

FLORA OF BANGLADESH

NO. 77

BORAGINACEAE

EDITOR

December 2020

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MOHAMMAD SAYEDUR RAHMAN
And
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GOVT. OF THE PEOPLE'S REPUBLIC OF BANGLADESH

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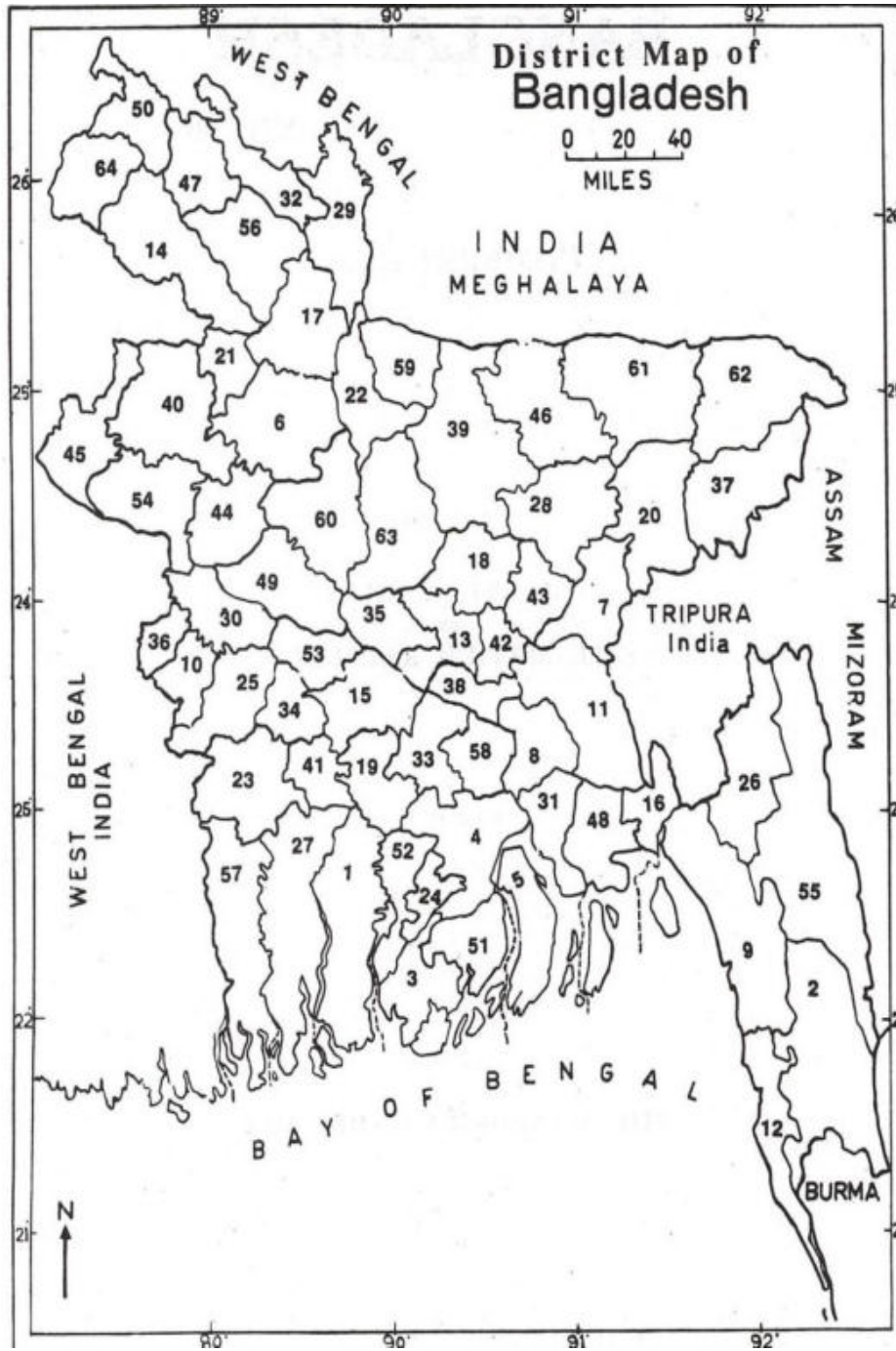
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(Fig. District Map of Bangladesh - 64 districts with Nos. 1, 2, 3.....)



List of Districts

The serial numbers correspond to those given in the map.

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

LIST OF FAMILIES PUBLISHED

	Fl. No.		Fl. No.		Fl. No.
Acoraceae	67	Dilleniaceae	56	Phytolaccaceae	1
Aizoaceae	34	Dipterocarpaceae	25	Plumbaginaceae	42
Alangiaceae	68	Elatinaceae	39	Polemoniaceae	2
Annonaceae	52	Flagellariaceae	3	Pontederiaceae	24
Araceae	75	Fumariaceae	3	Potamogetonaceae	40
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	Sabiaceae	62
Bixaceae	35	Juncaceae	29	Salicaceae	20
Boraginaceae	77	Lamiaceae	58	Sapindaceae	59
Bromeliaceae	74	Linaceae	26	Solanaceae	53
Buddlejaceae	13	Lecythidaceae	60	Sonneratiaceae	12
Burmanniaceae	38	Loranthaceae	33	Sphenocleaceae	5
Burseraceae	36	Martyniaceae	1	Stemonaceae	41
Butomaceae	2	Malvaceae	54	Stylidiaceae	32
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Cannaceae	73	Meliaceae	71	Tiliaceae	64
Capparaceae	57	Menispermaceae	51	Trapaceae	27
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Dichapetalaceae	23	Periplocaceae	47		

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BORAGINACEAE Juss.

Mohammad Sayedur Rahman and Mohammad Amdadul Hoque

Herbs perennial, biennial, or annual, less often lianas, shrubs, or trees, usually covered by hairs or bristles on the herbaceous part. Leaves alternate, very rarely opposite (in *Tournefortia*), exstipulate, undivided, usually entire, in a very few species serrate. Inflorescence either a simple cyme or compound, cymes arranged dichotomously or in racemes or panicles, with or without bracts, terminal or lateral, sometimes single flowers in the axils of upper leaves. Flowers bisexual, actinomorphic, rarely zygomorphic. Calyx usually 5-parted or lobed, mostly persistent. Corolla 5-lobed, gamopetalous, twisted or imbricate, tubular, salverform, funneliform or campanulate. Stamens of the same number as corolla lobes, alternating with them, included in or exerted from the corolla; anthers sessile or on distinct filaments, opening longitudinally. Ovary superior, 4-locular at maturity; placentation axillary; ovules erect or nearly horizontal, rarely pendent; style gynobasic or terminal; stigma absent or disc to cushion-shaped terminating the style, or (in *Heliotropium* and *Tournefortia*) forming a ring round the style at various levels. Fruits drupe or nutlet, 1-4 seeded. Seeds erect or oblique, usually without albumen.

About 156 genera and 2500 species in all climatic regions of the world (Wu *et al.*, 2013). In Bangladesh the family is represented by 09 genera and 28 species including two new record.

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Abbreviations used in the text

ASSAM= Botanical Survey of India, Eastern Circle

BM= British Museum of Natural History

C= University of Copenhagen Herbarium

CAL = Central National Herbarium, Kolkata

CUH= Chattogram University Herbarium

BFRIH = Bangladesh Forest Research Institute Herbarium

DACB = Bangladesh National Herbarium

DUSH = Dhaka University Salar Khan Herbarium

JUH= Jahangirnagar University Herbarium

K = The Royal Botanic Gardens Kew Herbarium

P = National Museum of Natural History, France

KEY TO THE GENERA

- 1 Ovary undivided; style terminal (2)
- + Ovary (2- or) 4-lobed; style gynobasic (7)
- 2 (1) Style once or twice forked, with or without a distinct stigma, sometimes undivided with 2 stigmata. Fruit drupaceous with 1 to 4 pyrenes and 4 seeds (3)
- + Style simple or forked, surrounded by an annular stigma. Fruit drupaceous or separating into 4 nutlets or 2 mericarps (6)
- 3 (2) Style twice forked. Fruit with a single 4-locular pyrene **Cordia**
- + Style simply forked or styles 2. Fruit with two 2-seeded or four 1-seeded pyrenes (4)
- 4 (3) Creeping herbs **Coldenia**
- + Trees, shrubs or woody climbers (5)
- 5 (4) Style forked. Fruit breaking up into two 2-seeded pyrenes **Ehretia**
- + Style undivided. Fruit breaking up into four 1-seeded pyrenes **Rotula**
- 6 (2) Trees, shrubs or woody climbers. Fruit drupaceous; pericarp corky or fleshy **Tournefortia**
- + Herbs. Fruit separating into 4 nutlets or two 2-seeded mericarps, rarely undivided with mostly 1 locule by abortion **Heliotropium**
- 7 (1) Anthers with long, twisted awns. Fruit separating into nutlets only at a late stage **Trichodesma**
- + Anthers without awns. Fruits with 4 separate locules develop at the early stage (8)
- 8 (7) Nutlets without glochids **Bothriospermum**
- + Nutlets with glochids at least marginally and on ventral side **Cynoglossum**



Figure 1. *Bothriospermum zeylanicum* (J. Jacquin) Druce, a) habit and b) flower.

Bothriospermum Bunge
Enum. Pl. Chin. Bor. 47 (1833).

Type species: *Bothriospermum chinense* Bunge.

Annual or biennial herbs, hispid and appressed pubescent, hairs discoid at base. Stems erect or prostrate. Leaves alternate, elliptic, ovate or oblanceolate, margin entire. Raceme bracteate. Flowers small, pentamerous, extra-axillary, solitary but rarely forming a leafy raceme in distal part of the branches, pedicellate. Calyx 5-lobed, cleft to the base, narrowly lanceolate, slightly enlarged in fruit. Corolla rotate, blue or white, tube shortly cylindrical, throat with 5 scale like appendages; spreading limbs divided into five obtuse lobes. Stamens 5, included, filament extremely short; anthers ovate, obtuse. Ovary 4-parted, valves free, each containing 1 anatropous ovule, style short, stigma capitate. Nutlets 4 or fewer, very small, compressed dorsally. Seeds usually not curved.

About 15 species world wide. Only one species in Bangladesh.

Bothriospermum zeylanicum (J. Jacquin) Druce, Bot. Exch. Club Brit. Isles. 4: 610 (1917). *Anchusa zeylanica* J. Jacq., Ecl. Pl. Rar.1: 47, pl. 29 (1812). *Bothriospermum tenellum* (Hornem.) Fisch. & C.A. Mey., Index Seminum (St. Petersburg) 1: 23–24 (1835). **Fig.1.**

Bangla: Lechra; English: Leaf Betwera Flower.

Herbs annual. 15-32 cm tall. Stem slender, prostrate or erect, much branched, appressed hispid that are only more patent in the petioles and leaf margins. Leaves elliptic to narrowly elliptic, 10-27 mm × 5-10 mm, sparsely short appressed bristly or strigose, base broadly cuneate, apex obtuse, mucronulate, upper most leaves smaller, obovate to lanceolate, undulate. Recemes leafy, numerous, lax after anthesis; lower bracts few, lanceolate, 1.5-5 mm, apex acute; upper bracts very small. Flowers small, extra-axillary, pedicellate; pedicels 1-3 mm long. Calyx 1-2mm long, to 3 mm in fruits, with short ascending white bristles, 5 lobed, lobes linear-lanceolates, throat appendages ca. 0.2 mm long, limb 2.5-3mm wide. Corolla white or blue, 1.5- 2.5 mm long, salver-shaped, slightly longer than calyx; lobes 5, rounded, ca. 1 mm; throat appendages ca. 0.2 mm;

limb 2.5-3 mm wide. Anthers c. 0.5 mm long, ovate, obtuse, attached below the throat. Style terete, ca. 0.5 mm long; stigma capitate. Nutlets 4, gray, oval-reniform, 1-1.2 mm long, aperture longitudinally elliptic. Flowering and fruiting: February-October. In moist places near ditches.

Type: in Herb. Vahl (as *Anchusa zeylanica*), 'Hab. in China' (C).

Mymensingh (Present Placement Kishoregonj): Bhairab, 11 vi 1975, Msc prel student, (DACB 27581).

Afghanistan, China, India, Indonesia, Japan, Kazakhstan, Korea, Kyrgyzstan, Pakistan, Philippines, Russia, Tajikistan, Turkmenistan, Uzbekistan and Vietnam.

The plant is used for forage of cattle.

Coldenia L.

Sp. Pl. 1: 125 (1753).

Type species: *Coldenia procumbens* L.

Annual herbs. Stem prostrate, dorsiventrally compressed, ascendingly branched. Leaves alternate, small, asymmetric; margin crenate-dentate or lobulate; secondary veins ending in sinuses. Inflorescences extra-axillary, sometimes glomerate. Flowers tiny, arisen between the leaves or bracts, sessile or on short pedicels, tetramerous. Calyx 4-lobed, lobes lanceolate or linear. Corolla white or yellow, throat glabrous, connate at the base to form short tube; 4 lobed, lobes spreading, overlapping in bud. Stamens 4, epiphyllous; filament short, attached to about middle of the corolla tube; anthers broad, included in the corolla. Ovary ovoid, glandular villose, pyramidate, \pm 4-lobed, bilocular with with 2 ovules per locule or solitary while imperfectly 4-celled; styles terminal, bi-fid, free or adnate to middle; stigmas 2, tiny, capitate. Fruit fleshy or dry, endocarp bony, divided into 4, 1 seeded pyrenes. Seeds with little or no endosperm.

A genus of 38 species, mostly tropical and subtropical America. Represented in Bangladesh by 1 species.

Coldenia procumbens L., Sp. Pl. 1: 125.1753. C.B. Clarke in Hook.f., Fl. Brit India 4: 141. 1883; Prain, Beng Pl. 2: 718. 1903; J.Sinclair, Bull. Bot. Soc. Beng. 9(2): 100. 1955; Ahmed *etal.*(ed.), Encycl. Fl. Fauna Bangladesh 7: 35. 2008; Uddin and Hassan (ed), vascular flora of Chattogram and the Chattogram Hill Tracts 3: 446 (2018). **Fig. 2.**

Bangla: Tripukshi; English: Trailing Coldenia.

Annual herbs, procumbent. Stems ascendingly branched, 10-50 cm long, greyish hairy. Leaves simple, alternate, lower stem leaves petiole 3-7 mm long, dent hairy; upper leaves sessile; blades 10-30 x 5-15 mm, asymmetric, obovate to oblong, pinnatifid subobtusate; lobes hairy, especially on lower surface, veins 4-6 on each side, strigose between veins. Flowers tetramerous, solitary, axillary, sessile or subsessile. Calyx c. 2.3 mm long, slightly accrescent in fruit, 4-lobed, lobes lanceolate or ovate-lanceolate, c. 2 mm long hairy and ciliated, persistent. Corolla pale yellow, glabrous, 1.5-1.8 mm long, tube 1-1.3 mm long, lobes 4, ascending, 0.2-0.4 mm long, rounded. Stamens 4, included; filaments c. 0.3 mm long, glabrous, inserted at middle of corolla tube, longer than the anthers; anthers rounded to broadly ovate, ca. 0.2 mm long. Ovary ovoid, glandular villose, pyramidal, ± 4-lobed, bilocular with with 2 ovules per locule; style bifid nearly to the base; stigmas 2-cleft, tiny, capitate. Fruit 3-4 mm long, pyramidal, 4-lobed, pyrenes beaked, puberulose. Seeds non endospermic. *Flowering & fruiting*: March-July. In moist places, and sandy dunes.

Type: Ceylon, Hermann Herbarium (lectotype BM-HERM, chosen by Verdcourt, 1991).

Bogra: Kholas, Dhupchachia, 17 iii 1995, *O. Rahman*-1065 (DACB). **Chattogram:** Chunti forest range, Harbang, 9 vi 1979, *Khan, Huq & Rahman*, K-5453 (DACB 18156); Chunati, East Lohagara, 26 iv 2017, Tajul et al, TAK 4346; Mainamukh, Chattogram Hill Tracts, 27 iv 1977, *Huq & Rahman*, H-3141 (DACB 18159); Padua, Lohagara, 20 iv 1996, *M. S. Khan & M. K. Mia*, K-9237 (DACB 38857). Manikchari, Chattogram Hill Tracts, 25 iv 1976, *Huq, Rahman & Mia*, H-2526 (DACB 18162). **Chattogram Hill Tracts:** Pablakhali-Saratali, 30 iv 1977, *A. M. Huq*, H-3287 (DACB 18152). **Cox's Bazar:** St. Martins island, 08 ii 1980, *Khan & Rahman*, K-6024 (DACB 18154); Dulahazra Safari Park, Chokoria, 18 iv 2004, *Sarder Nasir Uddin*, N-2324 (DACB 41450). **Dhaka:** Rampura, 22 iii 1968, R Roy-56, (DUSH); Pilkhana, 21 iii 1968, Dr Akhtary-137, (DUSH); Mirpur, 15 iii 1964, Din Mohammad-231, (DUSH); Dhaka cantonment, 15 iv 1970, M Rahman-72, (DUSH); Nahinagar, 4 vi 1999, *B.M. Rezia Khatun*, RK-1804 (DACB-29935); Nahinagar, 4 vi 1999, *B.M. Rezia Khatun*, RK-1804 (DACB-29934). **Mymensingh:** Panihata, Haluaghat, 23 v 1989, *Mia, Huq &*



Figure 2. *Coldenia procumbens* L., a) habit; b) flower; and c) fruit.

Rahman, M-2048 (DACB 18150). **Rajshahi**: Mirjapur, 27 x 1989, *Mia, Rahman, Halim & Rezia*, M-2398 (DACB-18178); Rohanpur, 12 vi 1975, *A. M. Huq*, H-1226 (DACB 18157); Chapal, Nawabganj, 7 vi 1973, *M. S. Khan & A. M. Huq*, K-3015 (DACB 18254). **Rangamati**: 4 vi 1959, M S Khan-1653, (DUSH); Kaptai, 13 iv 1986, *M. S. Khan*, K-7694 (DACB 18158); Chattogram Hill Tracts, 26 iv 1976, *Huq, Rahman & Mia*, H-2448 (DACB 18161). **Satkhira**: Bakal check post, 4 v 1984, *Khan, Rahman & Mia*, K-6668 (DACB 18155). **Sherpur**: Nanni near Baromari, 28 iv 1986, *A. M. Huq*, H-7708 (DACB 27487). **Sunamganj**: Pashura haor, 23 v 1992, *Khan et al.*, K-8655 (DACB 26629). **Sylhet**: Shibpur, 7 iv 1959, N Islam-67, (DUSH); Goainghat, Raturgoal Swamp Forest, 18 x 2020, *M. Sayedur Rahman* 4138 (DACB). **Tangail**: Gorai, 31 v 1973, *M. S. Khan & A. M. Huq*, K-2990 (DACB 18256); Gorai, 31 v 1973, *M. S. Khan & A. M. Huq*, K-2990 (DACB 18256).

Cambodia, China, India, Indonesia, Malaysia, Pakistan, Sri Lanka, Thailand, Vietnam; Africa, Australia, North America, South America.

Cordia L.

Sp. Pl. 190 (1753).

Type species: *Cordia sebestena* L.

