



## Two new species of *Brachystelma* (Apocynaceae: Ceropegieae) from peninsular India

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### Abstract

Two new species of *Brachystelma*, viz., *B. gondwanense* and *B. shrirangii* are described here from the Gadchiroli and Kolhapur districts of Maharashtra and Belgaum district of Karnataka, respectively with illustrations and photographs. Both the new species are similar to *B. kolarensis* but *B. gondwanense* differs in having twisted corolla lobes and *B. shrirangii* in having thin and short stem.

**Keywords:** Asclepiadoideae, Hysteranthous, Succulent, Taxonomy, Tuberous Roots

### Introduction

The genus *Brachystelma* R. Br. ex Sims (Apocynaceae: Ceropegieae), has over 160 species distributed in South Africa, Southeast Asia and Australia (The Plant List, 2013). In India, it is represented by 22 species with most of the species distributed in peninsular India (Kambale *et al.*, 2014), especially in the Eastern Ghats and some parts of the Western Ghats. During the floristic explorations in Vidarbha region of the Gadchiroli district of Maharashtra, the authors have collected specimens of *Brachystelma* in July 2009. This was followed by subsequent collections for the fruiting specimens in 2014 from the forests near to the villages Mallera-Lohara and Dhannur in Gadchiroli district, which form the northern boundary of the Chaprala Sanctuary. Since it was hysteranthous species, to understand the life cycle, the tubers were also grown in pots at Choudampalli Range Forest Office during 2009–2011 and at Nagpur from 2009 to till date. Thorough perusal of the relevant literature (Jagtap & Singh, 1999; Kambale *et al.*, 2014; Venu & Prasad, 2015) revealed that the species is unrecorded so far. Therefore, it is described and illustrated here as a new species *B. gondwanense*.

Also, as a part of taxonomic revision of Indian *Brachystelma* the protologue (Collett & Hemsley,

1890) and syntype specimens (housed at K) of *B. edule* Collett & Hemsl. (published as *B. edulis*), which is known from upper Burma (now Myanmar) and Siam (now Thailand) were analysed and compared with the Indian materials studied by Yadav *et al.* (1990), and we concluded that the Indian and true *B. edulis* are looking very similar, but the Indian material differs from true *B. edule* in having erect flowers, pilose, shallowly bifid interstaminal corona (vs. drooping flowers, linear staminal corona and glabrous, trifid interstaminal corona in *B. edule* proper). These species hence cannot be conspecific. Nevertheless, in all the regional floras and miscellaneous works (Jagtap & Singh, 1999; Singh *et al.*, 2001; Yadav & Sardesai, 2002; Bhat, 2003) the *B. shrirangii* has been treated as "*B. edule*".

In addition to this, phylogenetically *B. edule* (from Myanmar) is nested along with the southern Indian species of *Brachystelma* such as *B. brevitubulatum* Gamble, *B. maculatum* Hook.f. and *B. mahajanii* Kamble & S.R. Yadav (Bruyns *et al.*, 2015) and stands distinct from "*B. edulis*" (sensu Yadav *et al.*, 1990) from India. Therefore, again, there is convincing evidence that the Indian material represents a different species, here described as *B. shrirangii*.

