



Euphorbia ellipticaulis (Euphorbiaceae), a new species from Andhra Pradesh, India

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ABSTRACT: *Euphorbia ellipticaulis* sp. nov., a succulent shrub of subgenus *Euphorbia*, is newly described from Andhra Pradesh, India. It resembles *E. antiquorum* but differs in involucre bracts broadly oblong, ciliate at apex (versus broadly triangular, lacinate at apex in *E. antiquorum*); staminate flower bracteole filiform, bifid at apex (versus setaceous, deeply lacinate at apex); styles free from the base (versus styles connate up to middle). The new taxon also is close to *Euphorbia tortilis* in a few morphological features but differs in the rarely twisted nature of a few mature branches (versus twisting), ellipsoid internodes (versus oblong) and transversely elliptic-oblong involucre glands (versus transversely oblong in *E. tortilis*). A comprehensive taxonomic description, along with illustrations and a comparative analysis with closely related species, is provided to highlight its distinct characteristics.

KEY WORDS: Andhra Pradesh, *Euphorbia antiquorum*, *Euphorbia tortilis*, Kadapa District, Nandyal District, Succulent *Euphorbia*.

INTRODUCTION

The tribe Euphorbieae (Euphorbiaceae) is characterized by a cyathia inflorescence composed of a gland-bearing involucre of several united bracts and their associated flowers of bracteoles. Each bract subtends a monochasial staminate inflorescence, and these monochasia surround a single pistillate flower. The individual flowers in Euphorbieae are highly reduced and represented by a single stamen or ovary with or without a perianth. Cyathia shows more diversity in this group. Within each cyathium, the staminate flowers with bracteoles and the central pistillate flower (long-pedicillate or sub-sessile) are systematically arranged (Steinmann and Porter, 2002).

The genus *Euphorbia* L. is one of the largest and most diverse groups among angiosperms (Govarts *et al.*, 2000; Frodin, 2004). *Euphorbia* species have successfully adapted to diverse habitats worldwide (Pritchard, 2003; Bruyns *et al.*, 2006; Ozbilgin and Citoglu, 2012; Yang *et al.*, 2012), with more than 2,053 species currently recognized by Plants of the World Online (POWO, 2025). According to modern classification, which integrates phylogenetic analyses and morphological traits, four primary subgenera are recognized in the genus *Euphorbia* that are further divided into sections (Yang *et al.*, 2012; Dorsey *et al.*, 2013; Peirson *et al.*, 2013; Riina *et al.*, 2013). Within this framework, the succulent cactiform *Euphorbia* species of Africa and Asia are classified under the section *Euphorbia* (Dorsey *et al.*, 2013). Indian succulent species analysed in phylogenetic studies by Dorsey *et al.* (2013) form a distinct clade that includes *E. antiquorum* L., *E. caducifolia* Haines, *E. lactea* Roxb., *E. nerifolia* L., *E. nivulia* Buch.-Ham., and *E. vajravelui* Binjok. & N.P.Balacr.

Within India, the subgenus *Euphorbia* comprises 12 species of formerly documented succulents (Binojkumar and Balakrishnan, 2010) and thirteen recently described taxa, these include *E. gokakensis* S.R. Yadav, Malpure & Chandore (Malpure *et al.*, 2016), *E. venkatarajui* Sarojin. (Sarojinidevi, 2017), *E. belgaviensis* Sarojin. & Raja Kullayisw. (Sarojinidevi and Raja Kullayiswamy, 2018), *E. lakshmiinarasimhanii* Sardesai & Malpure (Malpure *et al.*, 2021a), *E. sahyadrica* Sardesai & Malpure (Malpure *et al.*, 2021b), and *E. ravii* A.Naray. & K.Prasad (Swamy and Prasad, 2022), *E. vajravelui* var. *thenensis* B.De Jong & R.W.Stewart (De Jong and Stewart, 2019) and *E. antiquorum* var. *longa* Sarojin. (Sarojinidevi, 2024) and *E. duerrii* Sarojin. & Raja Kullayisw. (Sarojinidevi and Raja Kullayiswamy, 2024), *E. paschimia* Malpure, P.S.Raut, Sardesai, & B.De Jong (Malpure *et al.* 2025), *E. yadavii* Malpure, P.S.Raut, Sardesai & B.De Jong (Malpure *et al.* 2025), *E. paraikalli* B. DeJong, Malpure & Mahalingam (De Jong *et al.*, 2025a), and *E. costatoalata* B.De Jong, Malpure & Mahalingam (De Jong *et al.*, 2025b). Most of these taxa are confined to the tropics and subtropics.