Medium sized trees, shrubs or woody climbers. Leaves simple, alternate to subopposite and exstipulate, petiolate, entire or crenate-serrate. Inflorescences terminal or axillary, paniced to corymbose, sometimes very few-flowered, subglobose, with scorpioid branches. Flowers with a short, distinct pedicel or sessile, (4-)5-16-merous, bisexual, sometimes functionally unisexual and dioecious, ebracteate, frequently heterostylous. In male flowers Calyx c. 2.5 mm long, shallowly 5-lobed, hairy to the inside. Corolla infundibuliform or campanulate, 4-5(-8) lobed, c. 6 mm long, tube about equalling the limb, dense hairy within. Stamens of same number as corolla-lobes, included or exserted; filaments glabrous or pubescent at base; anthers oblong, ovate to subquadrate. Ovary reduced and style absent. Bisexual flowers are similar but larger than male flowers; anthers sterile. Ovary 4-locular with one ovule in each locule; style twice

forked, terminal; stigma elongate on each branch or subcapitate. Fruit a 1-seeded (by abortion) drupe. Seeds exalbuminous.

A genus of 325 species, mostly tropical and subtropical America. Represented in Bangladesh by eight species.

KEW TO THE SPECIES

- | | | |
|-------|--|--------------------------|
| 1 | Corolla large, orange; tube much longer than calyx | (2) |
| + | Corolla small, white; tube hardly longer than calyx | (3) |
| 2 (1) | Branchlets minutely pubescent on nerves, hairy; petiole length ≤ 4 cm; corolla lobes crenulate, not leathery; fruit whitish | C. sebestena |
| + | Branchlets glabrous; petiole length ≥ 4 cm; corolla lobes irregular, leathery; fruit yellow to red, becoming blackish | C. subcordata |
| 3 (1) | Leaves beneath densely tomentose | C. fragrantissima |
| + | Leaves beneath pubescent when young, glabrous when mature | (4) |
| 4 (3) | Leaves ovate to broadly ovate, stamens 8-9 | C. serrata |
| + | Leaves ovate to lanceolate or orbicular, stamens 4-7 | (5) |
| 5 (4) | calyx more or less glabrous | C. myxa |
| + | Calyx pubescent | (6) |
| 6 (5) | Stamens 4 | C. grandis |
| + | Stamens 5-7 | (7) |
| 7 (6) | Calyx densely tomentose to the outside. Corolla tube glabrous within | C. macleodii |
| + | Calyx pubescent to the outside. Corolla tube hairy within | C. dichotoma |

Cordia dichotoma G. Frost., Fl. Ins. Austr. 18:110 (1786). Basak and Alam, Annotated checklist of the Tree Flora of Bangladesh, BFRI:14 (2015). *Varronia sinensis* Lour., Fl. Cochinch., 1: 138 (1790).

Cordia dichotoma var. *dichotoma* Fl. Ins. Austr. Prodr. 18: 110 (1876); Ahmed et al. (ed.), Encycl. Fl. Fauna Bangladesh 7: 36 (2008); Uddin and Hassan (ed), Survey of vascular flora of Chattogram and the Chattogram Hill Tract 3: 447 (2018).

Cordia griffithii C.B. Clarke, Fl. Brit. India 4: 139 (1883). **Fig. 3.**

Bangla: Boula; English: Clammy cheney.

Tree or shrub, 6-20(-27) m high. Younger branches grey, greyish brown to brownish, glabrous; petiole upto 4.5 cm long, leaf blade 5-8 x 1.5-3.0 cm, elliptic-ovate to obovate, pubescent, especially on the under-surface, margin sometimes undulate, base cuneate to oblique or rounded. Inflorescences terminating leafy lateral branches, dichotomously branched into corymbose cymes, widely spaced, 5-8 cm wide. Flowers dimorphic, sessile. Calyx cup shaped, 5-6 mm long, shallowly 5-lobed; lobes unequal, triangular, hairy to the inside, expanded in fruit. Corolla cylindrical-campanulate, white, ca. as long as calyx; tube 3 mm long, dense hairy within; limb 5 mm in diam.; lobes 5, shorter than tube, oblanceolate or broadly so, recurved, margin somewhat undulate. Stamens long exerted; filaments of staminate flowers c. 4.5 mm long, lower half hairy and adnate to tube, filaments of bisexual flowers 1-2 mm long; anthers 2.5-3 mm long, anthers sterile in bisexual flower. In bisexual flower ovary 4-locular with one ovule in each locule; style twice forked, terminal; stigma elongate on each branch or subcapitate; ovary sterile with reduce style in male flower. Fruit ovoid, 10-15 mm long, 8-10 mm in transverse diam., 1-seeded. Seed exalbuminous. Flowering & fruiting: February-August. In glass land, sea shores, scrub forests and in village thickets.

Type: New Caledonia, Coll. Ignor. (BM).

Bagerhat: Sarankhola range, Terabeka, 02 May 2012, *Sayedur1056* (JUH). Khulna: Khulna range, Nilkomol, 20 Aug 2011, *Sayedur 102* (JUH). Satkhira: Satkhira range, Mandarbaria, 29 Jan 2012, *Sayedur 461* (JUH). **Bandarban:** Chimbuk hills, on the way

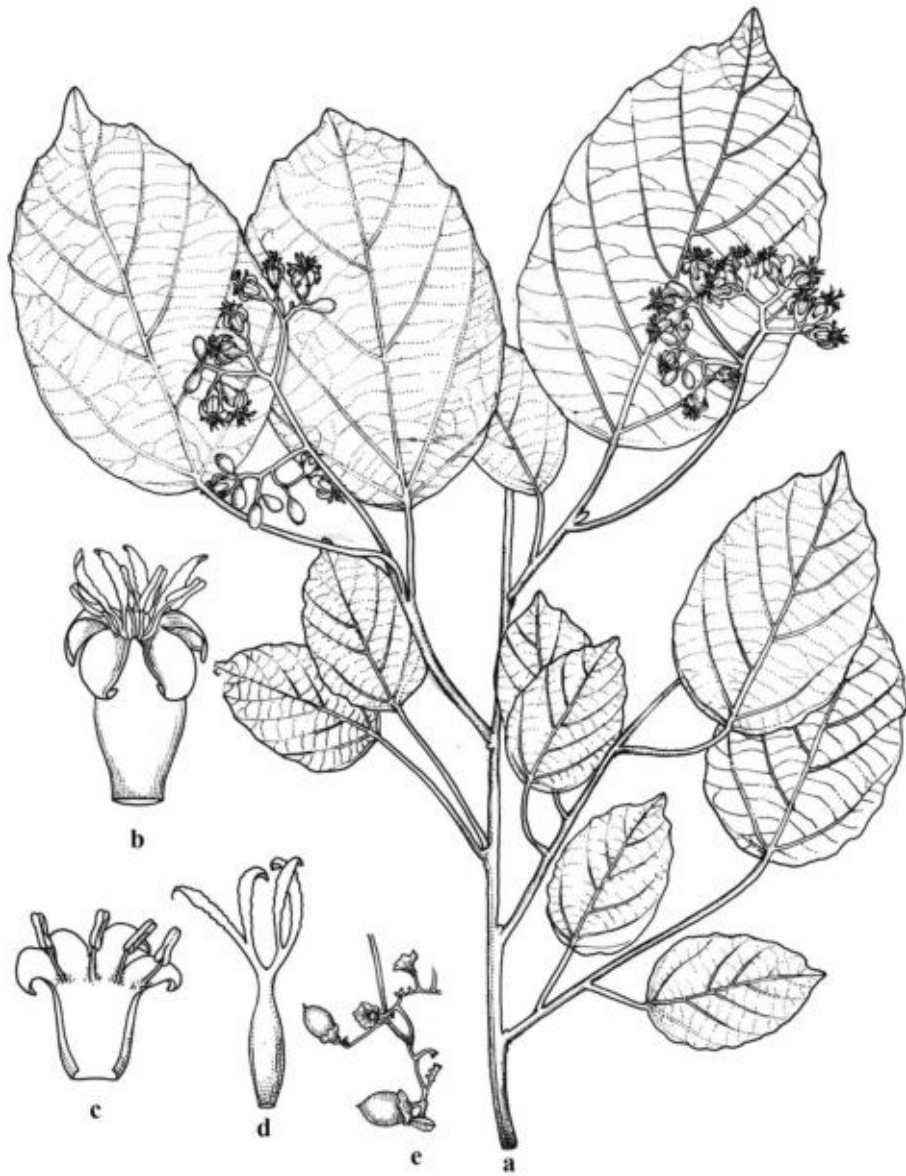


Figure 3. *Cordia dichotoma* G.Forst., a) flowering branch; b) flower; c) epipetalous stamens; d) pistil and e) Portion of infructescence.

of chimbuk para, 28 xi 1983, *Khan, Huq Mia & Rahman*, K-6557 (DACB 18141). **Chattogram:** Kutubdia (south), 25 xii 1983, *Huq, Rahman & Mia*, H-6599 (DACB 25224); Urirchar, 08 iii 2018, M.Zaman et al, MK-7901; Sitakundo National Park, 2016, Anwar 308 (JUH). **Cox's Bazar:** Himchari National Park, 21 xi 2020, *M. Sayedur Rahman*, Sayedur s.n. (DACB) **Dhaka:** Savar, 30 iii 1982, *A. M. Huq*, H-5526 (DACB 18129); Daskendi, 17 vi 1970, *A. M. Huq*. 56 (DACB 18137); Daskendi, 17 vi 1970, *A. M. Huq*. 56 (DACB 18130); Aricha-Teota, 9 vi 1981, *Huq & Mia*, H-5199 (DACB 25232); Chiriakhana road, Mirpur, 27 ii 2007, *B.M. Rezia Khatun*, RK-5612 (DACB-34789); Chiriakhana road, Mirpur, 15 iii 2007, *B.M. Rezia Khatun*, RK-5661 (DACB-34790); Mirpur, Shah Ali, National Botanical Garden, Section-51, 07.08.2012, *S. S. Shetu* 374 (JUH). **Faridpur:** Near Goalandaghat, 1 vii 1973, *A. M. Huq*, H-1023 (DACB 18139); Magura, 6 i 1976, *Huq, Rahman & Mia*, H-1964 (DACB 18138); Goalando, 16 vi 1981, *Mia, Huq, Halim & Begum* M-527 (DACB 25226). **Jamalpur:** Runctia 6 v 1982, *Mia et al.*, M-777 (DACB 25234). **Jessor:** Radhanagar, 1 xii 1979, *Khan & Huq* K-5735 (DACB 18142). **Moulvibazar:** Madhabkundu eco-park, Barolekha, 20 v 2014, *Sarder Nasir Uddin*, N-5271 (DACB 43748); Kamalganj: Rajkandi forest range, Adampur, 06 Apr 2014, Kamrul 2144 (JUH); Kamarchara, 06 apr 2014, Kamrul 2145 (JUH); Kurma, 07 apr 2014, Kamrul 2146 (JUH). **Mymensingh:** Panihata, Haluaghat, 23 v 1989, *Mia, Huq & Rahman*, M-2026 (DACB 18125); Madhupur, 6 iv 1976, *Huq & Mia* H-2262 (DACB 18140); Madhupur National Park area, 12 v 1983, *Huq, Hasan & Islam*. H-5734 (DACB 25236). **Narsingdi:** Robayda 527 (JUH). **Noakhali:** Dagunbhuia, Momarijpur, 18 xi 1981, *Huq, Rahnam, Halim & Begum* H-5266 (DACB 25225); Hatia to Nalchira, 17 iii 1987, *A. M. Huq & M. K. Mia* H-8291 (DACB 18128). **Nowabgonj:** Piarapur, Fakirpara, 30 iv 1991, *Mia, Rahman, Mahbuba & Mahfuz*, M-2808 (DACB-18134). **Panchagarh:** Tetulia, 1 vii 1998, *Mia et al.*, M-4005 (DACB 28640). **Rangamati:** Borkol Reserve Forest, 20 xii 2015, *Naimur Rahman*, NR-77 (DACB 46364). **Sherpur:** Gazni forest, 27 iv 1989, *A. M. Huq*, H-7705 (DACB 27475). **Sylhet:** Satchari, 18 iv 1985, *A. M. Huq & M. K. Mia*, H-6930 (DACB 18148). **Tangail:** Elenga, 20 iv 1974, *Eusuf* 121 (DACB 25235).

Cambodia, China N India, Indonesia, Japan (Ryukyu Islands), Kashmir, Laos, Malaysia, Myanmar, Pakistan, Thailand, Vietnam; NE Australia, Pacific Islands.

The plant is used for wild life food, fiber, timber and medicine. Fruits and kernel of seeds are eaten. Trees are used as host plant for lac insect.

Cordia fragrantissima Kurz, For. Fl. Brit. Burma 2: 207. (1877). C.B. Clarke in Hook.f. Fl. Brit India 4: 139. 1883; Ahmed *et al.* (ed.), Encycl. Fl. Fauna Bangladesh 7: 38. 2008; Basak and Alam, Annotated checklist of the Tree Flora of Bangladesh, BFRI: 14 (2015), Uddin and Hassan (ed), Uddin and Hassan (ed), Vascular flora of Chattogram and the Chattogram Hill Tracts 3: 449 (2018). *Cordia clarkei* Brace *ex* Prain, Beng Pl. 2: 714. (1903); Heining, Pl. List Chitt. Coll. & HT.: 44. 1925. *Cordia rotundifolia* B. Heyne *ex* C.B. Clarke, Fl. Brit. India 4: 139 (1883). **Fig. 4.**

Bangla: Kaladuti, Mahidal.

Medium trees, deciduous, densely covered with fugacious tomentum. Leaves simple, alternate, 6-20 x 5-15 cm, elliptic to ovate, acute to obtuse, entire, base rounded or cuneate, scabrous above, sparingly hairy, soft tomentose beneath, glabrescent and white dotted when dry, chartaceous, 3-nerved at base, petioles 7-15 cm long. Inflorescence large, unilateral racemes, axillary and terminal, densely tawn-tomentose, later on glabrescent. Flowers white, 6-7 mm across, fragrant, tetramerous, sessile. Calyx bell-shaped, tawny-tomentose outside and glabrous within, not distinctly ribbed, tube as long as calyx lobes. Corolla white, glabrous, tube as long as calyx, mouth hairy. Stamens 5, as long as corolla, alternate with petals. Ovary with sessile stigma. Fruits ellipsoid, 6-8 mm across, obtuse. Flowering & fruiting: May-December. In hilly forest areas.

Bandarban: Keokradong, Ruma, 4 xii 2014, K. K. Islam, KKI 3184 (DACB).

Chattogram: Bariadhala, 19 xi 1986, A. M. Huq & M. K. Mia, H-8066, (DACB 18135).

Comilla: Rajeshpur, near Tripura border, 13 xi 1970, M.S. Khan & A.M. Huq, K-2204 (DACB 18123). **Sylhet** (Present Placement Moulvibazar): Lawachara, Bhanugach, 20.x 1940 R.N. De 19756 (ASSAM).

India, Srilanka and Myanmar.

Wood is very fragrant. Timber is suitable for house posts.



Figure 4. *Cordia fragrantissima* Kurz, a) fruiting branch.

Cordia grandis Roxb., Fl. Ind. 2: 335 (1824). C.B. Clarke in Hook.f., Fl. Brit India 4: 137 (1883); Prain, Beng Pl. 2: 714. (1903); Heining, Pl. List Chitt. Coll. & HT.: 44 (1925); J.Sinclair, Bull. Bot. Soc. Beng. 9(2): 100 (1955); Ahmed *et al.* (ed.), Encycl. Fl. Fauna Bangladesh 7: 38 (2008); Basak and Alam, Annotated checklist of the Tree Flora of Bangladesh, BFRI: 14 (2015); Uddin and Hassan (ed), vascular flora of Chattogram and the Chattogram Hill Tracts 3: 449 (2018). *Cordia cordata* Steud., Nomencl. Bot. ed. 2, 1: 417 (1840). *Cordia cordifolia* C.B. Clarke (1883).

Bangla: Kotra, Kalauja.

Large deciduous trees, 10-20 m tall, crown spreading. Leaves simple, orbicular, alternate, broadly ovate to 5-20 x 3.5-15 cm, entire, acuminate, rounded or obtuse, coriaceous, copiously whitish cystolith disk above, base cuneate, rounded or truncate, 3-5 nerves, petiole 9.5-12.5 cm long. Inflorescence dense, terminal, pedunculate, paniced cymes, dichotomously branched. Flowers tetrandrous, small, white, shortly pedicillate or sessile. Calyx campanulate, 5 mm across, smooth, not distinctly ribbed, mouth toothed, indistinctly puberulous or glabrous, accrescent in fruits. Corolla 2.5-4.5 mm across, tube included, lobes about half as long as calyx. Stamens 4, long exserted. ovary 4-celled, with one ovule in each cell, style twice 2-partite, stigma clavate. Fruit a drupe, 1.0-1.2 cm long, ellipsoid, white, seated on dilated calyx, 1-seeded with viscid pulp. Flowering & fruiting: November-April. In hilly areas.

Maulovi Bazar: Lawachara National Park, Kamalgonj, 19 vii 2009, *Sarder Nasir Uddin*, N-3945 (DACB 35774); Madhabkundu eco-park, Barolekha, 20 v 2014, *Sarder Nasir Uddin*, N-5254 (DACB 43835). The plant was previously recorded from Chattagram and Cox's Bazar by Basak and Alam (2015).

India, Indo-china, Bhutan and Myanmar.

The plant provides firewood.

Cordia macleodii (Griff.) Hook. f. & Thoms. in J. Iron. Soc. Bot. 2:128 (1858). C.B. Clarke in Hook f., Fl. Brit. Ind. 4:139 (1883); Ahmed *et al.* (ed.), Encycl. Fl. Fauna Bangladesh 7: 39 (2008); Basak and Alam, Annotated checklist of the Tree Flora of Bangladesh, BFRI: 14 (2015). *Hemigymnia macleodii* Griff. Calcutta J. Nat. Hist. 3: 363 (1843). **Fig. 5.**

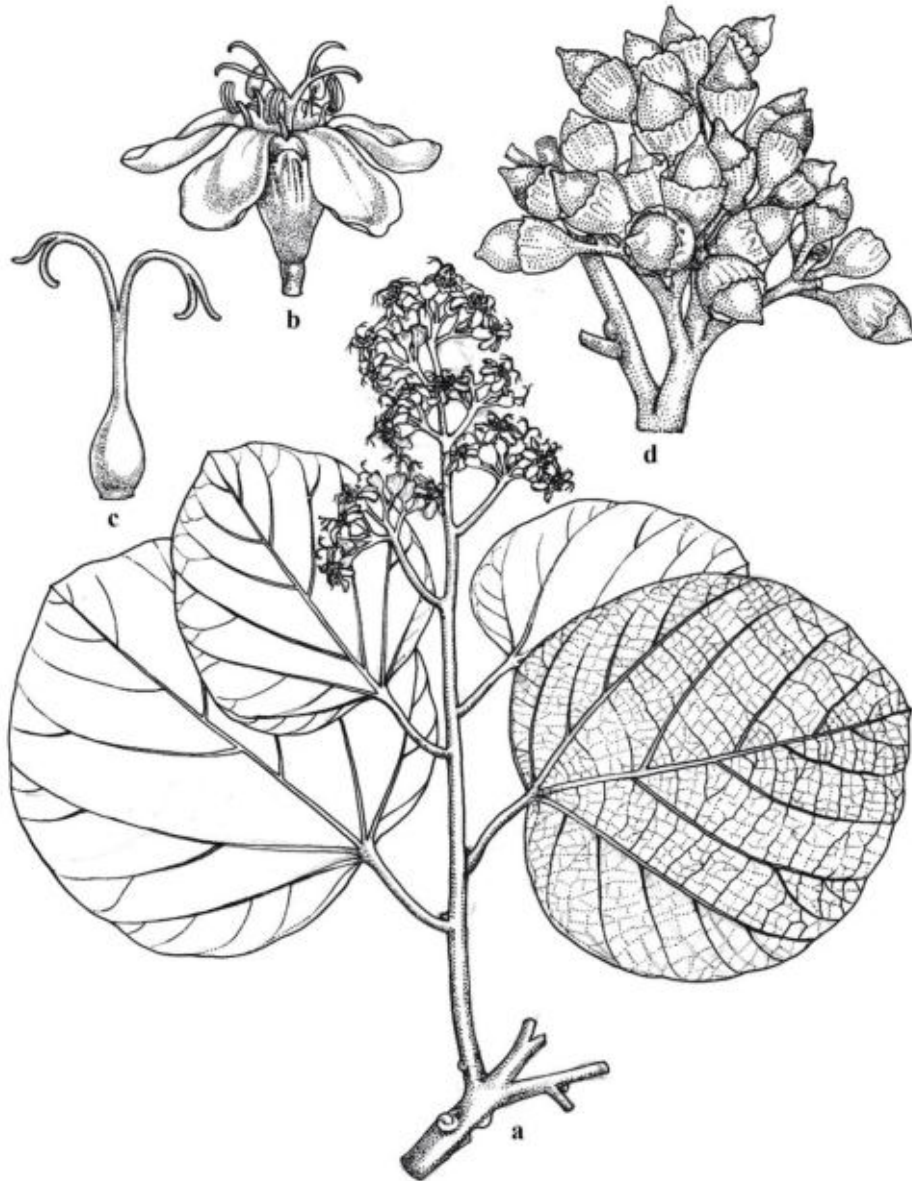


Figure 5. *Cordia macleodii* Hook.f. & Thomson, a) flowering branch; b) flower; c) pistil and d) portion of infructescence.

