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## *Commelina badamica* (Commelinaceae), a new species from India

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### Abstract

A new species *Commelina badamica* Nandikar & Gurav from the sandstone plateaus of Badami, Karnataka, India is described and illustrated. *Commelina badamica* is similar to *C. clavata* and *C. diffusa*, but differs in having indefinite habit, linear to narrowly lanceolate leaves, puberulous or velutinous to tomentose spathes, clawless petals, a velutinous ovary, a radiately tri-lobed stigma, one capsule per spathe, and trapezoidal, ventrally truncate seeds.

### Introduction

*Commelina* L. (Linnaeus 1753) is one of the largest genera in the family Commelinaceae, represented by c. 170 species (Faden 2012). The genus is pantropical but has mostly diversified in Tropical Africa comprising 120 species, with a wide range of variation in habit, inflorescence, flower colour, capsule dehiscence, seed number and coat texture, and chromosome number (Faden 2012). Most of the species occur as weeds along roadsides or in cultivation fields, but a few of them are restricted or exclusively known from forest habitats (Faden 2012; Nandikar 2013, 2014). In India, the genus is represented by 25 species (Nampy *et al.* 2013) of which *Commelina alisagarensis* Kumar & Deodikar (1941), *C. hirsuta* (Wight) Bedd. (Beddome 1880), and *C. tricolor* E. Barnes (1946) are apparently endemic. Recently, two new species *Commelina clavatooides* Nampy & S.M. Joseph (Joseph *et al.* 2012) and *C. andamanica* S.M. Joseph & Nampy (Nampy *et al.* 2013) have been added to the Indian flora. However, the distinctiveness of the former species from *C. clavata* C.B. Clarke (1874) requires further study.

During 2010 the first author visited Badami, Bagalkot District, Karnataka, India and collected several individuals of a *Commelina* species. This led to a subsequent visit and collection in 2014. These specimens were compared with the known species of *Commelina* held at major Indian herbaria (ASSAM, BLAT, BSI, CAL, CALI, DD, MH) and a literature survey was then carried out. In addition, seeds were examined using a scanning electron microscope and compared with seed from known species. From this study it was determined that the Badami specimens belonged to a hitherto undescribed species. The species is here illustrated, and details of morphology and conservation status are provided.

## Taxonomy

### *Commelina badamica* Nandikar & Gurav, sp. nov.

**Diagnosis:** *Commelina badamica* is similar to *C. clavata*, but differs in having an indefinite habit, linear to narrowly lanceolate leaves, puberulous, velutinous to tomentose spathes, upper cincinnus with single male flower, clawless petals, yellow to golden yellow antherodes, velutinous ovary, radiately tri-lobed stigma, single capsule per spathe, spathe with rounded or retuse apex, oblique base, and prominent mid-ventral constriction, and trapezoidal, ventrally truncate seeds.

**Type:** India: Badami, Bagalkot District: Karnataka: 670 m alt. (15°54'N 75°41'E), *M. D. Nandikar 0238*, 11 Nov 2010 (holo: CAL; iso: BLAT, BSI, CALI, MH, NGCPR, SUK and Goa University Herbarium).

