



The genus *Baliospermum* (*Euphorbiaceae*) in Malesia

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Key words

Baliospermum
Euphorbiaceae
Malesia
revision

Abstract The genus *Baliospermum* is revised for the Malesian area. A single, variable species is recognized: *B. solanifolium*.

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INTRODUCTION

Blume (1826) established the genus *Baliospermum* based on *B. axillare*, now a synonym of *B. solanifolium* (Burm.) Suresh (formerly generally referred to as *Baliospermum montanum* (Willd.) Müll.Arg., e.g., Backer & Bakhuizen van den Brink Jr 1963, Airy Shaw 1972, 1981, 1982). Typical are: the stipular glands, the glands on the lower side of the leaf blade teeth of which the most basal ones are enlarged, the strigose hairs, the structure of the stamens (flat, rather broad filament ending in a triangular connective, with on top of the connective the two thecae that are almost confluent; Fig. 1g) and the stigmas that are apically split and broadened perpendicular to the ovary.

The genus is classified in the subfamily *Crotonoideae* Pax. Radcliffe-Smith (2001) briefly discusses the classification of the genus. Müller (1866: 1124) and Pax & Hoffmann (1912) associated *Baliospermum* with *Suregada* Roxb. ex Rottler, which is placed in tribe *Gelonieae* (Müll.Arg.) Pax. Webster (1994), following the suggestion by Airy Shaw (1972: 194), placed it in tribe *Codiaeae* (Pax) Hutch. because of the inaperturate pollen (Punt 1962), even though the genus lacks petals in both sexes, which are present in the other members of the *Codiaeae*. Radcliffe-Smith (2001) followed this view and also classified *Baliospermum* in the *Codiaeae*. Webster (2014) subdivides tribe *Codiaeae* and places *Baliospermum* in subtribe *Codiaeinae* Pax. The backbone phylogeny of Wurdack et al. (2005) supports the tribal classification in the *Codiaeae*; *Baliospermum*, together with *Codiaeum* A.Juss., is part of the rather unresolved C2 *Crotonoideae* clade, which is characterized by a large deletion in the *trnL-F* spacer.

Within the genus Chakrabarty & Balakrishnan (1992) established two sections, section *Baliospermum*, only containing *B. solanifolium*, which is generally monoecious (sometimes unisexual) and has an annular, lobed staminate disc, and section *Gymnanthemum* Chakrab. & N.P.Balakr., in which the species are dioecious and have free staminate disc glands.

Quite a number of names were united under *B. calycinum* Müll.Arg. and recognized on variety level by Chakrabarty & Balakrishnan (1992; see also Govaerts et al. 2000 for other

reductions). The reductions under *B. calycinum* were followed in the treatment for the Flora of Thailand by Phattarahirankanon & Chayamarit (2005), but no varieties were recognized because of the overlapping variability. This reduced the number of taxa recognized for Thailand from five (Airy Shaw 1972) to two (Phattarahirankanon & Chayamarit 2005): *B. calycinum* and *B. solanifolium*. The latter species is the only one present in Malesia.

The species of *Baliospermum* are herb-like shrubs to at most very small trees and are generally weedy species. This may explain their phenotypic plasticity, it may also show that the group is undergoing fast evolutionary changes. This treatment unites a description of the variability of one of the species with the most recent changes in nomenclature, a highly detailed drawing and a distribution map.

