan (eds.), Vas. Fl. Chittagong & CHT. 3: 251. 2018. *Glycosmis cochinchinensis* var. *contracta* Craib, Fl. Siam. 1: 223. 1926. *Glycosmis parkeri* V. Naray., Rec. Bot. Surv. India 14(2): 52. 1941. *Glycosmis touranensis* Guillaumin, Bull. Soc. Bot. France 91: 216. 1945. *Toluifera cochinchinensis* Lour., Fl. Cochinch. 1: 262. 1790. *Glycosmis greenei* var. *virgate* Tanaka, Meded. Rijks-Herb. 69: 5. 1931. **Fig. 17**

Trees or shrubs, 1-5 m tall. Leaves simple and petiolate; petiole 3-9 mm; lamina glabrous, suborbicular, broadly elliptic, oblong, ovate, or lanceolate, 3-25 × 2-7 cm, papery to leathery, base rounded, obtuse, cuneate or attenuate, margin entire, apex rounded, obtuse, mucronate or acuminate. Inflorescences terminal or axillary, with flowers conglomerate, rarely solitary, or in panicle to 5 cm. Sepals ovate, small and less than 1 mm. Petals white, to 3 mm. Stamens 10; filaments widest in or their basal half. Disk obvious. Ovary globose; style narrow, short; stigma slightly expanded. Fruit reddish, 0.8-1.5 cm in diam. *Fl. & fr.:* 1-12. *Up to 600 m altitude.*

Cambodia, China, Laos, Myanmar, Thailand and Vietnam.

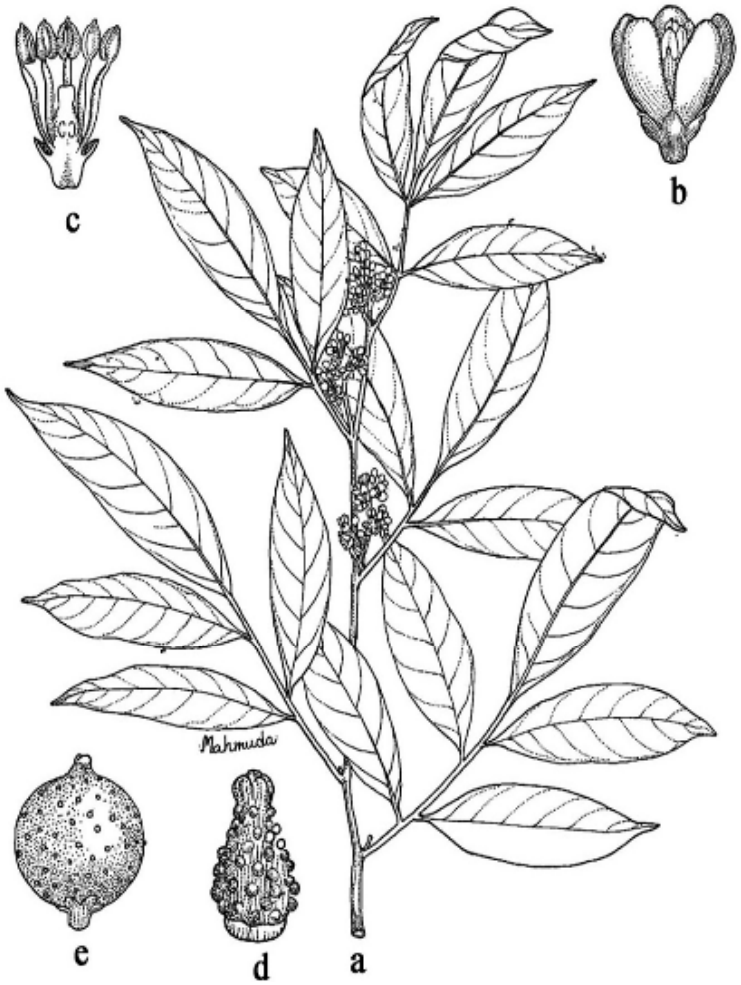


Figure 17: **Glycosmis cochinchinensis** (Lour.) Pierre *ex* Engl.: a) Flowering shoot; b) flower; c) flower with petals removed; d) gynaceum; and e) fruit.

Glycosmis cyanocarpa (Blume) Spreng., Syst. Veg. 4(2): 161. 1827; Kurz, Forest Fl. Brit. Burma 1: 184. 1877 (Repr. 1974); Hajra *et al.,* Fl. India 4: 335. 1997; Uddin & Hassan (eds.), Vas. Fl. Chittagong & CHT. 3: 251. 2018. *Cookia cyanocarpa* Blume, Bijdr. 3:136. 1825. *Dioxippe cyanocarpa* (Blume) M. Roem., Fam. Nat. Syn. Monogr. 1: 46. 1846. *Glycosmis cyanocarpa* f. *longifolia* Yu. Tanaka, J. Bot. 68: 226. 1930. *Glycosmis cymosa* (Kurz) J. Naray. *ex* Tanaka., Rec. Bot. Surv. India 14(2): 26. 1941. **Fig. 18**

Figure 18: **Glycosmis cyanocarpa (**Blume) Spreng.: a) Flowering shoot; b) stamen; c) pistil; d) ; e) fruit; and f) seeds.

Small trees or shrubs, up to 10 m tall. Leaves, simple, 5- or 3- or rarely 6-foliolate, up to 30 cm long, alternate or subopposite; leaflets oblong-lanceolate or elliptic-oblong, 4.5-15.5 × 2.5-5.5 cm, acuminate at base, caudate or sometimes obtusely acuminate at apex, acumen 5-16 mm long, bluntish at tip. Inflorescences lax panicles or axillary, 3-5 cm long, spreading or condense, rusty-puberulent or glabrous. Flowers subsessile. Sepals

4 or 5, suborbicular, minute to 1 mm long, puberulous, glabrous or ciliolate. Petals 4 or 5, oblong-obovate, imbricate, obtuse or rounded at apex, greenish-white, glandular, glabrous. Stamens 8 or 10; filaments linear, glabrous, dilated below, subulate or abruptly acuminate above, sometimes ridged at inner face near apex, 3-5 mm long; anthers oblong or ovoid, to 1 mm long, often gland tipped. Disk annular, broader than ovary to 1 mm high and broad, fleshy, glabrous. Ovary ovoid, broadly oblong or subglobose, smoothly glandular, glabrous, 5- or 4-locular, each locule with one ovule; style short, glabrous, to 1 mm long, not clearly marked from ovary but with a different shade or colour; stigma persistent in fruits, truncate or subcapitate. Fruits a berry, obovoid or oblong or ellipsoid, 1-15 x 6 mm, bluish, pitted glandular. Seed 1. *Fl. & fr.:* 1-12. *Evergreen forests; up to 800 m altitude.*

Cox's Bazar: Kudum-Guha, Hoyaikong, Teknaf, 18 xii 2017, *Niyamul et al.*, NK-4665 (DACB 63353). **Moulvibazar:** Adampur Forest Beat, Kamalganj, 7 iii 2011, *S.N. Uddin* N-4480 (DACB 40535). **Rangamati:** Sitapahar, Kaptai, 4 vi 1999, *Rahman et al.*, (CUH 4972); Rampahar, Kaptai, 12 iii 2021, *Rahim & Arif* R-21; Sitapahar, Kaptai, 18 xii 2004, *S.N. Uddin* N-2615 (DACB 37011); Kaptai Range, Sitapahar, 26 iv 1997, *Khan et al*., K-9913 (DACB 28179); Ansar Campchara, Rampahar, Kaptai, 16 vi 2001, *S.N. Uddin* N-1008 (DACB 40443); Kaptaimukh Beat, Kaptai, 22 iii 2010, *S.N. Uddin* N-4103 (DACB 43661).

Bhutan, China, Myanmar, Philippines, Sri Lanka and Taiwan.

Glycosmis mauritiana (Lam.) Tanaka, Bull. Soc. Bot. Franc. 75: 708. 1928; Hajra *et al.,* Fl. India 4: 340. 1997; Ahmed *at el.* (eds.), Encycl. Fl. Fauna Bangladesh 10: 173. 2009; Uddin & Hassan (eds.) Vas. Fl. Chittagong & CHT. 3: 252. 2018; *Limonia mauritiana* Lam., Encycl. Meth. Bot. 3: 517. 1792. *Glycosmis triphylla* Wight in Bot. Misc. 3: 298. 1833. *Glycosmis pentaphylla* var. *nitida* Prain, Beng. Pl. 1: 300. 1903; Heinig, List Pl. Chitt. Coll. & HT.: 9. 1925. **Fig. 19**

Shrubs or small trees, up to 10 m high; branchlets cylindric, glabrous or greyish or rusty-puberulent when young. Leaves imparipinnate, 5-14 cm long, 3-5 or rarely even 1 or 2 foliolate; petiole subcylindric, rachis and slender, glabrescent; leaflets opposite and alternate, elliptic, ovate, linear-lanceolate to oblanceolate, cuneate at base, green and glossy above, slightly oblique, obtuse to rounded or shortly acuminate at apex, entire along margins, coriaceous, pale greenish beneath, glabrous; secondary nerves 5-16 pairs, slender, prominulent above, rather prominent beneath, inconspicuously reticulate. Inflorescences panicles, axillary, up to 9 cm long, branches and peduncle greyish to

Figure 19: **Glycosmis mauritiana** (Lam.) Tanaka: a) Flowering shoot; b) flower; and c) fruit.

ferruginously puberulous. Flowers small, to 0.5 mm long; pedicels to 1 mm long; bracteoles minute, puberulous, deltate. Sepals 4-5, acute, obtuse, deltate or suborbicular, to 0.5 mm long, puberulent abaxially, ciliolate along margins. Petals oblong-obovate or elliptic-oblong, obtuse, 2-4 × 1.5-2.1 mm, greenish-white, obscurely glandular, glabrous. Stamens 8 or 10; filaments subulate, to 4.5 mm long, glabrous; anthers oblong or ovoid, cordate below, to 1 mm long, often with an obscure apical gland. Disk minute, lobulate. Ovary cylindric-ovoid or fusiform, narrowed and stipitate below, to 2.0 × 1.0 mm, pitted or smoothly glandular, rusty puberulent above, rarely glabrous, locular 4-5, cells with one ovule; style absent; stigma truncate, persistent in fruits as an apical knob. Fruit a subglobose berry, 5-15 mm across, smoothly or pitted glandular, pink or reddish when ripe, 1-seeded. *Fl. & fr.:* 1-5. *Coastal scrub and semi-evergreen forests*; *up to 400 m altitude.*

Rangamati: Karnaphuli Sadar Beat, Kaptai, 23 iii 2010, *S.N. Uddin* N. 4145 (DACB 36711); Sitapahar, Simanachhari, 12 ii 2011, *Harun & Aminul* (CUH 59).

India, Indonesia, Malaysia, Mauritius, Myanmar, Sri Lanka and Thailand.

Pulpy fruits are eaten by tribals.

Glycosmis pentaphylla (Retz.) DC., Prodr. 1: 538. 1824; Hook.f., Fl. Brit. lndia 1: 499. 1875; Kurz, Forest Fl. Brit. Burma 1: 186. 1877 (Repr. 1974); Prain, Beng. Pl. 1: 300. 1903; Brandis, Indian Trees: 112. 1906 (Reprt. 1984); Heinig, List Pl. Chitt. Coll. & HT.: 9. 1925; Sinclair, Bull. Bot. Soc. Beng. 9(2): 89. 1955; Hajra *et al.,* Fl. India 4: 346. 1997; Ahmed (eds.), Encycl. Fl. Fauna Bangladesh 10: 174. 2009; Uddin & Hassan (eds.), Vas. Fl. Chittagong & CHT. 3: 253. 2018. *Limonia pentaphylla* Retz., Obs. Bot. 5: 24. 1788. *Limonia arborea* Roxb., Pl. Coromandel 60, t. 85. 1788. *Glycosmis arborea* (Roxh.) DC., Prodr. 1: 538. 1824; Kurz, Forest Fl. Brit. Burma 1: 185. 1877 (Repr. 1974). Glycosmis *quinquefolia* Griff., Not. Pl. Asiat. 4: 495. 1854. *Glycosmis rigida* (Jack) Merr., J. Arnold Arbor. 33: 218. 1952. *Glycosmis madagascariensis* Corrêa *ex* Risso, Hist. Nat. Orangers 19: t. 109. 1820. *Glycosmis chylocarpa* Wight & Arn., Prodr. Fl. Ind. Orient. 93. 1834. *Chionotria rigida* Jack, Malayan Misc. 2(7): 54. 1822. **Fig. 20**

Bengali: *Ash-sheora, Bonjamir, Datmajani, Matkila* English: Tooth-brush Plant

Evergreen small trees or shrubs to 1-5 m tall; branches woody, glabrous, cylindric, young parts finely rusty puberulent; bark lenticellate, greenish to grey-brownish. Leaves margin serrate, apex mucronate; leaflet blades, papery, oblong, oblong-elliptic or ovate

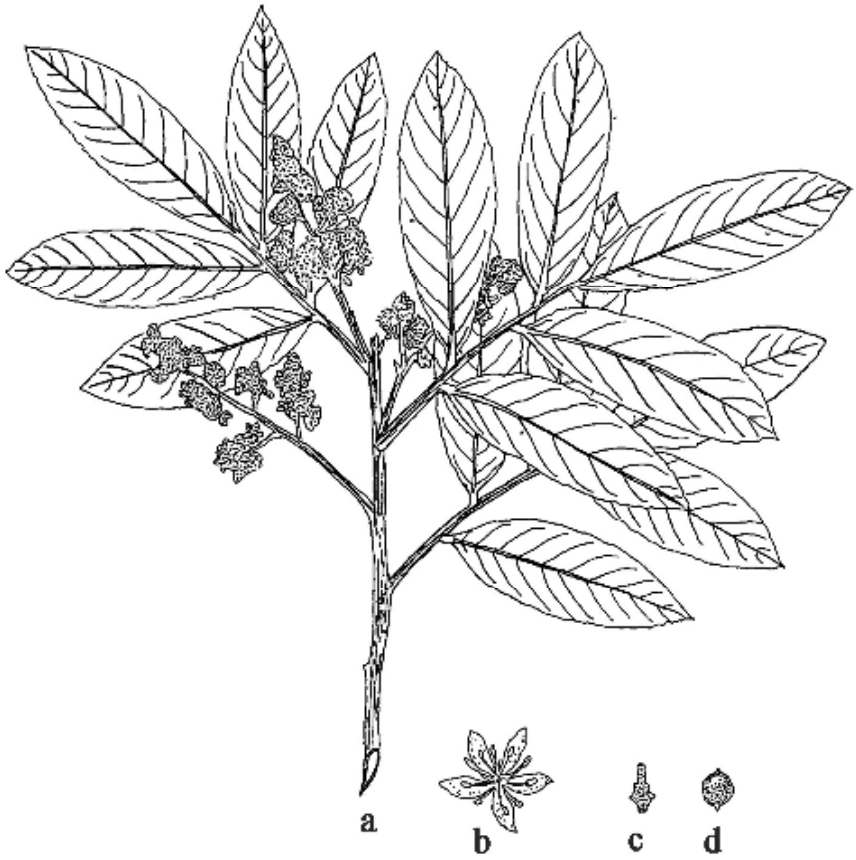


Figure 20: **Glycosmis pentaphylla** (Retz.) DC.: a) Flowering shoot; b) flower; c) pistil; and d) fruit.

pinnate, petiolate, usually 3-5 foliolate or rarely 7-foliolate; petiole and rachis angular or cylindric; petioles 2.0-6.0 cm long; leaflet blades oblong, 10-25 × 3-7 cm, base cuneate, to oblanceolate, rarely linear-elliptic, opposite and alternate, 8-22 × 2-7 cm, coriaceous dark green above, light greenish beneath, glabrous, base cuneate or obtuse, apex acute, acuminate, obtuse rounded, distantly or closely serrate or sometimes obscurely crenate ordenticulate or rarely entire along margin, glabrous; secondary nerves 10-18 pairs, spreading, inarchig near margins, finely reticulate, petiolules 3-7 mm long. Inflorescences axillary or terminal and paniculate; peduncles elongated, up to 15 cm long, greyish or rusty puberulent. Flowers densly clusters, 5-merous, subsessile; bracteoles 2, ovate, rusty-puberulent abaxially, glabrous adaxially, margin ciliolate. Sepals 5, imbricate, deltate to suborbicular, acute, acuminate or obtuse to rounded, to 1

mm long, margin ciliolate. Petals 5, elliptic-obovate, imbricate, obtuse at apex, narrowed below, 2.5-4.5 × 2.0-3.5 mm, white or pale yellow, glabrous, caducous; filaments gradually dilated upwards, ampliated at centre almost near subulate tip, glabrous; anthers to 1 mm long, oblong, cordate below, prominently gland-tipped. Disk annular, to 0.5 mm high, obscurely lobed, fleshy, white. Ovary globose tobroadly ovoid, ovoid-cylindric or conical, to 1.5-3.0 mm high, coarsely pustular-glandular, glabrous, usually 5-locular with a single ovule in each locule; style extremely short; stigma slightly expanded, scarcely distinct; stigma truncate or globose, obscurely lobed. Fruit a berry, subglobose, reddish or cream to crimson red, Pinkish when ripe, 10.0-13.0 mm in diameter, mamillate, 1-3 seeded. Seeds round to planco-convex, suboblong, green. Seeds plano-convex, green. Chromosome number: 2n = 16, 18 (Kumar and Subramaniam, 1986). *Fl. & fr.:* 1-12. *Forest margins, roadsides, village thickets, hillside and valley woods; to 600-1000 m altitute.*

