

The Genus *Spatholobus* Hassk. (Leguminosae-Papilionoideae) in Thailand

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Abstract.— The genus *Spatholobus* Hassk. in Thailand is presented. Eight species are enumerated and described, viz. *S. acuminatus*, *S. ferrugineus*, *S. gyrocarpus*, *S. harmandii*, *S. littoralis*, *S. parviflorus*, *S. pottingeri* and *S. suberectus*. A key to the species, photographs, ecological and distributional information are provided.

KEY WORDS: Revision, *Spatholobus*, Leguminosae, Thailand

INTRODUCTION

Spatholobus Hassk. is a genus of woody climbers of the tribe Phaseoleae (Leguminosae-Papilionoideae) with *ca.* 29 species that are mainly distributed in tropical and subtropical Asia. This genus was established by Hasskarl in 1842 with one species, *S. littoralis* (Ridder-Numan and Wiriadinata, 1985), and is closely related to the *Butea*, *Kunstleria* and *Meizotropis* genera but differs in the number of leaflets and the shape of the pod and the flower (Ridder-Numan, 1998). In Thailand, *Spatholobus* is listed in only two checklists, those by Craib (1928) and The Forest Herbarium, Royal Forest Department (2001) with six and four species, respectively. Therefore, a description and key to the species of the genus *Spatholobus* in Thailand are provided herein along with ecological and distributional data.

MATERIALS AND METHODS

Specimens from field collections in Thailand and dried specimens from AAU, ABD, BCU, BK, BKF, BM, C, CMU, E, K, KKU, PSU, QBG (Thiers, 2013) and the Biology Herbarium, Chiang Mai University were consulted. All field collection specimens were deposited at KKU.

TAXONOMIC TREATMENT

SPATHOLOBUS

Hassk., Flora Beihl. 25(2): 79. 1842; Miq., Fl. Ind. Bat. 1(1): 203. 1855; Baker in Hook.f., Fl. Brit. India 2: 193. 1876; Engl. & Prant., Pflanzenfam. 3(3): 367. 1894; Prain, J. Asiat. Soc. Bengal 66(2): 412. 1897; Ridder-Numan & Wiriadinata, Reinwardtia 10(2): 156. 1985.

Woody climber. *Leaves*: alternate, pinnately trifoliolate; stipules stipellae present; leaflets opposite. *Inflorescence*: an axillary or terminal panicle; bract and bracteole present. *Flowers*: 3–12 mm long, white, pink, red or crimson. *Calyx*: cup-

shaped, 4–5-lobed. *Corolla*: papilionaceous. *Stamens* 10, diadelphous, nine in a sheath and the vexillary one free. *Ovary*: superior. *Pods*: samaroid.

Key to the species

- 1. Lateral leaflets symmetric **2**
- 1. Lateral leaflets asymmetric **4**
- 2. Flowers arranged in a fascicle; leaf margin crenate; inflorescence 15–25.5 cm long **5. *S. littoralis***
- 2. Flowers not arranged in a fascicle; leaf margin entire; inflorescence 4.5–15 cm long **3**
- 3. Inflorescence with tertiary branches; both leaflet surfaces dull brown **1. *S. acuminatus***
- 3. Inflorescence with secondary branches; upper leaflet surface blue-green, lower leaflet surface dull brown **4. *S. harmandii***
- 4. Flowers arranged in a fascicle **5**
- 4. Flowers not arranged in a fascicle **7**
- 5. Calyx at most 1/2 of the flower; pedicel 1–1.5 mm long **6**
- 5. Calyx at least 1/2 of the flower; pedicel 1.6–3 mm long **8. *S. suberectus***
- 6. Inflorescence 6–15 cm long; both leaflet surfaces pubescent dull brown **2. *S. ferrugineus***
- 6. Inflorescence 16–40 cm long; upper leaflet surface silvery pilose, lower leaflet surface silvery sericeous **6. *S. parviflorus***
- 7. Leaf margin crenate; peduncle brownish pubescent; pedicel 0.5–1.5 mm long **3. *S. gyrocarpus***
- 7. Leaf margin entire; peduncle glabrous; pedicel 1.6–2.5 mm long **7. *S. pottingeri***

1. *Spatholobus acuminatus* (Wall.) Benth., Pl. Jungh. 2: 238. 1852.

Butea acuminata Wall., Numer. List no. 5443. 1831. Type: Lower Burma (Myanmar), Wallich 5443 (holotype K! barcode K000900449; isotype SING! barcode SING0051018).

Pongamia rosea Grah. in Wall. Numer. List no. 5907. 1831. Type: Burma (Myanmar), Martaban, at Phanoe, on the Salween river, Wallich 5907 (holotype K! barcode K000900450).

S. listeri Prain, J. Asiat. Soc. Bengal 66(2): 415. 1897. Type: Burma (Myanmar), Chittagong, J.L. Lister 293 (lectotype K! barcode K000900442 chosen by Ridder-Numan, 1985).

S. roseus (Grah.) Prain, J. Asiat. Soc. Bengal 66(2): 415. 1897.

S. squamiger Prain, J. Asiat. Soc. Bengal 66(2): 414. 1897. Type: Burma (Myanmar), Pegu, Kuntze 2596 (holotype K! barcode K000900452).

S. pallidus Craib, Bull. Misc. Inform., Kew 1928: 62. 1928. Type: Thailand, Surat Thani, Tha Khanon, 14 Mar. 1927, A.F.G. Kerr 12317 (holotype K! barcode K000900463; isotypes BM! barcode BM000946872, E! barcode E00275923).

B. listeri (Prain) Blatt., J. Ind. Bot. Soc. 8: 136. 1929.

B. rosea (Prain) Blatt., J. Ind. Bot. Soc. 8: 137. 1929.

B. squamiger (Prain) Blatt., J. Ind. Bot. Soc. 8: 138. 1929.

Woody climber. *Leaves*: petioles 3–5.5 cm long; rachis 0.7–1.3 cm long; petiolules 3–5 mm long; terminal leaflet symmetric, ovate, oblong or elliptic, 6.5–13 by 3–5.5 cm, base obtuse, apex acute or acuminate, margin entire, upper surface glabrous, lower surface pubescent; lateral veins 5–7 pairs; lateral leaflets broadly elliptic or ovate,

