



Rediscovery and amended description of *Strobilanthes humilis* (Acanthaceae)

Strobilanthes Blume consists of approximately 350 species, chiefly distributed in the tropical and sub-tropical parts of Asia but extending to the Pacific islands (Tripp *et al.* 2013, Mabberley 2017, Chen *et al.* 2019, 2020, Deng 2019, Manzitto-Tripp *et al.* 2021). Approximately 150 species of *Strobilanthes* are reported from India and, among them, around 70 species are restricted to South India (Carine & Scotland 2002, Venu 2006, Krishnapillai *et al.* 2020). In the course of a floristic survey in the Megamalai Hills of Tamilnadu in 2016–2017, we collected a remarkable specimen of *Strobilanthes*, which was characterized by having viscous uninterrupted spikes with a subventricose corolla. Since it has spicate inflorescences, 5-partite calyces, two fertile stamens, and densely hygroscopic-pubescent seeds, the material belongs to the *S. kunthiana* group (Carine *et al.* 2004). After a critical examination of relevant literature and herbarium materials it was found that the specimen matches the type of *S. humilis*, hence our collections are the first verified collection after its type collections in 1836.

Strobilanthes humilis was first described by Nees (1847) as a variety of *Endopogon viscosus* Arn. ex. Nees, namely *E. viscosus* α^* *humilis* Nees. Nees (1847) used Wight's material (K000882932) for describing this variety. Two years later Wight (1849) illustrated the same taxon in 'Icones Plantarum Indiae Orientalis'. While transferring *Endopogon* to *Strobilanthes*, Anderson (1864) treated Wight's specimen and illustrations within *S. consanguinea* (Nees) T. Anderson. Clarke (1884) elevated the same to a variety of *S. consanguinea* i.e., *S. consanguinea* var. *hypoleuca* (Nees) C.B. Clarke. Gamble (1924) later analysed Wight's material (K000882932) and elevated it to a distinct species, *S. humilis* (Nees) Gamble. He illustrated the corolla, stamen, and style and separated and glued the floral parts on a separate sheet which he had pasted on Wight's material

(K000882932). After a long period, Carine *et al.* (2004), in their revisionary account of the *S. kunthiana* group, synonymized *S. humilis* (Nees) Gamble within *S. consanguinea* (Nees) T. Anderson. However, Venu (2006) treated it as a distinct species, with short descriptions, in his account of *Strobilanthes* of peninsular India. Currently, *S. humilis* (Nees) Gamble is treated as an accepted species in the Plants of the World Online database (POWO 2022). However, the type material (K000882932) for the same has been treated as the holotype of *S. consanguinea* (Nees) T. Anderson in POWO. Our collections exactly match the descriptions and illustrations of *S. humilis* (Nees) Gamble. Hence, we reinstate *S. humilis* (Nees) Gamble as a distinct species. An amended description of the species is given, and the specimen Wight s.n. (K000882932) treated as lectotype. The specimen Wight 1982 (K000882927) has been designated as the type of *S. consanguinea* (Nees) T. Anderson by Carine *et al.* (2004).

The plant materials were collected from the Megamalai Hills of Tamilnadu, India. Photographs of the vegetative and floral parts were obtained in the field. Measurements of the plant parts were made from fresh as well as preserved materials and an illustration of the species was prepared. The voucher specimens of the taxon were prepared and deposited at Rapinat Herbarium, Tiruchirappalli, Tamilnadu. The specimens were studied using the local floras, relevant literature (Nees 1847, Wight 1849, Anderson 1864, 1867, Clarke 1884, Gamble 1924, Carine & Scotland 2002, Carine *et al.* 2004, Venu 2006, Thomas *et al.* 2019a–c, 2020, Krishnapillai *et al.* 2020) and relevant herbarium material (CAL, E, GZU, K, L, MH, RHT).

The pollen grains were analyzed by Scanning Electron Microscopy (SEM). They were washed in water using ultrasound, and then air dried and fixed to aluminum stubs and sputter-coated with gold. Morphological observations were made, and micrographs were then taken with JEOL (JSM-6390LV/JED-2300) SEM-EDS.