Trees upto 12 m. tall. Bark grey corky, young shoots and branchlets brownish-white tomentose. Leaves alternate to sub opposite, 6-18 x 5-16 cm, broadly cordate-ovate to oblong-ovate, obtuse, margin subentire, \pm undulate; petiole 2-3.5 cm long. Flowers polygamous, in axillary short terminal corymbs. Calyx funnel shaped or sub-campanulate, 8 mm long, ribbed, densely tomentose outside, 6 toothed lobes without tufts of hair at apex, accrescent in fruit. Corolla white, lobes ligulate-obtuse, 6-8 mm long. Stamens as many as and alternating with the corolla lobes, filaments exerted, base hairy. Ovary undivided, 4-locular with 1 ovule in each locule; style terminal, doubly bipartite. Drupes ca. 22 mm long, ovoid, acuminate at apex, basal portion seated at persistent cupular calyx. Seeds 1, exalbuminous. Flowering and fruiting in February-August.

Type: In the vicinity of Jubbulpore woods, in association with *Tectona*, Hb. *Griff.* (K).

Dhaka: Komolapur, Savar, *M.A. Rahim*, MAR 858 (JUH). **Central Bengal**, Brandis, 1874.

India and Pakistan.

Wood is used for making furniture and bark is used for treatment of Jaundice (*Chopra et al.*, 1956)

Cordia myxa L., Sp. Pl. 190. 1753. Wight, Icon. 2: t. 169 (1841); DC. Prodr. 9:479 (1845); Brandis, For. Fl. C. W. & C. Ind. 366 (1874) exclud. syn.; Cooke, Fl. Bomb. Pres. Reprint edit. 2, 2:265.1967; Uddin and Hassan (ed), Vascular flora of Chattogram and the Chattogram Hill Tracts 3: 450 (2018). *Cordia latifolia* Wall. ex G. Don, Gen. Hist. 4: 375 (1837). **Fig. 6.**

Deciduous trees up to 12 m. tall; young shoots and branches rusty pubescence. Leaves alternate, broadly ovate to suborbicular, elliptic-ovoid to elliptic-obovoid, 7.5-13.5 x 6-12.5 cm., 3-nerved, acute or obtuse, subentire to sinuate-crenate or dentate, glabrous to dense tomentose on under surface, base cuneate to rounded; petiole 2.5-4.5 cm. long, sparsely pubescent. Inflorescence lax, terminal panicle, dichotomously branched, peduncle 2-4 cm. long, glabrous to sparsely pubescent. Flowers unisexual, pedicilate, pedicel 1-2 mm. long. Male flower: Calyx campanulate, 4.5-5.5 X 3.5-4.5 mm., glabrous outside and pubescent at apex inside, 3-lobed. Corolla salverform, white,

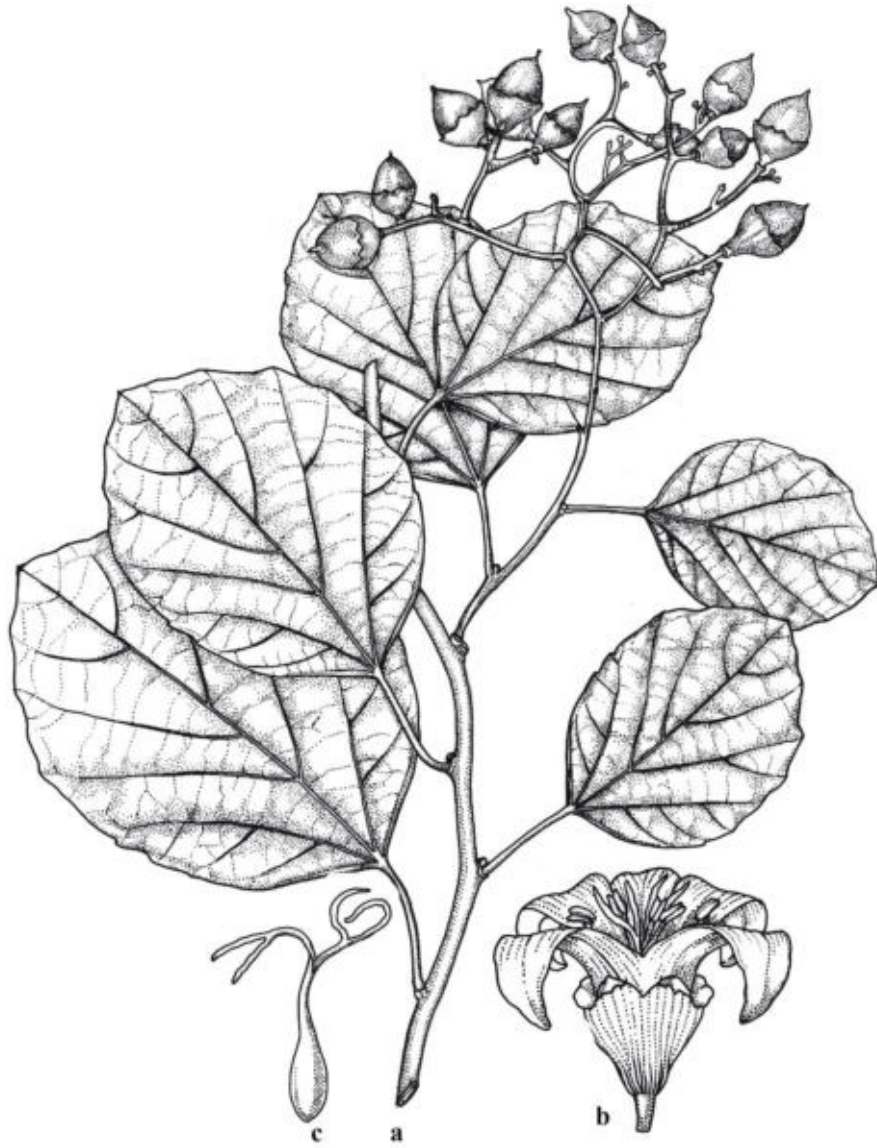


Figure 6. *Cordia myxa* L., a) fruiting branch; b) flower and c) pistil.

glabrous, tube 3.5-4.5×2.5-3 mm.; lobes 5, elliptic, each 5 ×2 mm, apex obtuse. Stamens 5; filaments exerted, anthers 1.3-1.5 X 0.75-1.5 mm. Ovary rudimentary, style absent. Female flower: Similar to male flower. Calyx tubular-campanulate, 4.5-8 × 3.5-4.5 mm., sparsely hairy outside and densely pubescent inside; teeth 3-4, unequal, acute. Corolla tube 4-6 × 2.5-3 mm., lobes 4-5, oblong elliptic, each 3-6 × 1.5-3 mm. Stamens 4-5, anthers sterile. Ovary obovoid or ellipsoid, 2.5-4 × 2-3 mm., style deeply divided, exerted, 1-2.5 mm. long, stigma flattened and subfoliaceous with denticulate margin. Fruit brownish-light salmon colour, sweet with a viscid almost transparent pulp, ovoid or globular, 12-20 × 8.5-11mm., held in the accrescent campanulate calyx. Pyrene broadly ellipsoid or ± globose, 8.5-12 × 8-9.5 mm., deeply rugose. *Flowering & fruiting*: March-June. In hill forests along streams and coastal areas.

Type: Habitat in Aegypto, Malabar, Hb. Linn. 253.1 (LINN).

Chattogram: Baraiyadhala, 28 xi 1954, Dr. Majeed, (DUSH). **Cox's Bazar:** Himchari forest office, 27 xi 1970, *M.S. Khan & A.M. Huq*, K-2290 (DACB 18124); Shilkhali, Teknaf, 24 i 2018, Niyamul *et al.*, NK-6889. **Dhaka:** Zingira, 28 iv 1968, Amalendu 101, (DUSH). **Jamalpur:** Gajni forest, Nakshi, 6 v 1982, *Mia et al.*, M-761 (DACB 25233). **Pirojpur:** Akhor, Kuryana, shipla khal, 17 x 1998, *Khan, Huq, Mahfuz & Mia*, K-7833 (DACB 18127). **Rangamati:** Rampahar, Kaptai, 16 x 2004, *Sarder Nasir Uddin*, N-2577 (DACB); Kaptai range, Sitapahar west, 26 iv 1977, *Khan, Yusuf, Alam & Nasir*, K-9921 (DACB 28188).

Pakistan, India, Sri-Lanka.

The pulpy drupe is edible. The bark, leaves and fruit are used variously as diuretic, demulcent and in stomach aches.

Cordia sebestena L., Sp. Pl. 1: 190 (1753); L.H. Bailey, Stand. Cycl. Hart. 2: 842.1929; Prain, Beng Pl. 2: 714 (1903); Ahmed *et al.* (ed.), Encycl. Fl. Fauna Bangladesh 7: 40. 2008; Basak and Alam, Annotated checklist of the Tree Flora of Bangladesh, BFRI: 14 (2015); Uddin and Hassan (ed) Uddin and Hassan (ed), Vascular flora of Chattogram and the Chattogram Hill Tracts 3: 451 (2018). **Fig. 7.**

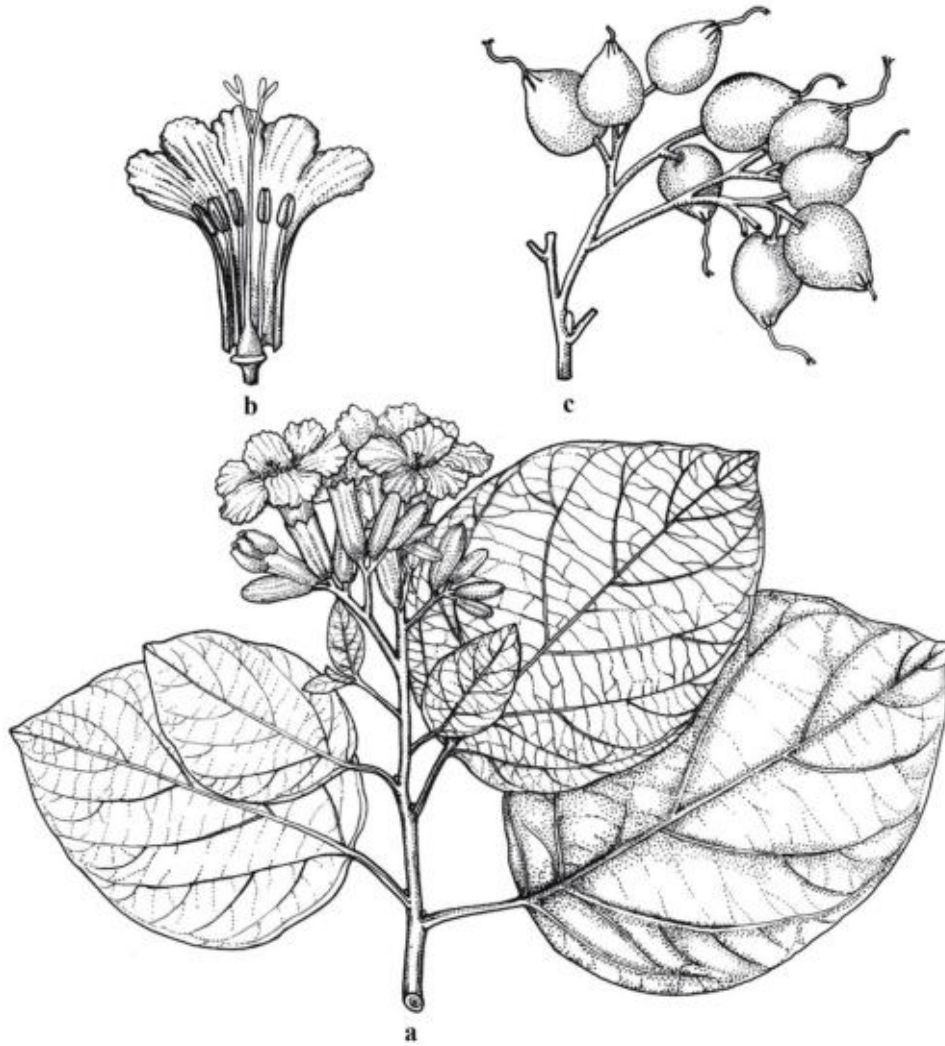


Figure 7. *Cordia sebestena* L., a) flowering branch; b) stamen and pistil and c) infructescence.

Bangla: Raktarag, Lallsora; English: Aloe-wood, Cuba sebasten, Scarlet cordia, Sebesten plum, Geiger tree.

Tree or small shrub up to 8 m. tall. Branchlets minutely pubescent on nerves, hairy. Leaves alternate; lamina mostly ovate, sometimes elliptic, 8-17×4.5-11cm.; apex obtuse to acuminate; base round to obtuse; margin entire or occasionally slightly undulate or dentate; densely hairy beneath the veins only; petiole 1-4 cm. long, hairy. Inflorescence lax, in terminal paniculate cymes, 6-8 cm. long, peduncle 2-2.5 cm. long, pubescent. Flower bisexual, pedicellate, pedicel 7-15 mm. long, 5-8 flowers per cyme. Calyx tubular, 11-16.5×5-7 mm., both side hairy; teeth 3-5, unequal. Corolla funnel-shaped, crinkly, bright reddish-orange; tube exerted, 15-30×4-5 mm.; limb 15-20×19-27 mm.; lobes 5-7, rhombic to obovoid, each 8-13×9-13 mm., margin undulate, apex retuse, both sides sparsely hairy. Stamens 5-7; filaments inserted, anthers 3-4×1.5 mm. Ovary conical, 2-5×2-2.5 mm., glabrous; style inserted, 18-25 mm. long; style branches 1-3 mm. long; stigmatic branches 1-2 mm. long; stigma clavate. Fruit whitish, ovoid, 2.3-3 ×1.5-2 cm. completely enclosed in the accrescent calyx. Pyrene ovoid, 2-2.7 × 1-1.9 cm with a peak 1-3 mm. long, deep brown. Flowering & fruiting: Almost through out the year. $2n=32$ (Briton, 1951).

Type: Described from 'America Calidiore'.

Dhaka: Baldha garden, 13 x 1954, M. S. Khan (DUSH); 12 xii 1963, A F Muhammed-56, (DUSH); 11 x 1970, M A Rahman-207, (DUSH); Balda garden, 25 xi 1996, *B.M. Rezia Khatun*, RK-1139 (DACB-31062); Arts Building, D. U. Library, 2 v 1977, *K. Ahmed* (DACB 18131); Dhaka University campus, 12 iii 2007, *B.M. Rezia Khatun*, RK-(DACB-39567); Mirpur Botanical Garden, 15 ii 1989, *B.M. Rezia Khatun & Hosneara*, RK-476 (DACB-18132); **Chattogram and Rangamati:** Locality unknown, 2018, Uddin and Hassan.

Egypt, Southeastern United States and Southern Mexico in Northern America; Caribbean and Mesoamerica in Southern America.

Cultivate as ornamental trees for its large showy flower. The fruit is edible.

Cordia serrata Roxb., Fl. Ind. (ed. Carey & Wall.) 1: 592 (1820). Ahmed *et al.* (ed.), Encycl. Fl. Fauna Bangladesh 7: 40. 2008; Basak and Alam, Annotated checklist of the Tree Flora of Bangladesh, BFRI: 15 (2015); Uddin and Hassan (ed), Vascular flora of Chattogram and the Chattogram Hill Tracts 3: 452 (2018). **Fig. 8.**

Bangla: Koratsura.

Small trees, tender parts pubescent. Leaves simple, alternate, 6-20 x 6-15 cm, ovate to cordate, entire to crenate-serrate, acuminate, glabrous, sparsely pubescent beneath, 5-7 veined, lateral veins 3-4 on either side, petioles 3-5 cm long. Inflorescence lateral, dichotomously branched corymbos, peduncles 2-3 cm long, minutely rusty-pubescent. Flowers bracteate, subsessile. Calyx tube short, sub-cylindric, 5-6 mm long; mouth 3-5 toothed, inside hairy. Corolla white to grey, tube cylindrical, 1.5-1.8 cm long, lobes 7-9, 1.4-1.5 cm long, oblong recurved. Stamens 8-9, epipetalous; filaments hairy, 2 mm long; anthers small, ovate. Ovary conical, 4 alternate ridges and furrows, 4-celled, one ovule in each cell; styles and stigmas 2-partite. Fruit drupe, 6-8 x 3-4 mm, longitudinally ribbed, crowned by style at apex. Flowering & fruiting: March-August. In evergreen forests and in village thickets.

Kurigram: Paglarhat, 25 iii 1990, *Huq, Mia, Mahbuba & Rezia*, H-9555 (DACB 18136). **Maulovi Bazar:** Lawachara, Srimangal, 11 v 2009, *Bushra et al.*, B-1529 (DACB 37811). **Narsingdi:** Robayda 1318 (JUH). **Sylhet:** Boraikanda, 10 iii 2008, *B.M. Rezia Khatun*, RK-5847 (DACB 40158); Boraikanda, 10 iii 2008, *B.M. Rezia Khatun*, RK-5847 (DACB 40159); Boraikanda, 10 iii 2008, *B.M. Rezia Khatun*, RK-5847 (DACB 40192). **Rangamati:** Locality unknown, 2018, Uddin and Hassan. s.n.

India

The plant is used for fuel wood.

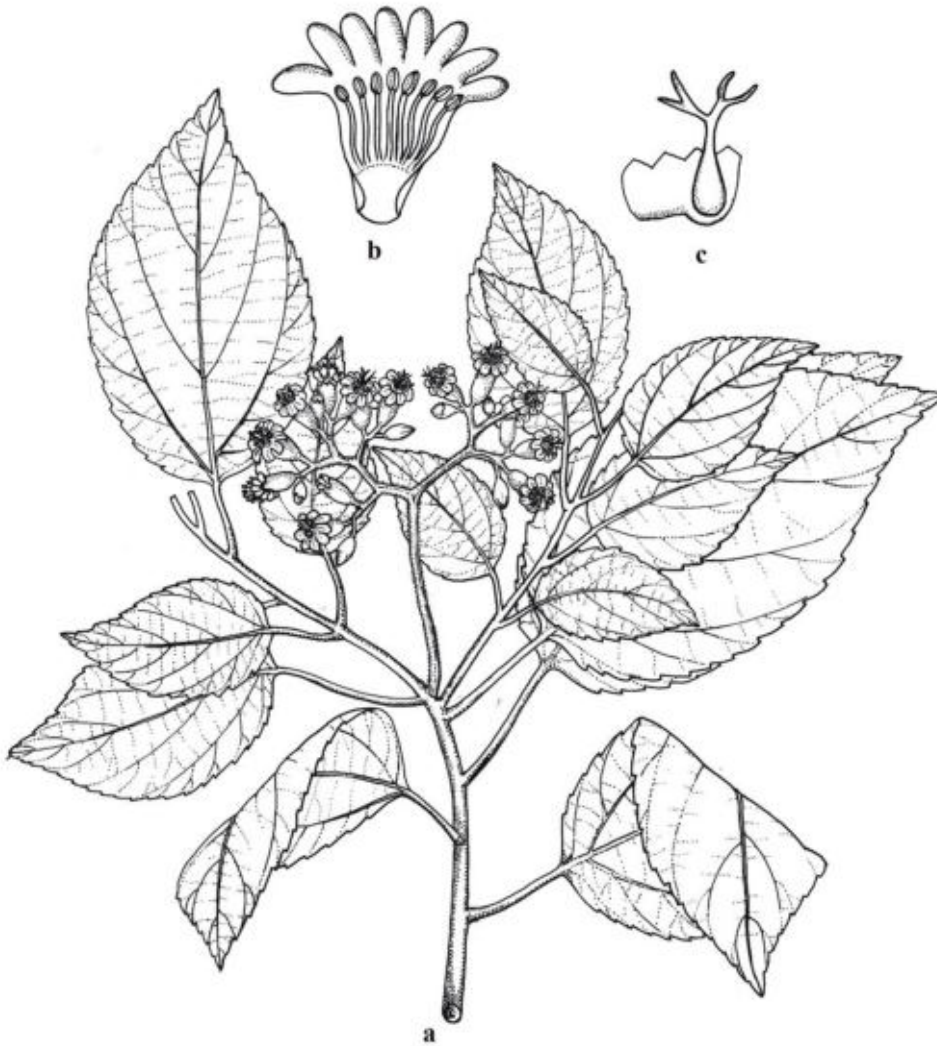


Figure 8. *Cordia serrata* Roxb., a) flowering branch; b) stamens and portion of petal and (c) pistil.

Cordia subcordata Lam., Tabl. Encycl. 1: 421 (1792). Rahman *et al.*, in Bull. of Bangladesh National Herb. 6:91 (2018). *Cordia campanulata* Roxb., Hort. Bengal. 17 (1814). *Cordia rumphii* Blume, Bijdr. Fl. Ned. Ind. 843 (1826). *Cordia banalo* Blanco, Fl. Filip. 124 (1837). **Fig. 9.**

An evergreen small to medium sized tree typically reaches 3–10 m. in height. Bark is pale gray furrowed or flaky. Trunk usually less than 40 cm in diameter may be larger in very old trees; branchlets glabrous. Petiole 3–6 cm long; Leaves alternate ; blade ovate to narrowly ovate, 8–20×5–13 cm, abaxially densely cottony in vein axils, adaxially ± spotted, base obtuse to rounded, rarely cordate, margin entire to subundulate, apex acuminate to acute. Inflorescence cymes or panicles, opposite to leaves, ca. 12 cm long and wide at anthesis. Pedicel 3–6 mm long. Calyx 12–15 mm. long and 4–5 mm. in diam. at the mouth, cylindric or slightly conical, coriaceous, usually with 3–5 rounded teeth up to 4 mm. long, glabrous or very sparsely strigose outside and inside but densely strigose inside on the teeth. Corolla 30–45 mm. long, infundibuliform, orange, glabrous or nearly so; limb nearly as broad as the length of the corolla; lobes 5–7, broad, rounded, sometimes with crenate margin, spreading. Stamens inserted at c. 20 mm. from the base of the corolla tube; filaments in the short-styled flowers c. 8 mm. long, in the long-styled flowers 3–5 mm. long, glabrous; anthers 2.5–3.5 mm. long. Ovary c. 3 mm. long, conical, glabrous; style 2–2.5 cm. long (short) or ± 3 cm. long (long); primary branches 2–7 mm. long, the 4 stigmatic lobes 0.5–2 mm. long, flattened. Fruit yellow to red, becoming blackish, ovoid, obovoid or subglobose, 1.5–4 cm. long, 2–3 cm. wide, sometimes ± beaked, the enveloping calyx becoming hard; endocarp very hard, angular and furrowed, 4-locular but only 2 seeds developing. In Sandy open wood land and fairly common in secondary forest and thickets along the sea shores.

Type: Papua New Guinea: Port Praslin, Commerson P., s.n. (Muséum National d'Histoire Naturelle P00633463, Image!)

Moulvibazar: Madhabkundu eco-park, Borolekha, 20 v 2014, S.N. Uddin N5254 (DACB).

China, India, Indonesia, Thailand, Vietnam; Africa (E coast), Pacific Islands

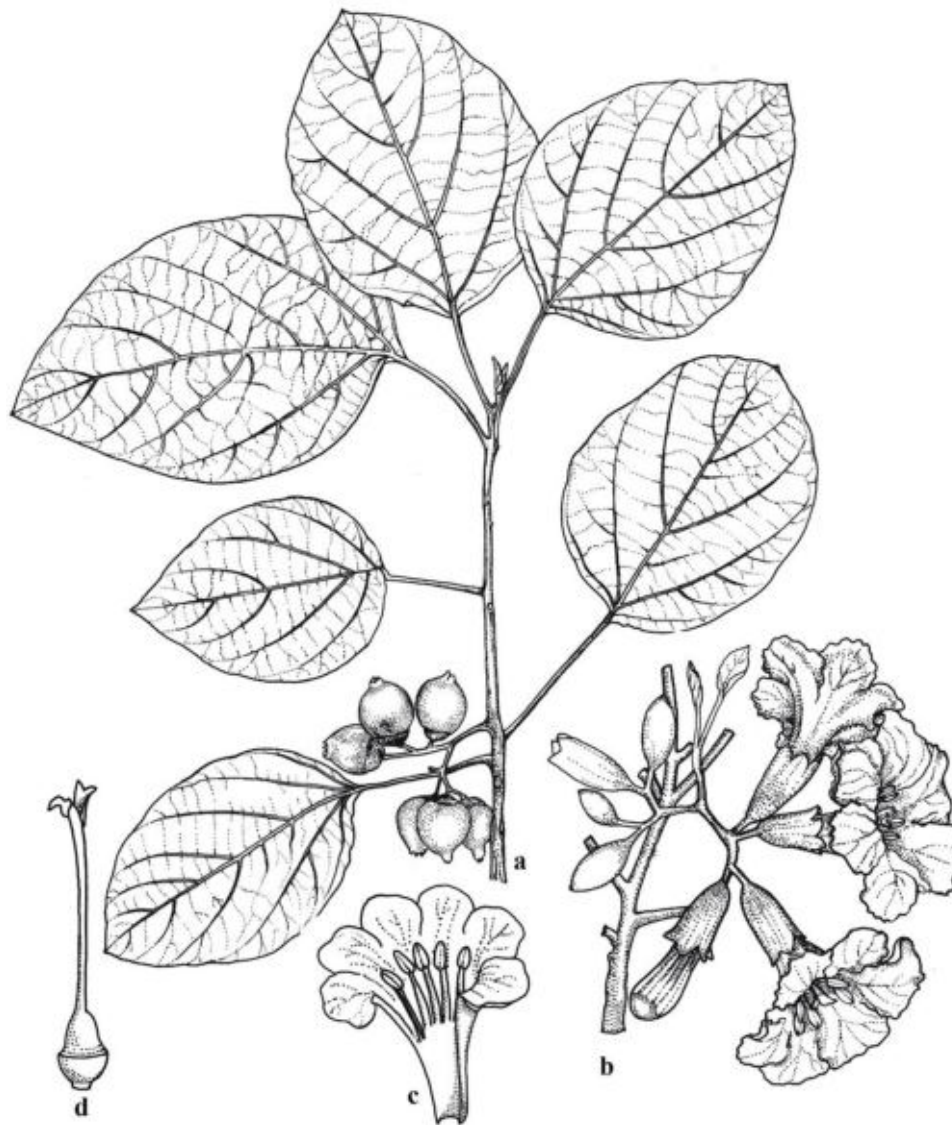


Figure 9. *Cordia subcordata* Lam., a) fruiting branch; b) flowering branch; c) stamen and portion of petal and d) pistil.

Cynoglossum L.

Sp. Pl. 1: 134 (1753)

Perennial or annual herbs. Leaves usually basal and stem. Cymes terminal or axillary, crowded or often dichotomously branched spreading panicles. Flowers pedicellate. Calyx 5-parted to base, enlarged in fruits; lobes reflexed or spreading. Corolla usually blue, rarely white, dark purplish red, campanulate, tubular or funnellform, 5-parted; tube shorter than calyx; lobes ovate to orbicular. Stamens included, inserted at middle or above in corolla tube; anthers ovoid or oblong. Style filiform, terete or tetraginous; stigma capitate; ovary 4-parted; ovule anatropous. Nutlets 4, ovoid to subglobose, with glochids, attachment scar subapical.

About 75 species: cosmopolitan, primarily in Africa, Asia, and Europe, 03 species in Bangladesh

KEY TO THE SPECIES

- | | | |
|-------|---|-----------------------|
| 1 | Nutlets c. 1.5-2.2 mm long, fruiting pedicel length \leq 1mm. | C. lanceolatum |
| + | Nutlets 2.5-3(-3.5) mm long, fruiting pedicel length >1mm | (2) |
| 2 (1) | Fruiting pedicel c. 3 mm long; corolla white or pale blue, glabrous; nutlets ovate, c. 3 mm long. | C. hellwigii |
| + | Fruiting pedicel c. 5 mm long; corolla blue or blue purple, hairy at least at the margin; nutlets ovoid, c. 4 mm long | C. wallichii |

Cynoglossum hellwigii Brand, Repert. Spec. Nov. Regni Veg.13:546 (1915).

Herbs, annual or biennial. Stem 8-100 cm long, profusely branched, hirsute with dense hairs on both side. Leaves alternate, blade 12-15×3.5-5 cm, gradually decreasing in length upwards; long elliptical oblong, oblong, elliptical, oblong-lanceolate or lanceolate; petiole 4-7 cm long in lower leaves, sessile with narrow base in upper leaves, obtuse to subacute, with numerous, very distinct nerves on both sides, strigose with antrorse longer and shorter hairs, spreading hairs denser along the nerves on lower side. Inflorescence much branched, cymes divaricate, ebracteate; pedicels less than 1 mm in

flower, 1-3 mm in fruit, densely hairy. Calyx 1.5-2 mm long in flower, lobes 2.5 mm long, 0.8-1 mm wide in fruit, obtuse, hairs subappressed, antrorse. Corolla white or pale blue, campanulate to funnel-shaped, glabrous, 2.5-3 mm long, 3.5-4 mm in diam., tube slightly shorter or equal to calyx, lobes oblong, 1.5-1.8 mm long, 1—1.2 mm wide. Stamens included, filaments very short, anthers ovate. Style 1.5 mm long, stigma small, bilobed. Nutlets ovate in outline, convex dorsally, 2-3 mm long, 1.5-2 mm wide, glochids equally distributed or slightly looser dorsally. In grass land, river bank and open places.

Type: Hellwig 362 (B, destroyed), New Guinea, Finisterre Mts.

Bandarban: Shabilchori, Lama, 17 vi 1983, *Mia, Rahman, & Mahfuz*, M-2640 (DACB-18229); 17 vi 1983, *Huq, Rahman & Mia*, H-5883 (DACB 18239); Betunia, 8 viii 1989 *Huq, Rahman, Mahbuba & Mahfuz*, H. 9295 (DACB18223). **Dhaka:** Manikganj, 9 vi 1981, *Huq & Mia*, H. 5207; (DACB 18237) Aricha, 11 vi 1973, *M.S. Khan & A.M. Huq*, K-3072 (DACB 18241). **Lalmonirhat:** Harianga, 7 v 1988, *Mia, Mahbuba, Rezia, Mahfuz & Bushra*, M. 1872 (DACB 28230). **Nawabganj:** Sonamasjid, 03 ix 2002, *Rezia, Momtaz, Bushra & Harun*, RK-3783 (DACB 29951), Dinajpur: Sahajpur, Khansama, 24 viii 1998 *Mia et al.*, M-4224 (DACB 28328). **Nilfamari:** Nilfamari-Saidpur road, 3 xii 1985, *Khan, Huq & Mia*, K-7510 (DACB 18233). **Panchagar:** Amarkhan, 25 v 1998, *Sk. Harun, Zashim & Nasir*, SHR-244 (DACB 28326); Kasmat, Artoary, 30 vi 1998 *Mia et al.*, M-3926 (DACB 28325). **Rangpur:** Burirhat, 11 i 1974, *M. S. Khan & A.M. Huq*, K-3744 (DACB 18249). **Thakurgaon:** Moheshpur, Ranisankhail, 5 viii 1998, *Khan, Harun, Zashim & Nasir*, K-10004. (DACB 28327).

New Guinea, Indonesia.

Cynoglossum lanceolatum Forssk., *Fl. Aegypt.-Arab.* 41 (1775); *Ahmed et al.* (ed.), *Encycl. Fl. Fauna Bangladesh* 7: 41 (2008); Uddin and Hassan (ed), *Vascular flora of Chattogram and the Chattogram Hill Tracts* 3: 453 (2018). *Cynoglossum canescens* Willd., *Enum. Pl.* 180 (1809). *Cynoglossum hirsutum* Thunb., *Prodr. Pl. Cap.* 34. (1794); *Cynoglossum micranthum* Poir., *Encycl. Suppl.* 2: 431 (1811). *Cynoglossum racemosum* Roxb., *Fl. Ind.* 2: 6. (1824). **Fig. 10.**

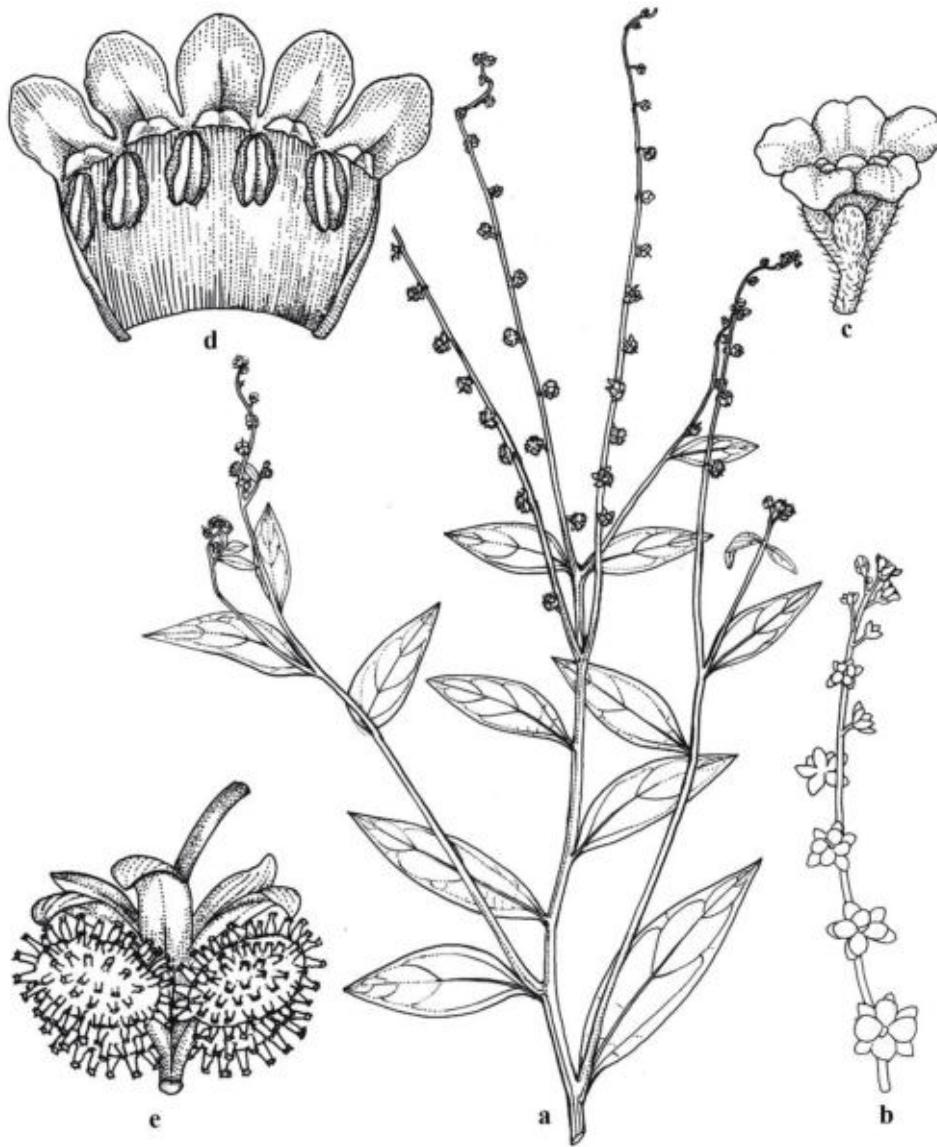


Figure 10. *Cynoglossum lanceolatum* Forssk., a) habit; b) inflorescence; c) flower; d) portion of petal with stamen and e) fruit.

Biennial or perennial herb up to 120 cm tall. Stem erect, much branched from the middle, with longer, patent and shorter, antrorse hairs. Leaves alternate, lanceolate or oblong-lanceolate, petiole 1.5-3 cm long in lower, 0-1 cm in upper leaves, blade up to 10-11 × 3-3.5 cm in lower, 5-9 × 1.3-1.8 cm in middle, 1.5-6×0.3-1 cm in upper leaves, tapering towards base, acute, nerves very distinctly impressed on upper, prominent on lower side, upper side strigose, hairs on lower side subpatent, a few longer, numerous shorter, denser along nerves. Inflorescences terminal on main stem and branches, furcate, cymes divaricate, scorpioid in flower, 3-10 cm long in fruit, ebracteate. Pedicels very short in flower, up to 3 mm and reflexed in fruit. Calyx 1-1.5 mm in flower, slightly enlarged in fruit, lobes ovate, 0.5-0.8 mm wide, and densely short appressed pubescent outside, and glabrous inside, apex acute or obtuse. Corolla white or dilute bluish, funnel-shaped, 2-3(-4) mm long, c. 3-4 mm in diam., glabrous, lobes ovate-suborbicular, 1(—1.5) mm long; fornices transverse linear, much wider than long. Filaments and anthers very short, anthers broadly ovate, ca. 0.5 mm long, much smaller than fornices, not reaching their base. Style tetragonous, ca. 1 mm, stigma indistinct. Nutlets ovate in outline, with nearly flat disc, 1.5-2.2 mm long, and glochids equally distributed or less dense on disc, bases joined along margin. Flowering and fruiting in August-November. 2n=24 (Kumar and Subramaniam, 1986). Rarely found in hills, meadows, roadsides.