MATERIALS AND METHODS

Flowering twigs and propagules were collected from the Rachakuntapalli village of Kadapa District on 12th March 2025 to supplement earlier collections made during 2006 of this taxon that are under conservation within the Dharmavana Nature Ark. Herbarium specimens were prepared by standard protocol (Davies *et al.*, 2023). Cyathia were examined under Olympus SZ2-ILST stereomicroscope and images were captured using Magnus (Magcam DC5) camera attached. Online databases, protologues, and specimens from Kew¹, GBIF²,

**Table 1.** Comparison between *Euphorbia ellipticaulis* sp. nov. and allied species

Characters	<i>Euphorbia ellipticaulis</i>	<i>Euphorbia antiquorum</i>	<i>Euphorbia tortilis</i>
Habit	Shrubs up to 1.5 m tall	Arborescent trees up to 8 m tall	Small tree up to 3 m tall
Stem	3–4 (-5)-winged, seldom twisted, shape of internodes in cross section ellipsoid	3–4-winged, not twisted, shape of internodes in cross section angular	2–3-winged, twisted, shape of internodes in cross section angular
Cyathia	Dyads, 2–4 pairs at each eye, peduncles up to 8 cm long	Triads, 2–3 pairs at each eye, peduncles up to 1.5 cm long	Triads, 3 pairs at each eye, peduncles up to 6 mm long
Involucre	6 mm across, bracts broadly oblong, ciliate at apex, glands elliptic-oblong, largely pitted	8 mm across, bracts broadly triangular, lacinate at apex, gland elliptic-oblong, sparsely pitted	6 mm across, bracts broadly triangular, lacinate at apex, glands transversely oblong, sparsely pitted
Staminate flower bracteole	Filiform, bifid at apex	Setaceous, deeply lacinate at apex	Filiform, deeply lacinate at apex
Pistillate flower	Styles free from the base, stigmas slightly bifid at apex	Styles connate up to middle, stigmas each bifid at apex	Styles connate up to the middle, stigmas each bifid at apex
Capsules	Acutely keeled, recurved	Obtusely keeled, not recurved	Acutely keeled, not recurved
Seeds	Globose to sub-globose, 1.5–2 × 1.2–1.8 mm, brown	Globose, 2–2.5 × 2.5–3 mm, grayish brown	Sub-globose, 3–3.2 × 2.8–2.9 mm, brown

POWO³, JSTOR⁴ and BSI⁵ (links provided below) were scrutinized during the identification of the species, along with protologues of recently published taxa.

¹[https://records.data.kew.org/occurrences/search?taxa=Euphorbia+antiquorum#tab_recordImages & Euphorbia+tortilis#tab_recordImages](https://records.data.kew.org/occurrences/search?taxa=Euphorbia+antiquorum#tab_recordImages&Euphorbia+tortilis#tab_recordImages)

²[https://www.gbif.org/species/3069535 & 3068572](https://www.gbif.org/species/3069535&3068572)

³[https://powo.science.kew.org/taxon/urn:lsid:ipni.org:names:345613-1 & 927747-1](https://powo.science.kew.org/taxon/urn:lsid:ipni.org:names:345613-1&927747-1)

⁴[https://plants.jstor.org/search?filter=name&so=ps_group_by_genus_species+asc&Query=Euphorbia+antiquorum & Euphorbia+tortilis](https://plants.jstor.org/search?filter=name&so=ps_group_by_genus_species+asc&Query=Euphorbia+antiquorum&Euphorbia+tortilis)

⁵[https://ivh.bsi.gov.in/phanerogams-Details/en?link=MH00001063 & column=szBarcode & https://ivh.bsi.gov.in/phanerogams-general-collection/en?search_bar=Euphorbia+tortilis&selection=Scientific_Name](https://ivh.bsi.gov.in/phanerogams-Details/en?link=MH00001063&column=szBarcode&https://ivh.bsi.gov.in/phanerogams-general-collection/en?search_bar=Euphorbia+tortilis&selection=Scientific_Name)

TAXONOMIC TREATMENT

Euphorbia ellipticaulis Sarojin. & Raja Kullayisw., *sp. nov.* **Figs. 1–3.**

Type: India, Andhra Pradesh, Kadapa District, Rachakuntapalli village, 14.303913°N, 78.295735°E, 442 m, 03 March 2025, *N. Sarojinidevi & K. Raja Kullayiswamy DNA 899*. (Holotype: BSID; Isotypes: MH, SKU, CAL). Andhra Pradesh, Nandyal District, Srisailam, 16.064185°N, 78.874268°E, 526 m, 12 March 2025, *N. Sarojinidevi & K. Raja Kullayiswamy, DNA 908* (Paratype BSID).

Diagnosis: *Euphorbia ellipticaulis* resembles *E. antiquorum* L. in number of angles but differs in habit: shrubs up to 1.5 m tall (versus arborescent trees up to 8 m of *E. antiquorum*); shape of internodes ellipsoid (versus angular); cyathial peduncles less than 1 cm long (versus 1.5 cm long); involucre bracts broadly oblong, ciliate at apex (versus broadly triangular, lacinate at apex); staminate flower bracteole filiform, bifid at apex (versus setaceous, deeply lacinate at apex); styles free from the base (versus styles connate up to middle); capsules acutely keeled and recurved (versus obtusely keeled not recurved). It also resembles *E. tortilis* in the twisting nature seen in mature internodes and other characters viz., internodes 3–4(-5) winged (versus 2–3 winged in *E. tortilis*); involucre bracts broadly oblong (versus broadly triangular); glands elliptic-oblong (versus transversely oblong); styles free from the

base (versus styles connate up to middle) remaining characters tabulated in Table 1 and Fig. S1.

Description: Perennial shrubs up to 1.5 m tall, branches 3–4 (-5) winged, costate/fluted on stem latex milky. