

STUDIES IN INDIAN EUPHORBIACEAE—V: THE GENUS *CHROZOPHORA* NECK.

N. P. BALAKRISHNAN

Botanical Survey of India, Port Blair

A B S T R A C T

The genus is revised for the Indian subcontinent including Pakistan, India, Bangla Desh and Burma. The present work indicates the existence of 4 species and 2 varieties in the area. Keys and detailed descriptions to the taxa are included.

The genus *Chrozophora* has been previously studied and revised by Pax & Hoffman (in Engler, *Pflanzenreich* 57: 17. 1912) and also by Prain (in Kew Bull. 1918: 49). The present review pertains only to the species as occurring in the Indian subcontinent, including the countries Pakistan, India, Bangla Desh and Burma. With a larger number of specimens now available and studied than before, it has been possible to discover wider range of variations and hence a wider specific concept.

Bentham & Hooker (1880) place this genus under the subtribe *Chrozophoreae* of tribe *Crotoneae*. Pax & Hoffman (in Engler & Harms, 1913) place it along with the genus *Doryxylon* Zoll. (*Sumbavia* Baill.) under the subtribe *Regulares* (more correctly to be called *Chrozophorinae*) of the tribe *Chrozophoreae* in the subfamily *Crotonoideae*. This genus differs from *Doryxylon* in the stamens being definite in number and filaments united into a staminal column, in contrast to the indefinite number of stamens and free filaments. The genus can be divided into two sections, sect. *Chrozophora* and sect. *Plicatae* based mainly on the lepidote capsules of the former and stellate-pubescent capsules of the latter. There are altogether four species and two varieties in the area under study. The genus with about 12 species is widely distributed mainly, though not exclusively, in the arid and semiarid regions from NE Tropical Africa, Mediterranean re-

gions and Middle East to India, Indo-China and Java.

The specimens studied are from the herbaria of Botanical Survey of India, namely Central National Herbarium, Calcutta (CAL), Southern Circle Herbarium, Coimbatore (MH), Western Circle Herbarium, Poona (BSI), Northern Circle Herbarium, Dehra Dun (BSD), Kanjilal Herbarium, Shillong (ASSAM) and also from Blatter Herbarium, Bombay (BLAT) and Herbarium of Royal Botanic Garden, Kew (K). The valuable help rendered by the Keepers of these herbaria are gratefully acknowledged.

CHROZOPHORA Neck.

Chrozophora Neck. Elem. Bot. 2: 337. 1790, nom. cons.; Benth. in Benth. & Hook. f. Gen. Pl. 3: 305. 1880; Hook. f. Fl. Brit. Ind. 5: 408. 1887; Pax in Engler & Prantl, *Pflanzenfam.* ed. 1. 3, 5: 43, 1890; Pax & Hoffm. in Engler, *Pflanzenr.* 57: 17. 1912; Prain in Fl. Trop. Africa 4(1): 834. 1912 et in Kew Bull. 1918: 49. 1918; Pax & Hoffm. in Engler & Harms, *Pflanzenfam.* ed. 2, 19C: 90. 1931. *Tournesol* Adans. Fam. Pl. 3: 356. 1763. *Tournesolia* Scop. Introd. Hist. Pl. 243. 1777. *Ricinoides* Tourn. ex Moench, Method. 286. 1794. *Crozophora* A. Juss. Euphorb. Tent. 27, 84. 1824; Endl. Gen. Pl. 2: 1117. 1840; Baillon, Etud. Gen. Euphorb. 321, t. 15. f. 12-22. 1858; Muell.-Arg. in DC. Prodr. 15(2): 746. 1866; Boiss. Fl. Orient. 4: 1139. 1879. *Crossophora* Link, Handb.

2: 438. 1833. *Lepidocroton* Presl, Epimel. Bot. 213. 1849. *Argythamnia* sect. *Tournesolia* Post & Kuntze, Lexicon 43. 1904.

