

A revision of *Cajanus* Adans. (Fabaceae-Papilionoideae) in Thailand

CHARAN LEERATIWONG^{1,*}, JIRATTHI SATTHAPHORN¹, PRANOM CHANTARANOTHAI² & SAWAI MATTAPHA³

ABSTRACT

The genus *Cajanus* in Thailand is revised. It comprises five species, *C. cajan*, *C. elongatus*, *C. goensis*, *C. scarabaeoides* and *C. volubilis*. A key, descriptions, distributions and ecological data, vernacular names and photographs are presented. A lectotype for *Atylosia siamensis* is designated here. One species, *C. elongatus*, is a new record for Thailand.

KEYWORDS: Cajaninae, lectotype, new record, Phaseoleae.

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INTRODUCTION

Cajanus is a genus in the family Fabaceae (subfamily Papilionoideae, tribe Phaseoleae, subtribe Cajaninae) (Schrire, 2005), and comprises about 34 species distributed in Western Africa, the Indian subcontinent, Eastern to South-Eastern Asia, Malesia and Northern Australia (Schrire, 2005). This genus was first described and named as *Cajan* by Adanson (1763) who separated it from the genus *Cytisus* L. (based on *Cytisus cajan* L.). However, Parkinson (1987) commented on Adanson's generic names and concluded that these names are all invalid, because they are identical to and used simultaneously as species descriptions. However, this is allowed based on article 38.5a of International Code of Nomenclature (McNeill *et al.*, 2012) when the genera are still monotypic at the time of publication. Therefore, *Cajanus* Adans. is now an accepted and conserved name against *Cajan* (McNeill *et al.*, 2012). As Adanson's name is now valid and legitimate, it means that de Candolle's use of *Cajanus* is illegitimate as it is a later homonym. Typical for *Cajanus* are the resinous glands on the vegetative and reproductive parts and fruits with transverse grooves between the seeds (Niyomdham, 1994).

In Thailand, four species have been recorded (Craib, 1928; Pooma & Suddee, 2014). However, a thorough overview of the nomenclature and complete information on the morphology of all Thai species is still lacking and needed for the forthcoming Flora of Thailand account on the Papilionoids. This article introduces a newly recorded species and lectotypifies a name.

MATERIALS AND METHODS

The collections in the field were conducted in Thailand and specimens from the following herbaria were studied: A, AAU, BK, BKF, BM, C, CMU, CMUB, E, G-DC, K, KKU, L, LE, NY, P, PSU, QBG and TCD (herbarium acronyms follow Thiers, 2016). Morphological, ecological and distribution data, vernacular names and photos were gathered in the field and from the herbarium specimens. Most type specimens cited have been studied and these are indicated in the text by an exclamation mark (!). The few types that were not seen are indicated by *n.v.* (*non vide*).

¹ Department of Biology, Faculty of Science, Prince of Songkla University, Songkhla 90112, Thailand.

² Department of Biology and Center of Excellence on Biodiversity (BDC), Faculty of Science, Khon Kaen, University, Khon Kaen 40002, Thailand.

³ Department of Biology, Faculty of Science, Udon Thani Rajabhat University, Udon Thani 41000, Thailand.

* Corresponding author: charan.leeratiwong@gmail.com

TAXONOMIC TREATMENT

CAJANUS

Adans., Fam. Pl. 2: 326, 529. 1763 (as *Cajan*), **orth. cons. et nom. cons.**; Huth, Helios 11: 133. 1893. — *Cajanus* DC., Cat. Pl. Horti Monsp.: 85. 1813, **nom. illeg.**; DC., Prodr. 2: 406. 1825; Wight & Arn., Prodr. Fl. Ind. Orient. 1: 256. 1834; Steud., Nomencl. Bot. ed. 2. 2: 248. 1841; Benth. & Hook.f., Gen. Pl. 1: 541. 1865; Baker in Hook.f., Fl. Brit. India 2: 217. 1876; F.Muell., Census Austral. Pl. Suppl.: 41. 1881; Taub. in Engl. & Prantl, Nat. Pflanzenfam. 3(3): 372. 1894; Backer & Bakh.f., Fl. Java 1: 634. 1963; Hutch., Gen. Fl. Pl. 1: 421. 1964; Lackey, Bot. J. Linn. Soc. 74: 163. 1977; Lackey, Adv. Legume Syst. 1: 327. 1981; Pedley, Austrobaileya 1: 378. 1981; Maesen, Agric. Univ. Wageningen Pap. 85(4): 44. 1986; R.Sha & M.G.Gilbert, in C.Y.Wu *et al.*, Fl. China 10: 230. 2010. Type: *C. cajan* (L.) Huth.

— *Atylosia* Wight & Arn., Prodr. Fl. Ind. Orient. 1: 257. 1834; Benth. in Miq., Pl. Jungh. 2: 242. 1852; Benth. & Hook.f., Gen. Pl. 1: 542. 1865; Benth., Fl. Austral. 2: 262. 1864; Prain in King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66: 45. 1897; Gagnep. in Lecomte & Gagnep., Fl. Indo-Chine. 2: 279. 1916; Ridl., Fl. Malay Penins. 1: 564. 1922; Backer & Bakh.f., Fl. Java 1: 635. 1963; Hutch., Gen. Fl. Pl. 1: 421. 1964; Lackey, Adv. Legume Syst. 1: 327. 1981; S.T.Reynolds & Pedley, Austrobaileya 1: 420. 1981. Lectotype: *A. candollei* Wight & Arn. (= *C. trinervius* (DC.) Maesen), selected by Hutchinson (1964).

— *Cantharospermum* Wight & Arn., Prodr. Fl. Ind. Orient. 1: 255. 1834; Benth. in Miq., Pl. Jungh. 2: 242. 1852; Hassk., Cat. Hort. Bogor.: 281. 1844 (as *Cantharosperma*); Benth. & Hook.f., Gen. Pl. 1: 542. 1865; Taub. in Engl. & Prantl, Nat. Pflanzenfam. 3(3): 373. 1894; Ewart & O.B.Davies, Fl. N. Territory: 152. 1917. Type: not indicated.

— *Cajanum* Raf., Sylva Tellur.: 25. 1838. Type: *C. thora* Raf.

— *Endomallus* Gagnep., Notul. Syst. (Paris) 3: 184. 1915; Gagnep. in Lecomte & Gagnep., Fl. Indo-Chine. 2: 267. 1916; Thuan in Aubrév. & J.-F.Leroy, Fl. Cambodge, Laos & Vietnam 17: 128. 1979. Type: *E. pellitus* Gagnep. (= *C. goensis* Dalzell).

Shrubs or climbers, hairy, with sessile, resinous glands or sometimes with glandular hairs (*C. goensis*). *Leaves* pinnately 3-foliolate, alternate; leaflets subequal or unequal in size with sessile glands on lower surface; veins reticulate with 3 basal veins at base; stipules present; stipels present. *Inflorescence* a pseudoraceme, axillary or terminal, pedunculate; bracts caducous; bracteoles absent. *Flowers* papilionaceous. *Calyx* cup-shaped, 5-lobed; upper lobes 2, entirely connate to almost entirely connate with 2 minute lobes at apex or connate up to ½ of its length; lateral lobes 2, slightly shorter than or equal to upper lobes; lower lobe single, longer than others. *Petals* 5, yellow, with or without purplish to reddish stripes; standard orbicular, obovate or obovate-elliptic, reflexed, clawed, bi-auriculate at base, with or without callosities; wings narrowly to broadly elliptic or obliquely obovate, auriculate; keels obliquely boat-shaped, with or without auricle, ventral sutures joined. *Stamens* 10, diadelphous with one vexillary free stamen; anthers uniform. *Pistil* 1-carpellate; ovary superior, sub-sessile, 1-locular, densely hairy and glandular; ovules 2–10; style slender, apex curved, upper part glabrous or slightly hairy; stigma terminal, small, capitate. *Pods* dehiscent, linear-oblong to oblong, laterally compressed, depressed between the seeds with transverse lines, more or less septate between seeds. *Seeds* 2–10 per fruit, reniform to almost orbicular, shiny, colourful or blotched; strophiole present or absent.

A genus of about 34 species, widely distributed in Western Africa, Asia (Indian subcontinent, China, Eastern Asia, Indo-China, Malesia and Pacific) to Northern Australia. Five species in Thailand.

