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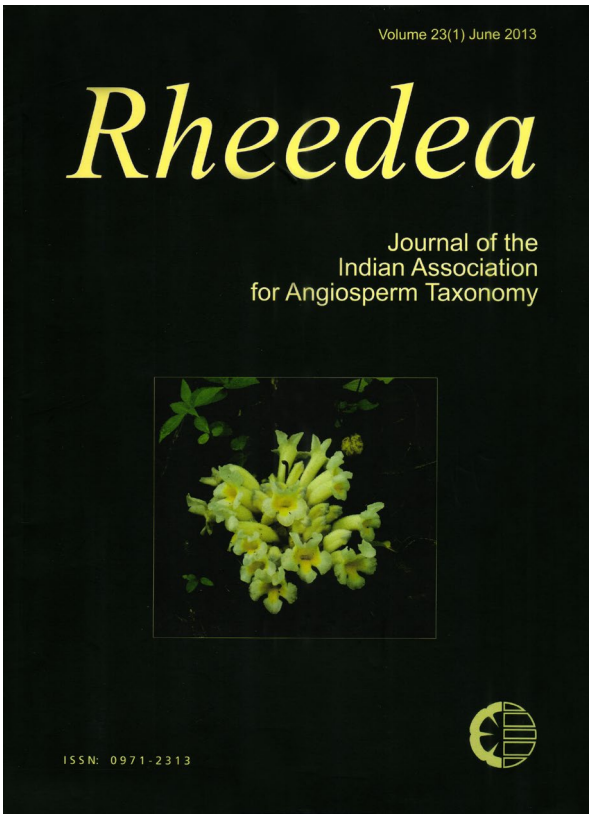

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Taxonomic status of *Strobilanthes warreensis* (Acanthaceae), an endemic species of Western Ghats, India

Maria Emilia Mascarenhas* and M.K. Janarthanam[1]
Department of Botany, St. Xavier's College, Mapusa – 403 507, Goa, India.
[1]Department of Botany, Goa University, Taleigao Plateau – 403 206 Goa, India.
*E-mail: emilia_m@rediffmail.com

Abstract

Strobilanthes warreensis Dalzell (Acanthaceae) is endemic to the Western Ghats. Due to its close resemblance to *S. ciliatus* Nees, it has been critically studied along with the latter and evaluated for its taxonomic status and circumscription. Based on our studies, including that of type and tagged live specimens in the field, it is concluded that both are conspecific. Therefore, *S. warreensis* has been synonimised here under *S. ciliatus*.

Keywords: Conspecific, Endemic, *Strobilanthes ciliatus*, *S. warreensis*, Western Ghats

Introduction

Strobilanthes Blume is the second largest genus in the family Acanthaceae with *c*. 300 species restricted to the hills in tropical Asia of which *c*. 150 species are distributed in the Indian subcontinent (Wood, 1998; Venu, 2006; Karthikeyan *et al*. 2009). Venu (2006), in his work on *Strobilanthes* from Peninsular India, treated 59 species of which 44 are endemic to the Western Ghats.

The genus is not well-defined as the taxonomy of certain species is still unclear (Carine & Scotland, 1998, 2002; Wang & Blackmore, 2003; Carine *et al*., 2004; Venu, 2006). Yet it is one of the most interesting genera in the family, known for its gregarious nature, infrequent flowering and diverse habitats, coupled with narrow distribution of species. It forms a dominant part of the vegetation of the hilly areas and hence is an important floristic element.

Strobilanthes ciliatus Nees and *S. warreensis* Dalzell are among the annually flowering species that are endemic to the Western Ghats. Earlier workers such as Anderson (1867) and Beddome (1868-1874) found them to be similar and treated *S. warreensis* as a synonym of *S. ciliatus*. Yet the two were treated as distinct entities by others (Clarke, 1884; Cooke, 1905; Gamble, 1924; Santapau, 1952; Ramamoorthy, 1976; Kulkarni, 1988; Venu, 2006). Although Talbot (1911) treats *S. ciliatus* and *S. warreensis* separately, he categorically felt that they are the same, since both the species from his collections were from the same locality and all his specimens of *S. warreensis* collected are in fruiting, while those of *S. ciliatus* are in flowering.