Plate 32

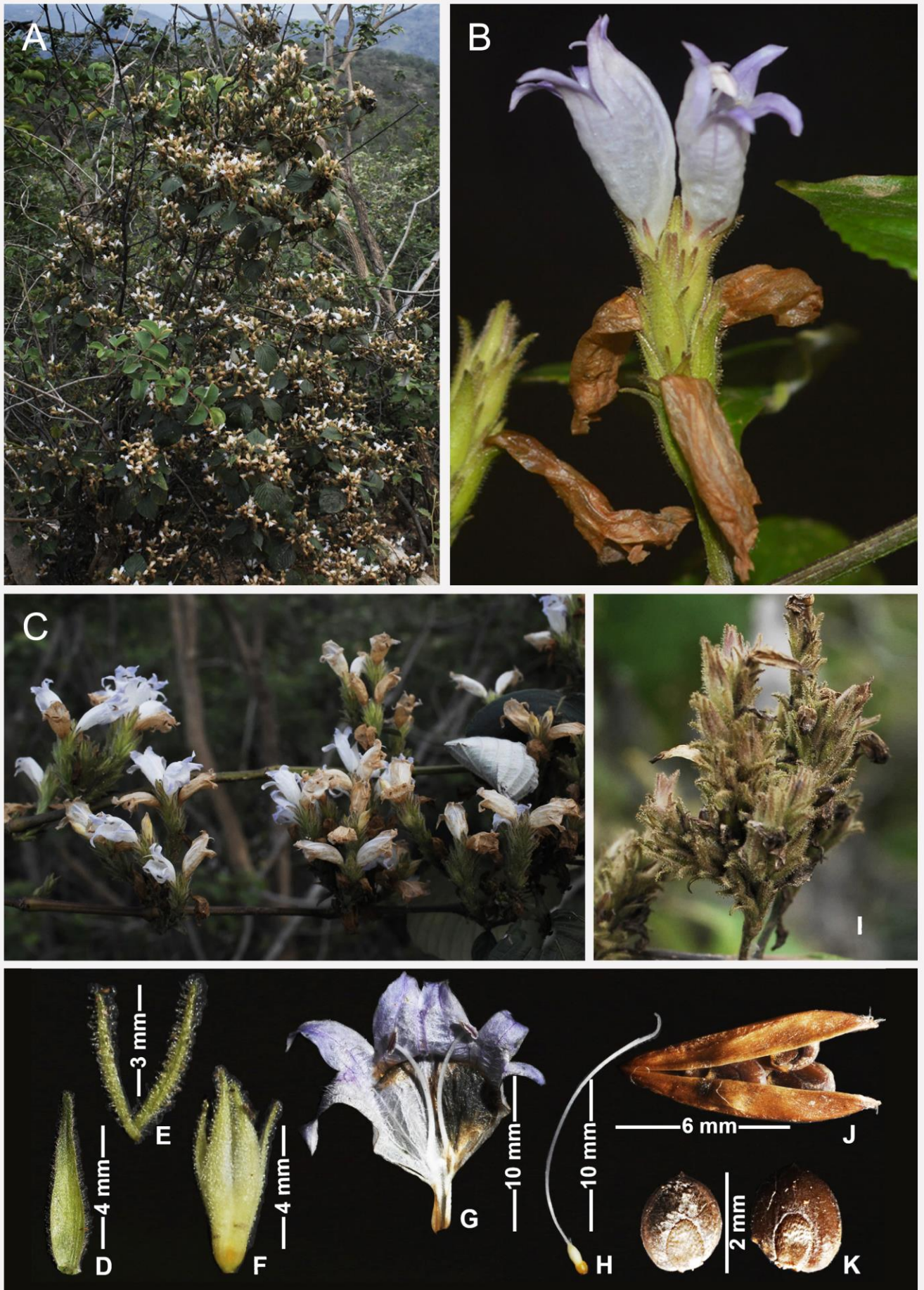


Figure 2. *Strobilanthes humilis*: (A) habit, (B–C) inflorescence, (D) bract, (E) bracteole, (F) calyx, (G) corolla split open, (H) pistil, (I) infructescence, (J) dehisced fruit with seeds, (K) seeds.

Taxonomy

Strobilanthes humilis (Nees) Gamble, Fl. Madras 1035.1924 (Figs. 1, 2, 3A)

Endopogon viscosus Nees var. *humilis* Nees., 1847
Phlebophyllum humile (Nees) Bremek., 1944

Type. India, Tamil Nadu, Courtallam, *Wight s.n.* (lectotype: designated by Carine *et al.* 2004: K000882932).