Annual or perennial coarse branched herbs, less often undershrubs, usually clothed with stellate-tomentose hairs, very rarely glabrous. *Leaves* alternate, petiolate, often plicate-rugose or plicate-bullate or nearly smooth, rarely glabrous, often with two glands near the apex of the petiole beneath the base of leaf-blade. *Flowers* monoecious, dichlamydous, in short dense stalked or sessile racemes in upper axils, with sessile or subsessile male flowers densely arranged towards apex and long-pedicelled female flowers sparsely arranged towards base. *Male flowers*: calyx ovoid, globose, closely adherent in bud, splitting into 5 lobes. Petals 5, usually equal to or slightly longer or shorter than sepals, yellowish, lepidote outside. Disc inconspicuous. Stamens 5-15; filaments connate at base, 1-3 verticillate on a central column, the free portion usually shorter or rarely longer than anthers; anthers oblique, extrorse, longitudinally dehiscent; cells parallel, contiguous. Pistillode absent. *Female flowers*: Calyx 5-lobed, valvate, narrower than in male. Petals similar to sepals, narrow, usually much smaller than in male, sometimes setaceous, rarely obsolete. Disc composed of 5 short wide rather prominent glands alternating with the petals. Ovary 3-celled, clothed either with stellate hairs or with flat peltate denticulate or subentire scales; styles 3, erect, often very thick, bifid; branches entire, spreading, usually red, rarely purplish-red or orange; ovules solitary in each cell. *Capsules* 3-celled, at first somewhat fleshy, usually tinctorial when red, purple or purplish white when ripe, occasionally non-tinctorial when grey or nearly black, smooth, tuberculate, clothed with stellate hairs or with flat pectinate or subentire scales. *Seeds* ecarunculate; testa smooth or somewhat rugose; albumen fleshy; cotyledons broad;

Type species: *C. tinctoria* (L.) A. Juss.

Distribution: NE. Trop. Africa, Mediterranean regions, W. Asia to India, Thailand, Indo-China and also in Java.

KEY TO THE SPECIES

- 1a. Ovary and capsules lepidote, but never stellate-pubescent. Sect. I. CHROZOPHORA
 - 2a. Leaves twice as long as broad; ripe carpels bluish-purple ... 1. *C. oblongifolia*
 - 2b. Leaves not much longer than broad; ripe carpels reddish-purple ... 2. *C. hierosolymitana*
- 1b. Ovary and capsules stellate-pubescent, but never lepidote ... Sect. II. PLICATAE
 - 3a. Capsules purple; stigmas red ... 3. *C. rottileri*
 - 3b. Capsules grey or black; stigmas orange. ... 4. *C. prostrata*

Sect. I. CHROZOPHORA

Section *Tinctoriae* Pax & Hoffm. in Engler, Pflanzenr. 57: 21. 1912 (excl. *C. sabulosa*) et in Engler & Harms, Pflanzenfam. ed. 2, 19C: 91. 1931. Sect. *Lepidocarpa* Prain in Kew Bull. 1918: 98. 1918.

Anthers 2-verticillate; free portion of filaments longer than the united portion; ovary and capsules lepidote.

Type species: *C. tinctoria* (L.) A. Juss.

- 1. **Chrozophora oblongifolia** (Delile) A. Juss. ex Spreng. Syst. Veg. 3: 850. 1826; Pax & Hoffm. in Engler, Pflanzenr. 57: 25. 1912; Prain in Kew Bull. 1918: 100. 1918. *Croton oblongifolium* Delile, Fl. Egypte 139, t. 51, f.l. 1814; A. Juss. Euphorb. Tent. 28: 1824. *Chrozophora obliqua* (non A. Juss. ex Spreng. 1826) Muell.-Arg. in DC. Prodr. 15(2): 749. 1866, excl. syn. Wall. Cat. 7716 G; Boiss. Fl. Orient. 4: 141. 1879, excl. syn. Schweinf.; Hook. f. Fl. Brit. Ind. 5: 409. 1889, p.p.; Cooke, Fl. Pres. Bomb. 2: 607. 1906, ibid. Repr. ed. 3: 104. 1958; Blatter in Rec. Bot. Surv. Ind. 7: 332. 1915. *Tournesolia obliqua* Franch. in Morot. J. Bot. 1: 135. 1887. *Chrozophora tinctoria* (non A. Juss. 1824) Schweinf. Beitr. Fl. Aethiop. 36. 1867. *Chrozophora tinctoria* var. *subplicata* (non Muell.-Arg. 1866) Boiss. l.c. 1141, p.p.

Chrozophora subplicata Pax & Hoffm. in Engler, l.c. 24. 1912, p.p.