Hence, critical studies have been carried out on live specimens in the field and herbarium specimens from BLAT, BSI, JCB, MH and CAL along with photographs of types and protologues.

Comparison of protologues reveals that *S. ciliatus* and *S. warreensis* are very similar in their morphological characters, viz., woody stem, leaf morphology, opposite, axillary spikes with geniculate peduncles. Venu (2006) distinguished former by its perfectly glabrous peduncles and bracts and slender spikes.

Observations similar to Talbot (1911) were made during the present study on the collections from same localities [eg. *Ansari* 108413, *Kulkarni* 119373 (in flowering–*S. ciliatus); Ansari* 108456, *Kulkarni* 129416A (in fruiting–*S. warreensis*)]. Two populations from Goa, one from Bondla Wildlife Sanctuary and another from Ambeghat, were tagged during the flowering stage and observed till fruiting. It was seen that during the early stages of flowering the peduncles, bracts and calyx were glabrous which during the later stages of flowering developed cottony hairs on peduncles and glandular hairs on both bracts and calyx. Intermediate forms, i.e., with and without cottony hairs and glandular hairs, were found in the same population. The two species are therefore

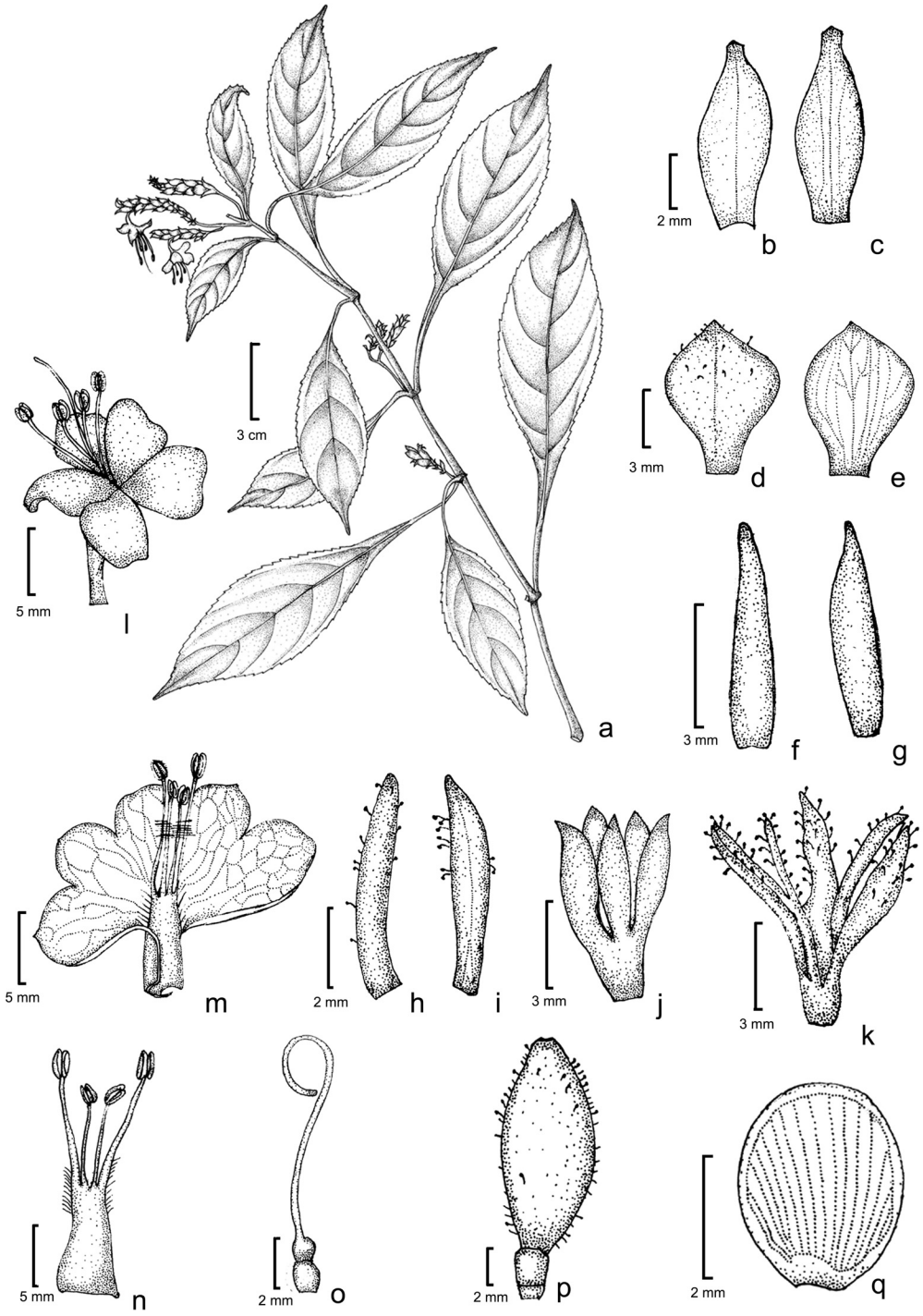

Fig. 1. *Strobilanthes ciliatus* Nees: **a**. Flowering twig; **b, c.** Bract in flower (dorsal & ventral view); **d, e.** Bract in fruit (dorsal & ventral view); **f, g.** Bracteole in flower (dorsal & ventral view); **h, i**. Bracteole in fruit (dorsal & ventral view); **j.** Calyx in flower; **k.** Calyx in fruit; **l.** Corolla; **m.** Corolla spread out with stamens; **n**. Stamens; **o.** Pistil; **p.** Capsule; **q.** Seed.