Bandarban: Ruposhipara, Lama, 26 xi 1998, *Rahman and Hossain* (CUH 2538); Thanchi road, Ali Kadam, 13 x 1998, *Rahman et al.*, (CUH 3782); Rawangchari, 29 iii 2017, UMM Rasel UAMR-002, (DACB 73654); Kuhalong Para, Kuhalong, 24 iv 2017, Mong & Marma UMN-072 (DACB 73182); Kuhalong Forest Range, 16 v 2018, *Islam & Miah* MSI-7543 (DACB 71000); Matamuhuri Forest Range, Alikadam, 27 xi 2017, *Islam & Miah* MSI-6410 (DACB 71002); Sangu Forest, Bolipara, 20 xi 2017, *Shahidul et al.*, MSI-6310 (DACB 71001); Poly Forest Range, 25 iv 2018, *Shahidul et al.*, MSI-7443 (DACB 70818); Bandarban sadar, 29 viii 2016, *Imam et al.*, HI-158 (DACB 70212); Maurchara Poly Forest Range, Ruma, 25 i 2017, *K.K. Islam*, *KKI*-964 (DACB 47249); Thanchi Forest Range, 9 x 2016, *Imam et al*., IH-764 (DACB 69709); Lama Forest Range, 11 i 2017, *Imam et al.*, IH-3124 (DACB 69705); Balaghata, Bandarban sadar, 8 xi 2016, *Imam et al*., IH-1525 (DACB 68796); Rowangchara, 18 x 2017, *Uho et al*., UAMR-309 (DACB 67179); Raisa Forest Range, 22 x 2016, *Imam et al.*, IH-995 (DACB 72415); Rajbila Forest Range, Bandarban sadar, 13 xi 2016, *Imam et al.*, IH-1613 (DACB 72413); Naikhyongchari Forest Range, 20 ii 2017, *Imam et al.*, IH-4247 (DACB 72411); Youngcha, Lama, 12 i 2018, *Uthowi Marma*, UAM-264 (DACB 73778); Batchara Forest Range, Rawangchari, 4 x 2017, Shahidul & Rashed MSI-5915 (DACB 73704); Sakdu Forest Range, 22 i 2018, *Shahidul & Rashed* MSI-6803 (DACB 73701); Rupashipara, Lama, 26 xi 1998, *Rahman and Hossain* (CUH 2538). Thanchi road, Ali Kadam, 13 x 1998, *Rahman et al.*, (CUH 3782). **Bogura:** Bogura to Natore road, 19 i 1974, *Khan & Huq* K-3797 (DACB 12575); Beltola, Kagail, Gabtali, 18 xi 2001, Rezia Khatun RK-5430 (DACB 32976); Baropur, Bogura sadar, 4 ii 2003, *Rezia & H. Ara* RK-4025 (DACB 32846); Sherpur, near Duk-banglow, 24 I 1981, *Huq* H-4928 (DACB 12551). **Chapainawabganj:** Sonamosjidh area, 2 ix 2002, *Rezia et al*., R.K.-3784 (DACB 30256). **Chattogram:** Pagoda, Chittagong University Campus, 2 ii 2011,

M. 624 (CUH 7835); Rob Hall, Chittagong University campus, 25 iii 2012, *Zahir Uddin* (CUH 11). Pagoda, Chittagong University campus, 2 ii 2011, M-624 (CUH 7835); Lohagora, Chunati, 28 viii 2017, *Shahidul et al.*, SAK-5510 (DACB 51767); Isamoti beat, Ranirhat, Rangunia, 13 viii 2017, *Shahidul et al.*, SAK-5415 (DACB51766); Baraiyadhala, Sitakundha, 6 iii 2017, *Tajul et al.*, TOK-3884 (DACB 51764); Dhopachari, Chandanaish, 10 iv 2017, *Tajul el al*., TAK-4114 (DACB 51763); Kamalchari, Ranghunia, 3 iv 2018, *Moniruzzaman & Kawsar* MK-8124 (DACB 54587); Sitakunda Eco-park, Sitakunda, 6 xii 2017, *Moniruzzaman et al.*, MAK-6772 (DACB 5488); Kumira, Sitakunda, 31 i 2017, *Tajul et al.*, TOK-3570 (DACB 51787); Khaiyachara, Mirsari, 5 i 2017, *Tajul et al.*, TOK-2547 (DACB 49464); Hazarikhil, Fatickchari, 4 x 2016, *Tajul et al.*, TOK-800 (DACB 48878); Chittagong University campus, 29 viii 2016, *Tajul et al.* TOK-106 (DACB 50996); Bauria, Sandip, *Tajul et al.*, TOK-3106 (DACB 53176); Andermanik, Raojaon, 19 xi 2016, *Tajul et al*., TOK-1940 (DACB 49996); Patia, Haidgaon, 15 ii 2017, *Tajul et al.*, TOK-3743 (DACB 54586); Chattogram sadar, 6 xi 1995, *M.K. Mia* M-3437 (DACB 27080); CRB & Tigerpass, 4 ix 2016, *Tajul et al.* TOK-407 (DACB 50036); Korocia, Rangunia, 6 ii 2017, *Tajul et al.*, TOK-3328 (DACB 53178); Sandwip, Rahmatpur, 11 ii 1988, *Mia & Mahfuz* M-1593 (DACB 12581); Dohazari range, Lalutia, 27 xi 1970, *Khan & Huq* K-2307 (DACB 12573); Barabkundo, 9 i 1971, *Khan & Huq* K-2351 (DACB 12566); Patia, 24 ii 1979, *Huq* 4344 (DACB 12545); Baraiyadhala, 24 x 1985, *Khan & Mia* K-7303 (DACB 12548); Napora, Chunati Sanctuary, 30 xii 1989, *Khan et al.* K-8189 (DACB 12549). **Chuadanga:** Gokulkhali, 2 i 1976, *Huq et al.* H-1762 (DACB 12578); Nilmaniganj, 11 xii 1988 *Huq et al*. H-8843 (DACB 12582). **Cox's Bazar:** Kutubdia south, 25 xii 1983, *Huq et al.* H-6594 (DACB 12596); Rajarkul National Park, Ramu, 20 i 2017, *Md. Rasel* MR-20 (DACB 56630); Circuit House, 7 ix 2016, *Niyamul et al.*, NK-384 (DACB 57486); Khuruskul, Cox'x Bazar sadar, 24 iii 2018, *Niyamul et al.*, NK-7645 (DACB57487); Domdomia Nature Park, Teknaf, 13 ii 2018, *Niyamul et al.*, NK-6985 (DACB 62501); Bhomoriaghona, Eidgaon, 24 i 2017, *Moniruzzaman & Mehedi* NK-2580 (DACB 62500); Chofolondi, 31 x 2016, *Niyamul et al.*, NK-1492 (DACB 57267); Fasiakhali, Chakaria, 22 xi 2017, *Niyamul et al.* NK-4560 (DACB 63357); Bangdeba, Joarianala, Ramu, 13 xi 2017, *Niyamul et al*., NK-5087 (DACB 60531); Uttar Harbang, Chakaria, 14 ix 2017, *Niyamul et al.* NK-5681 (DACB 57877). **Cumilla:** Salban Bihar, Mainamoti, Lalmai, 8 viii 1988, *Mahfuz & Huq* HM-205 (DACB 12583). **Dinajpur:** Birganj National Park, 2 xii 2020, *K.K. Islam*, KKI-3974 (DACB 65941); Moriampur, Khansama, 24 viii 1998, *Mia et al.* M-4213 (DACB 28710); Singra forest, 12 x 1980, *Huq et al.* H-4735 (DACB 12572). **Faridpur:** Komorpur, 7 viii 1982, *Matiur Rahman,* M. 1469 (DACB12558). **Gaibanda:** Jamalpur, Palashbari, 6 v 1988, *Mia et al.* M-1800 (DACB 12590). **Gazipur:** Kaliganj, 6 ix 1989, *M.K. Mia* M-1272 (DACB 12591); Rajendrapur forest, 29 vii 2002, *Rezia Khatun* RK-3682 (DACB 34828); Chandra Forest,

19 viii 1980, *Huq et al.*, H-4636 (DACB 12560). **Jashore:** Navaron, 18 vi 1982, *A.M. Huq* H-5644 (DACB13592); Haridrapota, Jhikargacha, 2 ii 2022, *Jannatul Sultana* SJ-1 (DACB 66518); Burbhadurey, 29 viii 1983, *Huq et al.*, H-5926 (DACB 12559). **Jhenaidah:** Kaliganj, Smitalla, Mallikpur, 26 iii 1998, *Khan et al.*, K-9940 (DACB 29175). **Khagrachhari:** Khagrachari sadar, 10 x 2018, *Naimur Rahman* NR-1278 (DACB 47591); Gomoti, Panchari, 23 iv, 2011, *S.N. Uddin* N-4589 (DACB 39957). **Kishoreganj:** Katabaira, 13 i 1989, *Mahbuba Halim* MH-407 (DACB 12546). **Kurigram:** Paglarhat, 25 iii 1990, *Huq et al.*, H-9563 (DACB 12586). **Kushtia:** Munshiganj, Nilmaniganj, 10 vi 1974, *Khan & Huq* KK-3897 (DACB 12571). **Lakshmipur:** Lakshmipur sadar, 22 ii 2018, *Naimur Rahman* NR-1228 (DACB 45475). **Moulvibazar:** Lawachara National Park, Kamalganj, 10 xi 2009, *S.N. Uddin* N-4071 (DACB 41508); Madhabkunda Eco-park, Barlekha, 21 ix 2014, *S.N. Uddin* N-5588 (DACB 42486). **Mymensingh:** Kadigar National park, Bhaluka, 28 ii 2022, *K.K. Islam* KKI-5006 (DACB); Dhanchira, 4 xi 1983, *Huq et al.*, H-6489 (DACB 12595); Haluaghat, 23 v 1989, *Mia & Mahfuz* M-2027 (DACB 27374); Majra Kura, Karaitala sal forest, 24 v 1989, *Mia et al.*, M-2072 (DACB 12671). **Narayanganj:** Elachipur, 19 xi 1975, *Huq & Rahman* H-1571 (DACB 12570). **Noakhali:** Sonaimuri, Begumganj, 20 xi 1981, *Huq et al.*, H- 5351 (DACB 12579); Maizdee, 21 xi 1981, *Huq et al.*, H-5381 (DACB 13577). **Panchagarh:** Tetulia, 25 ii 1984, *Mia et al.*, M-1024 (DACB 12597); Kadila, Boda, 1 vii 1998, *Mia et al.*, M-3941 (DACB 28747). **Patuakhali:** Kuakata, 23 iii 2021, *Ahmed Saqee* ASQ-144 (DACB 66870); Kuakata, Kalapara, *M. Sultana*, DMS-2880 (DACB 59937). **Pirojpur:** Kaukhali, 4 iii 1985, *Huq & Mia* H-6740 (DACB 12567). **Rajshahi:** Rajshahi University campus, 15 viii 1999, *Khatun & Rahman* RK-1891 (DACB 28080); Godagari, 17 xi 1988, *Huq et al.*, H-8683 (DACB 12585). **Rangamati:** Sitapahar, Kaptai, 25 iv 1997, *Huq* 10476 (DACB 81089); Kaptai, 13 vi 1983, *Huq et al.*, H-5802 (DACB 12593); Barkal Reserve Forest, 4 xii 2015, *K.K. Islam, KKI*-1767 (DACB 46067); Fring Kheong Forest Beat, Karnafuli, Kaptai, 3 vii 2010, *S.N. Uddin* N- 4348 (DACB 44973); Sitapahar, Kaptai, 24 iv 1997, *Khan et al.*, K-9846 (DACB 28217); Jibtoli Reserve Forest, Kaptai, 15 x 2017, *Joyanta et al.*, JCR-6751 (DACB 64267); Khaskhali, Kaukhali, 11 x 2016, *Moninur et al.*, JCR-1111 (DACB 64265). **Rangpur:** Kudda Narayanpur, Mithapukur, 14 xii 1980, *Mia & Rahman* M-454 (DACB 12557). **Satkhira:** Sundarban, 26 iii 2002, *S.N. Uddin* N-1311 (DACB 37433); Mandarbari, 26 iii 2002, *Uddin & Deodatus* N-1311 (DACB 30753). **Sunamganj:** Takerghat, 14 x 1985, *Khan et al.*, K-7206 (DACB 12550). **Sylhet:** Sarighat Forest, 3 x 1983, *Huq et al.*, H-6306 (DACB 12594); Chattak, 5 i 1978, *Huq & Rahman* H-3621 (DACB 12561). **Tangail:** Tangail sadar, 19 vii 1977, M. Rahman R-579 (DACB 12562). **Thakurgaon:** Salandar, 26 ii 1984, *Mia et al.*, M-1077 (DACB 23937).

Bhutan, Cambodia, China, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand, Vietnam, Philippines and Australia.

The plant is used against diarrhoea, coughs, rheumatism, anaemia, jaundice, fever, liver complaints, eczema, scabies, boils and ulcers, and use as a vermifuge. A decoction of the roots is given for facial inflammation. Roasted leaves is prescribed for women after delivery as an appetizer.

Limonia L., Sp. Pl. ed. 2: 554. 1762.
Type species: *Limonia acidissima* L.

Spinous trees. Leaves alternate, imparipinnate; leaflets 5-7, usually opposite, petioles winged. Inflorescence terminal or lateral, loose panicles or racemes. Flowers polygamous. Calyx 5-toothed, small, flatted, deciduous. Petals 5, rarely 4-6, spreading, imbricate. Stamens 10-12, inserted outside a short disk; filaments dilated, sides and front villous, tip subulate; anthers cordate or linear-oblong. Ovary oblong, 5-6 celled, at length 1-celled, ovules numerous, crowded in many series upon 5-6 at length parietal placentas; styles absent; stigmas oblong, fusiform, deciduous. Fruit a berry, globose, rind woody, rough, 1-celled, many-seeded. Seeds buried in pulp, oblong, compressed, cotyledons fleshy, radicle pointing away from the hilum.

Limonia acidissima L., Sp. Pl. ed. 2, 1: 554. 1762; Kurz, Forest Fl. Brit. Burma 1: 192. 1877 (Repr. 1974); Prain, Beng. Pl. 1: 303. 1903; Brandis, Indian Trees: 118. 1906 (Indian reprint, 1984); Hajra *et al.,* Fl. India 4: 294. 1997; Ahmed *et al*. (eds.), Encycl. Fl. Fauna Bangladesh 10: 175. 2009. *Schinus limonia* L., Sp. Pl. 389. 1753. *Feronia elephantum* Corr. in Trans. Linn. Soc. London 5: 225. 1800; Kurz, Forest Fl. Brit. Burma 1: 198. 1877 (Repr. 1974); Prain, Beng. Pl. 1: 305. 1903; Brandis, Indian Trees: 118. 1906 (Reprt. 1984). *Hesperuthusa acidissima* (L.) M. Roem., Syn. Mon. Hesper. I: 38. 1846. *Feronia limonia* (L.) Swingle in J. Wash. Acad. Sci. 4: 328. 1914. *Limonia elephantum* (Corr.) Panigrahi in Taxon 26: 576. 1977. **Fig. 21**

Bengali: *Koethbel, Kait.*

English: Wood Apple, Elephant Apple, Curd fruit, Monkey fruit.

Medium-sized, semi-deciduous trees, up to 10 m tall. Branch lets slightly zig-zag when young, with axillary sharp spines to 3 cm long, glabrous; bark greyish or white, sometimes with scabrous dots. Wood is yellowish-white, hard. Leaves imparipinnate, alternate, up to 10 cm long; rachis and petioles narrow or marginately winged; wings to 1.2 mm broad; leaflets 5-7, opposite, obovate, 2.5-3.5 × 1-2 cm, glabrous, subsessile,

coriaceous, gland-dotted, cuneate at base with obtuse or rounded tip, entire or faintly glandular-crenulate along margins; petiolules of lateral leaflets obsolete, up to 2.1 mm long, those of terminal ones on an extension of rachis, up to 11.5 mm long, puberulent, soon becoming glabrous; secondary nerves 2-4 pairs, slender, oblique, inarching near margins, finely reticulate beneath. Inflorescence axillary or terminal, many-flowered panicles or racemes, up to 5 cm long, finely puberulent. Flowers small, bisexual, dull red or greenish-white, reddish in bud that turning to pale-yellowish, polygamous by abortion; pedicels to 5 mm long, glabrescent. Calyx 5-toothed, teeth lobes small, to 0.5 mm long, deltoid, puberulent, ciliate near tip, caduceus. Petals 5, oblong-ovate, acute, c. 6 × 2 mm, acute, glandular, glabrous. Stamens 10 or 12; filaments dilated at base, to 4 mm long, woolly-pubescent on inner face, glabrous above; anthers linear-oblong, acute, to 4 mm long. Disk minute. Ovary green, globose, incompletely 4-6 locular, cells with many ovules in several series; style very short, thick, fleshy; stigma oblong- fusiform. Fruit a globose berry, 5-6.5 cm greenish-white or brownish, hard, woody rind, pulp sweet-sour mucilaginous and fleshy, chocolate-coloured when ripe, many-seeded. Seeds oblong, slightly compressed, c. 5 × 3 mm, testa brownish, hairy. 2n = 18 (Kumar and Subramaniam, 1986). *Fl. & fr.:* 2-12. *Dry or moist deciduous forests; at lower-elevations.*

Rajshahi: Rajshahi University campus, 15 viii 1999, *Khatun & Rahman* RK-1900 (DACB 28085).

China, Indonesia, Malaysia, Myanmar, Pakistan, Sri Lanka, Thailand and the United States.

Fruit is eaten raw and made into jelly, sherbet or chutney. Ripe fruits are aromatic, antiscorbutic and alexipharmic. Fruit Pulp is used to cure bites of venomous insects and reptiles, biliousness, coughs, dysentery, heart disease, asthma, consumption, tumours, opthalmia, leucorrhoea and diarrhoea. Wood apple cream also processed from the fruit pulp. Leaves are aromatic, astringent, carminative and used to cure indigestion, flatulence, diarrhoea, dysentery, vomiting, hiccup and haemorrhoids (Ghani, 2003). Leaves are also yield an essential oil. Spines and bark are used in several medicinal preparations for the treatment of excessive menstruation, liver disorders, bites and stings and nausea. Woods are takes a fine polish and used for house-building, naves of wheels and agricultural implements. A gum, resembling 'gum arabic' in properties, is extracted from the stem bark.

