



A taxonomic revision of the genus *Smithia* Ait. (Fabaceae) in South India

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ABSTRACT: The genus *Smithia* in South India is revised based on field and herbarium studies. A brief history of the genus along with a key to the identification of the South Indian species, updated nomenclature, detailed descriptions, illustrations, photo plates and notes on distribution, phenology and ecology are provided for each species. Status of *S. conferta* var. *geminiflora* is reinstated. Four names are lectotypified, namely, *Smithia bodinierii*, *S. conferta* var. *geminiflora*, *S. venkobarrowii* and *S. yunnanensis*.

KEY WORDS: Fabaceae, *Smithia*, South India, Revision, Lectotypification.

INTRODUCTION

Aiton (1789) established the genus *Smithia* based on collection of J.G. Keonig from India with a single species, *S. sensitiva* Ait. The genus was named after Sir James Edward Smith, one of the most preeminent English botanists of the late 18th and early 19th centuries, who was the first president of Linnean Society, London. The genus is widely distributed in Old world tropics chiefly in Asia and Madagascar and is estimated to comprise about 20 species (Klitgaard and M. Lavin, 2005). The genus is principally Asiatic with highest species diversity in the Indian subcontinent (17 species out of 20). Moreover, 11 of them are endemic to the Indian subcontinent which suggests that subcontinent as one of the centre's of its origin and evolution. Out of the 17 species reported from India (Sanjappa, 1992), 9 are endemic and are chiefly confined to the Western Ghats. South India in particular, shows the highest degree of endemism and diversity of this genus in the region.

The generic name *Smithia* Ait. is conserved against *Damapana* Adans., and is conserved automatically against the earlier homonym *Smithia* Scop. The genus *Smithia* was part of the Tribe *Hedysareae* of Bentham and Hooker (1865). They included *Smithia* along with the genera *Aeschynomene* L., *Geissaspis* Wight & Arn., and others in the subtribe *Aeschynomineae*. Hutchinson (1964) included the genus *Smithia* in the tribe *Aeschynomeneae*. Rudd (1981) divided the tribe *Aeschynomeneae* into two subtribes, namely, *Ormocarpinae* Rudd and *Aeschynominae* (Benth.) Hutch. The genus *Smithia* was placed in the subtribe *Aeschynominae*. None of the *Aeschynomeneae* had previously been considered closely related to the tribe *Dalbergieae*. But the work of Lavin *et al.* (2001) resolved all the 'aeschynomeneoid genera' within the Dalbergioid clade, based on DNA sequence data.

Species of *Smithia* are difficult to distinguish in the field as well as herbarium due to the herbaceous nature, close resemblance among members and microscopic key characters primarily based on calyx characteristics. This genus represented in various Indian herbaria is poorly identified and are confusing. Recently, Nayar, T.S. *et al.* (2014) listed out 14 species of *Smithia* from Western Ghats. Balan and Predeep (2014) described a new variety of *S. venkobarrowii* Gamble from the Western Ghats. Singh, R.Kr. (2016) lectotypified fourteen binomials of eleven recognized species from India. However, still it is one of the least studied legume genus in India and no detailed study has followed that of Baker (1876) and Gamble (1918), except for treatments in some regional floras (Saldanha, 1984; Manilal, 1988; Pullaiah and Chennaiah, 1997; Matthew, K.M., 1999; Singh, N.P. and Karthikeyan, 2000; Mohanan and Sivadasan, 2002).

A treatment of different species belonging to this genus is of urgent necessity and hence, the authors made an effort to relocate all the species of *Smithia* in South India to present a revision of the genus in the region based on field studies, consultation of herbarium specimens, types and protologues. A key with detailed descriptions, illustrations, photographs etc. are provided for each taxon so far reported from south India along with notes on phenology, distribution pattern and ecological preferences for each taxon.

MATERIALS AND METHODS

Fresh material for the study was collected from various localities in South India and herbarium sheets were prepared as per international standards and are housed at the herbarium in Department of Botany, S.V.R. N.S.S. College, Vazhoor (VZHR—yet to be approved by Index Herbariorum) and MH. All collected specimens were dissected using an Olympus Stereo



Zoom microscope upon which detailed descriptions and illustrations were made. Specimens deposited in the major herbaria of India (CAL, CALI, K, KFRI, MH, RHK and TBGT) were also consulted for the study. Identification of each taxon was done with the consultation of authentic specimens, types and protologues. Virtual herbaria of BM, E, FI, HAL, K, L, LINN, M, MNHN, MPU, P, RBGE, S etc. were also consulted for the digital images of type specimens. The lectotypifications are followed by McNeill *et al.* (2012).

TAXONOMIC TREATMENTS

Smithia Ait., Hort. Kew 3: 496. 1789; Benth. & Hook.f., Gen. Pl. 1: 516. 1865; Wight & Arn., Prod. Fl. Ind. Orient. 220. 1834; Baker in Hook. f., Fl. Brit. India 2: 148. 1876; T. Cooke, Fl. Bombay 1: 335. 1902; Gamble, Fl. Madras 1: 327. 1918; 327; Hutch., Gen. Fl. Pl. 1: 475. 1964; Rudd, Advances Legume Syst. 1: 352. 1981; Klitg. & M. Lavin, Legumes World 330. 2005; Mabb., Mabblerley's Pl.-Book 802. 2008; T.S. Nayar *et al.*, Fl. Pl. W. Ghats, India. 1: 455. 2014. **TYPE:** *Smithia sensitiva* Ait.

Damapana Adans., Fam. Pl. 2: 323. 1763, *nom. rej.* **TYPE:** "H.M. 9 t. 38"

Diffuse herbs or suberect or erect undershrubs. Stem usually patently bristly, sometimes glabrous. Stipules membranous, prolonged below the point of attachment into a biauriculate appendage, the one auricle short and rounded, the other longer, linear; stipels absent. Leaves paripinnate, shortly petiolate; rachis ending in a bristle; leaflets subsessile, asymmetric at the base, with a single centrally placed main nerve, 2–15 pairs, usually ciliated with adpressed bristles. Flowers generally yellow, sometimes purple or blue, in axillary often unilateral racemes or terminal heads or panicles, rarely solitary or in pairs; bracts and bracteoles membranous, persistent. Calyx deeply 2-lipped, lips equal or unequal, entire or slightly lobed, prominently parallel or reticulate veined, more or less bristly (**Fig.1**). Corolla exserted; standard petal suborbicular, emarginate at apex, clawed; wing petals obliquely oblong, clawed and auricled; keel petals slightly incurved, clawed. Stamens diadelphous, in 2 bundles of 5 each; filaments short; anthers uniform, ovoid. Ovary subsessile, 6–15-ovuled; style filiform; stigma terminal, pointed. Fruit a lomentum of flattened, 1-seeded, indehiscent, orbicular joints, folded together inside the calyx. Seeds reniform, estrophiolate.

Twenty species, in Old World Tropics. Eleven species are restricted to the Indian subcontinent *viz.*, *S. agharkarii* Hemadri, *S. bigemina* Dalz., *S. capitata* Dalz., *S. gracilis* Benth., *S. grandis* Benth., *S. hirsuta* Dalz., *S. oligantha* Blatt., *S. purpurea* Hook., *S. pycnantha* Benth. ex Baker, *S. setulosa* Dalz. and *S. venkobarrowii* Gamble. *S. blanda* Wall. ex Wight & Arn., *S. ciliata* Royle, *S.*

finetii Gagnep. and *S. salsuginea* Hance are confined to Asia. *S. abyssinica* (A. Rich.) Verdc. and *S. erubescens* (E. Mey) Baker f. are endemic to Africa. *S. elliotii* Baker f. is distributed in Africa and Indian Ocean (Madagascar). *S. conferta* Sm. extend from Asia to Australasia and *S. sensitiva* Ait. from Asia to Australasia and Indian Ocean (Madagascar). All Asian species are known to occur in India, except *S. finetii* Gagnep., which is endemic to Vietnam.

In the present revision, twelve species and two varieties are recognized from South India (including states of Andhra Pradesh, Goa, Karnataka, Kerala, Tamil Nadu and Telangana).

Key to the south Indian species of *Smithia*

- 1a. Flowers solitary or in pairs, axillary *S. conferta*
- 1b. Flowers in racemes or heads 2
- 2a. Flowers in globose heads 3
- 2b. Flowers in simple or paniced racemes 4
- 3a. Flowers yellow; calyx with bristles on black glands; leaflets 3–4 pairs 8. *S. pycnantha*
- 3b. Flowers blue; calyx with bristles not on black glands; leaflets 10–15 pairs 3. *S. capitata*
- 4a. Calyx rigid, veins parallel, simple 5
- 4b. Calyx membranous, veins anastomosing 7
- 5a. Flowers in axillary lax racemes; stem glabrous 6
- 5b. Flowers in terminal, paniced racemes; stem densely bristly 11. *S. setulosa*
- 6a. Flowers purple; lomentum joints reticulate 7. *S. purpurea*
- 6b. Flowers yellow; lomentum joints papillose 10. *S. sensitiva*
- 7a. Flowers in lax racemes, peduncles filiform 8
- 7b. Flowers in congested racemes or subcapitate heads; peduncles not filiform 9
- 8a. Leaflets 2 pairs; calyx lower lip 3-lobed; lomentum joints reticulate–papillose 1. *S. bigemina*
- 8b. Leaflets 3–4 pairs; calyx lower lip not lobed; lomentum joints reticulate–smooth 5. *S. gracilis*
- 9a. Calyx accrescent in fruit, lip not lobed; lomentum joints margined on one side, papillose 9. *S. salsuginea*
- 9b. Calyx not accrescent, lower lip 3-lobed; lomentum joints not margined, smooth 10
- 10a. Flowers in subcapitate heads in pairs or threes in upper leaf axils 12. *S. venkobarrowii*
- 10b. Flowers in corymbose racemes, one-sided in fruit 11
- 11a. Calyx with bristles on black bulbous bases; lomentum joints 7–10, reticulate 6. *S. hirsuta*
- 11b. Calyx with bristles not on black bulbous bases; lomentum joints 3–6, reticulate, bordered 2. *S. blanda*

1. *Smithia bigemina* Dalz. in Hook., J. Bot. Kew Gard. Misc. 3: 208. 1851; Baker in Hook. f., Fl. Brit. India 2: 149. 1876; T. Cooke, Fl. Bombay 1: 335. 1902; Gamble, Fl. Madras 1: 329. 1918; C.J. Saldanha, Fl. Karnataka 1: 490. 1984; Sanjappa, Legumes India 246. 1992; Sasidh., Biodiv. Doc. Kerala Pt. 6. Fl. Pl. 144. 2004; T.S. Nayar *et al.*, Fl. Pl. W. Ghats, Ind. 1: 455. 2014.

TYPE: INDIA, Maharashtra, *Dalzell s.n.* (Lectotype: CAL0000012752!), designated by Singh, R. Kr. (2016); Isolectotype, MH! Accession No. 14583).

Figs. 2 & 26. A-E.

Slender diffuse herbs, 20–35 cm long; stem much branched, minutely bristly-glabrescent. Stipules 3–5 ×

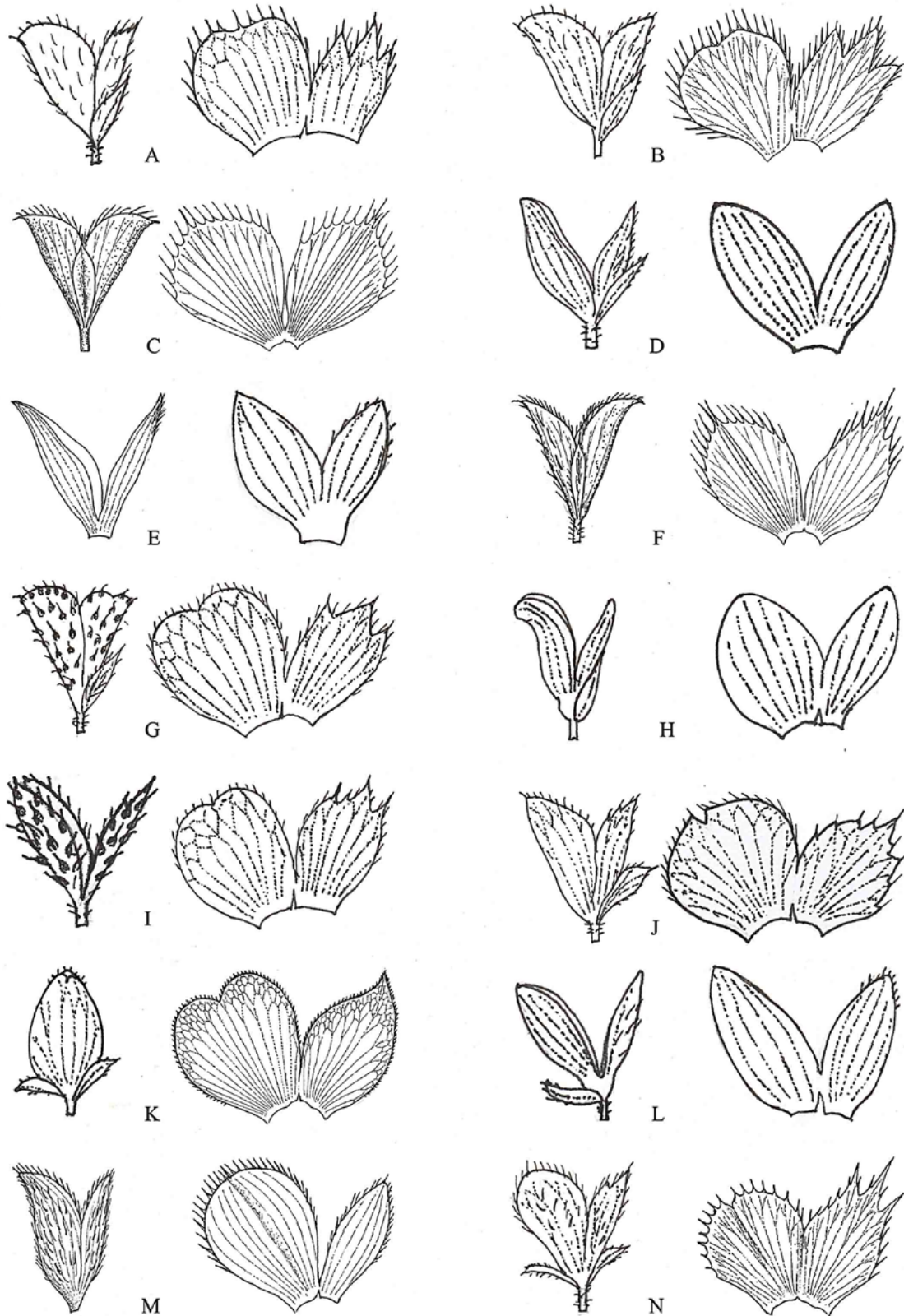


Fig. 1. Calyx of *Smithia* species. **A:** *Smithia bigemina* Dalz., **B:** *S. blanda* Wall. ex Wight & Arn., **C:** *S. capitata* Dalz., **D:** *S. conferta* Sm. var. *conferta*, **E:** *S. gracilis* Benth., **F:** *S. hirsuta* Dalz., **G:** *S. purpurea* Hook., **H:** *S. pycnantha* Benth. ex Baker, **I:** *S. salsuginea* Hance, **J:** *S. sensitiva* Ait., **K:** *S. setulosa* Dalz., **L:** *S. venkobarrowii* Gamble var. *venkobarrowii*, **N:** *S. venkobarrowii* Gamble var. *glabra*.

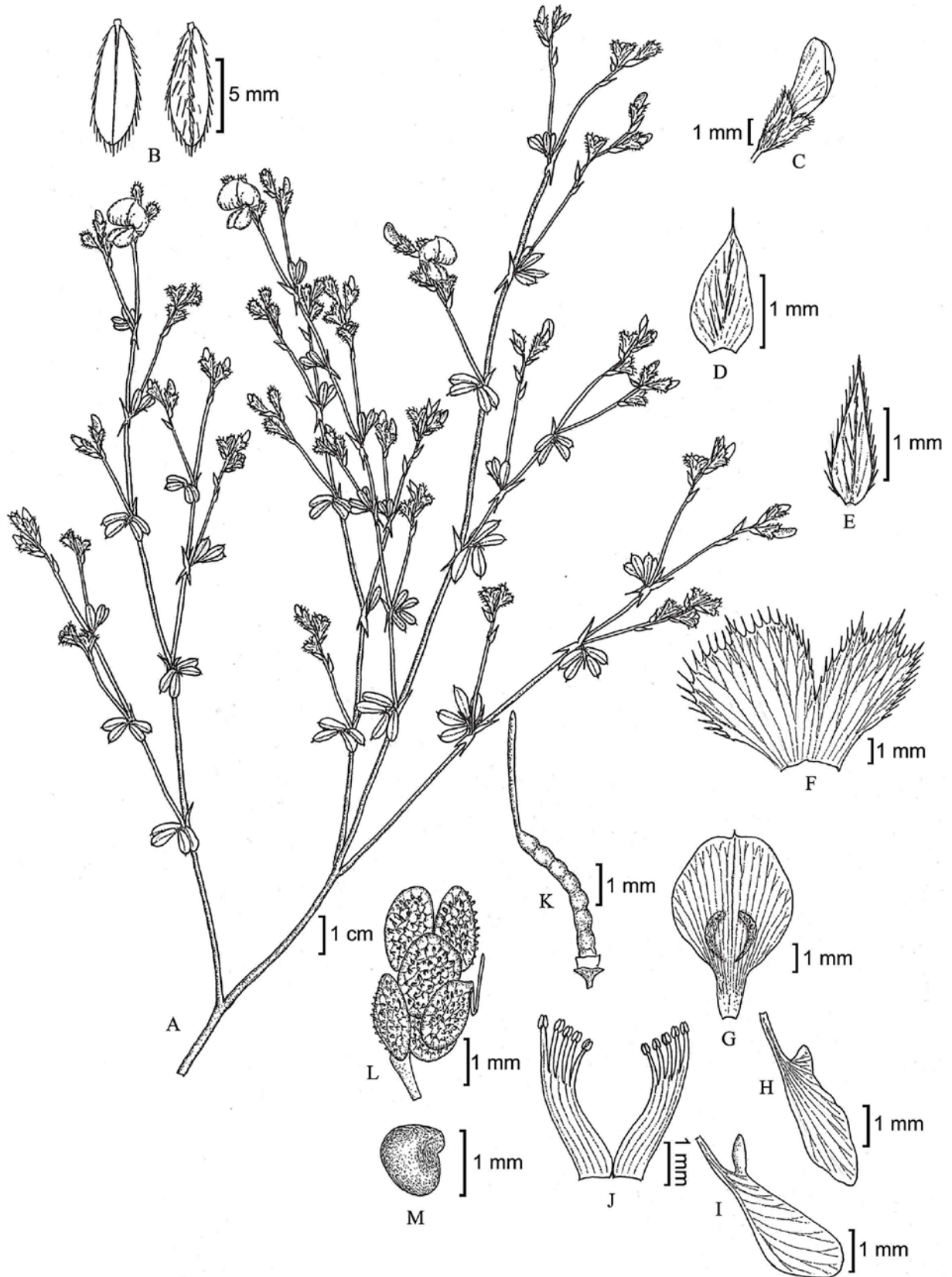


Fig. 2. *Smithia bigemina* Dalz. A: Habit, B: Leaflets upper and lower side, C: Flower, D: Bract, E: Bracteole, F: Calyx, G: Standard petal, H: Wing petal, I: Keel petal, J: Stamens, K: Pistil, L: Lomentum, M: Seed.