4.7–10 by 2–4 cm, base obtuse, apex acute or acuminate, margin entire, upper surface glabrous, lower surface pubescent; both leaflet surfaces dull brown; lateral veins 6–8 pairs; stipules triangular, 2–3 by 1–2 mm, densely pubescent; stipels acicular, 1–2 mm long, sparsely pubescent. *Inflorescence*: axillary or terminal; panicles with tertiary branches, 7.3–15 cm long; peduncle silvery pubescent; pedicels 2–5 mm long, densely pubescent; bracts triangular, 1–1.2 by 0.8–1 mm, glabrous or sparsely pubescent. *Flowers*: 7–8 mm long, white, not arranged in a fascicle. *Calyx*: 4.8–5.1 mm long, 5-lobed. *Corolla*: standard ovate, 6.5–7 by 5–6 mm, base obtuse or truncate, apex obcordate; wing petals elliptic or oblong, 5–5.2 by 2–2.5 mm, base oblique, apex obtuse; keel petals ovate or elliptic, 6.2–6.5 by 2–2.1 mm, base attenuate, apex obtuse. *Stamens*: filaments 6.5–7 mm long; anthers oblong, 0.2 mm long. *Ovary*: obovate, densely pubescent; style 2–2.2 mm long. *Pods*: oblong or ovate, 7–10 by 1.7–2.1 cm, brown pubescent.

Thailand.— PENINSULAR: Chumphon [Bang Son, 10 Mar. 1928, *Put* 1504 (BK, BM, K)]; Surat Thani [Tha Khanon, 14 Mar. 1927, *A.F.G. Kerr* 12317 (BK, BM, K, ABD)]; Khao Wong 26 Feb. 1930, *A.F.G. Kerr* 18291 (BK, BM, K)]; Pattani [Khao Kala Khiri, 4 Apr. 1928, *A.F.G. Kerr* 15033 (BK, BM, K)].

Distribution.— Borneo (Sarawak).

Ecology.— Evergreen forest, alt. 50–100 m.

Vernacular.— Thao sam bai hok (เถาสามใบหอก), Yan uat (ยานอวด).

2. *Spatholobus ferrugineus* (Zoll. & Moritzi) Benth., Pl. Jungh. 2: 238. 1852.

Drebbelia ferruginea Zoll. & Mor., Nat. Geneesk. Arch. Neerl. Indie 3: 66, 79. 1846. Type: v. Hasselt s.n. (legit in sylvit

prope Panimbang Javae prov. Bantam (n.v., not in L).

Butea ferruginea (Zoll. & Mor.) Blatter, J. Ind. Bot. Soc. 8: 136. 1929.

Woody climber. *Leaves*: petioles 4–9 cm long; rachis 1–1.5 cm long; petiolules 5–7 mm long; terminal leaflet ovate, oblong or elliptic, 12–19.5 by 6.5–16 cm, base cuneate, apex cuspidate, margin entire, both surfaces brownish pubescent; lateral veins 7–8 pairs; lateral leaflets asymmetric, elliptic, oblong or ovate, 6.9–15 by 4.5–12.5 cm, base oblique, apex cuspidate, margin entire, both surfaces brownish pubescent; lateral veins 8–9 pairs; stipules triangular, 4–4.5 by 1–1.2 mm, densely pubescent. *Inflorescence*: axillary; panicles with tertiary branches, 6–15 cm long; peduncle silvery pubescent; pedicels 2–3 mm long, densely pubescent; bracts lanceolate, 2–4 by 1 mm, densely pubescent; bracteoles acicular, 0.5–0.6 mm long. *Flowers*: 6–8 mm long, red, arranged in a fascicle. *Calyx*: 4.2–5 mm long, 5-lobed. *Corolla*: standard reniform, 5–5.5 by 6.5–7 mm, base cuneate, apex obcordate; wing petals elliptic or oblong, 7–7.2 by 2–2.1 mm, base oblique, apex acute; keel petals ovate or elliptic, 6.2–6.5 by 2–2.1 mm, base oblique, apex obtuse. *Stamens*: filaments 6.5–7 mm long; anthers elliptic, 0.1 mm long, linear or oblong, densely pubescent; style 2–2.3 mm long. *Pods*: ovate, 7–9.5 by 1.8–2 cm, brown pubescent. **Thailand.**— PENINSULAR: Krabi [26 Oct. 1915, *Vanpruk* 680 (K)]; Narathiwat [Sungai Padee, 11 Feb. 1991, *Niyomdham et al.* 2074 (BKF)].

Distribution.— Malay Peninsula, Sumatra, Java, Borneo.

Ecology.— Evergreen forest, alt. 10–100 m.

Vernacular.— Chang haek (ช้างเห็ก).

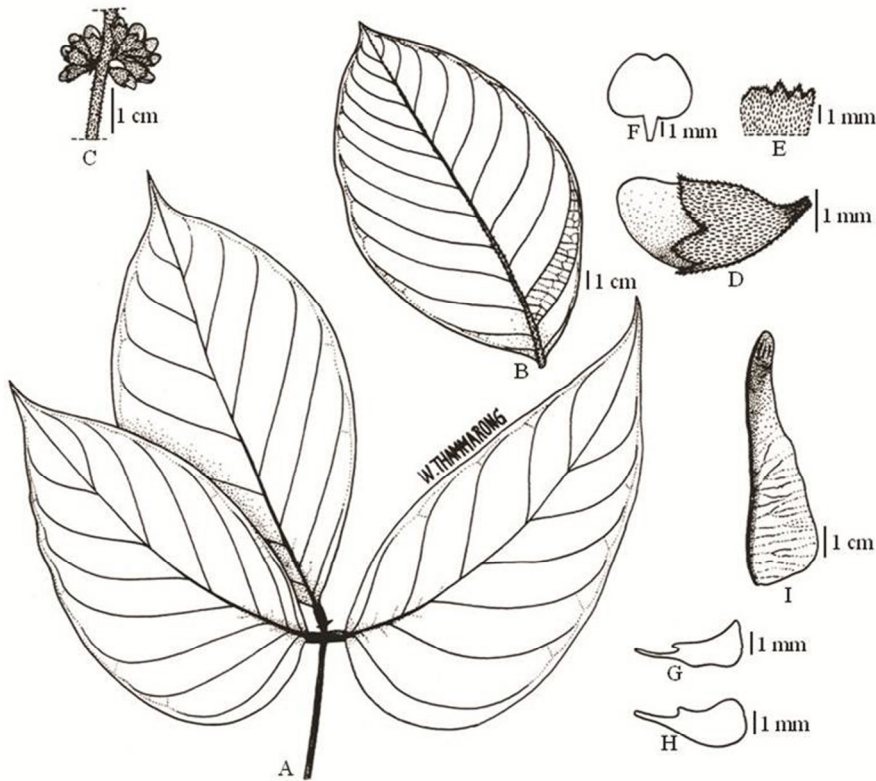


FIGURE 1. *Spatholobus gyrocarpus* A. and B. leaves; C. inflorescence; D. flower; E. calyx; F. standard; G. wing; H. keel; I. pod.