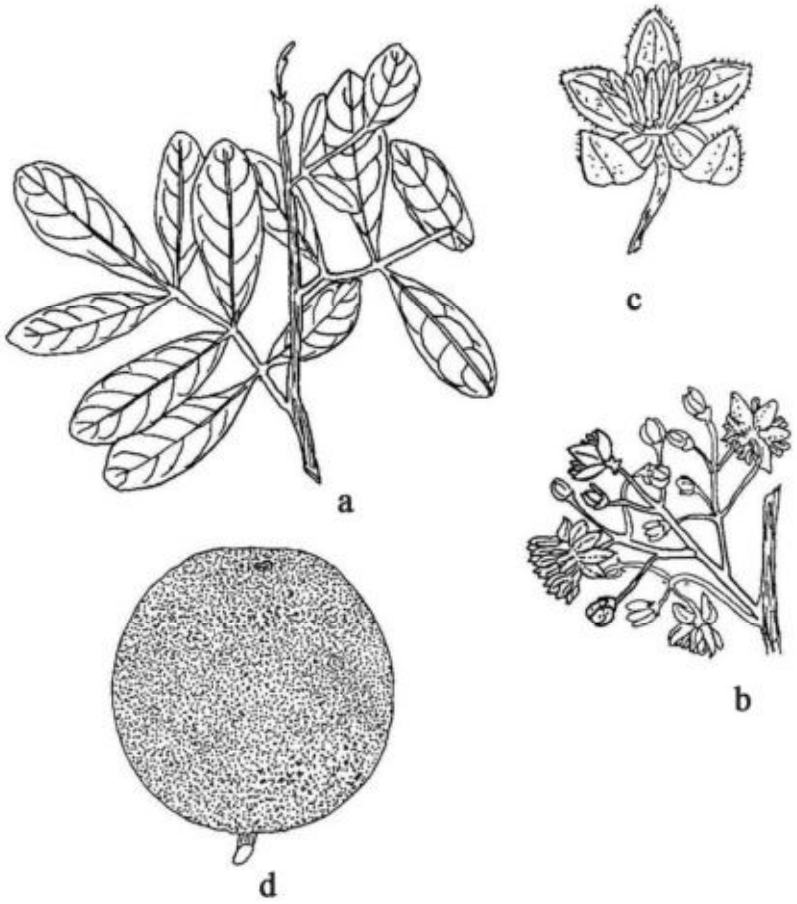


Figure 21: **Limonia acidissima** L.: a) Vegetative shoot; b) flowering branch; c) flower; and d) fruit.

Luvunga Buch.-Ham. *ex* Wight & Arn., Prodr. Fl. Ind. Orient. 90. 1834.
Type species: *Luvunga scandens* (Roxb.) Wight

Woody climbers or lianas, with straight, retrorse or recurved axillary spines, without rust-colored villosus indumentum on terminal and axillary buds or young inflorescences. Leaves alternate, digitately 3-foliolate, unifoliolate on seedlings and juvenile shoots; leaflets on short petiolules, entire along margins, revolute on drying, coriaceous, glandular-punctate. Inflorescences axillary, terminal, or basal to leaves, paniculate or racemose. Flowers bisexual, 4-5-merous, oblong or subglobose in bud. Calyx cup-

shaped, 3-5-lobed or truncate. Petals 3-5, imbricate in bud, linear-oblong or lanceolate, thick, fleshy, soon caducous. Stamens 6-10, rarely less, equal in length, free or connate; anthers linear-oblong, obtuse or slightly apiculate, dorsifixed. Disk annular, pulvinate, or columnar. Ovary long-ovoid, 2-4-loculed, fleshy, syncarpous; each locule with 1-2 collateral or super imposed ovules; style continuous with the ovary, cylindric, long, thick, caducous; stigma obtuse or capitate. Fruit ellipsoid or globose berries with thick densely glandular or pustular pericarp; mucilaginous pulp and without pulp vesicles; endocarp membranous or fleshy. Seed 1-3, embaded with membranous seed coat, ovoid, light greenish; endosperm lacking; embryo straight; cotyledons elliptic, plano-convex; hypocotyl partly included between cotyledons.

Luvunga scandens (Roxb.) Buch. -Ham. *ex* Wight & Arn., Prodr. Fl. Ind. Orient. 1: 90. 1834; Hook. f., Fl. Brit. India 1: 509. 1875; Kurz, Forest Fl. Brit. Burma 1: 191. 1877 (Repr. 1974); Prain, Beng. Pl. 1: 304. 1903; Brandis, Indian Trees: 120. 1906 (Indian reprint, 1984); Heinig, List Pl. Chitt. Coll. & HT.: 9. 1925; Hajra *et al.,* Fl. India 4: 298. 1997; Ahmed *et al.* (eds.), Encycl. Fl. Fauna Bangladesh 10: 177. 2009; Uddin & Hassan (eds.), Vas. Fl. Chittagong & CHT. 3: 254. 2018. *Luvunga nitida* Pierre, Fl. Forest. Cochinch. 4 (92): pl. 288B, 1893. *Limonia scandens* Roxb., Fl. Ind., ed. 1832, 2: 380. 1832. **Fig. 22**

Bengali: *Kakoli, Labangalata, Luvunga lata, Luvungphul.*

Woody liana. Branches flexuous, spines slightly recurved often from a conical base, up to 25 m long; bark smooth when young, rough on ageing, greyish. Leaves digitately 3-foliolate; lamina elliptic to obovate or oblanceolate, 6-18 × 3-6 cm, base cuneate, apex acute or shortly acuminate, margins entire; coriaceous, thick, glabrous, secondary nerves obscure; petioles 2-7 cm long, horizontally grooved above, glabrous; petiolules 3-10 mm long. Inflorescence many-flowered paniculate cymes. Flowers small, ellipsoid in bud, fragrant; peduncles short, glabrescent. Calyx cup-shaved, 3.5-4.5 mm long, shallowly 4-lobed, lobes truncate, minute, ciliolate along margin. Petals 4, oblong, 12-16 × 3-4 mm, obtuse, glabrous, fleshy, white. Stamens 8 or fewer; filaments linear-subulate, connate almost to tip; staminal tube to 12 mm long, glabrous; anthers linear, apiculate, c. 5 mm long. Ovary long-ovoid, 2.4-2.6 × 2.0-2.2 mm, seated on a columnar fleshy glandular disk, glabrous, 3-4 celled, each locule with 1 or 2 superimposed ovules; styles cylindric, continuous with ovary, up to 7 mm long, glandular, glabrous; stigmas capitate, to 2.6 mm broad, glandular. Fruits oblong, globose or obpyriform, 2.0-2.5 × 3.5-4.0 cm in diameter, yellow, 1-4-seeded, densely glandular or pustular, 3-locular, each locule with a solitary seed, pericarp smooth and thick, locule 1-seeded. Seeds broadly ovoid, 2-3 cm, greenish, rather pointed at apex, outer integument of testa membranous, embedded in a

mucilaginous matrix. *Fl. & fr.:* 3-12. *River banks, valleys of evergreen broad-leaved forests; up to 800 m altitude.*

China, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Philippines, Sri Lanka, Thailand and Vietnam.

Figure 22: **Luvunga scandens** (Roxb.) Buch. -Ham. *ex* Wight & Arn.: a) Fruiting shoot; b) flowering branch; c) flower with petals and stamens removed; d) abaxial and adaxial views of petal; and e) stamens.

The plant has an ornamental value. Fruits are used in the preparation of a perfumed medicinal oil, called kakoli oil. An essential oil obtained from fruits that has a strong repellent effect on insect and has antifungal property. Roots and fruits are reported to be used as antidotes for snake poison and scorpion-sting.

Merope M. Roem., Syn. Hesper.: 44. 1846.
Type species: *Merope spinosa* (Blume) M.J. Roemer

Small trees or erect shrubs. Leaves alternate, unifoliolate, petiolate, lamina oblong-ovate to obovate, acute or shortly acuminate at apex, subentire to faintly notched. Flowers 5-merous, fragrant, bisexual, axillary, solitary, rarely in fascicles of 2. Calyx cup-shaped, acutely lobed. Petals free, lanceolate-oblong. Stamens 10, free; filaments linear; anthers linear-oblong. Ovary superior, 3-4 celled; styles short, thick; stigmas flat. Fruit an angular berry, ovoid to ellipsoid. Seeds 2-3 cm long, somewhat reniform, flat, testa rough.

Merope angulata Swingle, J. Wash. Acad. Sci. 5: 423. 1915; Amhed *et al*. (eds.), Encycl. Fl. Fauna Bangladesh 10: 178. 2009; Uddin & Hassan (eds.), Vas. Fl. Chittagong & CHT. 3: 255. 2018. *Atalantia angulata* (Willd.) Engl., Nat. Pflanzenfam. ed. 2 19a: 328. 1931. *Atalantia longispina* Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 41(2): 295. 1872. *Atalantia spinosa* (Blume) Hook. *ex* Koord., Exkurs. -Fl. Java 2: 427. 1912. *Glycosmis spinosa* (Blume) D. Dietr., Syn. Pl. 2: 1409. 1840. *Gonocitrus angulatus* (Willd.) Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 42(2): 228. 1873. *Paramignya longispina* Hook.f., Fl. Brit. India. 1: 511: 1875; Prain, Fl. Sun.: 291. 1903. **Fig. 23.**

Bengali: *Bon-lebu, Ban-nimbu* *English:* Mangrove lime

Small trees or erect shrubs, up to 3 m tall, evergreen. Branchlets cylindric, armed with strong, sharp, straight, axillary, rarely solitary or paired, stout spines up to 2-5 cm long, glabrous; bark greyish, lenticellate. Leaves unifoliolate, alternate, often crowded on short lateral branchlets; lamina oblong, oblong-ovate to obovate, 4.5-15.0 × 2-7 cm, base rounded or thick-headed, apex obtusely acute, margins entire, faintly notched, thick, coriaceous, profusely pellucid-gland dotted, glabrous; secondary nerves 5-8 pairs, visible in larger leaves, rather faint in smaller ones, anastamosing near margins; tertiaries indistinct; petioles short, 5-8 mm long, articulated at apex, slightly marginate, glabrous. Flowers axillary, solitary or in pairs or clusters of a few flowers, bisexual, 5- merous, ellipsoid in bud, c. 2 cm long, fragrant. Calyx cup-shaped, c. 1.4 × 2.0 mm, 5-lobed, lobes ovate, subacute, c. 1.2 mm long, glandular- punctate, glabrous. Petals 5, free, white

Figure 23: **Merope angulata** Swingle: a) Fertile shoot.

or yellowish, lanceolate-oblong, elliptic-oblong, obtuse above, subtruncate at base, 6-8 mm long, glabrous, imbricate. Stamens 10, free, subequal; filaments linear, c. 3 mm long, shorter than anthers, with a prominent mid nerve, glabrous; anthers linear-oblong, apiculate, 4.1-4.4 × 1.0-1.2 mm; apiculum c. 0.5 mm long. Disk annular, c. 0.8 mm high, glabrous, thick, fleshy. Ovary superior, ovoid-ellipsoid, 3-4 celled, 3-4 mm long; each locule with 4 ovules; style short, thick cylindric, glabrous; stigmas flat, minute. Fruit ovoid to ellipsoid, semidry, strongly, angular, with a narrow tapering end, triangular in cross sections, up to 4.5 cm long, peel thick, glandular and strongly aromatic, green to

yellowish when ripe. Seeds 3, reniform, 2-3 cm long, testa rough, flattened with tapering ends. *Fl. & fr.:* 2-11. *Landward margins of mangrove swamp forests and along river banks.*

Bagerhat: Kachikhali medow, Sundarbans, 16 ii 2002, *S.N. Uddin et al*., N-1264 (DACB 36245); Sarankhola range, Kachikhali, Sundarbans, 31 i 2012, *Sayedur*, 646 (JUH); **Barguna:** Tangragiri, Taltoli, 4 iii 2021, *M. Sultana* DMS-3638 (DACB). **Cox's Bazar:** Dulahazara range, Harbang, Chakaria (Chakaria Sundarban), 21. 11. 1979, *Huq & Mia*, H.-4552 (DACB 12654).

India, Indonesia, Malaysia, Myanmar, Papua New Guinea and Singapore.

Fruits are used to treat dysentery, abdominal complaints and assist womb contraction after childbirth.

Micromelum Blume, Bijdr. 137. 1825.
Type species: *Micromelum pubescens* Blume

Trees or shrubs, evergreen, unarmed. Leaves alternate, imparipinnate, usually with more than 5-23 leaflets or rarely 3- or 1-foliolate. Inflorescences terminal or terminal and axillary, corymbose panicles, often very large and flat topped. Flowers bisexual, small or medium to large, ellipsoid or broadly ellipsoid to obovoid to oblong in bud. Calyx cup-shaped, small deltate, shallowly 5-lobed or toothed. Petals 5, valvate on slightly overlapping in bud. Stamens 10, distinct, alternately unequal in length; filaments sublinear, ± straight; anthers sub-basifixed. Disk annular or columnar. Ovary 3-5-locular; ovules 2 in each locule; style slender, cylindric, articulate with ovary, c. 1.5 long, deciduous in fruit; stigma capitate, broader than style. Disk annular, fleshy, glabrous. Fruit a berry, baccate, semidry, subglobose or broadly ellipsoid, pericarp thin, glandular, reddish or orange coloured when ripe with neither pulp nor pulp vesicles; endocarp membranous. Seeds ellipsoid, oblong, slightly compressed, 2 or 3, rarely only one; seed coat membranous; endosperm lacking; embryo straight; cotyledons green, broadly elliptic, thin, folded; hypocotyl superior.

Micromelum minutum (J.G. Forster) Wight & Arn., Prodr. Fl. Ind. Orient.: 448, 468. 1834; Ahmed *et al*. (eds.), Encycl. Fl. Fauna Bangladesh 10: 179. 2009; Uddin & Hassan (eds.), Vas. Fl. Chittagong & CHT. 3: 256. 2018. *Micromelum pubescens* Blume, Bijdr. 138. 1825; Hook.f., Fl. Brit. India 1: 501. 1875; Kurz, Forest Fl. Brit. Burma 1: 186. 1877 (Repr. 1974); Prain, Beng. Pl. 1: 302. 1903; Brandis, Indian Trees: 114. 1906 (Indian reprint, 1984); Heinig, List Pl. Chitt. Coll. & HT.: 9. 1925. *Limonia minuta* G. Forst., Prodr.: 33. 1786. *Micromelum pubescens* var. *glabrescens* (Benth.) Oliv., J. Proc.

Linn. Soc., Bot. 5: 40. 1861. *Micromelum integerrimum* (Roxb. *ex* DC.) M. Roemer, Syn. Mon. Hesper. 1:47. 1846 (as *M. Integerrium* Wight & Arn., 1834, *nom. Illegit*); Hajra *et al.,* Fl. India 4: 349. 1997. **Fig. 24.**

Bengali: *Koroiphula, Bankunch, Dulia* English: Lime Berry

Evergreen, unarmed tree, up to 10 m tall. Twigs and buds densely short-hairy. Leaves alternate, imparipinnate, up to 30 cm long; leaflets 9-15, alternate, ovate-lanceolate to ovate, 4-15 × 2-6 cm, base obtuse and asymmetrical, apex attenuate-acuminate, margin entire to irregularly undulate-crenate. Inflorescence terminal, cymose-paniculate. Flowers bisexual, 5-merous. Calyx cupular, shallowly 5-toothed, about 0.1-0.2 mm long. Petals 5, valvate, linear-oblong, 2.5-3.5 × 1.3-1.6 mm, densely appressed hairy outside, pale green to yellowish-white. Stamens 10, dimorphic, five long and five short; filaments linear, 4-6 mm long; anthers ellipsoid, c 1.5 mm long. Disk small, confined to an area beneath the ovary. Ovary subglobose or ellipsoid, 1-2 × 1 mm, obscurely and longitudinally furrowed, hairy, 5-locular, cells with one pendulous ovule; styles cylindric, glabrous; stigmas capitate, c. 1.0 × 1.0 mm. Fruit a berry, ovoid-ellipsoid, 8-10 × 6-8 mm, orange or reddish when ripe, endocarp fleshy, mucilaginous, 2-3 seeded. Seeds 6-7 × 4-5 mm, glabrate, yellow, testa smooth, translucent, cotyledons flat and folded, green, folded many times, oil dots numerous, readily visible with a lens. *Fl. & fr.:* 1-12. *Primary, secondary forests, monsoon forests and beach forest; up to 700 m altitude.*

Bandarban: Paindu Forest Range, 6 ii 2017, *Imam et al.*, IH-3880 (DACB 72418); Youngcha, Lama, 1 xii 2017, *Uthowi Aung Marma* UAM-231 (DACB 73779); Rawangchari Forest Range, 7 iii 2017, *Imam et al.*, IH-4650 (DACB 69702); Hansama Para, Bandarban Sadar, 7 ii 2018, *Mong & Marma* UMN-662 (DACB 67626); Kuhalong Para, Kuhalong, 7 iv 2017 *Mong & Marma* UMN-20 (DACB 67633); Dakbanglormore, Poly Forest Range, Ruma, 23 i 2017, *K.K. Islam* KKI-746 (DACB 47213); Thanapara, Ruma, 10 v 2018, *K.K. Islam*, *KKI*-2786 (DACB 47350); Mourchara, Poly Forest Range, Ruma, 25 i 2017 *K.K. Islam*, *KKI*-988 (DACB 47122). **Bogura:** Brindabanpara, 13 ii 2001, *Rezia Khatun* RK-2820 (DACB 34843). **Brahmanbaria:** Sherpur, 11 ii 1976, *Huq & Rahman* H-2207 (DACB 12603). **Chapainawabganj:** Shibganj, 17 xii 1996, *H. Rashid* HR-36 (DACB 39131). **Chattogram:** Korocia, Rangunia, 6 ii 2017, *Tajul et al.*, TOK-3284 (DACB 48815); Khoiyachaora, Mirsori, 30 iv 2017 *Tajul et al.*, TAK-4552 (DACB 51781); Dudhpukuri, Ranghania, 17 v 2017, *Tajul et al.*, TAK-5010 (DACB 51782); Dupachari, Chandanaish, 8 ii 2017 *Tajul et al.*, TOK-3424 (DACB 53168); Hajarkhil, 5 iv 2017, Kumkbo Ram Tripura, KR-168 (DACB 53170); Kumari Khal,

Figure 24: **Micromelum minutum** (J.G. Forster) Wight & Arn.: a) Flowering shoot and b & c) flower.