Type: Forsskal (C), Yemen, Hadie.

Bandarban: Sakdu Forest Range, Bolipara, 7 xii 2016, Hossen et al., IH-2365; Khaikkhang Jhiri Forest Range, Ruma, 10 v 2017, Hossen *et al.*, IH-5469; Matamuhuri forest range, 27 ii 2017, Imam et al., IH-4509; Khaikkhang jhiri forest range, Ruma, 09 v 2017, Imam et al., IH-5428; Thana para. Ruma, 10 v 2018, *Khandakar Kamrul Islam*, KKI-2797 (DACB 47328); Rijnukchara, Ruma, 12 v 2018, K. K. Islam, KKI 2952 (DACB). **Jamalpur:** Polashbari, Gaibanda, 6 v 1988, *Mia, Mahbuba, Rezia, Mahfuz & Bushra*, M. 1786 (DACB 18245). **Lalmonirhat:** Harianga, 7 v 1988, *Mia, Mahbuba, Rezia, Mahfuz & Bushra*, M. 1853 (DACB 24348). **Rangpur:** kurigram, Hingon village, 5 v 1988, *Mia, Mahbuba, Rezia, Mahfuz & Bushra*, M. 1753 (DACB 18243).

Widespread in NE, Eastern and southern Africa, Arabia, Afghanistan, Pakistan, Himalayas, India, China, Japan, Taiwan, Indochina, Burma, Thailand; Malaysia,

Mynanmar, Malesia (Sumatra, Borneo, Java, Philippines, Celebes), Nepal, Sri Lanka, SW and W Asia.

The plant has medicinal properties.

Cynoglossum wallichii G. Don, Gen. Hist. 4: 354. (1837) var. **glochidiatum** (Wall. ex Benth.) Kazmi, J. Arnold Arbor. 52: 347. 1971; Uddin, S.N, Bull. of Bangladesh National Herb. 6:13 (2018). *Cynoglossum glochidiatum* Wall. ex Benth., Ill. Bot. Himal. Mts. 306 (1836). **Fig. 11.**

Annual or biennial herbs, upto 70 cm tall. Stems single or several and cespitose, branched above, densely hispid, hairs discoid at base; branches slender, spreading. Basal and lower stem leaves petiolate, green to gray-green, lanceolate to obovate, 20–50×5–12 mm; middle and upper stem leaves sessile, green to gray-green, smaller, sparsely hispid and appressed pubescent. Inflorescences terminal and axillary, forked, to 20 cm in fruit, becoming racemelike, many flowered at anthesis, ebracteate. Pedicel ca. 5 mm in fruit, recurved. Calyx 2–2.5 mm, densely and antrorsely appressed pilose; lobes erect, ovate to oblong, ca. 2 × 0.5 mm, slightly enlarged in fruit, margin ciliate. Corolla blue or blue-purple, campanulate, base 3–4 mm wide; throat appendages trapeziform, ca. 0.7 mm, margin pubescent; limb 2.5–4.5 mm wide; lobes orbicular; veins distinctly reticulate. Anthers oblong, 0.8–1 mm. Nutlets ovoid, 3–4 × 2.5–3 mm; abaxially concave, with glochids, base of marginal glochids expanded and confluent forming a wing, apex of nutlets rounded to acute. Flowering and fruiting: July to December. On shady and wet rocks; between 200-500 m altitudes.

Bandarban: Khanshama Bazar, Rowangchari, 05 ix 2016, I Hossen *et al.*, IH 345 (DACB), Betchata Forest range, Rowangchari, 27 ix 2016, Imam *et al.*, IH 443 (DACB); Khaiyachalang Forest range, Rowangchari, 21 xi 2016, Imam *et al.*, IH 1855 (DACB); Tankaboti Forest Range, Bandarban Sadar, 26 xii 2016, Imam *et al.*, IH 2680 (DACB); Thanapara, Ruma, 10 v 2018, K. K. Islam, KKI 2797 (DACB).

Combodia, China, Thailand, Vietnam, Peninsular, Malaysia and Indonesia.

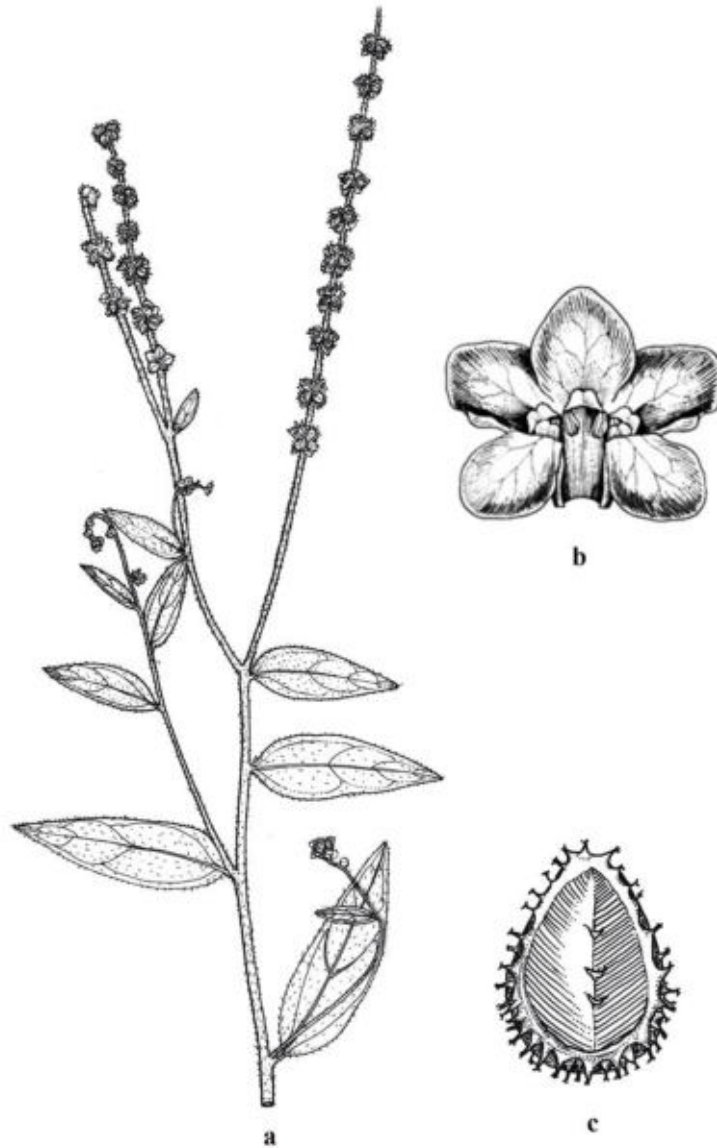


Figure 11. *Cynoglossum wallichii* G. Don, Gen. Hist. 4: 354. (1837) var. **glochidiatum** (Wall. ex Benth.) Kazmi, a) habit; b) stamen with portion of petal and c) fruit.

Ehretia P. Br.,

Civ. Nat. Hist. Jamaica 168, pl. 16, f. 1 (1756)

Trees or shrubs. Leaves simple, alternate. Flowers white, small, pentamerous, bracteate, in terminal or axillary paniced cymes, rarely solitary. Calyx cylindrical, tubular, 5-segmented, small. Corolla shortly cylindrical, tubular, 5-segmented, spreading. Stamens 5, filaments filiform, inserted in corolla tube, anthers exserted. Ovary 2 or incompletely 4-celled, style terminal, bifid, stigma small, capitate. Fruit a small drupe, sub-globose. Seeds straight, testa thin.

About 50 species: mostly in Africa and South Asia, three in North America and the Caribbean; 03 species in Bangladesh including 1 species new addition to the Flora of Bangladesh.

KEY TO THE SPECIES

- | | | |
|-------|---|---------------------|
| 1 | Leaves serratulate | E. acuminata |
| + | Leaves entire | (2) |
| 2 (1) | Inflorescences scorpioid; corolla tube shorter than corolla lobes | E. levis |
| + | Inflorescences cymose; corolla tube as long as corolla lobes | E. silvana |

Ehretia acuminata R.Br., Prodr. Fl. Nov. Hall.: 497 (1810). Prain, Beng Pl. 2: 717 (1903); Uddin and Hassan (ed), Vascular flora of Chattogram and the Chattogram Hill Tracts 3: 454 (2018). *Ehretia serrata* Roxb., Fl. Ind. (ed. Carey & Wall.) 2: 340 (1824). Ahmed *etal.* (ed.), Encycl. Fl. Fauna Bangladesh 7: 42. 2008; Basak and Alam, Annotated checklist of the Tree Flora of Bangladesh, BFRI: 15 (2015). **Fig. 12.**

Bangla: Kala-aja, Kala-huja, Kaal-auja, Kat-goa; English: Heliotrope Tree.

Trees, deciduous, 8-10 (-15) m tall. Bark grey-brown, lacinate, branchlets terete, greyish, with elliptic lenticels, glabrous. Leaves simple, alternate; lamina subcoriaceous, elliptic to obovate or narrowly obovate, 7–15 by 4–8 cm; apex acute or acuminate; base acute or oblique; margin serrate to irregularly dentate; upper surface dark green, strigose;



Figure 12. *Ehretia acuminata* R. Br., a) flowering branch; b) flower; c) pistil and d) fruit.

lower surface light green, strigose; midrib, lateral veins and nervations impressed on upper surface, conspicuous on lower surface; lateral veins in 4–6 pairs; petiole 1.8–2.7 (–3) cm long, strigose-glabrous. Inflorescences 7–10 (–15) cm long, terminal, paniculate, with 30–60 flowers, pubescent. Peduncle 1–2 cm long, pubescent. Flowers subsessile, fragrant. Calyx campanulate, 3.2–3.6 mm long; tube *ca.* 0.5 mm long; lobes ovate or suborbicular, 2–2.5 by 2–3 mm, pubescent outside, glabrous inside, persistent at fruiting. Corolla white, 2–4 mm long, short tubular with spreading lobes; tube 1.5–2 mm long; lobes oblong 2–2.5 × 0.8–1 mm. Stamens 5, separate, 4.5–5.5 mm long; filaments 3.5–4.5 mm long, glabrous, inserted near base of corolla tube, exerted; anther ovate, 1–1.3 mm long. Ovary ovoid, *ca.* 1 mm long; style 3–4 mm long, bifid, branches *ca.* 0.5 mm long, glabrous. Fruits subglobose, 3–4 mm long, black, yellow or orange at maturity; endocarp wrinkled, divided at maturity into 2 2-seeded pyrenes. Flowering and fruiting: February–July. $2n = 32$ (Humbel, 1990). In Hill forests, outskirts of city and village thickets.

Type: Australia, Port Jackson, *R. Brown* 2916 (holotype K, isotype K).

Chattogram: BFRI campus, 24 iii 2008, *Bushra, Habib & mafiz*, B-895 (DACB 32800). **Cox's Bazar:** R.S. Forest Range, Hazarikhil, 14 iii 1964, M S Khan-832, (DUSH); Fasiakhali, Chakaria, 10 iv 2017, Nazim Uddin, NU-117. **Dhaka:** Nayarhat, savar, 16 iii 1990, *M.K. Mia*, M-2576 (DACB 23986); 5 iv 1991, *M.K. Mia*, M-2725 (DACB 23990). **Faridpur:** Govt. Rajendra College Campus, 17 v 2014, *Sarder Nasir Uddin*, N-5144 (DACB 39721). **Khulna:** Jatrapur, 16 vi 1982, *A. M. Huq*, H-5576 (DACB 24398). **Kishorganj:** Jangle bari, Karamganj, *Mia, & Mahfuz*, M-1635 (DACB 24267). **Kurigram:** Krishnopur, 5 v 1988, *Mia, Mahbuba, Mahfuz, Bushra & Rezia*, M-1778 (DACB 24347); Paglarhat, 25 iii 1990, *Huq, Mia, Rezia & Mahbuba*, H-8681 (DACB 18188). **Maulovi Bazar:** Lawachara National Park, Kamalgonj, 10 x 2010, *Sarder Nasir Uddin*, N-4496. **Mymensingh:** Golgonda, sadar, 27 vi 1998, *M. Sultana*, M. S. Sultana-2, (DACB 27936); Muktagacha to Rajbari area, 7 iv 1976, *A. M. Huq & M. K. Mia*, H-2300 (DACB 18143); Raghurampur, 27 iii 1982, *A. M. Huq*, H-5522 (DACB 24410). **Narsingdi:** Robayda 2435 (JUH). **Panchagarh:** Tetulia, 11 iv 1986, *A.M. Huq*, H-7575 (DACB 15812). **Rangamati:** 2018, Uddin and Hasan. **Sylhet:** Chatak, 27 v 1935, *G. K. Deka* 12830 (ASSAM); Near satchari forest, 19 iv 1985, *A. M. Huq & M. K. Mia*, H-

7005 (DACB 18145); Boraikanda, 10 iii 2008, *B.M. Rezia Khatun*, RK-5841 (DACB 40201); Boraikanda, 10 iii 2008, *B.M. Rezia Khatun*, RK-5841 (DACB 40160).

India, China, Thailand, Vietnam, Malesia, Australia.

The timber is used for making furniture, agricultural implements and building construction. The leaves and branchlets are used as medicin. Fruits are edible and also used for making pickles.

Ehretia laevis Roxb., Pl. Corom. 1: 42, t. 56 (1795); Kurz, Forest Fl. Burma 2: 210. (1877).; C.B. Clarke in Hook.f., Fl. Brit. Ind. 4: 141. (1883).; Prain, Beng Pl. 2: 718. (1903).; Basak and Alam, Annotated checklist of the Tree Flora of Bangladesh, BFRI: 15 (2015). *Ehretia aspera* Willd., Phytographia 1: 4 t. 2 fl (1794). *Ehretia floribunda* Benth., Ill. Bot. Himal. Mts. 1: 306 (1839). *Ehretia laevis* var. *platyphylla* Merr., Lingnan Sci. J. 14(1): 55 (1935). **Fig. 13.**

Shrub or tree, 5-10 m tall. Branches greyish, the youngest ones dark reddish brown, glabrous. Leaves simple, alternate; lamina oblong to suborbicular or oblong-lanceolate, 3-9 (-18)×3—5(—11) cm, margin entire, base broadly rounded to truncate, apex acuminate, rounded or emarginate, nerves 4 or 5 on each side, upper side glabrous, lower side with hairs in the axils of lowest primary nerves; petiole c. 1-2.5 cm long, tomentose. Inflorescences 6-13 cm long, axillary, corymbose, with very short hairs, with 9-13 flowers; branches somewhat scorpioid, pubescent. Peduncle 1–10 cm long, pubescent. Flowers subsessile or pedicels up to 1 mm long. Calyx cupshaped, (1.2—) 1.5—1.8 mm long, 3 mm wide, 5-partite, glabrescent; lobes lanceolate, c. 1 mm long, ovate, acute. Corolla white, 2-2.3 mm long, up to 5 mm in diam., tube cylindrical, surpassing calyx for c. 0.5 mm, lobes explanate to recurved, c. 2 mm long, longer than wide, rounded with often revolute margins. Stamens 5 (–6), free, 2.5–4 mm long; filaments 1.8–2.3 mm long, glabrous, inserted near base of corolla tube, exserted; anther oblong, versatile or basifixed, 0.5–0.8 mm long. Ovary 4-locular, each locule with 1 ovule, ovoid, 0.5–1 mm long; style 2.5 mm long, divaricately forked to at least middle, branches ca. 0.3 mm long, glabrous; stigmas 2, capitate. Fruit globose, 4-5× 3-4 mm,



Figure 13. *Ehretia laevis* Roxb., a) flowering branch; b) flower; c) portion of petal with stamen and pistil and d) infructescence.

yellow or orange at maturity; endocarp wrinkled, divided at maturity into 4 1-seeded pyrenes. Flowering: February-April. $2n = 26$ (Fedorov, 1969). On Forest slopes and roadsides.

Type: 'Circar Mountains', without citation of collectors name (?CAL).

Chattogram: Locality unknown, 2015, Basak and Alam, s.n.

Australia, China, Bhutan, India, Kashmir, Laos, Myanmar, Pakistan, Thailand and Vietnam.

Ehretia silvana R.R.Mill, Edinburgh J. Bot. 53: 266. (1996).; *Cordia acuminata* Wall. in Roxb., Fl. Ind. 2: 339. (1824) [non *Ehretia acuminata* R.Br., Prodr. 1: 497. (1810). Rueangsawang in Thai Forest Bull., Bot. 47(1): 34–37 (2019). **Fig. 14.**

Tree, 3–7 m tall; bark thin, rough, grey-brown, with elliptic lenticels, glabrous; branchlets terete, glabrous to sparsely puberulous with glandular trichomes when young. Leaves chartaceous, elliptic to broadly ovate, 12–18 × 7–12 cm, apex cuspidate or acuminate, base oblique or rounded, margin entire; upper surface dark green, glabrous, lustrous; lower surface light green, usually puberulous, with scattered in the axils of lateral veins or glandular trichomes when young; lateral veins and venations impressed on upper surface, conspicuous on lower surface; lateral veins 5–6 pairs; petiole 2–3 cm long, grooved above, usually puberulous. Inflorescences terminal and subterminal, 5–9 cm long, cymose with 10–30 flowers, puberulous with glandular trichomes. Peduncles 2.5–4 cm long, puberulous. Flowers sessile or with pedicels up to 1 mm long, pubescent. Calyx green, campanulate, 3–4 mm long, 5-lobed, tube ca. 0.5 mm long; lobes narrowly ovate or triangular, 1.5–1.8 × 0.5–1 mm, strigose with glandulartrichomes outside, glabrous inside, persistent in fruiting. Corolla white, 8–9 mm long, tubular with spreading lobes, 5-lobed; tube 5–7 mm long; lobes oblong 2–3 × 4–6 mm. Stamens 5, separate, 5–7.5 mm long; filaments 2–3 mm long, glabrous, inserted near base of corolla lobe, exserted; anther oblong, basifixed and sagittate, 3–3.5 mm long. Ovary 4-locular, each locule with 1 ovule, ovoid; style 6–8 mm long, bifid, branches ca. 1 mm long, sparsely pubescent or glabrous; stigmas 2, capitate. Fruits drupaceous, subglobose, 3–4 mm long, yellow or orange at maturity, separating into

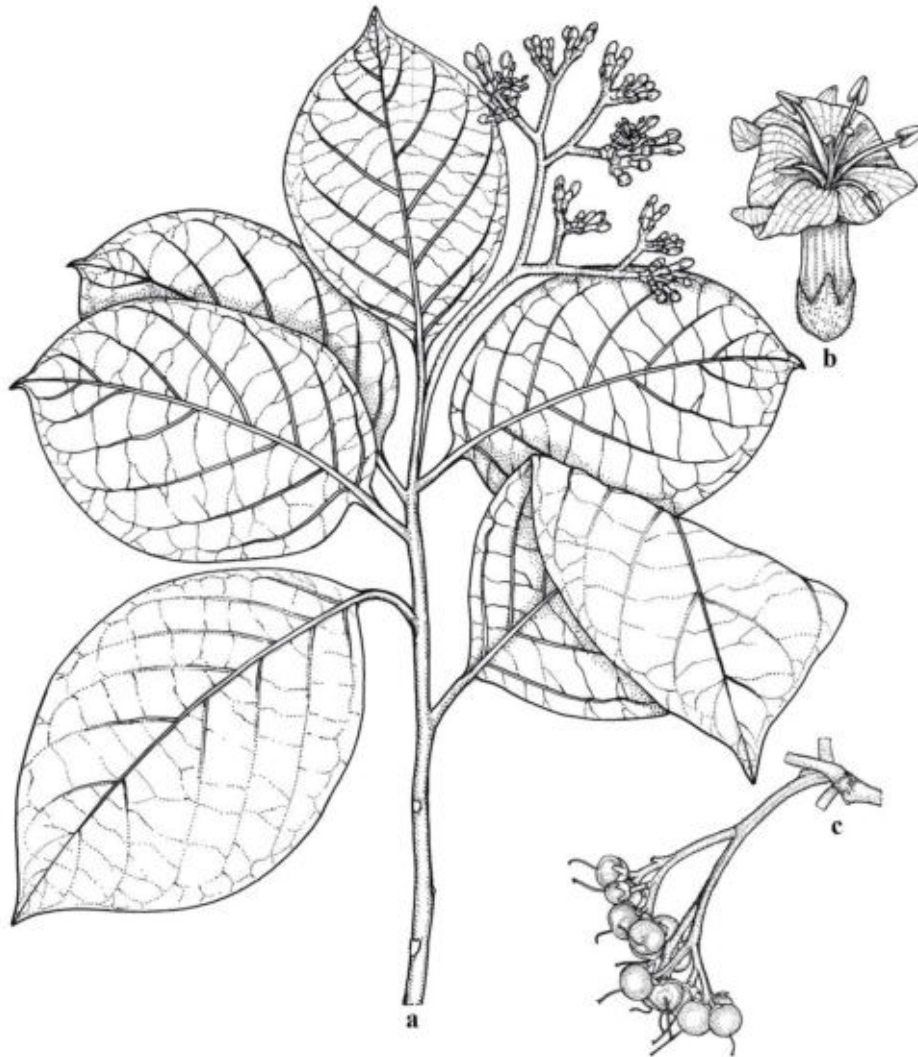


Figure 14. *Ehretia silvana* R.R.Mill, a) flowering branch; b) flower and c) infructescence.

4 pyrenes, 2.8–3 mm long, ridged on the sculpture.

Type: Bangladesh (Silhet), Wallich Numer. List 896 (lectotype K).

Sylhet: Hooker, J.D., 1867, s.n. (K, K000998072, image!)

India (Assam) and Thailand.

(The identity of *Cordia acuminata* Wall, is discussed and the name is lectotypified. Its type is treated as *Ehretia silvana* R.R. Mill *nom. nov.*, The species has been included here as a new angiosperm record for Bangladesh).

Heliotropium L.

Sp. Pl. 1: 130 (1753)

Annual or perennial herbs, rarely undershrubs, villous or scabrous. Leaves simple, alternate, petiolate or sessile, exstipulate. Flowers bisexual, small, often unilateral along the branches of forked terminal scorpioid cymes. Bracts small or absent. Calyx cylindrical, tubular, sepals 5, unequal, linear or lanceolate, imbricate. Corolla tubular, salver-shaped, white, yellow or purple, petals 5, spreading, imbricate or induplicate. Stamens 5, inserted on corolla tube, included. Ovary superior, perfect or imperfectly 4-celled with 1 pendulous ovule in each cell, style ending in a depressed-conical or flat disc. Fruits 2-4 lobed, or 4, more or less nutlet-like dry drupe, indehiscent. Seeds straight or curved.

About 250 species in tropical and temperate regions; four species in Bangladesh.

KEY TO THE SPECIES

- | | | |
|-------|--|------------------------|
| 1 | Stigma an umbrella-shaped disc on a short style; Plant more or less succulent | H. curassavicum |
| + | Stigma conical or a ring-like structure surpassed by a tubular apical part. Plants not succulent | (2) |
| 2 (1) | Leaves broad, ovate to oblong; fruit remaining undivided | H. indicum |
| + | Leaves narrowly linear to lanceolate or elliptic to obovate; fruit separating into 4 nutlets | (3) |

- 3 (2) Inflorescence without bracts; leaves elliptic to obovate, with silky hairs **H. ovalifolium**
- + Inflorescence with bracts; leaves narrowly oblong-lanceolate, without silky hairs **H. strigosum**

Heliotropium curassavicum L., Sp. Pl. 1: 130. (1753).; C.B.Rob., Philipp. J. Sc., Bot. 4 (1909) 695; Backer & Bakh. f., Fl. Java 2: 461(1965); Ahmed *etal.* (ed.), Encycl. Fl. Fauna Bangladesh 7: 44. 2008; Uddin and Hassan (ed), Vascular flora of Chattogram and the Chattogram Hill Tracts 3: 453 (2018). *Heliotropium glaucum* Salisb., Prodr. 113 (1796). *Heliotropium glaucophyllum* Moench, Meth. Suppl. 147 (1802). *Heliotropium curassavicum* var. *vixens* (E. Mey. ex DC.) DC., Prodr. 9:538. (1845). *Heliotropium curassavicum* var. *obovatum* (E. Mey. ex DC.) DC., Prodr. 9:538 (1845). **Fig. 15.**

English: Salt Helitrope.

Annual, prostrate to ascending, more or less succulent herb. Stems much branched, up to 70 cm long, glabrous. Leaves nearly opposite and alternate, shortly stalked to sessile, oblong, spatulate, lanceolate to linear, glaucous, 1-5×0.3-1 cm, glabrous, nerves faint. Inflorescence terminal and lateral, simple or branched, scorpioid, 3–10 cm long, dense, ebracteate, usually forked once. Calyx 1-2 mm long, persistent; lobes 5, ovate-lanceolate, acute, glabrous. corolla 1.0–2.5 mm, long, limb about 2 mm in diameter, white, usually mauve internally, lobes 0.5–1.0 mm long, obtuse-undulate, longer or equalling the calyx. Anthers subsessile, sagittate, mucronate at apex. Pistil: style indistinct, stigma 0.2 mm long, with a broad, discoid base. Fruit breaking up into 4 nutlets; nutlets 1.5-2.0 mm long, glabrous, brown. Flowering and fruiting: March-December. 2n= 24, 26, 28 (Kumar and Subramaniam). In Wet places, along roadsides, near tidal water, edge of salt marshes and other similar habitats.



Figure 15. *Heliotropium curassavicum* L., a) habit; b) inflorescence and c) fruit.

Type: Herb. Cliff. 45 (BM), 'Habitat in Americae calidioris

Bagerhat: Sundarban, Kotka, 20 v 2011, *Sarder Nasir Uddin*, N-4670 (DACB 40013); Sarankhola range: Shapla, 01 May 2012, *Sayedur 951* (JUH); Meharali Char, 20 Dec 2012, *Sayedur 1142* (JUH). **Bhola:** 27 ii 1989, *Huq, Rahman & Mia*, H-9080 (DACB 18146). **Chattogram:** Sitakundu, 13 I 1976, *K. Pasha*, 9 (DACB 18251); *Sandwip, musapur*, 6 iii 2018, *Md. Moniruzzaman & Kawser*, Mk-7829 (DACB 55447); Urirchar, 8 iii 2018, MD. Moniruzzaman & Kawser, MK-7888, (DACB 55446). **Cox's Bazar:** Sonadia Island, Moheshkhali, 30 iv 2017, Nyamul et al., NK-3512. **Noakhali:** Hatia Island, 17 iii 1987, *A. M. Huq & M. K. Mia*, H-8264 (DACB 18148). **Patuakhali:** Galachipa, Lakhir char, 13. 01. 2006, M. Sultana, 1102 (DUSH). **Satkhira:** Bakal checkpost, 4 v 1984, *Khan, Rahman & Mia*, K-6668 (DACB 18149); Bakal checkpost, 4 v 1984, *Khan, Rahman & Mia*, K-6663 (DACB 18255); Sundarban, notabeki, 22 viii 2002, *Sarder Nasir Uddin*, N-1350 (DACB 37384); 22 viii 2002, *Sarder Nasir Uddin*, N-1350 (DACB 37385); 23 ix 2017, *Dr. M. Sayedur Rahman*, sayedur-3115 (DACB 47393).

America, Europe, Africa, Pakistan, India and Australia.

Powder of dried roots are used for the treatment of sores and wounds.

Heliotropium indicum L., Sp. Pl. 1: 130. 1753. C.B. Clarke in Hook.f., Fl. Brit India 4: 152. 1883; Prain, Beng Pl. 2: 716. 1903; Heining, Pl. List Chitt. Coll. & HT.: 44. 1925. J.Sinclair, Bull. Bot. Soc. Beng. 9(2): 100. 1955; Ahmed *etal.* (ed.), Encycl. Fl. Fauna Bangladesh 7: 44. 2008; Uddin and Hassan (ed), Vascular flora of Chattogram and the Chattogram Hill Tracts 3: 456 (2018). **Fig. 16.**

Bangla: Hatisur, Hatisura; English: Indian Heliotrope.

Annual herb, 15-50 cm high. Stems erect, stout, much branched, strigose. Leaves alternate or subopposite; petiole 1-9 cm long; blade ovate, (1.5—)3—10(—12) by 0.8-8(-9) cm, base horizontally truncate, long decurrent, apex acute, primary nerves 4-7 on each side, between them a dense network of nerves of higher order, upper side with bristles arising from white tubercles of mineralized cells and short hairs, lower side with



Figure 16. *Heliotropium indicum* L., a) habit; b) flower; c) portion of petal with stamen; d) pistil and e) fruit.

dense, white tubercles of mineralized cells and bristly hairs along the nerves. Inflorescence spike-like, elongate, cymes 1 to several, 5-20 cm long, ebracteate. Flowers sessile, crowded. Calyx lobes lanceolate, 1.5-2 mm long, with patent, white, bristly hairs, lobes free to base, less than 0.5 mm wide, acute. Corolla salver-shaped, with appressed white hairs outside, tube 3-4.5 mm long, limb pale violet, blue or white, throat sometimes orange-yellow, lobes rounded, c. 1 mm long. Anthers subsessile at about middle of tube. Ovary glabrous; Style ca. 0.5 mm, slightly longer than stigma, short conical, broadly obtuse; stigma conical, pubescent. Fruit 2-3 mm long, deeply bifid, margins of lobes meeting far below middle of fruit or at very base only, apices divergent, fruit-halves two-celled, cells two locular, outer partition with one seed, inner one larger, empty. Flowering and fruiting: Throughout the year. $2n= 22, 24, 64$ (Kumar and Subramaniam). In Open waste places, sandy river banks, sides of canals, drains, ditches or bank of streams, roadsides, village thickets, and dry harvested rice fields.

Type: probably in Herb. Cliff. (BM), 'Habitat in India utraque'.

Bagerhat: Mongla Port area, 27 vi 1986, *A. M. Huq & M.K. Mia*, H-7766 (DACB 18209); Jatrapur, 16 vi 1982, *A. M. Huq*, H-5548 (DACB 18168); Sarankhola range: Kochikhal, 31 Jan 2012, Sayedur 627 (JUH); Shapla, 01 May 2012, Sayedur 990 (JUH). **Bandarban:** Lama, 6 xii 2008, Bushra et al., B-593, (DACB 32717); Ruma, 24 i 2017, *Khandakar Kamrul Islam*, KKI-876 (DACB 47154); 3 v 1977, *A. M. Huq*, H-3334 (DACB 18201). **Barguna:** Patharhat, 20 iii 1989, *Huq, Mahfuz, Matiur & Mia*, H-9158 (DACB 18190). **Barisal:** Bohla-near College, *Rahman & Mia*, R-1369 (DACB 18172). **Bogra:** Rainagar, 9 iv 2003, *B.M. Rezia Khatun & Hosne Ara*, RK-4398 (DACB); Near A.H. College, 18 i 1974, *M. S. Khan & A. M. Huq*, K-3794 (DACB 18207); Beltola, 12 iii 2001, *B.M. Rezia Khatun*, RK-2763 (DACB-30436); Beltola, 12 iii 2001, *B.M. Rezia Khatun*, RK-2763 (DACB 45791); Near A.H. college, 18 i 1974, *M. S. Khan & A. M. Huq*, K-3794 (DACB 18213). **Chattogram:** Hathazari-Raozan, 27 ix 2016, *Tajul, Owahid & Kawsar*, TOK-64 (DACB-50977); Fatikchori, baganbazar, 14 iii 2017, *Tajul, Owahid & Kawsar*, TOK-4007 (DACB 55443); Mirsori, Napittachara, 25 ii 2018, *Md. Moniruzzaman, Al-Amin & Kawsar*, MAK-7739 (DACB 55444); Mirsori, 15 vii 2012, *Bushra et al.*, B-2879 (DACB 38507); Urirchar, 08 iii 2018, *Md. Moniruzzaman & Kawsar*, MA-7881 (DACB 55445); Moheshkhali, 6 iii 1978, *Eric Francis*, 3(DACB

18176); Kutubdia, 25 xii 1983 *Huq, Rahman & Mia*, H-6615 (DACB 18180); Chowdhury Hat, 19 iv 1995, ????, 1788 (DACB 28039); Sitakundo National Park, 2016, Anwar 915 (JUH). **Cox's Bazar:** Teknaf, 26 x 1963, M S Khan-615, (DUSH); Sylhet: Shalatikorghat, 11 iii 1956, M S Khan-123, (DUSH); Himchari, dhuapalang Range, 17 v 2006, Bushra et al., B-65, (DACB 31411). **Chattogram Hill Tracts:** Pablakhali-Saratali, 30 iv 1977, *A. M. Huq*, H-3293 (DACB 18210); Manikchari, 25 iv 1976, *Huq, Rahman & Mia*, H-2354 (DACB 18200); Mohalchari, 15 vi 1983 *Huq, Rahman & Mia*, H-5859 (DACB 18179). **Cumilla:** Sarail Beel area, *Huq & Rahman*, H-2143 (DACB 18208). **Cox's Bazar:** Teknaf, Nayapara, 8 vi 1988, *Mia, Huq & Mahfuz*, M-1956 (DACB 18166); 17 v 1999, *A. M. Huq & M.K. Mia*, H-10563 (DACB 31776); Chokoria sundarban "Charan-dip", 29 xii 1973, *M. Rahman*, M-207 (DACB 18163). **Dhaka:** Rokeya Hall, Dhaka University, 10 iii 1969, Rokeya-51, (DUSH); Zingira, 24 iv 1968, H Hasan-51, (DUSH); Naya Paltan, 30 iii 1967, Hosne Ara-51, (DUSH); Jurain, 15 xii 1964, Maula Basak-11, (DUSH); Savar, J.U. campus, 4 vi 1999, *B.M. Rezia Khatun*, RK-1816 (DACB-29938); Beltola, 12 iii 2001, Taraghat, 19 iii 1981, *Huq Rahman & Mia*, H-5017 (DACB 18196); Manikganj, *Huq & Mia*, H-5170 (DACB 18175); Jinjira, 14 vi 1970, *A. M. Huq*, H-18 (DACB 18177); 14 vi 1970, *A. M. Huq*, H-18 (DACB 18218); 12 xii 1980, *Huq, Rahman & Mia*, H-4922 (DACB 18169); 14 vi 1970, *A. M. Huq*, H-18 (DACB 18167); Mirpur, Shah Ali, National Botanical Garden, Section-57, 27.12.2011, *S. S. Shetu* 45 (JUH); Pallabi, Degunmouja, near the Beribandh, 26.02.2013, *S. S. Shetu* 525 (JUH). **Faridpur:** Near Goulandaghat, 1 vii 1973, *A. M. Huq*, H-979 (DACB 18214). **Gazipur:** Near BRRI, 19 iii 1997, *B.M. Rezia Khatun & Hosne Ara*, RK-1181 (DACB 29521). **Habiganj:** Near Chunarghat, 17 iv 1985, *A. M. Huq & M.K. Mia*, H-6870 (DACB 18183). **Jhalkathi:** Nalchiti, 3 iii 1985, *A. M. Huq & M. K. Mia*, H-6718 (DACB 18181). **Joypurhat:** Khanjanpur, 23 viii 1989, *Mia, Rahman, Mahbuba & Rezia*, M-2214 (DACB-18193). **Kishorganj:** Poolghat saat, Kahoon, 14 iii 1988, *Mia & Mahfuz*, M-1697 (DACB 18199). **Khagrachari:** Gomoti, Panchari, 22 iv 2011, *Sarder Nasir Uddin*, N-4542(1) (DACB 40012); Gomoti, Panchari, 22 iv 2011, *Sarder Nasir Uddin*, N-4542 (DACB 40011). **Khulna:** Near railway station area, 19 vi 1982, *A. M. Huq*, H-5677 (DACB 18177). **Kurigram:** Hingon, 5 v 1988, *Mia, Mahfuz, Mahbuba, Rezia & Bushra*, M-1754 (DACB 18191). **Kushtia:** Dhoulatpur, 30 v 1991, *Mia, Mahfuz, Mahbuba & Rezia*, M-2883 (DACB 18198); Bharamara, 29 v

1991, *Mia, Rahman, Mahbuba & Rezia*, M-2836 (DACB-18178); Meherpur-Baradi, 10 vi 1974, *M. S. Khan & A. M. Huq*, K-3862 (DACB 18212). Darsana halt railway station, 28 ix 1978, *Khan & Huq* K-5152 (DACB 18203). **Lalmonirhat:** Haribanga, 7 v 1988, *Mia, Mahfuz, Mahbuba, Rezia & Bushra*, M-1845 (DACB 18197). **Moulvibazar:** Srimangal, hail haor, 2 ii 1986, *Khan & Mia*, K-7591 (DACB 18217); Kamalganj: Rajkandi forest range, Adampur, 06 Apr 2014 Kamrul 2147 (JUH); Kamarchara, 06 Apr 2014 Kamrul 2148 (JUH); Kurma, 07 Apr 2014 Kamrul 2149 (JUH). **Munshigonj:** College area, 28 v 1977, *A. M. Huq & Rahman*, H-3377 (DACB 18202). **Mymensingh:** Haluaghat, Panihata, 23 v 1989, *Mia, Huq & Rahman*, M-2035 (DACB 18170). **Narsingdi:** Shibpur, 10 i 2008, *Bushra, Habib & mafiz*, B-672 (DACB 32440). **Nilphamari:** Nilphamari Town area, 3 xii 1985, *Khan, Huq & Mia*, K-7492 (DACB 18187). **Noakhali:** Hatia Island, 16 iii 1987, *A. M. Huq & M. K. Mia*, H-8243 (DACB 18186). **Nowabgonj:** Piarapur, Fakirpara, 30 iv 1991, *Mia, Rahman, Mahbuba & Mahfuz*, M-2803 (DACB-18192). **Pabna:** Nainamoty, Md. Hafizur Rahman, 41 (DACB 18195). **Panchagarh:** Amarkhan, 25 v 1998, *Sk. Harun, Zashim & Nasir*, SHR-252 (DACB 28632); Atwari, 30 vi 1998, *Mia et al.*, M-3886 (DACB 28589); Badurjhula, 1 vii 1998, *Mia et al.*, M-3990, (DACB 28591); Amarkhan, 25 v 1998, *Sk. Harun, Zashim & Nasir*, SHR-252 (DACB 28632). **Patuakhali:** Kolapara, 5 i 1980, *Khan, Huq, Rahman & Mia*, K-5964 (DACB 18204); Bauphal, Indrokool, 12 iii 1973, *M. S. Khan & A. M. Huq*, K-2794 (DACB 18211); Bauphal-Kalaiya, 13 iii 1973, *M. S. Khan & A. M. Huq*, K-2837 (DACB 18205); Bauphal, Indrakool, Galachipa, Bashbunia, 01. 03. 2005, *M. Sultana*, 654 (DUSH); Kalapara, Kuakata, 04. 02. 2007, *M. Sultana*, 1598 (DUSH); Bauphal, Bogha, 03. 06. 2006, *M. Sultana*, 1373 (DUSH). **Rajshahi:** Mohanpur, Naogaon road, 18 xi 1988, *Huq, Mahfuz, Rezia & Bushra*, H-8719 (DACB 18189); Near Godagari, 17 xi 1988, *Huq, Mahfuz, Rezia & Bushra*, H -8681 (DACB 18188); Borgachi, 29 iv 1991, *Mia, Rahman, Mahbuba & Mahfuz*, M-2774 (DACB 18219); Agriculture Research Centre, *M. Rahman*, R-369 (DACB 18215); Near Nawhati, 13 xii 1972, *A. M. Huq*, H-690 (DACB 18216); Rohanpur, 11 ii 1976, *A. M. Huq*, H-1227 (DACB 18206). **Rangamati:** 14 vi 1983, *Huq, Rahman & Mia*, H-5835 (DACB 18165); Barkal, Choto-horina, 9 xii 2015, *Khandakar Kamrul Islam*, KKI-1917 (DACB 46255); Karnafuli sadar beat, Kaptai, 23 iii 2010, *Sarder Nasir Uddin*, N-4138, (DACB 36716), **Satkhira:** Satkhira-kolaroa, 2 v 1984, *Khan, Rahman & Mia*, K-6612 (DACB 18182).

