
NOTES ON SOUTH ASIAN *BEGONIA* (*BEGONIACEAE*)

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Details are given of several morphological characters that separate the Vietnamese endemic *Begonia balansana* from the more widespread south Asian *B. handelii*, with which it is often confused. *Begonia prostrata* is reduced to a variety of *B. handelii*. Descriptions are provided for *B. balansana* and for *B. handelii* and the closely affiliated and poorly known *B. burkillii*. *Begonia balansana* is illustrated. *Begonia handelii* var. *prostrata* is recorded as new to Vietnam, Laos and Thailand and *B. burkillii* as new to Myanmar.

Keywords. *Begonia* sect. *Sphenanthera*, Laos, local endemism, Myanmar, new combination, Thailand, Vietnam.

INTRODUCTION

Begonia handelii Irmsch. has long been confused with *B. balansana* Gagnep. and has recently been reduced to a variety of that species (Shui & Huang, 1999). Observations made on these taxa in the field and from herbarium specimens as part of a monographic study of *Begonia* section *Sphenanthera* (Hassk.) Warb. show that several characters of the vegetative and reproductive structures may be used to separate them (Table 1). This indicates that *B. handelii* requires reinstating as a distinct species. This study also found that the only character reliably distinguishing *B. handelii* from the sympatric *B. prostrata* Irmsch. is flower size. The outer male perianth segments of *B. handelii* are 1.5–5.5cm long and are the largest known for any Asian *Begonia* (Irmscher, 1921), while those of *B. prostrata* are 1.5–2.1cm long and more typical of the genus. As no additional characters could be found that separate these taxa, *B. prostrata* is here recognized as a variety of *B. handelii*.

Begonia handelii shares several morphological characters with *B. burkillii* Dunn, suggesting that these two species are closely related within section *Sphenanthera*. Walter & Gillett (1998) list *B. burkillii* as rare and restricted to Arunachal Pradesh State, India. This species is here newly recorded from the Kachin and Kadu Hills of northern Myanmar, suggesting that it may be more abundant than previously thought. As a detailed description of *B. burkillii* is currently lacking this is also provided.

The Vietnamese endemic *B. balansana* has traditionally proved difficult to place within sectional classifications and was not assigned to any section in the most recent revision of the genus (Doorenbos *et al.*, 1998). In 1999, Ku erected the monotypic

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TABLE 1. Main morphological characters separating *Begonia balansana* Gagnep., *B. handelii* Irmsch. and *B. burkillii* Dunn

	Disposition of flowers	Internode pubescence	Leaf morphology	Male pedicel length	Anther morphology	Ovary shape	Number of locules
<i>B. balansana</i>	Monoecious with bisexual inflorescences	Hairs pink, floccose	Blade ovate-obtuse, veinlets prominent	To 2cm	Anther c.1mm long, dehiscent by a transverse slit along sides of locules; connective not projecting	Star-shaped	(5-)6(-7)
<i>B. handelii</i>	Dioecious or rarely monoecious with unisexual inflorescences	Hairs white, microscopic glandular	Blade ovate, veinlets not prominent	3.5-11cm	Anther 1.8-3.5mm, dehiscent by a vertical slit along sides of locules; connective projecting	Globose-obovate	4
<i>B. burkillii</i>	Monoecious with unisexual inflorescences	Glabrous	Blade lanceolate-ovate to ovate, veinlets not prominent	0.8-3.5cm	Anther 1.5-2mm, dehiscent by a vertical slit along sides of locules; connective projecting	Rhomboid	4

section *Pleiothece* for this species (Ku, 1999). In that work, Ku records *B. balansana* from southern Yunnan and Kwangsi, as well as from its type locality at Mount Bavi, Vietnam. Given that *B. handelii* has long been confused with *B. balansana* and also occurs in Yunnan and Kwangsi, it is likely that these Chinese records refer to *B. handelii*. Unfortunately, as no specimens of *B. balansana* are cited by Ku, this could not be confirmed. Recent analyses of ITS sequence data indicate that *B. balansana* is closely related to *B. ceratocarpa* S.H. Huang & Shui and seven other, morphologically similar, species from the border region of China and Vietnam (M.C. Tebbitt *et al.*, unpublished data). This finding suggests that the circumscription of section *Pleiothece* requires revision. The ITS sequence data do not support a close relationship between *B. balansana* and *B. handelii*. Three accessions of *B. handelii* and two accessions of *B. prostrata* have been sequenced and have been found to form a clade that is the sister group of *B. silletensis* (A. DC.) C.B. Clarke emend. M.C. Tebbitt. *Begonia burkillii* was not included in the analysis.