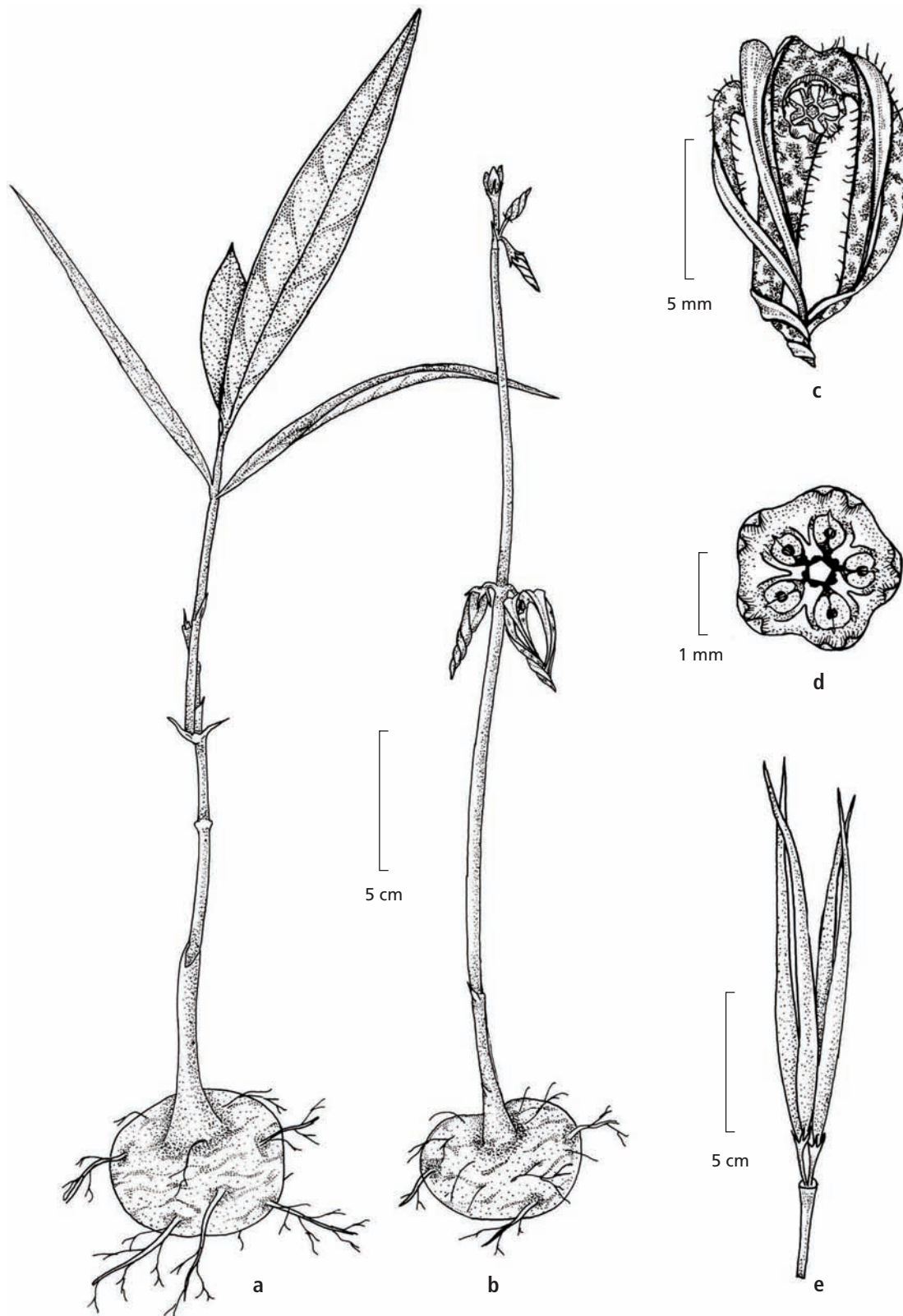


Fig. 1. *Brachystelma gondwanense* Govekar, Kahalkar & Sardesai: a & b. Habit: a. vegetative; b. reproductive; c. Flower; d. Corona (top view); e. Follicles. Drawn by R.D. Gore from R.S. Govekar 174.



Fig. 2. *Brachystelma gondwanense* Govekar, Kahalkar & Sardesai: a & b. Flowers; c & d. Corona top view (d is from pickled sample). Photographs by R. Govekar, M.M. Sardesai & S.S. Kambale from *R.S. Govekar 174*.

**Brachystelma gondwanense** Govekar, Kahalkar & Sardesai, *sp. nov.* **Figs. 1,2**

*Diagnosis:* Similar to *Brachystelma kolarensense* Arekal & T.M. Ramakrishna in having subglobose tubers and erect stem but differs in longer flowers and twisted corolla lobes.

Type: INDIA: **Maharashtra**, Gadchiroli district, Lohara village, 19°38'06.70" N, 79°56'36.00" E, 178 m, 29.4.2012, R.S. Govekar 174 (Holotype, CAL; Isotypes, BAMU, BSI, MH, SUK).

Herb, perennial, erect, to 25 cm high; roots tuberous, generally globose, 3–5 cm, greyish white with scattered, few roots (during summer tubers in fruiting shoot are comparatively much smaller and shaped differently ranging from horizontally ellipsoid to pyriform or reniform). Stem solitary, terete, 1–2 mm in diam., generally unbranched, ridged, glabrous, whitish at base, glaucous green above; internodes 2–3 cm long, gradually decreasing in length near apex. Leaves simple, sessile, opposite-decussate in 3–7 pairs, lanceolate, to 13 cm long and 1.5–2 cm broad at middle, smooth at margins, acute at apex, glabrous, green above, glaucous pale beneath; midvein strong and thicker at base, thin towards tip, protruding lower side, very yellowish white; secondary veins 4 or 5, obscure on upper surface. Flowering on a long leafless, glabrous, yellowish green shoot of 8–12 × c. 0.2 cm, which turns dark sepia in fruiting stage. Inflorescence initially crowded at apical nodes with internodes increasing gradually 4–6 cm; lateral, shortly peduncled, pubescent, 2-flowered, inverted; pedicels stout, to 7 mm, minutely pubescent. Bracts and bracteoles persistent, linear, acute at apex, minutely glandular, greenish yellow, turning dull brown in fruiting stage; bracts c. 8 × 0.5 mm; bracteoles c. 3 × 0.3 mm. Calyx 5-lobed; lobes triangular, 3–4 × 0.5–1.5 mm, united at base, acute at apex, glandular-hairy, yellowish green. Corolla sharply angled conical in bud stage; tube to 1 mm long, shallow, 5-lobed at apex; lobes erect but twisted while opening and open gradually from base to tip and tips often remain united for a few days, linear, subcylindrical, 14–18 × 1.5–2 mm, involute at margins, acute at apex, 2–3 mm long white hairs scattered throughout the inner surface and margins but not on the outer surface, more dense towards lower half and almost absent near tips; lobes pale yellow with purple irregular blotches and yellowish green above with few purplish blotches only towards base. Corona biseriate; staminal and interstaminal parts fused and form bowl-shaped staminal corona. Interstaminal corona c. 3 mm across, slightly above the gynostegium of 5 shallowly bifid lobes, hairy

inside, glabrous otherwise, yellowish white with purple dots; staminal corona incumbent on anther sacs more than half the length of sacs, lanceolate, white-blotched with deep purple. Pollinarium c. 0.25 × 0.15 mm; pollinium ovoid, attached to red corpusculum by short caudicles. Follicles in pairs, erect, crowded at top, 8–10 × 0.25–0.3 cm, acute at apex, broader towards basal half, pinkish, smooth.

*Flowering & Fruiting:* April–June. This is a hysteranthous species (flowering stage is followed by vegetative state). Flowering has not been observed during monsoon, from July to November (vegetative stage).

*Habitat:* The species is found mostly in dry to moist deciduous lowland mixed forests with clayey-gravelly to loamy soils at an elevation of 160–180 m and annual rainfall about 1500 mm.

*Distribution:* India (Maharashtra), known only from type locality. **Endemic.**

*Etymology:* The species is named after Gondwana, the area including the type locality, which was once dominated and ruled by the Gond tribe.

*Note:* It is a robust, dwarf species with leathery leaves. It is very difficult to locate this species in the field while in flowering and fruiting due to inconspicuous habit. The tubers which look like small potato are uprooted, peeled off and eaten by the local people. This is one of the major threats to this extremely rare species.

*Additional Specimens Examined (Paratype):* INDIA, **Maharashtra**, Gadchiroli district, Compartment No. 316, Chaprala Sanctuary, near Dhannur village, 19°36'33.28" N, 79°55'42.22" E, 162 m, 1.5.2012, M.M. Sardesai 2014 (BAMU).

**Brachystelma shrirangii** Kambale, Gholave & Sardesai, *sp. nov.* **Figs. 3,4**

*Brachystelma edule* auct. non Collett & Hemsl. 1890: S.R. Yadav *et al.*, J. Bombay Nat. Hist. Soc. 86: 480. 1990; A.P. Jagtap & N.P. Singh, Fasc. Fl. India 24: 181. 1999; A.P. Jagtap & S.K.D. Das in N.P. Singh *et al.*, Fl. Maharashtra 2: 340. 2001; S.R. Yadav & Sardesai, Fl. Kolhapur: 282. 2002; K.G. Bhat, Fl. Udupi: 370. 2003.