KEY TO THE SPECIES

1. Shrubs

1. Climbers

1. *C. cajan*

2. Standard petal less than 16 mm long

3. Peduncle 2–4 cm long; standard petal more than 8.5 mm long; leaf rachis 0–1.5 mm long; leaflets without stipels 2. *C. elongatus*

3. Peduncle 0.1–1.5 cm long; standard petal 6–8.5 mm long; leaf rachis more than 1.5 mm long; leaflets with stipels

4. *C. scarabaeoides*

2. Standard petal more than 16 mm long

4. Standard petal with 2 callosities; two upper calyx lobes connate for ½ of their length; upper part of style glabrous; wing petals free from keel petals; keel petals without auricles 3. *C. goensis*

4. Standard petal without callosities; two upper calyx lobes almost entirely connate or with 2 minute lobes at apex; upper part of style hairy; wing petals adherent to keel petals; keel petals with auricles 5. *C. volubilis*

1. *Cajanus cajan* (L.) Huth, Helios 11: 133. 1893; R. Sha & M. G. Gilbert, in C. Y. Wu *et al.*, Fl. China 10: 231. 2010.— *Cytisus cajan* L., Sp. Pl. 2: 739. 1753; Burm. f., Fl. Ind.: 163. 1768; Lam., Encycl. Meth. 2: 249. 1786.— *Cajan inodorum* Medik., Vorles. Churpfälz. Phys.-Öcon. Ges. 2: 363. 1787, **nom. superfl.**— *Cajanus indicus* Spreng., Syst. Veg., ed. 16, 3: 248. 1826, **nom. superfl.**; Wight & Arn., Prodr. Fl. Ind. Orient. 1: 256. 1834; Steud., Nom. Bot. ed. 2: 170. 1841; Miq., Fl. Ned. Ind. 1(1): 174. 1855; Thwaites, Enum. Pl. Zeyl.: 90. 1858; Benth., Fl. Hong Kong: 89. 1861; Baker in Hook. f., Fl. Brit. India 2: 217. 1876; Kurz, Forest Fl. Burma 1: 377. 1877; Prain in King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66: 47. 1897; Merr., Philipp. J. Sci., C 3: 82. 1908; Gagnep. in Lecomte & Gagnep., Fl. Indo-Chine 2: 278. 1916; Craib, Fl. Siam. 1(3): 461. 1928.— *C. cajan* (L.) Millsp., Publ. Field Columb. Mus., Bot. Ser. 2: 53. 1900, **nom. superfl.**; Merr., Enum. Philipp. Pl. 2: 34. 1923; Backer & Bakh. f., Fl. Java 1: 634. 1963; Verdcourt, Fl. Trop. E. Africa ed. 2: 709. 1971; T. C. Huang & H. Ohashi, Fl. Taiwan 3: 188. 1977; Thuan in Aubrév. & J.-F. Leroy, Fl. Cambodge, Laos & Vietnam 17: 106. 1979; Maesen, Agric. Univ. Wageningen Pap. 85(4): 65. 1986.— *C. cajan* (L.) Merr., Fl. Manila: 255. 1912, **nom. superfl.** — *C. cajan* (L.) Druce, Rep. Bot. Exch. Club Brit. Isles 4 (suppl. 2): 611. 1917, **nom. superfl.** Type: Sri Lanka, Matale, Herb. Hermann 1: 14, No. 279 (lectotype **BM** [BM000621275!], designated by Fawcett & Rendle, 1920).

— *Cajanus bicolor* DC., Cat. Pl. Horti Monsp.: 85. 1813; Prodr. 2: 406. 1825; Blanco, Fl. Filip., ed. 2: 416. 1845. Type: Cultivated plant at Montpellier from seed sent from India (holotype **G-DC n.v.**)

— *Cajanus flavus* DC., Cat. Pl. Horti Monsp.: 85. 1813; DC., Prodr. 2: 406. 1825. Type: Plants cultivated at Montpellier (holotype **G-DC n.v.**). Fig. 1A–E.

Shrub 1–5 m high; branches woody with dense to moderate cover of greyish hairs, glabrescent. *Leaves*: petioles 1–8 cm long; rachis 0.5–3 cm long, grooved, densely grey-hairy; stipules triangular or ovate-lanceolate, 2–6 × 1.5–2 mm, outside hairy, inside glabrous, persistent; terminal leaflet elliptic to lanceolate, 4–14 × 1.4–8 cm, subcoriaceous or chartaceous, base cuneate, margins entire, apex acuminate or acute, upper surface sparsely hairy, lower surface greyish green to silvery, covered with

dense grey hairs and sessile glands; lateral leaflets obliquely elliptic or lanceolate, 2.8–13 × 0.5–7.5 cm, base obliquely cuneate, apex acuminate or acute, other details similar to terminal leaflet; secondary veins 5–7 pairs; petiolules 1–5 mm long, hairy; stipels narrowly setaceous, 1–4 mm long, hairy, persistent. *Inflorescences* terminal or axillary, 3–15 cm long; peduncles 2–8 cm long, with dense cover of long hairs; bracts ovate to broadly triangular, 1–4 × 1–3 cm, apex acuminate, outside hairy, inside glabrous; pedicels 0.3–1.5 cm long, densely hairy. *Calyx* greenish-brown, campanulate; tube 3–6 mm long; lobes lanceolate or triangular, unequal, 3–4 × 1.5–2 mm; upper ones shortest, entirely connate; outer surface with sparse cover of hairs and glands; inner surface hairy. *Corolla* yellow or orange-yellow, with red lines on dorsal face of standard, glabrous; standard obovate-orbicular or suborbicular, 1–1.6 × 1–1.7 cm, apex emarginate, claw 3–4 mm long, blade bi-auriculate, with 2 callosities; wings irregularly oblong-obovate or obovate, 1–1.4 × 0.3–0.7 cm, apex obtuse, claw 2.5–4 mm long, blade unequally bi-auriculate, free from keel petals; keel obliquely oblong-obovate, 0.9–1.2 × 0.3–0.6 cm, incurved, apex obtuse, claw 4.5–6 mm long, blade without auricle. *Stamens*: staminal tube 9–14 mm long, free part of filaments 4–7 mm long, curved, glabrous; anthers elliptic, 0.5–1.5 mm long. *Ovary* linear-oblong, 4–8 × 1–1.5 mm, 2–9-ovuled; stipe ca 0.5 mm long, densely hairy and glandular; style 9–12 mm long, lower part hairy, upper part glabrous. *Pods* oblong to linear-oblong, 3–13 × 0.4–1.7 cm, laterally compressed, covered with dense greyish hairs and sessile glands, apex beaked, acuminate, greyish- or brownish-green when young, turning dark brown to black. *Seeds* 2–9, subglobose to globose or reniform, 3–9 × 3–9 mm, slightly compressed, shiny creamy-white or brown to black; strophiole absent.

Thailand.— **NORTHERN**: Mae Hong Son [Khun Yuam, *Chusie* KY275 (**QBG**); Muang, 5 Feb. 2014, *Norsaengsri* 10752 (**QBG**), 20 July 2014, *Srisanga et al.* 3836 (**AAU, QBG**)]; Chiang Mai [Chiang Dao, 13 Dec. 1995, *Gardner H-161* (**CMUB**); Chom Thong, 18 Dec. 1998, *Konta et al.* 4708 (**BKF**), 4717 (**BKF**); Doi Mae Sa, 10 Mar. 1978, *Niyomdham* 69 (**BKF, K**); Doi Pui, 17 Jan. 1965, *Phengklai* 1971 (**BKF**); Doi Sa Ket, 8 Jan. 2008, *Warintorn* 08-137 (**QBG**); Doi Suthep, 9 Feb. 1989, *Maxwell* 89-132 (**BKF**); Mae Klang, 14 Dec. 1990, *Lakshanakara*

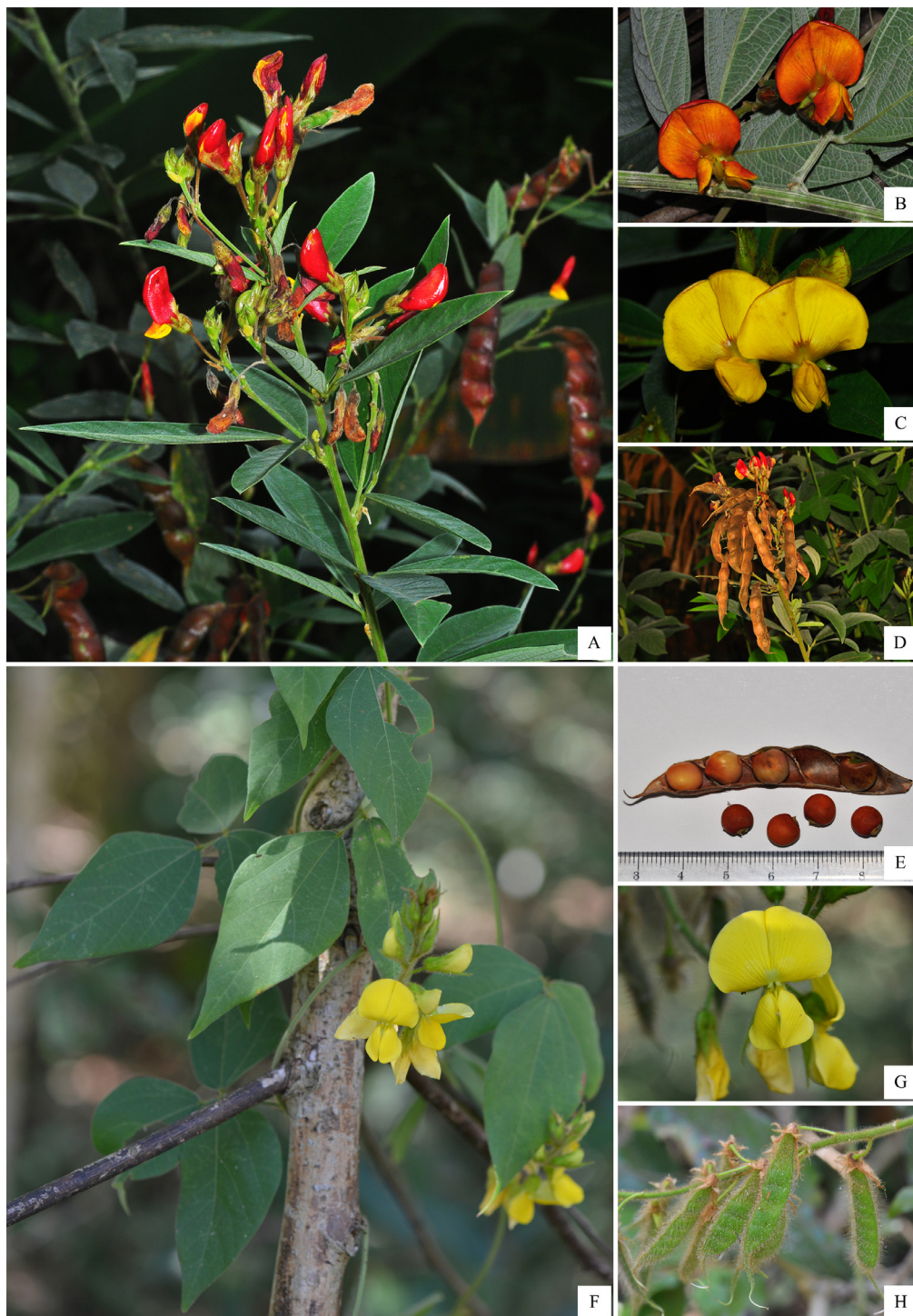


Figure 1. *Cajanus cajan*: A. flowering branch, B–C. flowers, D. fruits, E. seeds; *Cajanus goensis*: F. flowering branch, G. inflorescence, H. fruits. Photos by C. Leeratiwong (A–E) and H. Balslev (F–H).

1504 (BK); Mae Rim, 14 Jan. 1994, *BGO. Staff.* 390 (QBG); *ibid.*, 15 Dec. 1998, *Serm & Thon* 31 (QBG); Mae Taeng, 25 Feb. 2002, *Maxwell* 02-46 (BKF, CMUB); Muang, 12 Jan. 1980, *Sunee* 21 (CMUB); Om Koi, 27 Jan. 2016, *Pongamornkul* 5605 (QBG); Chiang Rai [Ban Yane, 19 Jan. 1970, *Sutheesorn* 1509 (BK)]; Phayao [Muang, 10 Feb. 2016, *Muangyen* 722 (QBG)]; Nan [Muang, 16 Feb. 1983, *Vacharee* 472 (BK); Tha Wang Pha, 8 Mar. 1996, *Towaranonte s.n.* (QBG); Thung Chang, 29 June 2010, *Srithi* 707 (QBG)]; Lampang [Pan, 16 Feb. 1996, *Maxwell* 96-245 (CMUB)]; NORTH-EASTERN: Phetchabun [Klong Yang, 11 Jan. 1969, *Vatcharapong* 246 (BK); Nam Nao, 3 Nov. 2003, *Sawai* 437 (KKU); *ibid.*, 20 Nov. 2004, *Sawai* 821 (KKU)]; Loei [Phu Ruea, 6 Feb. 2006, *Krachai* 103 (KKU)]; Sakon Nakhon [Waritchaphum, 17 Feb. 2006, *McClatchey et al.*, *WCM*3724 (BKF)]; Khon Kaen [Muang, 15 Dec. 2003, *Ruamkhonburi* 10 (KKU); *ibid.*, 12 July 2005, *Virapongse* y13 (KKU); Muang Phon, 18 Dec. 2007, *Norsaengsri* 3245 (CMUB, KKU, QBG)]; EASTERN: Chaiyaphum [Khonsan, 3 Feb. 1994, *Vacharee & Santi* 1065 (BK)]; Nakhon Ratchasima [Pak Chong, 16 Feb. 1976, *Sutheesorn* 3599 (BK)]; SOUTH-WESTERN: Kanchanaburi [Khao Hin, 1 Mar. 2017, *Muangyen* 1740 (QBG); Srisawat, 1994, *Kasessart Student* 94010123 (BK, K); Thongphaphum, 19 Dec. 1993, *Parinya & Santi* 392 (BK)]; CENTRAL: Lop Buri [Supchampa, 19 Nov. 1984, *Murata et al.* *T-68118* (BKF)]; Nonthaburi [18 Jan. 1955, *Agooroo* 16 (BK)]; Bangkok [1899, *Zimmermann* 594 (K); *ibid.*, 3 Jan. 1988, *Lakshanakara* 568 (BK)]; PENINSULAR: Ranong, Nakhon Si Thammarat [Lansaka, 17 Jan. 1966, *Tagawa et al.* *T-4534* (BKF)]; Songkhla [Hat Yai, 19 Jan. 1985, *Maxwell* 85-83 (BKF, PSU), 85-84 (PSU); Sadao, 17 Apr. 2016, *Komnurdpriwan & Leeratiwong* 16-678 (PSU), Jan. 2018, *Leeratiwong* 18-1141 (PSU); Sathing Phra, 23 Apr. 1974, *Vitelue* v25 (PSU)]; Pattani [Khok Pho, 17 Feb. 2003, *Upho* 420 (QBG)].

Distribution.— Native to India, cultivated in tropical areas.

Ecology.— Cultivated throughout the country, sometimes spreading to roadsides and open or disturbed areas; 0–1500 m alt.; flowering and fruiting throughout the year.

Vernacular.— Ma hae (มะแฮะ), ma hae ton (มะแฮะตัน)(Northern); thua ma hae (ถั่วมะแฮะ); thua

mae tai (ถั่วแม่ตาย)(Central); thua phi (ถั่วผี)(Prachuap Khiri Khan); thua rae (ถั่วระ)(Central); thua raet (ถั่วแรด)(Chumphon); Angola pea, Congo pea, Pigeon pea.

Uses.— This species is an important crop plant (providing staple food in India), but also an ornamental.

Note.— *Cajanus cajan* is easily recognized in the genus, as it is the only shrub among the Thai species and the seeds lack the strophiole.

2. *Cajanus elongatus* (Benth.) Maesen, Agric. Univ. Wageningen Pap. 85(4): 115. 1986.— *Dolichos elongatus* Grah. ex Wall., Numer. List nr. 5543. 1831–32, **nom. nud.— *Atylosia elongata* Benth. in Miq., Pl. Jungh. 1: 243. 1852; Baker in Hook.f., Fl. Brit. India 2: 215. 1876; Thuan in Aubrév. & J.-F. Leroy, Fl. Cambodge, Laos & Vietnam 17: 112. 1979. !).— *Cantharospermum elongatum* (Benth.) Raizada in Mooney, Suppl. Bot. Bihar & Orissa: 53. 1950. Type: Nepal, 1821, *Wallich* 5543 (holotype **K-W** [K001121245!]; isotypes **BM** [BM000574466!], **CAL** *n.v.*, **E** [E00301629!], **G** [G00364706!, G00364708!], **K** [K000900563!, K000900564!], **K-W** [K000900562!], **L** [L0018799!], **LE** [LE00014567!, LE00014568!]). Fig. 2.**

Perennial vine; branches with dense cover of long brown hairs, short hairs and sessile glands, glabrescent. *Leaves*: petioles 1–3.5 cm long, covered with dense, long hairs, short hairs and sessile glands; rachis 0–1.5 mm long, grooved, with dense long hairs and sessile glands; stipules ovate-triangular or lanceolate-triangular, 3.5–5 × 0.8–1.5 mm long, hairy, caducous; terminal leaflet rhomboid or obovate-rhomboid, 1.5–3.5 × 1–3 cm, chartaceous to slightly coriaceous, base rounded or slightly cordate, margins entire, apex acute, both surfaces sparsely to moderately long-hairy and with sessile glands; lateral leaflets obliquely ovate, 1–3 × 1–2.5 cm, apex acute, base obliquely rounded, other details similar to terminal leaflet; secondary veins 3–5 pairs; petiolules 1–2 mm long, hairy; stipel absent. *Inflorescences* axillary, 2.5–5 cm long, with 2–5 flowers, bearing 2 flowers at each node; peduncles 2–4 cm long, with both densely long and short hairs mixed with sessile glands; bracts elliptic, 1–3.5 × 0.5–1 mm, apex acuminate, both sides hairy, caducous; pedicels 5–10 mm long, recurved, moderately to sparsely hairy. *Calyx* cup-shaped; tube 3–5 mm long; lobes linear-lanceolate or narrowly

triangular, unequal, $5-9 \times 1-2$ mm; two upper calyx lobes connate for up to $\frac{1}{2}$ of their length; outside moderately to densely hairy and with sessile glands; inside glabrous. *Corolla* yellow, glabrous; standard obovate or ovate, $1.2-1.5 \times 1-1.2$ cm, reflexed, apex emarginate, claw $2-2.5$ mm long, blade bi-auriculate without callosities; wings irregularly oblong, $1-1.5 \times 0.4-0.6$ cm, apex obtuse, incurved, claw $2.5-3$ mm long, blade with an auricle, free from keel petals; keel boat-shaped, $0.8-1.2 \times 0.5-0.7$ cm, limb incurved, apex obtuse, claw $2.5-3$ mm long, blade without auricle. *Stamens*: staminal tube $10-13$ mm long, free part of filaments $4-6$ mm long, upcurved, glabrous; anthers oblong-ovate, $0.5-0.6$ mm long. *Ovary*

ovate-oblong, $2-4 \times 1-1.2$ mm, 2-3-ovuled, stipe $0.3-0.5$ mm long, densely long-hairy; style $14-15$ mm long, curved at upper part, glabrous. *Pods* not seen.

Thailand.— NORTHERN: Mae Hong Son [Doi Pui, 22 Oct. 2000, *Suksathan 2829 & 2830 (QBG)*].