Begonia balansana Gagnep. in Bull. Mus. Hist. Nat. (Paris) 25: 194 (1919) [*'balansaeana'*]. **Fig. 1.**

Syntypes: Vietnam, Forests du Mont Bavi sur le bord des torrents, i 1887, *B. Balansa* 3758 (syn. P, isosyn. K); Vietnam, sine loc., 1885–89, *B. Balansa* 3758 (isosyn. P); Vietnam, Vallée de Lankok (mont-Bavi), sur le bord des torrents, x 1887, *B. Balansa* 3764 (syn. P, isosyn. K).

Begonia balansana auct. non Irmsch.: Shui & S.H. Huang in Acta Bot. Yunnan. 21: 11–12 (1999).

Monoecious, perennial herb. *Stems* prostrate, c.5mm in diameter, rooting at nodes, internodes 4–5cm long, with pink floccose hairs. *Stipules* persistent, ovate-acute, 8–17 × 6–11mm, apex acute, margin ciliate, especially near apex, dorsal surfaces with red-villose hairs. *Leaves* alternate; *petiole* continuing into midrib at a distinct angle, dull green, 9–35cm long, c.5mm in diameter, fleshy, covered with pink floccose hairs; *blade* drooping, upper surface glossy green with darker veins, lower surface paler green, both surfaces glabrous or veins and veinlets beneath with sparse to dense short pink hairs, ovate-obtuse, 12–16 × 8–15cm, apex acute or somewhat rounded, base strongly asymmetric cordate, sinus c.2cm deep, margin often undulate, entire, ciliate, veins 6–8, palmate, ending in 2–5 conspicuous secondary veinlets. *Inflorescences* axillary, bisexual, once or twice branched dichasia, protandrous, 2–10-flowered; *peduncles* 8–12cm; *bracts* deciduous, resembling the stipules, glabrous, 10–15mm. *Pedicels* with soft pink hairs, in male flowers to 2cm, in female flowers to 1cm. *Male flowers*: *bracteoles* absent; *perianth segments* 4, pink or very rarely white, outer 2 ovate to orbicular, 13–17 × 8–16mm, apex obtuse, outer surface with microscopic glandular hairs, inner 2 elliptic, 6–10 × 4–6.5mm, apex obtuse, outer surface glabrous; *stamens* c.65, forming a symmetric dome-shaped mass; *filaments* c.2.5mm, free to base, borne on top and sides of a raised receptacle; *receptacle* 1–1.5mm tall; *anthers* asymmetrically elliptic, c.1mm long, connective not projecting