Annual herbs, diffusely branched, c. 30 cm tall, ascending to erect, with or without definite growth. *Roots* fibrous, rooting from the basal nodes. *Stem* with 1.2–6(–7) cm long internodes, glabrous, green to maroon, nodes swollen. *Leaves* distichous or spirally arranged, sheath usually splitting longitudinally at branching or flowering points, otherwise tubular, persistent, 0.2–1 cm long, ribbed and speckled with maroon spots, sparsely to densely ciliate at summit; leaf lamina sessile, falcate or not, folded or not, linear to narrowly lanceolate, 1–6(–7) cm long, 0.3–0.6 cm wide, glabrous, apex acuminate, base truncate to auriculate, margin glabrous. *Spathes* solitary, terminal or leaf opposed, pedunculate, peduncle 1–4(–5) cm long, margin puberulous, lanceolate in outline, 0.4–0.5 cm high, 1–2(–2.2) cm long, surface puberulous abaxially, velutinous to tomentose adaxially, margin free, ciliate or villous, apex acute, base cordate. Upper cincinnus with a single male flower, lower cincinnus consists of 4 or 5 bisexual flowers. Male flower similar to bisexual flowers; bisexual flowers 10–12 mm diameter, dark blue in colour, rarely white, pedicellate, pedicel c. 5 mm, glabrous. Lateral sepals paired, elliptic, c. 4 mm long, 2 mm wide, petaloid or faint blue to white, concave at apex; medial sepal slightly to broadly elliptic, c. 4 mm long, 3 mm wide. Lateral petals paired, clawless or rarely with inconspicuous claw, limb orbicular to sub-orbicular, c. 6 mm long, 6 mm wide, dark blue, medial petal sub-orbicular, c. 5 mm long, 4 mm wide, dark blue, rarely white. *Staminodes* 3, equal to or shorter than stamens; filament blue to white, c. 2 mm long; antherode cruciform, yellow to golden yellow. *Stamens* 3, equal to or longer than staminodes; filament blue to white, c. 2 mm long, anther of medial stamen saddle shaped, elliptic in lateral stamens, golden yellow. *Ovary* oblong-elliptic, c. 1.5 mm long, 1 mm wide, bi-locular, velutinous; style slender, c. 1 mm long; stigma radiately