Distribution.— Nepal, India, Bhutan, Myanmar, Vietnam.

Ecology.— Along edges of mixed deciduous forest; ca 1650 m alt.; flowering September–November; fruiting October–December.

Vernacular.— Thua pap phi huai hi (ถั่วแปบผีหัวอื้อ)(General).



Figure 2. *Cajanus elongatus*: A. flowering branch, B. palmately 3-foliolate leaves, C. a part of leaves showing short rachis and absence of stipels, D. inflorescence. Photos by C. Leeratiwong, from *Suksathan 2829* (QBG).

Notes.—*Cajanus elongatus* is characterised by its short leaf rachis (0–1.5 mm long), two upper calyx lobes which are connate for up to ½ of their length and absence of stipel on leaflets. This species is recorded for the first time in Thailand, because two collections with flowers were collected in Mae Hong Son province.

3. *Cajanus goensis* Dalzell, Hooker's J. Bot. Kew Gard. Misc. 2: 265. 1850; Maesen, Agric. Univ. Wageningen Pap. 85(4): 117. 1986; R. Sha & M.G. Gilbert, in C.Y.Wu *et al.*, Fl. China 10: 231. 2010. — *Atylosia goensis* (Dalzell) Dalzell, J. Linn. Soc., Bot. 13: 186. 1873; Backer & Bakh.f., Fl. Java 1: 636. 1963. Type: India, Maharashtra, Mumbai (Bombay), *Dalzell s.n.* (holotype **K** [K000900567!]; isotypes **K** [K000900566!, K000900568!]).

— *Dolichos barbatus* Wall., Numer. List nr. 5548. 1827, **nom. nud.** — *Dunbaria barbata* Benth. in Miq., Pl. Jungh. 1: 242. 1852. — *Atylosia barbata* (Benth.) Baker in Hook.f., Fl. Brit. India 2(4): 216. 1876; Gagnep. in Lecomte & Gagnep., Fl. Indo-Chine 2: 279. 1916; Craib, Fl. Siam. 1(3): 464. 1928; Thuan in Aubrév. & J.-F.Leroy, Fl. Cambodge, Laos & Vietnam 17: 110. 1979. — *Cantharospermum barbatum* (Benth.) Koord. ex Keuchenius, Meded. Prokefstat. Thee 90: 15. 1924. Type: Myanmar, Kogun ad ripas Saluan in Martabania, 1827, *Wallich 5548* (holotype **K-W** [K001121253!]).

— *Dolichos ornatus* Wall., Numer. List nr. 5561. 1827, **nom. nud.**

— *Rhynchosia vestita* Wall., Numer. List nr. 5505. 1827, **nom. nud.**

— *Dunbaria calycina* Miq., Fl. Ned. Ind. 1(1): 180. 1855. — *Atylosia calycina* (Miq.) Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 43(2): 186. 1874. Type: Indonesia, Java, *Horsfield 123* (holotype **K** [K000900602!]; isotypes **BM** [BM000958647!], **K** [K000900603!], **U** [U0003484!]).

— *Endomallus pellitus* Gagnep., Notul. Syst. (Paris) 3: 185. 1915; in Lecomte & Gagnep., Fl. Indo-Chine 2: 267. 1916; Thuan in Aubrév. & J.-F.Leroy, Fl. Cambodge, Laos & Vietnam 17: 128. 1979. Type: Vietnam, Song-lu, Bien hoa, *Pierre s.n.* (holotype **P** [P02142810!]; isotypes **P** [P02142811!, P02142812!]).

— *Endomallus spirei* Gagnep., Notul. Syst. (Paris) 3: 186. 1915; in Lecomte & Gagnep., Fl. Indo-Chine

2: 268. 1916; Thuan in Aubrév. & J.-F.Leroy, Fl. Cambodge, Laos & Vietnam 17: 128. 1979. Type: Laos, Luang Prabang, *Spirei 1561* (holotype **P** [P02142808!]; isotype **P** [P02142809!]).

— *Atylosia siamensis* Craib, Bull. Misc. Inform. Kew 1927: 65. 1927; Craib, Fl. Siam. 1(3): 465. 1928. Type: Thailand, Saraburi, Muak Lek, ca 200 m. alt., 19 Jan. 1925, *Kerr 10004* (Lectotype **K** [K001306582!], selected here; isolectotypes **BK** [BK257975!], **BM** [BM000958631!]; **K** [K001306583!], **TCD** [TCD0016186!, TCD0016187!]).

— *Dunbaria stipulata* Thuan, Adansonia, ser.2, 16(4): 514. 1977. Type: Thailand, Tak, Doi Pae Poe, alt. 1400 m, *Hansen & Smitinand 12895* (holotype **P** [P00708572!]; isotypes **AAU** *n.v.*, **C** *n.v.*, **P** [P00708573!]). Fig. 1F–H.

Perennial vine; branches brown, with dense cover of long brown to yellowish-brown hairs and sessile glands, glabrescent. *Leaves*: petioles 0.8–8 cm long; covered with dense long brown hairs; rachis 5–17 mm long, grooved, with dense long hairs and sessile glands; stipules triangular-ovate to lanceolate, 3–12 × 1–5 mm, hairy, persistent; terminal leaflet ovate-elliptic to ovate or rhomboid-ovate, chartaceous or subcoriaceous, 1.8–11 × 1.4–8.5 cm, base cordate or rounded, margins entire, apex acute or acuminate, upper surface sparsely hairy, sometimes with glandular hairs at margins, lower surface densely hairy with straight hairs and sessile glands; lateral leaflets obliquely ovate, 1.5–10 × 1–6 cm, apex acute, base obliquely cordate; other details similar to terminal leaflet; secondary veins 5–7 pairs; petiolules 1–3 mm long, densely hairy with straight hairs; stipels setaceous, 1–5 × 0.3–1 mm, with straight hairs, persistent. *Inflorescences* axillary, 15–25 cm long, bearing 2 flowers at each node, densely hairy; peduncle 2–15 cm long; bracts broadly ovate to ovate-lanceolate, 5–10 × 3–5 mm, apex acuminate to caudate, densely hairy with long-hairs and sessile-glandular hairs on outer surface; glabrous on inner surface. *Pedicels* 5–15 mm long, hairy. *Calyx* green, cup-shaped; tube 3–10 mm long; lobes unequal, triangular or linear-lanceolate; 5–16 × 2–2.5 mm, two upper calyx lobes connate for ½ of their length; outside densely hairy with long hairs and sessile glandular hairs; inside glabrous or sparsely hairy. *Corolla* yellow, both sides glabrous; standard obovate-orbicular or obovate-elliptic, 18–30 × 15–28 mm, inflexed, apex emarginate, claw 2.5–5 mm long,

blade bi-auriculate, with two callosities; wings broadly oblong or obovate, 16–28 × 5–10 mm, apex acute or obtuse, claw 2.5–5(–8) mm long, blade with an auricle on one side, free from keel petals; keel obliquely sickle-shaped, 15–26 × 6–10 mm, body incurved, apex obtuse or acute, claw 3.5–6 mm long, blade without auricle. *Stamens*: staminal tube 10–12(–23) mm long, glabrous; free part of filaments 4.5–7 mm long; anthers oblong, 0.8–1.5 × 0.3–0.5 mm. *Ovary* oblong or linear-oblong, 6–10 × 1.5–2 mm, densely hairy with long hairs, 5–10-ovuled; style 10–20 mm long, hairy at base, upper part glabrous. *Pods* oblong or elliptic, 3–6 × 0.8–1 cm, apex linear-acuminate, densely covered with long brown hairs, green when young, turning brown to dark brown when mature. *Seeds* 5–10, subglobose, 3–3.5 × 4–5 mm, light brown with grey to black mosaic; strophiole present.

Thailand.—NORTHERN: Mae Hong Son [27 Feb. 2017, *Pingyot et al.* 75 (QBG); Ban Huai, 13 May 2011, *Pongamornkul* 3015 (QBG); Doi Chong, 17 Feb. 1968, *Hansen & Smitinand* 12616 (AAU, BKF, E, L, K, P); Khun Yuam, 10 Feb. 1972, *Smitinand* 11442 (K); Mae La Noi, 29 Mar. 2004, *Pongamornkul* 1811 (QBG); Mae Sa Rieng, 20 Jan. 1995, *Pooma* 1012 (BKF, CMUB); *ibid.*, 20 Feb. 2007, *Wattana* 2271 (BKF, QBG); Muang, 19 Nov. 1984, *Koyama et al.* 32555 (BKF); *ibid.*, 25 Mar. 2009, *Pongamornkul* 2562 (QBG); Sop Moei, 16 Jan. 2013, *Pongamornkul* 3340 (QBG); *ibid.*, 27 Feb. 2014, *Pongamornkul* 3994 (QBG)]; Chiang Mai [31 Jan. 1921, *Kerr* 4739 (BK, K); Chiang Dao, 19 Mar. 1910, *Kerr* 1050 (K); *ibid.*, 28 Dec. 1931, *Put* 4535 (BK, K); *ibid.*, 13 Jan. 1941; *ibid.*, *Garrett* 1228 (E, K); *ibid.*, 11 Feb. 1957, *Smitinand* 3731 (BKF); *ibid.*, 6 May 1958, *Bunchuai* 771 (BKF); *ibid.*, 12 Feb. 1989, *Maxwell* 89-183 (AAU, BKF, CMU); *ibid.*, 1 Mar. 1995, *Maxwell* 95-171 (CMUB); *ibid.*, 27 Jan. 1996, *Maxwell* 96-110 (CMUB); *ibid.*, 3 Feb. 2001, *La-ongsri & Norsaengsri* 92 (QBG); *ibid.*, 28 Jan. 2007, *Suddee et al.* 2969 (BKF); Chom Thong, 24 Feb. 1989, *Maxwell* 89-259 (BKF); *ibid.*, 16 Feb. 1998, *Konta et al.* 4327 (BKF); Doi Chang Khian, 26 Feb. 1975, *Sadakorn* 535 (BK); Doi Pui, 11 Jan. 1969, *Nooteboom et al.* 719 (BKF); Doi Inthanon, 6 Feb. 1998, *Konta & Phengklai* 4047 (BKF); Fang, 2 Feb. 2007, *Srisanga et al.* 2973 (CMUB, QBG); Doi Suthep, 28 Feb. 1915, *Kerr* 3530 (K); *ibid.*, 10 Feb. 1926, *Collins* 1213 (BK,