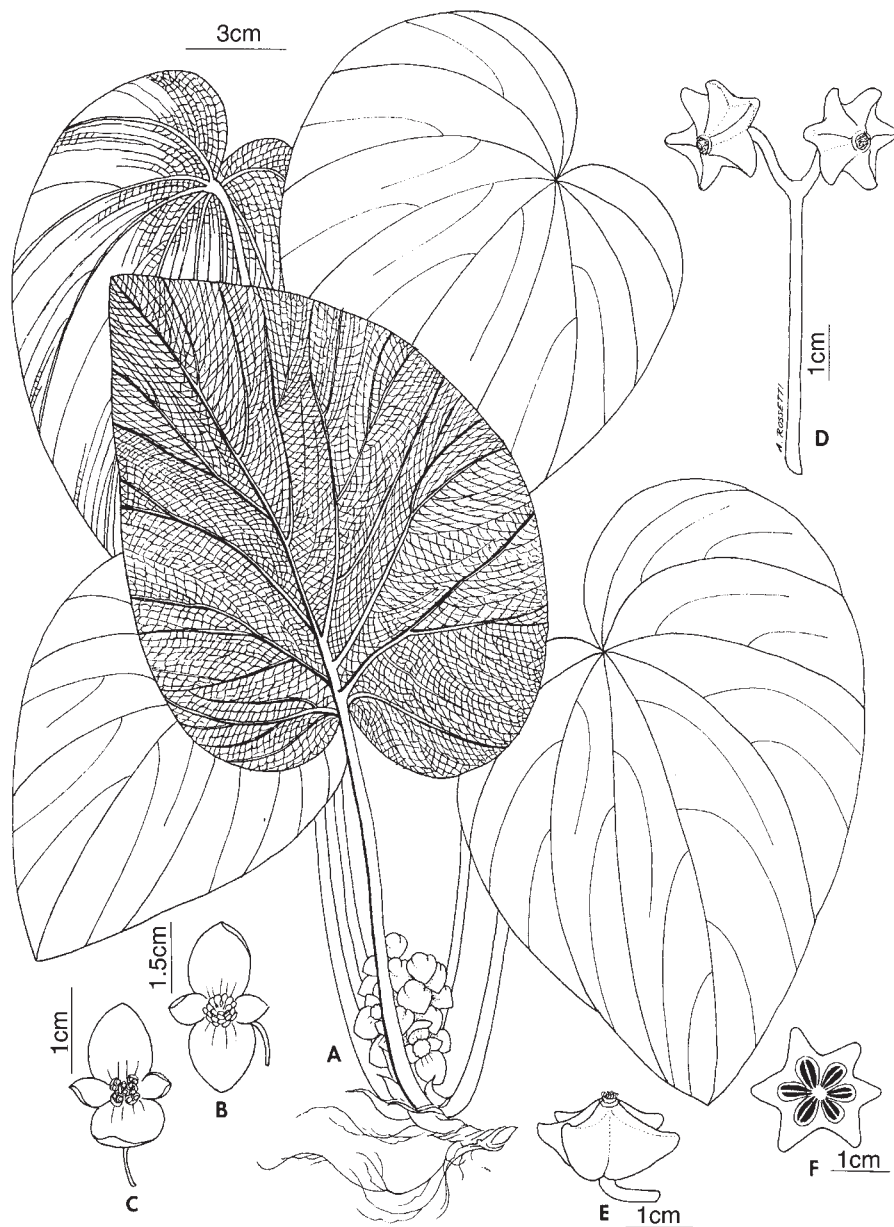


FIG. 1. *Begonia balansana* Gagnep.: A, habit; B, male flower; C, female flower; D, infructescence; E, fruit; F, fruit cross-section. Drawn by Adèle Rossetti Morosini from photographs taken at the type locality.

and locules adpressed at apex, dehiscing via transverse slits along sides of locules. *Female flowers*: bracteoles absent; perianth segments 4, pink or very rarely white, ovate to obovate, 9–11 × 5–8mm, gradually becoming smaller towards centre of

flower, apex obtuse, both surfaces glabrous; *ovary* c.1cm in diameter, star-shaped with (5–)6(–7) fleshy wedge-shaped points, wingless, apex beaked, (5–)6(–7)-locular, *placentation* axillary, *placentas* bifid, bearing ovules on both surfaces of branches; *styles* caducous, (5–)6(–7), fused at base for c.1mm, *stigmas* bifid, branches erect and strongly contorted, band of stigmatic papillae spirally twisted once. *Infructescences* 2–4-fruited; *fruiting pedicels* green, curved downwards, c.1.5cm; *fruit* 1.8cm in diameter, indehiscent(?), succulent, star-shaped with (5–)6(–7) fleshy wedge-shaped points, points c.4 × 6.5–10mm, apex beaked.

Distribution and ecology. Northern Vietnam. Endemic to montane forest above 550m on Mt. Bavi. Terrestrial on soil banks or on rocks in moist to mesic conditions in half-sun.

Additional specimens examined. VIETNAM. Mont Bavi, forêts bord de torrents, vii 1908, sine coll., s.n. (L).

Begonia balansana is threatened with extinction. Tourists commonly uproot this narrow endemic in great numbers as it has very attractive flowers (Tebbitt, pers. obs.; Tran Cong Khanh, pers. comm.).

Begonia handelii Irmsch. in Akad. Wiss. Wien., Math.-Naturwiss. Kl., Anz. 58: 24–25 (1921); Mitt. Inst. Allg. Bot. Hamburg 6: 348 (1927); in Hand.-Mazz., Symbolae Sinicae 3: 385 (1931); Mitt. Inst. Allg. Bot. Hamburg 10: 517 (1939); Chun & Chun, Sunyatsenia 4: 22, pl. 9 (1939); Yu in Bull. Fan. Mem. Inst. Biol. n.s. 1: 115 (1948). Type: Tonkin Indochinae Gallicae Laogai ad fines prov. Yünnan, in regionis tropicae bambusetis valliculae Ngoikoden ad Phomei, c.150m, 2 xi 1914, *Handel-Mazzetti* 12 (holo. WU; iso. B, E).