Hathazari, 23 xi 2016, *Tajul, Owahid & Kawsar* TOK-2094 (DACB 50155); Sitakunda Eco-park, 13 ii 2018, *Moniruzzaman et al.*, MAK-7575 (DACB 54564); Fatehpur, Hathazari, 10 v 2017, *Tajul et al.*, TAK-4853 (DACB 54566); Kamolachori, Ranghunia, 3 iv 2018, *Moniruzzaman et al.*, MAK-8108 (DACB 54567); Khoiyachora, Mirsori, 20 xii 2017, *Moniruzzaman et al.*, MAK-6967 (DACB 54568); Kalapanichara, Hajarikhil, Fatikchari, 22 v 2017, *Tajul et al.*, TAK-5147 (DACB 54569); Bariadhala, 19 xi 1996, *Huq & Mia* H-8060 (DACB 12604); Napora, 30 xii 1989, Khan & Huq K-8180 (DACB 12609); Goalmara, Chunati, 9 vi 2001, *S.N. Uddin* N-928 (DACB 34072); Hazarikhil, 30 x 1987, *Huq & Mia* H- 8584 (DACB 12605); Jaldi Beat, Banskhali, 14 v 1990, *Khan & Huq* K-8356 (DACB 12610); Chamachari, Dhopachari, 7 x 1998, *Rahman et al.*, R-161

(DACB 29056); Isamoti, Ranghunia, 5 v 2017, *A. Uddin* AU-304 (DACB 54577); East Lohagara, Chunati, 27 iv 2017, *Tajul et al.*, TAK-4460 (DACB 54576); Chandranath, Sitakundo, 17 iv 2017, *Tajul et al.*, TAK-4265 (DACB 54575); Shatghor, Lohagara, Chunati, 25 iii 2018, *Moniruzzaman & Kawsar* MK-8033 (DACB 54573); Dudhpukuria, Ranghunia, 2 iv 2018, *Moniruzzaman & Kawsar* MK-8096 (DACB 54570); Fatikchari, 20 I 1989, *Huq et al.*, H-8994 (DACB 12612); Dhurun, Fatikchari, 18 i 1989, *Huq et al.*, H-8935 (DACB 12613). **Cox's Bazar:** Joariana, Ramu, 4 iv 2017, *Niyamul et al.*, NK-3174 (DACB 57888); Kudum-Guha, Hoyaikong, Teknaf, 18 xii 2017, *Niyamul et al*., NK-4661 (DACB 63364); Soankhali, Inani, 15 iii 2017, *Monir Ahmed* MA-05 (DACB 59131); Swankhali, Inani 14 ii 2017*, Niyamul et al*., NK-2778 (DACB 59136); Fasiakhali, Chakaria, 10 iv 2017, *Nazim Uddin* NU-57 (DACB 57490); Soankhali, Inani, 15 v 2017, *Niyamul et al.*, NK-4017 (DACB 59795). **Cumilla:** Chaddagram, 8 ii 1979, Huq 4251 (DACB 12626); Mainamati, Sultanpur, 12 ii 1976, *Huq & Rahman* H-2211 (DACB 12628); Mainamati, Sultanpur, 12 ii 1976, *Huq & Rahman* H-2246 (DACB 12627). **Dhaka:** Asulia, 14 x 1075, *A.M. Huq* H-1353 (DACB 12559); Nayerhat, 15 xii 1979, *Huq et al.*, M-256 (DACB 12554); Agricultural College campus, Tejgoan, 30 xii 1987, *Rezia Khatun* R-41 (DACB 12599); Mirpur Botanical Garden, 2 xii 2001, *Rezia Khatun* RK-3391 (DACB 31155). **Dinajpur:** Ronia, Biral, 27 viii 1998, *Mia & Harun* M-4384 (DACB 28744). **Gazipur:** Kaliakoir, 14 iv 2001, *Harun & Rahman* SH-478 (DACB 39945). **Gaibanda:** Palasbari, 6 v 1988, *Bushra et al.*, M-1828 (DACB 12615). **Habiganj:** Kalenga beat, Habiganj 2 range, 14 iv 2000, *Khan et al.* K-10385 (DACB 39280); Chundee Cheera Tea estate, near Chunarughat, 17 iv 1985, *Huq & Mia* H-6893 (DACB 12607). **Jamalpur:** Dakkhin Sherpur, 16 ii 1979, Huq 4291 (DACB 12622). **Khagrachhari:** Perachara, Hatimura, 28 x 1997, *Rahman et al.*, (CUH 2327); Manikchari, 14 iii 1999, *Rahman et al.*, Rahman-4565 (DACB 29484); Manikchari, 17 x 1998, *Saifur* (BCSIR). **Kishoreganj:** Karmganj Jangle bari, 13 iii 1988, *Mia & Mahfuz* M-1667 (DACB 12611). **Kurigram:** Bhurungamari, Bagbhander border, 23 iii 1990, *Huq et al.*, H.-9483 (DACB 12600). **Kushtia:** Munshiganj, 24 ix 1978, *Khan & Huq* K-4938 (DACB 12547). **Moulvibazar:** Adampur, Kamalganj, 19 iv 2014, *S.N. Uddin* N-5191 (DACB 43515); Kamarchara forest beat, Kamalganj, 21 ix 2011, *S.N. Uddin* N-4819 (DACB 37364); Adampur forest beat, Kamalgonj, 7 iii 2011, *S.N. Uddin* N-4447 (DACB 35812); Madhabkunda Eco-park, Barlekha, *S.N. Uddin* N-5299 (DACB 43868); Lawachara, Kamalganj, 11 v 2009, *S.N. Uddin* N-3590 (DACB 43050). **Mymensingh:** Mymensingh, 8 iv 1976, *Mia et al*., M-2346 (DACB 12619); Haluaghat, Panihata, 23 v 1989, *Mia et al.*, M-2017 (DACB 12602); Bijoypur, 05 xi 1983, *Huq et al.*, H-6506 (DACB 12630). **Noakhali:** Momarijpur, 18 xi 1981, *Huq et al.*, H-5268 (DACB 12633). **Patuakhali:** Kolapara, Kuakata, 5 i 1980, *Khan et al.*, K-5966 (DACB 12555). **Pirojpur:** Bhandaria, 18 ii 1986, *Huq & Mia* H-7443 (DACB 12598). **Rajshahi:** Near Nawhati, 13 xii 1972, *A.M. Huq* H-685 (DACB 12574). **Rangamati:** Pathaptala,

Sitapahar, Kaptai, 25 ix 2002, *S.N. Uddin* N-1576 (DACB 40448); Monlovichara, Pharua Reserve Forest, 17 i 2009, *S.N. Uddin* N-3205 (DACB 46639); Rampahar, Kaptai, 27v 2003, *S.N. Uddin* N-1858 (DACB 36793); Kaptaimukh Beat, Kaptai, 22 iii 2010, *S.N. Uddin* N- 4102 (DACB); Kuramara Pahar, Rangamati sadar, 30 xii 2016, *K.T. Chakma* KTC-41 (DACB 66052); Kannebichara, Barkal, 15 i 2017, *Joyanta & Kamrul* JCR-2214 (DACB 64275); Bilaichari, Pharua Reserve Forest, 18 iv 2009, *S.N. Uddin* N-3990 (DACB 47097); Fring Kheong forest beat, Karnaphuli, Kaptai, 28 xii 1973, *M. Rahman* R-156 (DACB 12623). **Rangpur:** Banubari, 17 i 1974, *Khan & Huq* K-3755 (DACB 12624). **Sherpur:** Gazni, Jhenaigathi, 9 ii 1985, *Khan et al.*, K-7017 (DACB 12652); Samaschara beat, Rangtia range, 10 x 2003, *H. Ara* HA-641 (DACB 30295). **Sylhet:** Khadimnagar National Park, 15 iii 2019, *Sultana et al.*, DMS-2811 (DACB 57400); Jaintapur-Tamabil (Sreepur), 5 iv 1988, *Mahfuz et al.*, M-58 (DACB 12616); Shah Paran mazar, 22 x 1986, *Huq & Mia* H-7945 (DACB 12606); Chhatak, 5 i 1978, *Huq & Rahman* H-3664 (DACB 12621). **Tangail:** Madhupur, 16 vii 1987, *A.M. Huq* H-8466 (DACB 25446). **Thakurgaon:** Ranisankhal, Sandharoy, 5 viii 1998, *Khan et al.* K-10009 (DACB 28607).

Australia, India, Indo-China, Indonesia, Malaysia, Myanmar, New Guinea, Philippines, Sri Lanka, Thailand to the Pacific Islands.

The leaves are used as a general tonic. It is used to treat irregular menstruation, scabies, skin irritation, toothache, fevers, white scum on the tongue, tumors, bad breath and haemorrhoids. The young shoots and barks are used as medicine for treating infantile convulsions, diarrhea, headache, stomach-ache, coughs, sore tongue, gonorrhea and thrush. Pieces of the root are chewed with betel for coughs.

Murraya J. Koenig *ex* L., Mant. Pl. 2: 554. 563. 1771.
Type species: *Murraya exotica* L.

Trees or shrubs, unarmed, evergreen or deciduous, without rust-colored villosulous indumentum on terminal and axillary bud or young inflorescences. Leaves alternate, odd-pinnate (occasional leaves even-pinnate or unifoliate); leaflets alternate, often asymmetric. Inflorescences axillary or axillary and terminal, paniculate or reduced to cymes or few to many-flowered racemes. Flowers medium to large, bisexual, ellipsoid to obovoid, cylindric or long ovoid in buds. Sepals 4-5, united at base or to ± half their length, ovate or lanceolate, glandular. Petals 4-5, imbricate, glandular, linear or ovate-lanceolate, greenish-white to pure white. Stamens 8-10, distinct, alternately unequal in length, free; filaments linear or sublinear, straight; anthers small, ovoid or ellipsoid. Disk

annular, pulvinate, columnar, lobulate or cylindrical, short. Gynoecium 2-5-loculed, syncarpous; radial walls of locules straight; ovary seated on a distinct gynophore, ovules 1 or 2 per locule; style slender, caducous, deciduous in fruit or sometimes basal portion persistent; stigma capitate. Fruits subglobose to ovoid-ellipsoid, baccate, with thin, glandular pericarp, reddish or black when ripe, 2-5-locular, 1 to few seeded. Seeds embedded in a white mucilaginous pulp or fleshy seed coat; endosperm lacking; embryo straight; cotyledons green, elliptic, plano-convex, neither convolute nor folded; hypocotyl partly included between cotyledons.

KEY TO THE SPECIES

1. Leaves with 15-27 leaflets; inflorescences with very numerous flowers (up to 60); berries subglobose, purplish to black when ripe **M. koenigii**

\+ Leaves with 7 leaflets; inflorescences with only 3-6 flowers; berries ovoid-ellipsoid, reddish when ripe **M. paniculata**

Murraya koenigii (L.) Spreng., Syst. Veg. 2: 315. 1817; Hook.f., Fl. Brit. India 1: 503. 1875; Kurz, Forest Fl. Brit. Burma 1: 190. 1877 (Repr. 1974); Prain, Beng. Pl. 1: 302. 1903; Brandis, Indian Trees: 113. 1906 (Reprt. 1984); Heinig, List Pl. Chitt. Coll. & HT.: 9. 1925; Sinclair, Bull. Bot. Soc. Beng. 9(2): 89. 1955; Hajra *et al.,* Fl. India 4: 351. 1997; Ahmed *et al.* (eds.), Encycl. Fl. Fauna Bangladesh 10: 180. 2009; Uddin & Hassan (eds.), Vas. Fl. Chittagong & CHT. 3: 257. 2018. *Bergera koenigii* L., Mant. Pl. Alt. 563. 1771. *Chalcas koenigii* (L.) Kurz in J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 44: 132. 1875. **Fig. 25.**

Bengali: Currypata*, Kari-pakku, Bishahari*, *Narasingha,* Kariaphuli.

English: Curry Leaf, Curry Tree.

Small trees or large shrubs, up to 6 m tall. Branchlets rather cylindric, puberulous or glabrous; bark greyish or green. Leaves 16-30-foliolate, imparipinate, up to 50 cm long. Petioles 2.5-4.5 cm, petioles and rachises densely white-puberulent; leaflets 15-27, alternate, ovate to lanceolate, 2-6 × 1-2.5 cm, conspicuously asymmetric, dark green above, paler beneath, foetid-scented, thin membranous to chartaceous, base acut, obtuse to rounded and very oblique, glabrous except the puberulent midrib, shortly acuminate or tapering at apex, tip notched, glandular-crenulate along margin; secondary nerves 4-10 pairs, less prominent above; margin entire or crenulat. Inflorescence terminal, corymbose paniculate, many-flowered, up to 60. Flowers 5-merous, cylindric or ellipsoid in bud, scented; pedicels slender, short to 4 mm long, puberulent. Calyx saucer shaped;

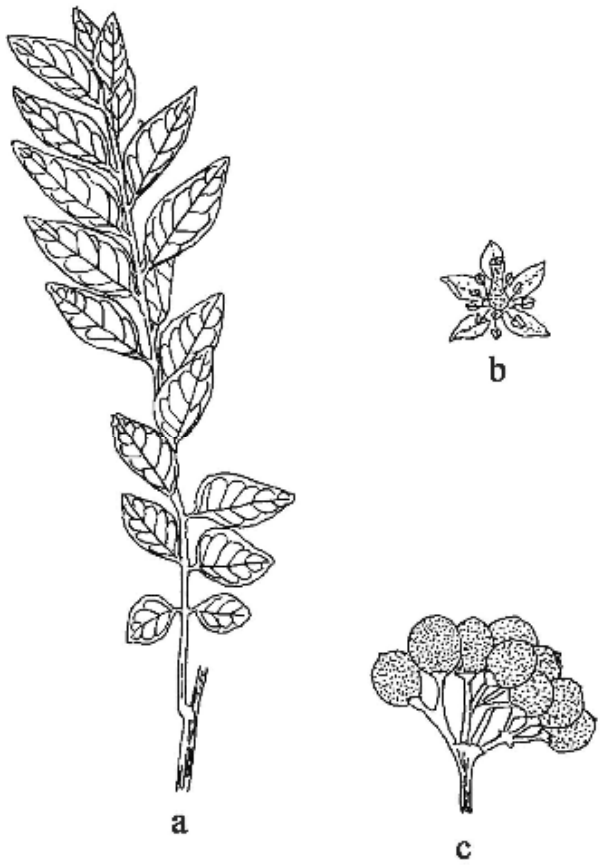


Figure 25: **Murraya koenigii** (L.) Spreng., Syst.: a) Leafy shoot; b) flower; and c) fruiting branch.

sepals 5, ovate, united at base, caducous, small, less than 1 mm long, deltate, puberulent abaxially, glandular. Petals 5, white or greenish-white, oblanceolate to oblong, valvate, linear-oblong, obtuse, glandular, glabrous 6.0-8.0 × 1.0-1.5 mm. Stamens 10; filaments subulate, 5-7 mm long, glabrous; anthers dorsifixed, ellipsoid, short, less than 1 mm long, pale greenish. Disk annular, slightly conicalto 0.5 × 2.0 mm, greenish, obscurely 5-lobed. Ovary oblong-ovoid, slightly narrowed towards apex, to 1 mm long, greenish, 2-locular, locule with 1-2 ovules; style slender below, dilated below stigma, up to 2.5 mm long, pale green; stigma capitate, glandular. Fruits purplish to black when ripe, 2-locular, ovoid to oblong or subglobose, to 9 × 10 mm, pulp whitish, mucilaginous, 1 or 2-seeded. Seeds green, ovoid to oblong, cotyledons glandular, seed coat membranous. 2n = 18

(Kumar and Subramaniam, 1986). *Fl. & fr.:* 1-11. *Mostly in moist deciduous forests in subtropical regions, also in cultivation; between 50-450 m altitude.*

Chapainawabganj: Shibganj, 18 xi 2021, *Anita Rani Chowdhury* ARC-01 (DACB 66366); Godabari, Panchananpur, 4 ix 2002, *Rezia & Momtaz* RK-3879 (DACB 30004). **Chattogram:** Kalapanichara, Hajarikhil, 5 iv 2017, Md. Mannan MM-151 (DACB 51786). **Cox's Bazar:** Moheshkhali, 2 vi 2017, *Sumon Dey* SD-10 (DACB 59791). **Cumilla:** Gatura, 11 ii 1976, *Huq & Rahman* H-2136 (DACB 25384). **Dhaka:** Mirpur Beribadh, 9 i 2022, *S. Sultana* SS-09 (DACB 66476); Mirpur Botanical Garden, 5 xi 2002, *Rezia & Momtaz* R-4020 (DACB 32808). **Dinajpur:** Singra National Park, 3 ii 2019, *M. Sultana* DMS-2568 (DACB 58998); Ramsagar National Park, 5 ii 2019, *M. Sultana* DMS-2634 (DACB 61974); Mayer pukur, 28 viii 1998, *Mia & Harun* M-4394 (DACB 28746); Parlo Mallickpur, Kaharul, 25 viii 1998, *Mia & Harun* M-4268 (DACB 28588); Mariumpur, Ghoraghat, 10 iv 1996, *Khan & Mia* K-9231 (DACB 38935). **Jhalakathi:** Kaukhali, 4 iii 1985, *Huq & Mia* H-6737 (DACB 12650). **Kishoreganj**: Poolhat Satkahoon, 14 iii 1988, *Mia & Mahfuz* M-1685 (DACB 12659); Karimganj, Nayamatpur, 15 iii 1988, *Mia & Mahfuz* M-1716 (DACB 12647). **Khagrachhari:** Gomoti, Panchari, 23 iv 2011, *S.N. Uddin* N-4581 (DACB 39949). **Kurigram:** Bhurungamari, Bagbhander Border, 23 iii 1990, *Huq et al.*, H-9474 (DACB 12646); Gochidanga, 24 iii 1990, *Huq et al.*, H-9527 (DACB 12645). **Mymensingh:** Kadigar National park, Bhaluka, 3 iii 2022, *K.K. Islam* KKI-5039 (DACB). **Netrokona:** Birisiri, 6 xi 1983, *Huq et al.*, H-6553 (DACB 25382). **Panchagarh:** Bhajanpur-Majhipara, 12 iv 1986, *Huq & Mia* H- 7645 (DACB 12639); Kagila, Boda, 1 vii 1998, *Mia et al.*, M-3945 (DACB 28745); Bolherhat, 4 vi 1989, *Huq et al.*, H-9223 (DACB 12644). **Rajshahi:** Mohanpur (Naogaon road), 18 xi 1988, *Huq et al.*, H-8760 (DACB 12642); Rajshahi University Campus, 15 viii 1999, *Khatun & Rahman* RK-1888 (DACB 28076). **Rangpur:** Kitkipara, Mulafol, 10 ix 2019, *Motashim Billah* MB-01 (DACB 55423). **Sherpur**: Nanni, 28 iv 1986, *Huq* H-7741 (DACB 27484).

Bhutan, Cambodia China, India, Laos, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand and Vietnam.

Fruits are edible. Leaves oil is used as a fixative in soap perfume. Leaves are used to cure vomiting, diarrhea, dysentery, bruises and snake bites. Leaves, stem, bark and roots are tonic, stomachic and carminative and act in anti-tumor activity (Ghani, 2003). Fresh leaves are also used as an ingredient in Indian curries and chutneys. Root of this plant acts as mild purgative and its juice is used in kidney pain. Wood is used for making agricultural implements.