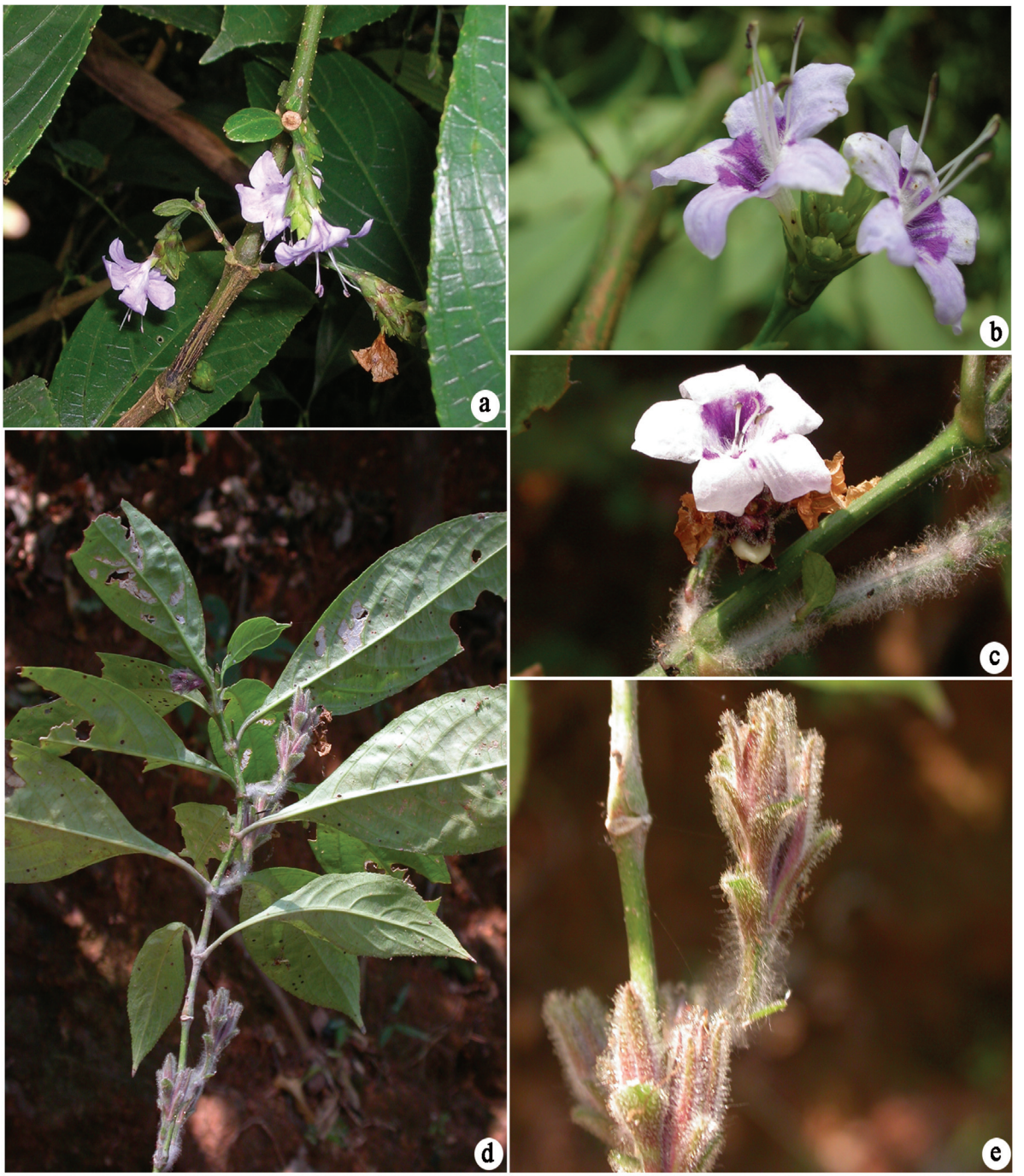

Fig. 2. *Strobilanthes ciliatus* Nees: **a.** Glabrous flowering twig; **b.** Early flowers with glabrous bracts and peduncle; **c.** Late flowers with cottony hairy peduncle; **d, e.** Infructescence with cottony hairy peduncle and bracts with glandular hairs.

considered as conspecific and hence merged. The updated nomenclature and description is provided below:

Strobilanthes ciliatus Nees in Wall., Pl. Asiat. Rar. 3: 85. 1832 & in DC., Prodr. 11: 183. 1847; T. Anderson, J. Linn. Soc., Bot. 9: 468. 1867; Bedd., Icon. Pl. Ind. Or. 49, t. 211. 1874; C.B. Clarke in Hook.f., Fl. Brit. India 4: 439. 1884; T. Cooke, Fl. Bombay 2: 369. 1905; Talbot, For. Fl. Bombay 2: 326. 1911; Gamble, Fl. Madras 1039. 1924; Venu, *Strobilanthes* Penins. Ind. 82. 2006; Karthik. & al., Fl. Pl. India-Dicot. 1: 45. 2009. –Type: INDIA, **Tamil Nadu**, Courtallum hills, *Wight* 1949 (K, photograph! Wall. Numer. List No. 2415).

Ruellia ciliata Wall. ex Nees in Wall., Pl. Asiat. Rar. 3: 85. 1832 & DC., Prodr. 11: 183. 1847, pro. syn.

S. warreensis Dalzell, Hooker's J. Bot. Kew Gar. Misc. 2: 341. 1850; Dalzell & A. Gibson, Bombay Fl. 187. 1861; C.B. Clarke in Hook.f., Fl. Brit. India 4: 439. 1884; T. Cooke, Fl. Bombay 370. 1905; Talbot, For. Fl. Bombay 2: 326. 1911; Gamble, Fl. Pres. Madras 1039. 1924; Venu, *Strobilanthes* Penins. Ind. 193. 2006; Karthik. & al., Fl. Pl. India-Dicot. 1: 60. 2009. –Type: INDIA, **Bombay**, Warree country below the ghats, latitude 16°, December, *Dalzell s.n.* (K, photograph!).

Nilgirianthus ciliatus (Nees) Bremek., Verh. Kon. Ned. Akad. Wetensch., Afd. Natuurk., Sect. 2, 41(1): 173. 1944; Santapau, Bot. Mem. Univ. Bombay 2: 40. 1951; Ramamoorthy in C.J. Saldanha & Nicolson, Fl. Hassan 555. 1976; Kumari in A.N. Henry *et al*., Fl. Tamil Nadu 2: 154. 1987; B.G. Kulkarni, Fl. Sindhudurg 336. 1988; V.S. Ramach. & V.J. Nair, Fl. Cannanore 345. 1988; S.M. Almeida, Fl. Savantwadi 1: 327. 1990; Moorthy in N.P. Singh *et al*., Fl. Maharashtra 2: 654. 2001. **Fig. 1, 2**