Erect or suberect much-branched shrub, densely white or tawny stellate-tomentose. *Leaves* ovate, ovate-lanceolate, more or less lobed or incised, sub-entire, sinuate-toothed, rounded or cuneate at base, subobtusate at apex, 3.5×1.2 cm, usually with 2 glands beneath near the base of midrib, densely stellate-tomentose on both sides; main nerves few, prominent beneath; petioles 1.0-2.5 cm long; stipules linear, soon deciduous. *Flowers* in axillary bracteate racemes, the males towards the upper part, sessile, the females towards the lower part, pedicellate; bracts linear, ± 3 mm long, hairy. *Male flowers*: Sepals ± 3 mm long, densely stellate-tomentose. Petals thin, membranous, yellowish-white, ± 2.5 mm long. Stamens 5. *Female flowers*: Sepals triangular, acute, $\pm 2.5 \times 1.0$ mm, stellate-tomentose. Petals narrower and shorter than sepals, stellate-tomentose. Ovary clothed with silvery lepidote scales; styles 3, erect, ± 3 mm long, 2-fid to about half the way down. *Capsules* ± 7 mm diam., bluish purple in colour, covered with silvery lepidote scales with fringed margins. *Seeds* tuberculate.

Type specimen: Ajeraud, Egypt, *Delile* (non *vidi*).

Distribution: Sublittoral zones of NE. Coast of Africa, Sind and Rajasthan.

Specimens examined: INDIA: Sand dune area, Bikaner, Rajasthan, *Patil* 575 (CAL); Drosh, Punjab, *Drummond* 21494 (K). BALUCHISTAN: without locality, *Lace* 4089 (CAL).

2. *C. hierosolymitana* Spreng. Syst. Veg. 3: 850. 1826; Prain in Kew Bull. 1918: 109. 1918; Blatter in J. Bombay nat. Hist. Soc. 37: 408. 1934; Kitamura, Fl. Afghanistan 256. 1960. *Croton tinctorium* (non L.) sensu Russell, Aleppo 2: 265. 1794 pp. *Croton oblongifolium* Sieb. ex. Spreng. l.c. 1826 (non *Delile*, 1814). *Chrozophora sieberi* Presl, Bot. Bemerk. 109. 1844. *Chrozophora tinctoria* (non A. Juss.) sensu Stew-

art, Punjab Pl. 193. 1869; King, Pl. NW Prov. 15. 1870; Aitchison in Trans. Linn. Soc. Bot. n.s. 3: 108. 1880 et in J. Linn. Soc. Bot. 19: 186. 1881; Hook. f. Fl. Brit. Ind. 5: 408. 1887, quoad spec. capsulis lepidotis tantum. *Chrozophora verbascifolia* (non A. Juss.) Baill. Etud. Gen. Euphorb. 322. 1858, p.p.; Boiss. Fl. Orient. 4: 1141. 1879, p.p.; Pax & Hoffm. in Engler, Pflanzenr. 57: 26. 1912, p.p. *Chrozophora tinctoria* var. *hierosolymitana* Muell.-Arg. in DC. Prodr. 15(2): 749. 1866, p.p. *Chrozophora obliqua* (non A. Juss.) Muell.-Arg. l.c. p.p. et quoad Wall. Cal. 7716 G tantum; Hook. f. Fl. Brit. Ind. 5: 409. 1887, excl. spec. Sind. *Chrozophora obliqua* var. *hierosolymitana* (Spreng.) Duthie, Fl. U. Gang. Pl. 3: 105. 1915.

Annual erect herbs; main stem woody. *Leaves* ovate or subrhomboid, longer than wide, truncate, rounded or broadly cuneate at base, obtuse or subobtusate at apex, subentire, wavy, undulate or distantly dentate at margins, $2.0-6.5 \times 1.5-5.0$ cm, densely or sparsely tomentose on both sides; petioles 1.5-5.5 cm long, densely tomentose. *Male flowers* sessile, crowded at the top of the bracteate raceme. Calyx rounded, ovoid; segments 5, ± 3 mm long. Petals 5, linear ± 2.5 mm long, densely lepidote. Stamens 4-5, rarely 6-8, united below. *Female flowers* solitary, scattered at the lower part of the raceme, pedicelled. Calyx segments 5, linear lanceolate, ± 3 mm long. Petals narrow or obsolete. Disc glands short, broad. *Capsules* 6-8 mm diam., reddish-purple, distinctly muricate when mature, covered with silvery scales. *Seeds* globose.

Type specimen: Gethsemane, Syria, *Sieber* s.n. (non *vidi*).

