

## A checklist of the genus *Ixora* L. (Rubiaceae) in Thailand

VORADOL CHAMCHUMROON\*

ABSTRACT. A checklist of *Ixora* in Thailand is presented. The following 27 species are recognized. A key to the species, ecological data and geological distribution are provided.

*Ixora* L. is a genus of trees and shrubs within the Rubiaceae. *Ixora* contains 563 species according to Govaerts *et al.* (2006), some of which are ornamental plants such as *I. coccinea* L. The highest numbers of species occur in southeast Asia and Malaysia reaching a maximum in Borneo (Bremkamp, 1937a) although the genus is pantropically distributed.

The systematics of *Ixora* at generic level is quite well understood, but the delimitation of species is not. Thus there have been both confusion and superfluity in nomenclature. The most recent accounts of the genus are those of Bremkamp (1937b) and Corner (1941), the latter dealing with Malayan taxa. Thus there is no modern guidance to identification for *Ixora* species. The Rubiaceae is one of the largest families not yet treated for the Flora of Thailand, and *Ixora* represents one of the most problematic genera of the family, with the limits of many species needing to be clarified.

In Thailand, Craib (1934) listed *Ixora* in the *Florae Siamensis Enumeratio* and enumerated about 38 species and seven varieties. Boonbundral (1978) carried out a preliminary study of the genus *Ixora* in Thailand with 23 species and 3 varieties. In peninsular Malaysia only 20 species of *Ixora* were recorded from the lowlands and mountains (Corner, 1941).

### MATERIALS & METHODS

The *Ixora* treatment for the Flora of Thailand is based on the examination of 1,200 specimens from Thailand at the following herbaria: AAU, BK, BKF, C, K, PSU, QBG, W and WU. Abbreviations follow Holmgren & Holmgren (1990). Comparative morphology was used to delimit species in all cases. A list of the specimens of each species consulted indicating the herbaria in which they are kept is available from the author by email on request.

---

\* Forest Herbarium (BKF), National Park, Wildlife and Plant Conservation Department, 61 Phahonyothin Rd., Chatuchak, Bangkok 10900, Thailand. email: voradol@yahoo.com.

## TAXONOMIC TREATMENT

## IXORA

L., Sp. Pl.: 110. 1753; Gen. Pl. [ed. 5: 48. 1754]; [ed. 8 curante Schreber: 70. 1789; [ed. 9 curante Sprengel: 90. 1830]; De Candolle, Prodr. 4: 485. 1830; Hook.f., in Benth. & Hook.f., Gen. Pl. 2: 113. 1873; Hook.f. in Fl. Brit. Ind. 3: 137. 1880; Boerlage, Handl. Fl. Ned. Ind. 2: 134. 1891; Schumann in Engler & Prantl, Nat. Pfl. fam. 4,4: 107. 1897; King & Gamble, Mat. Fl. Malay Penins. 15: 70. 1904; Pit. in H. Lecomte, Fl. Indo-Chine 3(3): 303. 1924; Ridl., Fl. Malay Penins. 2: 89. 1923; Bremek., Bull. Jard. Bot. Buitenzorg, ser. 3, 14: 198. 1937; Backer & Bakh.f., Fl. Java 2: 324. 1963; Merr., Fl. Manila: 451. 1968; Wong in Tree Fl. Mal. 4: 356. 1989. Lectotype: *I. coccinea* L. (designated by Hitchcock & Green 1929).— *Schetti* Adans., Fam. Pl. 2: 146. 1763. Type species: unknown.— *Sideroxyloides*, Jacq. Select. Stirp. Amer. Hist. 19, t.: 175. 1763. Type species: *S. ferrum* Jacq.— *Siderodendrum* Schreb., Gen. Pl.: 71. 1789. Type species: *S. floribundum* Schreb. — *Eumachia* DC., Prodr. 4: 478. 1830. Type species: *E. carnea* DC.— *Bemsetia* Raf. Sylva Tellur.: 12. 1838. Type species: *B. paniculata* Raf.— *Panchezia*, Montrouz., Mâm. Acad. Roy. Sci. Lyon Sect. Lett., 10: 223. 1860. Type species: *P. collina* Montrouz.— *Charpentiera* Viell., Bull. Soc. Linn. Normandie 9: 346. 1865. Type species: *C. bracteata* Viell.— *Hitoa* Nadeaud, Journ. Bot. (Morot) 13: 2. 1899; Krause, in Engler & Prantl, Nat. Pfl. Fam. Nachtr. 3: 329. 1908. Type species: *H. moreensis* Nadeaud.— *Thouarsiora* Homolle ex Arânes, Notul. Syst. (Paris), 16: 19. 1961. Type species: *T. littoralis* Homolle ex Arânes.— *Ixora* Lam., Encycl. 3: 342. 1789, p.p.; Roxb., Fl. Ind.: 126. 1820, p.p.; Bentham, Fl. Austral. 3: 413. 1866, p.p.; Kurz, For. Fl. Burma 2: 15. 1877, p.p.; von Mûller, Syst. Census Austral. Pl.: 74. 1882, p.p.; Baillon, Adansonia 12: 213. 1878, p.p.; Kuntze, Rev. Gen. Pl.: 287. 1891, p.p.— *Pavetta* sect. *Ixora* Bl., Bijdr. Fl. Ned. Ind.: 949. 1826; Korthals, Ned. Kruidk. Arch. 2,2: 261. 1851; Miquel, Fl. ind. Bat. 2: 264. 1857. *Pavetta* L.: A. Rich., Mâm. Fam. Rub.: 100. 1829, p.p.

Shrubs, to small or medium-sized trees, 1–8 m high, young twigs usually flattened, more rarely bisulcate, glabrous or more rarely pubescent, older branches smooth to corky, grayish to greenish or brown. Leaves opposite, petiolate or more rarely sessile; petioles up to 1.5 cm long, glabrous or more rarely pubescent, often with cork rings, bases distinctly articulate; blades elliptic to obovate, more rarely ovate, apex usually acuminate but sometimes acute or obtuse, base attenuate to cordate, chartaceous to coriaceous, drying greenish to grayish to blackish brown, glabrous above, glabrous or more rarely pubescent underneath, the pubescence then restricted to the nerves or present on the whole surface; 6–14 pairs of lateral nerves; intersecondaries reticulate; margin entire and (somewhat) revolute. Stipules interpetiolar, limbs amplexicaul, basally fused to form a cone but free in their upper parts, truncate to triangular or more rarely ovate, apex bearing a short to long awn. Inflorescence terminal on main or lateral branches, corymbose to paniculate, congested to extremely lax, sessile or short to long pedunculate, in the latter case erect or drooping to pendulous, multiflorous or more rarely pauciflorous; branching trichotomous, articulate and opposite or non-articulate and non-opposite, bracts well developed to reduced or absent; if inflorescence pedunculate, then provided with 1(–2) pairs of (sub)sessile inflorescence-supporting leaves with rounded to cordate bases and usually much smaller than the vegetative

leaves, but with fully developed stipules; modified inflorescence-supporting leaves usually absent in sessile inflorescence; peduncle and inflorescence axes usually red to purplish, glabrous or variously pubescent; first order bracts with the stipular parts fused to an ovate blade with a central awn, the foliar part either absent or forming small leaves (in sessile inflorescences) or with or without stipular parts, the foliar parts connate, triangular and vaulted (in pedunculate inflorescences); higher order bracts with stipular parts absent, the foliar parts narrowly triangular and vaulted, fimbriate or filiform. Ultimate flower triads with flower sessile to long pedicellate (up to 2.5 cm), the pedicel of the central flower sometimes shorter than the pedicels of the lateral ones; bracteoles usually present on most pedicels, often connate and opposite at the base of ovary or on the pedicel or non-opposite along the pedicels, widely triangular to filiform or ovate, with obtuse to acuminate tips. Flowers 4-merous, hermaphrodite, fragrant, white, pale pink, or red shading orange, calyx together with ovary often red, glabrous to pubescent outside, often pubescent and always provided with colleters at the base of the lobes inside; tube usually short, truncate or dentate; lobes triangular to linear or ovate with rounded to acuminate tips, their bases sometimes overlapping; corolla white, pink, yellow, orange or red, the colour usually darker in bud and corolla lobes paler than tube, glabrous or more rarely pubescent outside; tube cylindrical, slender, slightly widening at the throat, 0.5–8 cm long; lobes contorted to the right in bud, spreading or reflexed at anthesis, with obtuse to acuminate eccentric apices, mostly glabrous at the adaxial side but sometimes with long spreading hairs near the throat; stamens exerted at anthesis; filaments 0.5–10 mm long, inserted at the throat of the corolla tube; anthers linear, basifixed to inframedifixed, bases sagittate, apex with a sterile appendage; ovary small, usually cup-shaped, 2-locular, glabrous to pubescent outside, its wall containing many tannins; ovule anatropous to hemi-anatropous, pendulous, attached to the upper half of the massive septum, with adaxial obturator; style slender, exerted, usually glabrous; stigma bilobed or rarely 3–4-lobed, lobes often recurving. Fruits drupaceous, more or less bilobed, with persistent calyx, red or black when ripe, containing (1–)2 one-seeded pyrenes; pyrenes hemispherical to hemiovoid, with convex abaxial side and flat subapically perforated adaxial side, leathery to crustaceous to stony, often with performed germination slit(s); seed ± the same shape as the pyrenes, reddish brown, with large adaxial excavation continuing into a basal vertical groove; extreme thickening of the seed-coat around the adaxial excavation absent; endosperm horny, in some species showing traces of rumination around the adaxial excavation; embryo dorsal, somewhat curved, with foliaceous cotyledons; radicle inferior.

Twenty-nine taxa of *Ixora* have been recorded in Thailand. Three species are identified as new to science but are withheld until good flowering and fruiting material are available.

#### KEY TO THE SPECIES OF IXORA IN THAILAND

1. Branchlets of inflorescence never opposite (though sometimes subopposite) and never articulate.  
Flowers rarely in distinct triads; pedicels never articulate
2. Leaf base rounded or cordate; leaves sessile or subsessile **3. *I. brunnescens***
2. Leaf base cuneate; leaves distinctly petiolate
3. Awn of stipule 5–7 mm long; corolla tubes 23–25 mm long, lobes (5–)5.5 mm long; southeastern Thailand only **9. *I. dolichophylla***
3. Awn of stipule 1–3 mm long; corolla tubes 7–10 mm long, lobes 2–4 mm long; peninsular Thailand only **12. *I. grandifolia***

1. Branchlets of inflorescence all opposite and articulate. Flowers in distinct triads; pedicels of lateral flowers articulate at base
4. Leaves drying blackish brown
5. Leaves (at least lower leaf surface) densely covered with short spreading hairs
6. Both lower and upper surface hairy; awn of stipule 10–20 mm long
  6. Only lower leaf surface densely covered with short spreading hairs; awn of stipule less than 10 mm long
    7. Stipule sheath 8–12 mm long and awn 5–8 mm long **4b. I. brunonis** subsp. **kratensis**
    7. Stipule sheath 5–6 mm long and awn 1–2 mm long **25. Ixora** sp. 1
5. Leaves entirely glabrous
  7. Stipule sheath 5–6 mm long and awn 1–2 mm long **18b. I. lucida** var. **densipila** [in part]
8. Anthers and exerted style and stigmas longer than or about as long as corolla lobes
9. Corolla tube 13–20 mm long; inflorescence sessile or subsessile (peduncles only to ca. 3 mm long) **11. I. fusca**
9. Corolla tube 20–35 mm long; inflorescence distinctly stalked (peduncles up to ca. 45 mm long) **20. I. nigricans**
8. Anthers and exerted style and stigmas shorter than corolla lobes
  10. Corolla tube puberulous both outside and inside
    11. Throat of corolla glabrous **18a. I. lucida** var. **lucida**
    11. Throat of corolla with long spreading hairs **18b. I. lucida** var. **densipila**
  10. Corolla entirely glabrous
    12. Leaf base cordate **15. I. kerrii**
    12. Leaf base never distinctly cordate
    13. Individual flowers subtended by large, conspicuous oblong-ovate bracteoles (6–10 x 2.5–4.5 mm) covering the ovary **24. I. umbellata** var. **multibracteata**
    13. Individual flowers partially subtended by much smaller bracteoles, reaching at most the middle of ovary
    14. Inflorescences pendulous, their stalks 10 cm or considerably longer **22. I. pendula**
    14. Inflorescences erect, their stalks much shorter than 10 cm
      15. Leaves up to 6.5(–10) mm long and up to 3.5 cm wide, with up to 8(–10) pairs of lateral veins; flowers white, fragrant **2. I. bracteolata**
      15. Leaves 10.5–19.5 by 4.7–7.2 cm, with 12–26 pairs of lateral veins; flowers orange, turning red, not fragrant **17. I. lobbii**
4. Leaves not drying blackish brown
  16. Calyx lobes leafy, oblong-ovate to oblong-lanceolate, at least twice as long as the calyx tube **10. I. finlaysonianana**
  16. Calyx lobes not leafy, narrowly triangular or linear, shorter than calyx tube or at least not more than twice as long
    17. Leaves (at least lower leaf surface) densely covered with short spreading hairs
      18. Leaf base cordate **4a. I. brunonis** subsp. **brunonis**
      18. Leaf base never distinctly cordate
        19. Leaves 27–33 by 9–10.5 cm **1. I. betongensis**
        19. Leaves considerably smaller, to 20 cm long and 8 cm wide at the most
          20. Awn of stipule 1–3 mm long; corolla tube 13–22 mm **21. I. opaca**
          20. Awn of stipule < 1 mm long; corolla tube 30–37 mm **16. I. lakshnakarae**
    17. Leaves entirely glabrous
      21. Leaf blades 10–20 cm wide
        22. Stipule sheaths 5–8 mm long, awn 3–4 mm **26. Ixora** sp. 2
        22. Stipule sheaths 2–3(–5) mm long, awn 1–2 mm **19. I. merguensis**
      21. Leaf blades to 10 cm wide, but usually less
        23. Awn of stipule 10–25 mm long **13. I. henryi**
        23. Awn of stipule always < 10 mm long
          24. Inflorescence (sub) sessile
            25. Leaf blades 2.5–7.5 mm long, stipule awn 1–2 mm long **7. I. cibdela**
            25. Leaf blades > 7.5 mm long, stipule awn 2–4 mm long
            26. Leaf blades 12–18 by 5–6.5(–7) cm, petioles 8–10 mm; stipular sheath 5–7 mm long, awn 2–3 mm long **27. Ixora** sp. 3

26. Leaf blades 8.5–12.0(–18) by 2–3.1(–5) cm, petioles 4–6 mm; stipular sheath 8–10 mm long, awn 3–4 mm long **23. *I. phuluangensis***
24. Inflorescence pedunculate
27. Flowers orange-red, sometimes fading orange-yellow, not fragrant **14. *I. javanica***
27. Flowers white or pinkish, often fragrant
28. Corolla tube 25–35 mm long **6. *I. cambodiana***
28. Corolla tube only up to 15 mm long
29. Corolla tube 5–12 mm long; leaf blades 20–29 cm long **5. *I. butterwickii***
29. Corolla tube 12–15 mm long; leaf blades 11.5–21.5 cm long **8. *I. diversifolia***

**1. *Ixora betongensis*** Craib, Bull. Misc. Inform. Kew 1910: 425. 1910; Fl. Siam. 2: 150. 1934. Type: Thailand, Yala, Betong, Kerr 7639 (holotype **K!**; isotype **BK!**).

Thailand.—PENINSULAR: Yala (Betong), Narathiwat (Waeng).

Distribution.—Endemic to Thailand.

Ecology.—Evergreen forest, along streams, ca. 300 m; flowering March, fruiting unknown.

Vernacular.—Khem betong (เข็มเบตง) (Central).

Notes.—Distinguished from *I. merguensis* Hook. f. by having hirsute lower leaf surfaces and glabrous corolla tubes. Given that the species occurs in the southernmost part of Thailand, it is likely that it can also be expected in neighbouring Malaysia.

**2. *Ixora bracteolata*** Craib, Bull. Misc. Inform. Kew 1932: 426. 1932; Fl. Siam. 2: 150. 1934. Type: Thailand, Trat, Ta Kum, Put 2887, (holotype **K!**; isotype **BK!**).

Thailand.—SOUTHEASTERN: Chanthaburi (Khao Soi Dao, Chantabun, Pong Nam Ron, Makhm), Rayong (Khao Chamao), Sa Kaeo (Khlong Nam Sai), Trat (Tha Kum); PENINSULAR: Nakhon Si Thammarat (Khao Klong Mi), Phatthalung (Khao Pu Khao Ya).

Distribution.—Endemic to Thailand.

Ecology.—Along streams in evergreen forest, 170–400 m; flowering March–Aug., fruiting Oct.–Dec.

Vernacular.—Kanlakahom (กัลละกะฮ้อม) (Chanthaburi).

Notes.—This species is related to *I. lucida* R. Br. ex Hook.f. and *I. eugenoides* Pierre ex Pit.. From the former it may be distinguished by the bracteoles being longer than the receptacle and the corolla tube being glabrous on the outside, and from the latter by the narrower stipules and calyx segments and the longer corolla tube.

**3. *Ixora brunnescens*** Kurz, J. & Proc. Asiat. Soc. Bengal 2: 317. 1872; For. Fl. Burma. 2: 24. 1877; Hook.f. in Fl. Brit. Ind. 3: 143. 1882; Brandis, Ind. Trees.: 389. 1921; Craib in Fl. Siam. 2: 150. 1934; Bremek., Jour. Bot.: 324. 1937. Type: Burma, Andaman Sea, Long Island, Parkinson 746 (lectotype **K!**, selected here; isolectotype **DD**, not seen).

Thailand.— PENINSULAR: Phangnga (Ko Similan, Ko Si, Ko Hok, Hat Thong Muang), Krabi (Ao Maya, Ko Pi Pi Le), Satun (Ko Tarutao), Trang (Ko Kradan).

Distribution.— Andaman and Nicobar Islands, Peninsular Thailand.

Ecology.— Beach forest and limestone forest near seashore; flowering Nov.–April; fruiting March–July.

Note.— *Ixora brunnescens* resembles *I. grandifolia* in its inflorescence but the leaves are very differently shaped and almost or altogether sessile.

**4. *Ixora brunonis*** Wall. ex G. Don, Gen. Syst., 3: 573. 1834; Kurz, For. Fl. Burma, 2: 20. 1877; Hook.f. in Fl. Brit. Ind., 3: 139. 1882; King & Gamble, Mat. Fl. Malay Penins. 15: 72. 1904; Brandis, Ind. Trees: 388. 1921; Ridl., Fl. Malay Penins. 2: 91. 1923; Craib in Fl. Siam. 2: 151. 1934; Corner, Gard. Bull. Straits Settlements. 11: 183. 1941; Wong, Tree Fl. Mal. 4: 356. 1989. Type: Malaysia, Penang, *Wallich* 6136 (holotype **K!**).

#### KEY TO THE SUBSPECIES

Petioles < 10 mm long, leaf blades oblanceolate or obovate, base cordate (Peninsular Thailand, Malay Peninsula) subsp. **brunonis**

Petioles mostly > than 10 mm, leaf blades elliptic or oblong, base rounded or cuneate (Southeast Thailand) subsp. **kratensis**

**4a. subsp. *brunonis***.— *I. brevidens* Craib, Bull. Misc. Inform. Kew 1932: 426. 1932; Fl. Siam. 2: 150. 1934. Type: Thailand, Huai Yang, *Put* 3253 (holotype **K!**; isotype **BK!**).