Begonia balansana auct. non Irmsch.: Shui & S.H. Huang in Acta Bot. Yunnan. 21: 11–12 (1999).

Dioecious or rarely *monoecious*, rhizomatous creeping herb, rooting at nodes; *rhizome* to 30cm long, c.1cm in diameter, *aerial stem* 1–10(–30)cm long, unbranched or shortly 2–3-branched, internodes usually 1–4cm long, with very sparse white microscopic glandular hairs. *Stipules* persistent, oblong-ovate to ovate-lanceolate, 0.9–2.3 × 0.3–1cm, glabrous, apex acute, aristate, margin entire. *Leaves* alternate, few; *petioles* continuing into midrib at a distinct angle, green, fleshy, 15–28cm long, c.6mm in diameter, usually glabrous to sparsely glandular hairy, rarely with dense reddish glandular hairs; *blade* erect, fleshy to almost leathery, upper surface bright green, lower surface paler green, sometimes purple-tinged along veins, glabrous or with sparse microscopic glandular hairs, ovate, 10–20 × 6–16cm, apex shortly acuminate, base strongly asymmetric cordate, sinus 0.5–2.5cm deep, margin often undulate, usually with short angular lobes and short blunt or acute teeth, veins 7–8, palmate. *Inflorescences* axillary, unisexual dichasia, usually several arising from aerial stem, the primary branches reduced to 1–3mm and inflorescence appearing umbellate; *flowers* fragrant, 1–7; *peduncle* 0.25–5.5cm in both male and female inflorescences;

bracts usually persistent, variable, oblong to ovate-lanceolate, 1.55–1.8 × 0.5–0.8cm, apex acute, margin entire, outer surface glabrous or with sparse microscopic glandular hairs, inner surface glabrous. *Pedicels* with microscopic glandular hairs, in male flowers 3.5–11cm long, in female flowers 1.5–8cm long. *Male flowers*: *bracteoles* absent; *perianth segments* 4, white to pink, outer 2 broadly ovate to elliptic, 1.5–5.5 × 1.6–2.2cm, apex acute to rounded, inner 2 oblong to ovate, 0.65–3 × 0.3–1cm, apex acute to obtuse; *stamens* 35–100+, forming a symmetric dome-shaped mass; *filaments* 1.4–3.5mm long, free to slightly fused at base, borne on slightly raised receptacle, *anthers* linear-elliptic-oblong, 1.8–3.5 × 0.7–0.8mm, dehiscing via vertical splits along sides of locules, connective projecting 0.25–0.5mm, apex obtuse. *Female flowers*: *bracteoles* absent; *perianth segments* 4, white to pink, outer 2 ovate to elliptic, 3–27 × 2.2–19cm, apex obtuse, inner 2 linear to oblong-ovate, 0.2–1.4 × 0.5–0.8cm, apex obtuse; *ovary* globose-obovate, 0.5–1.6 × 0.6–1.5cm, indistinctly 4-angled, usually with very short triangular wings in upper half of each angle or occasionally wingless, with microscopic glandular hairs, 4-locular, *placentation* axillary, *placentas* bifid, bearing ovules on both surfaces of branches; *styles* 4, caducous, erect, slender, 5–6mm long, base fused for 0.5–2mm, bifid from half way, branches erect, band of stigmatic papillae spirally twisted once. *Infructescences* 1–4-fruited; *fruiting pedicels* erect, 2–4cm; *fruit* fleshy, green when young, becoming purple-tinged and finally red, obovate-turbinate, 1–1.8 × 0.9–1.6cm, with microscopic glandular hairs, wings triangular to rib-like, to 2.5mm long.

Key to the varieties of Begonia handelii

- 1a. Outer perianth segments of male flowers 3–6.5cm long, apex usually acute —
 _____ var. **handelii**
 1b. Outer perianth segments of male flowers 1.5–2.1cm, apex rounded _____
 _____ var. **prostrata**

var. **handelii**

Distribution and ecology. Southern China (Yunnan, Kwangtung and Kwangsi) and northern Vietnam. Terrestrial or on mossy rocks in shady moist acidic conditions in evergreen broad-leaved or bamboo forest.

Additional specimens examined. VIETNAM. Prov. Tonkin, nächst der Yunnan-Grenze Tropischer Dschungel im Talchen Ngoi koden bei Phomoi nächst Laokay, 180m, leg. 2 viii 1914, *Handel-Mazzetti* s.n. (B).

CULTIVATED. Jardin Botanique de Montréal, ex. Loogee's Greenhouses, Danielson, Connecticut, USA, 12 i 1960, *N. Cornellier* 1747-57 (B).

var. **prostrata** (Irmsch.) M.C. Tebbitt, **comb. et stat. nov.**

Syn.: *Begonia prostrata* Irmsch. in Mitt. Inst. Allg. Bot. Hamburg 10: 516 (1939).
Type: China, Yunnan province, E. mt. forests, 5000ft, *Henry* 11628 (holo. LE);
 ravine, 4500ft, *Henry* 11628A (iso. B, E n.v., K n.v.); Szemao, forest ravine, 4500ft,
Henry 11628B (iso. E n.v., K n.v., NY).

Note. Irmscher (1921) cited specimens of *Henry* 11628A and 11628B from the Kew and Edinburgh herbaria. These specimens have not been re-found despite repeated searching.

Distribution and ecology. Myanmar, Southern China (Yunnan, Guangxi, Guangdong), northern Vietnam, northern Laos and northern Thailand. Terrestrial or on mossy rocks in shady moist acidic conditions in evergreen broad-leaved forest.

Additional specimens examined. MYANMAR. *Wehrli* s.n. (2 sheets Z); sine loc., *S.M. Toppin* 4137 (E).

CHINA. Yunnan province, *C.W. Wang* 2526 (B); Yunnan province, Si-chour-hsien, Shiang-ping-shan, 1600m, in mixed forests, 3 ix 1947, *K.M. Feng* 11607 (B); Yunnan province, Marlipo, Szetaipo (Loa-chün-shan), 1300–1500m, in mixed forest, *K.M. Feng* 13894 (E). Guangxi, Pingnan Xian, Guangxi by side of brook, 26 xii 1936, *C. Wang* 40767 (MO). Guangdong, Xinyi Xian, Guangdong in stream side by ravine, 21 iii 1931, *C. Wang* 31748 (MO).

VIETNAM. Sine loc., sine coll. 4482 (2 sheets HN); sine loc., sine coll. 3454 (3 sheets HN); Lan-Tsang Hsien, ravine, rock crevice, 1300m, v 1936, *C.W. Wang* 76618 (KUN); Van Son, woodland in valley, 370–400m, 4 i 1964, *Sino-Vietnam Exped.* 954 (KUN); Moc chau, Suan nha, *H.T. Dung* 197 (HN); Vinh Phu, Tam Dao, on rock under evergreen broad-leaved forest, 4 ii 1962, *Sino-Vietnam Exped.* 1982 (KUN); Tam Dao, sine coll. 4570 (2 sheets HN); Tam Dao, 1000–1100m, 8 ii 1965, *Sino-Vietnam Exped.* 2070 (KUN).

LAOS. Tatom, Chieng kwang [Xiang Khoang], c.200m, 1 iv 1932, on banks in evergreen forests, *A.F.G. Kerr* 21772 (K).

THAILAND. Doi Pae Poe, about 90km NW of Tak, 17°17'N, 98°25'E, 1380m, 14 iii 1968, succulent herb common on granitic rock in streams, *B. Hansen & T. Smitinand* 12905 (E, L); between Fang and Chiengrai evergreen forest, moist slope, 900m, ii 1928, *Th. Sorensen, K. Larsen & B. Hansen* 1804 (E, GB, L).

Begonia burkillii Dunn in Bull. Misc. Inform. Kew 1920: 109–110 (1920).

Syntypes: *Burkill* 36121 (syn. n.v.), 36315 (syn. n.v.), 36910 (syn. n.v.), 37121 (syn. n.v.), 37139 (syn. K, isosyn. B), 37375 (syn. n.v.), 37455 (syn. K), 37706 (syn. n.v.).