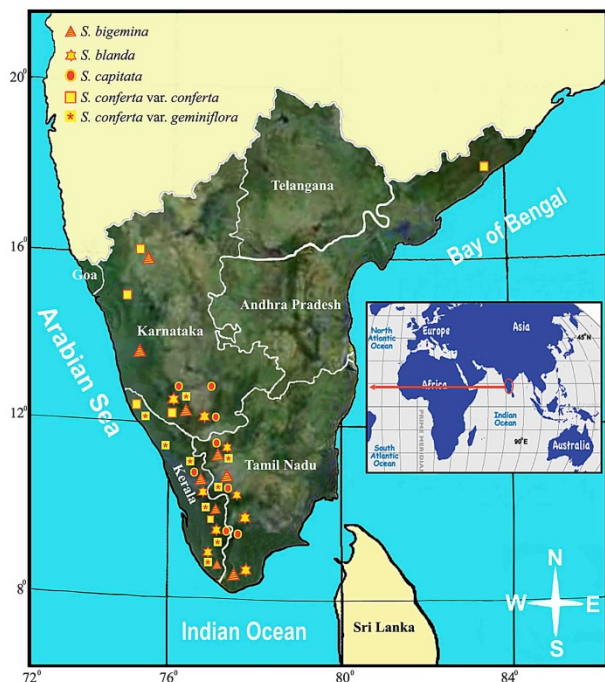


Fig. 3. Distribution Map of *Smithia bigemina* Dalz., *S. blanda* Wall. ex Wight & Arn., *S. capitata* Dalz., *S. conferta* Sm. var. *conferta* and *S. conferta* Sm. var. *geminiflora* (Roth) T. Cooke in South India.

1–2 mm, ovate, acuminate, bristly on the back, scarious, persistent; appendage 2–3 mm long, unequally bilobed. Leaves up to 1.5 cm long including 4–6 mm long bristly rachis and 1–2 mm long petioles: leaflets 2 pairs, subsessile, 5–14 × 3–5 mm, obovate-oblong, obtuse at apex, aristate, oblique at base, glabrous above, sparsely setaceous beneath, margins bristly. Flowers 6–8 mm long, yellow, in 2–3.5 cm long, axillary racemes: peduncles filiform, c. 3 cm long; pedicels 1–3 mm long, hispid; bracts c. 2 × 1.5 mm, ovate, aristate, bristly outside towards the base, scarious, persistent; bracteoles c. 2 × 1 mm, ovate-lanceolate, margins bristly. Calyx membranous, bristly outside with anastomosing veins: tube c. 2 mm long; upper lip broad, c. 4 × 2 mm, emarginate at apex; lower lip c. 2 × 2 mm, acute, 3-lobed, margins bristly. Corolla: standard 5–6 × 5–6 mm, suborbicular, claw c. 2.5 mm long; wings 5–6 × 2–3 mm oblong, claw c. 1.5 mm long; keels 4–6 × 1–2 mm, obliquely obovate, subtruncate at apex, auricle c. 1 mm long, claw c. 1.5 mm long. Staminal sheath c. 4 mm long; filaments 1–2 mm long; anthers ovoid. Ovary subsessile, c. 3–4 × 1 mm, curved; ovules 6–8; style 3–4 mm long, glabrous; stigma pointed. Lomentum slightly exerted, twisted and folded within; joints 4–6, 1.5 mm across, reticulate, papillose, margins flat. Seeds c. 1 × 1 mm, brown.

Flowering and Fruiting: August–December.

Ecology: Common in open moist hill slopes and grass lands at 500–1200 m elevation.

Distribution: India (Andhra Pradesh, Goa, Gujarat,

Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Rajasthan, Tamil Nadu and Uttar Pradesh) and Pakistan. (**Fig. 3**)

Specimens examined: INDIA. Karnataka: Concan, *Stocks s.n.* (MH). **Kerala:** Idukki district, Pullumedu, 13 December 2007, *Anoop P.B. 20747*(VZHR); Palakkad district, Silent Valley, 04 December 1980, *N.C. Nair 69105* (CAL, MH); Pathanamthitta district, Pampa Dam, 21 November 2008, *Anoop P.B. 20872* (VZHR); Thiruvananthapuram district, Bonaccord, 650 m, 28 November 1989, *N. Mohanan 8144* (CAL); Ponmudi, 13 November 1996, *N. Ravi 31740* (TBGT). **Tamil Nadu:** Coimbatore district, Waverly estate, 1250 m, 22 October 1961, *J. Joseph 13081*(MH); Coimbatore, Cinchona plantations, 17 November 1952, *C.R. Mudaliar 94407*(MH); Kanyakumari district, Muthukuzhivayal, 1400 m, 29 September 1980, *Henry 68865*(MH).

2. *Smithia blanda* Wall. ex Wight & Arn., *Prod. Fl. Ind. Orient.* 221. 1834; Baker in Hook. f., *Fl. Brit. India* 2: 151. 1876; Gamble, *Fl. Madras* 1: 330. 1918; C.J. Saldanha, *Fl. Karnataka* 1: 491. 1984; Sanjappa, *Legumes India* 246. 1992; Sasidh., *Biodiv. Doc. Kerala Pt. 6. Fl. Pl.* 144. 2004; T.S. Nayar *et al.*, *Fl. Pl. W. Ghats, Ind.* 1: 455. 2014.

TYPE: BANGLADESH, Mont Sillet, 1823, *Wallich L.n. 5669* (Lectotype: K001121661!), designated by Singh, R. Kr. (2016); Syntypes: Bangladesh, Mont Sillet, *Wallich L.n. 5669* (BM000958974!, BR000005174515!, CAL0000012741!, E00174479!, MNHN-P-P02297843! and S13-12434!).

Smithia racemosa Heyne ex Wight & Arn., *Prod. Fl. Ind. Orient.* 221. 1834. **TYPE:** INDIA, *Heyne* in *Wallich Cat. n. 5670* (Lectotype: K001121662!), designated by Singh, R. Kr. (2016); Isolectotypes: (CAL0000012740! and K000827998!)

Smithia blanda Wall. ex Wight & Arn. var. *racemosa* (Heyne ex Wight & Arn.) Baker in Hook. f., *Fl. Brit. India* 2: 151. 1876, *pro parte*. **TYPE:** same as for *S. racemosa* Heyne ex Wight & Arn.

Smithia paniculata Arn., *Nov. Act. Phys.-Med. Acad. Caes. Leop.-Carol. Nat. Cur.* 18: 330. 1836. **TYPE:** SRI LANKA, Neure Ellia, 6000 ft., *Walker s.n.* (Lectotype, E00301237!), designated by Singh, R. Kr. (2016); Syntypes: SRI LANKA, Walker 135 (K000827991! and K000827992!); Walker 171 (E00301235!); Walker 174 (E00301236!); Walker *s.n.* (K000827993!).

Smithia blanda Wall. ex Wight & Arn. var. *paniculata* (Arn.) ex Baker in Hook. f., *Fl. Brit. India* 2: 151. 1876. **TYPE:** same as for *S. paniculata* Arn.

Smithia yunnanensis Franch., *Pl. Delavay* 170. 1889. **TYPE:** CHINA, Yunnan, 24 September 1888, *J.M. Delavay 3518* (Lectotype: MNHN-P-P02849182! - **Fig. 4**), designated here; Isolectotypes: (HUH00112823!; L3814918!, MNHN-P-P02849181!, MNHN-P-P02913733!; MNHN-P-P02913736-9!; MNHN-P-P02913826-8! and MNHN-P-P02913835!)

Smithia bodinierii H. Lev., *Fl. Kouy-Tcheou* 242. 1914. **TYPE:** CHINA, 09 September 1897, *E.M. Bodinier 1821* (Lectotype: E00275868! - **Fig. 5**), designated here; Isolectotypes: (MNHN-P-P02913831!, MNHN-P-P02913832! and MNHN-P-P02913833!)

Figs. 6 & 26. F-I

Diffuse herbs to erect subshrubs, 20–70 cm high; stem densely yellow-bristly. Stipules 6–12 × 2–3 mm, striate, triangular; appendage 5–7 mm long. Leaves 3–4 cm long including c. 3 cm long rachis and 6–10 mm long bristly petioles: leaflets 3–5(-6) pairs, 1–2 × 0.4–0.6 cm, obovate-oblong, obtuse at apex, aristate, oblique at base, glabrous above, sparsely setaceous beneath, margins



Fig. 4. Lectotype of *Smithia yunnanensis* Franch. (MNHN-P-P02849182, © Muséum national d'Histoire naturelle, Paris).

ciliate. Panicles 3–5 cm long, terminal, corymbose; peduncles 2–3.5 cm long, hispid. Flowers 8–12 mm long, bright yellow; pedicels c. 2 mm long, hispid; bracts c. 3 × 1 mm, elliptic, aristate, setaceous outside along keel, caducous; bracteoles c. 3 × 2 mm, obovate, acuminate, margins ciliate, setaceous outside, persistent. Calyx membranaceous, veins anastomosing: upper lip 4–5.5 × 3–5 mm, emarginate at apex, margins bristly, lower lip 3-lobed, lobes acute, sparsely bristly outside. Corolla: standard 6–8 × 6–8 mm, suborbicular, red-tinched towards claw, claw 2.5–3 mm long; wings 6–7 × 3 mm, obovate, shortly auricled, claw 2–2.5 mm long; keels 6–7 × 2–3 mm, obliquely obovate, curved, ciliate at apex, auricle c. 2 mm long, claw 1.5–2 mm long. Staminal sheath 4–6 mm long; filaments c. 2 mm long. Ovary subsessile, c. 2 mm long, curved; ovules 5–6; style 6–7 mm long, glabrous; stigma pointed. Lomentum slightly exerted, twisted and folded back within the calyx, 3–6-jointed; joints 2–2.5 × 2–2.5 mm, reticulate, margins bordered. Seeds 1.5–2 × 1.5–2 mm, brown.

Flowering and Fruiting: September – January.

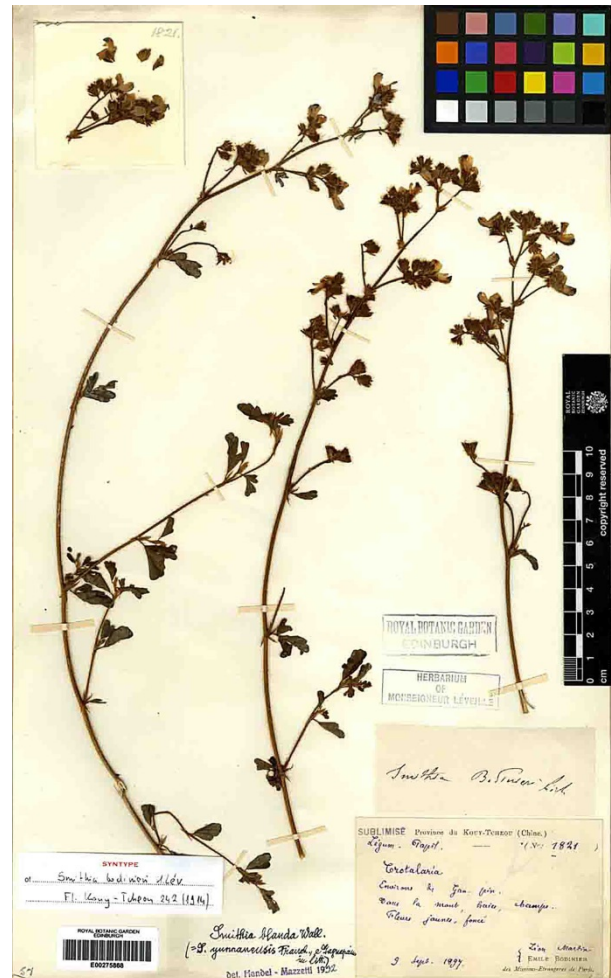


Fig. 5. Lectotype of *Smithia bodinierii* H. Lev. (E00275868, © Royal Botanic Garden, Edinburgh).

Ecology: Common in high altitude grass lands up to 1200 m elevation.

Distribution: Bangladesh, China, India (Assam, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Nagaland, Rajasthan, Sikkim, Tamil Nadu and West Bengal), Laos, Sri Lanka and Thailand. Fig. 3

Specimens examined: **INDIA. Karnataka:** Concan, *Stocks s.n.* (MH); South Canara, ghats, *s.l.* 14595 (MH). **Kerala:** Idukki district, Kuttikanam, 28 November 1996, *Ravi & Mohanan 24798* (TBGT); Kallar, 08 October 2008, *Anoop P.B. 20832* (VZHR); Pullumedu, 20 November 2008, *Anoop P.B. 20872* (VZHR); Kannur district, Chandanathodu, 03 November 1965, *Ellis 26389* (MH); Palakkad district, Kaikatty, 19 November 1973, *Vajravelu 44687* (MH); Silent Valley, Sairandri, 29 November 2008, *S.V. Predeep & Anoop P.B. 20955* (VZHR); Pathanamthitta district, Ponnambalamedu, 1000 m, 15 December 1981, *C.N. Mohanan 72836* (CAL, MH); Pampa-Goodrical, 25.02.1988, *Anil Kumar 1337* (SN College, Kollam); Thiruvananthapuram district, Bonaccord, Koviltherimala, 1100 m, 24 November 1989, *N. Mohanan 8147* (TBGT). **Tamil Nadu:** Kanyakumari district, Balabore to M. K. Vayal, 1100 m, 28 June 1976, *Henry 47523* (MH); Madurai district, Vattparai, 1750 m, 17 August 1990, *V. Lakshmanan 93521* (MH); Nilgiri district, Way to Nilgiri peak- Mudimundu, 2200 m, 26 October 1972, *J.L. Ellis 43387* (MH); Anamallays, 1873, *Beddome s.n.* (VZHR); Nilgiri

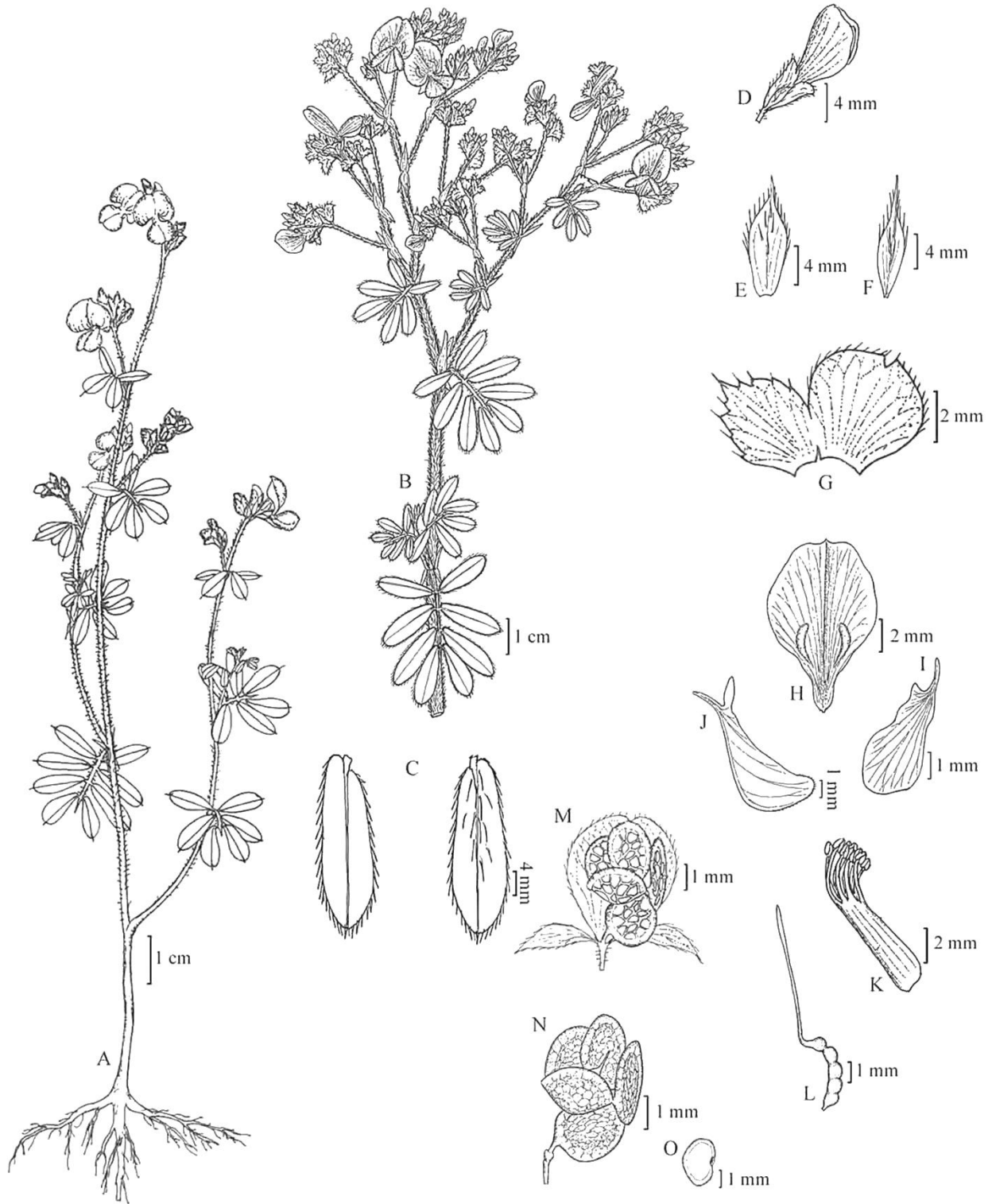


Fig. 6. *Smithia blanda* Wall. ex Wight & Arn. A & B: Habit, **C:** Leaflets upper and lower side, **D:** Flower, **E:** Bract, **F:** Bracteole, **G:** Calyx, **H:** Standard petal, **I:** Wing petal, **J:** Keel petal, **K:** Stamens, **L:** Pistil, **M & N:** Lomentum, **O:** Seed.

district, Avlanche, 1925 m, 14 October 1972, *Vivekananthan* 42965(MH); Nilgiri, Sispara, 2200 m, *B.V. Shetty* 37521(MH); Nilgiri district, Naduvattom, September 1883, *s.l. s.n.* (MH); Nilgiris, Pykara,

riverbank, 7000 ft., 12 September 1930, *V. Narayanaswami* 4254 (MH); Mukurti, 14 July 1970, *J.L. Ellis* 34678 (MH); Pykara, 21 October 1972, *Ellis* 43302 (MH).



Notes: *Smithia yunnanensis* was described by A.R. Franchet (1889) based on the gatherings of J.M. Delavay (*Delavay 3518*) from China, but no specific herbarium sheet was designated as holotype. Franchet was a French botanist based at the Natural History Museum of France (P). His type specimens are known to occur at P and the duplicates at HUH, K, L, NY, PC, etc. After extensive surveys, thirteen specimens of *Delavay 3518* were traced (HUH00112823, L3814918, MNHN-P-P02849181 to 2, MNHN-P-P02913733, MNHN-P-P02913736 to 9, MNHN-P-P02913826 to 8 and MNHN-P-P02913835). Among the eleven specimens at P, MNHN-P-P02849182 is a full specimen with 'creeping rhizome' as mentioned in the protologue and is more close to the protologue, with detailed field notes of Mr. Delavay, which is selected here as the lectotype of *S. yunnanensis* Franch.