3. *Spatholobus gyrocarpus* Benth., Pl. Jungh. 2: 238. 1852. Type: Peninsular Malaysia, Pinang, Wallich 5442 (holotype K! barcode K000900455; isotypes BR, E, SING! barcode SING0045451). Fig. 1.
Butea gyrocarpa (Benth.) Blatt., Ind. Bot. Soc. 8: 136. 1929.

Woody climber. *Leaves*: petioles 11–13 cm long; rachis 2–4 cm long; petiolules 6–7 mm long; terminal leaflet obovate, 17.5–26 by 8.3–16 cm, base cuneate, apex obtuse, margin crenate, upper surface glabrous, lower surface pubescent; lateral veins 8–9 pairs; lateral leaflets asymmetric, elliptic or

oblong, 9.0–17.5 by 5.5–10.6 cm, base oblique, apex cuspidate, margin crenate, upper surface glabrous, lower surface pubescent; lateral veins 7–8 pairs; stipules triangular, 7–8 by 3–4 mm, densely pubescent; stipels acicular, 3 mm long. *Inflorescence*: axillary; panicles with tertiary branches, 20–41 cm long; peduncle brownish pubescent; pedicels 0.5–1 mm long, densely pubescent; bracts triangular, 5–7 by 1–2 mm, densely pubescent; lateral bracts triangular, 0.8–0.9 by 0.6–0.7 mm, densely pubescent; bracteoles acicular, 0.5–0.6 mm long. *Flowers* 3–5 mm long, red, not arranged in a fascicle. *Calyx*

1.4–2.3 mm long, 5-lobed. *Corolla*: standard reniform, 2–3 by 3–5 mm, base obtuse, apex emarginate; wing petals elliptic or oblong, 2–2.5 by 1–1.5 mm, base oblique, apex emarginate; keel petals ovate or elliptic, 1–2.5 by 1–2.5 mm, base oblique, apex obtuse. *Stamens*: filaments 2–3.5 mm long; anthers oblong, 0.1 mm long. *Ovary* elliptic; style 1–2 mm long. *Pods* elliptic or narrowly ovate, 7.7–8 by 1–1.7 cm, brown pilose.

Thailand.— PENINSULAR: Phatthalung [Khao Pu Khao Ya National Park, 30 Jul. 1986, *J.F. Maxwell* 86-530 (AAU, BKF, CMU, PSU)].

Distribution.— Malay Peninsula, North Borneo, Philippines.

Ecology.— Evergreen forest, alt. 300–400 m.

Vernacular.— Thao manora (ตามโนราห์).

4. *Spatholobus harmandii* Gagnep., Notul. Syst. (Paris) 2(12): 368. 1913. Type: Laos, Champasak, Bassac, *Harmand* 42 (isolectotype P!-online). Fig. 2A

S. compar Craib, Bull. Misc. Inform., Kew 1927: 62. 1927. Type: Thailand, Trat, Koh Chang, Klong Non Si, 26 Sept. 1924, *A.F.G. Kerr* 9167 (holotype K! barcode K000900465; isotypes BK! barcode BK258035, BM! barcode BM000946871, K! barcode K000900464, E! barcode E00275924, SAR, SING! barcode SING0051021).

Butea harmandii (Gagnep.) Blatter, J. Ind. Bot. Soc. 8: 136. 1929.

S. sinensis Chun & T.C. Chen, Acta Phytotax. Sin. 7: 31. 1958. Type: China, Hainan, Yai Hsien, Lopeng, 12 Jun. 1933, *F.C. How* 71016 (K, E, P, US).

Woody climber. *Leaves*: petioles 1.2–13.5 cm long; rachis 0.4–3 cm long; petiolules 3–10 mm long; terminal leaflet

oblong elliptic or obovate, 5–23.5 by 2–10 cm, base cuneate or obtuse, apex acuminate, margin entire, upper surface glabrous, blue-green, lower surface pubescent, dull brown; lateral veins 7–9 pairs; lateral leaflets symmetric, oblong, elliptic or obovate, 4–21 by 1.5–9.1 cm, base cuneate or obtuse, apex acuminate, margin entire, upper surface glabrous, blue-green, lower surface pubescent, dull brown; lateral veins 6–9 pairs; stipules narrowly triangular, 3–5 by 1 mm, densely pubescent; stipels acicular, 1–3 mm long. *Inflorescence*: axillary; peduncle silvery pubescent; panicles with secondary branches, 4.7–15 cm long; pedicels 2–3 mm long, densely pubescent; bracts triangular, 1 by 0.5 mm, densely pubescent; lateral bracts triangular, 0.9–1 by 0.3–0.4 mm, densely pubescent; bracteoles acicular, 0.5–0.6 mm long. *Flowers*: 5–9 mm long, crimson, not arranged in a fascicle. *Calyx*: 2.3–4.5 mm long, 5-lobed. *Corolla*: standard reniform, 5–5.5 by 6–7 mm, base cuneate, apex obcordate; wing petals spatulate or oblong, 4 by 2–2.1 mm, base oblique, apex obtuse; keel petals spatulate or elliptic, 4 by 2–2.2 mm, base oblique, apex obtuse. *Stamens*: filaments 3–5 mm long; anthers oblong, 0.2 mm long. *Ovary*: linear; style 1–2.5 mm long. *Pods*: ovate, 6.4–7.5 by 1.9–2.4 cm, brown pubescent.

Thailand.— NORTH-EASTERN: Buengkan [Phu Wua Wildlife Sanctuary, 20 Oct. 2012, *S. Ninkaew* 132 (KKU)]; Udon Thani [Nong Saeng, *W. Sidajium* 39 (BKF)]; Phu Foi Lom, 8 Sept. 2012, *S. Ninkaew* 144 (KKU) & 145 (KKU)]; EASTERN: Si Sa Ket [8 Oct. 1984, *G. Murata*, *C. Phengklai*, *S. Mitsuta*, *H. Nagamasu* & *N. Nantasan* T-49641 (AAU)]; CENTRAL: Nakhon Nayok [Khao Yai National Park, 14 Feb. 2001, *A. Boonkongchart* 42 (BKF), 27 Feb. 2000, *P.*



FIGURE 2. A. *Spatholobus harmandii*; B-C. *S. parviflorus*: B. flowers; C. habit (arrow).