Shrubs, slender, to 2 m high. Stems obtusely quadrangular to terete, diffusely branched, sulcate on two sides when young, glabrous, lenticulate, swollen above the nodes; nodes jointed, prominent, often fimbriate. Leaves opposite, unequal, broadly elliptic to elliptic-lanceolate, 3.5–16 × 2–7 cm, attenuate at base, subentire to serrate at margins, acute-acuminate to acuminate at apex, subcoriaceous, glabrous or nearly so, dark green on upper surface, glaucous on lower, lineolate; upper surface densely covered with cystoliths; secondary veins 7–9 pairs, curved upwards, raised on upper surface, slightly impressed on lower; petioles 0.5–8 cm long, obscure due to decurrent leaf base. Inflorescences opposite, axillary spikes, often from the older leafless axils, sub-capitate to oblong, 1–3 cm long at first with two bracts at base of spike, elongated to 3–5 cm later; peduncles 1.5–4.5 cm long, mostly deflexed, glabrous at first, often cottony hairy later, jointed, bracteate at joints; bracts suborbicular-broadly elliptic to obovate, *c*. 7 × 3.5 mm, entire to serrulate at margins, acute-acuminate at apex, glabrous during early flowering, glandular-hairy, *c*. 8 × 4 mm at fruiting; bracteoles linear-lanceolate, *c*. 5 × 1 mm, sub-acute to acuminate at apex, glabrous at first, enlarging to *c*. 8.5 mm at fruiting. Flowers 4-seriate. Calyx 5–6.5 mm long, divided to 2/3rd of its length; segments unequal, linear-lanceolate, acute at apex, almost glabrous but with a few glandular hairs, enlarging to *c*. 15 mm, becoming densely covered with glandular hairs on outside and sparsely glandular-hairy inside at fruiting. Corolla *c*. 13.5 mm long, glabrous outside; tube cylindrical, 6–7 mm long, campanulate above, broad portion 1–2 mm long; lobes 4–6 × *c*. 4 mm, spreading, obtuse, white with purple blotches at throat, veins clearly visible on lobes, two rows of hairs in widened portion on inside holding style. Stamens 4, didynamous, exserted; staminal tube opens at one end, densely hairy at open edges; filaments above the staminal tube, 6–9 mm long; filaments of longer stamens bearded at base, fifth filament may be present as a rudimentary staminode, *c*. 2 mm long, hairy; anthers oblong, *c*. 2 mm long, purple, bithecous. Disk 1–1.5 mm broad, fleshy. Ovary conical, 1–1.5 mm long, glabrous; style *c*. 1.3 cm long, glabrous; stigma 2-cleft with one lobe highly suppressed; ovules 4, orbicular, *c*. 0.5 mm. Capsules ellipsoid, *c*. 10 × 3 mm, sub-acute at apex, glandular-hairy, sometimes pigmented red, 4-seeded; seeds suborbicular to oblong, 2.5–4.5 × 2–2.5 mm, obtuse at apex, glabrous with thick rim, yellow vertical striae, exareolate.

Local name: *Karimkurinji* (Malayalam).

Flowering & Fruiting: October–April.

Habitat: An undergrowth, in shade and along streams in evergreen, semi-evergreen and moist deciduous forests.