Distribution: Widespread from Egypt and Turkey to Pakistan and NW. India.

Specimens examined: INDIA: Churu, Rajasthan, *Puri* 39933 (BSI); Ambala, *Edgeworth* 127 (K); Ferozpur, *Thomson* 1473 (K). PAKISTAN: Hazara, *Duthie* s.n. (K); Shahpur,

Drummond 6347 (K); Rawalpindi, *Aitchison* 533 (K); Saidu Sharif Village, Swat State, *Rodin* 5429 (K).

Sect. II. PLICATAE

Section *Plicatae* Pax & Hoffm. in Engler, *Pflanzenr.* 57: 19. 1912. Sect. *Trichocarpa* Prain in Kew Bull. 1918. *Chrozophora* Sect. I. Muell.-Arg. in DC. Prodr. 15(2): 747. 1866.

Anthers 2-3-verticillate; stigmas orange or red; capsules stellate-pilose, never lepidote, purple or greyish black.

Type species: *C. rottleri* (Geis.) A. Juss. ex Spreng.

3. *C. rottleri* (Geis.) A. Juss. ex Spreng. Syst. Veg. 3: 850. 1826; Thwaites, Enum. pl. Zeyl. 443. 1864; Pax & Hoffm. in Engler, *Pflanzenr.* 57: 19. 1912; Prain in Kew Bull. 1918: 95. 1918; Haines, Bot. Bih. Or. 2: 103. 1921; Gamble, Fl. Pres. Madras 1317. 1925, *ibid.* Repr. ed. 2: 921. 1957; Santapau in Rec. Bot. Surv. Ind. 16(1): 280. 1953. *Croton tinctorium* (non L.) Burm. f. Fl. Ind. 304 (204), t. 62, f. 1. 1768. *Croton hastatus* (non L.) Burm. f. l.c. 305 (205), t. 63, f. 1. 1768. *Croton molluccanum* sensu Willd. Sp. Pl. 4(1): 551. 1805 (non L.). *Croton rottleri* Geis. *Croton Monogr.* 54. 1807. *Croton asperum* Koen. ex Roxb. Hort. Beng. 104. 1814, n.n. *Croton burmanni* Spreng. Syst. Veg. 3: 1826. *Croton plicatum* (non Vahl) Roxb. (Hort. Beng. 69. 1814, n.n.) Fl. Ind. 3: 681. 1832. *Chrozophora plicata* (non A. Juss.) Voigt, Hort. Sub. Calc. 156. 1846; Dalz. & Gibs. Bombay Fl. 233. 1861; Stewart, Punjab Pl. 192. 1869, p.p.; King, Fl. NW. Prov. 15: 1870, p.p.; Prain, Beng. Pl. 994. 1903; Cooke, Fl. Pres. Bombay 2: 607. 1906, *ibid.* Repr. ed. 3: 104. 1958. *Chrozophora tinctoria* (non A. Juss.) Hook. f. Fl. Brit. Ind. 5: 408. 1887, p.p.; Cooke, l.c. 606. 1906, *ibid.* Repr. ed. 2: 104. 1958. *Chrozophora plicata* B. Watt, Dict. Econ. Prod. Ind. 2: 620. 1889. *Tournesolia plicata* O. Kuntze, Rev. Gen. Pl. 2: 621. 1891.

Annual or sometimes perennial herbs or

undershrubs, erect, diffusely branched, densely hispid or stellate-tomentose; hairs rough, sessile, silvery. *Leaves* cauline, broadly ovate-orbicular to oblong, sometimes elliptic-lanceolate sinuate-toothed or undulate-crenate, entire or trilobed, truncate or cuneate at base, rounded or subacute at apex of lobes, 3-7(-10) × 2-6(-9) cm, sometimes broader than long, often plicate-rugose, densely tomentose on both sides, 2-glandular beneath at the base of midrib; petioles upto 10 cm long, stellate-tomentose, silvery. *Flowers* in axillary or terminal bracteate racemes, 2.5-8.0 cm long, equal to or exceeding the uppermost leaves; bracts linear, ± 3 mm long, caducous. *Male flowers*: subsessile, crowded at the upper part of raceme. Calyx globose or ovoid, splitting into 5 equal valvate sepals, glabrous inside, stellate-tomentose outside. Petals 5, elliptic-oblong, yellow with peltate silvery scales outside, sparsely hairy inside. Disc obscure. Stamens 5-15; filaments connate below into a column in 1-3 series; anthers oblong; cells parallel, contiguous. Pistillode absent. *Female flowers* pedicelled, arranged at the lower part of the raceme. Sepals 5, narrow. Petals 5, narrowly setaceous or obsolete, yellow. Disc of 5 short broad glands alternating with petals. Styles 3, each bifid, erect or spreading, tomentose at lower portion and reddish-papillose above. *Capsules* almost fleshy, subglobose, ± 1 cm diam., stellate-tomentose, reddish-purple when mature, tinctorial when wetted; stalk 5-10 mm long, style persistent; seeds estrophiolate, ± 3 mm diam., shiny.