H. Leveille (1914) described *Smithia bodinierii* based on the collection of E.M. Bodinier (*Bodinier 1821*) from China, without designating a holotype. Leveille's type specimens are known to be stored at E, and duplicates at A, P, etc. Four herbarium sheets of *Bodinier 1821* were traced, one at E (E00275868), and three at P (MNHN-P-P02913831 to 3). Among them, the specimen belongs to Leveille's herbarium (E00275868) is selected here as the lectotype. The herbarium label of E00275868 bears the names of Mr. Lion Martin and E.M. Bodinier as collectors. However, the specimens at P do not bear the name of Mr. Martin, and same with the protologue.

S. blanda is one of the widely distributed species of the genus showing great diversity in its habit and other vegetative and floral characters. Habit ranges from diffusing herbs to erect, tall shrubs. Indumentum varies from densely bristly to glabrescent. Corymbose racemes sometimes aggregated into terminal panicles. Leaf and flower size also varies in different geographical regions.

3. *Smithia capitata* Dalz. in Hook., J. Bot. Kew Gard. Misc. 3: 208. 1851; Baker in Hook. f., Fl. Brit. India 2: 150. 1876; T. Cooke, Fl. Bombay 1: 335. 1902; Gamble, Fl. Madras 1: 330. 1918; C.J. Saldanha, Fl. Karnataka 1: 491. 1984; Sanjappa, Legumes India 246. 1992; Sasidh., Biodiv. Doc. Kerala Pt. 6. Fl. Pl. 144. 2004; T.S. Nayar *et al.*, Fl. Pl. W. Ghats, Ind. 1: 455. 2014. **TYPE:** India, Bombay, Parwar Ghat, *Dalzell s.n.* (Lectotype, K000859003!), designated by Singh, R. Kr. (2016); Isolectotypes: (CAL0000012753 to 5!).

Figs. 7 & 26. J

Erect herbs, 15–35 cm high; stem terete, glabrous. Stipules 5–6 × 2 mm, ovate, acuminate, glabrous; appendage 4–5 mm long. Leaves 3–5 cm long including 3–4 mm long bristly petioles: leaflets (4–) 8–10 (-15) pairs, 6–10 × 2–3 mm, obovate-oblong, obtuse at apex, oblique and truncate at base, glabrous above,

bristly beneath along midrib and margins. Heads 2–2.5 cm across, terminal, capitate; peduncles c. 1 cm long. Flowers c. 10 mm long, blue; pedicels c. 2 mm long; bracteoles c. 6 × 2–3 mm, obovate, aristate, glabrous, striate. Calyx membranous: upper lip c. 8 × 8 mm, obovate, obtuse, margins bristly; lower lip ovate, acute, obscurely 3-lobed with 4–5 simple veins at the middle, glabrous outside. Corolla exerted. Staminal sheath c. 4 mm long; filaments 1.5–2 mm long; anthers c. 0.3 mm long, ovoid. Ovary stipitate, c. 2 mm long, glabrous, 6–8-ovuled; style 3–3.5 mm long; stigma pointed. Lomentum 7–8-jointed, folded back within the calyx; joints c. 2 × 1.5 mm, smooth-lightly rugose. Seeds c. 1.5 × 1.25 mm, subreniform.

Flowering and Fruiting: September–December.

Ecology: Discontinuously distributed in open, moist grass lands at 800–1200 m elevation.

Distribution: India (Goa, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Rajasthan and Tamil Nadu), endemic. **Fig. 3**

Specimens examined: **INDIA. Karnataka:** South Canara, Jolpad, 14 November 1900, *C.A. Barber 2356* (MH). **Kerala:** Idukki district, Mangaladevi, 1300 m, 17 November 1994, *Jomy & Rajesh 14195* (CALI); Vallakadavu-Gavi, 20 November 2008, *Anoop P.B. 20860* (VZHR); 'Malabar', *Stocks & Law s.n.* (MH); Palakkad district, Silent Valley, Camp shed, 16 October 1982, *T. Sabu 10832* (CALI); Wayanad district, Nelakotta, November 1884, *Gamble 15575* (MH). **Tamil Nadu:** Coimbatore hills, *Dalzell s.n.*; Nadugani, November 1885, *s.l., s.n.* (MH); Madurai district, Periyar dam, 980 m, 19 October 1959, *K. Subramanyam 9443* (MH); Nilgiris, Devla, 3000 ft., November 1884, *J.S. Gamble, 15524* (MH).

4. *Smithia conferta* Sm. in Rees, Cyclop. 33(2): 1816; T. Cooke, Fl. Bombay 1: 336. 1902; Gamble, Fl. Madras 1: 329. 1918; Meeuwen in Meeuwen *et al.*, Reinwardtia 5(4): 445. 1960; Sanjappa, Legumes India 246. 1992; Pull. & Chennaiah, Fl. Andhra Pradesh 1: 445. 1997; Sasidh., Biodiv. Doc. Kerala Pt. 6. Fl. Pl. 144. 2004; T.S. Nayar *et al.*, Fl. Pl. W. Ghats, Ind. 1: 455. 2014. *Smithia geminiflora* var. *conferta* (Sm.) Baker in Hook. f., Fl. Brit. India 2: 149. 1876. **TYPE:** Australia, 1793, *Joseph Banks s.n.* (Holotype: LINN–HS 1211.1! – **Fig. 9**)

Smithia hispidissima Zoll. & Mor., in Nat. & Geneesk. Arch. Ned.-Indie 3: 76. 1846. **TYPE:** JAVA, *Junghuhn s.n.* (L?)

Smithia capitata Desv., J. Bot. Appl. Agri. Phar. Med. Arts 1: 121. 1813, *nom. nud.*; Meeuwen in Meeuwen *et al.*, Reinwardtia 5(4): 445. 1960.

Decumbent-erect herbs, 25–90 cm high; stem weak-woody, glabrous. Stipules 4–6 × 2 mm, ovate, striate, scarious, persistent; appendage bilobed, lobes unequal, c. 5 mm long. Leaves 1.5–3.0 cm long including 1–2.5 cm long rachis and 1–2 mm long bristly petioles: leaflets 3–6(-8) pairs, shortly petiolulate, 6–16 × 1–4 mm, obtuse to acute at apex, oblique at base, glabrous above, bristly beneath especially along the midvein and margins. Flowers 0.8–1.3 cm long, yellow, solitary or in pairs, axillary; pedicels 1–3 mm long, hispid; bracts 4–5 × 3 mm, ovate-elliptic, acute, scarious, persistent; bracteoles like

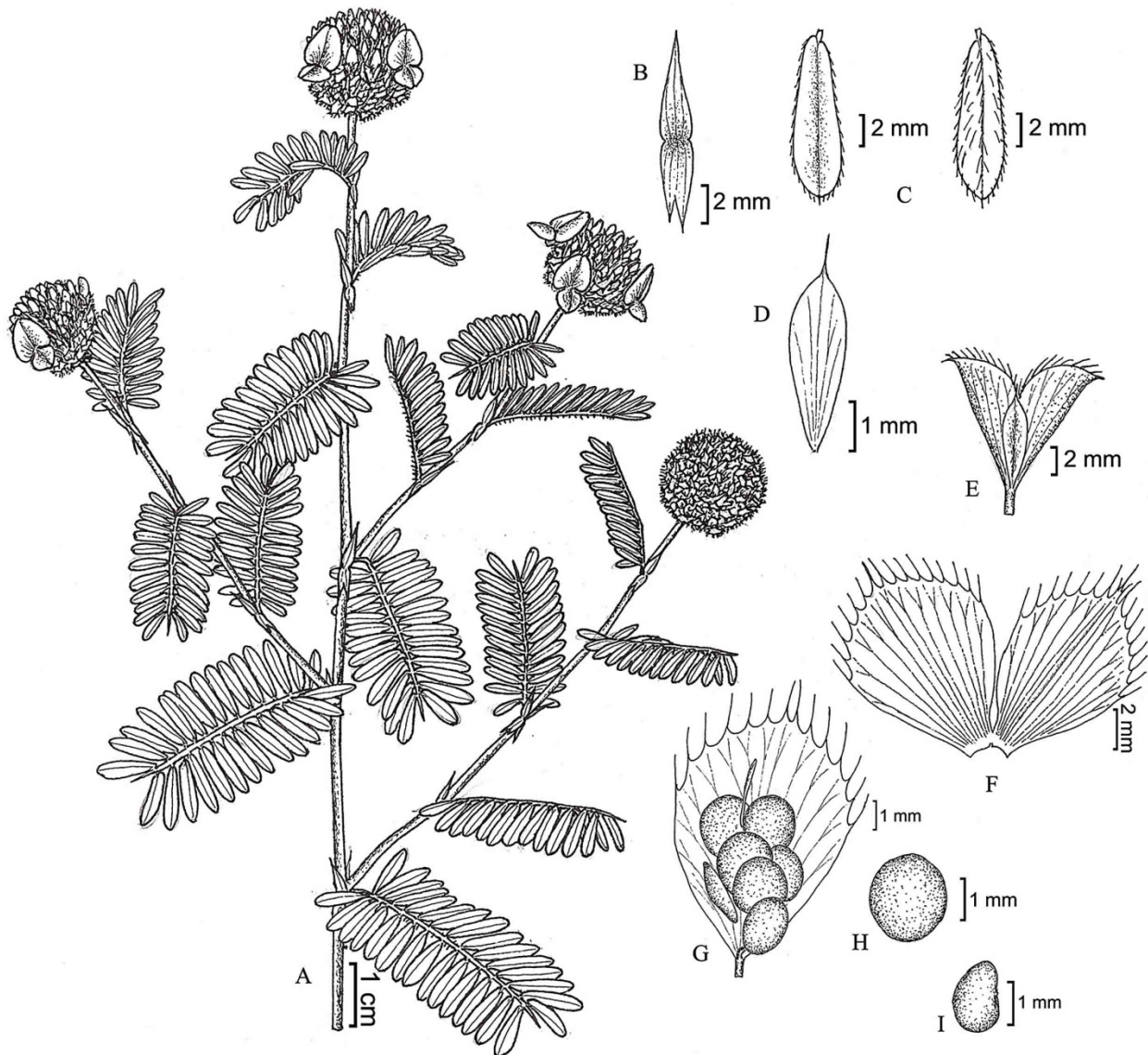


Fig. 7. *Smithia capitata* Dalz. A: Habit, B: Stipule, C: Leaflets upper and lower side, D: Bracteole, E & F: Calyx, G: Lomentum, H: Lomentum joint, I: Seed.

bracts, 6–7 × 4 mm, persistent. Calyx rigid, parallel-veined: tube 1–1.5 mm long, campanulate; upper lip broad, 5–7 × 4–5.5 mm, ovate, acute; lower lip 5–7 × 3–4 mm, ovate, acute bristly outside. Corolla: standard, 7–10 × 3.5–10 mm, obovate-orbicular, emarginate at apex, claw 3–3.5 × 2 mm; wings 7–10 × 3–4 mm, obovate, auricled at base, claw 2–2.5 mm long; keels, 5–9 × 2.5–4 mm, boat-shaped, truncate at apex, auricle c. 2 mm long, claw c. 2.5 mm long. Staminal sheath 4–7 mm long; filaments 1–2.5 mm long; anthers ovoid. Ovary subsessile, 2–3 × 0.6 mm, glabrous; ovules 5–8; style 4–9 mm long, broadened towards the stigma; stigma pointed. Lomentum more or less straight, included, 5–8-jointed; joints 1–2 × 1–2 mm, smooth or papillose. Seeds 0.8–1.5 × 0.6–1.6 mm, subreniform.

Key to the varieties

- 1a. Leaves and flowers crowded at the apex in the form of head 'inflorescence'; flowers 0.7–0.8 cm long; lomentum joints 6–8, c. 1 × 1 mm, subtriangular, smooth var. *conferta*
- 1b. Leaves and flowers not congested at branch apex; flowers 1–1.2 cm long; lomentum joints suborbicular, 5–6, c. 2 × 2 mm, papillose var. *geminiflora*

Smithia conferta* Sm. var. *conferta

Figs. 8 & 27. A-G

Flowering and Fruiting: September –January.

Ecology: Open hill slopes and sandy valleys at sea level to 1200 m elevation, not common in south India.

Distribution: Australia, China, India (Throughout), Indonesia, Laos, Malaysia, Nepal, Sri Lanka and Vietnam. **Fig. 3**

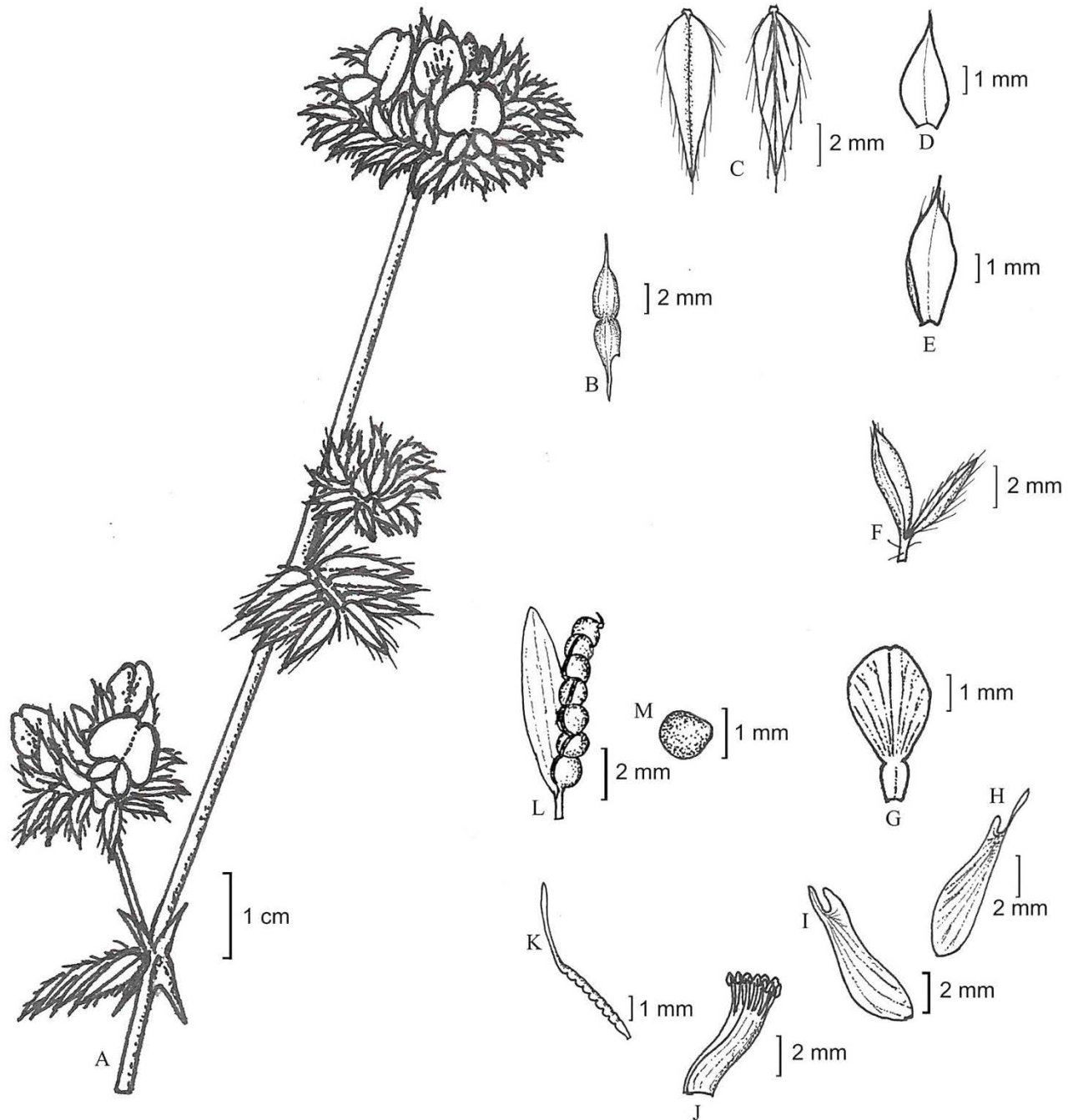


Fig. 8. *Smithia conferta* Sm. var. *conferta*. A: Habit, B: Stipule, C: Leaflets upper and lower side, D: Bract, E: Bracteole, F: Calyx, G: Standard petal, H: Wing petal, I: Keel petal, J: Stamens, K: Pistil, L: Lomentum, M: Seed.

Specimens examined: **INDIA. Andhra Pradesh:** Visakhapattanam, Jangavanam, *Subba Rao* 42619 (MH). **Kerala:** Idukki district, Rajakkad, 12 January 2016, *Anoop P.B.* 20935 (VZHR); Kasargod district., Bela, 01 October 1982, *R. Ansari* 74417 (MH). **Tamil Nadu:** Nilgiris, Devala, November 1884, *Gamble* 15526 (MH).

Notes: Smith (1816) described *Smithia conferta* based on specimens from New Holland (Australia) collected by Sir Joseph Banks who was a member botanist of Captain James Cook's first Pacific voyage.

After extensive search for the type specimen we could locate only one specimen from New Holland collected by Sir Joseph Banks in Smith's herbarium in The Linnean Society, London. The specimen was housed at LINN under the name *Smithia indet.* (Herb. Smith – LINN-HS 1211.1). Smith's original description must have been based on Bank's specimen deposited in Smith's herbarium. Since only one original specimen is extant, it is the obligatory holotype.



Fig. 9. Holotype of *Smithia conferta* Sm. var. *conferta* (LINN-HS 1211.1, © The Linnean Society of London).

Smithia conferta Sm. var. *geminiflora* (Roth) T. Cooke, Fl. Bombay 1: 336. 1902.

Smithia geminiflora Roth, Nov. Pl. Sp. 352. 1821; Baker in Hook. f., Fl. Brit. India 2: 149. 1876; Gamble, Fl. Madras 1: 329. 1918. **TYPE:** INDIA, Heyne *s.n.* in Wallich L.n. 5668 (D) (Lectotype: K001121654!–Fig. 10), designated here; Isolectotype: (L0019296!).

Figs. 11 & 27. H-Q.

Differs from var. *conferta* in its robust habit, short internodes and less bristly leaves which are not crowded at branch ends. Flowers are comparatively larger and are not congested in the upper leaf axils to form a head ‘inflorescence’; petals are shortly clawed than the var. proper. Lomentum joints are papillose.

Flowering and Fruiting: October–February.

Ecology: Very common in open grasslands, paddy fields sandy valleys near sea level to 1100 m elevation.

Distribution: INDIA (Throughout). **Fig. 3**

Specimens examined: **INDIA. Karnataka:** S. Canara district, Sambagi, 10 November 1900, *C. A. Barber* 2215 (MH); S. Canara, Jolpad, 13 November 1900, *Barber* 2339 (MH). **Kerala:** Idukki district, Marayoor, 21 October 2006, *S.V. Predeep & Anoop P.B.* 20235 (VZHR); Kulamavu, 17 October 2008, *Anoop P.B.* 20842 (VZHR); Kottayam district, Kurisumala, 09 November 1984, *M.C. Lukose* 402 (RHK); Kozhikkod district, *J.L. Ellis* 18590 (CAL, MH); Palakkad district, Parampikulam, 30 November 2006, *S.V. Predeep* 20478 (VZHR); Thrissur district, *K. Ramamurthy* 74928 (CAL).