tri-lobed. *Capsule* one per spathe, bi-locular with prominent, longitudinal constriction in the middle, longitudinally dehiscent, c. 6 mm long, 2 mm wide, oblong, glabrous, apex rounded or obtuse or retuse, excurved from the spathe, base oblique; locules 2-seeded, rarely 1-seeded. *Seeds* trapezoidal, 2–3 mm long, 1.8–2 mm wide, truncate at both ends; testa usually brown, with yellowish warts, dorsally reticulate, ventrally faintly reticulate; hilum linear, covering entire ventral end; embryotega distinct, exerted, acute. **Fig. 1, Fig. 2 (excl. E), Fig. 3A–C.**

**Etymology:** The specific epithet 'badamica' refers to the place of the type collection: Badami, a tourist destination in Karnataka, India, famous for cave temples, inscriptions and sculptures.

**Phenology:** Flowers and fruit observed from October to December.

**Distribution & Habitat:** Found on sandstone plateaus of the Bagalkot and Gadag districts of Karnataka and possibly endemic to this region. However, it may also occur in similar habitat of the Bijapur and Gulbaraga districts of Karnataka. Grows in full sun in open drylands on sandstone plateaus.

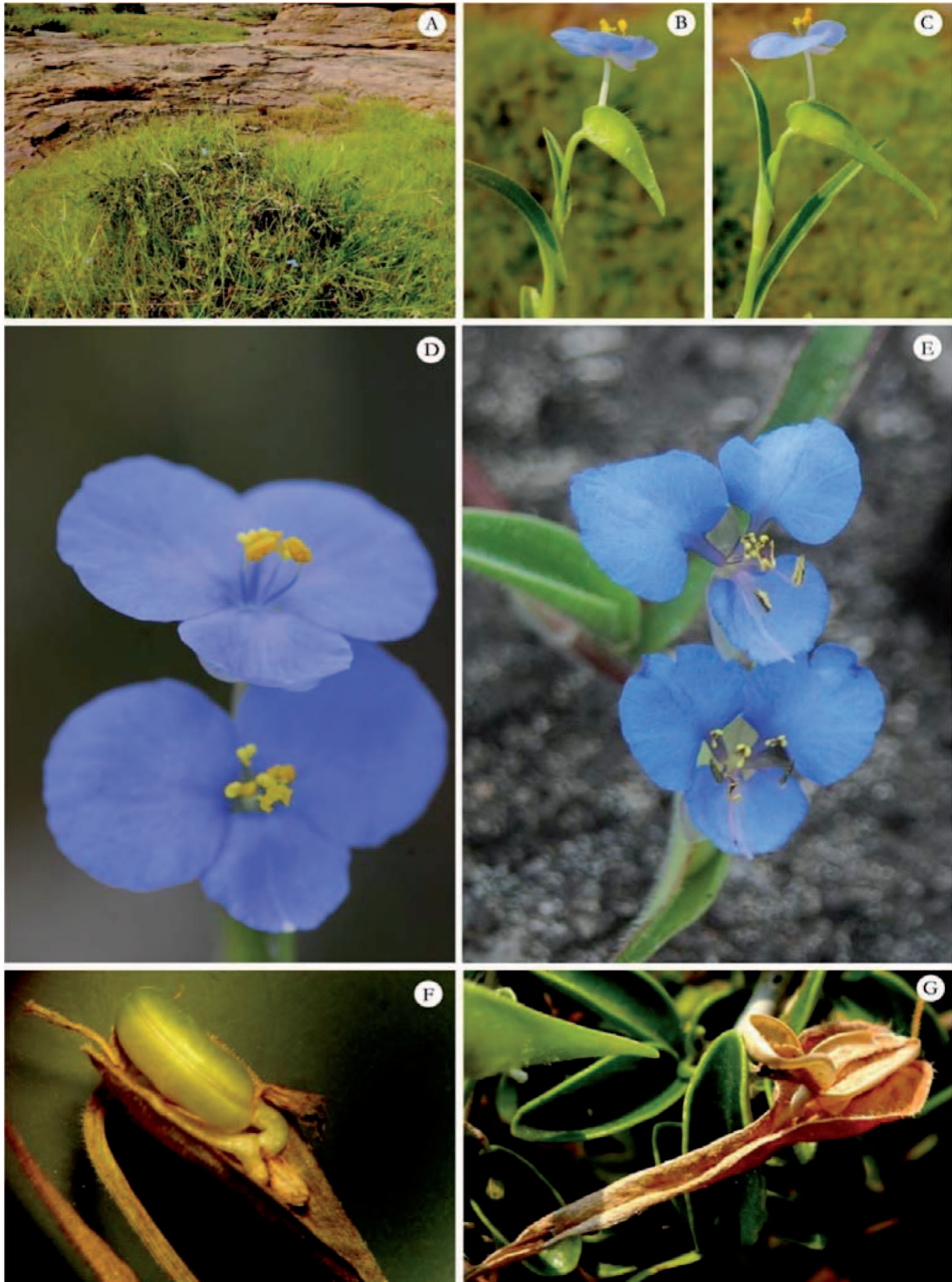
**Conservation status:** This species was collected from two sandstone localities. One is the type locality at Badami, while the other is from Gajendragad in the adjoining Gadag district. The population of *Commelina badamica* from the type locality is found across an area of less than 1 sq km, and even though the area receives many tourists, no threats were observed. The Gajendragad locality contains small populations with very few individuals, spread over less than 1 sq km. At this site a future investigation is required to determine whether or not the recent installation of windmills has caused damage to the populations. To better assess the species' distribution and conservation status, future field surveys are needed in similar habitats within adjoining districts. Presently the species is assessed as Data Deficient (IUCN 2014).