Type specimen: Tranquebar, Madras State, *Rottler* in Herb. Wallich (non vidi).

Distribution: Throughout India, S. Pakistan, Bangla Desh, Burma, Thailand, Indo-China and also in Java (van Steenis in Bull. Bot. Gard. Btzg. ser. 3, 399, 1948). In India this species is common from Rajasthan to Bengal, from Maharashtra to Coromandel coast and down to Cape Comorin and Andaman Islands.

Notes: Leaves show extreme variation. The normal form is 3-lobed, ovate-orbicular to rounded and quite often they are oblong, almost entire, without lobes and very rarely they are elliptic-lanceolate, acute at apex and cuneate at base. All these variations can often be seen in one and the same plant and gradations from one form to another is also not uncommon. Hence delimitation into subspecific taxa is rather impossible.

Specimens examined: INDIA: Andhra Pradesh: Salur, Srikakulam Dt., *Balakrishnan* 1160 (CAL); Kandlamadugu, Chittoor Dt., *Fischer* 4419 (CAL); Guntur, Kistna Dt., *Gamble* 18604 (MH); Narasapur, Medak Dt., *Sebastine* 79924 (MH); Sudikonda, E. Godavari Dt., *Wagh* 1618 & 1620 (BLAT); Rajmundhry, *Wagh* 6220 (BLAT); Puttaparthi, Anantapur Dt., *Wagh* 6220 & 6221 (BLAT); Samalkota, Herb. Roxb., *Wallich* 7716 A (CAL). Assam: Gauhati, *King's Collector* s. n. (CAL). Gujarat: Sevalia, Kaira, *Chibber* 554 (BSI); Kabiwad, Broach, *Gammie* s.n. (BSI); Broach, *Jain* 2447 & 17537 (BSI); Ankaleshwar, *Kanetkar* 151 (BSI); Rajkot, *Santapau* 13615, 13631, 14423, 14424, 15027 & 15028 (BLAT); Unai, Dangs forest, *Santapau* 18169, 18170 & 18173 (BLAT); Surat, *Santapau* s.n. (BLAT); Broach; *Shah* 1265, 1318, 1319 & 1320 (BLAT); Baroda, Karelibag Road, *Shah* 3029 (BLAT). Madhya Pradesh: Bhopal, *Fernandez* s.n. (BLAT); Jubbalpur, *Hole* 251 (CAL); Kappa, *Merchant* 931, 932 & 933 (BLAT); Gwalior, *Miars* 282 (CAL); Linga Tamia, *Santapau* 22521 (BLAT); Rewa, *Sebastine* 10019 (MH). Maharashtra: Poona, *Bhidie* 77 (BSI); Poona, *Cooke* s.n. (K); Karli, *Gammie* 15115 (BSI); Lonavla, *Irani* 627 (BLAT); Lonavla, *Jain* 2447 (BSI); Sholapur, *Jain* 19967 A (BSI); Katraj, *Mahajan* 618 (BSI); Vihar Lake, *Merchant* 761 (BLAT); Ganeshkhanda, *Paranjape* s.n. (BSI); Girgaon, *Patel* s.n. (BLAT); Gondaria, *Puri* 50758 (BSI); Sangam Bridge, Poona, *Razi* 5077 (BLAT); Bombay, *Santapau* 9934, 9935 & 9936