Murraya paniculata (L.) Jack, Malayan. Misc. 1 (5): 31. 1820; Sinclair, Bull. Bot. Soc. Beng. 9(2): 89. 1955; Ahmed *et al.* (eds.), Encycl. Fl. Fauna Bangladesh 10: 181. 2009; Uddin & Hassan (eds.), Vas. Fl. Chittagong & CHT. 3: 258. 2018. *Murraya exotica* L., Mant. Pl. Alt. 563. 1771; Hook. f., Fl. Brit. India 1: 502. 1875; Prain, Beng. Pl. 1: 302. 1903; Heinig, List Pl. Chitt. Coll. & HT.: 9. 1925; Hajra *et al.,* Fl. India 4: 352. 1997. *Chalcas exotica* (L.) Millsp, Publ. Field Columbian Mus., Bot. Ser. 1: 25 1895. *Chalcas paniculata* L., Mant. Pl. 1: 68. 1767. *Murraya omphalocarpa* Hayata, Icon. Pl. Formosan. 3: 51. 1913. *Chalcas sumatrana* M. Roem., Fam. Nat. Syn. Monogr. 1: 49. 1846. *Connarus foetens* Blanco, Fl. Filip. 525. 1837. *Chalcas japanensis* Lour., Fl. Cochinch. 271 1790. *Chalcas intermedia* M. Roem., Fam. Nat. Syn. Monogr. 1: 48. 1846. **Fig. 26.**

Bengali: *Kamini*. English: Cosmetic Bark, Orange Jasmine.

Shrubs or small trees, up to 5 m high. Branchlets cylindric, slender, puberulent to glabrous; bark pale, lenticellate. Leaves up to 20 cm long, 2-5, rarely 7-foliolate; petioles less than 1 cm; petioles and rachises slender, cylindric or angular, puberulent or glabrous; leaflets alternate, ovate, ovate-elliptic, oblong-elliptic to obovate, variable in size, larger forms 3.0-8.5 × 2.5-3.5 cm, smaller form 1.0-3.5 × 0.5-1.5 cm, chartaceous to coriaceous, cuneate and oblique at base, apex rounded to acuminate and often notched at apex, margin entire or crenulate; secondary nerves 4-7 pairs, slender arising at angles 50-55° with the midrib, prominent on both surfaces, distinctly reticulate petiolules short, to 5 mm long, puberulent to glabrous. Inflorescences terminal or axillary, few-flowered panicles. Flowers 5-merous, fragrant, medium to large, up to 12 mm long, pedicels slender, up to 10 mm long, glandular, glabrous. Calyx 5-lobed, small, 0.5-1.0 mm long, acute, deltate, glabrous, glandular; sepals persistent in fruit. Petals 5, c. 2 cm long, white, narrowly elliptic to oblanceolate, oblong-elliptic or obovate, narrowed at base, acute or obtuse at apex, 12-15 × 3-4 mm, glandular, glabrous. Stamens 10; filaments 5-10 mm long, subulate above, dialated below, white, glabrous; anthers ellipsoid-oblong, c. 1 mm long, yellowish. Disk annular, lobulate, c. 1.2 × 1.5 mm, glabrous. Ovary ellipsoid-ovoid, entire, 2-3 mm long, 2-3 locular, greenish, glabrous, locule with 1-ovule; style cylindric, 4-8 mm long, glabrous; stigma capitate, glandular, 2-3-lobes, broader than style. Fruits orange to vermilion, narrowly ellipsoid or rarely ovoid berry, 1.0-2.0 × 0.5-1.4 cm, tapering at end, reddish when ripe, glandular-punctate, glabrous. Seed 1-2, ellipsoid, c. 1 cm long, seed coat pale brownish, hairy. 2n = 18 (Kumar and Subramaniam, 1986). *Fl. & fr.:* 2-12. *Thickets, evergreen or moist deciduous forests, lowland and hilly rain forests, also cultivated in gardens*; *up to 500 altitudes*.

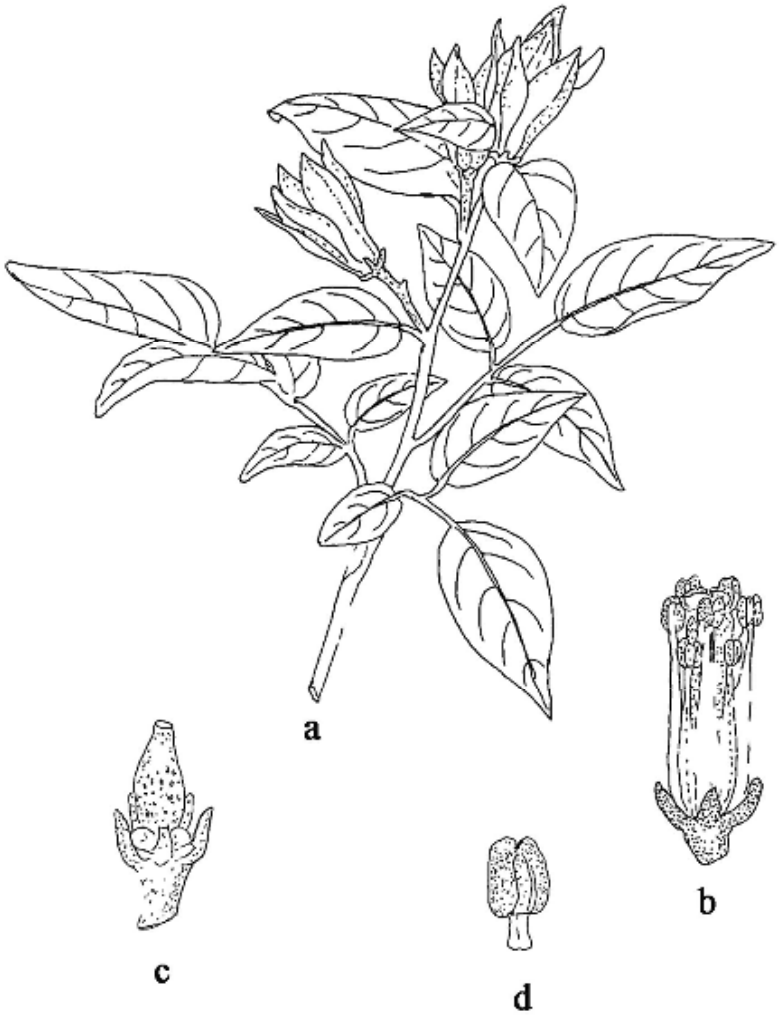


Figure 26: **Murraya paniculata** (L.) Jack: a) Flowering shoot; b) L.S. of flower; c) pistil and d) stamen.

Bandarban: Nilachol Forest Range, 12 iii 2017, *Imam et al.*, IH-4728 (DACB 71574); Minjhiri para, Ruma, 15 ii 2018, *Ang Sa Puru Marma* ASPM-460 (DACB 73533). **Bogura:** Beltola, Kagail union, Gabtoli, 18 xi 2006, *Regia Khatun* RK-5415 (DACB 32997). **Chattogram:** Sitakunda Eco-park, 18 iv 2017, *Tajul et al.*, TAK-4289 (DACB 69706); Patia, Haidgaon, 15 ii 2017, *Tajul et al.*, TOK-3710 (DACB 51784); Fatehpur, Hathazari, 10 v 2017, *Tajul et al*., TAK-4832 (DACB 51785); Chittagong University Campus, 29 viii 2016, *Tajul et al.*, TOK-267 (DACB 50156); Bashkhali

coastal area, 6 xii 2016, *Tajul et al.*, TOK-2356 (DACB 50154); Andarmanik, Raozan, 18 xi 2016, *Tajul et al.*, TOK-1885 (DACB 49285); Parkirchor coastal area, Anawara, 5 xii 2016, *Tajul et al.*, TOK-2270 (DACB 48691). **Cox's Bazar:** Domdomia National Park, Teknaf, 30 iii 2017, *Niyamul et al.*, NK-3037 (DACB 59137). **Dhaka:** Agricultural College Campus, Tejgaon, 30 ii 1988, *Rezia Khatun* RK-17 (DACB 12651); Mirpur Botanical Garden, 18 ii 2007, *B.M. Rezia Khatun* RK-5491 (DACB 33133). **Dinajpur:** Ramsagar National Park, 5 ii 2019, *M. Sultana* DMS-2670 (DACB 62819). **Mymensingh:** Kadigar National park, Bhaluka, 3 iii 2022, *K.K. Islam* KKI-5047 (DACB). **Rangamati:** Barkal Reserve Forest, 4 xii 2015, K.K. Islam, KKI-1809 (DACB 46348); Sitapahar, Kaptai, 20 xii 2004, *S.N. Uddin* N-2659 (DACB 36970). **Sylhet:** Khadimnagar National Park, 14 iii 2019, *M. Sultana* DMS-2758 (DACB 64545).

Australia, Bhutan, Cambodia, China, India, Indonesia, Japan, Laos, Madagascar, Malaysia, Mayanmar, Nepal, New Guinea, Pakistan, Philippines, Sri Lanka, Taiwan, Thailand and Vietnam.

Leaves are used in diarrhoea, dysentery, dropsy, powdered leaf is applied to fresh cuts, and diseases of teeth and gum. It yields an essential oil. Leaves are also used to making flower bouquets. Root bark is eaten and rubbed on body to relieve body ache. Barks of stem and root possess antidiarrhoeal properties (Ghani, 2003). The pleasantly scented flowers are used for decoration and cosmetics. Ripe fruits are eaten raw and have a sweet taste. The woods used for kris handles and sheaths, walking sticks, paper weights, in laying, chessmen and flutes.

Paramignya Wight, Ill. Ind. Bot. 1: 108. Pl. 42. 1840.
Type species: *Paramignya monophylla* Wight

Woody climbers or erect or scandent evergreen shrubs. Armed with straight or recurved spines or rarely unarmed, without rust-colored villosus indumentum on terminal and axillary buds or young inflorescences. Leaves alternate, unifoliolate or simple; petiole 0.4-2.5 cm long, pulvanoid, usually bent and/or twisted and swollen apically, often articulated above with leaflet blade. Flowers medium to large, fragrant, bisexual, axillary, solitary or in few-flowered fascicles. Calyx cupular with 4-5 distinct sepals, persistent, connate at base. Petals 4-5, white, imbricate in bud. Stamens 8-10, alternately shorter and longer; filaments linear, subulate above; anthers linear-oblong, larger. Disk cup-shaped, conic, or columnar. Gynoecium 3-5-loculed, syncarpous; each locule with 1 or 2 ovules; style cylindric, longer than ovary; deciduous in fruit; stigma capitate, globose or oblate. Fruit a berry, with copious mucilaginous pulp and without pulp vesicles; subglobose, ellipsoid to pyriform or obovoid, entire or obscurely lobed or

sometimes furrowed, apiculate or obtuse at apex; pericarp thick, glandular, variously pubescent, yellowish or orange-coloured to deep pinkish when ripe; endocarp fleshy. Seeds embedded in a mucilaginous substance; endosperm lacking; embryo straight; cotyledons elliptic, plano-convex; hypocotyl partly included between cotyledons.

Paramignya citrifolia Oliv. in J. Linn. Soc. Bot. 5. Suppl. 2: 42. 1861; Kurz, Forest Fl. Brit. Burma 1: 194. 1877 (Repr. 1974); Prain, Beng. Pl. 1: 304. 1903; Brandis, Indian Trees: 122. 1906 (Reprt. 1984); Uddin & Hassan (eds.), Vas. Fl. Chittagong & CHT. 3: 258. 2018. *Paramignya scandens* (Griff.) Craib, Fl. Siam. Enum. 1: 235. 1926; Sinclair, Bull. Bot. Soc. Beng. 9(2): 89. 1955; Ahmed *et al.* (eds.), Encycl. Fl. Fauna Bangladesh 10: 182. 2009. *Limonia citrifolia* Roxb., Fl. Ind. 2: 379. 1832, non Salisb. 1796. *Atalantia citrifolia* Kurz, And. Rep. App. 4: 33. 1870. *Paramignya citrifolia* (Roxb.) Hook.f., Fl. Brit. India 1: 510. 1875, non Oliver 1861. *Paramignya micrantha* Kurz in J. Asiat. Soc. Bengal Pt. 2, Nat. Hist. 44: 135. 1875. **Fig. 27**

Bengali: *Mei-soh-khar-khlaw*.

Scandent shrubs, branchelets with recurved spines in leaf axils; spines greenish at base, shiny at tip; bark grey, lenticellate. Leaves simple; petioles 7-10 mm long, not articulated with leaf blade, twisted, glabrescent; leaf blades elliptic-oblong, rounded at base, abruptly acuminate at apex, acumen 14 mm long, bluntish at tip, entire along margins or nearly so, 8-16 × 3-7 cm, coriaceous, profusely gland-dotted; glands convex on both surfaces but more prominently raised beneath, minutely adpressed hairy beneath; secondary nerves 12 to 14 pairs, prominent on both sides. Flowers axillary, small. Sepals 5, acute, minute, glandular. Petals 5, white, oblong, glabrous. Stamens 10; filaments short; anthers linear. Ovary ovoid or oblong, 5-grooved, 5-locular; each locule with 2 ovules; style thick, short; stigma subpeltate. Fruits ovoid, obtusely 5-angled, pointed, yellowish when ripe, 5-locular. Seeds 3-5, oblong, laterally compressed, large, c. 15 × 10 mm; testa brownish. *Fl. & fr.:* 1-12. *Evergreen hilly forests, along water courses; at lower elevation.*

Bandarban: Boompara, Ruma, 24 i 2017, *K.K. Islam, KKI*-864 (DACB 64768); Sangu Reserve Forest, Thanchi, 10 x 2017, *Shahidul & Rashed,* MSI-5924 (DACB 73707). **Cox's Bazar:** Jadi-phar, Teknaf, 26 iv 2017, *Niyamul et al.*, NK-3425 (DACB 59130); Himchari National Park, 27 viii 1996, *Rahman & Uddin* (DACB 38977). **Rangamati:** Barkal Rserve Forest, 10 i 2016, *K.K. Islam, KKI*-2090 (DACB 46239); Pharua Reserve Forest, Bilaichari, 16 i 2009, *S.N. Uddin,* N-3161 (DACB 41323); Baluchara, Rampahar, Kaptai, 16 x 2003, *S.N. Uddin* N-2040 (DACB 41429); Sapchhara, Sitapahar, Kaptai, 17 vi 2001, *S.N, Uddin* N-1037 (DACB 36225); Pharua Reserve Forest, 16 i 2009, *Bushra,* B-1190 (DACB 33957).

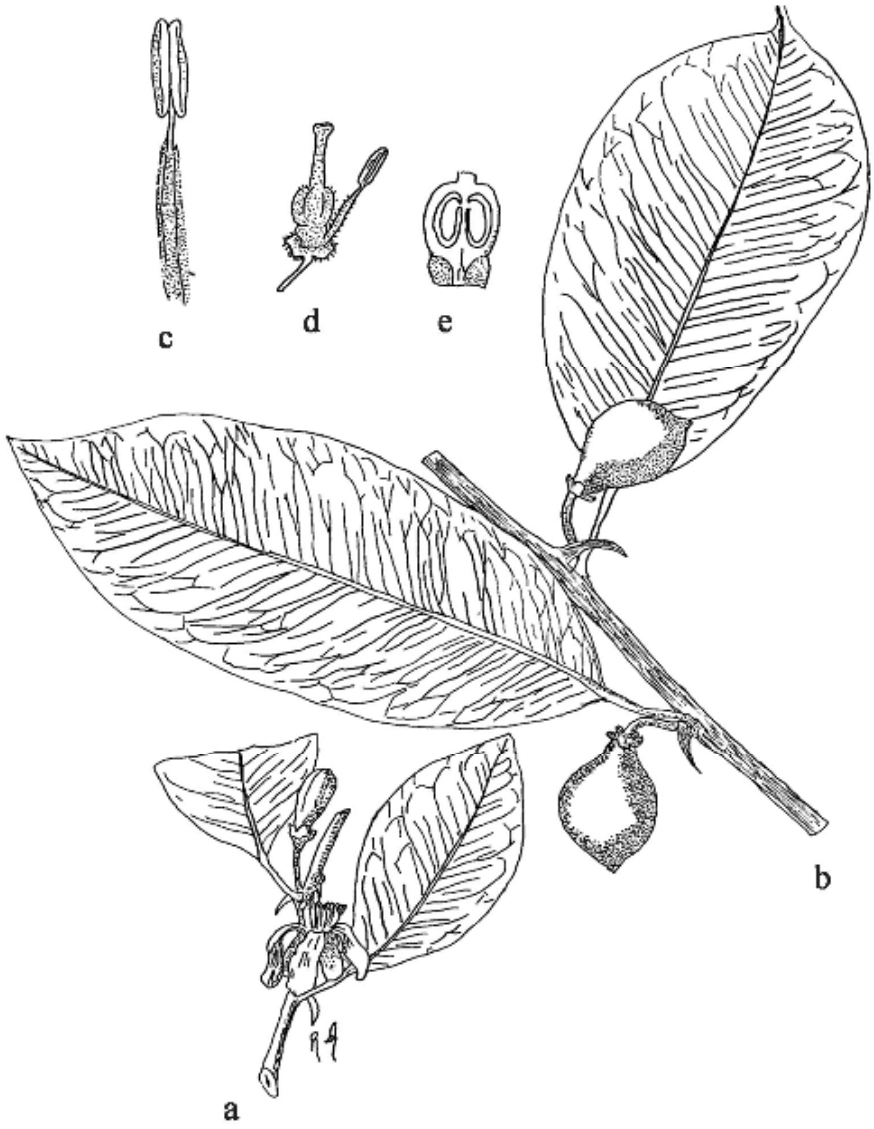


Figure 27: **Paramignya citrifolia** Oliv.: a) Fruiting shoot; b) flowering shoot; c) stamen; d) pistil; and e) L.S. of ovary.

Cambodia, China, Haina, India, Laos, Malaya, Myanmar, Philippines, Sri Lanka, Thailand and Vietnam.

Ravenia Vell., Fl. Flumin: 20. 1825
Type species: *Ravenia infelix* Vell.