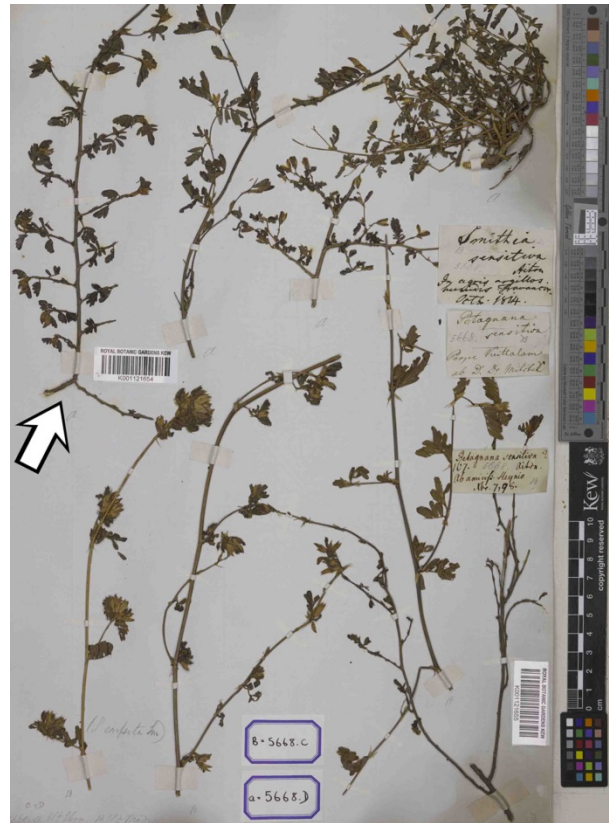


Fig. 10. Lectotype of *Smithia conferta* Sm. var. *geminiflora* (Roth) T. Cooke (K001121654, © The Board of Trustees of the Royal Botanic Gardens, Kew).

Tamil Nadu: Coimbatore district, Siruvani, 25 October 1968, *D.B. Deb* 31096 (MH); Kalkothi R.F., 28 January 1984, *Vajravelu* 7771 (MH); Nilgiris, Kuzhivayal R.F., 850 m., *Vajravelu* 43744 (MH).

Notes: Roth (1821) described *S. geminiflora* based on the collection of Heyne from India. However, no specific herbarium sheet was designated as holotype and greater part of Roth’s type materials held at B were destroyed in 1943 during the Second World War. After extensive search in various herbaria we traced two sheets of Heyne’s specimen, one sheet in K (K001121654), which is housed there under the name *S. sensitiva* Ait., and another in L (L0019296), which is an imperfect specimen to select as lectotype. K001121654 contains specimens of two different collections, i.e. Wall. L.n. 5668 C and 5668 D, both were undoubtedly belong to *S. geminiflora* Roth. Wight and Arnott (1834: 220) also clearly indicated that Wallich L.n. 5668 C, D and I are *S. geminiflora*. Among them, Wallich L.n. 5668 D was a collection of Heyne from India on which the original description of *S. geminiflora* based. Wallich L.n. 5668 D is a group of 4 specimens mounted in a row on the upper half of the sheet. Among them, the specimen first from left is more complete and is also close to the protologue, which is selected here as the lectotype.

Meeuwen (1960: 445–446) reduced *S. geminiflora*

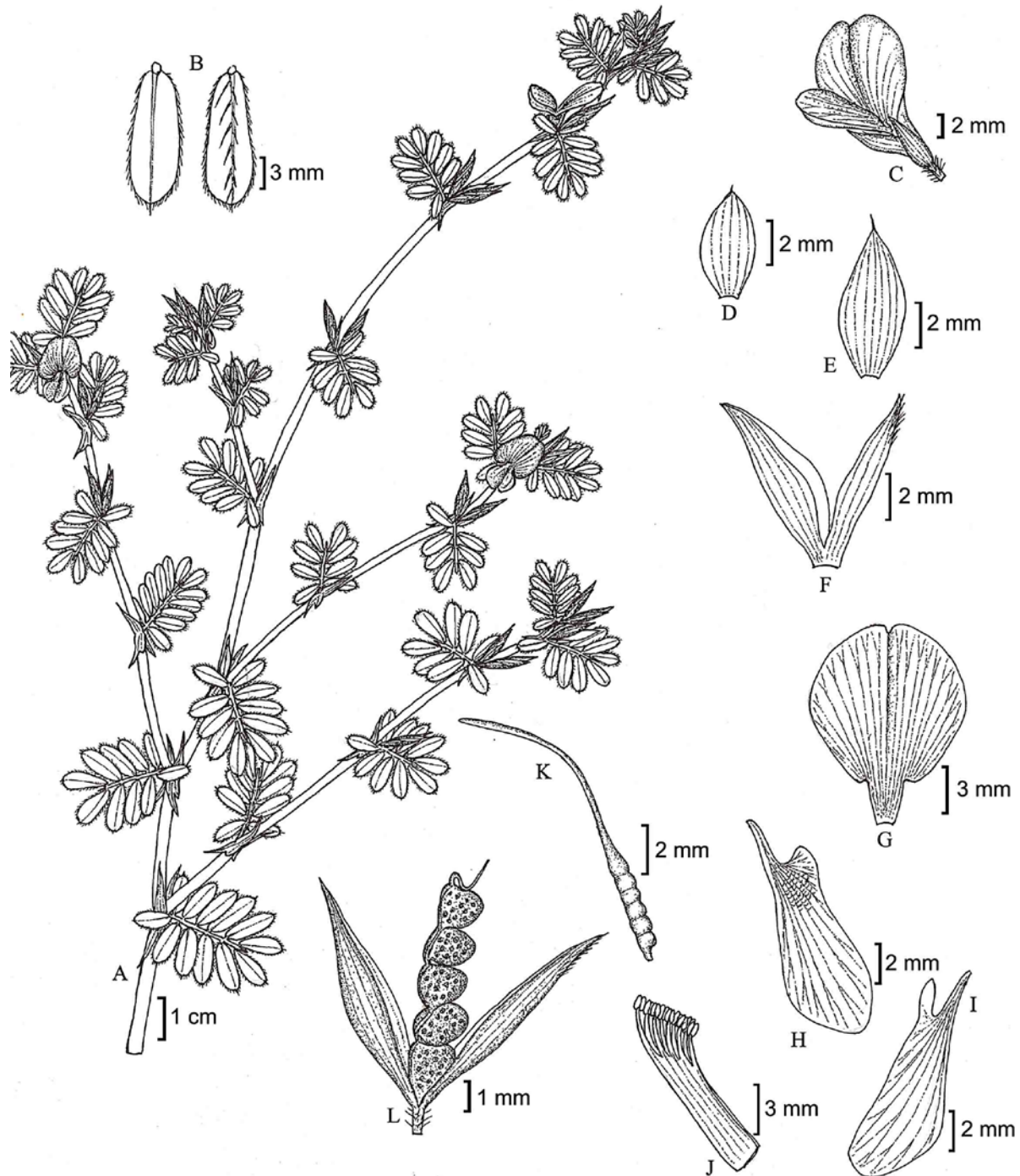


Fig. 11. *Smithia conferta* Sm. var. *geminiflora* (Roth) T. Cooke. A: Habit, B: Leaflets upper and lower side, C: Flower, D: Bract, E: Bracteole, F: Calyx, G: Standard petal, H: Wing petal, I: Keel petal, J: Stamens, K: Pistil, L: Lomentum.

to *S. conferta*, commented that "smooth pod-joints and a lower calyx-lip bristly on the back in *S. conferta* and papillose joints combined with a lower calyx-lip with a tuft of bristles near the apex in *S. geminiflora* do not hold in the Indian and Malaysian material I have studied. The fragment of an isotype of *S. geminiflora* possesses sparse bristle hairs in the upper half of the

lower calyx lip. The density and degree of these bristles show an appreciable degree of variation which is also found on the upper lip; they may even be found near the base. The degree of papillosity of the pod joints varies also; I have not seen any which are really smooth. I cannot find reason to distinguish these two species".

However, on a critical study of fresh as well as



Table 1. Comparison of the diagnostic morphological characters of *Smithia conferta* Sm. var. *conferta* with *S. conferta* Sm. var. *geminiflora* (Roth) T. Cooke

	<i>Smithia conferta</i> Sm. var. <i>conferta</i>	<i>Smithia conferta</i> Sm. var. <i>geminiflora</i> (Roth) T. Cooke
Habit	Decumbent herb; stem slender, weak, 30–45 cm long.	Procumbent-decumbent or erect herb; stem robust, woody, 65–90 cm long.
Leaves	1.5–2.0 cm long, 6–8 numbers crowded at branch apex. Leaflets 3–6 (-7) pairs, 0.6–0.8 × 0.15–0.2 cm, linear or linear-oblong, acute at apex, bristly along margins and midrib beneath.	Leaves 2.5–3.0 cm long, not crowded at branch apex. Leaflets 5–8 pairs, 1.0–1.6 × 0.3–0.4 cm, obovate-oblong, obtuse at apex, bristly along margins and throughout on the back.
Flowers	0.7–0.8 cm long, in pairs in the axils of crowded leaves in the branch apex in the form of a head 'inflorescence'; pedicels c. 1 mm long.	1–1.3 cm long; solitary or in pairs, not congested; pedicels c. 3 mm long.
Calyx	upper lip c. 5 × 3 mm. Lower lip c. 5 × 2 mm, densely bristly along the keel outside.	Upper lip c. 7 × 5.5 mm. Lower lip c. 7 × 4 mm, a tuft of bristles only at the tip.
Corolla	Standard petal c. 5–6 × 3.5–4 mm, obovate; claw c. 2.5 mm long. Wing petals 4–6 × 1.5–2 mm; claw c. 2 mm long. Keel petals 4–6 × 2 mm; claw c. 2 mm long.	Standard petal 8–9 × 8–9 mm, orbicular; claw c. 3 mm long. Wing petals 9–10 × 3.5–4 mm; claw c. 2.5 mm long. Keel petals 7.5–8.5 × 3.5–4 mm; claw c. 2.5 mm long.
Stamens	Staminal column 4–5 mm long; filaments 1–1.5 mm long.	Staminal column 6–7 mm long; filaments 2–2.5 mm long.
Pistil	Ovary 6–8-ovuled; style 4–4.5 mm long.	Ovary 5–6-ovuled; style 5–6 mm long.
Lomentum	Joints 6–8, c. 1 × 1 mm, subtriangular, smooth.	Joints 5–6, c. 2 × 2 mm, suborbicular, papillose.

herbarium specimens in south India, we found several characteristic features that could clearly distinguish *S. conferta* var. *conferta* from var. *geminiflora*, though the density and degree of calyx bristles show much variation. The herbarium specimens of var. *conferta* and var. *geminiflora* housed at major Indian herbaria as well as fresh specimens collected from the Western Ghats shows significant difference in its habit (small, weak branches, long inter nodes, small and bristly leaves much congested at the branch ends in var. *conferta*; robust, woody branches, short internodes, comparatively larger and less bristly leaves not congested at branch ends) and pod characters (joints are small and really smooth in var. *conferta*; joints are comparatively larger and obviously papillose in var. *geminiflora*). The pod characters are very consistent and easily diagnosable in all the south Indian specimens we examined and hence its varietal status is reinstated. The major diagnostic characters to distinguish both varieties are summarized in **Table 1**.

5. *Smithia gracilis* Benth., *Linnaea* 24: 642. 1851; Baker in Hook. f., *Fl. Brit. India* 2: 150. 1876; Gamble, *Fl. Madras* 1: 330. 1918; N.C. Nair & A.N. Henry, *Fl. Tamil Nadu* 1: 121. 1983; C.J. Saldanha, *Fl. Karnataka* 1: 491. 1984; Sanjappa, *Legumes India* 247. 1992; K.M. Matthew, *Fl. Palni hills* 1: 360. 1999; Sasidh., *Biodiv. Doc. Kerala Pt. 6. Fl. Pl.* 145. 2004; T.S. Nayar *et al.*, *Fl. Pl. W. Ghats, Ind.* 1: 455. 2014.

TYPE: INDIA, Tamil Nadu, Nilgiri, *Hohenacker, R.F. 1182* (Lectotype, K000827965!), designated by Singh, R. Kr. (2016); Isolectotypes: (FI009735!, HAL0119498!, JE00002124!, M0233760!, MNHN-P-P029139239! and MNHN-P-P02913927!).

Figs. 12 & 28. A-E

Slender diffuse herbs, c. 15 cm long; stem bristly-glabrescent. Stipules 4–5 × 2 mm, ovate-aristate,

glabrous, scarious, persistent; appendage 3–4 mm long. Leaves: rachis 1–1.5 cm long including 4–5 mm long bristly petioles; leaflets 3–4 pairs, subsessile, 5–14 × 4–5 mm, obovate-oblong, obtuse at apex, oblique at base, glabrous above, bristly beneath, so along margins. Racemes 1.5–2 cm long, axillary, 3–4-flowered; peduncles c. 1.5 cm long, filiform, hispid. Flowers yellow; pedicels 2–3 mm long; bracteoles c. 3 × 1 mm, ovate-elliptic, arisate, bristly along margins and outside along the keel. Calyx membranous, anastomosingly-veined: upper lip broad, c. 3.5 × 3 mm, ovate, acute, with 3 parallel nerves in the middle, margins bristly; lower lip c. 3.5 × 2 mm, ovate, acute, obscurely 3-lobed. Corolla: standard c. 6 × 6 mm, suborbicular, emarginate at apex, red-tinted towards the claw, claw c. 1.5 × 1.5 mm; wings c. 5.5 × 2 mm, obovate, auricled, claw c. 1.5 mm long; keels c. 6 × 2 mm, boat-shaped, truncate and ciliate at apex, auricle 0.75 mm and claw c. 1.5 mm long. Staminal sheath c. 4 mm long; filaments c. 2 mm long; anthers ovoid. Ovary stipitate, c. 2 × 0.4 mm, glabrous; style c. 3.5 mm long; stigma pointed. Lomentum joints folded within the calyx, 3–4-jointed; joints c. 2.5 × 2.5 mm, reticulate, margins flat.

Flowering and Fruiting: September–December.

Ecology: Very weak herb, rare in moist hill slopes at 800–2200 m elevation.

Distribution: India (Karnataka, Kerala and Tamil Nadu), endemic. **Fig. 13**

Specimens examined: **INDIA, Karnataka:** Chikkaballapur district, Nandi Hills, *Saldanha 18337*. **Kerala:** Idukki district, Peruvanthanam, 28 November 1996, *Ravi & Mohanan 24780*(TBGT); Marayoor, 21 October 2006, *S.V. Predeep & Anoop P.B 20233 VZHR*; Munnar, Rajamala, 21 October 2007, *S.V. Predeep & Anoop P.B 20667*(VZHR); Kozhikkod district, Vellarimala, 14 November 1997, *A.K. Pradeep 56166*(CALI); Thiruvananthapuram district, Agasthyamala, 07 February 1988, *N. Mohanan 948* (TBGT); Pongalappara, 16 December 1990, *N. Mohanan 7667* (TBGT). **Tamil Nadu:** Coimbatore district, Akkamalai-Anamalais, 1600 m, 29 October 1961, *J. Joseph 13404*(MH); Waverly estate, 22 October

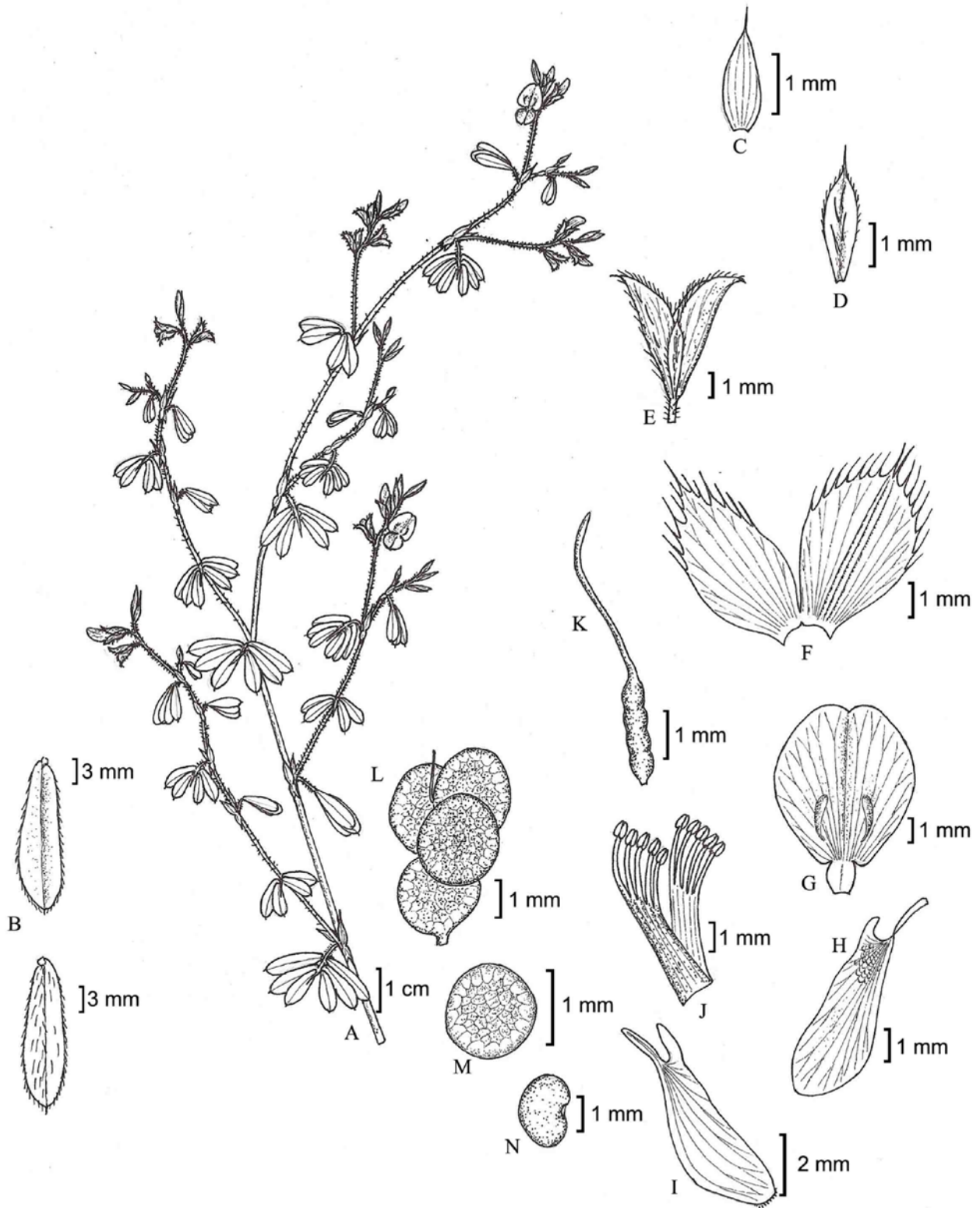


Fig. 12. *Smithia gracilis* Benth., A: Habit, B: Leaflets upper and lower side, C: Bract, D: Bracteole, E & F: Calyx, G: Standard petal, H: Wing petal, I: Keel petal, J: Stamens, K: Pistil, L: Lomentum, M: Lomentum joint, N: Seed.