(BLAT); Khandala, *Santapau* 24673 (BLAT); Tana, N. Konkan, *Sedgwick* 3645 (BLAT); Concan, *Stocks* s.n. (CAL); Nagpur, *Subramanyam* 4605 (MH); Goregaon; *Tavakari* 846 & 847 (BLAT); Bandra, *Salsette*, *Vakil* 35310 & 35480 (BLAT). Karnataka: Ranibennur, Dharwar, *Burns* s.n. (BSI); Bangalore, *Cameron* 224 (K); Alnawar, N. Kanara, *Jain* 16004 (BSI); Shirguppi, Dharwar, *Sedgwick* 2153 (BLAT); Dharwar, *Sedgwick* 27753 (BLAT); Dharwar, *Sedgwick & Bell* 4186 (BLAT); Gonah Falls, Belgaum Dt., *Sedgwick & Bell* 5718 (BLAT); N. Kanara, *Talbot* 919 (CAL); Bomantulli, near Dharwar, *Talbot* 270 A (BSI); Maisor, *Thomson* 24 (CAL). Orissa: Helei Village, Athmallick State, *Mooney* 2883 (CAL); Jambu, Mahanadi Delta, *Mooney* 3415 (K); Sukinda, *Panigrahi* 8304 (ASSAM). Rajasthan: Malwa, *Jerdon* s.n. (CAL); Jolana, Banswara, *Kanodia* 51198 (BSI). Tamil Nadu: Coimbatore, *Fischer* 863 (CAL); Pandalagudi, Ramnad Dt., *Maduram* 21835 (MH); Gingee R.F., *Ramamurthy* 13014 (MH); Uppilipalayam, Tiruchirapalli Dt., *Sebastine* 6277 (MH); Varapalayam, Coimbatore Dt., *Subramanyam* 658 (MH); Periaruvi, N. Arcot Dt., *Subramanyam* 6075 (MH); Anamalai, *Wight* 2313 (CAL); Sivasamudram, *without coll. name* 10420 (MH). Uttar Pradesh: Ghazipur, *Bhattacharya* 13743 (BSD), Palibhat, *Inayat* 22495 (K, CAL). Jarwa, *Malhotra* 12129 (BSD). West Bengal: Manbhum, *Campbell* 8765 (CAL); without locality, *Clarke* 11748 (CAL); Sunderbans, *Clarke* 33360 (CAL); Calcutta, *Helper* 539 (CAL); without locality, *Hooker* s.n. (CAL); Sunderbans, *Jonardhan* s.n. (CAL); Sibpur, *Kurz* s.n. (CAL); Malda, *Vicary* s.n. (CAL); Cal. Bot. Garden, *Wallich* 7716 H (CAL). BANGLA DESH: Jamalpur, *Allen* 47 (CAL); Chatak, Sylhet Dt., *Deka* 12833 (ASSAM); Kusthia, *Kurz* 4167 (CAL). BURMA: Kyouski, *Abdul Huk* s.n. (CAL); Inle Lake, S. Shan State, *Annandale* 177 (CAL); Mehtita, U. Burma, Col-

lett 54 (CAL); Kaletmyo, Dickason 7172 (CAL); Irrawady, Prome, Gage s.n. (CAL); Sagung, King's Collector 416 (CAL); Martaban, Pegu, Kurz 1545 (CAL); Shinday, Henzada, Shaik Mokim 1501 (CAL); Irrawady, Shaik Mokim 1599 (CAL). PAKISTAN: Banda, Bell 85 (CAL); Sind, Dalzell s.n. (CAL).

4. **C. prostrata** Dalz. in Dalz. & Gibs. Bombay Fl. 233. 1861; Cooke, Fl. Pres. Bombay 2: 607. 1906; *ibid.* Repr. ed. 3. 105. 1958, excl. specim. Africae; Prain in Kew Bull. 1918: 90. 1918; Haines, Bot. Bih. Or. 2: 103. 1921; Gamble, Fl. Pres. Madras 1316. 1925; *ibid.* Repr. ed. 2: 921. 1957; Santapau in Rec. Bot. Surv. Ind. 16(1): 280. 1953. *Croton plicatum* (non Vahl) Ham. ex Wall. Cat. 7716 C & D. 1830, n.n. *Croton tinctorium* (non L.) Wall. Cat. 7716 B. 1830, n.n. *Croton lanuginosum* (non Baill.) Schum. ex. Schweinf. Pl. Quaed. Nilot. 10. 1862. *Chrozophora plicata* var. *genuina* Muell.-Arg. in DC. Prodr. 15(2): 747. 1866, quoad specim. Ind. sed. syn. omn. exclud. *Chrozophora plicata* var. *prostrata* Muell.-Arg. l.c. 747 quoad syn. *Chrozophora plicata* var. 3. Hook. f. Fl. Brit. Ind. 5: 440. 1887. *Chrozophora plicata* (non A. Juss.) Stewart, Punjab Pl. 192. 1869 p.p. King, Pl. NW. Prov. 15. 1870, p.p.; Pax & Hoffm. in Engler, Pflanzenr. 57: 19. 1912, p.p.