**Additional specimens examined:** INDIA; KARNATAKA BADAMI; Bagalkot district, *M.D. Nandikar s.n.*, 4 Oct 2014 (NGCPR); GAJENDRAGAD; Gadag district, *M.D. Nandikar s.n.*, 5 Oct 2014 (Goa University Herbarium).

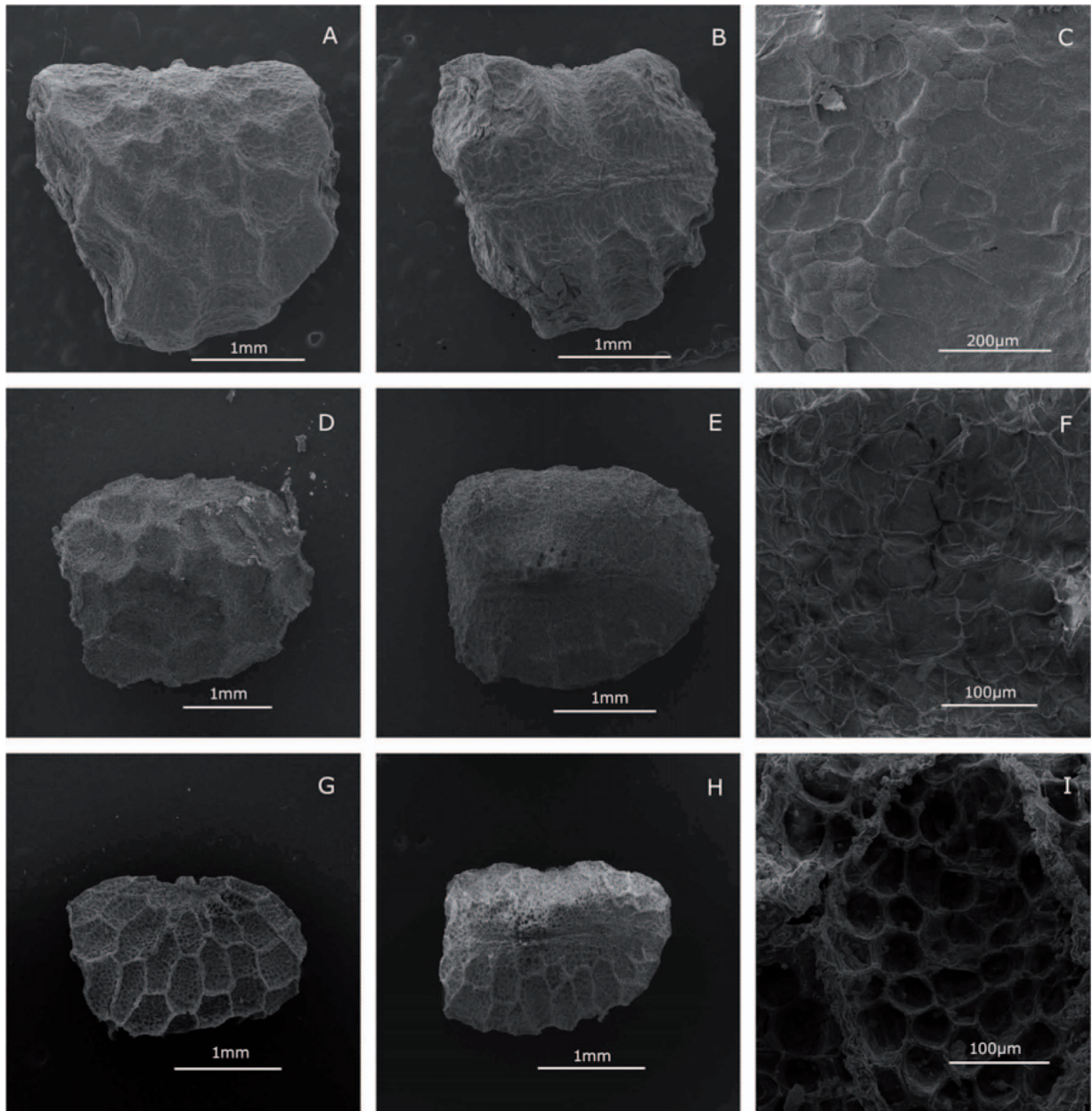
**Notes:** Apart from *Commelina clavata*, *C. badamica* exhibits similarity to *C. diffusa*, but this species differs in having glabrous spathes, clawed petals, a tri-locular, 5-seeded capsule, indehiscent dorsal locule (Table 1) and doubly reticulated seeds (Table 1, Fig. 3G–I). Characters such as puberulous to tomentose spathes and bi-locular capsules are also known in *C. attenuata* Vahl, but characters such as clawed petals and sausage shaped, smooth to alveolate appendaged seeds differentiate it from *C. badamica*. Comparative morphological differences from species *C. clavata* and *C. diffusa* are presented in Table 1.



**Fig. 1.** *Commelina badamica* A. habit, B & C. flowering spathes (abaxial and adaxial view respectively), D. stamen, E. staminode, F. pistil, G. fruiting spathe, H. capsule, I. seeds (dorsal surface (above) and ventral surface (below)). A-I from Nandikar 0238 (SUK). Scale shown on figure. Illustrator: M.D. Nandikar



**Fig. 2.** *Commelina badamica* A. habitat, B & C. spathes, showing length variation within individuals, D. flower from above, E. flower of *C. clavata*, F. spathe with a solitary unopened capsule, G. spathe with dehiscent capsule.



**Fig. 3.** Scanning electron microscope images of seeds: A–C. *Commelina badamica*, D–F. *C. clavata*, G–I. *C. diffusa* (A, D, G: dorsal view; B, E, H: ventral view; C, F, I: magnified view of testa). Scale shown on figure.

**Table 1. Comparative morphological characters for *Commelina badamica*, *C. clavata* and *C. diffusa*.**

Characters	<i>C. badamica</i>	<i>C. clavata</i>	<i>C. diffusa</i>
Habit	herbs of definite or indefinite growth	herbs of definite growth	herbs of indefinite growth
Leaf lamina	linear–narrowly lanceolate, 1–6 (–7) × 0.3–0.6 cm	narrowly lanceolate-elliptic, 2–10 × 0.5–1.5 cm	linear lanceolate–lanceolate-elliptic, 1.5–10 × 0.5–2 cm
Spathes	surface puberulous abaxially, velutinous–tomentose adaxially	surface glabrous–puberulous or pilose abaxially, glabrous adaxially	both surfaces glabrous
Petals	without claws	with distinct claws	with distinct claws
Antherode	yellow to golden yellow	purple to violet with yellow lobes	yellow
Ovary	velutinous	glabrous	glabrous
Number of capsules per spathes	1	2–6	2 or 3
Capsule	bi-locular, with apex rounded or obtuse or retuse, 4-seeded	bi-locular, with apex acute, 4-seeded	tri-locular, with apex acute, 5-seeded
Seed	trapezoidal, reticulate, ventrally truncate	ellipsoid, reticulate, not ventrally truncate	ellipsoid, doubly reticulate, not ventrally truncate

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