Sherpur: Nanni near Baromari, 28 iv 1986, *A. M. Huq & M.K. Mia*, H-7739 (DACB 18184). **Sunamganj:** Taherpur, 5 v 1997, *Mia, Karim, Jashim*, M-3718, (DACB 41946); Takerghat, 14 x 1985, *Khan, Huq & Mia*, K-7205 (DACB 18185). **Sylhet:** Shalatikorghat, 11 iii 1956, *M S Khan-123*, (DUSH); Jaintapur-Tamabel, 5 iv 1988, *Mahfuz, Huq, Momtaz & Hosneara*, Mz-39(DACB 18164); New Samanbagh Tea estate Patharea, 27 iii 1981, *Khan, Zaman & Aziz*, K-6196 (DACB 18174); Raturgoal Swamp Forest, Goinghat, 11 iii 2019, *M. Sayedur Rahman* 3627 (DACB). **Tangail:** Kalihati, 10 iii 2008, *Bushra, Habib & mafiz*, B-801 (DACB 32659). **Thakurgaon:** Baliadangi, Dhantala, 4 viii 1998, *Khan, Harun, Zashim & Nasir*, K-9983 (DACB 28590).

Probably a native of tropical America, now widespread in all the tropical regions of the world; distributed in Cambodia, China, India, Indonesia, Japan (Ryukyu Islands), Java, Laos, Moluccas, Malaysia, Myanmar, Philippines, Thailand, Vietnam.

Entire plant is used in herbal medicine.

Heliotropium ovalifolium Forssk., Fl. Aegypt.-Arab. 38 (1775). Clarke in Hook. f., Fl. Brit. Ind. 4:150 (1883); Wight, Icon. Pl. t. 1388.1848; I. M. Johnston in J. Am. AM. 32.111 (1951); Kazmi, l.c. 178; Cooke, Fl. Bomb. Pres. Reprint ed. 2,2:278 (1967); Bhandari, Fl. Ind. Desert, 235 (1978). Ahmed et al. (ed.), Encycl. Fl. Fauna Bangladesh 7: 45 (2008). *Euploca ovalifolia* (Forssk.) Diane & Hilger, Bot. Jahrb. Syst. 125: 48 (2003). **Fig. 17.**

Bangla: Nagaphuli.

Annual herbs or short lived perennial, sometimes with woody base, 10– 90 cm high, covered with appressed hairs. Stems ca. 40 cm high, terete, much branched, branches procumbent or erect to ascending, covered by antrorsely appressed, short hairs. Leaves petiolate, greyish-white with dense hairs; petiole 5-10 mm long. Lamina 10-25 x 4-13 mm, elliptic to obovate, mucronate, appressed hairy on both surfaces. Inflorescence a spike-like, terminal, slender, 2-13 cm long, sometimes forked, ebracteate, bearing biseriate flowers, flowers more or less dense, arranged in two ranks; pedicels usually less than 0.5 mm. Calyx c. 2 mm long, cleft to the base, 5-partite into 0.5-0.6 mm wide unequal lobes, covered densely by antrorse hairs, persistent. Corolla white, funnel-

shape, 3 mm long, 2 mm in diam, tube cylindrical with dense, antrorse hairs outside, sparsely so in the throat lobes ovate-triangular to ovate, 0.8 mm long, apiculate. Stamens

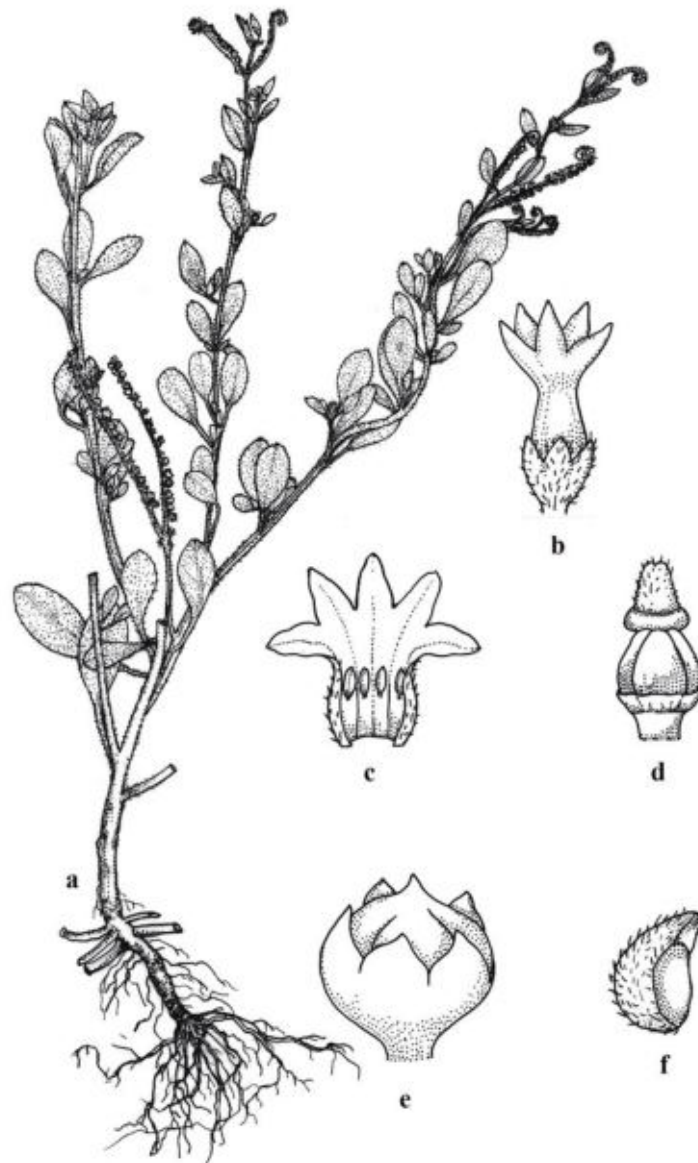


Figure 17. **Heliotropium ovalifolium** Forssk., a) habit; b) flower; c) stamen with portion of petal; d) pistil; e) fruit and f) seed.

inserted 0.75–1.00 mm from the base; anthers connate when young, elliptic to ovate, 0.5–1.0 mm long, narrow, apiculate and hairy at apex, attached c. 0.5 mm from corolla base, connective produced.; filament indistinct. Ovary glabrous, subglobose; Stigma sessile or subsessile, c. 0.4 mm long, conical from a wider base, 2 lobed at apex, minutely setose. Style inconspicuous. Fruit ovoid; nutlets 4, c. 1.5 mm long, densely antrorse hairy. Flowering and fruiting: February-August. $2n= 32, 56$ (Kumar and Subramaniam, 1986). In moist places, riversides and cultivated lands.

Type: Hadie, *Forsk.* s.n. (C).

Jessore: Mohespur, 3 v 1990, *M.S. Khan & A.M. Huq*, K-8450 (DACB 26395).

Rajshahi: Nawabgonj, Dolyapur, 7 vi 1973, *M.S. Khan & A.M. Huq*, K-3036 (DACB 18242); Rohanpur, 11 vi 1975, *A. M. Huq*, H-1147, (DACB 18232);

Africa, Arabia, Pakistan, India, China, Australia.

The plant is used as forage or fodder for domestic animals.

Heliotropium strigosum* subsp. *brevifolium (Wall.) Kazmi in *J. Arn. Arb.* 51 (2):153. 1970. *Heliotropium brevifolium* Wall. in *Roxb., Fl. Ind.* (ed. Car. & Wall.). 2,2. 1824. DC., *Prodr.* 9:546. 1845; Riedl in *Rech. f., Fl. Iran.* 48:16.1967. *Heliotropium strigosum* var. *brevifolium* (Wall.) Clarke in *Hook. f., Fl. Brit. Ind.* 4:151. 1883; Ahmed et al. (ed.), *Encycl. Fl. Fauna Bangladesh* 7: 46 (2008).

Bangla: Chitiphul; English: Hairy Helitrope.

Annual herb or short-lived perennial with woody base, 5– 40 cm high. Stem \pm terete, much-branched; branches prostrate to erect. Leaves lanceolate to linear or narrowly elliptic, $0.5\text{--}4.0 \times 0.1\text{--}0.5$ cm; apex acute; base cuneate; margin revolute; petiole 0.1–0.2 cm. Inflorescence lax, 1.5–8.5 cm, of 5–15 flowers in 1-rank; flowers bracteate (bract ovate, 2.0–3.0 mm wide), subsessile or shortly pedicelled; pedicle 0.5–1.5 mm. Calyx 5-lobed; lobes fused close to the base, unequal, ovate to narrowly elliptic, $1.5\text{--}3.0 \times 0.50\text{--}0.75$ mm, hairy outside, glabrous inside. Corolla white, 2.5–4.0 mm, hairy outside on lobes and upper part of tube, hairy inside above the anthers; tube 2.0–3.0 mm; lobes rounded, 0.5–1.0 mm. Stamens inserted 1.0–1.25 mm from the base; anthers connate when young, ovate, 0.75–1.00 mm, their apex apiculate and hairy, with connective tissue

prolonged and curved; filament ca 0.1 mm long. Ovary globose to subglobose; style 0.25–0.50 mm long, glabrous; stigma short conical, (0.30–) 0.50–0.75 mm, 4-lobed at apex, hairy and papillose, longer than or equal to the style. Fruit of 4 nutlets; nutlets ovoid, 1.3–1.5 × 0.5–1.0 mm, hairy, with two deep ventral circular depressions.

Type: India, *Wallich* 914 (K).

Panchagarh: Dist. Board office-Vitargarh, 05 vi 1989, Huq et al., H. 9238 (DACB 18246). **Rajshahi:** Rajshahi University campus, 08 vi 1973, A.M. Huq 950 (18248 DACB); Rohanpur, 12 vi 1975, A.M. Huq 1210 (DACB 18247); C.B. Clarke recorded it from central Bengal.

Afghanistan, Pakistan eastward to Nepal, Burma, Malaya.

The plant is used as laxative and diuretic and sometimes used in the treatment of snake bite.

Rotula Lour.

Fl. Cochinch. 1: 121 (1790)

Type species: *Rotula aquatica* Lour.

Shrubs with tough and twiggy branches. Leaves small, sessile or subsessile, alternate or clustered, linear-oblong, entire or obscurely toothed. Flowers bracteate, pinkish-purple, small, on lateral branchlets between leaves. Calyx and corolla campanulate, imbricate in buds. Sepals 5, lanceolate, acuminate, slightly connate below. Corolla short tube, included in calyx. Petals 5, oblong, united to form short tube at base. Stamens 5, adnate to corolla tube, filaments filiform, anthers oblong or ovate. Ovary ovoid, 2 to 4-celled, ovules 2 in each, when 2-celled, 1 ovule in each while 4-celled, style filiform, simple, and terminal, stigma indistinctly bilobed. Fruits drupaceous, red, with 4-lobed endocarp, splitting up into 1-seeded pyrenes. Seeds oblong.

Three species: Brazil, Africa, tropical Asia; one species in Bangladesh.

Rotula aquatica Lour., Fl. Cochinch.:121 (1790); Fl. China 16: 337. 1995; Riedl, Fl. Malesiana 13: 115, f. 11. (1997).; Ahmed *et al.* (ed.), Encycl. Fl. Fauna Bangladesh 7: 44. (2008).; Uddin and Hassan (ed), Vascular flora of Chattogram and the Chattogram Hill Tracts 3: 458 (2018). *Rhabdia lycioides* Mart., Nov. Gen. 2: 136, t. 195. (1827).; C.B. Clarke in Hook.f., Fl. Brit. Ind. 4: 145 (1883); Vidal, Rev. Pl. Vasc. Filip.: 194: 1886; Trimmen, Handb. Fl. Ceyl. 3: 197. (1895).; Gagnep. & Cour. in Lecomte, Fl. Indo-Chine 4(2): 214, f. 25/12-18. 1914. *Zombiana africana* Baill., Hist. Des Pl. 4: 421 (1888); Rolfe in Thiselton-Dyer, Fl. Trop. Afr. 5: 263. 1900. *Ehretia aquatica* (Lour.) Gottschling & Hilger, Bot. Jahrb. Syst.123(2): 263. (2001). **Fig. 18.**

Bangla: Pan ghurni .

Shrubs with many elongated terete shoots. Leaves with petiole 1–4 mm long; lamina subcoriaceous, oblanceolate to oblong, 3–8×10–22 mm, apex obtuse or acute, base cuneate or obtuse, margin entire, upper surface dark green, strigose; lower surface light green, strigose or villose; midrib impressed on upper surface, conspicuous on lower surface; lateral veins in 3–5 pairs. Inflorescences short, terminal or axillary, few flowered cyme; peduncle subsessile, tomentose; pedicels in axils of bracts, 2–3 mm long, light green, tomentose. Calyx 4–5 mm long, tube *ca.* 1 mm long, lobes lanceolate or ovate, 3.5–4 ×1–1.5 mm long, 0.5–1.5 mm wide, villous outside, glabrous inside, persistent at fruiting. Corolla pink to purplish, 5–7 mm long, tube *ca.* 1–2 mm long; lobes rounded, 2.3–3 × 1.8–2 mm long, glabrous, explanate. Stamens 4.5–5 mm long; filaments 3–4 mm long, glabrous, attached above middle of corolla tube; anthers oblong, 1–1.2 mm long. Ovary 4-locular, each locule with 1 ovule, ovoid or ellipsoid, 0.5–0.8 mm long; styles 3–3.5 mm long, undivided, glabrous; stigma 1, capitate. Fruits drupaceous, subglobose, 3–4 mm in diam., red or orange at maturity. Flowering and fruiting: October-March. In Exposed gravelly riverbanks, rocks along river banks and pebbles.

Type: Vietnam, Cochinchina (BM).

Bandarban: Mourchara, Ruma, 13 xi 2017, Khandakar Kamrul Islam, KKI-1636, (DACB 47811); Sangu Resrve Forest, Thanchi, 10 x 2017, Shahidul Islam *et al.*, MSI-



Figure 18. *Rotula aquatica* Lour., a) habit of twig; b) flower; c) portion of petal with stamen; d) pistil; e) fruit and f) seed.

5959. **Rangamati:** Bank of Karnafoli and Kasalong, 1876, J.L. Lister *s.n.* (CAL 305495). **Sylhet:** Lobah lake, 9 xi 1914, *U.N. Kanjilal* 4693 (ASSAM).

Tropical Africa, India, Sri Lanka, southern China, Vietnam, Laos, Thailand, Burma; Malesia: Malay Peninsula, Borneo, Philippines, Celebes, New Guinea.

Roots are used as medicinal. Ropes are made from the rough split stem.

Tournefortia L.

Sp. Pl. 1: 140 (1753).

Shrubs, rarely trees, or sub-scandent. Leaves simple, alternate, rarely opposite, entire, sessile or not, often crowded at end of branches. Flowers white to greenish-yellow, numerous, ebracteate, sessile, 4-5-merous in terminal, rarely lateral dichotomous scorpioid cymes. Sepals 4 or 5, ovate or lanceolate. Corolla tube short and cylindrical, naked in throat, hairy outside, lobes 4 or 5, spreading. Stamens 4 or 5, included in corolla tube, anthers oblong. Ovary 4-celled, ovule 1 in each cell, pendulous, style short, stigma terminal with fertile basal ring and sterile apical parts. Fruits drupaceous, small, ovoid with juicy mesocarp, separating into 2 or 4, shortly 2-seeded pyrenes. Seeds straight or curved.

About 150 species in tropical and subtropical regions of the world. Six species in Bangladesh including one new record.

KEY TO THE SPECIES

- | | | |
|-------|---|-----------------------|
| 1 | Drupes shortly pedicelled | T. heyneana |
| + | Drupes sessile | (2) |
| 2 (1) | Branches glabrous | T. hookeri |
| + | Branches hairy | (3) |
| 3 (2) | Climbing shrubs; corolla tube ca. 10 mm long;
calyx lobes ovate-acuminate | T. sermentosa |
| + | Erect shrubs, corolla tube less than 10 mm long;
calyx lobes linear-lanceolate | (4) |
| 4 (3) | Calyx lobes tubular at least and the base, corolla tube | T. viridiflora |

- ca. 2-5 mm long
- + Calyx lobes deeply divided into 5 linea-lanceolate segments; corolla tube 6-8 mm long (5)
- 5 (4) Petiole ca. 6.3 mm long; cymes not dichotomously branched, calyx lobes ca. 2.5 mm long **T. candollei**
- + Petiole ca 10 mm long; cymes not dichotomously branched; calyx lobes ca. 6.0 mm long **T. roxburghii**

Tournefortia candollei C.B. Clarke, Fl. Brit. India 4(10): 146 (1883); Ahmed *et al.* (ed.), Encycl. Fl. Fauna Bangladesh 7: 48 (2008); *Tournefortia khasiana* C.B. Clarke, Fl. Brit. India 4(10): 147 (1883).

Small Shrubs. Branches hairy. Leaves simple, alternate; lamina ovate-lanceolate, sometimes oblong, ca. 9 by 3.8 cm, base obtuse or subcordate; primary nerves soon impressed on the upper surface, tertiary very obscurely reticulated, petiole ca. 6.3 mm long. Cymes axillary. Flowers numerous, dense, sessile, ebracteate. Calyx lobes 5, lanceolate, 2.5 mm long, narrowly lanceolate in fruit, not glistening white within. Corolla tube ca. 6.3 mm long, naked in the throat; lobes 5, small, patent.. Fruit ovoid, ca. 4.2-3.2 mm long, sessile, scarcely fleshy, not distinctly separating into 2 or 4 pyrenes; pyrenes two 2-celled 2-seeded. Seed albuminous. Flowering and fruiting: November-July. In hill forest.

Sylhet: Locality and date unknown, *Wallich*, s.n.
Bhotan, India (Assam).

Tournefortia heyneana Wall. & G. Don, Gen. Hist. iv: 369 (1837); C.B. Clarke in Hook.f., Fl. Brit. India 4: 145. (1883). **Fig. 19.**

Shrubs, Branchlets strigose or nearly glabrous. Leaves simple, alternate, lamina ovate-lanceolate or ovate, 12.5 cm by 3.8 cm., base cuneate or rhomboid, apex acuminate, mature sparsely minutely scabrous-hairy on both surfaces; nerves 7 pair, closely hairy when young, petiole 8.5 mm long. Cymes terminal and extra-axillary, sparsely scabrous-hairy. Flowers on short pedicels, unilateral; Calyx 5 lobed, lanceolate, 2.1 mm long;

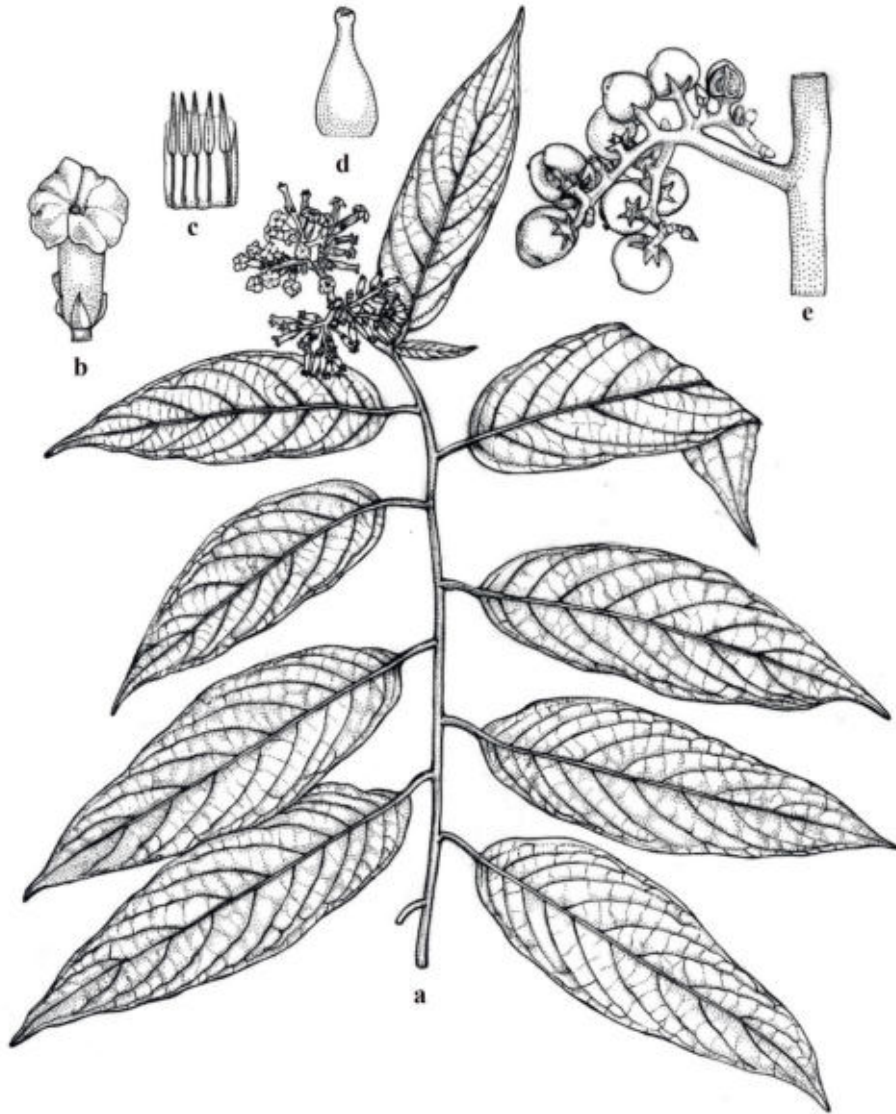


Figure 19. *Tournefortia heyneana* A.DC., a) flowering branch; b) flower; c) portion of petal with stamen; d) pistil and e) infructescence.

Corolla tubular, tube 2.8-3.8 mm long, mouth 5 toothed. Stamens included in the tube, filament short, anthers oblong. Ovary 4-celled, style terminal, shortly 2-lobed, ovules 1 in each cell. Drupes 4.2 mm long, pedicels 3.1 mm long. Seeds albuminous.

Bandarban: Betchara forest range, 17 i 2017, Imam *et al.*, IH-3409. **Bangladesh:** Locality and date unknown, *De Silva*, F. Cat. no. 910 (K).

Native of the East Indies.

Tournefortia hookeri C.B. Clarke, Fl. Brit. India 4(10): 147 (1883). **Fig. 20.**

Large scandent shrubs. Branches nearly glabrous. Leaves simple, alternate, entire; lamina ovate or elliptic, ca. 10-12.5×3.8-6.3 cm, basally obtuse and unequal, apically acute, glabrescent prominently reticulated beneath, tertiary nerves exceedingly prominent; petiole ca. 8.5 mm long. Cymes terminal, diffuse, rusty pubescent; branches long; flowers numerous, dense, ebracted, sessile sub-2-seriate. Calyx 4-5 lobed, teeth/lobes lanceolate, ca. 4.2 mm long. Corolla tube cylindrical, 4.2-5.0 mm long, rarely exceeding the calyx, and mouth 5-4 lobed. Stamens included in the tube, filaments short; anthers oblong. Ovary 4-celled; style terminal, short, shortly 2-lobed; ovules 1 in each cell. Drupes ovoid, sessile, 5 mm in diam., scarcely fleshy, not distinctly separating into 2 or 4 pyrenes; pyrenes two 2-celled 2-seeded. Seed straight or curved, albuminous.

Type: Bangladesh.

Bangladesh: Locality unknown, iv 1850, S.Coll, s.n., [K, (K000998134) image!];

Bandarban: Kupalong Para, Kualong, 24 iv 2017, *UMN Marma*, UMN-153; Lama forest Range, 10 i 2017, *Imam et al.*, IH-3039; Khaikkhang Jhiri Forest Range, Ruma 27 xi 2017; Hossen *et al.*, IH-2041. **Cox's Bazar:** Adinath temple, Moheshkhali, 01 v 2017, *Niyamul et al.*, NK-3550 (DACB 60464). **Rangamati:** Poapara Forest, Kaukhali, 28 i 2017, *Joyanto et al.*, JCR-2323; Uluchari forest, Rajosthali, 21 iii 2017, *Joyanta et al.*, JCR-4227.



Figure 20. *Tournefortia hookeri* C.B. Clarke, a) flowering brnch; b) flower and c) infructescence.

Tournefortia roxburghii C.B.Clarke in Hook.f., Fl. Brit. India 4: 146. 1883; Prain, Beng Pl. 2: 715. 1903; Heining, Pl. List Chitt. Coll. & HT.: 44. 1925; J.Sinclair, Bull. Bot. Soc. Beng. 9(2): 100. 1955; Ahmed *et al.*, (ed.), *Encycl. Fl. Fauna Bangladesh* 7: 49. (2008).; Uddin and Hassan (ed), *Vascular flora of Chattogram and the Chattogram Hill Tracts* 3: 459 (2018). **Fig. 21.**

Bangla: Shamshog, Roxyturni.

Scandent shrubs. Branches hairy. Leaves simple, alternate, stipules 5-7 mm long, linear-oblong, lamina lanceolate-oblong, 7-10 × 2.5-3.5 cm, acuminate, whitish and densely villous, lateral veins prominent beneath; petioles 6-10 mm long. Inflorescence axillary to terminal, dichotomous cymes, densely covered with reddish-brown pubescent. Flowers bracts linear-oblong. Calyx 4-6 mm long, deeply divided into 5 segments, linear-lanceolate, densely brown hirsute. Corolla tubular, much longer than calyx, tube 5-8 mm long, rounded, reflexed. Stamens 4 or 5, filaments included within tube. Ovary 4-celled, ovule 1 in each cell, style terminal, short. Fruits drupaceous, 3-4 mm long, ovoid, sessile. Flowering & fruiting: April-February. In Edge of hill forests and forest openings.

Bandarban: Ruma bazar, 28 x 1984, *Khan, Huq, Rahman & Mia*, K-6722 (DACB 18236); Balaghata, Bandarban Sadar, 08 xi 2016, *Hossen et al.*, IH-1499; Rawangchari Forest Range, 02 xi 2016, *Hossen et al.*, IH-1377; Batchara Forest Range, 29 ix 2016, Hossen et al., IH-519; Bogalake, Ruma, Bandarban 26 iii 2019, *K. K. Islam*, KKI 3527 (DACB). **Chittogram:** Barabkund, 23 vi 1979, *Mia & Rahman*, M-111 (DACB-18231); Sitakundo Eco-park, sitakundo, 14 ii 2018, *Moniruzzaman, Al-amin & Kawsar*, MAK-7637, (DACB 55441); Mirasarai, 27 i 1973, *M. S. Khan & A. M. Huq*, K-2771 (DACB 18224); Khoiyachora, Mirasarai, 20 xii 2017, *Md. Moniruzzaman, Al-amin & Kawsar*,



Figure 21. *Tournefortia roxburghii* C.B.Clarke; a) flowering branch and b) portion of infructescence.

MAK-6993, (DACB 55442); Napittachara, Mirasarai, 25 ii 2018, *Md. Moniruzzaman, Al-amin & Kawsar*, MAK-7766, (DACB 55440); Sitakunddo Eco-Park, 14 ii 2018, *Moniruzzaman et al.*, MAK-7637; Napittachora, Mirsori, 25 ii 2018, *Moniruzzaman et al.*, MAK-7766. **Chattoqram Hill tracts:** Between Manikchhari and ghagra, Sapchhari, 21 xi 1980, *Khan, Huq, Rahman & Mia*, K-6112 (DACB 18221); Raikhali, 22 ii 1979, Daskendi, 17 vi 1970, *A. M. Huq*, 4323 (DACB 18225). **Coxs Bazar:** Rajarchara, 5 x 1991, *Khan, Huq, Rahman & Mia*, K-8570 (DACB 24752); Maheshkhali island, Adinath hill, 22 ii 1971, *M. S. Khan & A. M. Huq*, K-2528 (DACB 18222) Neela range, Whykong beat, 28 viii 1998, *Khan, Huq, Rahman & Mia*, K-8542 (DACB 18296); Kudum Guha, Teknaf, 18 xii 2017, *Niyamul Kabir et al.*, NK-6664. **Khagrachari:** Kasalong Reserve Forest, Bagaichhari, 20 ii 2017, *Kowser et al.*, KH-7566; Hazachhara Reserve Forest, Ramgarh, 02 xi 217 Kowser et al., KH-7372. **Rangamati:** Bamchhara, Kaptai, 9 i 2005, *Sarder Nasir Uddin*, N-2725 (DACB 33930); Barkal Reserve Forest, 5 xii 2015, *Khandakar Kamrul Islam*, KKI-1824 (DACB 46333); Kura mura pahar, Sadar, Rangamati, 17 ii 2017, K.T. Chakma, KTC-108; Kukujjachari Forest, Mogban, Rangamati Sadar; 13 ii 2017, *Joyanto et al.*, JCR-2929.

India and Myanmar

Tournefortia sarmentosa Lam., *Tabl. Encycl.* 2(1): 416 (1792); C.B.Rob., *Philipp. J. Sc., Bot.* 4 (1909) 694; I.M.Johnston, *J. Arnold Arbor.* 16 (1935) 147; 32 (1951) 115; Backer & Bakh.f., *Fl. Java* 2 (1965) 460. **Fig. 22.**

Shrubs climbing, 1-5 m tall. Petiole ca. 1 cm; branches terete, striated, beset with adpressed, white hairs. Leaves simple, alternate, petiole 7-20 mm long; leaf blade ovate to elliptic or lanceolate, usually densely minutely tuberculate, 6-10 × 2-5 cm, base obtuse to rounded, apex acuminate, upper side with a very few hairs, dense, minute whitish groups of mineralized cells usually present, lower side loosely appressed strigulose with irregularly directed hairs. Cymes terminating leafy branches, sparsely branched; branches slender, usually 1-3 cm. Flowers numerous in 2 ranks, sessile. Calyx cup-shaped, 1.5-2 mm long, 3 mm wide, with appressed to patent short hairs on outer and inner side, lobes 5, free to base, ovate-acuminate, 0.7-0.8 mm wide. Corolla white, 6—9(—10) mm long, 4 mm in diam., densely strigulose outside, tube cylindrical, slightly



Figure 22. *Tournefortia sarmentosa* Lam., a) flowering branch; b) flower and c) portion of infructescence

narrower in lowest third, lobes plicate, ovate, acuminate, up to 2 mm long. Anthers sessile, less than ca. 1 mm, inserted ca. 1 mm above base of corolla tube. Ovary glabrous or apex sparsely short pubescent. Style short; stigma globose to terete, ca. 2 × as wide as style, apex obscurely 2-cleft. Fruit white, ca. 5 mm, divided at maturity into 4 1-seeded mericarps.

Type: Sonnerat (P holo), Mauritius, cultivated.

Chattogram Hill Tracts: Raikhali farm to Kalamsha (other side of the paper mill about 6 miles), 22 ii 1979, *A.M. Huq* 4323 (DACB 18225).

Native to France. Distributed in Australia (N Queensland), China, Taiwan; Malesia: Sumatra, Malay Peninsula, Borneo, Java, Philippines, Celebes, Lesser Sunda Islands (Lombok, Flores, Timor, Alor, Wetar), Moluccas, New Guinea.

(Note: The species has been included here as a new angiosperm record for Bangladesh)

Tournefortia viridiflora (Wall.) C.B. Clarke in Hook.f., Fl. Brit. India 4: 146. (1883). C.B. Clarke in Hook.f., Fl. Brit India 4: 146. (1883).; Prain, Beng Pl. 2: 714. (1903).; Heining, Pl. List Chitt. Coll. & HT.: 44. (1925).; Ahmed *et al.* (ed.), Encycl. Fl. Fauna Bangladesh 7: 49. (2008).; Uddin and Hassan (ed), Vascular flora of Chattogram and the Chattogram Hill Tracts 3: 459 (2018). *Lithospermum viridiflorum* Roxb., Fl. Ind. (ed.) Carey & Wall. 2: 455 (1824). **Fig. 23**

Bangla: Shamsnog, Tiaturni.

Woody, sub-scandent shrubs, 2.0-3.6 m tall, young shoots rusty-brown pubescent. Leaves simple, alternate; stipules up to 7 mm long, linear-oblong; lamina 5-15 × 2.5-6.0 cm, oblong-ovate, entire, acuminate, membranous, sparsely pubescent above and softly hairy beneath, oblique, base obtuse; petioles 8-15 cm long. Inflorescence unilateral, dense, scorpioid spikes, in dichotomous, cymes. Flowers white, densely arranged. Calyx tubular, 2.5-4.0 mm long, linear-lanceolate, enlarged up to 1 cm in fruits, spreading, persistent. Corolla tubular, 2-5 mm long, little exceeding calyx teeth. Stamens 4 or 5, included in corolla tube. Ovary 4-celled, ovule 1 in each cell. Fruits drupaceous, ovate, 4-6 × 3-4 mm, white, sessile, succulent, beaked with persistent style. Flowering & fruiting: April-December. In Hilly forest areas and forest clearings, up to 900 m altitude.



Figure 23. *Tournefortia viridiflora* Wall., a) flowering branch and b) portion of infructescence.

Bandarban: Thana para. Ruma, 10 v 2018, *Khandakar Kamrul Islam*, KKI-2801 (DACB 47307). **Chattogram:** Sitakundo National Park, 2016, *Anwar* 585 (JUH). **Rangamati:** Pablakhali, near old forest rest house, 24 ix 1977, *Khan, Huq, Rahman & Shajahan*, K-4607 (DACB 18238). **Bangladesh:** Hooker J.D. 1867, 907 (K).

Bhutan and India.

Root infusion is used as convalescent and for baby bath. Leaves used as vegetable by ethnic people.

Trichodesma R. Br.

Prodr. 496 (1810).

Type Species: *Trichodesma zeylanicum* (Burm. f.) R.Br.

Annual or perennial herbs, sometimes suffrutescent. Leaves alternate or opposite, sessile or stalked. Cymes loose, often many-flowered, usually with bracts that may be similar to the upper stem leaves. Flowers pentamerous. Calyx on distinct, often fairly long pedicels, strongly accrescent in fruit, lobes free to the base or united in part. Corolla more or less rotate to funnel-shaped with a short tube and long-acuminate to cuspidate lobes, without scales in the throat. Stamens: anthers subsessile in the tube, oblong to linear, with long sterile awns that are twisted round each other. Ovary not divided in flower; style filiform, stigma small, globose. Nutlets 4, ovoid, triquetrous or nearly globose, smooth or rugose, sometimes hairy, with or without a distinct margin.

About 40-45 Species in tropical and subtropical Africa, Asia and Australia. Represented in Bangladesh by 1 species

Trichodesma indicum (L.) Sm. in Rees, Cyclop. 36/1 (1817) n.; C.B. Rob., Philipp. J. Sc., Bot. 4 (1909) 696; Brand in Engl., Pflanzenr., fam. IV.252 (1921); Ahmed et al. (ed.), Encycl. Fl. Fauna Bangladesh 7: 50 (2008). *Borago indica* L., Sp. Pl. 137 (1753). *Trichodesma amplexicaule* Roth, Nov. Sp. 104. 1821. C.B. Clarke, l.c.; Jafri, Fl. Kar. 282 (1966). *Trichodesma hirsutum* Edgew. in J. Asiat. Soc. Bengal. 21:175 (1853). *Trichodesma indicum* var. *amplexicaule* (Roth) T. Cooke, Fl. Bomb. Presid. Reprint. ed. 2,2:281 (1967). **Fig. 24.**



Figure 24. *Trichodesma indicum* (L.) Sm., a) habit; b) flower; c) corolla; d) carpel inside calyx; e) mature carpel and f) nutlet.

Annual herb. Stems 15-40 cm high, much branched, with spreading, not very dense hairs. Leaves sessile, oblong, lanceolate or lanceolate-oblong, lower leaves 5-8 × 0.8-2.2 cm, upper leaves 2-4.5 × 0.3-1.2 cm, base in lowermost leaves narrow, in the others broadly rounded, semiamplexicaulous, apex acute or obtusish, midrib distinct, sometimes also a few other nerves visible, hairs spreading-antrorse, arising from groups of mineralized cells on upper side, loose, crispulate on lower side. Inflorescence terminal on stem and branches, leafy, flowers axillary; pedicels 0.8-1.8 cm long, curved downwards in fruit, with long, dense, spreading hairs. Calyx c. 1 cm long in flower, up to 1.3 cm in fruit, cleft to the base into narrowly triangular, basally sagittate lobes 1.2 mm wide in flower, 2 mm wide in fruit, hairs loose, spreading from mineralized cells. Corolla funnel-shaped, lilac, tube c. 5 mm long, limb 1.3-1.5 cm in diam., lobes broadly rounded-acuminate, 7 mm long and wide. Anthers oblong, sterile, twisted apex 4-5 mm long, densely woolly. Style as long as calyx. Nutlets oblong ovoid, 5 mm long, 2-3 mm wide, smooth, whitish. Flowering and fruiting: August-April. In waste and cultivable land.

Type: Herb. Linn. 188/2 (LINN).

Rajshahi: Horticultural farm area, 21 i 1974, *M.S. Khan & A.M. Huq*, K-3837 (DACB 18228); Godabari, 14 xii 1972, A. M. Huq 736, (DACB 18227). **Rangamati:** Rangamati, 9 iv 1966, Slauddin-105, (DUSH);

Afghanistan, Pakistan, India, Burma (a separate variety), Mascarene Islands; Malesia and Philippines.

Leaves are used as depurative, roots used as antidiysenteric and flower used as sudorific and pectoral.

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