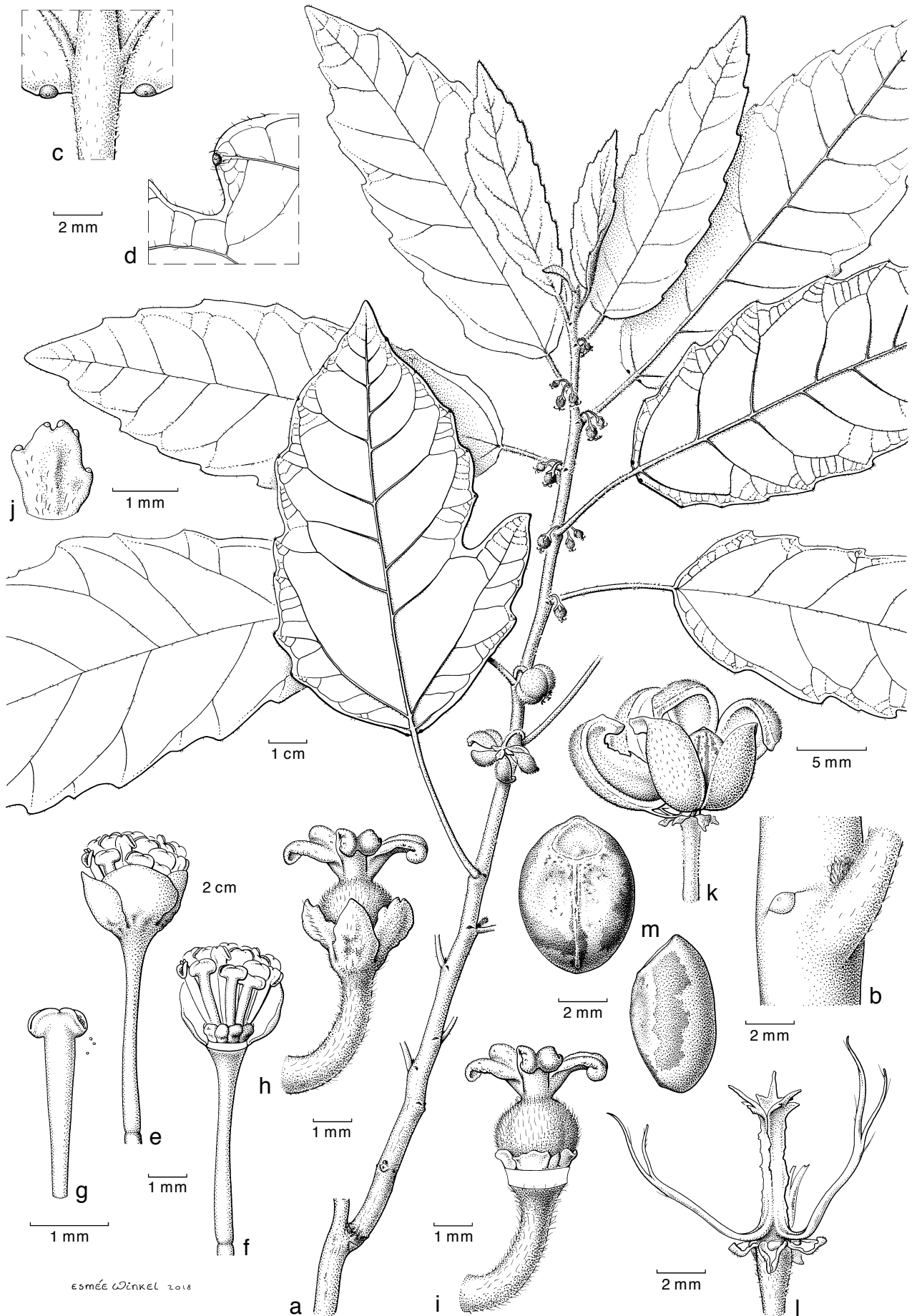
Baliospermum Blume

Baliospermum Blume (1826) 603; Decne. (1844) 154, t. 154 '155'; Baill. (1858) 394; Müll.Arg. (1866) 1125; Benth. (1880) 324; Hook.f. (1887) 461; J.J.Sm. (1910) 599; Pax & K.Hoffm. (1912) 24; Ridl. (1924) 312; Gagnep. (1927) 429; Pax & K.Hoffm. (1931) 182; Backer & Bakh.f. (1963) 497; Airy Shaw (1972) 222; Whitmore (1973) 68; Airy Shaw (1981) 267; (1982) 8; Radcl.-Sm. (1986) 83; Grierson & D.G.Long (1987) 809; Chakrab. & N.P.Balakr. (1992 '1990') 3; G.L.Webster (1994) 108; Govaerts et al. (2000) 242; Radcl.-Sm. (2001) 306; Phattar. & Chayam. (2005) 120; Thin (2007) 261; P.T.Li & M.G.Gilbert (2008) 277; (2009) f. 333: 4; G.L.Webster (2014) 177. — *Baliospermum* Blume sect. *Baliospermum*: Chakrab. & N.P.Balakr. (1992 '1990') 5. — Type: *Baliospermum axillare* Blume [= *Baliospermum solanifolium* (Burm.) Suresh].

