# A new variety of Commelina L. (Commelinaceae) from Eastern Ghats of Peninsular, India

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**Abstract**

Commelina badamica var. palakondensis .....var. nov. (Commelinaceae), a remarkable new variety from Palkonda hills of Eastern Ghats of Peninsular India is described and illustrated. It is apparently similar to C. badamica in habitat ecology and general morphology, but strictly differs in features like presence of 2-3 nerved ligule, lower cincinnus with single bisexual flower, ovary glabrous, anthers-elliptic and seeds ovoid-oblong or trapezoidal. In addition to description, habitat ecology, details on population distribution and the conservation status are also provided for the new variety.

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Keywords: Asia, Commelinales, Eastern Ghats, morphology, taxonomy

*Commelina* is the second largest genus in the family Commelinaceae (Commelinales) consisting of about 170 species distributed in tropical and subtropical regions of the world (Faden 1998, 2012). It was originally described by Linneaus (1753). Thereafter, the genus*Commelina* L. studied by various workers (Clarke 1881, Hooker 1875, 1892, Brashier 1966, Faden and Hunt 1991, Faden 1993,1998, Evans et al. 2000, 2003, Burns et al. 2011, Christenhusz and Byng 2016, Hassemer 2017,2018, Turland et al. 2017, Jung et al. 2021, Wang et al. 2023). India is an assemblage of diversified phyto-geographical provinces with hot spots of plant diversity (Singh, et al. 2014, 2021, Sivaramakrishna and Yugandhar 2020, Singh and Ranjan 2021, Sivaramakrishna et al. 2021). Although, Systematic explorations in Commelinaceae family are scarce in India (Hooker 1875, 1892, Beddome 1880, Clarke 1881, Kumar and Deodikar 1941, Barnes 1946, Karthikeyan et al. 1989, Rao 1997). In the recent past various taxonomic studies on Indian Commelinaceae have led to discovery of new species (Nandikar 2021, Nandikar and Gurav 2021) which will bridge the gap of the much needed information for exerting efforts in update account of Indian Commelinaceae and so on we feel that more extensive plant explorations will be required to examine the correct identity of species and elucidate what diversity still exist in entire India.

The genus *Commelina* is variable in habitats and characterized by having inflorescences subtended by spathaceous basal bracts and reduced to (1–)2 fasciculate cincinni, zygomorphic flowers, petals clawed, unequal

and mostly blue (but sometimes white or lilac, rarely yellow, apricot or orange), three posterior staminodes with 6-lobed cruciform antherodes, three anterior stamens, and 2-locular or unequally 3-locular and 2-valved capsules (Faden 1998,2012, Christenhusz and Byng 2016, Hassemer 2017,2018, Pellegrini and Forzza 2017, Jung et al. 2021). In India the genus *Commelina* is found throughout the country including Andaman and Nicobar Islands but there is an especially high diversity is found in Peninsular India (Western and Eastern Ghats). The Eastern Ghats of Andhra Pradesh state of Peninsular India is one of the floristically diversified region (Yugandhar et al. 2021). During botanical explorations conducted between 2019–2021 in Eastern Ghats region of Andhra Pradesh State of the Peninsular India, an unusual population of *Commelina* was encountered. The plants shares habitat and morphological characters with the species recorded from Badami hill of Bagalkot District of Karnataka State of Western Ghats, *C. badamica* Nandikar and Gurav. After critical study, we concluded that the specimens represent taxa new to science which is described and illustrated as a new variety here along with preliminary notes on its conservation status.