Thailand.— NORTHERN: Kamphaeng Phet (Sanfala); SOUTHWESTERN: Kanchanaburi (Khao Noi, Sang Khla), Phetchaburi (Thorthip Falls), Prachuap Khiri Khan (Hau Yang); PENINSULAR: Chumphon (Dan Chumphon), Ranong (Bunyapan Falls, Khlong Na Kha, Wat Tapotharam), Surat Thani (Ban Kop Kep, Chieo Lan dam, Khlong Phanom, Khao Sok), Phangnga (Nai Chong), Phuket (7th Day Adventist Hospital), Krabi (Ao Luk, Ao Nang, Khao Pra Bang Kram, Khao Phanom Bencha), Nakhon Si Thammarat (Chawang, Thung Song, Krung Ching Falls, Ka Rom Falls), Phatthalung (Khao Pu Khao Ya), Trang (Khao Chong, Khao Kaep, Khao Sung, Lumphura, Thung Khai), Satun (Ban Tan, Ko Tarutao, Thale Ban, Khuan Kalong), Songkhla (Hat Yai, Boripat Falls, Khao Kho Hong, Ban Rainuea), Narathiwat (Buketamon).

Distribution.— Southern Myanma and Tenasserim, Thailand, Peninsular Malaysia, Singapore.

Ecology.— Common in evergreen forest, 30–800 m; flowering Jan.–Sept., fruiting Oct.–June.

Vernacular. — Ngo (เงาะ) (Satun).

Notes.— *Ixora brevidens* Craib is a synonym of *I. brunonis* Wall. ex G. Don, Craib (1934) stated in the original publication of *I. brevidens* that it differs from *I. brunonis* in having a shorter indumentum on the lower surface of the leaf and shorter calyx segments. These characters are regarded as normal variations within the species. Both have the same floral characters.

**4b. subsp. *kratensis*** (Craib) V. Chamchumroon, Thai For. Bull. (Bot.) 33: 8. 2005.— *I. kratensis* Craib, Bull. Misc. Inform. Kew 1932: 427. 1932; Fl. Siam. 2: 159. 1934. Type: Thailand, Trat, Bo Rai, *Kerr* 9473 (holotype **K!**; isotype **BK!**).

Thailand.— SOUTHEASTERN: Rayong (Khao Cha Mao), Chanthaburi (Khao Soi Dao, Khao Sa Bap, Makham, Phlio Falls), Trat (Bo Rai, Dan Chumphon, Khao Saming, Khao Kop, Ko Chang, Huai Rang).

Distribution.— Endemic to Southeastern Thailand.

Ecology.— Common in evergreen forest, also in secondary forest, 150–900 m; flowering Aug.–Dec., fruiting Sept.–Jan.

Vernacular.— Khem khon (เข็มขน), nuan paeng (นวลเป้ง) (Southeastern).

Notes.— Craib (1932) stated in the original publication of *I. kratensis* that it differs from *I. brunonis* in having petiolate leaves and shorter corolla lobes and calyx segments. These differences, however, only hold for a few collections (e.g. *Kerr* 9473, *Put* 2936). The reproductive characters of the two are the same. *Ixora kratensis* Craib is, therefore, reduced to a subspecies of *I. brunonis*. The two subspecies only differ in some vegetative characters: subsp. *kratensis* has leaves with a cuneate to rounded base and oblong blades, subsp. *brunonis* always has leaves with a cordate base and oblanceolate or obovate blades.

**5. *Ixora butterwickii*** Hole, Ind. For. 14: 16. 1919; Ind. For. Rec. 7(4): 1. 1919; Craib, Fl. Siam. 2: 151. 1934; Bremek., Journ. Bot.: 172. 1937. Type: Burma, Yamethin Distr., Inbinyedwet, *Butterwick* 19978 (holotype **K!**, isotype **DD**).— *I. butterwickii* Hole var. *lepida* Craib, in Fl. Siam. 2: 152. 1934. Type: Thailand, Chiang Mai, Pang Tong, *Put* 3811 (holotype **K!**; isotype **BK!**).

Thailand.— NORTHERN: Chiang Mai (Ban Pan Mon, Ban Ta Fang, Doi Chiang Dao, Doi Pa Kluai, Doi Inthanon, Doi Lon, Doi Mae Sakut, Doi Meun, Doi Suthep, Mae Klang Falls, Mae Chaem, Mae Rim, Mae Ta, Huai Pan Si, Huai Pu, Pang Fean, Pang Tong, Pong Yaeng, Mae Mae), Chiang Rai (Doi Luang, Pang Tong), Kamphaeng Phet (Mae Wong), Lampang (Doi Khun Tan, Chae Son, Mae-A, Mae Li, Mae Yum, Pa Ma Hao), Mae Hong Son (Pai), Nan (Doi Phukha), Phrae (Hau Khamin, Hau Lo, Mae Sae), Phayao (Doi Luang), Sukhothai (Khirimat, Khao Luang), Tak (Thi Lo Su Falls), Uttaradit (Phu Soi Dao); NORTHEASTERN: Khon Kaen (Phu Khieo), Loei (Phu Luang); EASTERN: Nakhon Ratchasima (Pak Thong Chai); SOUTHWESTERN: Kanchanaburi (Ban Chakhae Yai, Khao Liao Long, Railoe, Sangkhla Buri, Tinuai forest protection unit); SOUTHEASTERN: Chanthaburi (Khao Soi Dao).

Distribution.— Central Myanmar and Thailand.

Ecology.— In hill evergreen forest or mixed deciduous forest, 900–1,300 m, rarely found in dry evergreen forest; flowering Nov.–May, fruiting Jan.–Aug.

Vernacular.— Khem pa (เข็มป่า) (Chiang Mai), khem phuang komen (เข็มพวงโกเมน) (Northern), khem phuang (เข็มพวง) (Southeastern).

Notes.— This species resembles *I. spectabilis* Wall. ex G. Don but the leaves are usually broader and with more numerous lateral nerves, with conspicuously articulate

inflorescence and considerably shorter calyx segments. The species is often confused with *I. cibdela* Craib but the latter has sessile or subsessile leaves, inflorescences with a peduncle not longer than 5 cm and shorter calyx and corolla lobes. Craib's (1934) var. *lepida* does not seem worth upholding; it refers to some collections (*Winit* 1681, etc.) with a shorter corolla tube but which, however, fall in the size range of other specimens.

**6. *Ixora cambodiana*** Pit. in H. Lecomte, Fl. Indo-Chine 3: 320. 1924; V. Chamchumroon, Thai For. Bull. (Bot.) 31: 7. 2003. Types: Cambodiana, without locality, *Jullien* s.n. (syntype **P**); Vietnam, Co-phah, between Hanoi and Bac-ninh, *Balansa* s.n. (syntype **P**).

Thailand.—NORTHEASTERN: Nakhon Phanom (Dong Bang-I); EASTERN: Buri Ram (Phanom Dong Rak).

Distribution.—Thailand, Cambodia, Vietnam.

Ecology.—Dry evergreen forest; flowering April–May, fruiting June–July.

Notes.—This species is closed to *I. diversifolia* but *I. cambodiana* does not produce inflorescence-supporting leaves, and the calyx lobes and corolla tube are longer than in *I. diversifolia*.

*Chamchumroon* 1472 was collected from a plant cultivated in the Rubiaceae section of the Northeastern Botanical Garden (Dong Fa Haun), Ubon Ratchathani. This plant had originally been collected in Khao Phanom Dong Rak Wildlife Sanctuary, Buri Ram.

**7. *Ixora cibdela*** Craib, Bull. Misc. Inform. Kew 1914: 127. 1914; Fl. Siam. 2: 153. 1934; Pit. in H. Lecomte, Fl. Indo-Chine 3: 329. 1924. Type: Thailand, Doi Sutep, *Kerr* 1706 (holotype **K!**; isotype **BK!**).—*I. grandifolia* Zoll. & Mor. var. *glabra* Craib, Bull. Misc. Inform. Kew 1911: 394. 1911; Pit. in H. Lecomte, Fl. Indo-Chine 3: 317. 1924. —Type: Thailand, Doi Sutep, *Hosseus* 178 (holotype **K!**).—*I. collinsae* Craib, Bull. Misc. Inform. Kew : 127. 1914; Pit. in H. Lecomte, Fl. Indo-Chine 3: 330. 1924. Type: Thailand, Sriracha, *Collins* 60 (holotype **K!**).—*I. cibdela* Craib var. *puberula* Craib in Fl. Siam. 2: 154. 1934. —Type: Thailand, Trat, Hui Reng, *Kerr* 17601 (holotype **K!**; isotype **BK!**).

Thailand.—NORTHERN: Chiang Mai (Doi Suthep, Mae Klang, Mon Tha Thong, Wiang Rong, Ob Luang), Lampang (Mae Li, Mae Kam, Mae Yom, Khun Tan), Mae Hong Son, Phrae, Phitsanulok (Phu Miang, Thung Salaeng Luang), Sukhothai (Muang Kao), Tak (Phumiphol dam, Lan Sang), Uttaradit (Huai Maeng Nao); NORTHEASTERN: Phetchabun (Chon Dan, Khao Phaya Po, Buengsamphan, Pak Tok), Loei (Phu Luang), Khon Kaen (Fai Pha Ya Nak, Thap Phaya Suea Falls), Mahasarakham (Pa Khok Dong Khaeng), Mukdahan (Phu Hin Thoep), Nong Khai (Bung Khla), Sakon Nakhon (Kum Phum Falls, Hui Nam Pung), Ubon Ratchathani (Phu Chan Dang); EASTERN: Chaiyaphum (Ban Chalongnaua), Nakhon Ratchasima (Ban Chum Saeng, Huai Thalang, Non Ra Wiang, Pak Thong Chai, Si Kio, Katok, Wang Nam Khiao); SOUTHWESTERN: Kanchanaburi (Linthin, Sisawat, Sangkhla Buri), Phetchaburi (Khao Son), Prachuap Khiri Khan (Huai Yang Falls, Hat Wanakorn, Khao Kradai, Pran Buri), Ratchaburi (Ko Lak), Uthai Thani (Huai Kha Khaeng); CENTRAL: Nakhon Nayok (Salika Falls, Nang Rong, Wang Ta Khrai Falls), Nakhon Sawan (Khao Mu Si), Saraburi (Phu Khae, Sam Lan Falls); SOUTHEASTERN: Chanthaburi (Chanthabun, Khlong Narai Falls, Khao Soi Dao, Khao Sabap, Laem Sing, Makhom, Khlong Mok, Krathing Falls),



Chon Buri (Chantatrain Falls, Hup Bon, Khao Din, Khao Khieo, Ko Samaesarn, Nong Kae, Nong Yai Bo, Laem Chabang, Satthahip, Sriracha), Prachin Buri (Khao E-To, Haew Narok Falls), Rayong (Ban Phae, Khao Cha Mao), Sa Kaeo (Ang Ruenai, Thap Phaya, Wathana Nakhon), Trat (Ban Rai, Huai Reng, Khao Saming, Ko Chang, Khlong Phlu Falls, Ko Kut, Than Ma Yom Falls); PENINSULAR: Chumphon (Khao Wiang), Surat Thani (Ko Samui).