1961, 1250 m, *J. Joseph* 13078(MH); Dindigul district, Kodaikanal-Pulney, November 1897, *Bourne* 799(MH); Nilagiri

district, Sispara ghat, November 1883, *s.l.* 14588(MH); Nilgiris, Naduvattam, *s.l. s.n.*(MH).

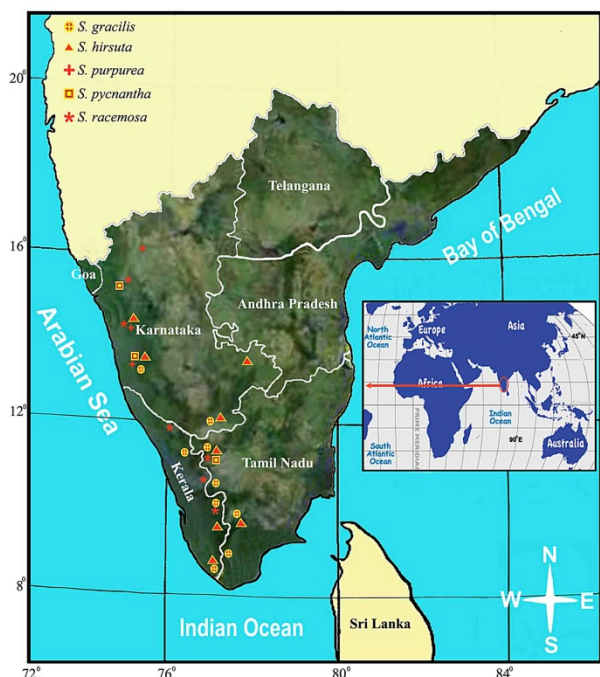


Fig. 13. Distribution Map of *Smithia gracilis* Benth., *S. hirsuta* Dalz., *S. purpurea* Hook. and *S. pycnantha* Benth. ex Baker in South India.

6. *Smithia hirsuta* Dalz. in Hook. f., J. Bot. Kew Gard. Misc. 3: 135. 1851; T. Cooke, Fl. Bombay 1: 339. 1902; Gamble, Fl. Madras 1: 330. 1918; C.J. Saldanha, Fl. Karnataka 1: 491. 1984; Sanjappa, Legumes India 247. 1992; Sasidh., Biodiv. Doc. Kerala Pt. 6. Fl. Pl. 145. 2004; T.S. Nayar *et al.*, Fl. Pl. W. Ghats, Ind. 1: 455. 2014.

TYPE: INDIA, Maharashtra, Phondaghat, *Dalzell s.n.* (Lectotype: K000827995!), designated by Singh, R. Kr. (2016); Isolectotype (K000827996!).

Smithia blanda Wall. ex Wight & Arn. var. *racemosa* Baker in Hook. f., Fl. Brit. India 2: 151. 1876, *pro parte*. **TYPE:** same as for *S. hirsuta* Dalz.

Smithia blanda Wall. ex Wight & Arn. var. *humilis* Prain, J. Asiat. Soc. Bengal 66: 379. 1897. **TYPE:** INDIA, Western Ghats, Mahabaleswar, 1884, T. Cooke 168 (Lectotype: CAL0000012744!), designated by Singh, R. Kr. (2016); Isolectotype (CAL0000012745!); Syntypes: India, Bombay, *Gibson s.n.* (CAL0000012746 and CAL0000012747); Karnataka, N. Canara, 3 September 1883, *Talbot 686* (CAL0000012749!); Concan, *Stocks & Law s.n.* (CAL0000012742 to 3! and CAL0000012749!).

Figs. 14 & 27. F.

Suberect herbs, 15–20 cm high; stem bristly, bristles black bulbous-based. Stipules 4–5 × 2 mm, triangular, striate, bristly outside along keel; appendage 3–4 × 2 mm, bristly outside. Leaves 1.5–2 cm long including 1–1.5 cm long petiole: leaflets 4 pairs, subsessile, 6–12 × 3–4 mm, obovate-oblong, obtuse-rounded at apex, oblique at base, glabrous above, bristly beneath especially along the midvein and margins. Flowers c. 5 mm long, pale yellow, in 3–4 cm long, terminal, one-sided racemes: peduncles c. 1 cm long, hispid; bracts c. 2 × 1.5 mm, ovate, striate, pilose

outside, caducous; bracteoles c. 3 × 1 mm, oblanceolate, bristly outside. Calyx membranous, anastomously-veined with black bulbous-based bristles: upper lip 3 × 3 mm, truncate-emarginate at apex, margins bristly; lower lip smaller, acute, 3-lobed. Corolla: standard c. 4 × 4 mm, suborbicular, claw c. 1 × 1 mm; wings c. 3 × 1.5 mm, obliquely ovate, auricle 0.5 mm long, claw c. 1.5 mm long; keels c. 3.5 × 2 mm, obliquely obovate, ciliate at apex, auricle 0.5 mm long, claw c. 1.5 mm long. Staminal sheath c. 4 mm long; filaments c. 1 mm long. Ovary stipitate, c. 2.5 × 0.2 mm, glabrous; ovules 10–11; style c. 2.5 mm long; stigma pointed. Lomentum joints folded back within the calyx, 7–10-jointed; joints c. 2 × 2 mm, reticulate. Seeds 1.5 × 1.5 mm, orbicular.

Flowering and Fruiting: October–December.

Ecology: Weak herb in moist hill slopes and grass lands at 850–1300 m elevation.

Distribution: India (Andhra Pradesh, Goa, Karnataka, Kerala, Manipur, Maharashtra, Meghalaya and Tamil Nadu), endemic. **Fig. 13**

Specimens examined: **INDIA. Karnataka:** Mysore, Nandidoorg, 26 December 1911, *R. D. Anstead 141*(MH). **Kerala:** Idukki district, Mangaladevi hills, 07 December 2007, *Anoop P.B. 20732* (VZHR); Vallakadavu, Pullumedu, 13 December 2007, *Anoop P.B. 20742* (VZHR); Upper Vaguvarai, 17 October 1989, *P. Bharghavan 90990* (MH); Thiruvananthapuram district, Agasthyamala, 26 February 1991, *N. Mohanan 10358* (TBGT). **Tamil Nadu:** Nilgiri district, Near boat house, Pykara, 2000 m, 21 October 1972, *Ellis 43302*(MH); Nilgiri, view point, 1800 m, 29 January 1972, *Vajravelu 39675*(MH); Nilgiri, Kodanad, 1900 m, 13 November 1970, *Ellis 36873*(MH); Nilgiris, Mukurti, 2025 m, 14 July 1970, *Ellis 34678*(MH).

7. *Smithia purpurea* Hook., Bot. Mag. t. 4283. 1847; Baker in Hook. f., Fl. Brit. India 2: 149. 1876; T. Cooke, Fl. Bombay 1: 337. 1902; B.D. Sharma *et al.*, Fl. Karnataka 82. 1984; Sanjappa, Legumes India 247. 1992; N.P. Singh & Karthik., Fl. Maharashtra St. Dicot. 1: 741. 2000; T.S. Nayar *et al.*, Fl. Pl. W. Ghats, Ind. 1: 455. 2014. **TYPE:** INDIA, Bombay, *J.S. Law s.n.* (Lectotype: K000827970!), designated by Singh, R. Kr. (2016); Syntypes: India, Concan, *Stocks & Law s.n.* (CAL0000012759!, K000827971!, MH! Accession No. 86877, MNHN-P-P02849170!, MNHN-P-P02913892!, MNHN-P-P02913893! and MNHN-P-P02913896!).

Figs. 15 & 28. G

Erect herbs, 30–60 cm high; stem glabrous. Stipules c. 5 × 2 mm, scariose; appendage c. 3.5 mm long. Leaves 4–6 cm long including 3–5 cm long bristly rachis: leaflets 8–14 pairs, subsessile, 0.8–1.2 × 3–4 mm, linear-oblong, obtuse at apex with a bristle, oblique at base, glabrous above, bristly outside especially along the mid vein and margins. Flowers c. 8 mm long, purple, in 6–12-flowered axillary racemes: peduncles 3–4 cm long, hispid; bracts c. 3 × 1.5 mm, ovate, pilose outside, caducous; bracteoles c. 4 × 1.5 mm, ovate, margins ciliate. Calyx rigid, parallel-veined:

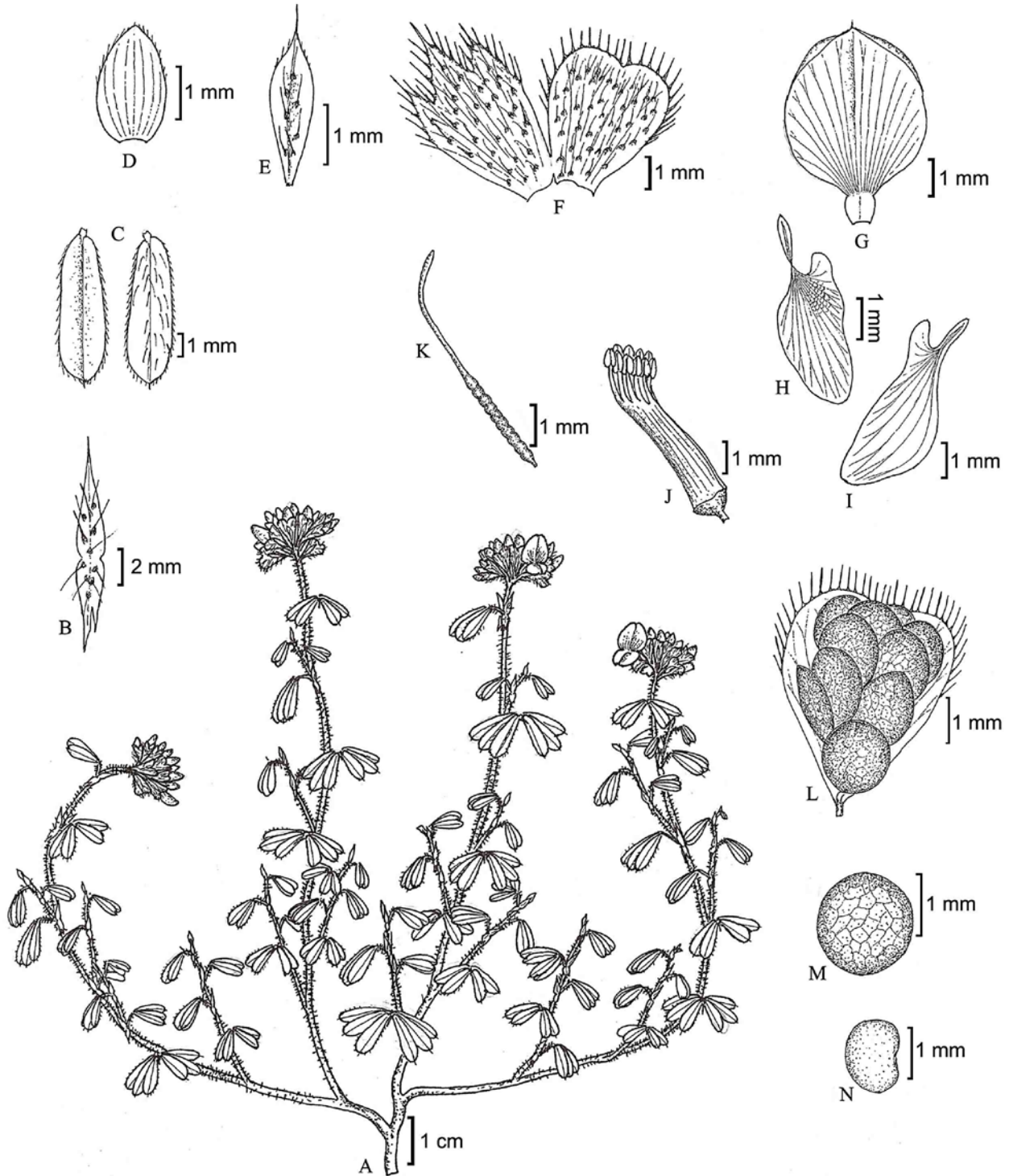


Fig. 14. *Smithia hirsuta* Dalz. A: Habit, B: Stipule, C: Leaflets upper and lower side, D: Bract, E: Bracteole, F: Calyx, G: Standard petal, H: Wing petal, I: Keel petal, J: Stamens, K: Pistil, L: Lomentum, M: Lomentum joint, N: Seed.

upper lip c. 5×2 mm, obtuse at apex, recurved; lower lip smaller, acute, with few bristles outside. Corolla: standard c. 8×7.5 mm, suborbicular-obovate, claw c. 2.5 mm long; wings c. 7×2.5 mm, obovate, shortly auricled, claw c. 2 mm long; keels c. 7×2 mm,

obliquely obovate, curved, auricle c. 1.5 mm long, claw c. 2 mm long. Staminal sheath c. 5 mm long; filaments c. 1.5 mm long. Ovary sessile, c. 2 mm long; ovules 10–12; style c. 4 mm long, glabrous; stigma pointed. Lomentum joints 10–12-jointed; joints c. 1.5×1.5 mm,

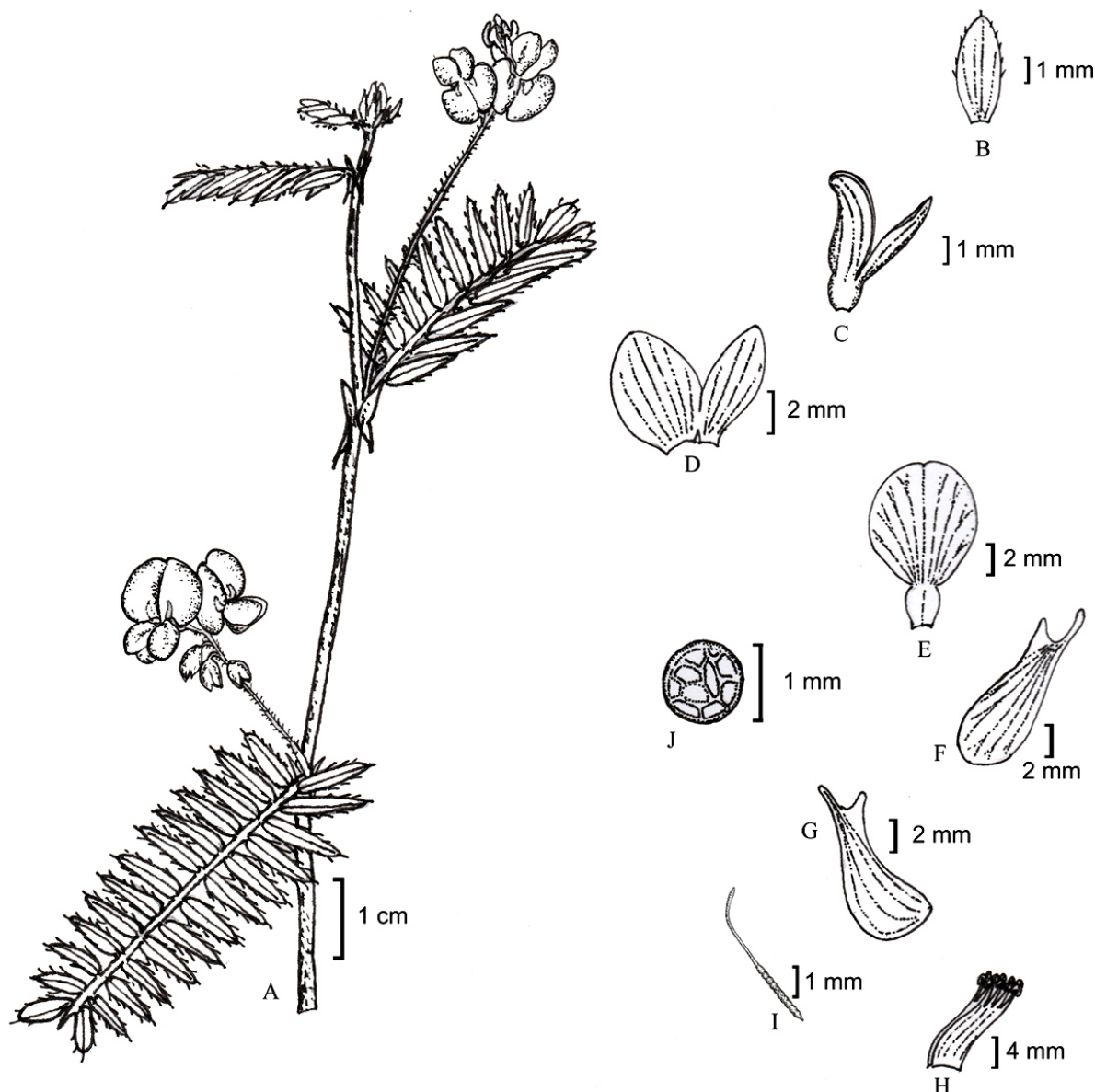


Fig. 15. *Smithia purpurea* Hook. A: Habit, B: Bracteole, C & D: Calyx, E: Standard petal, F: Wing petal, G: Keel petal, H: Stamens, I: Pistil, J: Lomentum joint.

orbicular, reticulate. Seeds 1.0×1.0 mm, subreniform.

Flowering and Fruiting: October–January.

Ecology: Gregoriously growing along open hill slopes and grass lands up to 1200 m elevation.

Distribution: India (Karnataka and Maharashtra), endemic. **Fig. 13**

Specimens examined: **INDIA. Karnataka:** Concan, *Stocks & Law s.n.* (MH); Koorgaon, October 1891, *PSK s.n.* (MH); Badiapur, October 1885, *HSM Gant Duff s.n.* (MH)

8. *Smithia pycnantha* Benth. ex Baker in Hook. f., *Fl. Brit. India* 2: 150. 1876; T. Cooke, *Fl. Bombay* 1: 338. 1902; C.J. Saldanha, *Fl. Karnataka* 1: 491. 1984; Sanjappa, *Legumes India* 248. 1992; N.P. Singh & Karthik., *Fl.*

Maharashtra St. Dicot. 1: 741. 2000; T.S. Nayar *et al.*, *Fl. Pl. W. Ghats, Ind.* 1: 456. 2014.

TYPE: INDIA, Concan, *Stocks & Law s.n.* (Lectotype: K000859001!), designated by Singh, R. Kr. (2016); Syntypes: India, Concan, *Stocks & Law s.n.* (CAL0000012756!, E00301233!, M0233764!, MPU022823!, MNHN-P-P02849167!, MNHN-P-P02913890 to 91! & S13-12436!).

Figs. 16 & 28. H.