## Materials and methods

Morphological observations of the putative new variety and its close relatives were carried out based on living plants in the field, as well as on herbarium specimens available from online sources like Indian Virtual Herbarium (https://www.bsi.gov.in), JSTOR (https://plants.jstor.org/), Kew Herbarium Catalogue (http://www.kew.org/herbcat) and scrutiny of relevant literature. All morphological characters were observed and photographed with a Leica S8 APO stereo-microscope and a Nikon D700 microscopic camera. Seed surface morphology details were obtained with Scanning Electron Microscope (JSM-IT 500 JEOL). The conservation status assessment was followed according to International Union for Conservation of Nature (IUCN 2023) criteria. The Geo CAT (Moat 2007) online tool available at Kew (http://www.rbgkew.org.uk/gis/cats) was used to calculate the Extent of Occurrence (EOO) and Area of Occupancy (AOO).

*Commelina badamica* **var. *palakondensis* .....var. nov.(Fig. 1-5)**

The variety is characterized by the presence of 2-3 nerved ligule, lower cincinnus with a single bisexual flower, ovary glabrous, three anthers elliptic and seed trapezoidal or oblong with yellowish warts.

**Type:** India, Andhra Pradesh, Kadapa District, Palkonda hills, 14°38'81.27"N, 78°64'70.03"E, 591 m.s.l.,12 Nov 2019, P. Sivaramakrishna and P. Yugandhar 0042 (holotype: CAL; isotypes: PBL).

Etymology

The variety epithet *palakondensis* is derived from its type locality.

Description

Annual herb, diffusely branched, c.15-30 cm in height, ascending to erect with definite base, root fibrous, often rooting from the basal nodes, stem branched, glabrous, cylindrical, green with pinkish stripes, nodes swollen, bent angular, internodes long, 4-8 cm; leaves distichous, leaf sheath tubular 0.5-0.8 cm, splitted longitudinally at branching or flowering points, leaf sheath coherent, ligule ovate to broadly elliptic, 2-3 nerved, firmly clasping the stem, leaves linear-lanceolate 4-4.5 x 0.3-0.5 cm, sessile, leaf base attenuate, sparsely ciliate, tip acute, margin entire, ciliate; Inflorescence-solitary spathe, leaf opposed, pedunculate, peduncle slender, 4-5 cm, hirsute, spathe 3-3.5 x 1-1.3 cm, condupilcate, lanceolate, 0.4-0.5 cm height, 1-2 cm long, base cordate, abaxially glabrous, adaxially puberulous, margins ciliate up to the middle of the spathe length, upper cincinnus with a single male flower, lower cincinnus with 4-5 flowers, first is the bisexual, remaining are male flowers, Male flower 0.8 x 1.2 cm, flowers dark blue, exerted, pedicellate, pedicel 0.7 cm in height, sepals 3, 0.3 x 0.3cm, slightly unequal, lateral sepals paired, broadly ovate to elliptic, concave at apex, third sepal boat shaped, petals-3, unequal, paired petals large, 0.6 x 0.7 cm, claw very short or indistinct, limb orbicular to sub-orbicular, margin slightly undulate, third petal sometimes reduced to linear scale like structure, stamens-3, equal, longer than staminodes, filaments pale blue, anthers elliptic, 0.3-0.4 cm, anthers yellow, longitudinal dehiscence, staminodes 3, equal, shorter than stamen filaments, filaments pale blue, 0.2 cm, antherodes cruciform (4-lobed), lemon yellow; Sepals and petals similar to male flower, slightly smaller in width, stamens and staminodes are similar to male flowers, anthers slightly small in

bisexual flowers; Ovary-oblong, 1 x 0.5 mm, bi-locular, pale green, glabrous, style slender, 2-3 mm long, stigma tri-lobed; Fruit-capsule single for spathe, inserted, fruit-oblong, 1.3 x 0.5 cm, pale green, glabrous, bilocular with prominent constriction in the middle, longitudinal dehiscencent, locules with 2-seeds, rarely 1-seeded, seeds brown, trapezoidal 2.5mm in length and 1.5mm wide or ovoid-oblong 3-3.3mm in length and 1.5mm wide, truncate at both ends, seed testa brown, dorsally reticulate and ventrally faintly reticulate, hilum linear, embryotega lateral, distinct, exserted, acute.

Phenology

Flowering and fruiting observed from November to January.

Habitat, ecology and distribution

*Commelina badamica* var. *palakondensis* grows on open rocky plateaus of dry deciduous forest. It grows isolatedly, but some places it grows in association with *Hyptis suaveolens* (L.) Poit. and*Heteropogon contortus* (L.) Roem. Endemic to the Eastern Ghats region of Andhra Pradesh State of the Peninsular India (Fig.4A).

Conservation status

Critically Endangered. *Commelina badamica* var.*palakondensis* is known from three localities with few individuals based on three collections. Only three clumps of plants were seen in type locality with 100-200 individuals, there are fewer than 50 mature individuals in a single location which is dominated by population of*Hyptis suaveolens* (L.) Poit. and *Heteropogon contortus*(L.) Roem. Because of the low AOO (12.000 km2), EOO (122.308 km2) and only three collections, the Endangered (EN) category is applied (EN B2ab(ii) (Fig.4B).

Similar species

*Commelina badamica var. palakonden* sis shares a common set of morphological characters with *C. badamica.* The characters such as habit-procumbent (ascending) with long internodes, leaf-linear to lanceolate, leaf sheath tubular, splitted at branching and flowering points, solitary inflorescence, flower petals-with short claw, fruit- solitary, oblong, bilocular, seed structure and surface patterns (dorsal surface with fine reticulations) are used as that of *C. badamica*but our collected specimen is markedly distinct by the presence of 2-3 nerved ligule, lower cincinnus with single bisexual flower in the lower cincinnus, anthers-elliptic, ovary glabrous seed-trapezoidal or oblong. Seed structure and surface patterns are very much unique among the species of Commelina. Considering these differences our specimen is proposed here as a varietal rank to *C. badamica i.e. C. badamica var. palakonden* sis. Although no population with intermediate characters was noticed during field study. The new variety collected from palakonda hill ranges of Andhra Pradesh state of Eastern Ghats of India while*C. badamica* is narrowly endemic to Badami Hill ranges of Karnataka, not reported in any other regions of Karnataka State of India. Distributional range of *C. badamica* and *C. badamica*var. *palakonden* sis are geographically isolated but they share similar ecology.

Additional specimens examined (paratypes)

India, Andhra Pradesh, Kadapa District, Guvvalacheruvu Ghat, 14°30'29.77"N, 78deg72'45.94"E, 383 m.s.l., 10 Dec 2020, P. Sivaramakrishna, P. Yugandhar 0056, India, Andhra Pradesh, Kadapa District, Devarakonda, 14deg12'11.56"N, 78deg56'55.92"E, 564 m.s.l., 28 Jan 2021, P. Sivaramakrishna 0081.

## Conclusions

*Commelina badamica var. palakonden* sis shares a common set of morphological characters and ecology with *C. badamica* with a small number of distinctive characters. Both taxa are geographically separated, the new variety collected from palakonda hill ranges of Andhra Pradesh state of Eastern Ghats of India while *C. badamica*is narrowly endemic to Badami Hill ranges of Karnataka state. Its distinctive morphological characters strongly supports as a varietal rank to *C. badamica.* Although no population with intermediate characters was spotted in the present study.Similar ecology might be the reason for its parallel evolution in these isolated geographical regions. *C. badamica var. palakonden* sis is distinct by the presence of 2-3 nerved

ligule, lower cincinnus with single bisexual flower in the lower cincinnus, anthers-elliptic, ovary glabrous seed-trapezoidal or oblong. Seed structure and surface patterns are very much unique and a key identification feature among the species of Commelina. It represents as new addition to science from India. The range of type locality of this new variety in Eastern Ghats is one of the richest regions for plant diversity in Eastern Ghats of India (Yugandhar, P. et al. 2021). The open rocky plateaus of dry deciduous forest areas were found to the most suitable habitat.