Charoenchai 1023 (BKF)]; SOUTH-EASTERN: Prachin Buri [6 Feb. 1932, *Khanthachai* 115 (BKF)]; Chon Buri [Si Racha, 3 Mar. 1927, *D.J. Collins* 1827 (ABD, BK, K), 7 Nov. 1927, *D.J. Collins* 1994 (ABD, BK, K), 24 Oct 1927, *D.J. Collins* 1635 (BK, K), 1914, *D.J. Collins* 536 (ABD, K)]; Trat [Koh Chang, 24 Sept. 1924, *A.F.G. Kerr* 9147 (BK), 26 Sept. 1924, *A.F.G. Kerr* 9167 (BM, K-2 sheets)]; PENINSULAR: Ranong [22 Jan. 1969, *T. Smitinand* & *Schaller* 10632 (BKF)]; Phangnga [Moo Koh Surin National Park, 17 Apr. 1976, *T. Smitinand* 2114 (BK, BKF), *C. Chermrsirivathana* & *T. Smitinand* 2104 (BK)]; Nakhon Si Thammarat [17 Sept. 1962, *C. Phengklai* 563 (K)]; Satun

[Tarutao Island, 3 Mar. 1970, *C. Chermrsirivathana* 1609 (BK)]; Songkhla [Khao Ko Hong, 2 Oct. 1984, *J.F. Maxwell* 84-283 (BKF, PSU), 13 Oct. 1984, *J.F. Maxwell* 84-322 (BKF, PSU), 25 Dec. 1984, *J.F. Maxwell* 84-553 (BKF, PSU)]; Narathiwat [Waeng, 23 Aug. 1966, *B. Sangkhachand* & *B. Nimanong* 1259 (BKF)]; Bahco, 12 Nov. 1961, *B. Sangkhachand* 238 (C, K)].

Distribution.— Myanmar, China, Laos, Vietnam, Northern Malay Peninsula.

Ecology.— Evergreen, dry evergreen and mixed deciduous forests, alt. 50-750 m.

Vernacular.— Thao khao mu (เถาข้าวหนู), Thao man mu (เถามันหนู), Khrua mueai lueat (เครือเมือขลือด), Pradong lueat (ประดงลือด).

5. *Spatholobus littoralis* Hassk., Flora Beibl. 25 (2): 52. 1842. Type: Hassk. Hort. Bog. (n.v.). Fig. 3.

Derris leytenensis Merr., Philipp. J. Sc. C9. 361. 1914. Type: Wenzet 841. Type: not located.

Butea littoralis (Hassk.) Blatter in J. Ind. Soc. 8: 136. 1929.

Woody climber. *Leaves*: petioles 2.4–6 cm long; rachis 1.2–2.5 cm long; petiolules 5–7 mm long; terminal leaflet ovate or obovate, 10–16 by 5–7 cm, base cuneate, apex acute, margin crenate, upper surface glabrous, lower surface pilose; lateral veins 6–8 pairs; lateral leaflets symmetric, ovate, 9.8–15 by 3.3–7 cm, base cuneate, apex acute, margin crenate, upper surface glabrous, lower surface pilose; lateral veins 6–8 pairs. *Inflorescence*: axillary; panicles with tertiary branches, 15–25.5 cm long; peduncle brownish pubescent; pedicels 1.8–3 mm long, sparsely pubescent; two lateral bracts, triangular, 0.8–0.9 by 0.4–0.5 mm, densely pubescent; the fascicles with two bracts, triangular, 1–1.1 x 0.1 mm, densely pubescent; the flower with one bract, acicular, 0.8–0.9 mm long; bracteoles 2, acicular, 1–2 mm long. *Flowers*: 7–8 mm long, white, arranged in a fascicle. *Calyx*: 2.3–3.5 mm long, 4-lobed. *Corolla*: standard orbicular, 4.3–4.5 by 4.3–4.5 mm, base attenuate, apex obcordate; wing petals elliptic or oblong, 5–7.2 by 1–1.2 mm, base oblique, apex acute; keel petals ovate or elliptic, 4–4.5 by 1–1.5 mm, base oblique, apex obtuse. *Stamens*: filaments 4–5 mm long; anthers elliptic, 0.2 mm long. *Ovary*:

linear; style 2.8–3 mm long. *Pods*: oblong, 7.5–10.5 by 2–3 cm, glabrous.

Thailand.— PENINSULAR: Yala [Kampong Pinang, 21 Jun. 1930, Kiah 24368 (BKF, K)].

Distribution.— Java, Philippines.

Ecology.— Brackish water, alt. sea level.

Vernacular.— Thao nam kroi (เถาน้ำกรือ).

6. *Spatholobus parviflorus* (Roxb.) Kuntze, Rev. Gen. Pl. 1: 205. 1891. Fig. 2B, C.

Butea parviflora Roxb., [Hort. Beng.: 90. 1814, *nom. nud.* ex] Fl. Ind. 3: 248. 1832. Type: *Herb. Roxb.* (BR).

S. roxburghii Benth. in Miq., Pl. Jungh.: 238. 1852, *nom. superfl.*

S. roxburghii Benth. var. *platycarpus* Baker in Hook.f., Fl. Brit. India. 2: 193. 1876. Type: not located.

S. roxburghii Benth. var. *denudatus* Baker in Hook.f., Fl. Brit. India. 2: 193. 1876. Type: Malaysia, Penang, 1882, *Wallich* 5442 (holotype K! barcode K000900462).

S. parviflorus (Roxb.) Hu, J. Arnold. Arbor. 5(4): 228. 1924.

Woody climber, sinistrorse. *Leaves*: petioles 8–11.7 cm long; rachis 1.5–3 cm long; petiolules 5–7 mm long; terminal leaflet obovate or ovate, 9.3–16.7 by 7.5–11.2 cm, base cuneate, apex acute or cuspidate, margin entire, upper surface pilose, lower surface sericeous; lateral veins 8–10 pairs; lateral leaflets asymmetric, ovate or elliptic, 8.3–15.8 by 5–8 cm, base oblique, apex obtuse or cuspidate, margin entire, upper surface pilose, lower surface sericeous; lateral veins 8–10 pairs; stipules triangular, 2–4 by 4–6 mm, densely pubescent; stipels narrowly triangular, 3–4 by 1–3 mm. *Inflorescence*: axillary; panicles with tertiary branches, 23–37 cm long; peduncle silvery pubescent; pedicels

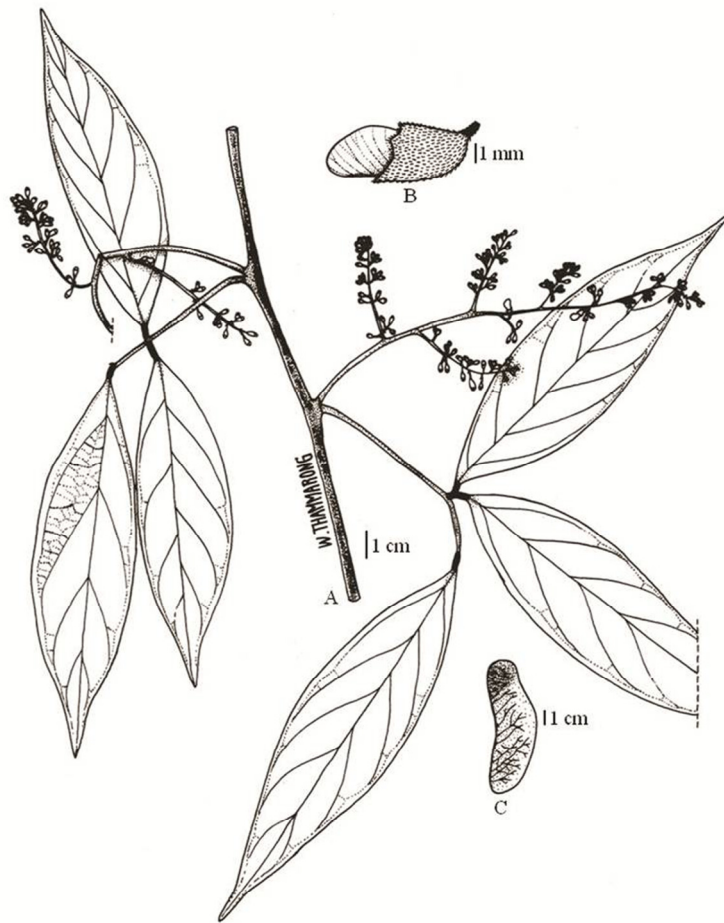


FIGURE 3. *Spatholobus littoralis* A. flowering branch; B. flower; C. pod.

1.8–2.2 mm long, bracts triangular 3–3.5 by 4–5 mm, densely pubescent; lateral bracts triangular, 0.5 by 3–4 mm, densely pubescent; bracteoles acicular, 1–3 mm long. *Flowers*: 8–12 mm long, white to pink, arranged in a fascicle. *Calyx*: 7.2–10.3 mm long, 4-lobed. *Corolla*: standard obovate or orbicular, 6–7 by 5–7 mm, base truncate, apex obtuse; wing petals oblong, 6.5–7 by 1.8–2 mm, base oblique, apex obtuse; keel petals spatulate, 4–5 by 2 mm, base oblique, apex obtuse. *Stamens*:

filaments 6–7 mm long; anthers elliptic, 0.2 mm long. *Ovary*: linear; densely pubescent; style 4–5 mm long. *Pods*: ovate or obovate, 10–12 by 1.9–2.4 cm, silvery pubescent.

Thailand.— NORTHERN: Mae Hong Son [Ban Nam Kat, 20 Oct. 1979, T. Shimizu, H. Toyokuni, H. Koyama, T. Yahara & T. Santisuk T-20049 (BKF)]; Chiang Mai [Thap Phanom Hot Spring, 21 Dec. 1989, J.F. Maxwell 89-1580 (CMU); Doi Suthep, 16 Jan. 1988 J.F. Maxwell 88-45 (CMU), 20 Sept. 1951, H.B.G. Garret 1356 (K-2