Annual erect herbs, 30–40 cm high; stem bristly. Stipules scariosse, 5–6 mm long, lobate; appendage 3–4 mm long, sparsely bristly outside. Leaves 2.5–3 cm long including 1.5–2 cm long bristly rachis; leaflets 3–4 pairs, 0.8–1.2 \times 0.3–0.4 cm, linear-oblong, bristly outside and margins. Flowers yellow, in globose

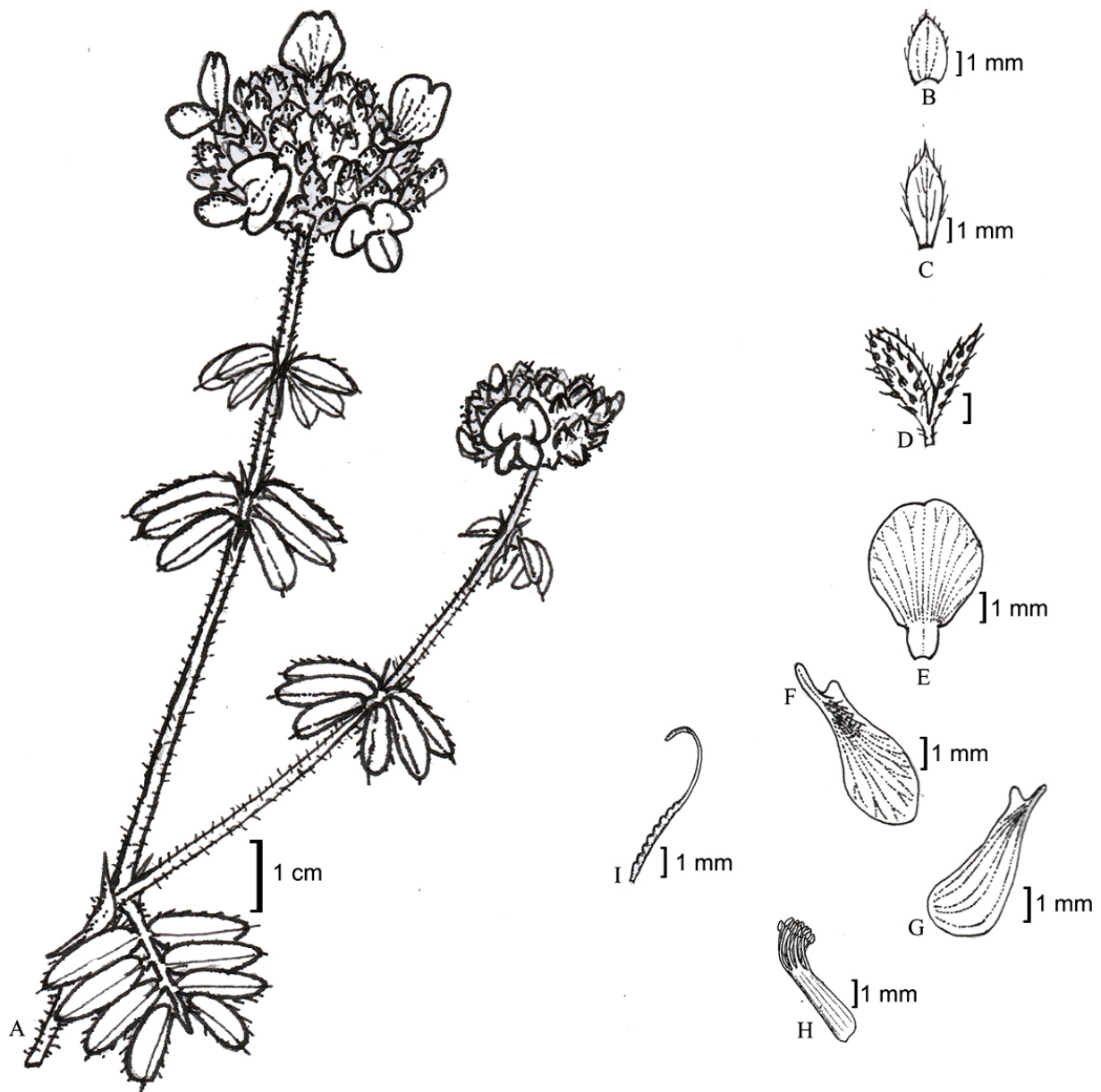


Fig. 16. *Smithia pycnantha* Benth. ex Baker. **A:** Habit, **B:** Bract, **C:** Bracteole, **D:** Calyx, **E:** Standard petal, **F:** Wing petal, **G:** Keel petal, **H:** Stamens, **I:** Pistil.

terminal heads of 2.5–3.5 cm dia.; peduncles slender, 1.5–2.0 cm long, patently hairy; bracts and bracteoles c. 3 mm long, minutely hairy. Calyx densely covered with yellow bristles on black glandular bases; upper lip truncate, emarginate, c. 3 × 3 mm; lower lip c. 3 mm long, 3-lobed. Corolla: standard tinged with red, c. 4 × 3.5 mm, suborbicular-obovate, claw c. 1 mm long; wings c. 3 × 1.5 mm, obovate, auricle c. 0.5 mm long, claw c. 1.5 mm long; keels c. 3.0 × 2 mm, obliquely obovate, auricle 0.5 mm long, claw c. 1.5 mm long. Staminal sheath c. 3 mm long; filaments c. 1 mm long. Ovary subsessile, c. 2.5 mm long; ovules 6–10; style c.

2 mm long; stigma pointed. Lomentum joints 6–10, c. 1.5 × 1.5 mm, reticulate. Seeds 1.2 × 1.2 mm, subreniform.

Flowering and Fruiting: October–December.

Ecology: Very rare, in open moist hill slopes and stream banks up to 1000 m elevation.

Distribution: India (Goa, Karnataka, Madhya Pradesh, Maharashtra, Rajasthan and Tamil Nadu), endemic. **Fig. 13**

Specimens examined: **INDIA, Karnataka:** Chikamangalur, 26 November 2014, *Anoop P.B. 20902* (VZHR); Uttara Kannada, *Talbot 626* (MH).



Fig. 17. Holotype of *Smithia salsuginea* Hance (BM000958971, © Natural History Museum, London).

9. *Smithia salsuginea* Hance, J. Bot. 7: 164. 1869; T. Cooke, Fl. Bombay 1: 340. 1902; Gamble, Fl. Madras 1: 330. 1918; C.J. Saldanha, Fl. Karnataka 1: 492. 1984; Sanjappa, Legumes India 248. 1992; Sasidh., Biodiv. Doc. Kerala Pt. 6. Fl. Pl. 145. 2004; T.S. Nayar *et al.*, Fl. Pl. W. Ghats, Ind. 1: 456. 2014. **TYPE:** CHINA, Hong Kong, Kau l'ung, October 1868, *Sampson, T. 15113* (Holotype: BM000958971! – Fig. 17)

Smithia dichotoma Dalz. ex Baker in Hook. f., Fl. Brit. India 2: 150. 1876. **TYPE:** India, Karnataka, Mangalore, *Hohenacker, R.F. 146* (Lectotype: MNHN-P-P02913887!), designated by Singh, R. Kr. (2016); Isolectotypes (E00301234!, M0233758!, M0233759!, MNHN-P-P02913888!, S13-12437!).

Figs. 18 & 29A

Erect herbs–undershrubs, 25–45 cm high; stem slender, terete, sparsely bristly–glabrescent. Stipules 5–6 × 2 mm, ovate, glabrous; appendage 3 mm long. Leaves c. 2.5 cm long: rachis bristly; petioles 3–5 mm long; leaflets 2–4 pairs, 1.0–1.8 × 0.4–0.6 cm, obovate, obtuse at apex, oblique at base, glabrous, margins sparsely bristly. Panicles 4–8 cm long, terminal, dichotomously branched, few-flowered, corymbose; peduncles c. 3.5 cm long. Flowers yellow: bracteoles c. 3 × 2 mm, ovate, glabrous, margins ciliate, striate. Calyx membranous, anastomosely-veined: upper lip c. 6 × 6

mm, deeply emarginate, glabrous outside, margins ciliate; lower lip longer, ovate, acute at apex. Corolla exerted. Lomentum joints folded back within the accrescent calyx, 10–15-jointed; joints c. 3 × 2.5 × 0.5 mm, suborbicular, margined on one side only, papillose. Seeds c. 2 × 1.5 mm, subreniform.

Flowering and Fruiting: August–November.

Ecology: Common in open hill slopes and paddy fields, near sea level to 350 m elevation.

Distribution: China, India (Dadra, Nagar Haveli, Daman, Diu, Goa, Gujarat, Karnataka, Kerala, Maharashtra, Rajasthan and Tamil Nadu) and Myanmar. **Fig. 19**

Specimens examined: **INDIA. Karnataka:** South Canara district, Sullia, 25 October 1900, *C.A. Barber 2107*(MH); Karkala, November 1907, *sl., sn.* (MH); Karkala, Gumataraya rock, November 1907, *s.l. s.n.* (MH). **Kerala:** Kasargod district, Beemanadi, 27 September 1982, *R. Ansari 74323* (CAL, MH); Nileswaram, 12 October 2010, *Anoop P.B. 20777* (VZHR).

Note: Hance (1869) described *Smithia salsuginea* based on the collection of Sampson from Hong Kong (*Sampson 15113*), without indicating the name of herbarium where specimen deposited. Hance's types are known to occur at BM and there is only one sheet of *Sampson 15113* is extant at BM (BM000958971), which is therefore the obligatory holotype.



Fig. 19. Distribution Map of *Smithia salsuginea* Hance, *S. sensitiva* Ait., *S. setulosa* Dalz., *S. venkobarrowii* Gamble var. *venkobarrowii* and *S. venkobarrowii* Gamble var. *glabra* Balan & Predeep in South India.

10. *Smithia sensitiva* Ait., Hort. Kew. 3: 496. 1789; Wight & Arn., Prod. Fl. Ind. Orient. 220. 1834, *pro parte*; Baker in Hook. f., Fl. Brit. India 2: 148. 1876, *pro parte*; Gamble, Fl. Madras 1: 329. 1918; Meeuwen

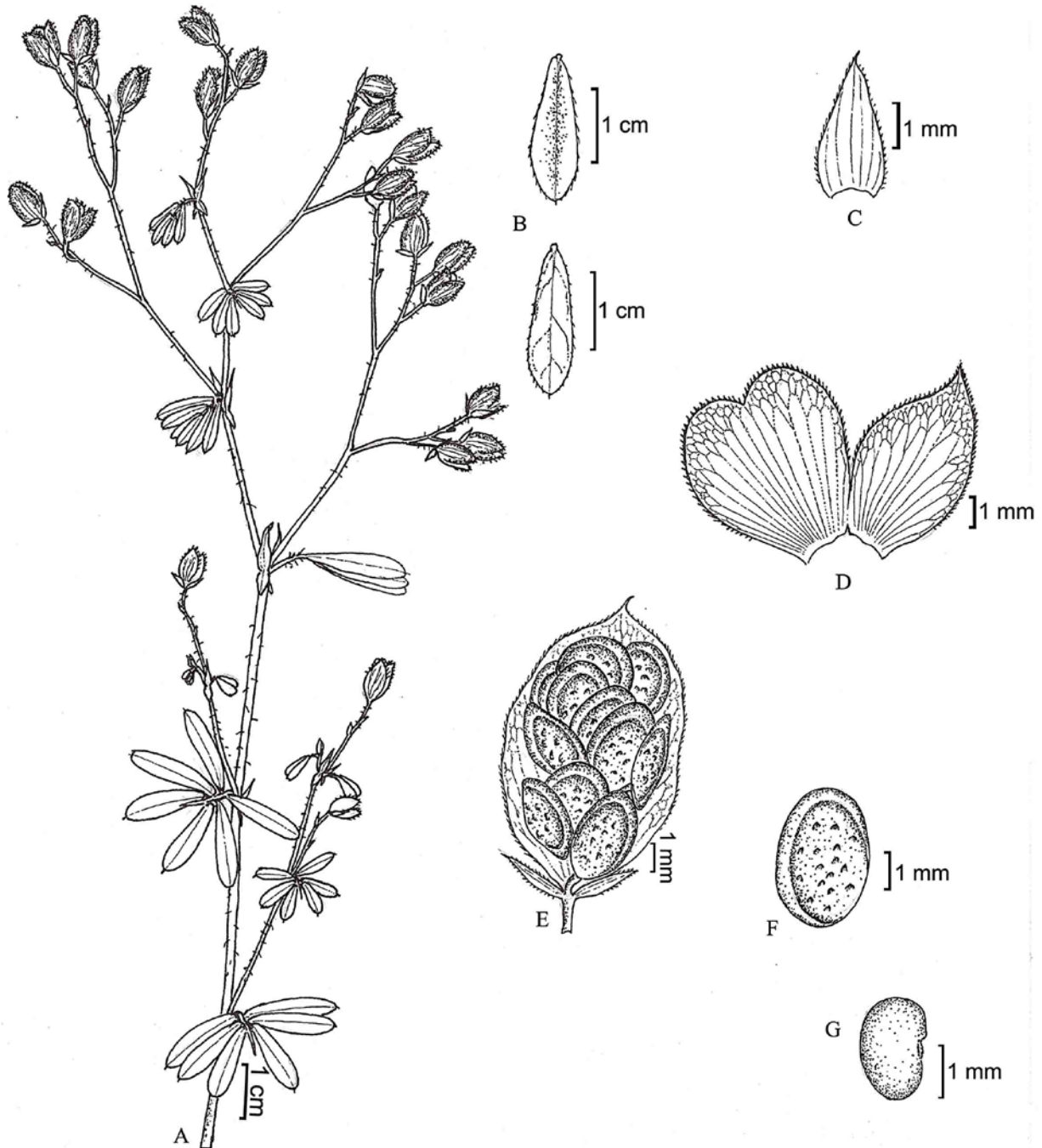


Fig. 18. *Smithia salsuginea* Hance. A: Habit, **B:** Leaflets upper and lower side, **C:** Bract, **D:** Calyx, **E:** Lomentum, **F:** Lomentum joint, **G:** Seed.

in Meeuwen *et al.*, *Reinwardtia* 5(4): 444. 1960; N.C. Nair & A.N. Henry, *Fl. Tamil Nadu* 1: 121. 1983; C.J. Saldanha, *Fl. Karnataka* 1: 493. 1984; Sanjappa, *Legumes India* 248. 1992; Pull. & Chennaiah, *Fl. Andhra Pradesh* 1: 315. 1997; Sasidh., *Biodiv. Doc. Kerala Pt. 6. Fl. Pl.* 145. 2004; T.S. Nayar *et al.*, *Fl. Pl. W. Ghats, Ind.* 1: 456. 2014. **TYPE:** INDIA, 'India Orientalis', Bengal, 1875, *Koenig s.n.* (Holotype: BM000958972! – **Fig. 20**)

Smithia javanica Benth., *Pl. Jungh.* 2: 211. 1852. **TYPE:** Indonesia, Battalanden Sumatra, *Junghuhn s.n.* (L0417691! and L0019297!)

Smithia laxiflora Benth., *Pl. Jungh.* 2: 211. 1852, *pro parte*. **TYPE:** Indonesia, Java, *Zollinger 897* (L?).

Figs. 21 & 29B

Diffuse herbs, 25–35 cm long; stem slender, glabrous. Stipules 3–5 × 1.5 mm, ovate, striate, scarios, persistent; appendage 2–4.5 mm long, bilobed. Leaves: rachis bristly; petioles 2–3 mm long; leaflets 4–10 pairs,

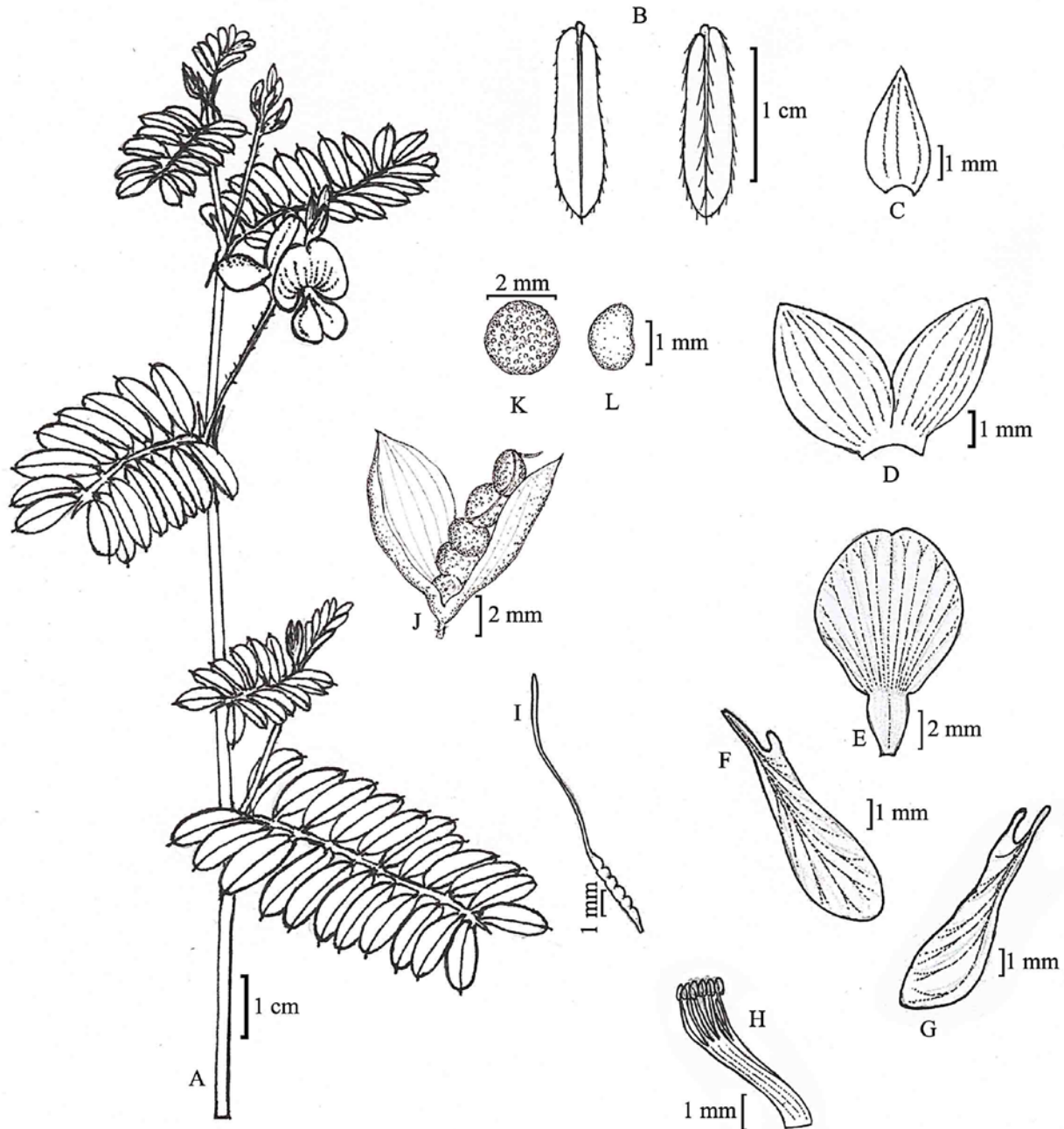


Fig. 21. *Smithia sensitiva* Ait. A: Habit, **B:** Leaflets upper and lower side, **C:** Bract, **D:** Calyx, **E:** Standard petal, **F:** Wing petal, **G:** Keel petal, **H:** Stamens, **I:** Pistil, **J:** Lomentum, **K:** Lomentum joint, **L:** Seed.