Shrubs or trees. Leaves 3-foliolate or simple, opposite, glandular-pointed, sessile or petiolate. Inflorescence terminal, sub-terminal, apparently axillary, pauciflorous and lax, usually long-pedunculated. Flowers 4(5) merous, bisexual, showy, pediceled; sepal free, green, glabrous, broad, (sub) leathery, very uneven and imbricate; corolla tubular (sub) zygomorphic, white to red, straight to curved tube; petals (4)5 unequal, glabrous; fertile stamens 2, inferior, exserted at anthesis; subulate fillets adnate to coroline tube; anthers ovoid-oblong, glabrous, basifixed; 5-6 colporate, oblate-spheroidal or prolate-spheroidal, large, cross-linked exine pollen; staminodes 3, larger than ovary; carpels (4)5, connates in 5-lobed subglobose ovary; ovules 2 per locule; style filiform, subcylindrical, glandular; capitate stigma (4)5-lobed. Fruit schizocarp composed of 1-5 mericarps (follicles) dehiscent by ventral suture and also dorsally until beyond basal half, 2-valvular, valves apiculate, externally transversely rough; seed 1(2) per carpel, subtrigonal; forehead leathery, rough, blackened, glabrous; thin endosperm; curved fleshy embryo, inflexed elongated radicle surrounded by fleshy cotyledons, conduplicate, smooth, 2-lobulated.

Ravenia spectabilis Engl., Fl. Bras. 12(2): 126. 1874; Hajra *et al.,* Fl. India 4: 408. 1997. *Lemonia spectabilis* Lindl., Edwards's Bot. Reg. 26: t. 59 1840. **Fig. 28**

English: Lemonia, Limonia, Pink Ravenia

Evergreen, unarmed shrubs, 3-5 m tall. Twigs greyish or greyish-brown; bark corcky, ridged or grooved. Leaves opposite or subopposite, digitately 3-foliate; blade linear, oblong to elliptic, oblanceolate or spathulate, 2-8 × 0.6-2.2 cm, base cuneate, apex obtuse or acute, coriaceous, dark green, glossy, aromatic, lateral nerves obscure; petiole 0.5-2.5 cm long, grandular punctate. Inflorescence axillary or terminal, few flowered racemes; 5-8 cm long. Flowers bisexual, 2.5-3.0 cm diameter. Sepals 5, green, densely glandular, unequal, outer 2 herbaceous, spreading, elliptic to ovate, 10-15 × 4-8 mm, inner three appressed to tube of corolla, concave, oval or orbicular, 7-10 × 6-9 mm, paler than outer. Corolla bright dark red, pink, rosy, crimson, densely glandular, tube cylindric, 0.8-1.5 cm long, 5 lobed, 4 of which united below, and one more isolated above, thick, surface granular lobes oblong to ovate, 10-20 × 4-10 mm. Stamens merged to tube, two of which fertile with sessile anthers and three sterile with anthers reduced to thin white laminae that serve as roost for pollinating insects. Pistil 2-5 or more carpels, often connate at base 2-5 or more locules, each with 1-several axile ovules. Fruits of 1-5

monospermous follicles. Seeds irregularly tetrahedral, 2.5-3.6 × 1.8-2.4 mm, rounded on back, tuberculate, brownish. *Fl. & fr.:* 9-5. *Prefers semi-shade conditions and regular watering*.

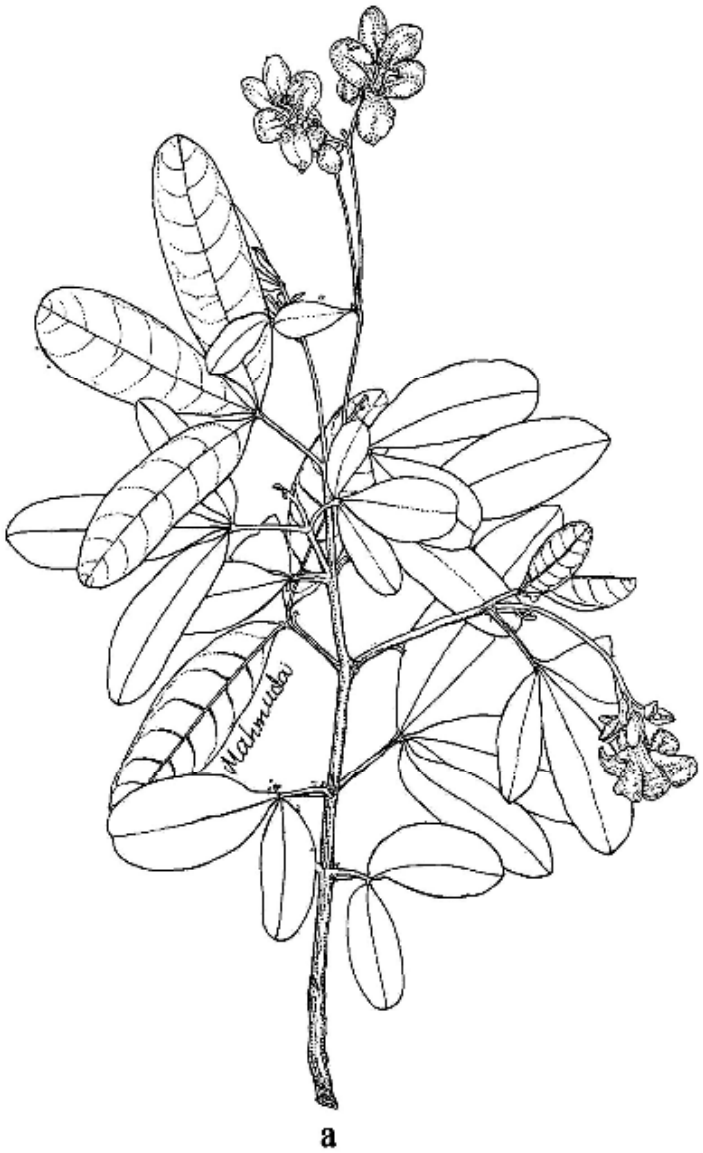


Figure 28: **Ravenia spectabilis** Engl.: a) Flowering shoot.

Dhaka: Balda Garden, Wari, 25 xi 1996, *B.M. Rezia Khatun* RK-1128 (DACB 31080); Balda garden, 17 xi 1999, *M.H. Sohab* (BCSIR 1238); Balda Garden, Wari, 22 xi 2017, *Sultana & Rahman,* DMS-2024 (DACB 46908).

Native to Brazil, Colombia, Cuba, France, Jamaica, Haiti, Mexico Nicaragua, Panama, Peru, Singapur, Tobago, Trinidad and West-Indies.

It can be used as a hedge, border plants. The plant is highly revered as an ornamental flowering plant as it's flower are delicately beautiful and blooms more or less at every seasons.

Tetradium Lour., Fl. Cochinch. 1: 91. 1790.
Type species: *Tetradium trichotomum* Lour.

Trees or shrubs, evergreen or deciduous, dioecious or rarely polygamo-dioecious. Axillary buds exposed. Leaves opposite, imparipinnate or rarely paripinnate; leaflets ovate, oblong or oblong-lanceolate, or elliptic-obovate, acute to cuneate of obtuse to rounded and more or less oblique at base, acute or shortly to long acuminate at apex, lateral leaflets petiolulate, blades often inequilateral, especially at base, terminal ones on an extension of rachis; margins entire or remotely to finely glandular-crenate, predominantly or rarely indistinctly gland-dotted, chartaceous to coriaceous, glabrous or glabrate to pubescent, green above, pale beneath, brown or glaucous when dry, pinnately nerved. Inflorescence corymbose to paniculate, spreading or compact, few to many flowered, axillary, terminal or pseudoterminal, thyrsiform. Flowers abortively unisexual, 4-5 merous, yellow or greenish-white, bracteate, pedicellate; Sepals 4-5, valvate, ovate or orbicular, connate at base. Petals 4-5, narrowly imbricate in bud, ovate or elliptic-oblong, obtusely acuminate at apex, acumen deflexed, glabrous abaxially, glabrous to pilose adaxially. Stamens distinct, as many as petals. In male flowers staminodes much shorter than petals, rarely persistent in fruits; filaments linear-subulate, glabrous abaxially, villous adaxially; disk intrastaminal, conical to cylindrical in staminate flowers or pulvinate to barrel-shaped in carpellate flowers; anthers dorsifixed, ovoid or oblong, obtuse; gynoecium rudimentary, 4-5, free or connate at base, divergent, and fingerlike carpels. In female flowers stamens rudimentary, ligulate, much shorter than petals or sometimes lacking; disk pulvinate to barrel-shaped; gynoecium 4-5-carpellate; ovary basally connate, otherwise contiguous, 4-5 lobed, 4-5 locular, subglobose to obovoid, glabrous, punctate, ovules 2 or 1 per locule; style short, apical; stigma capitate or peltate, pistillodes 3-5, free or basally connate, subulate, glabrous or hairy. Fruit of 1-5 basally connate follicles with abortive carpels, if any, persistent; outer part of pericarp (exocarp and mesocarp) dry or fleshy; endocarp cartilaginous. Seeds remaining attached in

dehisced fruit, ellipsoid or subtrigonal, shiny, smooth, black or brown, arillate, albuminous; endosperm copious; embryo straight; cotyledons broadly elliptic or flattened; hypocotyl superior.

Tetradium glabrifolium (Champ. *ex* Benth.) T. G. Hartley in Gard. Bull. Straits Settlem. 34: 109. 1981; Ahmed *et al.* (eds.), Encycl. Fl. Fauna Bangladesh 10: 183. 2009. *Boymia glabrifolia* Champ. *ex* Benth. in Hooker's J. Bot. Kew Gard. Misc. 3: 330. 1851. *Megabotrya meliaefolia* Hance *ex* Walpers in Ann. Bot. Syst. 2: 259. 1851. *Euodia meliaefolia* ('Evodia') (Hance *ex* Walpers) Benth., Fl. Hongk. 58. 1861; Hook.f., Fl. Brit. India 1: 490. 1875. *Euodia glabrifolia* (Champ. *ex* Benth.) Balakr., Fl. Jowail: 115. 1871. *Euodia yunnanensis* C.C. Huang, Sin. 6(1): 104-105, pl. 26. 1957. *Euodia taiwanensis* T. Yamaz., J. Jap. Bot. 68(4): 216-218, f. 2 1993**.** *Euodia glauca* Miq., Ann. Mus. Bot. Lugduno-Batavi 3: 23 1867. *Euodia fargesii* Dode, Bull. Soc. Bot. France 55: 704-705. 1908. *Euodia ailantifolia* Pierre, Fl. Forest. Cochinch. 4, pl. 287, f. B 1893. *Euodia balansae* Dode, Bull. Soc. Bot. France 55: 704. 1908. *Tetradium taiwanense* (T. Yamaz.) T. Yamaz, J. Jap. Bot. 72(4): 249. 1997. **Fig. 29**

Bengali: *Maiphak, Mukasing, Namsingasing, Pahari neem.*

Trees or shrubs, up to 23 m tall. Branchlets generally cylindric, slender, glabrous or glabrescent. Bark greyish, lenticellate. Leaves imperipinnate, opposite, 10-30 cm long; (3 or) 7-9-foliolate; rachis slender, terete, slightly ridged above, glabrate to pilose; leaf blades broadly ovate to lanceolate or less often elliptic or elliptic-oblong, 4.0-15.5 × 1.7-6.5 cm, opposite, subopposite and alternate, base obtuse or acute, often oblique, apex acuminate, acumen 9-14 mm long, margins entire or remotely to finely crenate, thin, abaxially usually glaucous, chartaceous, shiny above, glabrous, pale or glaucous beneath; secondary veins 8-18 on each side of midvein, faint; petiolules of lateral leaflets 5-11 mm long, terminal leaflet on an extension of rachis 19-45 mm long. Inflorescences trichotomously panicles, 10.5-17.5 cm long; peduncle 1.0-1.5 mm long, bracts slender, compressed, pubescent. Flowers 5-merous or occasionally 4-merous. Sepals connate, ovate-orbicular, pubescent abaxially, glabrous adaxially. Petals fleshy, green, yellow, or white, 2.5-4.0 mm long, outside glabrous or sparsely appressed pubescent, inside nearly glabrous to villous. Stamens 4-5; filaments 1.5 -2.5 mm long, subulate, hairy inside; anthers to 2 mm long, ovoid. Pistillodes 3-5, 2.1-2.6 mm long, hairy. Disk to 0.5 × 1.0 mm, lobulate, punctate, glabrous. Ovary 4-5, carpellate, united at base, 4-5 lobed, 4.0-4.5 mm across, punctate, glabrous or shortly pubescent, ovules 2 per carpel; 4- 5 locular; style short; stigma capitate. Fruit usually 5-carpelled; follicle, trigonous, 3.5-5.0 mm, laterally sparsely to densely appressed pubescent, connate towards base abaxially, glabrous; endocarp sparsely to densely pubescent. Seeds 1 per follicle but paired with an abortive seed, globose, ovoid to ellipsoid, 2.5-4.2 × 1.0-2.0 mm across, attached in

dehisced follicle to axile strip; seed coat hard. *Fl. & fr.:* 5-12. *Forests, thickets, open places; between 600- 800 m altitude.*

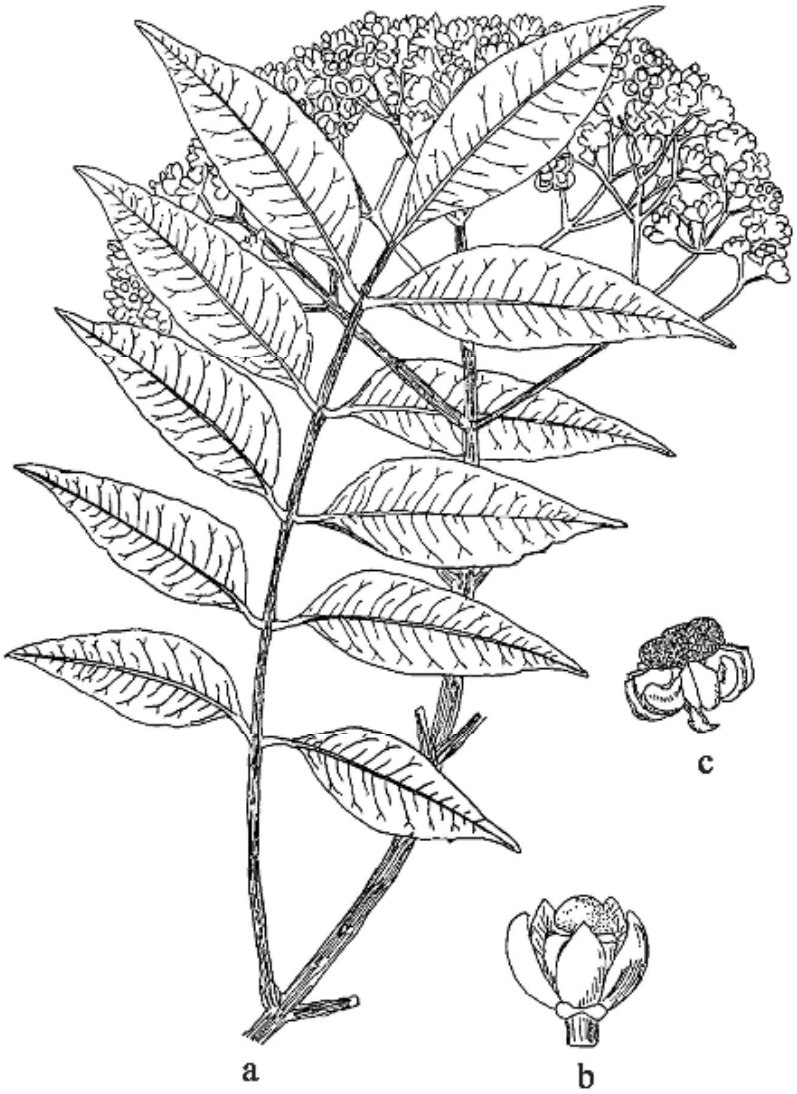


Figure 29: **Tetradium glabrifolium** (Champ. *ex* Benth.) T. G. Hartley: a) Fruiting shoot; b) female flower; and c) fruit.

Moulvibazar: Adampur Forest Beat, Rajkandi, Kamalganj, 13 ix 2012, *S.N. Uddin,* N-5052 (DACB 45491).

Bhutan, China, India, Indonesia, Japan, Malaysia, Myanmar, Nepal, Philippines, Thailand and Vietnam,.

Wood is used for making looms, cigar boxes and shingles. An amber coloured exudation in the form of beads is obtained from the bark and that has medicinal value.

Toddalia A.L. Juss., Gen. Pl. 371. 1789.
Type species: *Toddalia asiatica* (L.) Lam.

Sprawling shrubs, or woody scandent, dioecious, armed. Leaves alternate, digitately 1-3 foliolate, petioles prickly, leaflets sessile. Inflorescences axillary, terminal cymes, panicles, racemose, or umbelliform. Flowers small, unisexual. Calyx 4-5 lobed or partite. Sepals 4-6, connate at base or to half their length. Petals 4-6, valvate or narrowly imbricate in bud. Stamens in male flowers 2, 4, 5 or if 8 with alternately fertile and sterile filaments, inserted at base of a distinct or obosolete disk. Disk pulvinate. Gynoecium 4-7 loculed, syncarpous, rudimentary in male flowers. Ovary in female flowers oblong or globose, 2-7 or rarely 1-locular, cells with 2 superposed or collateral ovules, styles short or absent, stigmas sessile. Fruit subglobose or lobed, drupaceous, indehiscent, 2-7 loculed; exocarp fleshy; mesocarp undifferentiated; endocarp cartilaginous. Seed 1-2, brown to black, angular, reniform, dull to lustrous, testa coriaceous; seed coat with thick inner layer of dense black sclerenchyma surrounded by outer layer of compact parenchymatous tissue; endosperm copious; embryo curved; cotyledons elliptic, flattened, linear or oblong; hypocotyl superior.