- sheets), 13 Jul. 1909, *A.F.G. Kerr* 723 (BM, K-2 sheets), 17 Aug. 1951, *H.B.G. Garret* 1353 (K-2 sheets), 29 Jul. 1987, *J.F. Maxwell* 87-701 (BKF, CMU), 1 Oct. 1987 *J.F. Maxwell* 87-1105 (BKF, CMU); Doi Inthanon National Park, 15 Dec. 1998, *F. Konta, C. Phengklai & S. Khao-Iam* 4497 (BKF), 28 Nov. 1993, *P. Puudjia et al.* 100 (BKF), 1 Aug. 1988, *C. Phengklai* 7219 (BKF), 28 Jul. 1988, *N. Fukuoka* T-62302 (BKF), 19 Jul. 1988, *N. Fukuoka* T-62067 (BKF), 15 Feb. 1998, *F. Konta & C. Phengklai & S. Khap-Iam* 4289 (BKF), 14 Jan. 2013, *S. Ninkaew* 146 (KKU); Om Koi, 15 Dec. 1969, *C.F. van Beusekom & C. Phengklai* 2542 (BKF); Mae Rim, 30 Aug. 1997, *W. Boonchai* 15 (BKF), 3 Jun. 2001, *T. Wongprasert* 016-04 (BKF), 4 Nov. 1993, *BGO. Staff* 85 (QBG), 6 Dec. 2012, *S. Ninkaew* 144 (KKU); Phrao, 25 Jul. 1989, *B. Wongathai* 52 (CMU); Karen Center, 4 Sept. 1987, *E.F. Anderson* 5434 (CMU); Doi Lohn, 11 Sept. 1996, *J.F. Maxwell* 96-1190 (BKF); Doi Mu Ser, 1 Aug. 1967, *K.B. & B.N.* 1452 (BKF); 1 Oct. 1971, *G. Murata, K. Iwatsuki, C. Phengklai, & C. Charoenphol* T-15619 (BKF); 1 Dec. 1997, *J.F. Maxwell* 97-153 (BKF); San Pa Tong, 15 Feb. 1998, *C. Phengklai et al.* 11006 (BKF); Chiang Rai [Huay Mak Liam, 9 Feb. 1991, *E.F. Anderson* 6182 (CMU); Doi Tung, 30 Aug. 1983, *E.F. Anderson* 5215 (BKF); Wiang Pa Pao, 11 Jul. 2001, *T. Wongprasert* 17-16 (BKF); 31 Jul. 1967, *Prayad* 955 (BK)]; Phayao [Doi Pha Chang, 2 Aug. 1996, *J.F. Maxwell* 98-768 (BKF); Muang, 9 Aug. 1997, *J.F. Maxwell* 97-838 (BKF); 1 Oct. 1987, *J.F. Maxwell* 87-1103 (AAU, CMU)]; Lamphun [Doi Khun Tan National Park, 28 Jul. 1994, *P. Paalee* 234 (BKF); 9 Dec. 2012, *S. Ninkaew* 145 (KKU)]; Lampang [Muang, 14 Feb. 1996, *J.F. Maxwell* 96-200 (BKF)]; Tak [Umphang, 8 Nov. 2012, *S. Ninkaew* 140 (KKU)]; Mae Sot, 7 Nov. 2012, *S. Ninkaew* 141 (KKU)]; Kamphaeng Phet [29 Jul. 1973, *G. Murata* T-17277 (AAU, BKF)]; Nakhon Sawan [Klong Lan, 27 Aug. 1997, *M. van de Bult* 29 (BKF); Hua Wai, 28 Aug. 1931, *Put* 4062 (ABD, BK, BM, E, K); Ban Taklee, 1 Nov. 1922, *A. Marcan* 1106 (BM, C)]; NORTH-EASTERN: Loei [Phu Kradueng, 16 Apr. 1956, *Din* 30 (BKF); Si-Than, 19 Jul. 1983, *B. Sangkhachand* 9170 (BKF); 16 Feb. 1948, *Ploenchit* 1306 (BKF)]; Udon Thani [Nong Saeng, 26 Jan. 1968, *K. Bunchuai* 1595 (C, E, K)]; Buengkan [12 Jun. 2011, *S. Ninkaew* 6 (KKU)]; Sakon Nakhon [Ban Han, 1 Jul. 1932, *M.C. Lakshanakara* 1030 (ABD, BK, BM, E, K-2 sheets); Phu Phan National Park, 15 Nov. 1998, *J. Leerativong* 98-29 (KKU); 5 Dec. 1961, *P. Suvarnakoses* 2036 (C, K); 16 Jul. 2011, *S. Ninkaew* 9 (KKU), 10 (KKU) & 11 (KKU); 28 Jul. 2012, *S. Ninkaew* 112 (KKU); 22 Oct. 2012, *S. Ninkaew* 133 (KKU)]; Mukdahan [Phu Pha Thoep, 17 Nov. 1984, *G. Murata, C. Phengklai, T. Yahara, H. Nagamasu & N. Nantasan* T-50749 (BKF), T-50707 (BKF) & T-50944 (BKF); Ban Wan, 17 Jun. 1932, *M.C. Lakshanakara* 953 (ABD, BK, BM, K)]; Kalasin [Somdet, 16 Jul. 2011, *S. Ninkaew* 8 (KKU)]; Maha Saraklam [Borabue, 6 Aug. 1986, *Prachit* 321 (BK)]; Khon Kaen [Khok Phu Ta Ka, 5 Aug. 2011, *S. Ninkaew* 16 (KKU); Nam Phong, 14 Aug. 2011, *S. Ninkaew* 18 (KKU); Hin Chang Si, 22 Jul. 2012, *S. Ninkaew* 111 (KKU); Khao Suan Kwang, 5 Aug. 2012, *S. Ninkaew* 120 (KKU)]; EASTERN: Chaiyaphum [Thung Kramang, 1 Nov. 1986, *C. Phengklai & T. Smitinand* 6165 (BKF, K); 14 Aug. 1972, *K. Larsen, S.S. Larsen, I. Nielsen & T. Santisuk* 31816 (AAU, BM, K); 1972, *K. Larsen, S.S. Larsen, I. Nielsen & T. Santisuk* 31677 II (AAU, BKF); 3 Nov. 2012, *S. Ninkaew* 134 (KKU)]; Nakhon Ratchasima [Bua Yai, 19

May 1936, *A.F.G. Kerr* 20485 (AAU, ABD, BK, BM, K); Pak Thong Chai, 21 Sept. 1964, *P. Narer* 655 (BKF)]; Buri Ram [Prakon Chai, 28 Jun. 1986, *O. Thaithong et al.* 208 (BCU)]; 10 May 1984, *G. Murata, C. Phengkklai, S. Mitsuta, H. Nagamasu & N. Nantasana* T-37535 (AAU, BKF)]; Surin [Phanom Dong Rak, 15 Oct. 2012, *S. Ninkaew* 131 (KKU)]; Yasothon [Sai Mun, 13 Oct. 2012, *S. Ninkaew* 129 (KKU)]; Si Sa Ket [Phu Sing, 13 Oct. 2012, *S. Ninkaew* 130 (KKU)]; SOUTH-WESTERN: Kanchanaburi [Hin Dat, 1 Jun. 1926, *Put* 58 (AAU, ABD, BK, BM, E, K); 15 Aug. 1971, *C. Phengkklai, B. Sangkhachand & B. Nimanong* 2962 (AAU, BKF, C, K); 9 Nov. 1971, *C.F. van Beusekom, C. Phengkklai, R. Geesink & B. Wongwan* 3607 (BKF, C); Thong Pha Poom, 6 Jul. 1973, *J.F. Maxwell* 73-164 (AAU, BK); Sai Yok, 8 Dec. 1993, *C. Yonebayashi* 93029 (BKF)]; Ratchaburi [18 Jul. 1924, *A. Marcan* 1794 (ABD, BM, C); 18 Jul. 1924, *A.F.G. Kerr* 9026 (ABD, BM, K)]; CENTRAL: Saraburi [Wang Nam Keaw, 25 Dec. 1957, *Seana* 171 (BKF); 25 Jan. 1975, *R. Geesink & J.F. Maxwell* 8351 (BKF); 29 Jul. 1974, *J.F. Maxwell* 74-136 (AAU, BK); Kang Koi, 3 Feb. 2006, *P. Darumas et al.* 1 (BCU); 30 May 2006, *P. Darumas et al.* 79 (BCU)]; SOUTH-EASTERN: Chon Buri [Si Racha, 22 May 1975, *J.F. Maxwell* 75-555 (AAU, BK); 10 Apr. 1975, *J.F. Maxwell* 75-403 (AAU, BK)].

Distribution.— India, Sri Lanka, Bangladesh, China, Myanmar, Laos, Cambodia, Vietnam.

Ecology.— Dipterocarp, mixed deciduous, dry evergreen and pine-oak forests, alt. 100–1,000 m.

Vernacular.— Kwang phu (กวางฝู), Khruea khao phu (เครือเขาฝู), Ta lan khruea (ตาลานเครือ), Khruea khao khu (เครือเขาขุ), Chan khruea (จันท

เครือ), Chang haek (ช้างแหก), Thu-ku-pho (ตุ๊กไฟพะ), Thao Thong lueai (เถาทองเลื้อย), Thao phan sai (เถาพันซ้าย).