4–15 × 2–3 mm, linear-oblong, obtuse at apex, oblique and truncate at base, glabrous above, bristly beneath along the midvein and margins. Racemes 2–3.5 cm long, 3–6-flowered, lax; peduncles filiform, sparsely bristly. Flowers c. 1 cm long, yellow: pedicels c. 2 mm long; bracteoles c. 3 × 2 mm, ovate, striate, persistent. Calyx parallel-veined: lips 6 mm long, equal, ovate, acute at apex; lower lip with a few scattered bristles. Corolla: standard c. 9 × 8 mm, obovate, claw c. 3 mm long; wings c. 7 × 3 mm, oblong, auricled, claw c. 2 mm long; keels c. 8 × 3 mm, oblanceolate, auricle c. 1.5 mm long, claw c. 2

mm long. Staminal sheath c. 7 mm long; filaments c. 3 mm long; anthers c. 0.8 mm long, ovoid. Ovary stipitate, c. 2.5 mm long, linear, 4–6-ovuled; style c. 8 mm long; stigma pointed. Pods more or less straight, included, 4–6-jointed; joints c. 2 × 2 mm, papillose. Seeds 1.5 × 1.25 mm, reniform.

Flowering and Fruiting: August–November.

Ecology: Common in wetlands and paddy field margins in sea level to 950 m elevation.

Distribution: Australia, India (Throughout), Madagascar and Tropical Asia. **Fig. 19**



Fig. 20. Holotype of *Smithia sensitiva* Ait. (BM000958972, © Natural History Museum, London).

Specimens examined: **INDIA, Karnataka:** S. Canara district, *s.l. s.n.* (MH). **Kerala:** Idukki district, Kulamavu, 11 October 1982, *C.N. Mohanan 74551* (CAL, MH); Kannur, Kannothe, 06 December 1913, *Barber 9438* (MH); Kasargod district, Manjeswar, 13 October 1979, *R. Ansari 64905* (CAL). **Telangana:** Medak, *Rao 1986* (MH).

Notes: Aiton (1789) described *Smithia sensitiva* based on collections of Keonig from India. Two herbarium sheets belongs to *S. sensitiva* collected by Koenig from India were traced at BM (BM000958972 and BM000958973). Among them, sheet BM000958973 is without date and sheet BM000958972 is with date 1785, and then type was indicated by Aiton. It is the obligatory holotype, since only one specimen with date is extant.

11. *Smithia setulosa* Dalz. in Hook. J. Bot. Kew Gard. Misc. 3: 208. 1851; Bedd., Ic. Pl. Ind. Or. Part 13. 1874, t. 243; Baker in Hook. f., Fl. Brit. India 2: 149. 1876; Gamble, Fl. Madras 1: 329. 1918; N.C. Nair & A.N. Henry, Fl. Tamil Nadu 1: 121. 1983; C.J. Saldanha, Fl. Karnataka 1: 493. 1984; Sanjappa, Legumes India 248. 1992; Sasidh., Biodiv. Doc. Kerala Pt. 6. Fl. Pl. 145. 2004; T.S. Nayar *et al.*, Fl. Pl. W. Ghats, Ind. 1: 455. 2014. **TYPE:** INDIA, Maharashtra, Bombay, *Dalzell s.n.* (Lectotype: CAL0000012750!), designated by

Singh, R. Kr. (2016); Syntype: India, Deccan, *Dalzell s.n.* (MH! Accession No. 14578).

Figs. 22 & 29. C.

Erect herbs, 80–120 cm high; stem terete, conspicuously bristly, bristles 4–6 mm long with bulbous base. Stipules 12–15 × 3–4 mm, ovate, acuminate, striate; appendage 1–1.5 cm long. Leaves 5–8 cm long including 3–5 mm long bristly rachis and 5–7 mm long petioles; leaflets 5–8 pairs, 2–4 × 0.4–0.6 cm, oblong, obtuse at apex, oblique at base, glabrous, margins sparsely bristly. Panicles terminal; peduncles 2–3 cm long, bristly. Flowers c. 1.5 cm long, yellow: pedicels 2–3 mm long; bracts c. 5 × 3 mm, ovate, bristly outside, caducous; bracteoles c. 5 × 2 mm, ovate, acuminate, bristly outside, striate, persistent. Calyx yellow bristly: upper lip broad, c. 6 × 6 mm, obtuse, lower-lip short, narrow, subacute at apex. Corolla: standard c. 8 × 7 mm, obovate-orbicular, claw c. 2 mm long; wings c. 7 × 3.5 mm, oblong, claw c. 2.5 mm long; keels c. 7 mm long, oblong, incurved, claw c. 3 mm long. Staminal sheath c. 7 mm long; filaments c. 2.5 mm long. Ovary subsessile, 10–12-ovuled; style c. 5 mm long. Lomentum joints 10–12, folded back within the calyx, c. 2 × 2 mm, reticulate.

Flowering and Fruiting: October–December.

Ecology: Gregarious herb, occasional in open hill slopes and valleys at 600–1800 m elevation.

Distribution: India (Gujarat, Karnataka, Kerala, Maharashtra & Tamil Nadu), endemic. **Fig. 19**

Specimens examined: **INDIA, Karnataka:** Concan, *Stocks & Law s.n.* (MH); South Canara, Jolpad, 14 November 1900, *C. A. Barber 2349* (MH). **Kerala:** Wynad, 3000 ft., *s.l. s.n.* (MH); 'Malabar', *Stocks & Law s.n.* (MH); Pathanamthitta, Pampa-Goodrical, 25 December 1988, *Anilkumar N. 1337* (MH). **Tamil Nadu:** Nilgiri, November 1884, *Gamble 15331* (MH); Kanyakumari, 02 September 1894, *Bourdillon 355* (MH).

12. *Smithia venkobarrowii* Gamble, Fl. Madras 1: 330. 1918 & Bull. Misc. Inform. Kew 1919: 223. 1919; Sanjappa, Legumes India 248. 1992; Sasidh., Biodiv. Doc. Kerala Pt. 6. Fl. Pl. 145. 2004; T.S. Nayar *et al.*, Fl. Pl. W. Ghats, Ind. 1: 456. 2014. **TYPE:** INDIA, Kerala, Peermede, 16 October 1916, *Venkoba Row 3799* (Lectotype: K000827994!–**Fig. 23**), designated here; Isolectotype: Herbarium, Department of Botany, University College, Thiruvananthapuram (!).

Erect subshrubs, 30–125 cm high; stem densely bristly. Stipules 6–8 × 2.5 mm, ovate-lanceolate, sparsely bristly outside; appendage c. 4 mm long. Leaves 3–6 cm long including 2–3.5 cm long bristly rachis and 0.6–2.5 cm long petioles; leaflets 3–4(-5) pairs, subsessile, 1–3 × 0.4–0.8 cm long, oblong, obtuse–retuse at apex, oblique at base, glabrous. Flowers 0.8–1.2 cm long, yellow, in axillary subcapitate heads: heads in pairs or threes in upper leaf axils; peduncles 2–3 cm long, bristly; pedicels c. 2 mm long; bracteoles c. 4 × 1.5 m, obovate–elliptic, margins

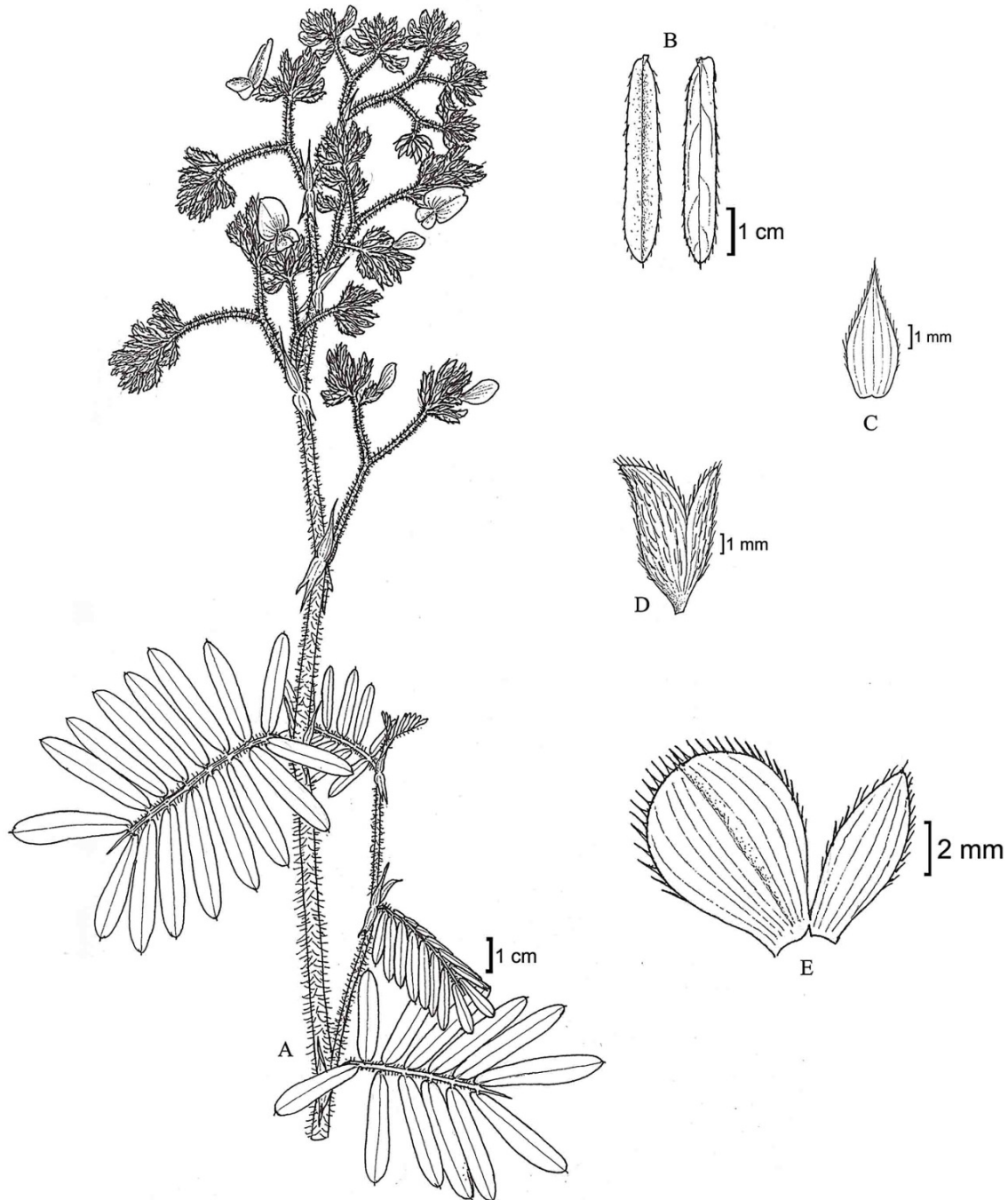


Fig. 22. *Smithia setulosa* Dalz. A: Habit, B: Leaflets upper and lower side, C: Bract, D & E: Calyx.

bristly, persistent. Calyx membranous, anastomosingly-veined: upper lip broad, c. 4 mm long, emarginate, margins short-bristly; lower lip 3-lobed, lobes acute, sparsely bristly outside. Corolla: standard c. 11 × 10 mm, suborbicular, emarginate at apex, red-tinched towards claw, claw 3 mm long; wings c. 10 × 5.5 mm, obovate-oblong, claw c. 2 mm long; keels c. 8 × 4 mm, obliquely obovate, ciliolate at apex, auricle 2 mm long, claw 1.5–2 mm long. Staminal sheath c. 8 mm long; filaments c. 3 mm long; anthers ovoid. Ovary

subsessile, c. 3 mm long, linear, ovules 5–7; style c. 8 mm long; stigma pointed. Lomentum almost included, joints folded back within the calyx, 4–6-jointed; joints c. 2.5 × 2.5 mm, reticulate, bordered. Seeds 2 × 1.8 mm, subreniform.

Key to the varieties

- 1a. Stem densely bristly; leaflets 3–5 pairs, 1.5–3 cm long; flowers 1.3–1.5 cm across, 1 cm long; lomentum joints 4–6 var. *venkobarowii*
- 1b. Stem glabrous; leaflets 3–4 pairs, 1–2 cm long; flowers 1 cm across, 0.8 cm long; lomentum joints 6–8 var. *glabra*



Fig. 23. Lectotype of *Smithia venkobarrowii* Gamble var. *venkobarrowii* (K000827994), © The Board of Trustees of the Royal Botanic Gardens, Kew).

Smithia venkobarrowii Gamble var. *venkobarrowii*

Figs. 24 & 29. D-H

Flowering and Fruiting: September –January.

Ecology: Gregoriously growing undershrubs, occasionally seen in moist hill slopes and grass lands in 900–1600 m elevation, not common.

Distribution: India (Kerala), endemic. **Fig. 19**

Specimens examined: **INDIA. Kerala:** Idukki district, Neryamangalam, 18 October 2007, *S.V. Predeep & Anoop P.B.* 20555 (VZHR); Vagamon hills, 04 November 2007, *S.V. Predeep 20901* (VZHR); Murinjapuzha, 01 December 2007, *Anoop P.B.* 20717 (VZHR); Vallakadavu, *Jomy 16893* (CALI).

Notes: Gamble (1918 and 1919) described *Smithia venkobarrowii* based on collections of Venkoba Rao (*Venkoba Rao 3799*) from the Peermad ghats of Kerala state. The type specimen kept at K (K000827994) contain inscription by J.S. Gamble as ‘Type’. But no

specific herbarium sheet was designated as holotype. We traced another herbarium sheet of *Venkoba Rao 3799*, in the botany department herbarium of University College, Thiruvananthapuram, Kerala. Among the two specimens of *Venkoba Rao 3799*, the specimen housed at K (K000827994) is selected here as the lectotype as it agrees exactly with the protologue and is well preserved.

Gamble (1918) described *S. venkobarrowii* as a suberect or prostrate or even as a trailing herb. However, we could locate good populations of the species in and around the type locality which were tall, robust subshrubs reaching 90–125 cm height.

Smithia venkobarrowii Gamble var. *glabra* Balan & Predeep, *Int. J. Pl., Anim. Environm. Sci.* 4(2): 201. 2014. **TYPE:** INDIA, Kerala, Palakkad district, Nelliampathy, 27 November 2006, *S.V. Predeep 20448*. Holotype (MH); Isotypes (VZHR). **Figs. 25 & 29. I**

Erect subshrubs, 80–125 cm high; stem glabrous throughout. Leaflets 3–4 pairs, c. 1–2 cm long, sparsely bristly beneath. Flowers c. 8 mm long. Lomentum joints 6–8, reticulate.

Flowering and Fruiting: October –December.

Distribution: South India (Kerala), endemic. **Fig. 19**

Ecology: So far known from the type locality, Nelliampathy hills of Southern Western Ghats at 1150 m elevation, growing along with *Smithia venkobarrowii* Gamble var. *venkobarrowii* and *Smithia bigemina* Dalz.

Specimens examined: **INDIA. Kerala,** Palakkad, Nelliampathy, 27 November 2006, *S.V. Predeep 20448* (VZHR).

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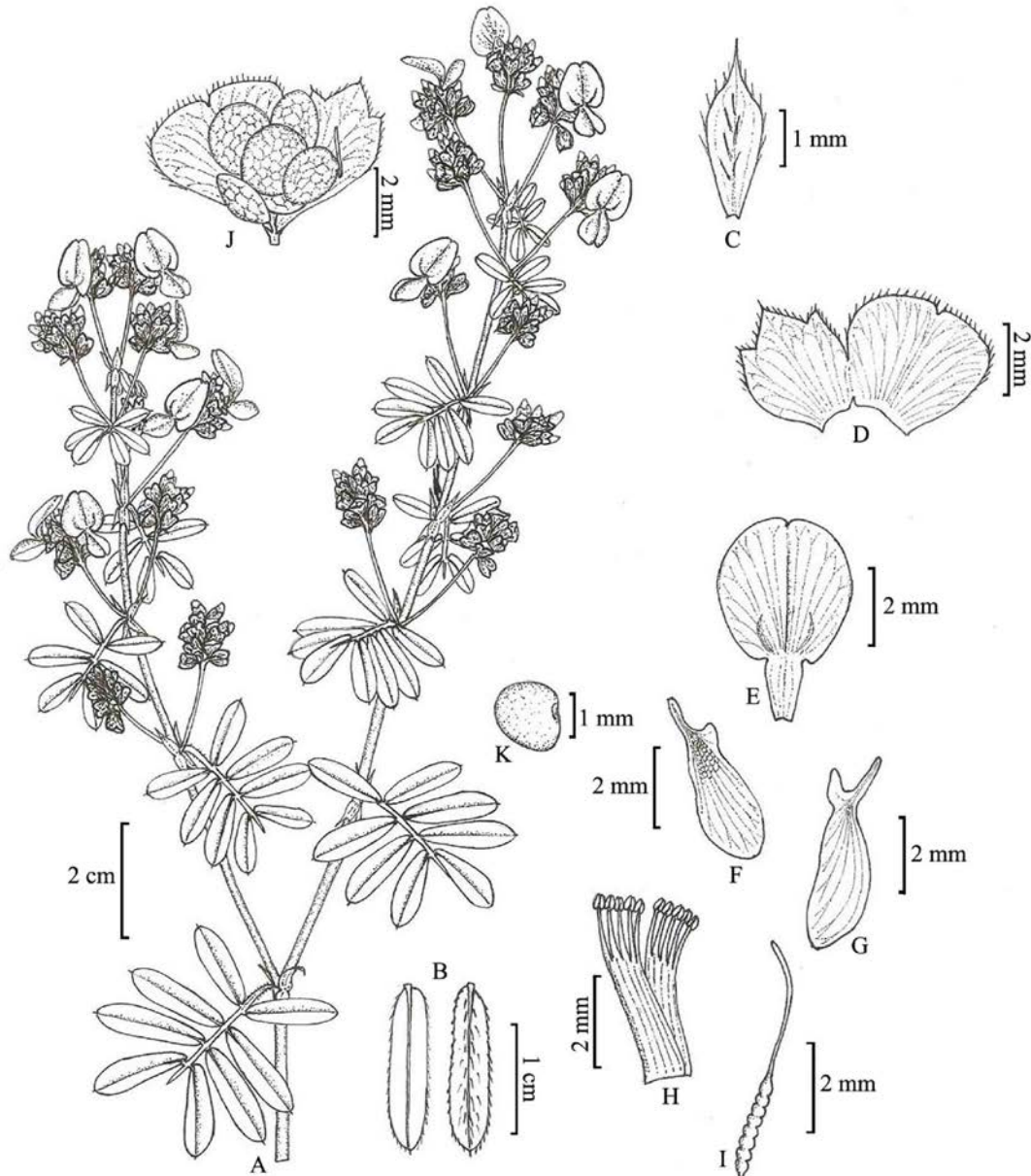


Fig. 25. *Smithia venkobarrowii* Gamble var. *glabra* Balan & Predeep. **A:** Habit, **B:** Leaflets upper and lower side, **C:** Bracteole, **D:** Calyx, **E:** Standard petal, **F:** Wing petal, **G:** Keel petal, **H:** Stamens, **I:** Pistil, **J:** Lomentum, **K:** Seed.