Toddalia asiatica (L.) Lam., Tab. Encycl. Menth. 2: 116. 1797; Ahmed *et al.* (eds.), Encycl. Fl. Fauna Bangladesh 10: 184. 2009; Uddin & Hassan (eds.), Vas. Fl. Chittagong & CHT. 3: 260. 2018. *Toddalia aculeata* (Sm.) Pers., Syn. Pl. 1: 249. 1805; Hook.f., Fl. Brit. India 1: 497. 1875; Kurz, Forest Fl. Brit. Burma 1: 183. 1877 (Reprt. 1974); Prain, Beng. Pl. 1: 299. 1903; Brandis, Indian Trees: 119. 1906 (Reprt. 1984); *Paullinia asiatica* L., Sp. Pl. 1: 365. 1753. *Scopalia aculeata* Smith, Pl. Ic. Hact. ed. 1. 2: 34. 1790. *Toddalia floribunda* Wall., Pl. As. Rar. 3: 17. 232. 1832. *Toddalia asiatica* (L.) Lam. var. *floribunda* (Wall.) Kurz in J. Asiat. Soc. Bengal pt. 2, Nat. Hist. 44: 130. 1875. **Fig. 30**

Bengali: *Kada-tadali* English: Orange Climber

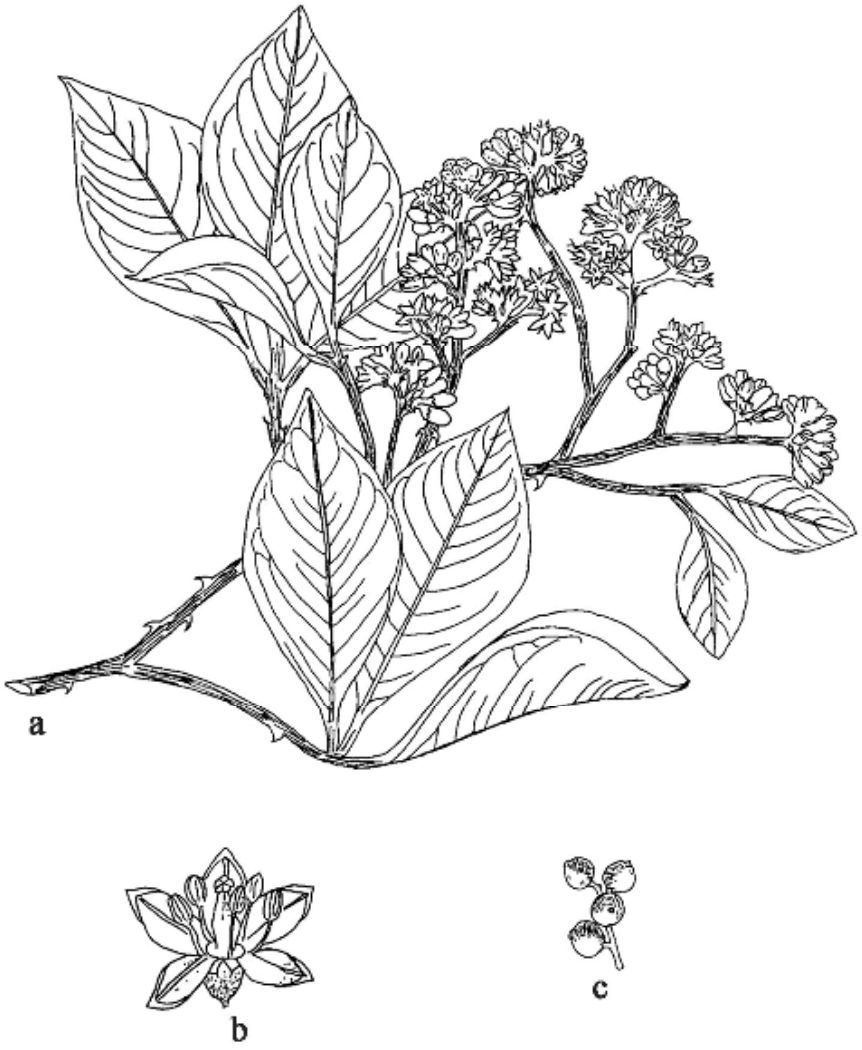


Figure 30: **Toddalia asiatica** (L.) Lam.: a) Flowering shoot; b) flower; and c) fruiting branch.

Sprawling shrubs, or woody scandent liana; 2-8 m long. Stem and branchlets densely to sparingly prickly or occasionally unarmed, young shoots rusty-tomentose; prickles scattered, recurved, sharp, 2-5 mm long. Leaves alternate, digitately trifoliolate; leaflet blades usually sessile or subsessile, elliptic or narrowly elliptic to obovate to oblanceolate, 2-9 × 1-5 cm, base narrowly cuneate to attenuate or acute, apex acuminate

or rarely acute to obtuse or rounded, acumen 4.0-13.5 mm long, bluntish or notched at tip, entire to subentire or faintly to prominently crenulate or subserrate along margins, glabrous, dark green and often glossy above, light green beneath; secondary nerves 10-30 pairs, slender, close, parallel, inarching near margins, in larger leaflets an astomosing. Petiole 0.5-4.2 cm long, slender, obscurely marginate or horizontally grooved above, prickly or unarmed. Inflorescence paniculate, up to 15 cm long. Flowers cream-white, 4.0-6.5 mm across, sweet-scented, bracteates, 5-merous, unisexual, usually 3.0-11 together in cymes or lax umbles on the lateral rachis. Pedicels slender, unequal in size, 1.0-6.0 mm long, puberulent or shortly pubescent. Panicle 1.5-10.5 cm long; peduncle slender or rather stout, sparsely branched or compounded as in larger forms. Calyx in male flowers is lobes deltoid, acute, 0.4-0.6 mm long, glandular, shortly pubescent externally, glabrous internally. Petals narrow to broadly oblong, hooded at apex, 1.5-6.0× 1.0-1.5 mm, glandular-punctate, glabrous or thinly pubescent externally; stamens slightly exserted, filaments 2.5-5.0 mm long, white; anthers broadly oblong, 1.0-1.5 mm long with a pellucid gland on dorsal side, yellow; disk 5 or more lobed, 0.4 - 0.7 mm high, 0.5-1.0 mm broad; pistillodes 1.0-2.0 mm high, glabrous. In female flowers sepals broadly triangular, otherwise same as in male flowers; petals narrowly oblong; stamens ligulate, staminodes 0.5-1.5 mm long, with minute, effete anthers; disk broader than in male flowers. Gynoecium in female flowers ovoid to ellipsoid and 1.4-3.0 mm, in male flowers subcylindric and 1.0-2.0 mm. Ovary oblong or subglobose, entire, c. 2.5 × 1.5 mm, punctate, glabrous, style very short or absent, stigma 5-lobed, punctate. drupes 4-6, grooved or lobed, orange or reddish when ripe, rind smooth with prominent, transluscent glands. seed one in each locule, reniform, 2-3 mm long, c. 1 mm across, brownish, shiny. Fruit a subglobose drupe, 5.0-8.0 mm in diameter, 4-7 grooved, orange or reddish when ripe, rind smooth with prominent, translucent glands. Seeds 4.5-6.5 mm,1 in each locule, reniform, c. 2.5 × 1.5 mm, shiny, brownish. 2n = 36, 72 (Kumar and Subramaniam, 1986). *Fl. & fr.:* 1-10. *Scrub forests, or evergreen secondary forests, villages, thickets or sholas from sea level to 1000 m.*

Sylhet: Jaflong, 4 iii 2004, *S.N. Uddin,* N-2247 (DACB 37147).

Bhutan, China, India, Indonesia, Japan, Laos, Malaysia, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam, Africa, Madagascar and Philippines.

This plant used as a security fence. All parts of the plant are used to flavour food, as a tonic for the stomach and as remedy for fever. Leaves carminative, contain a valuable low-grade perfume oil (0.08%) and eaten for stomach pain and remedy asthma. Fruit is used as a cough remedy. Pickled is made from ripen fruits. Root and its bark are used as a remedy for fever, malaria, cholera, diarrhea, indigestion, influenza and rheumatism.

Triphasia Lour., Fl. Cochinch.: 152. 1790.
Type species: *Triphasia aurantiola* Lour.

Small trees or shrubs, armed with slender, straight, axillary spines. Leaves alternate, simple or trifoliolate; petioles wingless, short; leaflets profusely gland-dotted, soft. Flowers fragrant, solitary or in groups of 2 or 3 in leaf axils. Calyx 3-5 lobed, lobes small, green. Petals 3-5, white, imbricate, glandular. Stamens twice the number of petals; filaments linear, sometimes broadened at base; anthers linear-oblong. Disk annular, fleshy. Ovary ellipsoid or ovoid, 3-5 loculedwith 1 or 2 ovules in each locule. Fruit an ovoid or subglobose berry, sometimes apiculate, reddish-orange or crimson-red when ripe, 1-3 seeded. Seeds oblong, green, embedded in a mucilaginous substance, polyembryonic.

Triphasia trifolia (Burm.f.) P. Wilson, Torreya 9: 33. 1909; Hajra *et al.,* Fl. India 4: 319. 1997; Ahmed *et al.* (eds.), Encycl. Fl. Fauna Bangladesh 10: 185. 2009; Uddin & Hassan (eds.), Vas. Fl. Chittagong & CHT. 3: 260. 2018. *Triphasia aurantifolia* Lour., Fl. Cochinch.: 153. 1790; Hook.f., Fl. Brit. India 1: 507. 1875; Prain, Beng. Pl. 1: 303. 1903; Heinig, List Pl. Chitt. Coll. & HT.: 9. 1925; Gamble, Fl. Pres. Madras 156. 1915. *Triphasia trifoliata* (L.) DC., Prodr. 1: 536. 1824; Hook.f., Fl. Brit. India 1: 507. 1875; Kurz, Forest Fl. Brit. Burma 1: 192. 1877 (Reprt. 1974); Prain, Beng. Pl. 1: 303. 1903. *Limonia trifolia* Burm.f., Fl. Ind. 103. 1768. *Limonia trifoliata* L., Mant. Pl. Alt. 237. 1771. **Fig. 31**

Bengali: *Cheeninarangi* English: Lime Berry

Evergreen small trees or erect or straggling shrubs, up to 8 m tall. Branches cylindric, armed with shrap paired spines in leaf axils; bark green, lenticellate. Leaves alternate, trifoliolate, petioles short, wingless, 3.0-4.5 mm long; leaflets ovate-oblong or ovate-elliptic, variable in size; terminal one much larger, 2-5 ×1.5-2 cm; lateral ones smaller, 1-2 × 0.5 -1.0 cm, cuneate at base, rounded and emarginate at apex, crenulate along margins, dark green and glossy above, light greenish beneath, pellucid-punctate, glabrous; mid and lateral nerves inconspicuous; petiolules short, c. 2.0 mm long. Flowers fragrant, solitary, or in a group of 2 or 3, axillary, cylindric in bud, 3-merous. Sepals 3, green, small, obtuse, ovate, cilioiate. Petals 3, white obtuse, linear-oblong, 7-11×3-4 mm, glandular, glabrous. Stamens 6, subequal, filaments linear, 7-10 mm long, glabrous; anthers oblong, 1.5-2.0 mm long. Disk white, annular, fleshy. Ovary ovoid, 1.5-2.0 mm long, glabrous, 3-locular with one ovule in each locule; style slender, deciduous; stigma capitate, 3-lobed, glandular. Fruit a subglobose or ellipsoid-ovoid berry, 1.0-1.5 cm long, dull reddish when ripe, pericarp glandular. Seeds 1-3, green, embedded in a whitish, mucilaginous pulp, pulp very viscid. 2n = 18 (Kumar and Subramaniam, 1986). *Fl. & fr.:* 1-10. *In forest areas.*

Figure 31: **Triphasia trifolia** (Burm.f.) P. Wils.: a) Fertile shoot; and b) L.S. of a flower.

Sylhet: Jaflong, 4 x 1983, *Huq et al.*, H-6368 (DACB 12665); Tamabeel, Jaflong, 11 iv 1987, *Mia et al.,* M. 1362 (DACB 12664).

India.

This is an excellent garden plant due to its dark green and glossy foliage and reddish fruits. It is often grown as a hedge plant. Wood is very hard and useful in making tool-handles and other small articles. Fruits are edible, but excess eating when raw can cause stomach upset, so they are usually cooked and made preserves. Fruits are also used for making pickles.

Zanthoxylum L., Sp. Pl. 1: 270. 1753.
Type species: *Zanthoxylum clava-herculis* L.

Evergreen or deciduous, dioecious or monoecious, aromatic, erect or scandent shrubs or trees. Branches usually armed with prickles. Leaves alternate, odd or occasionally even pinnate; petiole and rachis winged or not; leaflets 3-31, subsessile to shortly petiolulate, opposite to alternate, often asymmetric, entire to glandular-serrate. Inflorescences axillary, terminal or basal to leaves, cymose or paniculate, thyrsiform, corymbiform, racemose, or umbelliform. Flowers small, unisexual or bisexual. Perianth in 2 series and differentiated with 4 or 5 sepals and 4 or 5 petals or grading to 1 series and undifferentiated with 5-9 tepals. Sepals distinct or basally connate. Petals valvate or imbricate in bud. Stamens 3-5 (-8), free, alternate with petals, 4 or 5 in plants with sepals and petals, 3-8(-10) in plants with tepals, rudimentary or lacking in female flowers. Disk pulvinate, flattened, columnar, or obscure. Gynoecium 1-5-carpelled, in male flowers rudimentary or absent; ovary basally connate, otherwise contiguous or distinct; 1-locular, each with 2 collateral pendulous ovules; ovules 2 per locule; styles in compound gynoecium apical or subapical, coherent or contiguous to spreading-ascending or recurved; stigmas coherent, capitate, or distinct. Fruit 1-seeded, 2-valved, follicles 1-5, distinct, or basally connate or partially coherent, exocarp firm or fleshy, glandular-punctate, or pustular, red or black, endocatp cartilaginous, straw coloured, detached or adherent, apex often with a stylar beak; abortive carpels, if any, often persistent. Seeds ovoid to globose, black or reddish, shiny, testa crustaceous, persistent in dehisced fruit; endosperm fleshy, copious or rarely scant; embryo straight or curved; cotyledons orbicular to broadly elliptic, flattened or rarely plano-convex; hypocotyl superior.

KEY TO THE SPECIES

1.	Plants erect shrubs or trees	2
+	Plants scandent or climbing shrubs	**Z. nitidum**
2.	Plants often erect shrubs or small trees up to 10 m high; branchlets with small retrorse, simple prickles; leaves small to medium, up to 30 cm long	**Z. ovalifolium**
+	Plants medium to large trees up to 25 or 30 m tall with a long bole and a terminal crown; main stem and older branches with prickles borne on corky conical protruberances; leaves larger, up to 45 (-60) cm long	**Z. rhetsa**

Zanthoxylum nitidum (Roxb.) DC., Prodr. 1: 727. 1824; Babu in Bull. Bot. Survey India 16: 61. 1974 (1977). *Fagara nitida* Roxb., Fl. Ind. 1: 439. 1820. *Zanthoxylum hamiltonianum* Wall. *ex* Hook.f., Fl. Brit. India 1: 494. 1875; Kurz, Forest Fl. Brit. Burma 1: 181. 1877 (Repr. 1974); Brandis, Indian Trees: 118. 1906 (Reprt. 1984); Ahmed *et al.* (eds.), Encycl. Fl. Fauna Bangladesh 10: 186. 2009; **Fig. 32**

Large scandent or climbing evergreen shrubs. Branchlets velvety-tomentose, usually armed with scattered, few, straight or retrorse, brownish, with 3-5 mm long recurved prickles, or sometimes unarmed. Leaves trifoliolate to imparipinnate, 19-41 cm long,leaflets 3-9, lateral opposite, broadly ovate, elliptic or oblong, 6-18 × 3-8 cm, oblique or not, abruptly or gradually narrowed into a broad emarginate tip, rounded or subacute at base, scarcely oblique, usually entire, chartaceous, acumen 1 - 2 cm long with a retuse tip, often entire or sometimes remotely glandular-crenate along margins, chartaceous to coriaceous, glossy on both surfaces, glabrous above, shortly pubescent along midnerve and secondary nerves; midnerve depressed above, raised beneath; secondary nerves 4-16 pairs, spreading, depressed above; petiolules 2.0-5.0 mm long, petiole and rachis grooved above; prickly beneath or not, velvety-tomentose to glabrous. Inflorescence axillary, paniculate, fascicled, 3.0-15 cm long, glabrous to velvety-tomentose. Male flowers 4.0-5.0 mm long; pedicels 1.0-2.0 cm long, pubescent. Calyx lobes minute; sepals 4-5, broadly triangular, acute, 1.0 mm long. Petals 4-5, subimbricate, ovate-elliptic, obtuse, 3.0-4.0 mm long, dull-white, stamens 4, 4.0-5.0 mm long; filaments 3.0-4.0 mm long, linear, very slender; anthers basifixed, ovoid, 1.0-1.5 mm long, gland tipped. Pistillodes 4, linear, 1.0 mm long. Disk flat, 0.5-1.0 mm high. Female flowers 2.0-3.0 mm long; pedicels, sepals, petals as in male flowers. Disk pulvinate, 0.5-1.0 mm high. Gynoecium 4-carpellate, carpels ovoid, 2.5-3.0 mm long; style short; stigma capitate, cohering into a peltate disk at anthesis. Fruiting carpels 2-5, 5.0-7.0 mm across, obliquely set, somewhat compressed, pitted outside; exocarp pustular, apiculate; pedicels 3.0-5.0 mm long, Seeds rounded, pitted, brownish-black, very glossy. *Fl. & fr.:* 2-10. *Low level forests.*

Australia, Burma, Celebes, China, India, Indonesia, Malay Peninsula, Moluccas, Myanmar, Nepal, New Guinea, Philippines, Sri Lanka, Sumatra, Taiwan, Thailand, Solomon Islands and. Vietnam.

Stem and root bark contain an alkaloid known as 'nitidine'. Root bark is used for treatment of toothache and boils. It is also used as an insecticide. Fruits root barks are used as fish poison. Seeds yield an essential oil containing high percentage of linalool.