Shrubs, dioecious or monoecious. *Indumentum* of simple, strigose hairs. *Stipules* small and triangular or round, somewhat elevated, bud-like structures. *Leaves* alternate, simple, petiolate; blade deeply lobed or not, margin serrate to crenate, with glands in teeth underneath, the basal ones close to the petiole enlarged, basally 3- or 5-nerved. *Inflorescences* axillary to terminal, racemes or panicles, pedunculate to almost sessile, uni- or sometimes bisexual, staminate ones many-flowered per node, pistillate ones few-flowered or reduced to a single flower in the leaf axil. *Flowers* symmetric; pedicel with subbasal abscission zone; sepals 5 (or 6), connate at base, imbricate; petals absent. *Staminate flowers* small, pedicellate; sepals membranous, margin entire; disc annular and lobed or consisting of 5 (or 6) free glands; stamens 9–21, filaments free, thin, broadening towards the broadly triangular connective; anthers 2-thecate, thecae almost confluent on top of connective, opening later with

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Esmée Winkel 2018

Fig. 1 *Baliospermum solanifolium* (Burm.) Suresh. a. Habit; b. glandular stipule; c. glands at base of leaf blade; d. smaller gland along margin of leaf blade; e. staminate flower; f. staminate flower with sepal removed showing disc glands and stamens; g. stamen; h. pistillate flower; i. pistillate flower with sepals removed, showing disc glands and ovary; j. pistillate petal with glands along margin; k. dehiscent fruit; l. columella and persistent remnants of fruit wall; m. seed in ventral and lateral view (a–d, h–j: *Junghuhn s.n.*, barcode L.2189894; e–g: *Larsen 47261*; k, m: *Maxwell 87-109*; l: *Lörzing 16965*; all L). — Drawing by Esmée Winkel, 2018.

lengthwise slits; pistillode absent. *Pistillate flowers* larger than staminate ones, shortly pedicellate, elongating in fruit; sepals chartaceous, margin entire to often lobed with glands, persistent and sometimes accrescent; disc annular, lobed inside sepals, thin, flat, whitish when dry; ovary 3-locular, smooth, glabrous or hairy; ovules 1 per locule; styles absent, stigmas recurving, widening into shortly split wings. *Fruits* lobed capsules, septically and (partly to) completely loculicidally dehiscent, subglobose; columella persistent, apically shortly T-shaped. *Seeds* subglobose, marbled, ecarunculate.

Distribution — Five species (ranging from the Himalayas to Yunnan, Myanmar, Indochina to Malesia (Sumatra, Java, Sumbawa in the Lesser Sunda Islands) (Airy Shaw 1972, 1982, Govaerts et al. 2000, Phattarahirankanok & Chayamarit 2005).

1. *Baliospermum solanifolium* (Burm.) Suresh — Fig. 1; Map 1

Baliospermum solanifolium (Burm.) Suresh in Nicolson et al. (1988) 106; Phattar. & Chayam. (2005) 121, f. 25; P.T.Li & M.G.Gilbert (2008) 277; (2009) f. 333: 4. — *Croton solanifolius* Burm. (non Geiseler, see below) (1769) 6 ('*solanifolium*'). — Type: Rheede, Hort. Malab. 10 (1690) t. 76. See note 1.

Jatropha montana Willd. (1805) 563. — *Ricinus montanus* (Willd.) Wall. (1847) nr. 7727. — *Baliospermum montanum* (Willd.) Müll.Arg. (1866) 1125; Kurz (1877) 410; J.J.Sm. (1910) 600; Pax & K.Hoffm. (1912) 25, f. 6; Backer & Bakh.f. (1963) 497; Airy Shaw (1972) 222; Whitmore (1973) 68; Airy Shaw (1981) 267; (1982) 8; Radcl.-Sm. (1986) 83; Grierson & D.G.Long (1987) 811; Chakrab. & N.P.Balacr. (1992 '1990') 5, f. 1; P.H.Hô (1992) 351; Thin (2007) 262. — Type: *Klein s.n.* (holo B-WILLD, no. 17927), India.