Specimens examined: INDIA, **Goa**, North Goa district, Ponda, Curti, 30.1.2005, *M.E. Mascarenhas* 18; Satari, Codal, 6.2.2005, *M.E. Mascarenhas*, *M.K. Janarthanam & A. Prabhugaonkar* 20; Ponda, Bondla, 27.2.2005, *M.E. Mascarenhas & M.K. Janarthanam* 33; Ponda, Bondla, 6.3.2005, *M.E. Mascarenhas* 37; Ponda, Bondla, 6.3.2005, *M.E. Mascarenhas* 44; Ponda, Bondla, 27.12.2005, *M.E. Mascarenhas* 110, 117; Ponda, Bondla, 28.1.2007, *M.E. Mascarenhas* 324; Ponda, Bondla, 28.1.2007, *M.E. Mascarenhas* 326; South Goa district, Sanguem, Ambeghat, 28.10.2007, *M.E. Mascarenhas* 424; Sanguem, Ambeghat, 21.1.2008, *M.E. Mascarenhas* 478; Sanguem, Ambeghat, 24.2.2008, *M.E. Mascarenhas* 491; Sanguem, Ambeghat, 3.4.2008, *M.E. Mascarenhas* 498 (Goa University Herbarium). **Karnataka**, Chikmagalur district, Chandragiri, 16.10.1978, *Cecil J. Saldanha & K.R. Keshava Murthy* KFP3347 (CAL); Shankar falls, Kemmangundi, 1250 m, 16.10.1978, *C.J. Saldanha & K.R. Keshava Murthy* KFP3349; Charmadi ghat, 750 m, 13.11.1978, *C.J. Saldanha & P. Prakash* KFP4163; Bababudangiri Range, 1450 m, 18.11.1978, *A. Takhtajan*, *C.J. Saldanha & K.R. Keshava Murthy* KFP4619; Charmadi ghat, 700 m, 29.12.1979, *C.J.*