Annual herbs, stellately pubescent; branches numerous, erect, procumbent or prostrate, spreading from the rootstock, woolly tomentose. Leaves both radical and cauline, broadly ovate, suborbicular, oblong or oblong-lanceolate, obtuse or subacute, cordate or truncate at base, 1.5 × 0.5-3.5 cm, sometimes with 2 glands at base near the petiole on either side of the midrib, usually deeply bullate, plicate-rugose or rarely smooth, finely pubescent and with some stipitate hairs above, densely stellate-woolly beneath; petioles 3-6 cm long on radical leaves, 1-3 cm long on cauline leaves, woolly-tomentose. Flowers in

short few-flowered axillary racemes; bracts linear, ± 5 mm long. Male flowers: Sepals ovate, ± 3 mm long. Petals elliptic-lanceolate, ± 2.5 mm long. Stamens 15 in 2 whorls. Female flowers: Sepals linear-acute, ± 2 mm long. Petals linear, smaller and narrower than sepals. Styles ± 2.5 mm long, slightly connate at the base, 2-fid for more than half way down; stigma orange-coloured. Capsules ± 7 mm diam., stellate-woolly, greyish-black, nontinctorial.

KEY TO VARIETIES

- 1a. Leaves ovate-oblong, suborbicular, obtuse, usually eglandular, but sometimes with 2 glands at base near midrib; branches prostrate, procumbent ... var. (1) *prostrata*
- 1b. Leaves oblong-lanceolate, elliptic, subacute, always with 2 glands at base beneath near the midrib; branches erect ... var. (2) *parvifolia*

(1) var. **prostrata**

Type specimen: Bombay, Dalzell s.n. (K, CAL).

Distribution: From Punjab and Upper Gangetic Plain southward to Coromandel Coast in peninsular India. Very common in Gujarat and Maharashtra States but absent in Kerala and Assam.

Specimens examined: INDIA: Andhra Pradesh: Hyderabad, Sebastine 5959 (MH); Narasapur, Medak Dt., Sebastine 7985 (MH); Rajmundhry, Wagh 1907 & 1908 (BLAT); Kistnadevipeta, Vizagapatnam Dt., *without coll. name* 11737 (MH). Gujarat: Anand, Abraham 1 (CAL); Dwarka, Dhruna 3 & 19 (BLAT); Ankaleshwar, Jain 17438 (BLAT); Broach, Jain 17611 (BSI); Unai, Dangs Forest, Santapau 18168 & 18231 (BLAT); Baroda, Shah 1813, 1814 & 2034 (BLAT); Broach, Shah 6303, 6304, 6924, 6925, 6969, 6993 & 6995 (BLAT); Baroda-Karelibag Road, Shah 6815 & 6816 (BLAT); Baroda, on way to Harni, Shah 6838 & 6839 (BLAT); Marve-Madh Road, Shah 8422 (BLAT); Malad, Shah 8616 (BLAT). Madhya Pradesh: Near Hewra, Khandwa Dt. Duthie