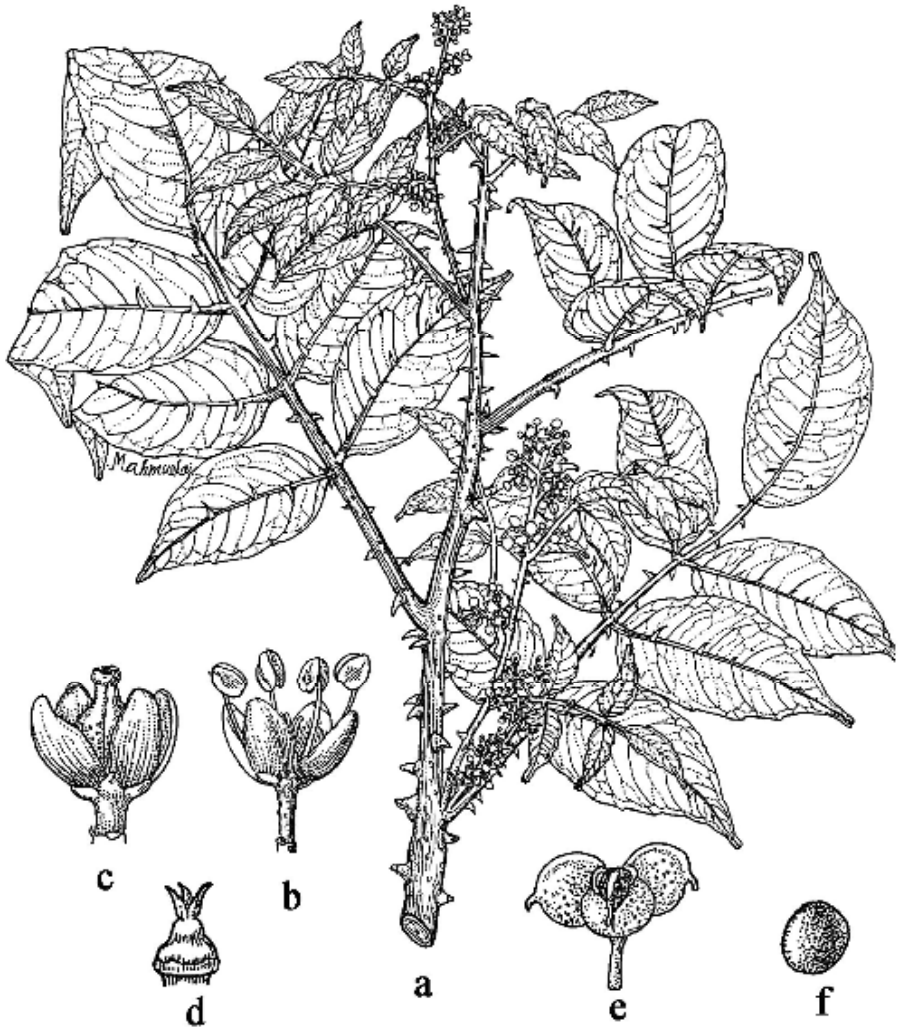


Figure 32: **Zanthoxylum nitidum** (Roxb.) DC.: a) Flowering shoot; b) male flower; c) femal flower; d) staminode; e) fruit; and f) seed.

Zanthoxylum ovalifolium C.T.Wight, Ill. Ind. Bot. 1: 169. 1839; Hook.f., Fl. Brit. India 1: 492. 1875; Brandis, Indian Trees: 118. 1906 (Reprt. 1984); Hajra *et al.,* Fl. India 4: 384. 1997; Ahmed *et al.* (eds.), Encycl. Fl. Fauna Bangladesh 10: 187. 2009. *Zanthoxylum sepiarium* C.T. Wight, Ill. Ind. Bot. 1: 169. 1839. *Zanthoxylum inerme* C.T. White, Bot. Bull. Dept. Agric., Queensland 22: 6. 1920. *Fagara ovalifolia* (Wight) Engler, Nat. Pflanzenfam. 3(4): 118. 1896. **Fig. 33**

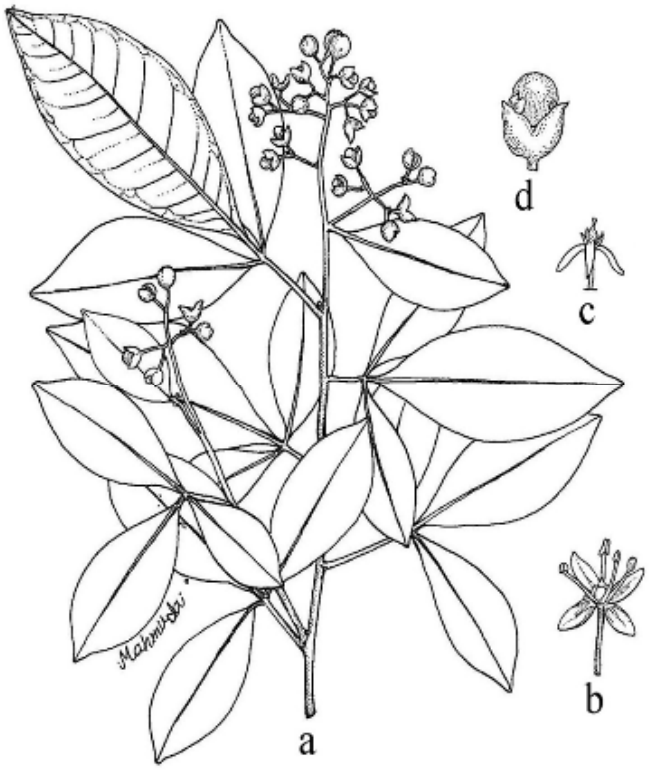


Figure 33: **Zanthoxylum ovalifolium** C.T.Wight: a) Flowering shoot; b) male flower c) femal flower; and d) dehisced fruit.

Erect shrubs or small trees, up to 9.0 m high. Branches spiny, glabrous, unarmed or occasionally with a few straight or incurved, reddish-brown, 3.0-7.0 mm long prickles. Leaves alternate, digitately trifoliolate or rarely uni or bi or very rarely 4-5-foliolate, up to 28 cm long; petioles (and rachis) slightly marginate, common petioles 2.0-2.5 cm long, unarmed or rarely armed with short prickles, glabrous; leaflets lanceolate, ovate to elliptic-oblong or obovate, 4.0-10 × 2.0-5.0 cm, acute to cuneate and slightly oblique at base, abruptly acuminate with a short, retuse acumen or rarely obtuse at apex, subentire or glandular-crenate to double crenate along margins, chartaceous to coriaceous, glabrous; lateral veins 12-14 on either half; secondary nerves 8-20 pairs, prominent; petiolules 3.0-5.0 mm long. Inflorescences axillary, terminal, paniculate, 4.0-15 cm long, glabrate or puberulous. Male flowers 2.0-5.0 mm long; pedicels slender, 1.5-3.5 mm long, glabrate, rarely glandular; sepals 4, triangular, acute, 0.5-1.0 mm long, glandular; petals 4, elliptic-oblong, obtuse, 2.0-3.0 mm long, white. Stamens 4, 2.0-3.5 mm long;

filaments linear; anthers oblong, 1.0-1.5 mm long. Disk pulvinate, 0.8-1.0 mm high. Pistillodes single, conical, 1.0-1.5 mm high. Female flowers 3.0-4.0 mm long; pedicels; sepals and petals as in male flowers. Disk pulvinate, 0.5-1.0 mm high. Staminodes 4, filiform, 1.0-1.5 mm long. Gynoecium 1-carpellate, 1.5-2.0 mm long; ovary ovoid, glandular-punctate; style 0.5-1.0 mm long, excentric; stigma globose. Fruits a single, subglobose, pustular apiculate red, solitary, pea sized, 6.0-8.0 mm across follicle; fruiting pedicels 3.0-8.0 mm long. Seeds globose, black, shining, 5.0-6.0 mm across. 2n = 36, 68 (Kumar and Subramaniam, 1986). *Fl. & fr.:* 5-12. *Evergreen, monsoon forests and thickets, up to 1800 m altitude.*

Australia, Guinea, India, Indonesia, Lesser Sunda Islands, Myanmar, Papua New and Pakistan.

The hard and lustrous wood is used for making tool handles, walking stick and in cabinet work. Seeds on distillation yield essential oil containing poisonous and carcinogenic compunds myrcene and safrole.

Zanthoxylum rhetsa (Roxb.) DC., Prodr. 1: 728. 1824; Hook.f., Fl. Brit. India 1: 495. 1875; Brandis, Indian Trees: 118. 1906 (Reprt. 1984); Heinig, List Pl. Chitt. Coll. & HT.: 9. 1925; Babu in Bull. Bot. Surv. India 16: 56. 1974 (1977); Ahmed *et al.* (eds.), Encycl. Fl. Fauna Bangladesh 10: 187. 2009; Uddin & Hassan (eds.), Vas. Fl. Chittagong & CHT. 3: 261. 2018. *Fagara rhetsa* Roxb., Fl. Ind. 1: 438. 1820. *Tipalia limonella* Dennst. in Schluss., Hort. Malab. 31. 1818, *nom. nud*. *Zanthoxylum limonella* (Dennst.) Alston in Trimen, Handb. Fl. Ceylon Suppl. 6: 37. 1931, *nom. illegit*. *Fagara budrunga* Roxb., Fl. Ind. ed. 1: 437. 1820. *Zanthoxylum burdunga* (Roxb.) DC., Prodr. 1: 728. 1824; Hook.f., Fl. Brit. India 1: 495. 1875; Kurz, Forest Fl. Brit. Burma 1: 182. 1877 (Repr. 1974); Prain, Beng. Pl. 1: 299. 1903; Heinig, List Pl. Chitt. Coll. & HT.: 9. 1925; Sinclair, Bull. Bot. Soc. Beng. 9(2): 89. 1955. *Zanthoxylum budrunga* (Roxb.) DC. var. *rhetsa* (Roxb.) Haines, Bot. Bihar Orissa 1: 165. 1921. *Zanthoxylum budrunga* Wall., Numer. List 1211. 1829; Prain, Beng. Pl. 1: 299. 1903. **Fig. 34**

Bengali: *Basinali, Bajna, Kantahorina, Tambol* English: Indian Ivy-rue

Evergreen or deciduous spiny trees, up to 20 m high, with a long bole and spreading crown. Trunk with stout, broad, conical prickles; branchlets terete, sparsely prickly. Leaves pinnate, usually confined at top of branchlets, 25-45 cm long; leaflets 15-31, opposite to subopposite, oblong to ovate-oblong or lanceolate, 6-18 × 2-6 cm, base acute to cuneate and oblique, apex caudate-acuminate, acumen 2-3 cm long, margins entire to

remotely crenate, along with large glands in sinuses of crenatures, chartaceous to coriaceous, glabrous; petiole slightly grooved above when young, becoming cylindric on maturity, usually prickly, 2-7 mm long. Inflorescence terminal or pseudoterminal panicles, 10-25 cm long; peduncle glabrous to puberulent, sometimes prickly. Flowers 4-merous; white or pale yellow. Male flowers: 1.5-2.5 mm long; pedicels 1.0-2.0 mm long; sepals 4, ovate-triangular, obtuse, subentire or fimbriate along margins, 0.4-0.5 mm long, green; petals 4, valvate, elliptic-oblong, obtuse, 2.0-2.5 mm long, white or creamy yellow; stamens 4, 2.0-2.5 mm long; anthers oblong, c. 1.0 mm long, yellow; disk pulvinate, lobulate, c. 0.5 mm high; pistillodes solitary, c. 0.5 mm high. Female flowers: 1.5-2.5 mm long; pedicels, sepals, petals as in male flowers; staminodes absent; disk pulvinate, c. 0.3 mm high; gynoecium 1-carpellate, 1.0-1.5 mm high; style eccentric; stigma truncate. Fruiting pedicels 1.0-4.0 mm long· Fruit a follicle, subglobose- globose, apiculate, 5.0-8.0 mm diameter, 2-valved, orange or reddish-yellow when ripe, pustular. Seeds solitary, globose, 4.0-6.0 mm diameter, bluish-black. 2n = 68 (Kumar and Subramaniam, 1986). *Fl. & fr.:* 1-12. *Evergreen or mixed deciduous forests, dry to sandy loamy soil; up to 600 m altitude*.

Bandarban: Y-Junction Forest Range, 26 x 2016, *Imam et al.*, IH-1029a (DACB 72414). **Cox's Bazar:** Medha Kacchopia National Park, Khutakhali, 5 xii 2016, *Niyamul et al.*, NK-1993 (DACB 62509). **Dhaka:** Choto Kaliakoir, Savar, 17 ix 2021, *Abdur Rahim* (DACB 66367). **Khagrachhari:** Dighinala, 27 i 2007, *M.A. Wahab* (BCSIR 2004). **Mymensingh:** Kadigar National park, Bhaluka, 1 iii 2022, *K.K. Islam* KKI-5023 (DACB). **Rangamati:** Dhopachari Forest, Kaukhali, 30 i 2017, *Joyanta et al.*, JCR-2518 (DACB 64283); Jamunachari, Pharua Reserve Forest, Bilaichari, 16 x 2008, *S.N. Uddin,* N-3090 (DACB 33286). **Tangail:** Gorai, 5 viii 1976, *Huq et al.*, K-4184 (DACB 12667); Madhupur Forest, 22 x 2001, *Rezia Khatun,* RK-3250 (DACB 29716); Gorai Sal Forest, 12 vi 1999, Huq (DACB 31057).

Bhutan, Celebes, India, Indonesia, Moluccas, Myanmar, Papua New Guinea, Philippines, Sri Lanka, Thailand and Vietnam.

Root bark is diuretic. Stem bark is used for stomachache and chest pain. Pericarp of unripe fruits is used to make pickle. Dried fruits are used as a condiment. An essential oil is extracted from fruits and used as an antiseptic and disinfectant. It is also used for treatment of cholera and inflammatory dermatitis. Young leaves are used as vegetables. Seeds are used as spice and catching fish. Beads are made from corky old prickles and used as ornaments. Wood is used for making combs, rafters, furniture, tool handles and for turnery.

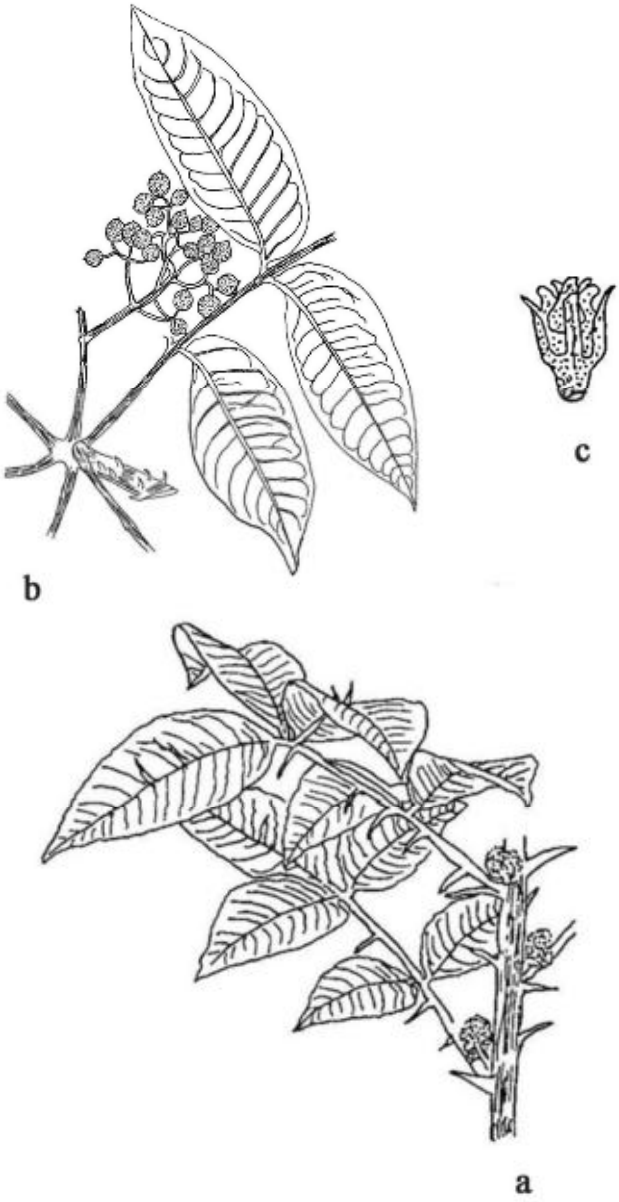


Figure 34: **Zanthoxylum rhetsa** (Roxb.) DC.: a) Flowering shoot; b) fruiting shoot; and c) flower.

Figure 35: **Evodia hortensis** J.R. Forst. & Forst.: a) Leafy shoot; b) flowering branch; and c) fruiting branch.

Acknowledgement

The authors are thankful to the authorities of the Bangladesh Council of Scientific and Industrial Research (BCSIR), Bangladesh Forest Research Institute (BFRI), and University of Chittagong for giving permission to us using their herbarium facilities.

INDEX

LIST OF FAMILIES PUBLISHED

	Fl. No.		Fl. No.		Fl. No.
Acoraceae	67	Dichapetalaceae	23	Phytolaccaceae	1
Aizoaceae	34	Dilleniaceae	36	Plumbaginaceae	42
Alangiaceae	68	Dipterocarpaceae	25	Polemoniaceae	2
Annonaceae	52	Elatinaceae	39	Pontederiaceae	24
Araceae	75	Fumariaceae	3	Potamogetonaceae	40
Aristolochiaceae	78	Flagellariaceae	3	Pontederiaceae	24
Asclepiadaceae	48	Gesneriaceae	65	Punicaceae	22
Averrhoaceae	18	Haloragaceae	8	Rhamnaceae	61
Avicenniaceae	31	Hydrocharitaceae	28	Rhizophoraceae	7
Basellaceae	2	Hydrocotylaceae	44	Ruppiaceae	19
Bignoniaceae	70	Hydrophyllaceae	1	Rutaceae	80
Bixaceae	35	Juncaceae	29	Sabiaceae	62
Boraginaceae	77	Lamiaceae	58	Salicaceae	20
Bromeliaceae	74	Linaceae	26	Sapindaceae	59
Buddlejaceae	13	Lecythidaceae	60	Solanaceae	53
Burmanniaceae	38	Loranthaceae	33	Sonneratiaceae	12
Butomaceae	2	Malvaceae	54	Stemonaceae	41
Burseraceae	36	Martyniaceae	1	Sphenocleaceae	5
Cannabidaceae	14	Melastomataceae	76	Stylidiaceae	32
Cannaceae	73	Meliaceae	71	Taccaceae	72
Capparaceae	57	Menispermaceae	51	Tiliaceae	64
Caricaceae	1	Menyanthaceae	49	Trapaceae	27
Cassythaceae	43	Molluginaceae	17	Tropaeolaceae	3
Casuarinaceae	1	Moringaceae	2	Turneraceae	3
Celastraceae	79	Nymphaeaceae	9	Typhaceae	69
Ceratophyllaceae	10	Ochnaceae	3	Urticaceae	66
Combretaceae	50	Onagraceae	6	Vitaceae	63
Commelinaceae	4	Orobanchaceae	21	Xyridaceae	46
Convolvulaceae	30	Oxalidaceae	15	Zannichelliaceae	11
Costaceae	45	Pedaliaceae	2	Zygophyllaceae	16
Cuscutaceae	55	Periplocaceae	47		

Ministry of Environment, Forest and Climate Change

ISBN: 978-984-34-1053-5

Illustration: Sabiha Sultana and Mahmuda Akhter

Price: Taka 70.00
US$ 7.00
£ 5.00

Published by: Bangladesh National Herbarium
Chiriakhana Road, Mirpur-1, Dhaka-1216, Bangladesh.
Phone: +880258054802, E-mail: bnh_mirpur@yahoo.com

Printed at: SRL Printing Press
Babupura, Nilkhet, Dhaka-1205