Saldanha KFP10660 (JCB); Dakhina Kannada district, S. Canara, *s. loc*., *s. die*, *R.H. Beddome* s.n. Acc. No. 37778 (Fig. in Ic. ccxi); Jahlsur, 19.11.1900, *C.A. Barber* 2444; Shiradi Ghat, 16.12.1918, *s.coll*. 15648; Punja, 20.12.1918, *s.coll*. 15725; Gundia, 180 m, 26.11.1927, *S.R. Raja & Naganthan* 18211; Bisle Ghat, 210 m, 1.12.1927, *S.R. Raja & Naganathan* 18247; Byndoor, 26.12.1938, *S.R. Raja* 488 (MH); Bisle ghat, Panorama view point, 10.10.1969, *C.J. Saldanha* 15303; Bisle ghat, Panorama point, 750 m, 24.10.1971, *D.H. Nicolson*, *S.S. Hooper*, *C.J. Saldanha & K.N. Gandhi* HFP2307 (JCB); Shiradi ghat, 200 m, 17.10.1978, *C.J. Saldanha & K.R. Keshava Murthy* KFP3377 (CAL); Shiradi ghat, 160 m, 11.11.1978, *C.J. Saldanha & P. Prakash* KFP4013 (JCB); Subramanya, 130 m, 17.12.1998, *K. Ravikumar*, *S.P. Subramani & P.S. Udayan* 06261 (FRLH); Hassan district, Genkalbetta, 1000 m, 9.10.1969, *C.J. Saldanha* 15258 (CAL, JCB); Mankanahalli, 6.10.1970, *F.M. Jarette*, *C.J. Saldanha & T.P. Ramamoorthy* HFP836 (JCB); Shiradi ghat, 200 m, 17.10.1978, *C.J. Saldanha & K.R. Keshava Murthy* KFP3377 (CAL, JCB); Kodagu district, Munard road, 26.9.1961, *A.S. Rao* 74678 (BSI); Makut, 10.10.1978, *S. R. Ramesh & P. Prakash* KFP3182 (JCB); Mercara, on way to Abbe, 1469 m, 11.10.1978, *S.R. Ramesh & P. Prakash* KFP3290 (CAL); Mercara on way to Abbi falls through Glenmore Estate, 20.10.1963, *A.S. Rao* 94916; Karavalabadiga side road on way to golf link, 21.9.1968, *A.S. Rao* 74490 (BSI); Shimoga district, Anabarkal gudda near Tirthahalli, 29.9.1962, *R.S. Raghavan* s.n. Acc. No. 82796; Tunga forest, Tirthahalli, 1.10.1962, *R.S. Raghavan* s.n. Acc. No. 82858; Hulical, 7.10.1962, *R.S. Raghavan* 83071 (BSI, CAL); Udupi district, Kolluru, 29.12.1938, *S.R. Raja* 6315 (MH); Kolur, 5.2.2007, *M.E. Mascarenhas & A. Prabhugaonkar* 338; Kolur, 135 km before Sagar, 5.2.2007, *M.E. Mascarenhas & A. Prabhugaonkar* 339 (Goa University Herbarium); Uttara Kannada district, Yellapore, 1881, *W.A. Talbot* 159 (CAL); Yellapore, October 1882, *W.A. Talbot* 7144; Agsoor, 10.2.1884, *W.A. Talbot* 897 (BSI); Agsoor, 14.1.1885, *W.A. Talbot* 27 (MH); Nilkund, 25.2.1889, *W.A. Talbot* 1859; Nilkund, 2.12.1895, *W.A. Talbot* 3535 (BSI, CAL); Nilkund, 25.2.1889, *W.A. Talbot* 1859; *s. loc*., *s. die*, *T. Cooke* s.n. Acc. No. 