Other specimens examined. INDIA: Tamil Nadu, Courtallam, 1836, *Wight 784* (GZU 000280510); *Wight s.n.* (GZU 000280511); February 1836, *Wight 784* (E00160829); February 1836, *Wight 2196* (L0108586); Theni District, Megamalai, 700 m, 26 Jan 2017, *Pradeep & Bince 68420* (RHT); *ibid.* 550 m, 26 Jan 2017, *Pradeep & Bince 68419* (RHT); *ibid.* 700 m, 24 April 2017, *Pradeep & Bince 68418* (RHT).

Description. Plietesimal undershrub, up to 1.5 m tall. Stem quadrangular to terete, lenticellate, green-brown, covered with short tawny tomentum, white-pubescent. *Leaves* isophyllous; petioles 1.5–3.7 cm long, brown tomentellose; lamina chartaceous, broadly elliptic, 5.5–12.5 × 3.7–7.5 cm, base decurrent onto the petiole, margin crenate, apex cuspidate, adaxially puberulent, abaxially covered with sericeous indumentum; midvein prominent, lateral veins 4–9 pairs, prominent on lower surface. *Inflorescences* axillary or terminal, broad uninterrupted viscous spikes, 1.0–4.5 × 0.5–0.6 cm; peduncle quadrangular, covered with glandular hairs, flowers in opposite pairs; bracts lanceolate, 6.0–7.5 × ca. 2.0 mm, base rounded, margin entire, ciliate, apex acuminate, recurved, shorter than or equal to calyx at anthesis, adaxial surface glabrous, abaxial surface glandular hairy with sparse white sericeous hairs; bracteoles linear, ca 5.0 × 0.5 mm, adaxially glabrous, abaxially glandular hairy with sparse white sericeous hairs, margin ciliate, secondary flower buds present. *Calyx* tubular below, 6.5–7.5 mm long, dense glandular hairy abaxially, adaxially fine pubescent, tube 4.0–4.5 mm long, lobes 5, lanceolate, two lobes slightly shorter than the other three, 2.9–3.1 × ca. 0.5 mm, margins ciliate, apex narrowly acute. *Corolla* pale purple, 1.6–1.8 cm long, basal tube cylindrical, 3.5–4.5 mm long, ca. 2 mm wide, glabrous, white; throat pale purple, sub-ventricose, 7–8 mm long, finely pubescent on outer surface, inside long hairy throughout; lobes unequal, two adaxial lobes

partly fused, 4.0–5.5 × 2.5–3.0 mm, narrowly triangular, pale purple, apex acute, fine pubescent outside, glabrous inside. *Stamens* 2, exserted, basally attached with corolla; filaments tubular, 8–9 mm long, glabrous except base; anthers elliptic, ca. 2.0 × 0.5 mm, thecae held perpendicular to the filament. *Pistil* 1.7–1.8 cm long, ovary ovate, ca. 1.0 × 0.5 mm, apex pubescent, 2-locular, 2 ovules per locule; style filiform, 1.4–1.5 cm long, glabrous; stigma linear, ca. 2 mm long, glabrous, curved. *Infructescence* 1.5–6.0 × 0.8–1.0 cm, bracts recurved, dense glandular hairy; capsule oblanceolate, 9–12 × 3–3.5 mm, hairy at apex; seeds 4, elliptic-orbicular, 2.0–2.5 × 1.5–1.75 mm, densely pubescent.

Pollen morphology. Pollen grains are ellipsoid, tricolporate and have pseudocolpi (Fig. 3A). The grains are apiculate and the outline is prolate. The exine is divided into longitudinal ribs which are distant, spiral and tectate. Pollen features of *S. humilis* are given in Table 1.

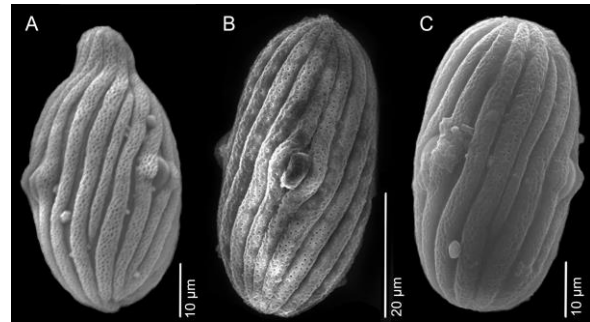


Figure 3: Scanning electron micrographs of pollen grains of (A) *Strobilanthes humilis*, (B) *S. consanguinea*, and (C) *S. cuspidata*

Phenology. Flowering January to March with a plietesimal life history. Local people say that it flowers every seven or eight years. The seeds disperse from mid-April to the end of May.