*Diagnosis:* Similar to *Brachystelma kolarensense* in having subglobose tubers, erect stem but differs in having short, thin and slender stem and shorter staminal corona.

Type: INDIA, **Maharashtra**, Kolhapur district, Shivaji University Campus, 16°40' 25.83" N, 74°15'19.97" E, 599 m, 29.3.2015, S.S. Kambale SSK 348 (Holotype, SUK; Isotypes, BSI, CAL).

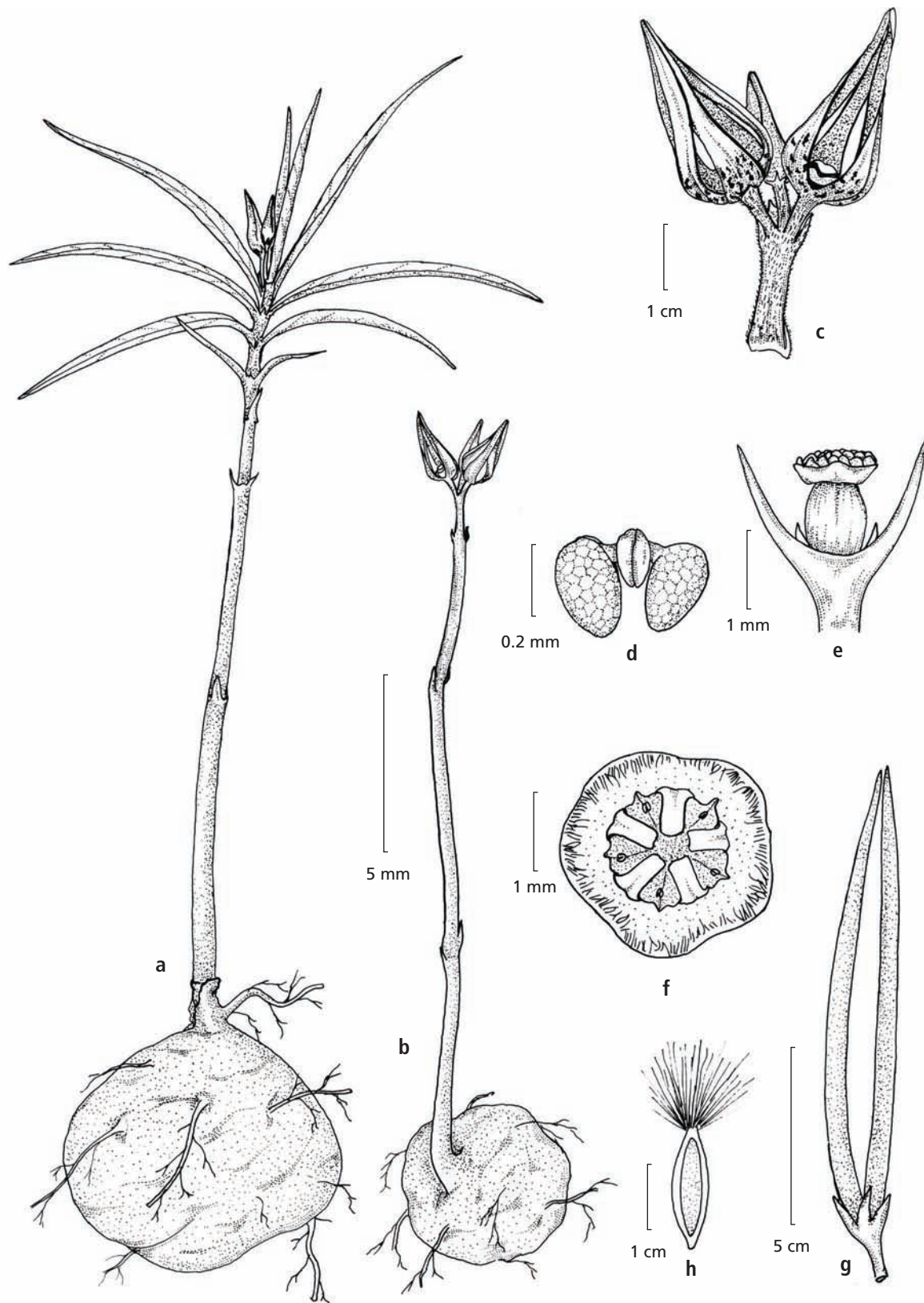


Fig. 3. *Brachystelma shrirangii* Kambale, Gholave & Sardesai: a & b. Habit: a. vegetative; b. reproductive; c. Flowers; d. Pollinarium; e. Corona; f. Corona (top view); g. Follicle; h. Seed with coma. Drawn by R.D. Gore from *S.S. Kambale SSK* 348, 351.