E); *ibid.*, 4 Feb. 1991, *Maxwell* 91-118 (AAU, CMU); Mae Chaem, 3 Mar. 1993, *Maxwell* 93-136 (BKF, CMUB); *ibid.*, 5 Feb. 1998, *Konta et al.* 3984 (BKF); *ibid.*, 15 May 1999, *Pooma* 1810 (BKF); *ibid.*, 10 Feb. 2017, *Pongamornkul* 5939 (QBG); Mae Rim, 20 Jan. 1996, *Nanakorn et al.* 5546 (QBG); Mae Taeng, 8 Jan. 1998, *Maxwell* 98-32 (BKF, CMUB); *ibid.*, 13 Feb. 2001, *Maxwell* 01-70 (BKF, CMUB); Mae Wang, 20 Feb. 2004, *Maxwell* 04-98 (CMUB); Muang, 20 Feb. 1988, *Maenahyahn* 6 (CMUB); *ibid.*, 21 Dec. 1994, *Nanakorn et al.* 2841 (QBG); Om Koi, 21 Jan. 2015, *Pongamornkul* 4566 (QBG); *ibid.*, 26 Jan. 2016, *Pongamornkul* 5588 (QBG); *ibid.*, 27 Jan. 2016, *Pongamornkul* 5615 (QBG); Pangbon, 11 Mar. 1965, *Smitinand* 8711 (BK, BKF); Pha Mon, *Konta & Khao-iem* 11027 (BKF); Wang Tao, 1958, *Sørensen et al.* 1033 (K); Chiang Rai [Hua Yano, 20 Jan. 1970, *Sutheesorn* 1418 (BK); Mae Fa Luang, 20 Jan. 2012, *van de Bult* 1225 (BKF, CMUB); Mae Kaun, 10 Feb. 1926, *Garrett* 265 (E, K); Mae Sai, 14 Feb. 1983, *Koyama et al.* T-33509 (BKF); *ibid.*, 14 Feb. 2005, *Maxwell* 05-95 (BKF, CMUB); *ibid.*, Feb. 2008, *Maxwell* 08-39 (CMUB, QBG); *ibid.*, 13 Feb. 2012, *Norsaengsri & Thatana* 8875 (QBG); Tham Luang, 29 Mar. 2012, *Norsaengsri & Thatana* 9295 (QBG)]; Phayao [13 Mar. 1980, *Pundir* 506 (K); Muang, 19 Nov. 1997, *Petrmitr* 151 (CMUB); *ibid.*, 10 Feb. 2016, *Muangyen* 720 (QBG)]; Nan [Doi Phu Kha, 11 Feb. 1999, *Srisanga* 487 (BKF); Muang, 12 Mar. 1980, *Pundir* 482 (K); Na Kwang, *Pantarod* 18 (QBG); Na Noi, 18 Jan. 2017, *Muangyen* 1646 (QBG); Pua, 11 Jan. 1988, *Paisooksantivatana et al.* 2232-88 (BK); *ibid.*, 1 Mar. 2002, *Srisanga et al.* 2491 (QBG); *ibid.*, 16 Feb. 2011, *Srithi* 531 (QBG)]; Lamphun [Mae Tha, 29 Jan. 1994, *Maxwell* 94-132 (BKF, CMUB)]; Lampang [27 Feb. 1926, *Winit* 1614 (BK, BKF, K); Muang Pan, 9 Jan. 1996, *Maxwell* 96-59 (BKF, CMUB)]; Phrae [Huai Rong, 6 Jan. 1972, *van Beusekom et al.* 4683 (BKF, K); Song, 5 Nov. 1991, *Maxwell* 91-953 (AAU, CMUB)]; Tak [Doi Pae Poe, 13 Mar. 1968, *Hansen & Smitinand* 12895 (AAU, BKF, E, L, K, P); Muang, 13 Jan. 1993, *Parinya et al.* 128 (BK); *ibid.*, *Winai & Santi* 1284 (BK); Sop Moei, 13 Jan. 2015, *Tanming* 758 (QBG); Ton Krabak, 19 Jan. 1995, *Pooma* 983 (BKF, CMUB); Um Phang, 21 Dec. 2007, *Pongamornkul* 2045 (QBG); Sukhothai [Muang, 7 Mar. 1972, *Maxwell* 72-58 (AAU, BK)];

NORTH-EASTERN: Phetchabun [Nam Nao, 18 Dec. 2003, *Sawai 171* (**KKU**)]; Loei [Phu Luang, 15 Dec. 1967, *Bunchuai 1344* (**AAU, C, E, L, K, P**)]; Phu Ruea, 1 Feb. 2004, *Sawai 586* (**KKU**); Wang Sa Phung, 10 Feb. 1931, *Kerr 20040* (**BK, K**); *ibid.*, 2 Feb. 1974, *Nakkorn 122* (**BKF**); Sakon Nakhon [27 Sept. 1995, *S.N.* (**BK**)]; Khon Kaen [Phuphaman, 14 Jan. 2011, *Lakoet 291* (**QBG**)]; SOUTH-WESTERN: Uthai Thani [Ban Rai, 1 Feb. 1976, *Maxwell 76-43* (**AAU, BK**)]; Kanchanaburi [Bao Noi, 18 Jan. 1926, *Kerr 10262* (**BK, K**); Ban Pilok, 19 Feb. 1967, *Chermsirivathana 635* (**BK**); Kroeng Krawia, 1 Feb. 1971, *Chermsirivathana 1774* (**BK**); Sangkhlaburi, 19 Feb. 1960, *Kantchai 51* (**BKF**); *ibid.*, 17 Jan. 1994, *Maxwell 94-86* (**BKF, CMUB**); Thongphaphum, 26 Jan. 1983, *Koyama et al. T-32952* (**BKF**)]; CENTRAL: Chai Nat [10 Jan. 1880, *Put 2669* (**BK, K**)]; Saraburi [Muak Lek, 19 Jan. 1925, *Kerr 10004* (**BK, BM, K, TCD**)]; SOUTH-EASTERN: Chon Buri [Sriracha, 7 Nov. 1927, *Collins 1699* (**BK**)]; PENINSULAR: Yala [Bannang Sata, 15 Dec. 1966, *Sangkhachand 1432* (**K**)]; Narathiwat [Waeng, 27 Mar. 1968, *Maxwell 93-136* (**BKF**); *ibid.*, *Prayad 1251* (**BK**)].

Distribution.— India, Bangladesh, Myanmar, China, Laos, Vietnam, Malaysia and Indonesia.

Ecology.— In mixed deciduous, dry dipterocarp, evergreen rain, pine, pine-dipterocarp, oak-pine and hill evergreen forests, mostly occurring in open, degraded, disturbed, agricultural or fire-damaged areas, along a stream, in grass fields; 0–1600 m alt.; flowering October–March; fruiting January–May.

Vernacular.— Khruea khao khon (เครือเขาขน), paep phi (แปบผี) (Chiang Mai); ma yoeng doi (มะเอียงดอย) (Prachin Buri); thua pap phi (ถั่วแปบผี) (Central).

Notes.— *Cajanus goensis* is distinguished by its standard petal with callosities, two upper calyx lobes which are connate for ½ of their length, the upper part of the style, which is glabrous and the fruits that are densely covered with long hairs. The type of *Atylosia siamensis* is *Kerr 10004*. Craib (1927) did not indicate which of the duplicates was the holotype, therefore a lectotype (**K** [K001306582]) was designated here, because it was the best preserved specimen.

4. *Cajanus scarabaeoides* (L.) Thouars, Dict. Sci. Nat. 6: 167. 1817; Maesen, Agric. Univ. Wageningen Pap. 85(4): 183. 1986; R.Sha & M.G.Gilbert, in C.Y.Wu *et al.*, Fl. China 10: 232. 2010.— *Dolichos scarabaeoides* L., Sp. Pl. 2: 726. 1753.— *Atylosia scarabaeoides* (L.) Benth. in Miq., Pl. Jungh. 2: 242. 1852; Fl. Hong Kong.: 90. 1861; Fl. Austral. 2: 263. 1864; Thwaites, Enum. Pl. Zeyl.: 91. 1864; Baker in Hook.f., Fl. Brit. India 2: 215. 1876; Gagnep. in Lecomte & Gagnep., Fl. Indo-Chine 2: 281. 1916; Ridl., Fl. Malay Penins. 1: 564. 1922; Craib, Fl. Siam. 1(3): 464. 1928; Backer & Bakh.f., Fl. Java 1: 636. 1963; C.D.Adams, Fl. Pl. Jamaica: 356. 1972; Verdc., Fl. Trop. E. Afr. ed. 2, 1: 707. 1971; T.C.Huang & H.Ohashi, Fl. Taiwan 3: 179. 1977; Thuan in Aubrév. & J.-F.Leroy, Fl. Cambodge, Laos & Vietnam 17: 112. 1979.— *Cajanus scarabaeoides* (L.) F.Muell., Census Austral. Plants, Suppl.: 41. 1881.— *Cantharospermum scarabaeoides* (L.) Baill., Bull. Mens. Soc. Linn. Paris 1: 384. 1883; Merr., Fl. Manila: 255. 1912. Type: Sri Lanka, Matala, Ceyton, Hermann 1: 34 (lectotype **BM** [BM000621349!]; isolectotype **BM** [BM000621350!], selected by Verdcourt, 1971).