Distribution.— Thailand, Cambodia.

Ecology.— Evergreen forest and mixed deciduous forest, 20–1,300 m; flowering Nov.–May, fruiting April–Nov.

Vernacular.— Khem ta kai (เข็มตาไก่), khem pa (เข็มป่า), khem doi (เข็มดอย).

Uses.— Roots, bark and leaves are locally used for medicinal purposes.

Notes.— According to Craib this species differs from *I. collinsae* in having pedunculate inflorescences and laxer flowers (Craib, 1934). This cannot be upheld as inflorescence structure is variable in *I. cibdela* (peduncle sizes range from relatively long to virtually absent). In addition, *I. cibdela* var. *puberula* Craib falls within the range of “typical” *I. cibdela* and should, therefore, be reduced to synonym status.

*Ixora grandifolia* var. *glabra*, originally described from Doi Suthep, has nothing to do with “typical” *I. grandifolia*, a species from peninsular Thailand, characterized by strikingly different (i.e. non-articulate) inflorescences.

**8. *Ixora diversifolia*** Wall. ex Kurz, For. Fl. Burma 2: 22. 1877; Hook.f., Fl. Brit. Ind. 3: 141. 1880; Ridl., Mat. Fl. Malay Penins. 15: 157. 1923; Fl. Malay Penins. 2: 96. 1923; Pit. in H. Lecomte, Fl. Indo-Chine 3: 315. 1924; Craib, Fl. Siam. 2: 150. 1934. Type: Myanma, Amherst, *Wallich* 6146 (holotype K!).— *I. pendula* Jack form 1 Corner, Gard. Bull. Straits Settlem. 11: 226. 1941. Type: Malaysia, no further locality data, *Wray* 3491 (type SING, not seen).

Thailand.— SOUTHWESTERN: Phetchaburi (Torthip Falls); PENINSULAR: Chumphon (Ka Por Falls, Ko Mattra), Ranong (Kapur, Ko Chang), Surat Thani (Ko Phangan, Ko Tao), Phangnga (Khao Tham Thing Lang, Ko Similan), Nakhon Si Thammarat (Khao Phra Mi, Khao Sun, Ko Hin Sung, Ko Kra), Trang (Khao Chong), Satun (Klaun Tan, Thung Wa, Thale Ban), Songkhla (Ton Nga Chang), Pattani (Khao Laivi).

Distribution.— Myanma (Tenasserim), Andaman Islands, Malay Peninsula.

Ecology.— Evergreen forest, 50–400 m; flowering March–May, fruiting Aug.–Dec.

Notes.— The corollas of this species are much shorter than those of *I. pendula*, moreover, they are white and the leaves are often broader. Nevertheless, the two species appear to be closely allied. Some specimens (e.g. *Kerr* 13913, *Kerr* 16610) seem to be atypical forms of this species.

**9. *Ixora dolichophylla*** K.Schum., Bot. Tidsskr. 24: 337. 1902; Pit. in H. Lecomte, Fl. Indo-Chine 3: 326. 1924; Craib, Fl. Siam. 2: 155. 1934. Type: Thailand, Ko Chang, *Schmidt* 813 (holotype C!).

Thailand.— SOUTHEASTERN: Chanthaburi (Khung Kraben), Trat (Ko Chang).

Distribution.— Endemic to Southeastern Thailand.

Ecology. — Evergreen forest; flowering Oct.–March, fruiting Feb.–April.

Notes.— In the original description, this species was compared with *I. fulgens* Roxb., but if *Kerr* 9272 is correctly identified the affinity to *I. merguensis* Hook.f. is much closer. In general appearance *I. dolichophylla* and *I. merguensis* are very similar but the calyx segments of the former are considerably shorter than those of the latter. *I. crassifolia* Merrill and *I. dongnaiensis* Pierre are probably also closely allied. It appears to be a very rare species confined to a small area in Trat and neighbouring Chanthaburi Province.

**10. *Ixora finlaysoniana*** Wall. ex G. Don, Gen. Syst. 3: 572. 1834; Pit. in H. Lecomte, Fl. Indo-Chine 3: 312. 1924; Craib, Fl. Siam. 2: 157. 1934; Corner, Gard. Bull. Straits Settlement. 11: 193. 1941; Backer & Bakh.f., Fl. Java. 2: 162. 1963; Merrill, Fl. Manila.: 451. 1968; Corner, Wayside trees Mal. 2: 637. 1988; Wong, Tree Fl. Mal. 4: 358. 1989; Ho, CÂY CỎ VIỆT NAM 3: 218. 1993. Type: Thailand, Bangkok, *Finlayson* s.n. (holotype **K!**).— *I. merguensis* Hook.f. var. *parvifolia* Williams in Bull. Herb. Boiss., Ser. 2: 954. 1905. Type: Thailand, Bangkok, *Zimmermann* 28 (holotype **K!**).

Thailand.— NORTHERN: Mae Hong Son, Nan (Tham Pa Tok), Chiang Mai (Ban Pong Noi, Doi Chiang Dao, Mae Rim, Mae Hat), Lampang (Ngao), Phrae (Mae Kon, Mae Kan), Uttaradit (Phudasom), Phitsanulok (Nakhon Thai); NORTHEASTERN: Loei (Wang Saphung), Nong Khai (Bung Khla), Sakon Nakhon (Phu Phan), Kalasin (Ban Din Suan); EASTERN: Nakhon Ratchasima (Pak Thong Chai, Sakaerat); SOUTHWESTERN: Uthai Thani (Ban Rai, Khao Hin Daeng), Ratchaburi (Ban Pong, Chom Bueng), Phetchaburi (Cha Am), Prachuap Khiri Khan (Pran Buri); CENTRAL: Chai Nat, Saraburi (Phu Khae, Sam Lan, Wat Prabat); SOUTHEASTERN: Chon Buri (Hup Farang, Khao Kheio, Nong Yai Bu, Sriracha), Chanthaburi (Pong Nam Ron); PENINSULAR: Trang (Khao Chong), Songkhla (Khao Rak Kiat).

Distribution.— India, Indochina, Thailand.

Ecology.— Evergreen forest, limestone forest; flowering Jan.–April, fruiting May–July.

Vernacular.— Khem phuang khao (เข็มพวงขาว), khem hom (เข็มหอม) (Chai Nat), khem khao (เข็มขาว) (Bangkok), Siamese White *Ixora*.

Uses.— Frequently cultivated as an ornamental all over the country.

Notes.— Both *I. finlaysoniana* and *I. umbellata* var. *multibracteata* have rather large, ± foliaceous calyx lobes, but in the latter also the bracteoles subtending individual flowers are large (in contrast, they are smaller and linear in *I. finlaysoniana*). *Kerr* 8910, erroneously identified as *I. acuminata* Roxb. (a species that does not occur in Thailand), belongs here. Because of the species frequent use as an ornamental flowering shrub, the general distribution range given above may not be the natural range but may include non-indigenous material (the type, for example, is undoubtedly from a cultivated plant). At least for Thailand, it can be said with certainty that the species also occurs in natural vegetation.

**11. *Ixora fusca*** Geddes, Bull. Misc. Inform. Kew 1927: 172. 1927; Craib, Fl. Siam. 2: 158. 1934. Type: Thailand, Sriracha, *Collins* 102a (holotype **K!**; syntype **BK!**).

Thailand.— NORTHERN: Lampang (Mae Pun, Mae Yom, Mae Sung), Phitsanulok (Kaeng Sopha, Thung Salaeng Luang); NORTHEASTERN: Nong Khai (Phu Tok Noi), Sakon Nakhon (Phu Phan), Kalasin (Ban Kham Bong), Khon Kaen (Pa Dong Lan); EASTERN: Chaiyaphum (Nam Phrom, Chulaphon dam, Phu Khieo), Nakhon Ratchasima (Wang Nam Khieo), Surin; SOUTHWESTERN: Kanchanaburi (Thung Phra Ruesi); CENTRAL: Bangkok (Bang Phlat), Nakhon Nayok (Heo Su Wat Falls), Saraburi (Sam Lan Falls); SOUTHEASTERN: Sa Kaeo (Khao Takrup), Chon Buri (Ban Dan, Khao Khieo, Nong Pom, Sriracha), Chanthaburi (Khao Soi Dao); PENINSULAR: Nakhon Si Thammarat (Khao Na Ron), Trang (Khao Chong).

Distribution.— Endemic to Thailand.

Ecology.— Evergreen forest, mixed deciduous forest, ca. 100–1,000 m; flowering March–July, fruiting April–Aug.

Vernacular.— Khem foi (เข็มฝอย) (Northeastern).

Uses.— Boiled roots are used as tea which supposedly stimulates milk and blood; sliced and cooked root can be used the same way; flowers are taken to temples.

Note.— This species is undoubtedly allied to *I. nigricans* Wight et Arn. It is distinguished from the latter by its longer flower buds and calyx segments which, on average, are rather more than twice as long as the receptacle.