8421 (CAL); Goona, King 34 (CAL); Samarde, Bhopal, Puri 48235 (BSI). Maharashtra: Salsette, Acland 1119 (BLAT); Ahmednagar, Acland 1133 (BLAT); Bassein, Thana Dt., Bhidie s.n. (BLAT); Vehar Lake, Bole 1339 (BLAT); Karli, Gammie 15092 (BSI); Shiravli, Thana Dt., Gammie 2325 (BSI); Barsi, Garade s.n. (BSI); Borivli, Herbert 574, 1530 & 1540 (BLAT); Poona-Bombay Road, Jain 11868 (BSI); Karvi, Jain 17749 (BSI); Borivli, Kalaniwalla 16, 106 & 119 (BLAT); Nasik, Kanetkar s.n. (BSI); Poona, Kanetkar s.n. (BSI); Alandi, near Poona, Kanetkar s.n. (BSI); Kalas, Kanetkar s.n. (BSI); Dhulia, Mukti Lake, Khandesh, Mahajan 6695 (BSI); Sholapur, Patel s.n. (BLAT); Wadgaon, Poona Dt., Ryan 1857 (BSI); Bombay, Santapau 3932; 3960 (BLAT); Panvel, Santapau 15623 (BLAT); Dongergon, Ahmednagar Dt., Sedgwick & Bell 6279 (BLAT, CAL); Aarey Colony, Goregaon, Shah 1813 & 1814 (BLAT); Mumbra, Shenoy 2580 (BLAT); Mundgod, Talbot 359 (BSI); Goregaon, Tavakari 469 & 896 (BLAT). Karnataka: Godavli, N. Kanara, Fernandes 1359 (BLAT); Dharwar-Kalegati Road, Irani 1813 (BLAT); Dundshi, Dharwar Dt., Sedgwick 2395 (BLAT); Gokak, Belgaum Dt., Sedgwick & Bell 5696 (BLAT); Dharwar, N. Kanara, Talbot 270 (CAL); N. Canara, Talbot 359 (CAL); Maisor, Thomson s.n. (CAL). Tamil Nadu: Palur, S. Arcot Dt., Barber 8305 (CAL, MH); Madras, Griffith s.n. (CAL); Shevaroy Hills, Perrottet 77 & 404 (CAL). Uttar Pradesh: Mirzapore, Griffith s.n. (CAL); Gorakpur, Harsakh 22494 (CAL); Bahriach, Oudh, Inayat s.n. (CAL); Kheri, Oudh, Inayat 22494 (CAL); Lucknow, Jerdon s.n. (CAL); Chitrakoot, Banda, Rau 3786 (BSD); North Oudh, Thomson s.n. (CAL). PAKISTAN: Lahore, Thompson 1508 (K).

- (2) var. **parvifolia** (Klotz. ex Schweinf.) Balakr. comb. nov. *Chrozophora parvifolia* Klotz. ex Schweinf. Pl. Quaed. Nilot. 110. 1862; Prain in Kew Bull. 1918: 91. 1918;

Gamble, Fl. Pres. Madras 1316. 1925; *ibid.* Repr. ed. 921. 1957; Mooney, Suppl. Bot. Bih. Or. 248. 1950. *Croton plicatum* (non Vahl) Willd. Sp. Pl. 4: 538. 1805, quoad specim. Ind. Cit. sed. syn. omn. exclud.; Klein ex Schweinf. Pl. Quaed. Nilot. 10. 1862. *Chrozophora plicata* var. *prostrata* Muell.-Arg. in DC. Prodr. 15(2): 747. 1866, p.p., quoad syn. Klein et Klotzsch tantum. *Chrozophora plicata* var. 2. Hook. f. Fl. Brit. Ind. 5: 410. 1887.

Herb; branches woody, erect or decumbent; leaves oblong-lanceolate, elliptic, subacute at apex, always with 2 glands beneath near the base of midrib.

Distribution: Rajasthan, Upp. Gangetic Plain, Madhya Pradesh and E. Coast of Peninsular India.

Notes: Prain (l.c.) treats this as a separate species and distinguishes *C. parvifolia* from *C. prostrata* by the former having glands and the latter not having glands on lower surface of leaves at base of midrib. After examining many leaves of both taxa it is found that this is not a constant distinguishing character as many specimens of *C. prostrata* are also found to possess two glands at the base of leaves on lower surface. The only two apparently reliable characters which distinguish these two taxa are the erect or decumbent branches and narrower leaves of *C. parvifolia* and the prostrate branches and broader leaves of *C. prostrata* and hence the former is treated here as a variety of the latter.

Specimens examined: INDIA: Andhra Pradesh: Chidura, Godavari Dt., Barber 4982 (CAL, K); Anantapur, Gamble 21167 (K). Madhya Pradesh: Bundelkhand, Edgeworth 8029 (K). Orissa: Bhawanipatna, Kalahandi, Mooney 3564 (K); Chilka Lake, Hooper 39598 (CAL). Rajasthan: Shakrai, near Lohargal, Nair 2036 (BSD); Nagkund, near Lohargal, Nair 2079 (BSD). Tamil Nadu: Madras, Griffith s.n. (CAL). Uttar Pradesh: Lucknow, Anderson s.n. (CAL); Mahruli, near Delhi, Drummond 6356 & 6358 (K).