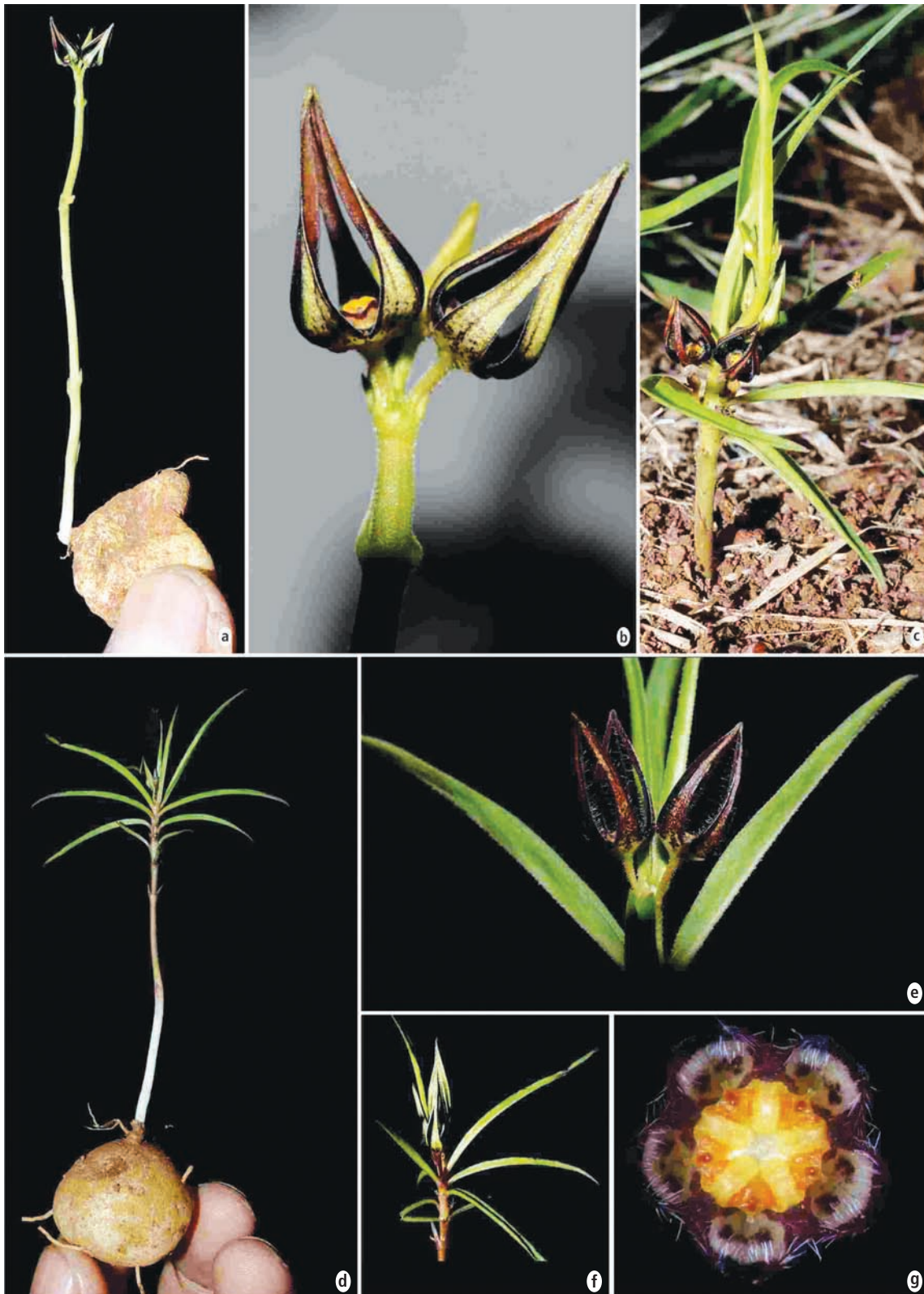


Fig. 4. *Brachystelma shrirangii* Kambale, Gholave & Sardesai: a. Habit (summer season); b. Flowers (from *S.S. Kambale* SSK 348); c-f. Habit and flowers (rainy season); g. Corona (top view from *S.S. Kambale* SSK 351).