— *Dolichos scarabaeoides* Roxb. ex Grah., in Wall., Numer. List nr. 5580a, 1831, **nom. nud.**

— *Glycine scarabaeoides* Buch.-Ham., Hump., Bonpl. & Kunth ex Wall., Numer. List nr. 5580b, 1831, **nom. nud.**

— *Hedysarum biflorum* Willd. ex Wall., Numer. List nr. 5580c, 1831, **nom. nud.**

— *Dolichos minutus* Roxb. ex Wight & Arn., Prodr. Fl. Ind. Orient. 1: 256. 1834. Type: Roxburgh drawing E.I.C. Mus. Tab. 252, f. 1 (holotype **CAL n.v.**).

— *Cantharospermum pauciflorum* Wight & Arn., Prodr. Fl. Ind. Orient. 1: 255. 1834.— *Atylosia pauciflora* (Wight & Arn.) Druce, Rep. Bot. Exch. Cl. Brit. Isles 1916: 607. 1916. Type: India Orientalis, *Wight 758* (holotype **E** [E00174531!]; isotypes **BM** [BM000958645!], **C** [C10011926!], **CAL n.v.**, **E** [E00174532!, E00174533!, E00174534!], **G** [G00370434!, G00370439!, G00364718!], **K** [K000900577!], **NY** [00006374!], **P** [P03326958!, P03326960!, P03326961!]). Fig. 3A–D.

Perennial vine; branches reddish brown, woody at base, densely covered with long hairs, glabrescent. *Leaves*: petioles 4–30 mm long, rachis

2–7 mm long, grooved, densely long-hairy; stipules triangular-ovate or ovate, $1\text{--}1.5 \times 0.5\text{--}1$ mm, hairy, caducous; terminal leaflet obovate, ovate-elliptic or obovate-elliptic, $1.5\text{--}5 \times 0.7\text{--}3.5$ cm, chartaceous to subcoriaceous, base cuneate, margins entire, apex obtuse and mucronate to slightly acute, both surfaces hairy, but more densely hairy with sessile glands at lower surface; lateral leaflets obliquely obovate-elliptic or obovate, $1\text{--}4.5 \times 0.7\text{--}3$ cm, base obliquely cuneate, apex obtuse, other details similar to terminal leaflet; secondary veins 2–3 pairs; petiolules 1–2 mm long, hairy; stipels setaceous, $0.7\text{--}1 \times \text{ca } 0.3$ mm, with straight hairs, persistent. *Inflorescences* axillary, 1–1.5 cm long with 1–6 flowers; peduncles 1–15 mm long, densely long-hairy; bracts ovate, $1\text{--}2 \times 0.5\text{--}1$ mm, hairy; pedicels 2–6 mm long, densely long hairy. *Calyx* cup-shaped; tube 1.5–3 mm long; lobes unequal, lanceolate, $4\text{--}6 \times 1\text{--}2$ mm; upper lobes almost entirely connate with 2 minute lobes at apex; outside with long hairs and glands; inside glabrous. *Corolla* yellow and with dorsally red lines, glabrous; standard obovate, $6\text{--}8.5 \times 4\text{--}7.5$ mm, apex rounded, apiculate, claw 1–1.5 mm long, blade bi-auriculate, without callosities; wings irregularly oblong or narrowly obovate, $6.5\text{--}7(9) \times 1.5\text{--}2.5$ mm, apex rounded, claw 1.5–2.5 mm long, blade with an auricle; keel obliquely boat-shaped, $6\text{--}7 \times 2.5\text{--}3$ mm, limb slightly incurved, apex rounded, incurved, claw 2.5–3 mm long, blade without auricles. *Stamens*: staminal tube 5–7.5 mm long, free part 2–4 mm long; anthers elliptic, 0.3–0.5 mm long. *Ovary* oblong, $4\text{--}7 \times 2\text{--}2.5$ mm, sub-sessile, densely hairy with white long hairs and sessile glands, 2–6-ovuled; style 5–6 mm long, curved at upper part, glabrous. *Pods* oblong, $1.5\text{--}2.7 \times 0.4\text{--}1$ cm, apex obtuse, densely covered with long brown hairs, short hairs and sessile glands, greyish-green when young, turning blackish-brown or black. *Seeds* 2–6, subglobose or broadly ellipsoid, $2.5\text{--}5 \times 2.5\text{--}4$ mm, shiny, dark brown or grey with black mosaic; strophiole present, green.

Thailand.—NORTHERN: Mae Hong Son [Mae Sa Rieng, 21 July 2014, *Srisanga et al.* 3848; *ibid.*, 22 July 2014, *Srisanga et al.* 3860 (AAU, QBG); Pang Mapha, 19 Nov. 2013, *Lakoet 0493* (QBG)]; Chiang Mai [Chom Thong, 22 Sept. 1992, *Palee* 87 (CMUB); *ibid.*, 15 Dec. 1998, *Konta et al.* 4540 (BKF); Doi Sa Ket, 25 Feb. 1993, *Maxwell* 93-194 (BKF, CMUB); Doi Suthep, 22 Oct. 1910, *Kerr* 1497 (K); *ibid.*, 14 Oct. 1987, *Maxwell* 87-1190 (BKF, CMU); *ibid.*, 17 Oct. 1999, *Srapratet* 25 (CMUB);

Hot, 11 Oct. 1996, *Maxwell* 96-1337 (BKF, CMUB); Mae Rim, 5 Nov. 2001, *Glamwaewwong* 41 (QBG); Muang, 20 Jan. 1987, *Nonkokul* 24 (CMUB); San Kham Phaeng, 18 Sept. 1996, *Maxwell* 96-1199 (CMUB); *ibid.*, 16 Oct. 1998, *Palee* 473 (CMUB); Nan [Na Noi, 19 Oct. 2004, *Bunma s.n.* (CMU, QBG)]; Lamphun [Mae Tha, 29 Oct. 1994, *Maxwell* 94-1141 (BKF, CMUB); Pa Sang, 12 Oct. 1996, *Nanakorn et al.* 7715 (QBG)]; Lampang [Mae Tha, 21 Oct. 2010, *Maxwell* 10-49 (CMUB, QBG); Sop Prap, 5 Nov. 2016, *La-ongsri et al.* 5097 (QBG)]; Phrae [Phra Tit hill, 25 Nov. 1960, *Champion* 502 (K); Song, 12 Nov. 1991, *Maxwell* 91-1037 (CMUB)]; Sukhothai [Srisatchanalai, 4 Feb. 2015, *Maknoi* 7338 (QBG)]; Kamphaeng Phet [9 Nov. 1920, *Kerr* 4550 (BK, E, K)]; Nakhon; Sawan [Takhli, 14 Oct. 2006, *van de Bult* 907 (BKF, CMUB)]; NORTH-EASTERN: Phetchabun [Nam Nao, *Sawai* 1003 (KKU)]; Sakon Nakhon [Phu Phan, 14 Nov. 1984, *Murata et al.* T-50539 (BKF); *ibid.*, 15 Nov. 1984, *Murata et al.* T-50426 (BKF); *ibid.*, 12 Dec. 1999, *Leeratiwong* 99-186 (KKU)]; Khon Kaen [Muang, 9 Sept. 1990, *Chantaranothai et al.* 90/21 (BKF, K, KKU); *ibid.*, 21 Oct. 2001, *Namdreng* 44/01 (KKU)]; EASTERN: Nakhon Ratchasima [Bua Yai, 3 Nov. 1931, *Put* 4289 (BK, K)]; Buri Ram [24 Nov. 1976, *Phengkklai et al.* 3391 (BKF)]; Roi Et [Selaphum, 25 Mar. 2010, *Karaket et al.* 12 (BKF)]; Ubon Ratchathani [Phu Chong Nayoi, *Meeboonya & Yodboplub* 89 (BKF); Warinchamrap, 1 Oct. 1985, *Paisooksantivatana* 1613-85 (BK)]; SOUTH-WESTERN: Uthai Thani [Nong Chang, 24 Oct. 1974, *Sutheesorn* 3085 (BK)]; Kanchanaburi [Donslap, 15 Oct. 2014, *Tanming* 642 (QBG); *ibid.*, 654 (QBG); Sai Yok, 26 Oct. 2013, *Meeboonya & Yodboplub* 230 (BKF); Salag Phra W.S., 28 Nov. 1971, *van Beusekom et al.* 4000 (BKF, K); Sri Sawat, 16 Nov. 1971, *van Beusekom et al.* 3817 (K)]; Phetchaburi [Bo Fai, 8 Nov. 1931, *Marcan* 2731 (K); Huai Sai, 1 Dec. 1998, *Niyomdham* 5653 (BKF)]; Prachuap Khiri Khan [Hua Hin, 7 Nov. 1923, *Kerr* 13483 (BK, E, K)]; CENTRAL: Lop Buri [23 Sept. 1971, *Murata et al.* T-14815 (BKF, K)]; Suphan Buri [Dan Chang, 9 Nov. 1992, *Somprasong et al.* 80 (BK); U Thong, 10 Oct. 1982, *Paisooksantivatana* y1186-82 (BK); *ibid.*, 30 Nov. 1993, *Yonebayashi* 93008 (BKF)]; Ang Thong [25 Dec. 1928, *Put* 2562 (BK, K)]; Nakhon Nayok [Khao Noi, 21 Dec. 1966, *Sutheesorn* 1900 (BK); Muang, 6 Oct. 2003, *Maxwell* 03-315 (BKF, CMUB)]; Bangkok [Bangna, 19 Sept. 1969, *Kerr s.n.* (BK, K)]; SOUTH-EASTERN:

Chon Buri [Sriracha, 1916, *Collins* 621 (**K**), 16 Nov. 1926, *Put* 475 (**BK, K**); *ibid.*, 9 Sept. 1993, *Maxwell* 93-1020 (**BKF, CMUB**); Chanthaburi [11 Jan. 1930, *Kerr* 18093 (**BK, K**); Wat Sing, 26 Oct. 1924, *Kerr* 9348 (**BK**)]; PENINSULAR: Surat Thani [Kanchanadit, 2 Feb. 1987, *Maxwell* 87-119 (**BKF, PSU**)]; Phuket [Muang, 1 Dec. 1986, *Maxwell* 86-1026 (**BKF, PSU**); Nai Harn beach, 14 Dec. 1979, *Shimizu et al.* T-27263 (**BKF**)]; Songkhla [Sadao, 12 Dec. 2015, *Komnurdpriwan & Leeratiwong* 15-775 (**PSU**); *ibid.*, 16 July 2016, *Komnurdpriwan & Leeratiwong* 16-725 (**PSU**); Sathingphra, 22 July 2016, *Komnurdpriwan & Leeratiwong* 16-954 (**PSU**); *ibid.*, 13 Nov. 2016, *Komnurdpriwan & Leeratiwong* 16-757 (**PSU**); *ibid.*, 30 Dec. 2016, *Komnurdpriwan & Leeratiwong* 16-1075 (**PSU**)]; Yala [Bannang Sata, 23 July 1923, *Kerr* 7293 (**BK, K**)].

Distribution.—Jamaica, Coastal West Africa, Madagascar, Mauritius, Pakistan, Nepal, India, Sri Lanka, Bangladesh, Bhutan, Myanmar, China, Taiwan, Japan, Laos, Cambodia, Vietnam, Malaysia, Indonesia, Australia and Pacific Islands.

Ecology.—Common in open areas of mixed deciduous, beach, evergreen rain, dry evergreen, dipterocarp-oak or scrub forest, mostly in degraded, disturbed, agricultural or fire-damaged areas, along roadsides, in grass fields, swampy areas and limestone areas; 0–840 m alt. Flowering July–February; fruiting August–March.

Vernacular.—Khi non thao (ขึ้นตอนเถา) (Chiang Mai); phang kratai (พังกระต่าย) (Ang Thong); thao khi non (เถาขึ้นตอนเถา) (Chon Buri); thua paep (ถั่วแปบ) (Nakhon Ratchasima).

Notes.—*Cajanus scarabaeoides* is distinct from the other Thai species by its short standard petals (6–8.5 mm long vs 10–28 mm long in other species) and short pods (1.5–2.7 cm long vs 3–13 cm long in other species).

5. *Cajanus volubilis* (Blanco) Blanco, Fl. Filip. ed. 2, 417. 1845; Maesen, Agric. Univ. Wageningen Pap. 85(4): 210. 1986; R. Sha & M.G. Gilbert, in C.Y. Wu *et al.*, Fl. China 10: 231. 2010.—*Cytisus volubilis* Blanco, Fl. Filip. 599. 1837.—*Cantharospermum volubile* (Blanco) Merr., Philipp. J. Sci., C 5(2): 127. 1910; Fl. Manila: 255. 1912.—*Atylosia volubilis* (Blanco) Gamble, Fl. Madras: 369. 1918; Craib, Fl. Siam. 1(3): 465. 1928; Backer & Bakh.f., Fl. Java 1:

636. 1963; Thuan in Aubrév. & J.-F. Leroy, Fl. Cambodge, Laos & Vietnam 17: 111. 1979. Type: Philippines, Luzon, Rizal, Antipolo, 6 Nov. 1914, Merrill: Species Blancoanae No. 142 (neotype US [US00170410!], selected by Maesen (1986); isoneotypes **A** [00059905!], **BM** *n.v.*, **CAL** *n.v.*, **GH** *n.v.*, **K** *n.v.*, **L** [L0018801!], **NY** [00006771!], **W** *n.v.*).

—*Collaea cinerascens* Grah. in Wall., Numer. List nr. 5575. 1831, **nom. nud.**

—*Dolichos reticulatus* Buch.-Ham. in Wall., Numer. List nr. 5552B. 1831, **nom. nud.**

—*Atylosia burmanica* Collett & Hemsl., J. Linn. Soc., Bot. 28: 49. 1890.—*Cantharospermum burmanicum* (Collett & Hemsl.) Raizada in Mooney, Suppl. Bot. Bihar & Orissa: 53. 1950. Type: Myanmar, Shan Hills, *Collett* 95 (holotype **K** [K000900597!]; isotype **CAL** *n.v.*).

—*Atylosia crassa* Prain in King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66(1): 45. 1897; Craib, Contrib. Fl. Siam. 1: 67. 1912; Gagnep. in Lecomte & Gagnep., Fl. Indo-Chine 2: 280. 1916; Ridl., Fl. Malay Penins. 1: 564. 1922.—*Cajanus crassus* (Prain) Maesen, Agric. Univ. Wageningen Pap. 85(4): 110. 1986. Type: India, Kalkapur, 13 Dec. 1810, *Wallich* 5553 (holotype **K-W** [K001121272!]). Fig. 3E–G.

Perennial vine or woody climber; branches with dense cover of brown hairs, glabrescent. *Leaves*: petioles 1–8 cm long, rachis 0.6–1.5(–3) cm long, grooved, densely long-hairy; stipules triangular or ovate, 2–4 × 1–1.5 mm, hairy, caducous; terminal leaflet rhomboid or obovate-rhomboid, 2–10 × 2.5–9 cm, slightly chartaceous to coriaceous, base rounded or cordate, margins entire, apex acuminate, acute or rarely obtuse, upper surface sparsely hairy, lower surface densely covered with grey hairs and sessile glands; lateral leaflets obliquely ovate, 3–8.5 × 2.5–6 cm, base obliquely rounded, apex acuminate, other details similar to terminal leaflet; secondary veins 3–4 pairs; petiolules 2–4 mm long, hairy; stipels setaceous, 1–4 mm long, hairy, persistent. *Inflorescences* axillary, 5–15 cm long, with 3–6 flowers, bearing 2 flowers at each node; peduncles 2–8 cm long, densely hairy; bracts ovate to broadly triangular, 1–2 × 0.5–1 cm, apex acuminate, both sides hairy; pedicels 0.3–1.2 cm long, densely hairy. *Calyx* cup-shaped; tube 4–7 mm long; lobes triangular, unequal, 3–6 × 2.5–5 mm; 2 upper calyx lobes almost

entirely connate with 2 minute lobes at apex; outside sparsely hairy and with sessile glands; inside glabrous. *Corolla* yellow, glabrous; standard obovate, 1.8–2.3 × 1–2 cm, apex emarginate, claw 4–5 mm long, blade bi-auriculate, reflexed, without callosities; wings irregularly oblong-obovate or falcate-oblong, 1.3–2.3 × 0.4–0.7 cm, apex obtuse, incurved, claw 6–8 mm long, blade bi-auriculate, adherent to keel via auricle; keel obliquely oblong, 1.3–1.8 × 0.5–0.8 cm, limb incurved, apex obtuse, claw 6–10 mm long, blade with an auricle. *Stamens*: staminal tube 12–22 mm long, free part of filaments 5–8 mm long, curved at upper part, glabrous; anthers elliptic or ovate-elliptic, 1–1.5 mm long. *Ovary* oblong, 4–8 × 1–2 mm, 2–6-ovuled, stipe 1–2 mm long, densely hairy; style 12–16 mm long, curved and hairy at upper part. *Pods* oblong, 3–5 × 0.8–1.5 cm, laterally compressed, apex obtuse, covered with dense long brown hairs, short hairs and sessile glands, greyish-green when young, turning blackish-brown or black when mature. *Seeds* 2–6, subglobose, 4–5 × 3–5 mm, shiny, dark brown or black; strophiole present, green.