Monoecious, rhizomatous creeping herb, rooting at nodes, *rhizome* 2.5–6mm in diameter, *aerial stem* 1–6cm long, usually unbranched, rarely once-branched, glabrous. *Stipules* persistent, ovate to ovate-lanceolate, 0.5–1.7 × 0.3–0.75cm, glabrous, apex acute, aristate, margin entire. *Leaves* erect, arising from aerial stem; *petioles* 2.5–25cm, glabrous or occasionally with scattered microscopic hairs, continuing into midrib at a distinct angle; *blade* lanceolate-ovate to ovate, to 20 × 8.5cm, upper surface bluish-green, usually with alternate radiating light and dark bands or white blotches, lower surface pale green, both surfaces usually glabrous, occasionally with microscopic glandular hairs, apex shortly acuminate, base strongly asymmetric cordate, sinus to 2.2cm deep, margin occasionally undulate, entire to shortly toothed, veins usually 7, palmate. *Inflorescences* axillary, unisexual, twice-branched dichasia, often several arising from aerial stem, primary branches occasionally reduced to 1–3mm and inflorescences appearing umbellate, female inflorescences usually appearing after the male, both 1–8-flowered and with slender pedicels to 6.5cm; *bracts* deciduous, delicate, linear-elliptic to elliptic, 0.6–2 × 0.1–0.4cm, apex acute, margin

entire. *Pedicels* with sparse microscopic glandular hairs, in male flowers 0.8–3.5cm, those of female flowers not observed. *Male flowers*: *bracteoles* absent; *perianth segments* 4, white or flushed pink, outer 2 ovate, 1–2.5 × 0.7–1.6cm, apex acute, outer surface with microscopic glandular hairs, inner surface glabrous, inner 2 narrowly elliptic, 1–2 × 0.5–0.65cm, apex acute, both surfaces glabrous; *stamens* c.50, forming a symmetric dome-shaped mass; *filaments* 1–2.5mm, free to base, borne on a raised receptacle, *anthers* elliptic-obovate, 1.5–2mm, dehiscent via vertical slits along sides of locules, connective projecting 0.25–0.5mm, apex rounded. *Female flowers* not observed; fide Dunn (1920): *perianth segments* 4; *ovary* 4-locular, *placentas* bifid; *styles* 2, fused at base, bifid. *Infructescences* usually 4-fruited; *fruiting pedicels* erect, 4.5–7cm; *fruit* rhomboid, c.2 × 1cm, with microscopic glandular hairs, 3-winged, wings arising in central part of each locule, triangular, 2–5 × 3–5mm, apex beaked.

Distribution and ecology. Northeastern India and northern Myanmar. Locally common by streams, on wet rocks in deep shade, 213–1188m.

Additional specimens examined. INDIA. Assam, eastern Himalaya, Outer Abor Hills [Renging camp], 1911–12, *I.H. Burkill* 36720 (B, K); Assam, Dihang Valley, Pasighat, 1000–2000ft, 10 ii 1928, *F. Kingdon-Ward* 7822 (B, 2 sheets K).

MYANMAR. Kachin Hills, *S.M. Toppin* 4276 (K), 4137 (K), 4371 (K); Katha District, Kadu Hill, 3500ft, 22 ii 1910, *Lace* 5105 (B, K, 2 sheets E).

New to Myanmar.

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REFERENCES

- DOORENBOS, J., SOSEF, M. S. M. & DE WILDE, J. J. F. E. (1998). The sections of *Begonia*, including descriptions, keys and species lists (Studies in Begoniaceae VI). *Wageningen Agric. Univ. Pap.* 98-2.
- DUNN, S. T. (1920). *Plantarum Novarum in Herbario Horti Regii Conservatarum*. *Bull. Misc. Inform. Kew.* 1920: 108–112.
- IRMSCHER, E. (1921). *Plantae novae Sinenses, diagnosibus brevibus descriptae a Dre. Henr. Handel-Mazzetti*. *Akad. Wiss. Wien., Math-Naturwiss. Kl., Anz.* 58: 24–25.
- KU, T.-C. (1999). *Begoniaceae*. In: KU, T.-C. (ed.) *Flora Reipublicae Popularis Sinicae* 52(1): 126–269, 401–402. China: Science Press.

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- SHUI, Y.-M. & HUANG, S. H. (1999). Notes on the genus *Begonia* from Yunnan. *Acta Bot. Yunnan.* 21: 11–12.
- WALTER, K. S. & GILLETT, H. J. (eds) (1998). *1997 IUCN Red List of Threatened Plants*. Compiled by the World Conservation Monitoring Centre. IUCN – The World Conservation Union, Gland, Switzerland and Cambridge, UK.

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