**12. *Ixora grandifolia*** Zoll. & Moritzi in A. Moritzi, Syst. Verz.: 65. 1846; Hook.f., Fl. Brit. Ind. 3: 143. 1880; King & Gamble, Mat. Fl. Malay Penins. 15: 81. 1904; Pit. in H. Lecomte, Fl. Indo-Chine 3: 316. 1924; Corner, Gard. Bull. Straits Settlements 11: 197. 1941; Backer & Bakh.f., Fl. Java. 2: 327. 1963; Corner, Wayside trees Mal. 2: 637. 1988; Wong, Tree Fl. Mal. 4: 364. 1989; Ho, Càyó Vietnam 3: 222. 1993. Type: Indonesia: Java, Salak, *Blume* 890 (holotype **L**, not seen).— *I. coriacea* Ridl., J. Straits Branch Roy. Asiat. Soc. 79: 83. 1918; Fl. Malay Penins. 2: 98. 1923. Type: without locality data, *Wallich* 6151 (holotype **K-W**, not seen).— *I. crassifolia* Ridl., J. Straits Branch Roy. Asiat. Soc. 79: 83. 1918; Fl. Malay Penins. 2: 98. 1923. Type: Malacca, Ayer Panas, *Griffith* s.n. (holotype **SING**, not seen).— *I. fluminalis* Ridley, J. Straits Branch Roy. Asiat. Soc. 79: 84. 1918; Fl. Malay Penins. 2: 97. 1923; Craib, Fl. Siam. 2: 157. 1934. Type: Malaysia, Johore, *Wallich* s.n. (holotype **K-W**, not seen).— *I. elliptica* Ridley, Fl. Malay Penins. 2: 98, 1923. Type: Malaysia, Penang, *Wallich* 6153 (holotype **K!**).— *I. lancifolia* Ridley, Journ. Bot. 72: 256. 1934. Type: Malaysia, Pahang, Tahan river, *Ridley* 2213 (holotype **SING**, not seen)

Thailand.— PENINSULAR: Ranong (Khlung Nakha), Surat Thani (Bang Bao, Ban Don, Ban Na San, Chieo Lan dam, Khao Sok), Nakhon Si Thammarat (Khao Phra Mi, Thung Song), Trang (Khao Chong), Songkhla (Boripat Falls), Narathiwat (Bang Khung Thong, Bangnara, Waeng, Tak Bai).

Distribution.— Myanmar, Indochina, Thailand, Malaysia, Borneo, Indonesia.

Ecology.— Evergreen and swamp forests, ca. 10–400 m; flowering June–Nov., fruiting Aug.–Jan.

Vernacular.— Khem yai (เข็มใหญ่), khem daeng (เข็มแดง) (Bangkok, Peninsular), ta chai bai yai (ตาชบาใหญ่) (Trang).

Uses.— Occasionally cultivated as an ornamental (especially in the Peninsula).

Notes.— *Ixora grandifolia* has a leaf shape that is similar to that of *I. brunnescens* but differs in floral characters (the latter has a shorter corolla tube). This species is the only Thai *Ixora* which occurs in Peat Swamp forest. It is also the tallest species (trees to 8 m high, with a trunk ca. 10 cm in dia. at breast height).

**13. *Ixora henryi*** H. Lâv., Repert. Spec. Nov. Regni Veg. 13. 178. 1914; Pit. in H. Lecomte, Fl. Indo-Chine 3: 324. 1923; V. Chamchumroon, Thai For. Bull. (Bot.) 31: 8. 2003. Types: China, Yunnan, *A. Henry* 11637 (syntype **K!**); China, Guizhou, Lou-fou, March 1909, *Cavalerie* 3496 (syntype **K!**).

Thailand.— NORTHERN: Chiang Rai (Doi Langka), Lampang (Chae Son), Nan (Doi Phukha); NORTHEASTERN: Loei (Phu Ruea); SOUTHWESTERN: Kanchanaburi (Khao Lio Long).

Distribution.— China (Guizhou, Yunnan), Thailand.

Ecology.— Along streams in hill evergreen forest; flowering Nov.– April, fruiting April–July.

Note.— This species is very closely allied to *I. stricta* Roxb. but differs in having longer stipules. *I. henryi* had previously been thought to be endemic to Southwestern China but has now also been discovered in Northern, Northeastern and Southwestern Thailand.

**14. *Ixora javanica*** (Blume) DC., Prodr. 4: 487. 1830; Craib, Fl. Siam. 2: 158. 1934; Corner, Wayside trees Mal. 1: 546. 1940; Corner, Gard. Bull. Straits Settlement. 11: 206. 1941; Backer & Bakh.f., Fl. Java 2: 325. 1963; Wong, Tree Fl. Mal. 4: 360. 1989. Type: [Indonesia: Java] Batavia Res., Salak, *Blume* 1914 (holotype L, not seen).— *I. amoena* Wall. ex G. Don, Gen. Syst. 3: 571. 1834; Hook.f., Fl. Brit. Ind. 3: 146. 1880; Pit. in H. Lecomte, Fl. Indo-Chine 3: 328. 1924; Craib, Fl. Siam. 2: 149. 1934; Corner, Gard. Bull. Straits Settlement. 11: 182. 1941. — Type: Malay Peninsula, Penang, *Wallich* 6121 (holotype **K-W**, not seen).— *I. stricta* Roxb. var. *blumeana* Kurz., For. Fl. Burma 2: 26. 1877; Hook.f., Fl. Brit. Ind. 3: 146. 1880. Type: [“Sri Lanka”] India, Calcutta Garden, *Wallich* 6124 (holotype **K-W**, not seen).— *I. javanica* (Blume) DC. var. *multinervia* Corner, Gard. Bull. Straits Settlement. 11: 206. 1941. Type: Malaysia, Kelantan, Kota Bahru, *Corner* 33438 (holotype **SING**, not seen).— *I. javanica* (Blume) DC. var. *paucinervia* Corner, Gard. Bull. Straits Settlement. 11: 206. 1941. Type: Malaysia, Pahang, Telok Sisek, *Burkill & Haniff* s.n. (holotype **SING**, not seen)

Thailand.— NORTHERN: Lampang (Mae Yom), Tak (Lan Sang) ; NORTHEASTERN: Maha Sarakhm (Pa Khok Dong Khaeng), Nakhon Phanom (Tha Uten), Nong Khai (Phon Phisai, Phu Wua), Sakon Nakhon (Phu Phan), Udon Thani (Nong Bua); EASTERN: Nakhon Ratchasima (Si Kio, Wang Nam Khieo), Surin (Sangkla), Yasothon (Chatuphak Phiman), Si Sa Ket (Kanthararom), Ubon Ratchathani (Khong Chiam); SOUTHWESTERN: Prachuap Khiri Khan (Bang Saphan Yai); CENTRAL: Saraburi (Sam Lan Falls), Nakhon Nayok (Salika Falls, Khao Yai) ; SOUTHEASTERN: Sa Kaeo (Wattana Nakhon), Prachin Buri (Kabin Buri), Chon Buri (Si Racha, Sathhahip, Khao Kheio, Ko Chan), Rayong (Ban Phe), Chanthaburi

(Bo Rai, Chantabun, Khao Pha Baht Phaung, Khao Soi Dao, Makham, Pong Nam Ron), Trat (Ban Dan Chumphon, Ban Sa Phan Hin, Klong Num Si, Klong Phu Falls, Ko Chang, Than Mayom Falls); PENINSULAR: Chumphon (Khao Phang, Khao Din, Ko Mattra, Lang Suan, Pha To, Pa Wi Sai, Pa Ya Mei Falls), Ranong (La-un, Ngao Falls, Punyaban Falls, Khlong Naka, Ko Deleale, Muang, Research center of mangrove), Surat Thani (Adang, Bangbao, Ban Don, Chaiya, Khao Phanom, Khao Sok, Khlong Yan, Khian Sa, Ko Tao), Phangnga (Khao Nang Hong, Ton Dang Falls, Nai Chong, Takuapa), Phuket (Kamala, Thalang), Krabi (Khao Phanom Bencha, Muang, Nai Chong), Nakhon Si Thammarat (Ban Khiriwong, Khao Luang, Khao Kao, Khao Phra Mi, Ko Kra, Karom Falls, Phrommalok Falls, Ron Phibun, Walailak University), Phatthalung (Chong, Khao Pu Khao Ya, Srinakkharin, Thamot), Trang (Ang Thong Falls, Khao Chong, Sikao, Thung Khai, Ton Tae Falls), Satun (Ko Tarutao, Khuan Kalong, Khuan Po, Ko Kabeng, Thale Ban), Songkhla (Ban Pak Nam Thepha, Boriphat Falls, Hat Yai, Khao Ko Hong, Khao Motdaeng, Khao Maew, Chana, Muang-Ngam beach, Padang Besar, Ton Plio Falls), Yala (Ban Chulaphon Phatthana 7, Banglang, Bannang Sata, Than To), Narathiwat (Bacho, Bang Nara, Bukit Tamong, Ruso, Muang, Nikhom Waeng, Klong Iga Deng, Tak Bai, To Mo).

Distribution.— China, India, Malay Peninsula, Indonesia.

Ecology.— Common in evergreen forest and secondary forest, 10–1200 m; flowering and fruiting Jan.–Dec.

Vernacular.— Khem (เข็ม) (Nakhon Si Thammarat); khem thong (เข็มทอง), khem saet, khem daeng (เข็มแดง) (Peninsular); pue-cho-pu-yo (ปือจาะปูโยะ), ya-rang (ยาราง) (Malay-Narathiwat); Glossy Ixora.

Uses.— The roots are locally boiled for medicinal purposes.

Notes.— Craib (1934) kept *I. amoena* separate from *I. javanica*, stating that the latter has longer stipules (but he did not give measurements of stipule lengths). Hooker used “laxer habit and longer lanceolate, more membranous leaves” as characters to distinguish *I. amoena*. *I. javanica*, however, is very variable in these characters so that it becomes impossible to draw a line of distinction between these two species. Stipule lengths of *I. javanica*, for example, range from 1 to 8 mm, and even within individual populations stipule lengths vary, depending on whether a plant grows in shade or full sun. I, therefore, agree with Corner’s treatment of *I. amoena* as a synonym of *I. javanica*.