Herb, perennial, erect, tuberous; tubers subglobose, 3–4 cm in diam.; roots fibrous. Stem solitary from individual tuber, erect, 7–10 cm high, 0.1–0.2 cm in diam., scabrid, green while flowering, turning pinkish red at fruiting; internodes 1.5–7.5 cm long. Leaves sessile, reduced, opposite-decussate, linear-lanceolate, 2–4 × c. 0.6 cm, ciliolate at margins and midvein beneath, puberulent (summer season), scabrid above, glabrous otherwise (rainy season). Inflorescence a simple cyme. Flowers 1 or 2 per node, erect; bract solitary, linear, c. 2 mm long, glabrous; pedicel 2–5 mm long, puberulous with translucent hairs. Calyx 5-partite; lobes linear-subulate, 1–1.5 mm long, hairy with translucent hairs. Corolla 0.8–1.5 cm long; lobes divided up to base, linear to lanceolate, connate at tip to form conical cage, glabrous (in summer season), hairy (in rainy season) at margins, reflexed along margins, deep brown inside, green to deep brown outside with purple spots at base. Corona biseriate; staminal and interstaminal parts fused and forms bowl-shaped staminal corona; interstaminal corona c. 1.6 mm across, shallowly bifid, deep pink along margin, whitish pink inside, hairy along margin and inside with translucent hairs; staminal corona at the base of anther sacs triangular, sparsely hairy, deep pink. Stylar head pentangular, whitish. Pollinia yellow with pellucid margin, c. 0.4 × 0.2 mm, attached to red corpusculum by short caudicles. Follicles paired, rarely solitary, 5–10 cm long, broad at base, pointed at apex, glabrous, pinkish red. Seeds 0.7–1 cm long, elongated, shallowly winged along margin; coma 5–7 mm long, silky white.

*Flowering & Fruiting:* March–August. The species starts flowering in hot dry summer, during which the plants are with reduced leaves. With the onset of monsoon certain individuals, which were not sprouted during summer produce vegetative shoots and by June they produce flowers and fruits again. Therefore, *B. shrirangii* is considered to be both synanthous and hysteranthous in nature.

*Habitat:* In gravelly soils on the drier hills, grows amidst grasses.

*Distribution:* India (Karnataka and Maharashtra). **Endemic.**

*Etymology:* The species is named in honour of Prof. S.R. Yadav (SUK), for his lifetime contributions in the field of taxonomy of angiosperms.

*Note:* *Brachystelma shrirangii* is known by a few fragmented populations in Maharashtra and one population each in northern (Belgaum) and

southern (Udupi) Karnataka. Food value of tuber, frequent forest fires and habitat modifications are some of the threats to the survival of the species.

*Additional Specimens Examined (Paratypes):* INDIA, **Karnataka**, Belgaum district, Appachiwadi, 7.6.1988, S.R. Yadav SRY 3601 (SUK). **Maharashtra**, Kolhapur district, Nesari, on the way to Kowad, 16°02'10.04" N, 74°21'45.13" E, 784 m, 23.4.1997, M.M. Sardesai MMS 1929 (SUK); Kagal, 16°36'40.99" N, 74°21'58.35" E, 652 m, 26.4.1998, M.M. Sardesai s.n. (SUK); Hills on the way to Bahubali from Hatkanagale, 16°48'04.90" N, 74°27'46.14" E, 628 m, 14.4.1999, M.M. Sardesai s.n. (SUK); Nesari, 20.6.2003, M.M. Sardesai MMS 101 (SUK); Shivaji University Campus, 16°40'25.83" N, 74°15'19.97" E, 599 m, 4.5.2006, M.M. Sardesai 111 (BAMU); Shivaji University Campus, 15.5.2015, S.S. Kambale SSK 351 (SUK).

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