Croton solanifolius Geiseler (1807) 74, nom. illeg., non Burm. (see above). — *Baliospermum indicum* Decne. (1844) 154, t. 154 '155'. — Type: *J.G. König s.n.*, Herb. Vahl (holo C), India.

Baliospermum axillare Blume (1826) 604; Miq. (1859) 410; Kurz (1877) 410; Hook.f. (1887) 461; Boerl. (1900) 294; F.N.Williams (1905) 32; Ostenf. (1905) 718; Craib (1911) 467; (1912) 194; Ridl. (1924) 312; Gagnep. (1927) 429, f. 51: 6–19. — Lectotype (designated here): *Anonymous s.n.*, *Hb. Reinwardt* (L, barcode L.2189912), [Indonesia, Java,] in montosis (in mountains).

Croton polyandrus Roxb. (1832) 682, nom. illeg., non Spreng. (1821). — *Croton roxburghii* Wall. (1840) 20 (see also Esser 2017). — *Baliospermum polyandrum* (Roxb.) Wight (1852) 23, t. 1885. — Lectotype (designated here): Herb. *Roxburgh s.n.* (BR 505447).

[*Rottlera suffruticosa* Wall. (1847) n. 7843, nom. nud. — Cited specimen: *Hb. N. Wallich 7843* (K-W).]

[*Baliospermum angulare* Decne. ex Baill. (1858) 395, nom. nud. — No specimen cited.]

[*Baliospermum moritzianum* Baill. (1858) 395, nom. nud. — Cited specimen: *Zollinger 615* (G-DC), cited as *Moritz 615*.]

Baliospermum axillare Blume var. *dioica* Haines (1910) 234. — *Baliospermum montanum* (Willd.) Müll.Arg. var. *dioica* (Haines) Haines (1921) 115. — Type: *Haines s.n.* (n.v.), India, Bihar, Choatanagpur (see Chakrabarty & Balakrishnan 1992 '1990').

Baliospermum pendulinum Pax in Pax & K.Hoffm. (1912) 28. — Lectotype (designated here): *Wawra von Fernsee 2495* (lecto W), Sandwich Inseln [Hawaii], Honolulu, in Gärten [cultivated in garden].

Baliospermum axillare Blume var. *heterophylla* Gagnep. (1927) 430. — Type: *Bon s.n.* (holo P), Annam [Vietnam], Prov. de Thanh-hoa, Trinh-nga.

Baliospermum razianum Kesh.Murthy & Yogan. in Keshva Murthy et al. (1987) 486 ('*raziana*'); T.Jose et al. (1988) 225 ('*raziana*'). — Type: *K.R. Keshava Murthy et al. 4218A* (holo RRCBI n.v.; iso *4218B*, C: RRCBI n.v.), India, Karnataka, Coorg dist., Nagarahole.

Shrubs, up to 2(–10) m high, stem up to 10 mm diam at base, monoecious (rarely only one sex present), evergreen to deciduous in drier areas, epidermis thin, smooth, brown-green when fresh; flowering branches 2.5–5 mm diam, somewhat hairy when young, glabrescent, dark brown; sap clear, sticky. *Indumentum* of simple hairs, strigose on branches and leaves, more sericeous on floral parts. *Stipules* bud-like or glandular enations. *Leaves*: petiole 0.9–18.2 cm long, round to reniform in transverse section, somewhat longitudinally ribbed when dry, at most