Forms of *I. chinensis* (plants only known as cultivated ornamentals in Thailand) can be very similar to *I. javanica* but differ in having very shortly petiolate leaves and flowers with ovate corolla lobe.

Corner (1941) distinguished 3 varieties and 30 forms of *I. javanica*. It hardly seems worthwhile to uphold all of these. They merely reflect the variability of the species (shape and size of leaves; corolla tube length; corolla lobe size and shape). I have transplanted living specimens (with small leaves) from a shady river bank to a sunny, open place and noticed that the leaves soon become much larger and wider.

**15. *Ixora kerrii*** Craib, Bull. Misc. Inform. Kew 1914: 128. 1914; Pit. in H. Lecomte, Fl. Indo-Chine 3: 326. 1924; Craib, Fl. Siam. 2: 159. 1934. Type: Thailand, Chiang Mai, Doi Suthep, Kerr 1745, 1745a (syntypes **K!**; **BK!**).

Thailand.— NORTHERN: Chiang Mai (Doi Intanon, Doi Angka, Doi Mon Chong, Doi Suthep, Pa Mon, Huai Lichia, Huai Maeni, Mae Chaem, Muang), Kamphaeng Phet (Mae Wong); SOUTHWESTERN: Kanchanaburi (Huai Lichia, Khao Ri Yai, Khao Yai, Khao Ngi Yai, Kriti, Sangkhla Buri, Sisawat).

Distribution.—Myanma, Thailand.

Ecology.— Hill evergreen forest, 1,000–1,400 m; flowering Jan.–April, fruiting unknown.

Vernacular.—Khem son kan (เข็มซ่อนก้าน) (Northern).

Note.— Distinguished from *I. stricta* Roxb. by the shorter corolla tube and the closely reflexed corolla lobes.

**16. *Ixora lakshnakarae*** Craib, Bull. Misc. Inform. Kew 1932: 428. 1932; Fl. Siam. 2: 160. 1934. Type: Thailand, Narathiwat, To Mo, *Lakshnakara* 688 (holotype **K!**; syntype **BK!**).

Thailand.— PENINSULAR: Narathiwat (Nikhom Waeng, To Mo).

Distribution.— Endemic to Thailand.

Ecology.— Evergreen forest, ca. 200 m; flowering Dec., fruiting unknown.

Note.— The species appear to be close to *I. betongensis* Craib but is distinguished by its longer calyx segments. *I. lakshnakarae* differs from *I. umbellata* var. *multibracteata* by having hirsute hairs on the leaves and inflorescence axes.

**17. *Ixora lobbii*** King & Gamble, Mat. Fl. Malay Penins. 15: 152. 1904; Ridl. Fl. Malay Penins. 2: 93. 1923; Pit. in H. Lecomte, Fl. Indo-Chine 3: 329. 1924; Craib, Fl. Siam. 2: 160. 1934; Corner, Gard. Bull. Straits Settlement. 11: 216. 1941; Corner, Wayside trees Mal. 1: 146. 1952; Wong, Tree Fl. Mal. 4: 361. 1989.—Type: Malay Peninsula, no further locality data, *Lobb* s.n. (holotype **SING**, not seen).— *I. lobbii* var. *angustifolia* King & Gamble, J. & Proc. Asiatic Soc. Bengal 23: 79. 1904; Craib, Fl. Siam. 2: 160. 1934; King & Gamble, Mat. Fl. Malay Penins. 15: 79. 1941.—Types: Singapore, no further locality data, *Wray* 519 (syntype **SING**, not seen), *Scortechini* 1893 (syntype **SING**, not seen), *King* 2718 (syntype **SING**, not seen), *Ridley* 2215 (syntype **SING**, not seen).— *I. aurea* var. *major* Ridley, Jour. Bot. 72: 252. 1934. Type: Malay Peninsula, Johore, Mohammed Nur 20007 (holotype **SING**, not seen).

Thailand.— PENINSULAR: Chumphon (Tha Sae, Ya Mai Falls), Ranong (La-un, Khao Nam Ron, Khlong Nakha), Surat Thani (Bang Bao, Huai Num Tao), Phangnga (Khao Nang Hong), Satun (Khlong Kewt, Thale Ban), Pattani (Betong), Yala.

Distribution.— Peninsular Thailand, Malay Peninsula, Singapore, Borneo, Sumatra, Natuna Island.

Ecology.— Evergreen forest, 100–200 m, mostly along streams; flowering and fruiting Jan.–Dec.

Vernacular.—Khem don (เข็มดอน) (Satun), khem daeng (เข็มแดง) (Surat Thani, Yala); cha-pu-yo (จ๊ะปู้โย) (Malay-Narathiwat); tu-do-bu-yo-bu-ke (ตุโดบูโยบูเกะ) (Malay); Glossy Ixora.

Uses.—Occasionally cultivated as an ornamental (especially in the Peninsula).

Notes.—This species had previously been attributed to Loudon, but in his publication there is no description (Encycl. Suppl. II, p. 1543). Loudon had based his name on *Pavetta lobbii* Teysm. et Binn., which is also a *nomen nudum*. Hence, King and Gamble were to first ones to validly describe the species.

The narrowly obovate, acuminate, many-veined, dark glossy green leaves and the acute petals will generally distinguish *I. lobbii*. But there are narrow-leaved collections of *I. congesta* which seem to approach *I. lobbii* and also forms of *I. javanica* with many-veined leaves which may resemble *I. lobbii*, especially if they also have acuminate blades and pointed petals.

**18. *Ixora lucida*** R.Br. ex Hook.f., Fl. Brit. Ind. 3: 148. 1880; Craib, Fl. Siam. 2: 160. 1934. Type: Malaysia, Penang, *Wallich* 6135 (holotype **K!**).

The species is divided into two varieties which can be distinguished primarily by indumentum characters:

#### KEY TO THE VARIETIES

Puberulous corolla tube and naked corolla-mouth	var. <b>lucida</b>
Densely puberulous corolla tube and heavily bearded corolla-mouth	var. <b>densipila</b>

var. **lucida** *I. nigricans* R.Br. ex Wight & Arn. var. *ovalis* Pit., Fl. Indo-Chine 3: 322. 1924; Corner, Gard. Bull. Straits Settle. 11: 224. 1941; Wong, Tree Fl. Mal. 4: 359. 1989. Type: Vietnam, Tan-huyen, de Bien-hoa, *Pierre* s.n. (holotype **P**, not seen).—*I. ebarbata* Craib, Bull. Misc. Inform. Kew 1932: 427. 1932; Fl. Siam. 2: 156. 1934. Type: Thailand, Ranong, Khao Talu, *Kerr* 11829 (holo? lectotype **K!**).—*I. straminea* Craib, Bull. Misc. Inform. Kew 1932: 427. 1932; Fl. Siam. 2: 156. 1934. Type: Thailand, Trang, Khao Sung, *Kerr* 15233 (holo? lectotype **K!**).

Thailand.—NORTHERN: Lampang (Hai Rua), Tak (Lan Sang); SOUTHWESTERN: Kanchanaburi (Erawan, Hin Dat, Sisawat), Prachuap Khiri Khan (Bang Sa Phan, Huai Yang Falls); PENINSULAR: Chumphon (Bang Son), Ranong (Khao Dam, Khao Po Ta Laung Kaeo, Khao Thalu), Surat Thani (Bang Bat, Bucang Balp, Ko Pha-ngan, Ko Tao, Khao Phra Rahu, Khao Sok, Khirirat Nikhom), Phang Nga (Takua Thung), Krabi (Klong Chilat), Nakhon Si Thammarat (Karom Falls, Khao Namhom, Khao Luang, Thung Song), Phatthalung (Khao Ha Tek, Khao Pu Khao Ya), Satun (Khuan Kalong), Songkhla (Boriphat Falls), Trang (Lo Lung, Lamphura, Khao Chong), Pattani (Bukit, Khao Kalakhiri), Yala (Ban Niang, Betong, Nikhom Kua Long), Narathiwat (Bacho, Waeng).

Distribution.—Indochina, Thailand, Malaysia.

Ecology.—Evergreen forest, limestone, 100–1,000 m; flowering May–Dec., fruiting unknown.

Vernacular.— Khem khao (เข็มหาว), khem plai san (เข็มปลายสาน), khem phra ram (เข็มพระราม), khem mai (เข็มไม้).

Uses— Roots are used to stimulate appetite and to treat eye-illness.

Notes.— Both Corner and Wong included *I. lucida* under *I. nigricans* var. *ovalis*, a view that is not shared by the author (Corner, 1941; Wong, 1989). Although *I. lucida* bears certain resemblances to *I. nigricans* (such as leaves drying blackish and lax, corymbose inflorescences), it seems sufficiently different to be recognized at the species level. It differs, amongst other characters, in having broader leaves.

var. **densipila** Craib, Fl. Siam. 2: 161. 1934. Type: Thailand, Nakhon Si Thammarat, Thungsong, Khao Namhon Keo, *Rabil* 223 (holotype K!; isotype BK!).

Thailand.— NORTHERN: Lampang (Hat Rua); NORTHEASTERN: Nong Khai (Bueng Kan); SOUTHWESTERN: Kanchanaburi (Erawan Falls, Hin Dat, Khao Salop, Lin Thin, Mae Nam Noi, Sisawat, Thung Phra Ruesi), Ratchaburi (Thung Kang Yang); PENINSULAR: Nakhon Si Thammarat (Thung Song).

Distribution.— Thailand.

Ecology.— Dry evergreen forest, 200–900 m; flowering March–June, fruiting unknown.

Notes.— Var. *densipila* appears to be merely a more densely hairy variety of *I. lucida*. Some collections (e.g. *Winit* 1907 and *Put* 77) appear to approach *I. brandisiana* Kurz, a species only occurring to the West of Thailand, but differ in having distinctly petiolate leaves and shorter calyx lobes.