Thailand.—NORTHERN: Mae Hong Son [Muang, 6 Feb. 2014, *Norsaengsri* 10796 (QBG); Pai, 12 Jan. 1986, *Paisooksantivatana* 1756-86 (BK)]; Chiang Mai [3 Feb. 1905, *Hosseus* 368 (K); Chiang Dao, 20 Dec. 1933, *Lakshanakara* 1518 (BK); *ibid.*, 16 Mar. 1996, *Maxwell* 96-366 (BKF, CMUB); Doi Inthanon, 19 Jan. 1969, *Nooteboom et al.* 756 (BKF, K); Doi Suthep, 25 Jan. 1910, *Kerr* 945 (K, P); *ibid.* 10 Feb. 1911, *Kerr* 945A (K, P); *ibid.*, 10 Feb. 1988, *Maxwell*, 88-161 (BKF, CMU); Hot, 24 Dec. 1978, *Niyomdham et al.* 123 (AAU, BKF, K); Mae Chaem, 18 Dec. 1998, *Konta et al.* 4792 (BKF) & 4800 (BKF); Mae Pong, 24 Feb. 1979, *Koyama et al.* 15542 (AAU, BKF); Mae Rim, 14 Jan. 1994, *BGO. Staff.* 385 & 389 (QBG); *ibid.*, 21 Jan. 2005, *Glamwaewwong* 895 (QBG); Muang, 20 Jan. 1985, *Pomprasert* 4 (CMUB); *ibid.*, 16 Jan. 1987, *Kahndee* 260 (CMUB); Phang, 25 Jan. 1973, *Umpai* 470 (BK)]; Chiang Rai [Chiangkhan, 15 Dec. 1967, *Prayad* 1128 (BK); Wiang Papao, 4 Dec. 1997, *Maxwell* 97-1464 (BKF, CMUB)]; Nan [Ban Hue Sai, 22 Feb. 1912, *Kerr* 2410 (AAU, K); Ban Suan, 19 Feb. 1921, *Kerr* 4869 (AAU, BK, E, K)]; Lamphun [Thung Hoa Chang, 25 Feb. 2000, *Maxwell* 00-92 (CMUB)]; Lampang [Ngao, 6 Feb. 2001, *Niyomdham & Jonganurak* 6421 (AAU, BKF, P)]; Phrae [Mae Khaem, 3 Jan. 1972, *van Beusekom et al.* 4632 (K, P)]; Tak [Um Phang, 17 Jan. 2004, *Sawai* 545 (KKU)]; NORTH-EASTERN:

Phetchabun [Nam Nao, 28 Nov. 2005, *Sawai* 702 (KKU); *ibid.*, 18 Feb. 2014, *Maknoi* 6571 (QBG)]; Sakon Nakhon [Phu Phan, 12 Feb. 1999, *Leeratiwong* 99-27 & 99-46 (KKU)]; EASTERN: Chaiyaphum [Nam Phrom, 13 Dec. 1971, *van Beusekom et al.* 4201 (BKF, K, P); *ibid.*, 19 Dec. 1971, *van Beusekom et al.* 4422 (K, P)]; SOUTH-WESTERN: Kanchanaburi [1 Jan. 1995, *Kasessart Student* 95010114 (BK); Mae Nam Noi, 30 Dec. 1961, *Phengkklai* 360 (K); Sai Yok, 30 Dec. 1961, *Larsen* 9045 (AAU, K); *ibid.*, 17 Dec. 2005, *Maxwell* 05-712 (CMUB)]; Prachuap Khiri Khan [Bangsapan, 23 Dec. 1927, *Put* 1340 (BK, K); Kan Kradei, 14 Jan. 1929, *Put* 2287 (BK, K); Kui Buri, 22 Jan. 2004, *Middleton et al.* 2368 (BKF); Thap Sakae, 26 Jan. 2004, *Middleton et al.* 2521 (BKF)]; CENTRAL: Saraburi [Chai Badan, 15 Dec. 1923, *Kerr* 7981 (AAU, BK, K)]; SOUTH-EASTERN: Chanthaburi [Tap Sai, 17 Dec. 1924, *Kerr* 9690 (AAU, BK, E, K)]; PENINSULAR: Chumphon [Ban Pak Chuang, 12 Jan. 1927, *Kerr* 11393 (BK, K); Tha Sae, 16 Jan. 1987, *Maxwell* 87-59 (AAU, BKF, CMU, PSU); Toung Kar, 29 Dec. 1973, *Sutheesorn* 2804 (BK)]; Songkhla [Khlong Hoi Khong, 12 Jan. 2016, *Kommurdpriwan & Leeratiwong* 16-627 & 16-628 (PSU); Padang Besar, 24 Dec. 1927, *Kerr* 13615 (BK, K); Sadao, 7 Jan. 2017, *Kommurdpriwan & Leeratiwong* 17-1023 (PSU); *ibid.*, Feb. 2018, *Leeratiwong* 18-1142 (PSU)].

Distribution.—Nepal, India, Myanmar, China, Laos, Vietnam, Indonesia (Java), Philippines, New Guinea, Australia.

Ecology.—In mixed deciduous, dry dipterocarp, pine, oak-pine, evergreen rain or scrub forest, especially along open, disturbed or roadside areas, along river banks, often in fire-damaged areas, agricultural areas; 10–1500 m alt.; flowering October–April; fruiting November–June.

Vernacular.—Paep khao lam (แป๊ะข้าวหลาม), thua phi (ถั่วฝัก)(General).

Notes.—*Cajanus volubilis* is similar to *C. goensis* by having rhomboid or obovate-rhomboid terminal leaflets, but differs by lacking the abaxial callosities of the standard petal and by having two upper calyx lobes almost entirely connate with a minutely bifid apex, the hairy upper part of style, wing petals adherent to the keel petals and keel petals without auricles.

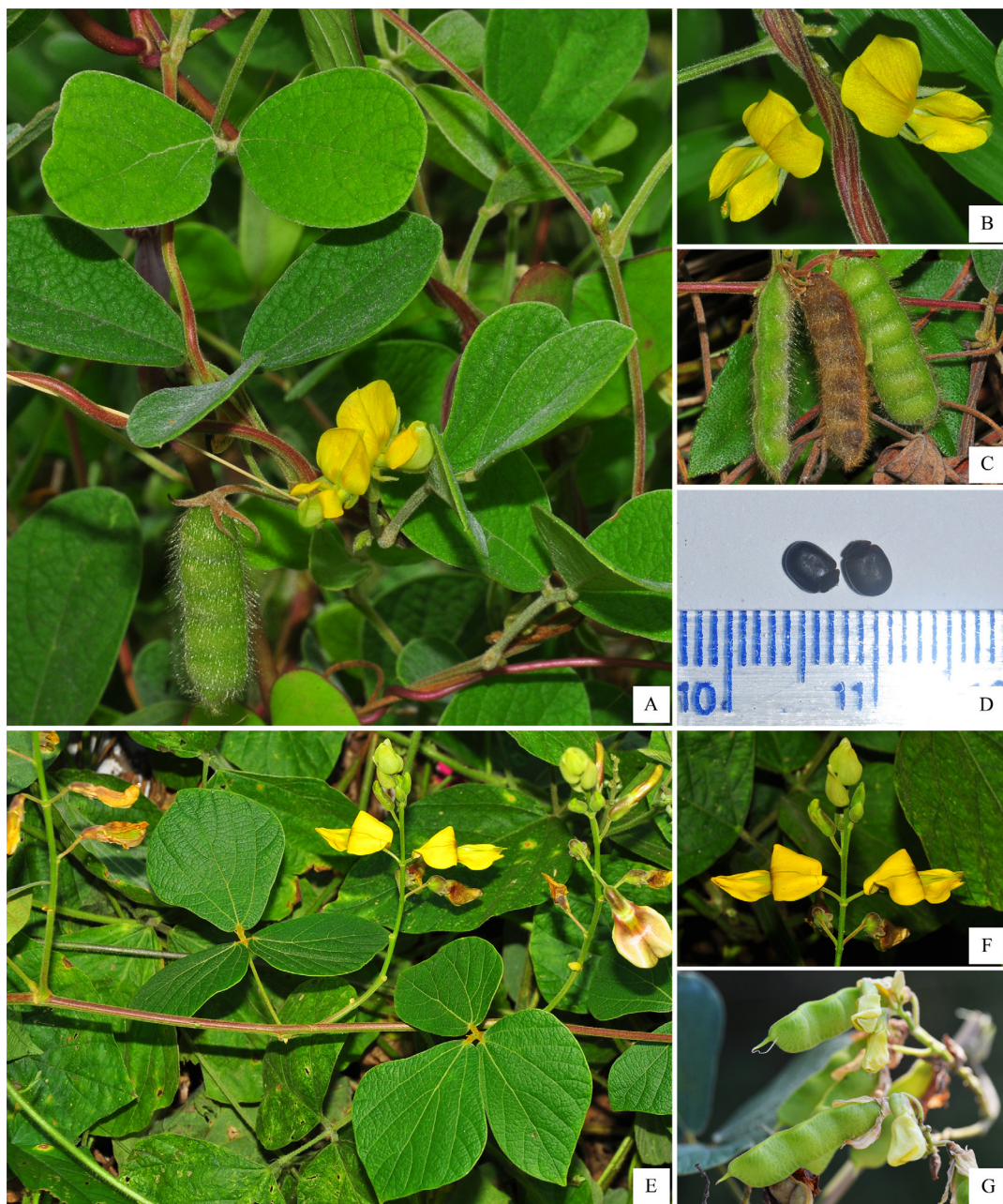


Figure 3. *Cajanus scarabaeoides*: A. flowering branch, B. inflorescence, C. fruits, D. seeds; *Cajanus volubilis* E. flowering branch, F. inflorescence, G. fruits. Photos by C. Leeratiwong (A–F) and H. Balslev (G).

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