7. *Spatholobus pottingeri* Prain, *J. Asiat. Soc. Bengal*, Pt. 2, Nat. Hist. 67: 286. 1898. Type: Burma (Myanmar), *E. Pottinger* s.n. (holotype K! barcode 000900472).

S. varians Dunn, *J. Linn. Soc. Bot.* 35: 490. 1903. Type: China, Yunnan, *A. Henry* 11771A (lectotype K! barcode K000900439 chosen by Ridder-Numan, 1992), *A. Henry* 11771 (isotype K! barcode K000900441), *A. Henry* 11771B (isotype K! barcode K000900400).

S. balansae Gagnep. in Lecomte, *Not. Syst.* (Paris) 2: 368. 1913. Type: Vietnam, Tonkin, *Balansa* 3141 (isotype P!-online).

S. spirei Gagnep. in Lecomte, *Not. Syst.* (Paris) 2: 370. 1913. Type: Laos, Khammouan, Tranninh *Spire* 1067 (P?).

S. dimorphus Craib, *Bull. Misc. Inform. Kew* 1927: 63. 1927. Type: Thailand, Loei, Phu Kradueng, 14 Mar. 1924, *A.F.G. Kerr* 8744 (lectotype K! barcode K000623147; isotypes BK! barcode BK258036, BM! barcode BM000946870, K! barcode K000623148, SING! barcode SING0051017).

Butea balansae (Gagnep.) Blatt., *J. Ind. Bot. Soc.* 8: 135. 1929.

B. pottingeri (Prain) Blatter, *J. Ind. Bot. Soc.* 8: 137. 1929.

B. spirei (Gagnep.) Blatt., *J. Ind. Bot. Soc.* 8: 137. 1929.

B. varians (Dunn) Blatt., *J. Ind. Bot. Soc.* 8: 138. 1929.

Woody climber. *Leaves*: petioles 3.5–14 cm long; rachis 1–3 cm long; petiolules 3–5 mm long; terminal leaflet ovate or elliptic, 10–22 by 4–12 cm, base cuneate, apex

acute or emarginate, margin entire, upper surface glabrous, lower surface pilose; lateral veins 7–9 pairs; lateral leaflets asymmetric, elliptic or ovate, 2–20 by 2.5–10 cm, base cuneate, apex acute or emarginate, margin entire, upper surface glabrous, lower surface pilose; lateral veins 9–10 pairs; stipules triangular, 1.3–1.5 by 3–5 mm, densely pubescent; stipels narrowly triangular, 5–7 by 0.5 mm. *Inflorescence*: axillary or terminal; panicles with tertiary branches, 12.5–28 cm long; peduncle glabrous or pilose; pedicels 1.8–2.5 mm long, bracts triangular, 2.5–3 by 8–9 mm, densely pubescent; bracteoles acicular, 0.2–0.3 mm long. *Flowers*: 5–9 mm long, dark red, not arranged in a fascicle. *Calyx*: 2.5–4.2 mm long, 5-lobed. *Corolla*: standard obovate or orbicular, 5–5.5 by 4–4.3 mm, base truncate, apex obcordate; wing petals elliptic or oblong, 4.5–7 by 1–1.2 mm, base oblique, apex obtuse; keel petals ovate or elliptic, 4–4.8 by 1–1.2 mm, base oblique, apex obtuse. *Stamens*: filaments 3.5–6.5 mm long; anthers elliptic, 0.2 mm long. *Ovary*: linear; sparsely pilose; style 2–2.3 mm long. *Pods*: oblong or elliptic, 10.3–11.5 by 2.3–2.5 cm, sparsely pilose.

Thailand.— NORTHERN: Chiang Mai [Doi Inthanon National Park, 7 Feb. 1998, C. Phengklai, F. Konta & S. Khao-Iem 10893 (BKF); 16 Feb. 1998, C. Phengklai, F. Konta & S. Khao-Iem 11029 (BKF) & 4330 (BKF); 24 Feb. 1989 J.F. Maxwell 89-246 (BKF, CMU); 19 Mar. 1990, T. Smitinand 90-97 (BKF); Ban Khun Klang, 7 Feb. 1998, F. Konta & C. Phengklai 4059 (BKF); Mae Rim, 14 Nov. 1993, BGO. Staff 85 (QBG); Doi Suthep, 19 Feb. 1989, J.F. Maxwell 89-236 (BKF, CMU); 7 Dec. 2012, S. Ninkaew 143 (KKU)]; Lamphun [Doi Khun Tan National Park, 30 Jan. 1994 J.F. Maxwell 94-148 (BKF)]; Phitsanulok

[Nakhonchai, 4 Apr. 1924, A.F.G. Kerr 8744B (K)]; NORTH-EASTERN: Loei [Phu Kradueng National Park, 14 Mar. 1924, A.F.G. Kerr 8744 (ABD, BM, K-2 sheets) & 8744A (ABD, BK, BM, K)].

Distribution.— Laos.

Ecology.— Dipterocarp, mixed deciduous and dry evergreen forests, alt. 500–1,400 m.

Vernacular.— Khruea khao phu (เครือเขาปู่).

8. *Spatholobus suberectus* Dunn, J. Linn. Soc. Bot. 35(247): 489. 1903. Type: China, Yunnan, Szemao, A. Henry 11997A (lectotype K! barcode K000900437 chosen by Ridder-Numan, 1985). *S. laoticus* Gagnep. in Lecomte, Not. Syst. (Paris) 2: 369. 1913. Type: Laos, Xieng-kouang, *Spire* 245 (K!) Fig. 4.

S. floribundus Craib, Bull. Misc. Inform. Kew 1927: 64. 1927. Type: Thailand, Chiang Mai, Doi Suthep, 7 May 1911, A.F.G. Kerr 1826 (holotype K! barcode K000900468; isotypes BM! barcode 000946868 K! barcode 000900467).

Butea laotica (Gagnep.) Blatt., J. Ind. Bot. Soc. 8: 136. 1929.