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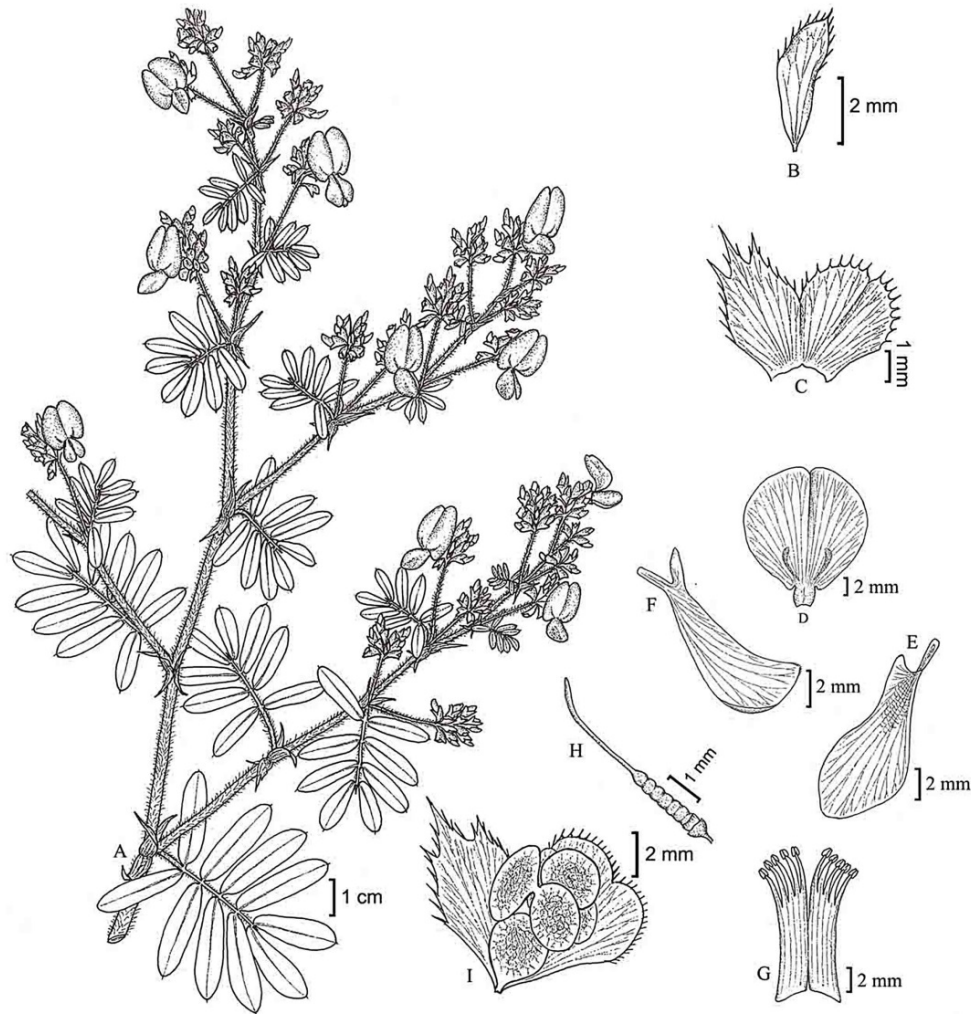


Fig. 24. *Smithia venkobarrowii* Gamble var. *venkobarrowii*. A: Habit, B: Bracteole, C: Calyx, D: Standard petal, E: Wing petal, F: Keel petal, G: Stamens, H: Pistil, I: Lomentum.

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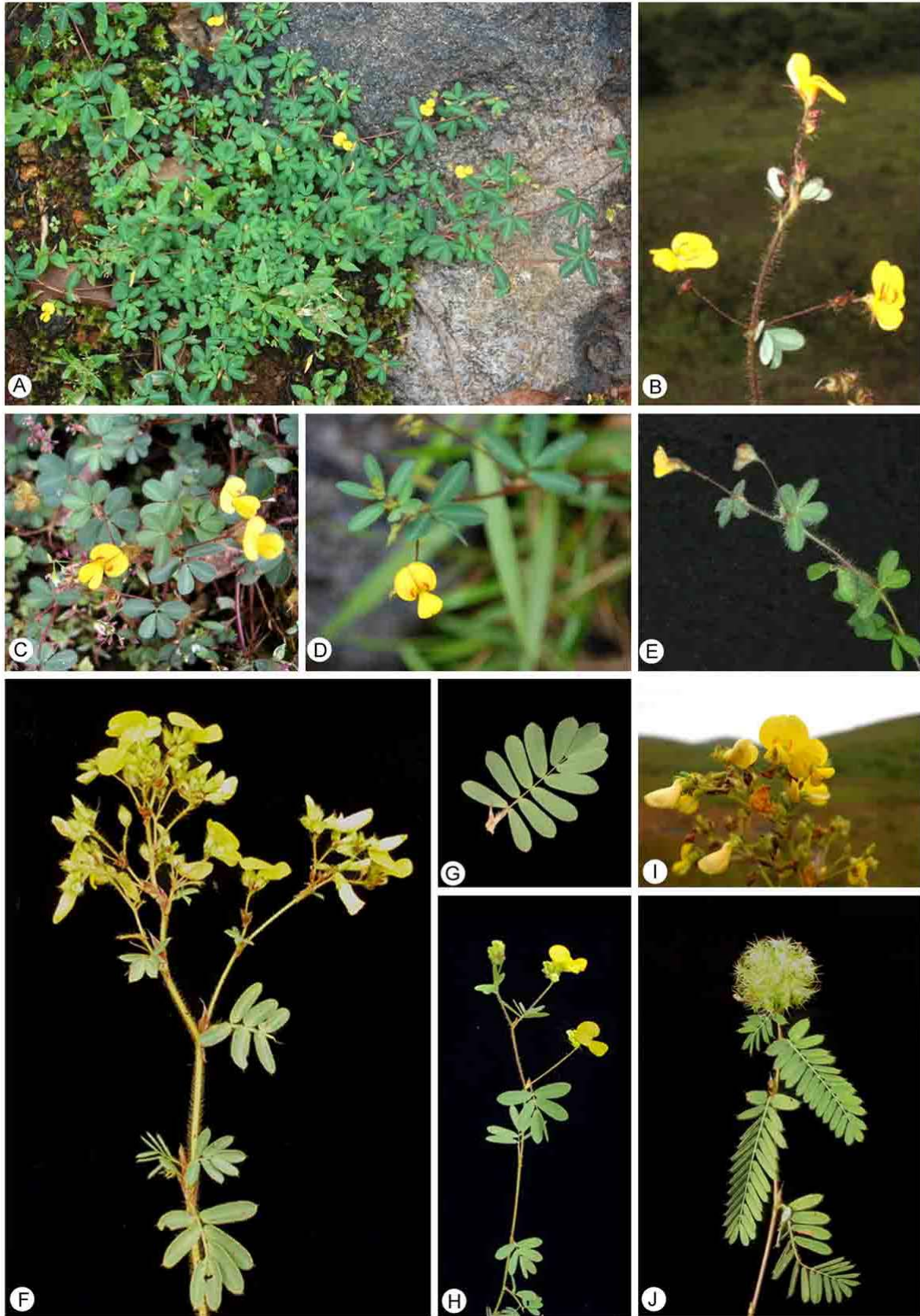


Fig. 26. A-E: *Smithia bigemina* Dalz., F-I: *S. blanda* Wall. ex Wight & Arn., J: *S. capitata* Dalz.

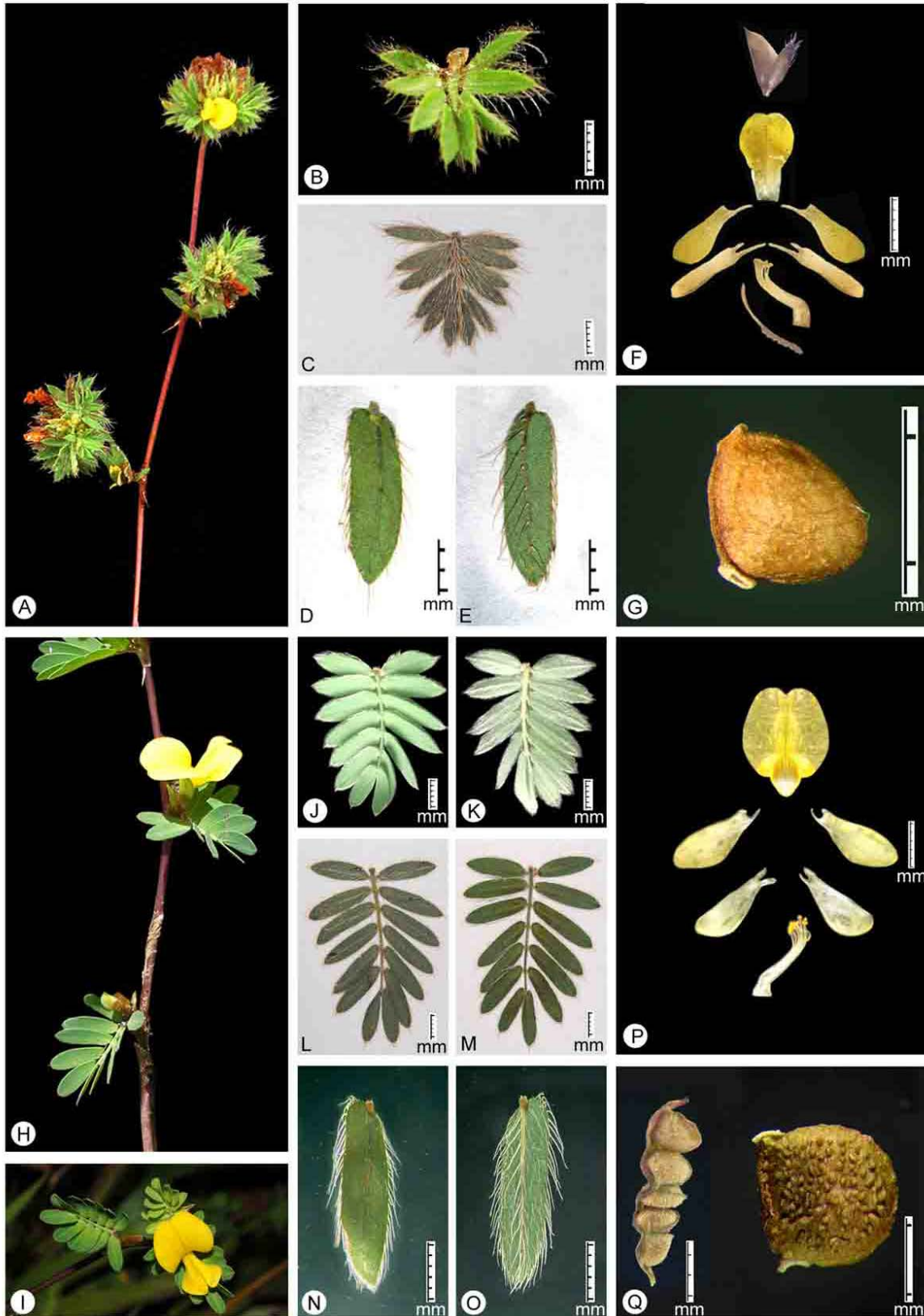


Fig. 27. *S. conferta* Sm. var. *conferta*, **A:** Habit, **B & C:** Leaf upper and lower views, **D & E:** Leaflet upper and lower views, **F:** Floral parts, **G:** Lomentum joint. *S. conferta* Sm. var. *geminiflora* (Roth) T. Cooke, **H & I:** Habit, **J-M:** Leaf upper and lower views, **N & O:** Leaflet upper and lower views, **P:** Floral parts, **Q:** Lomentum.

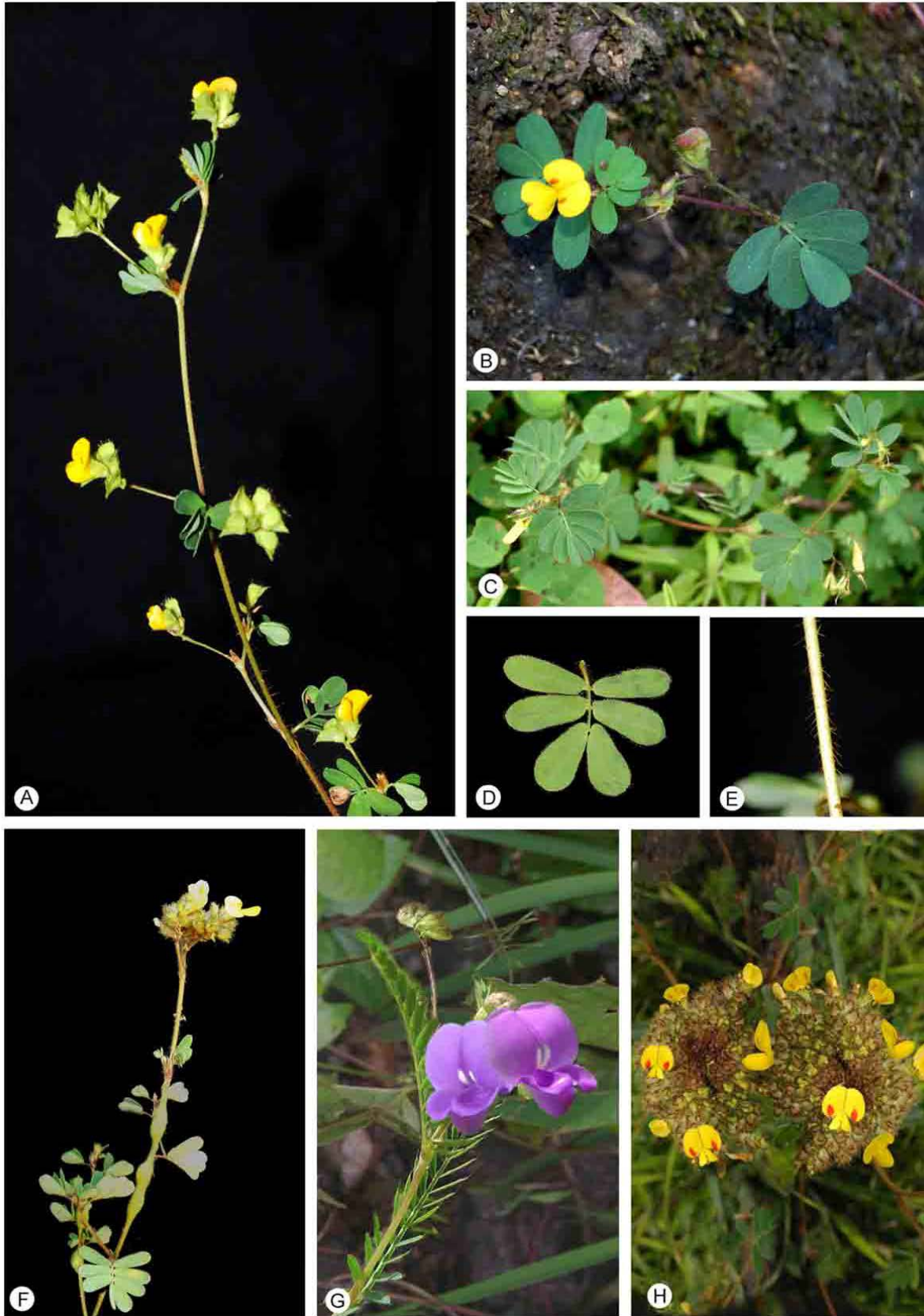


Fig. 28. A-E: *S. gracilis* Benth. F: *S. hirsuta* Dalz., G: *S. purpurea* Hook., H: *S. pycnantha* Benth. ex Baker.

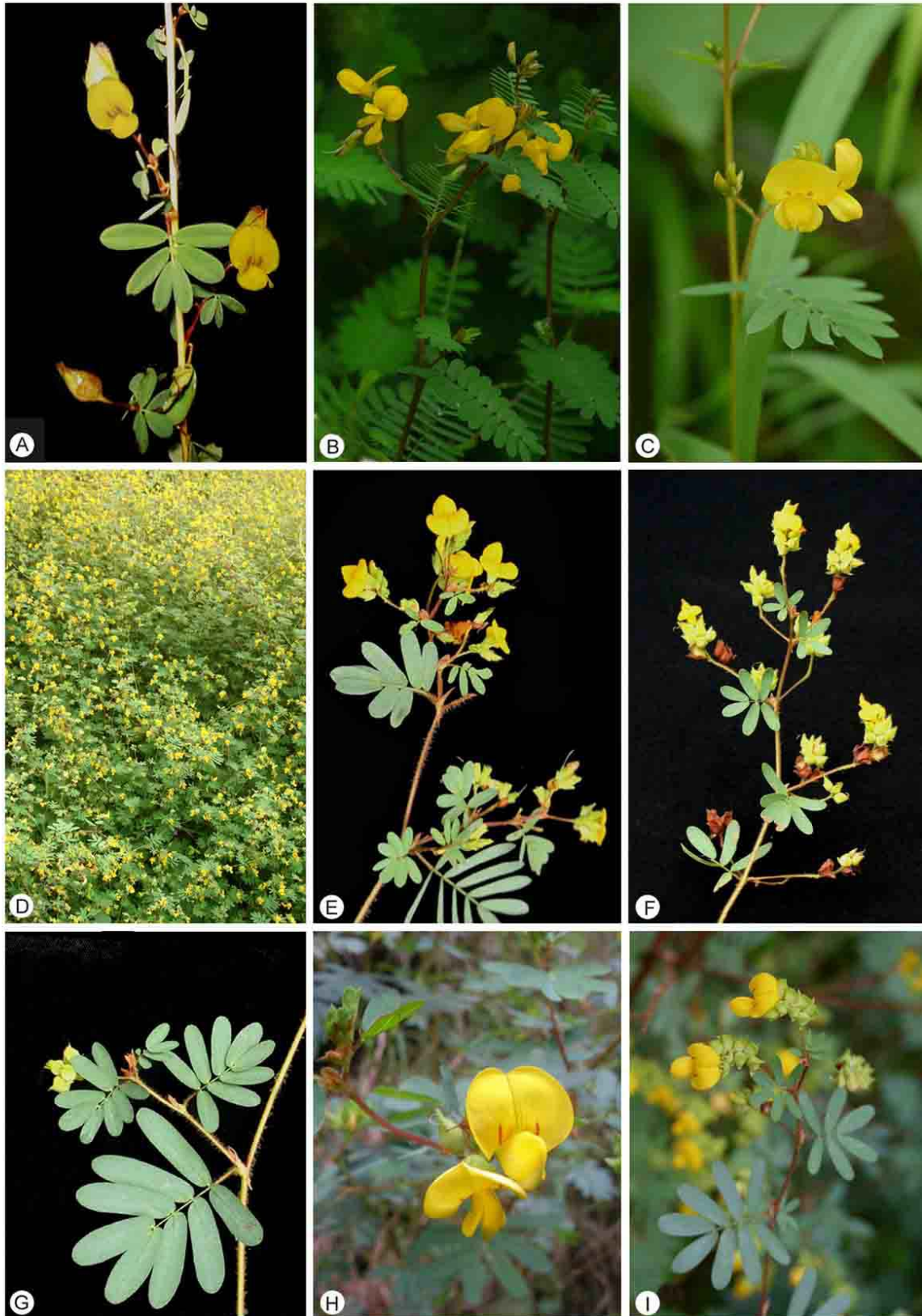


Fig. 29. A: *S. salsuginea* Hance. B: *S. sensitiva* Ait., C: *S. setulosa* Dalz., D-H: *S. venkobarrowii* Gamble var. *venkobarrowii* and I: *S. venkobarrowii* Gamble var. *glabra* Balan & Predeep.