337573; Mirjan, 150 m, November 1929, *Ambo* 6874 (CAL); Balicop forest, Siddapur, 19.11.1957, *S.K. Jain* 29812; Kolegar, 14 km from Murdeshwar, 19.2.1962, *R.S. Raghavan* 79519 (BSI). **Kerala**, Idukki district, Kulamavu, 8.6.1984, *C.N. Mohanan* 82033; Kulamavu, 8.6.1984, *C.N. Mohanan* 82035; Kadampara, Pooyamkutty, 100 m, 15.12.1988, *P. Bhargavan* 89928; HBC Camp Shed, Pooyamkutty, 50 m, 20.12.1988, *P. Bhargavan* 90023; Kannur district, Kannoth, Malabar, 11.12.1913, *s. coll*. 9574; Kannavam, ± 140 m, 16.2.1978, *V.S. Ramachandran* 54007; Kannoth R. F., ± 150 m, 4.11.1978, *V.S. Ramchandran* 58215; Panathur, ± 350 m, 28.1.1979, *V.S. Ramchandran* 59275; Kannoth, ± 150 m, 21.2.1979, *V.S. Ramchandran* 60068; Payyauur, 350 m, 21.12.1980, *R. Ansari* 69928; Panathur, 450 m, 28.12.1980, *R. Ansari* 70057 (MH); Ambayathode, 3.12.2001, *Betty* 10607 (FRLH); Kottayam district, Panayampala, ± 100 m, 28.1.1984, *V.T. Antony* 228 (MH); Travancore boundry, December 1886, *T.F Bourdillon* Acc. No. 37779; near Reni, 12.12.1894, *T.F. Bourdillon* 448; Thrissur district, Advaiapalli R.F., ± 100 m, 10.12.1965, *K.M. Sebastine* 26724 (MH). **Maharashtra**, *s. loc*., November 1891, *Sawant Wagh* 7145; Ratnagiri district, Tirali, 6 km from Bhedshi, 19.2.1966, *M.Y. Ansari* 108413 (BSI); Khanale, 8 km from Bhedshi, 20.2.1966, *M.Y. Ansari* 108456 (MH); Way to Ramghat – Bhedshi, 2.11.1969, *B.G. Kulkarni* 119372; Konal R.F., 15 km from Bhedshi, 30.4.1971, *B.G. Kulkarni* 129416A; Sindhudurg district, Sawantwadi, November 1891, *s. coll. s.n.* Acc. No. 7145 (BSI); Amboli, 22.1.1983, *S.M. Almeida s.n.*; Ramghat, 22.10.1983, *S.M. Almeida* 5144; Ramghat, December 1983, *S.M. Almeida* 4721; Savantwadi, Golharr, 17.1.1987, *M.R. Almeida* MRA4740 (BLAT). **Tamil Nadu**, Nilgiris district, Conoor Ghat, November 1885, *s. coll*. Acc. No. 37781 (MH); Tirunelveli district, Type: Courtallum, *s. die*, *Wight* 1949 (K, photograph!); monte prope Courtallum, *s. die*, *Wight* 2415 (Isotype CAL!)

Distribution: From the Northern Western Ghats of Maharashtra to the Southern Western Ghats of Kerala and Tamil Nadu.

Threat status: Least Concern [LC]. The taxon has been assigned to 'Least Concern' category as it is widespread and abundant.

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