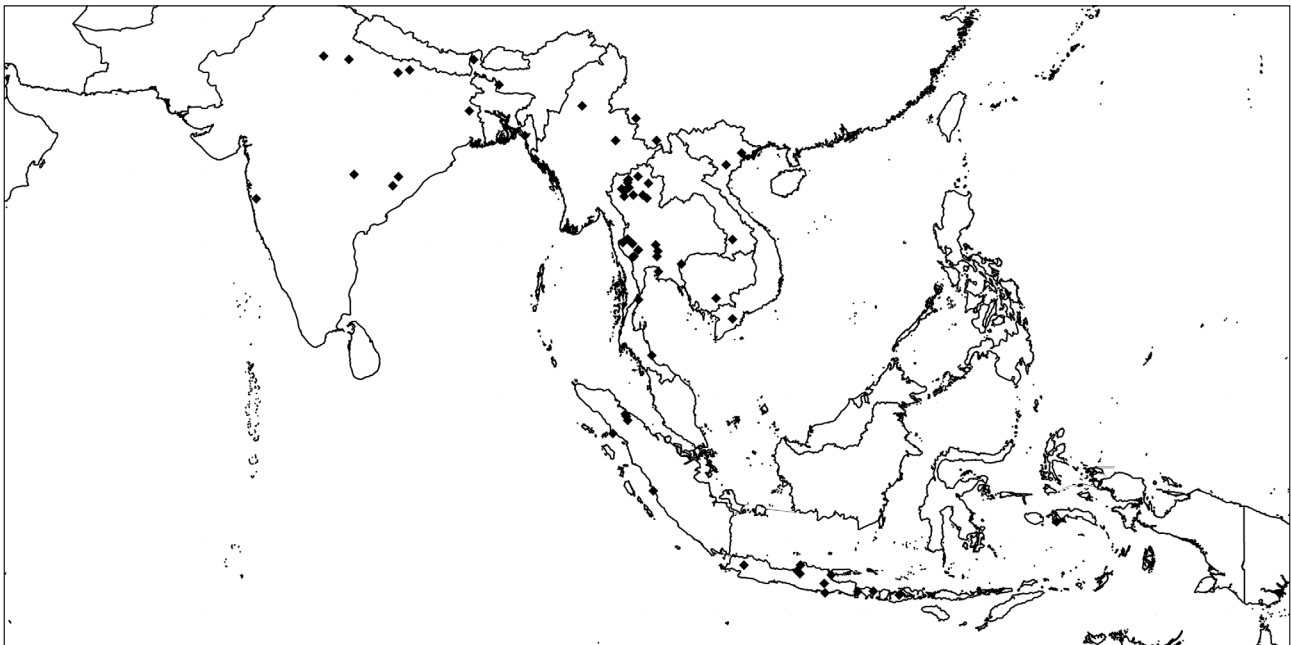
basally slightly pulvinate, hairy, glabrescent; blades ovate to elliptic to obovate, older ones often with 1 or 2 lobes, 4.2–32.6 by 1.5–15.5 cm (width without lobes), smaller in flowering part, 1.4–5.1 times as long as wide, symmetric, papery to pergamentaceous, base emarginate to truncate to narrowly cuneate, at attachment slightly emarginate, margin flat, especially in older leaves with a single to two lobes, basally up to c. halfway the blade, apex acuminate to cuspidate, both surfaces smooth, somewhat hairy when young, especially abaxially, dark green above, light green underneath; lobes sometimes present, basal to halfway the blade, small to larger, supported by a secondary vein; venation pinnate to 3-plinerved, slightly raised on both sides, especially abaxially, secondary veins 6–14 pairs, looped and closed near margin, lobes always supported by a secondary vein. *Staminate inflorescences* often developing during fruit set, raceme-like thyrses, up to 7(–20) cm long, but often very short when in bud, with few hairs, with groups of staminate flowers per node supported by a group of bracts, seldom also a pistillate flower per node; bracts triangular, c. 0.8 by 0.6 mm, outside slightly hairy, especially along midrib, margin of more basal ones with one or two tooth-like glands (comparable to leaves), inside glabrous, green. *Staminate flowers* 2.5–3 mm diam, bright green to yellow; pedicel 2.4–8 mm long, hairy, red suffused; sepals ovate, 1.3–2 by 1.3–2 mm, margin entire, light green (see note 3); stamens c. 15–19; filaments 1.2–1.3 mm long, pale light green; anthers cream to bright yellow. *Pistillate inflorescences* reduced to a single to three flowers developing in the leaf axil next to the staminate inflorescences. *Pistillate flowers* turning downwards, c. 2.5 mm diam; peduncle c. 2 mm long, elongating to c. 6 mm in fruit, round, hairy; sepals 5, ovate, 1.3–2 by 1–1.3 mm, green, margin with a few glandular teeth, not accrescent; ovary slightly 3-lobed, c. 1.2–1.3 by 1.2–1.6 mm, hairy, light green; style absent, stigmas 3, 1.4–2.3 mm long, light green, upper 0.5–1.3 mm split, basal part thick, ± round, lobes flat, thickened perpendicular to ovary, inside smooth. *Fruits* obovoid, 3-lobed, 7–10 by 7–9.8 mm, hanging downward, smooth, hairy, green to upper part white (immature?), dehiscing septically and apically partly loculicidally into bivalved cocci or also completely loculicidally and falling apart in 6 single cocci, strand-like remnants of sutures remaining attached to base of columella, these peeling off from bottom to apex; wall thin, woody when dry; columella slender, 5–6.7 mm long. *Seeds* dorsoventrally flattened obovoid with on inside a central ridge, c. 5.5–6.8 by 3.7–5 by 3–4 mm.