**19. *Ixora merguensis*** Hook.f., Fl. Brit. Ind. 3: 140. 1880; King & Gamble, Mat. Fl. Malay Penins. 15: 72. 1921; Brandis, Ind. Trees: 388. 1921; Pit. in H. Lecomte, Fl. Indo-Chine 3: 310. 1924; Craib, Fl. Siam. 2: 161. 1934. Type: Myanma, Mergui, *Griffith* 3003 (holotype K!).

Thailand.— NORTHERN: Mae Hong Son (Mae Sariang), Tak (Ti Lo Su Falls); PENINSULAR: Chumphon (Tha Sae), Ranong (Hok Hang, La-un, Lumlue, Tap Li), Phangnga (Thap Put), Satun (Ko Tarutao).

Distribution.— Myanma, Thailand, Malay Peninsula, Indochina.

Ecology.— Evergreen forest, 50–400 m; flowering Dec.–April, fruiting March.

Vernacular.— Ka ho (กาฮอ) (Ranong); khem khieo (เข็มหะเข็ยว), khem chang (เข็มช้าง) (Phangnga).

Note.— This species differs from its allies in having lanceolate bracts and sepals.

**20. *Ixora nigricans*** R. Br. ex Wight & Arn., Prodr. Fl. Ind. 1: 428. 1834; Hook.f., Fl. Brit. Ind. 3: 148–149. 1880; Bremek., Bull. Jard. Bot. Buit. 3: 282. 1937; Corner, Wayside trees Mal. 1: 547. 1940; Gard. Bull. Straits Settlement. 11: 223. 1941; Backer & Bakh.f in Fl. Java. 2: 326. 1963; Wong, Tree Fl. Mal. 4: 359. 1989. Type: Malay Peninsula, *Wight* 1335 (holotype K, not seen).— *I. erubescens* Wall. ex G. Don, Gen. Syst. 3: 571. 1834; Hook.f., Fl. Brit. Ind. 3: 149.



1880; Brandis, Ind. Trees, 389. 1921. Type: Myanmar, Tenasserim, *Wallich* 6143 (holotype **K-W**, not seen).—*I. affinis* Wall. ex G. Don., Gen. Syst. 3: 571. 1834; Craib, Fl. Siam. Enum. 2(2): 147. 1934. *Nom. non valide publ. (in commentario ad I. erubescens)*.—*I. plumea* Ridley, J. Str. Br. R. As. Soc. 59: 117. 1911. Type: Malay Peninsula, Perlis, *Ridley* 14995 (syntype **SING**, not seen).—*I. nigricans* R. Br. Ex Wight et Arn. var. *erubescens* (Wall. ex G. Don) Kurz, For. Fl. Burma 2: 23. 1877. *Nom. non valide publ. (see I. erubescens, above)*.—*I. arguta* R. Br. ex King & Gamble, Mat. Fl. Malay Penins. 15: 74. 1904; Ridl., Fl. Malay Penins. 2: 92. 1923. Type: South India, no locality, *Wallich* 6154, 6157 (syntypes **K-W**, not seen).—*I. nigricans* R. Br. ex Wight et Arn. var. *arguta* (R. Br.) Hook.f., Fl. Brit. Ind. 3: 149. 1880. Type: South India, no locality, *Wallich* 6157 (syntype **K-W**, not seen).—*I. affinis* Wall. ex G. Don var. *arguta* (R. Br. ex King & Gamble) Craib, Fl. Siam. 2: 147. 1934.—*I. affinis* Wall. ex G. Don var. *plumea* (Ridley) Craib, Fl. Siam. 2: 148. 1934.

Thailand.— NORTHERN: Mae Hong Son (Doi Bohoe), Phitsanulok (Thung Salaeng Luang), Kamphaeng Phet (Klong Lan); NORTHEASTERN: Mukdahan (Phu Pha Yon); EASTERN: Nakhon Ratchasima (Ban Chum Saeng), Si Sa Ket (Kantharalak, Pa Ban Nong Chok), Ubon Ratchathani (Chong Mek, Khong Chiam); SOUTHWESTERN: Kanchanaburi (Erawan Falls, Mae Nam Noi, Khao Salop, Khao Ngi Yai, Sangkhla Buri, Thong Pha Phum), Prachuap Khiri Khan (Huai Yang, Pa La-u); CENTRAL: Chai Nat, Saraburi (Phu Khae, Sam Lan Falls), Nakhon Nayok (Salika Falls), Bangkok (Bang Phlat), Samut Prakan (Bang Ka Chao, Phra Pradaeang); SOUTHEASTERN: Sa Kaeo (Khao Takrup, Watananakorn), Chachoengsao (Chukcher), Chon Buri (Ban Dan, Chan Ta Than Falls, Khao Khiew), Chanthaburi (Khao Pra Bat, Khao Sabap, Khao Soi Dao, Klung), Trat (Khao Kuap, Khlong Phu Falls, Ko Chang); PENINSULAR: Chumphon (Bang Son, Khao Kiap, Tha Sae), Ranong (Cham Cheng, Khlong Nakha, Nam Pu Ron, Hat Prapas, Ho Hang, Thap Li), Surat Thani (Ban Don, Ban Na, Bangbao, Kanchanadit, Khao Tok, Ko Phang-nga, Na San, Vipavadi Falls), Krabi (Ko Pi Pi, Khao Phanom Bencha, Khao No Chuchi), Phangnga (Khao Katalawan, Khao Phangnga, Khao Lak Lam Ru, Ko Kutalaken, Ko Tachai, Khao Nang Hong), Nakhon Si Thammarat (Krung Ching Falls, Karom Falls, Khao Luang, Khiri Wong, Phrom Lok Falls, Tha Pra Falls, Tha Sala, Walailak University), Phatthalung (Khao Pu Khao Ya), Satun (Ban Tan, Khuan Ka long), Songkhla (Ban Klang, Boripat Falls, Hat Yai, Khao Ko Hong, Na Thawi, Ton Nga Chang), Trang (Ban Bun Phrai, Lamphura, Khao Chong, Khao Banthat), Pattani (Sai Khao), Yala (Ban Niang, Bang Lang), Narathiwat (Bacho, Chatwarin, Waeng).

Distribution.— India, Myanma, Thailand, Indochina, Malay Peninsula.

Ecology.— Evergreen forest, 100–700 m; flowering Jan.–Sept., fruiting Aug.–Dec.

Vernacular.— Khem tut ma (เข็มตุตหมา), khem phut ma (เข็มพุดหมา) (Sukhothai); khem nam (เข็มน้ำ) (Surat Thani, Yala).

Notes. — For reasons unknown, Craib (1934) did not recognize *I. nigricans* but instead used the invalid name *I. affinis* (the latter in fact is the same taxon as the validly published *I. erubescens*). The common and widely distributed species is variable, and none of the numerous varieties described under *I. nigricans* or its synonyms deserves recognition, as already indicated by Bremekamp (1937a).

This species is apparently allied to *Ixora fusca* but the calyx lobes of the latter are longer and the anthers shorter.

**21. *Ixora opaca*** Wall. ex G. Don, Gen. Sys., 2: 573. 1834; Hook.f., Fl. Brit. Ind. 3: 147. 1880; Pit. in H. Lecomte, Fl. Indo-Chine 3: 328. 1924; Craib, Fl. Siam. 2: 163. 1934. Type: Malay Peninsula, Penang, *Wallich* 6141 (holotype **K!**).— *I. pendula* Jack var. *opaca* (Wall. ex G. Don) Ridl., Fl. Mal. Pen. 2: 96. 1923.— *I. opaca* Wall. ex G. Don var. *major* Craib, Fl. Siam. Enum. 2(2): 163. 1934. Type: Thailand, Ranong, Khao Po Ta Luang Khaew, *Kerr* 16910 (holotype **K!**)

Thailand.— SOUTHWESTERN: Kanchanaburi (Klang Wa, Khao Salom); PENINSULAR: Chumphon (Bang Son, Map Ammarit, Khao Nom Sao, Phato), Ranong (Khao Po Ta Luang Kaeo, Nam Pu Ron, Tap Li), Surat Thani (Ban Khaokep, Bucang Balp, Chaiya, Khao Phra Rahu, Khao Sok), Phangnga (Ban Tham Thing Lang, Takuapa, Tong Dang Falls), Krabi (Nai Chong, Khao Phanom Bencha), Nakhon Si Thammarat (Phrom Lok Falls, Karom Falls, Khao Luang, Khiri Wong), Satun (Ko Adang, Ko Tarutao), Songkhla (Hat Yai), Trang (Khao Chong, Lam Lung), Pattani (Bukit), Narathiwat (Waeng).

Distribution.— Thailand, Malaysia, Indonesia

Ecology.— Evergreen forest, 100–1,600 m; flowering July–March, fruiting Jan.–May.

Notes.— *Ixora opaca* clearly differs from *I. pendula* by having erect inflorescences and (much) shorter peduncles. Moreover, it is distinguished from *I. pendula* by its glabrous pedicels, calyces and corolla tubes, and by its narrower leaves. Ridley's opinion that *I. opaca* should be considered a high altitude variety of *I. pendula* cannot be shared.

Some specimens from high elevations (*Geesink*, *Hiepko*, *Charoenphol* 7657; *Kerr* 15781; *Kerr* 16910; *Kerr* 17528) differ from lowland forms by their leaf shape and texture.

**22. *Ixora pendula*** Jack in Mal. Misc. 5: 11. 1820; Hook.f., Fl. Brit. Ind. 3: 141. 1880; Ridl., Mat. Fl. Malay Penins 15: 151. 1923; Fl. Malay Penins. 2: 95. 1923. Type: Malay Peninsula, Penang, *Wallich* 6127 (neotype **K!**).— *I. parkinsoniana* Craib, Kew Bull.: 428. 1923; Fl. Siam. 2: 163. 1934. Type: Thailand, Surathani, Yangao, *Kerr* 1870 (holotype **K!**; isotype **BK!**).— *I. candida* Ridl., J. Fed. Malay States Mus. 10: 141. 1920; Fl. Malay Penins 2: 95. 1923; Craib, Fl. Siam. 2: 153. 1934. Type: Thailand, Tarutao, Telok Wau, *Robinson* (holotype **SING**, not seen).