B. suberecta (Dunn) Blatt., J. Ind. Bot. Soc. 8: 138. 1929.

Woody climber. *Leaves*: petioles 3.5–8 cm long; rachis 0.8–1.5 cm long; petiolules 3–6 mm long; terminal leaflet obovate, 5.5–10.5 by 2–5.6 cm, base cuneate, apex acute or acuminate, margin crenate, both surfaces pilose; lateral veins 5–7 pairs; lateral leaflets asymmetric, obovate, 4.9–11 by 2.5–5.2 cm, base oblique, apex acute, margin crenate, both surfaces pilose; lateral veins 5–8 pairs; stipels acicular, 0.5–0.6 mm long, sparsely pilose. *Inflorescence*: axillary or terminal; panicles with tertiary branches, 16–18 cm long; peduncle silvery pubescent; pedicels 1–1.5 mm long, bracts

lanceolate, 1.7–1.9 by 0.2–0.3 mm, densely pubescent; bracteoles acicular, 0.5–0.6 mm long. *Flowers*: 5–8 mm long, white, arranged in a fascicle. *Calyx*: 2.3–3 mm long, 4-lobed. *Corolla*: standard ovate, 2.4–2.6 by 4–4.3 mm, base cuneate, apex obcordate; wing petals elliptic or oblong, 4–5 by 1.2–2 mm, base oblique, apex emarginate; keel petals obovate or elliptic, 4.8–5 by 1.5–2 mm, base oblique, apex obtuse. *Stamens*: filaments 5–5.2 mm long; anthers elliptic, 0.2 mm long. *Ovary*: linear, densely pubescent; style 3 mm long. *Pods*: ovate, 8.7–9.5 by 3–3.2 cm, silvery pubescent.

Thailand.— NORTHERN: Chiang Mai [Doi Lohn, 15 Jul. 1996, *J.F. Maxwell* 05-441 (BKF); Doi Ka, 8 Apr. 1925, *Winit* 1427 (BKF, BK, K); Doi Inthanon National Park, 3 Aug. 1988, *C. Phengklai* 7445 (BKF); 5 Sept. 1991, *R. Pooma* 537 (BKF); Doi Suthep National Park, 7 May 1911 *A.F.G. Kerr* 1826 (BKF, BM, E, K-2 sheets); 22 Sept. 1912, *A.F.G. Kerr* 1826A (BKF, BM, E, K-2 sheets); 18 May 1991, *J.F. Maxwell* 91-443 (CMU); Mae Tang, 28 Nov. 1991, *R. Pooma* 589 (BKF); Doi Ngam, 13 May 1921, *A.F.G. Kerr* 5435 (BKF, BM, E, K); Mae Ta Lai, 28 Feb. 1957, *Khanthachai* 382 (BKF); Muang, 2

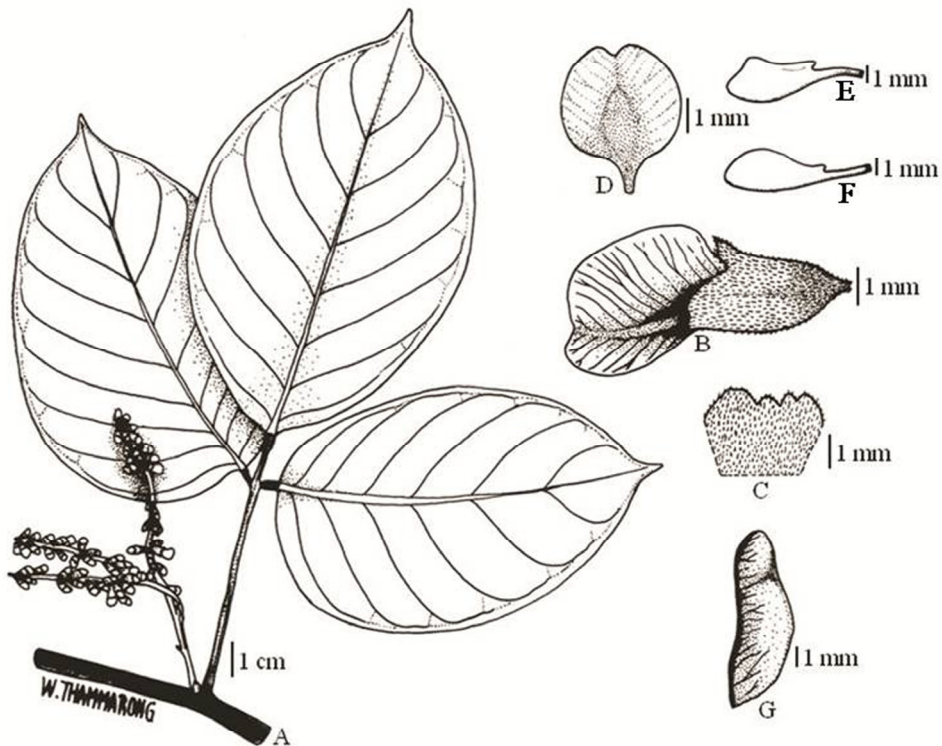


FIGURE 4. *Spatholobus suberectus* A. flowering branch; B. flower; C. calyx; D. standard; E. wing; F. keel; G. pod.

Jul. 1954, *Khanthachai* 893 (BKF); Doi Chiang Dao, 3 Jul. 1954, *Khanthachai* 896 (BKF, K); Hot, 27 Mar. 1977, *B. Nimanong* & *S. Phusomsaeng* 1757 (BKF); Chiang Rai [Khun Chae National Park, 1 Apr. 1998, *J.F. Maxwell* 98-353 (BKF); Doi Mae Salong, 12 Aug. 2010, *J.F. Maxwell* 10-12 (QBG)]; NORTH-EASTERN: Phetchabun [Nam Nao National Park, 15 May 2005, *S. Mattapha* 886 (KKU)].

Distribution.— Southern China.

Ecology.— Dry evergreen and pine forests, alt. 900-1,500 m.

Vernacular.— Thao phan doi (เถาพันดอย).

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LITERATURE CITED

- Craib, W. 1928. *Florae Siamensis Enumeratio* I. Siam Society, Bangkok.
- Ridder-Numan, J.W.A. 1992. *Spatholobus* (Leguminosae-Papilionoideae): A new species and some taxonomic notes. *Blumea* 37(1): 63-71.
- Ridder-Numan, J.W.A. 1998. Historical Biogeography of *Spatholobus* (Leguminosae-Papilionoideae) and allies in SE Asia. In: Hall, R. and Holloway, J.D. (Eds). *Biogeography and Geological Evolution of SE Asia*, Backhuys publishing, Leiden, 259-277.
- Ridder-Numan, J.W.A. and Wiriadinata, H. 1985. A Revision of the genus *Spatholobus* (Leguminosae-Papilionoideae). *Reinwardtia* 10(2): 139-205.
- The Forest Herbarium, Royal Forest Department. 2001. *Thai Plant Names Tem Smitinand*. 2nd ed. Prachachon, Bangkok.
- Thiers, B [continuously updated]. *Index Herbariorum*: A global directory of public herbaria and associated staff. New York Botanical Garden's Virtual Herbarium. <http://sweetgum.nybg.org/ih/>. April 26, 2013.