Distribution — Southeast Asia: ranging from India to S China (Yunnan Prov.) to Indochina; in *Malesia*: absent in the Malay Peninsula, present on Sumatra, Java, Lesser Sunda Islands (Bali, Sumbawa), and the Moluccas (Ambon).

Habitat & Ecology — Found in disturbed, seasonally dry habitats: shaded to partly open, often wet, fire-damaged, very degraded, mixed evergreen and deciduous hardwood forest with bamboo, in bamboo thickets, and in alang-alang; bedrock soil granite, limestone or shale. Even found on walls of demolished buildings. Altitude: 20–1300 m. Flowering and fruiting whole year through.

Uses — A decoction of the leaves is used as a purgative; the seeds are a drastic purgative (Radcliffe-Smith 2001). However, quite the opposite, the Karen hilltribes in N Thailand cut up the roots or leaves, soak these with seven grains of rice for 30 minutes and drink the liquid to stop vomiting and nausea (*E.F. Anderson 5459*, L).

Vernacular names — Thailand: Long pom, nong pom, thon di, tong tae, tong taek, thon di; pho-bo-cho, tho-khlo (Karen in Mae Hong Son) (Smitinand 2014). Java: (Smith 1910): Adakadal, Srintil (Javanese); Kasingat (Sundanese); Miquel (1859): Pantjahan, Oedoe lada (Sundanese).



Map 1 Distribution of *Baliospermum solanifolium* (Burm.) Suresh.

Notes — 1. The species is generally referred to as *B. montanum* (based on *Jatropha montana* by Willdenow 1805), because Burman (1769) seemingly published a nomen nudum when he listed *Croton solanifolius*. However, Burman correctly referred to a description and plate made by Van Rheedee tot Drakestein (1690) and created a valid name (see Nicolson et al. 1988).

2. This species differs from the remainder of the genus in its monoecy, annular staminate disc, generally single, hanging pistillate flowers and the gland-like stipules. Still, the species is variable and may have small to very large, narrow to broad, lobed or non-lobed leaves, short to sometimes long staminate inflorescences, etc. Usually the leaves in the flowering parts are much smaller. In Malesia the specimens are relatively uniform.

3. *Petrmitr 256* (in L, from Thailand) may be of hybrid origin. Like *B. solanifolium* the plant is bisexual with hanging pistillate flowers/fruits. However, the disc is subdivided and sometimes grown into petal-like organs. The separate glands are like in *B. calycinum*, which also often has the long inflorescences with long peduncle.

EXCLUDED SPECIES

Baliospermum malayanum Hook.f. (1888) 463; B.D.Jacks. in T.Durand & B.D.Jacks. (1902) 50 ('*Baliosperum analayanum*'). — Type: *Maingay KD 1455* (holo K), Peninsular Malaysia = *Cheilosa montana* Blume (see Van Welzen et al. 1993).

Baliospermum reidioides Kurz (1875) 32; (1877) 411. — Type: *Teijsmann 4981* (iso K, L), Siam [Thailand], Kanboeria [Kanchanaburi]. = *Trigonostemon reidioides* (Kurz) Craib.

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IDENTIFICATION LIST

The following specimens are all identified as *Baliospermum solanifolium* (Burm.) Suresh:

- Anderson 5459.
Blume 2086 – Burkill 1266.
Cheng & Leti CL 879 – Coert 475 – Collins 1962.
d'Alleizette 6541 – Dorgelo 767; 2184.
Geesink, Hiepko & Phengklai 8121 – Griffith 4743.
Huq & Mia 10308.
Jochems OPS 3203.
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