Thailand.— NORTHERN: Mae Hong Son (Doi Bo Hae), Kamphaeng Phet; SOUTHWESTERN: Prachuap Khiri Khan (Huai Yang Falls); PENINSULAR: Chumphon (Paknam Chumphon), Ranong (Klong Na Kha, Khao Pawta Luang Kaew, Kapur, Ko Chang), Surat Thani (Bang Bao, Ko Samui, Ko Pa Ngan, Ko Tao, Klong Sok), Phangnga (Ko Similan), Phuket (Ka Tu Falls), Krabi (Khao No Chu Chi, Khlong Thom, Mueang, Khao Phanom Bencha), Nakhon Si Thammarat (Cha Wang, Ko Kra, Khao Luang, Khao Phra Mi, Thung Song), Phatthalung (Chong), Trang (Khao Chong, Ko Kradan, Ko Li Bong, Ko Ra, Ton Tae Falls, Ang Thong Falls, Thale Song Hong), Satun (Ko Tarutao, Klaung Ton, Thung Wa, Thale Ban), Songkhla (Boriphat Falls, Hat Yai, Khao Ko Hong, Ton Nga Chang), Pattani (Khao Kala Khiri, Sai Kaeo), Narathiwat (Waeng, Chatwarin Falls).

Distribution.— Myanmar, Thailand, Malay Peninsula, Indonesia.

Ecology.— Evergreen forest, 100–1300 m; flowering Dec.–July, fruiting May–Dec.

Vernacular.— Khem phuang (เข็มพวง) (Trang), khem ma lai (เข็มมาลัย) (Surat Thani).

Notes.— This species is easily distinguished from all Thai *Ixoras* by having hanging inflorescences with long, slender, pendulous peduncles. There is often a whorl of lanceolate bracteoles near the base of the inflorescence and there are usually inflorescence-supporting leaves.

**23. *Ixora phuluangensis*** V. Chamchumroon, Thai For. Bull. (Bot.) 33: 8. 2005. Type: Thailand, Phu Luang Wildlife Sanctuary, Loei, 1400 m alt., *Wongprasert* s.n (holotype **BKF!**).

Thailand.— NORTHEASTERN: Loei (Phu Luang).

Distribution.— Endemic to Thailand.

Ecology.— Uncommon along streams in hill evergreen forest, 1,400–1,800 m; flowering Jan.–Feb., fruiting Feb.

Vernacular.—Khem dong (เขมดอง) (Loei).

Notes.— This new species belongs to the group of *Ixora* species with sessile inflorescences and is distinguished from *I. cibdela* by its lanceolate calyx lobes and shorter corolla lobes.

*Ixora phuluangensis* is endemic to Thailand and is only known from Loei Province, where it is only found from high elevations in the Phu Luang Wildlife Sanctuary. The species is named of location (Phu Luang Wildlife Sanctuary).

**24. *Ixora umbellata*** Koorders et Valetton, Bijdr. Booms. Java 8: 162. 1902; Corner, Wayside trees Mal. 2: 638. 1952; Wong, Tree Fl. Mal. 4: 358. 1989. Type: Java, *Hallier* 719 (holotype ? **B**, not seen).

#### KEY TO THE VARIETIES

Inflorescence bracts and calyx lobes 3–6 mm long

var. **umbellata**

Inflorescence bracts and calyx lobes 6–12 mm long

var. **multibracteata**

According to our present state of knowledge, var. *umbellata* is confined to the Malay Peninsula while var. *multibracteata* is more widely distributed and is also recorded from Peninsular Thailand.

var. **multibracteata** (H. Pearson ex King & Gamble) Corner, Gard. Bull. Straits Settlement. 11: 234. 1941; Wong, Tree Fl. Mal. 4: 359. 1989; Ho, Càycò Vietnam 3: 225. 1993. Type: see below.— *I. multibracteata* H. Pearson ex King & Gamble, J. Asiatic Soc. Bengal, Pt. 2, Nat. Hist., 73: 74. 1904; Mat. Fl. Malay Penins. 15: 74 (148); Ridley, Fl. Malay Pen. 15: 148. 1932; Fl. Malay Pen., 2: 92; Pit., Fl. Indo-Chine 3: 311. 1924; Craib, Fl. Siam. 2: 162. 1934. Types: Malaysia, Kedah, *Curtis* 3408 (syntype **SING**, not seen), *Curtis* 2954 (syntype **SING**, not seen), *Curtis* 3408 (syntype **SING**, not seen), *Ridley* 5540 (syntype **SING**, not seen), *Wray* 3317 (syntype **SING**, not seen).

Thailand.— PENINSULAR: Surat Thani (Bang Bat, Khao Pranom, Ko Tao, Khirirat Nikhom, Ko Samui, Tha Chana, To Rong Chang), Krabi (Khao Pra Bang Kram, Khao Phanom

Bencha), Nakhon Si Thammarat (Khao Dao, Krung Ching, Muang, Pak Ching, Thung Song), Phatthalung (Khao Olatalu), Trang (Khao Chong), Satun (Ko Tarutao).

Distribution.— Indochina, Thailand, Malaysia, Indonesia.

Ecology.— Evergreen forest, 50–1,100 m; flowering Jan.–April, fruiting unknown.

Vernacular.— Khem chang (เข็มช้าง) (Surat Thani), khem yai (เข็มใหญ่) (Satun).

Notes.— This species appears to be allied to *I. kingstoni* Hook.f. (a species not occurring in Thailand) but has less membranous leaves. Amongst Thai *Ixoras*, the species is readily distinguished by the numerous bracteoles below the flowers and by the large imbricate bracts at the bases of the ultimate branchlets.

The larger bracts and sepals distinguish this variety from typical *I. umbellata*.

### 25. *Ixora* sp. 1

Thailand.— SOUTHWESTERN: Prachuap Khiri Khan (La-U Falls).

Distribution.— Only known from Thailand.

Ecology.— Evergreen forest, 900 m; flowering unknown, fruiting Aug.

Notes.— This taxon is currently only known from a single collection. As some of its character states are still unknown (good flowering material is missing), I refrain from formally describing it as a new species.

### 26. *Ixora* sp. 2

Thailand.— SOUTHEASTERN: Chanthaburi (Khao Soi Dao).

Distribution.— Only known from Southeastern Thailand.

Ecology.— Evergreen forest, 800 m; flowering unknown, fruiting June.

Notes.— This taxon is currently only known from a single collection. As some of its character states are still unknown (good flowering material is missing), I refrain from formally describing it as a new species.

The taxon differs from all other Thai *Ixora* species in having unusually large leaves. Similarities in calyx shape and size may indicate a relationship to *I. finlaysoniana*.

### 27. *Ixora* sp. 3

Thailand.— NORTHEASTERN: Nong Khai (Phu Wua).

Distribution.— Only known from Nong Khai Province (Phu Wua), Thailand.

Ecology.— Evergreen forest, 600 m; flowering unknown; fruiting Nov.

Notes.— This taxon, only collected once and incompletely known (only young fruits and fallen flowers seen), might be allied to *I. lucida* but differs by being densely puberulous on the inflorescence.

A formal description as a new species is withheld until good flowering material and mature fruits are available.

### ACKNOWLEDGEMENTS

I am grateful to the curators of following herbaria: AAU, BK, BKF, C, K, PSU, QBG, W and WU for access to specimens. I would like to express my whole gratitude to Assist. Prof. Dr. Srunya Vajarodhya, Assoc. Prof. Dr. Lily Kaveeta, Dr. Kongkanda Chayamarit and Prof. Dr. Christian Puff for their valuable advice and critical discussion.

### REFERENCES

- Boonbundral, S. (1978). A Primary on Taxonomy of the genus *Ixora* in Thailand. M.S. thesis, Chulalongkorn University. Bangkok. (in Thai).
- Bremekamp, C.E.B. (1937a). The Malaysian species of the genus *Ixora* (Rubiaceae). *Bulletin du Jardin Botanique de Buitenzorg*, Ser. 3, 14: 197–367.
- \_\_\_\_\_. (1937b). The *Ixora* species of Burma and the Andaman Islands. *J. Bot.* (London) 75: 108–111, 169–175, 260–266, 295–298, 318–326.
- Corner, E.J.H. (1941). Notes on the Systematy and Distribution of Malayan Phanerogams, 4: “*Ixora*” In the *Gardens Bulletin of the Straits Settlements*. Vol. 11 (3). Singapore Botanic Gardens. pp. 177–235.
- \_\_\_\_\_. (1952). “*Ixora* Linn.” In *Wayside Trees of Malaya*. Vol. 1. Government Printing office, Singapore. pp. 542–547.
- Craib, W.G.. (1932). Contributions to the flora of Siam. *Additamentum* 33, 34, 35, 36, 37. *Kew Bulletin* 1932: 137–49, 276.
- Craib, W.G. and A.F.G. Kerr. (1934). “*Ixora* Linn.” In *Florae Siamensis Enumeratio*. Vol. 2. Siam Society. Bangkok. pp. 147–165.
- Govaerts, R., Ruhsam, M., Andersson, L., Robbrecht, E., Bridson, D., Davis, A., Schanzer, I. & Sonkâ, B. (2006). World Checklist of Rubiaceae. The Board of Trustees of the Royal Botanic Gardens, Kew. Published on the Internet; <http://www.kew.org/wcsp/rubiaceae/> accessed 26 September 2006.
- Holmgren, P.K. & Holmgren, N.H. (1990). *Index Herbariorum*. Part 1: the Herbaria of the World. 8<sup>th</sup> Edition. NYBG Press, New York.
- Wong, K.M. (1989). Rubiaceae in Tree flora of Malaya (Vol. 4), In F.S.P. Ng, ed. *Malaya Forest Records* no. 26, Forest Research Institute Malaysia. Longman, Malaysia. pp. 356–364.