Distribution. It is a gregarious species presently known from the Megamalai hills, Tamilnadu at elevations of 500–900 m.

Remarks. *Strobilanthes humilis* is morphologically similar to *S. consanguinea* in possessing characteristics such as habitus (shrubs), decurrent leaf base, spicate inflorescences, narrowly triangular corolla lobes, exserted stamens, and a pubescent apex of the ovary. Similarly, it shares features with *S. cuspidata* (Benth.) T. Anderson in the glandular spicate inflorescence and viscous bracteate infructescence. *Strobilanthes consanguinea* is variable in its morphology and is distributed in the Eastern Ghats and the eastern slopes of the

Western Ghats (Pullaiah & Babu 1997, Matthew 1999, Carine *et al.* 2004, Venu 2006). Several varieties have been recognized within this species (Nees 1847, Clarke 1884, Gamble 1924, Bremekamp 1944) and it has been occasionally misidentified as *S. cuspidata* (Matthew 1999). Additionally, *S. humilis* is similar to *S. viscosa* (Arn. ex Nees) T. Anderson, which is a Sri Lankan endemic, in having glandular spicate inflorescences. However, *S. humilis* is easily distinguished from these allied species by a set of diagnostic characters; a detailed comparison of these characteristics is provided in Table 1.

Wight (1849) assumed this plant grew to only 9 inches tall with small leaves and spikes. However, during our recent floristic explorations, we found that the plant may reach a height of 1.5 m. At the same time, we located a few small

plants with flowers as Wight had seen. Due to continuous herbivory, some plants might grow to only a few inches. This was observed not only in *S. humilis* but also in some other species of *Strobilanthes* in the Western Ghats. Gamble cited another specimen (*Beddome* 69, CAL 0000047900) in addition to Wight's specimen (K000882932) in the protologue of *S. humilis* (Nees) Gamble. *Beddome* 69 shows morphological similarity with *S. humilis* in leaf characteristics and the viscous nature of the inflorescences. However, it differs in having ventricose and hooded corollas (subventricose and non-hooded corolla in *S. humilis*) and narrow and non-compact spikes (broad and compact spikes in *S. humilis*). Hence, further studies are required to establish the taxonomic identity of *Beddome* 69.

Table 1. Diagnostic characters of *Strobilanthes cuspidata*, *S. humilis* and *S. consanguinea*; *based on Thomas *et al.* (2020a)

Character	<i>S. cuspidata</i> *	<i>S. humilis</i>	<i>S. consanguinea</i> *
Stem (young)			
Indumentum	Tawny	Tawny	Glabrous
Leaf blade			
Shape	Ovate	Broadly elliptic	Ovate to elliptic
Apex	Acuminate	Cuspidate	Acuminate
Margin	Entire	Crenate	Serrate
Inflorescence			
Spike	Uninterrupted	Uninterrupted	Interrupted
Peduncle	Glandular hairy	Glandular hairy	Glabrous
Bract			
Shape	Lanceolate	Lanceolate	Ovate
Abaxial indumentum	Glandular hairy	Glandular hairy	Glabrous
Calyx			
Margin	Non-ciliate	Ciliate	Non-ciliate
Corolla			
Shape	Ventricose	Subventricose	Ventricose
Length	2.7–2.9 cm	1.6–1.8 cm	2–2.4 cm
Lobe	Broadly elliptic	Narrowly triangular	Narrowly triangular
Androecium			
Stamen	Included	Exserted	Exserted
Anthers	Sagittate	Elliptic	Elliptic
Anther attachment	Held parallel	Held perpendicular	Held perpendicular
Pollen			
Pollen class	Prolate	Prolate	Perprolate
Shape	Terete	Ellipsoid-apiculate	Barrel
Pseudocolpi	Wide	Wide	Narrow
Ribs	16–18	16–18	18–21
Pistil			
Ovary apex	Glandular pubescent	Pubescent	Pubescent
Pubescence of style	Pubescent	Glabrous	Glabrous
Capsule			
Shape	Oblanceolate	Oblanceolate	Elliptic to narrowly obovate
Pubescence	Hairy at apex	Hairy at apex	Glabrous

Key to the species of the *S. kunthiana* group:

1. (a) Corolla ventricose or subventricose; dorsal lobes partly fused 2
(b) Corolla nearly campanulate; dorsal lobes free 12
2. (a) Stamens included at the throat of corolla 3
(b) Stamens exerted into the upper lip of the corolla 5
3. (a) Bracts lanceolate *S. cuspidata*
(b) Bracts ovate or elliptic-ovate 4
4. (a) Leaf apex cuspidate *S. canarica*
(b) Leaf apex acuminate *S. pothigaiensis*
5. (a) Leaf margins distinctly crenate or serrate 6
(b) Leaf margins entire 8
6. (a) Bracts lanceolate *S. humilis*
(b) Bracts ovate 7
7. (a) Abaxial leaf surface glabrous or rarely with white sericeous indumentum; calyx lobes lanceolate *S. consanguinea*
(b) Abaxial leaf surface sparsely pubescent; calyx lobes linear *S. mullayanagiriensis*
8. (a) Anthers held parallel to the filament (adnate) 9
(b) Anthers held perpendicular to the filament, dorsifixed 11
9. (a) Leaves coriaceous; spikes interrupted *S. carmelensis*
(b) Leaves membranous; spikes uninterrupted 10
10. (a) Staminal filaments villous; leaves lanceolate; bracts caudate; calyx lobes linear; corolla lobes oblong; *S. gamblei*
(b) Staminal filaments glabrous; leaves elliptic; bracts acuminate; calyx lobes narrowly triangular; corolla lobes triangular *S. bislei*
11. (a) Leaves long-petiolate (4–10 cm long); lamina margin entire, spikes narrow, interrupted *S. bourdillonii*
(b) Leaves short-petiolate (5–20 mm long); lamina margin denticulate, spikes broad, uninterrupted *S. pushpangadanii*
12. (a) Stems (except in *S. agasthyamalana*) and abaxial surface of leaves with dense tawny-woolly indumentum 13
(b) Stems and abaxial surface of leaves glabrous or if pubescent, the hairs not tawny-woolly 17
13. (a) Inflorescences a broad, uninterrupted spikes 14
(b) Inflorescences a narrow, interrupted spikes 15
14. (a) Spikes short (1–2 cm long); foliar bracts present; floral bracts 3–7 ribbed *S. agasthyamalana*
(b) Spikes rather long (4–8 cm); foliar bracts absent; floral bracts non-ribbed *S. lanata*
15. (a) Leaf apex cuspidate; bracts 3-ribbed *S. tricostata*
(b) Leaf apex long acuminate; bracts non-ribbed 16
16. (a) Bract acute at apex; corolla lobes widely elliptic; ovary apex pubescent *S. scopulicola*
(b) Bract acuminate at apex; corolla lobes ovate to triangular; ovary apex glabrous *S. lawsonii*
17. (a) Leaves long-petiolate (30–120 mm); abaxial surface of leaves glabrous or rarely with sericeous indumentum 18
(b) Leaves shortly petiolate (1–10 mm); abaxial surface of leaves pubescent 20
18. (a) corolla lobes broadly elliptic, inflorescences of broad uninterrupted spikes *S. benthamii*
(b) corolla lobes broadly triangular; inflorescences of narrow interrupted spikes 19
19. (a) Bracts longer than calyx; 1 calyx lobe shorter than others; lamina pubescent on adaxial surface *S. jeyporensis*
(b) Bracts shorter than calyx; 2 or 3 calyx lobes shorter than others; lamina glabrous on adaxial surface *S. carnatica*
20. (a) Lamina shortly acuminate at apex; ovary pubescent at the apex *S. kunthiana*
(b) Lamina acute at apex; ovary glabrous at apex *S. sainthomiana*

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Appendix. Comparative material

Strobilanthes consanguinea: INDIA: Kerala, Bodymettu, 1000 m, 17 Dec 2010, Pradeep 67203 (RHT); Marayur, 950 m, 13 Feb 2011, Pradeep 67314 (RHT); Alampetty, 800 m, 13 Feb 2011, Pradeep 67563 (RHT); Cambummettu, 800m, 20 Dec 2013, Pradeep & Bince 68140 (RHT); Tamilnadu: Palni hills, 700 m, 20 Jan 2015, Pradeep & Bince 68254 (RHT); Burliar, 950 m, 10 Feb 2012, Pradeep 68041 (RHT); Aliyar, 650 m, 06 Nov 211, Pradeep 68191 (RHT).