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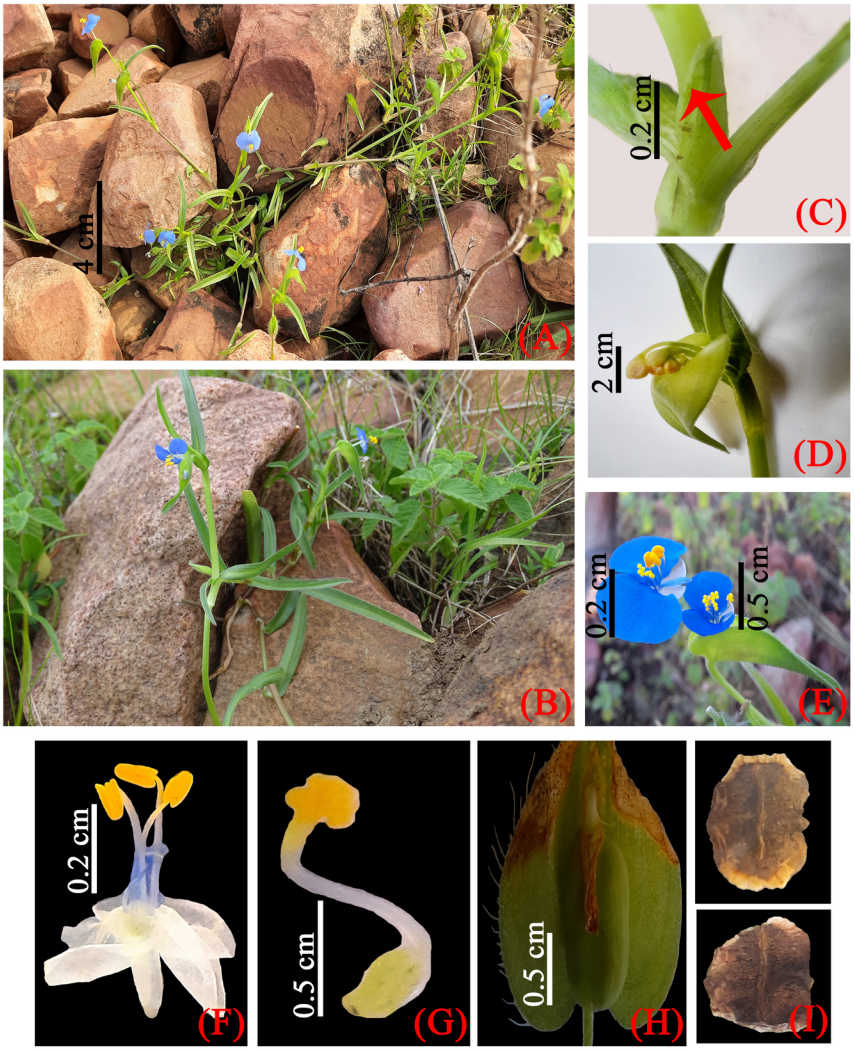

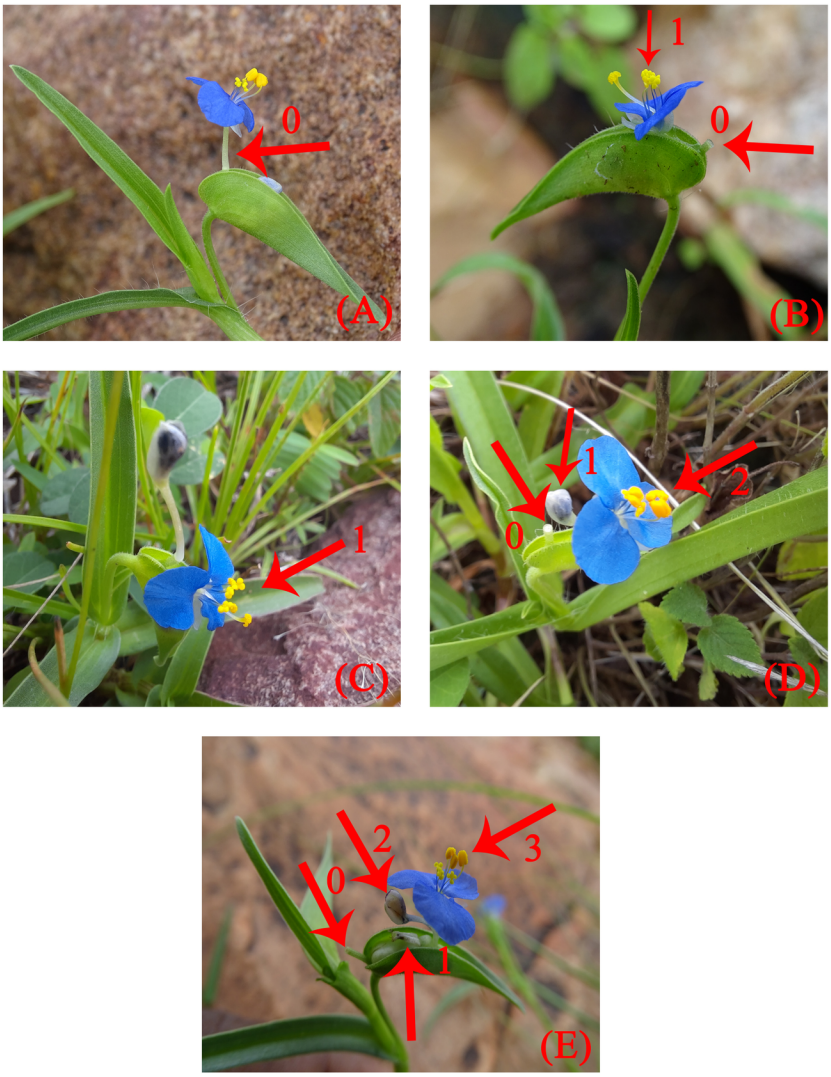

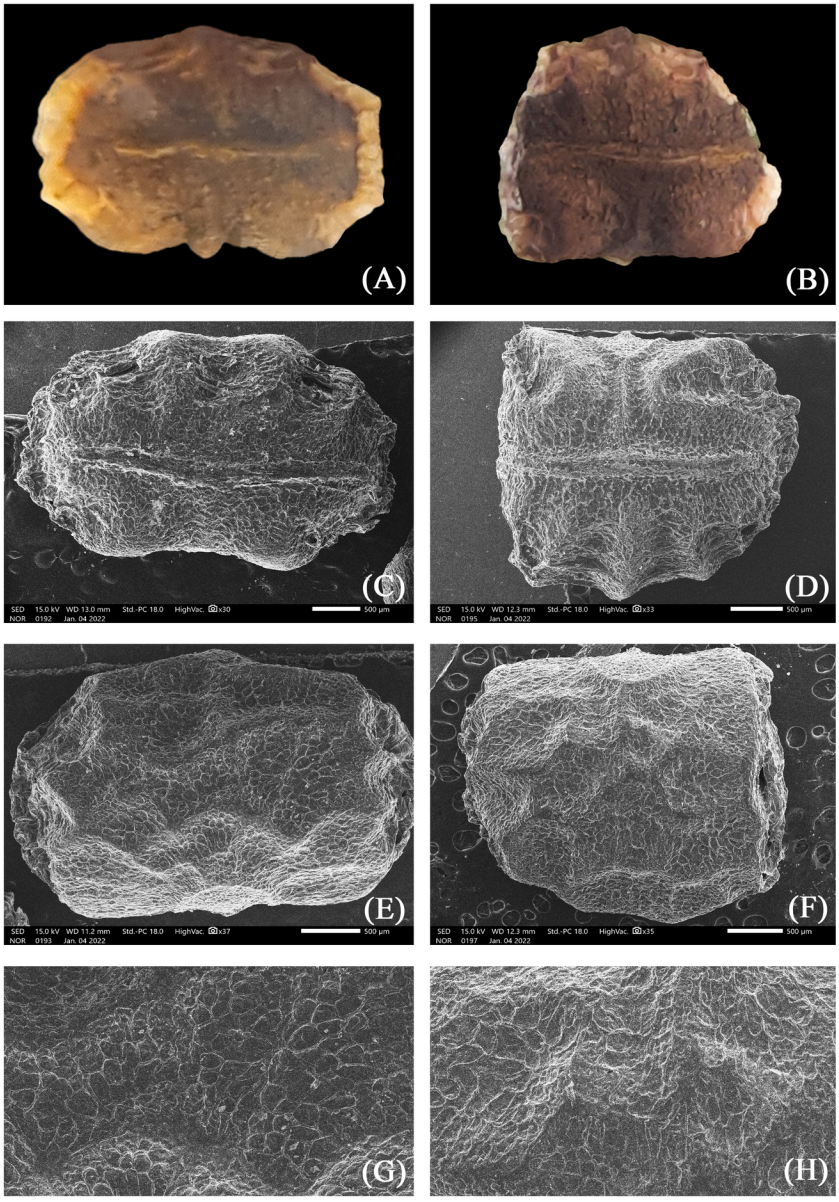

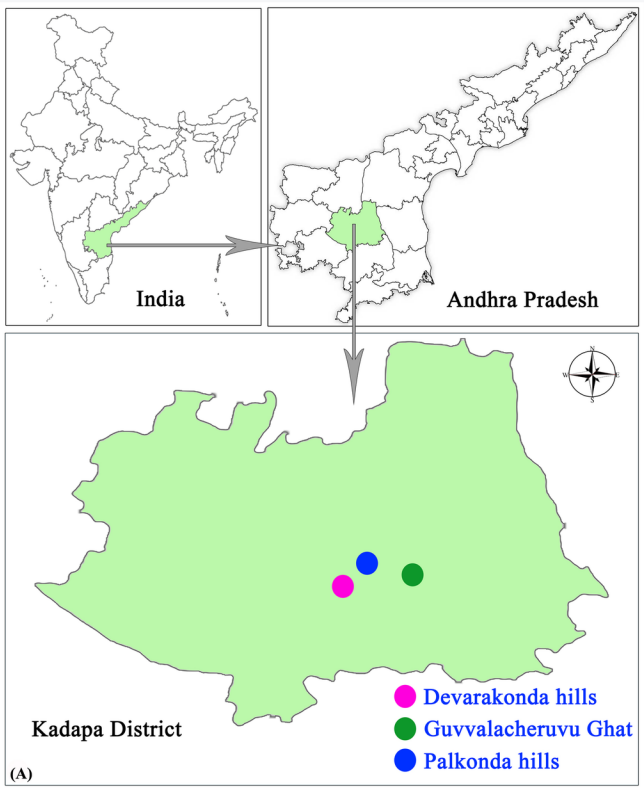


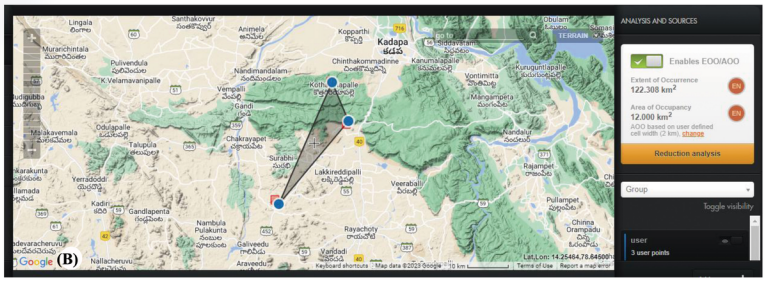


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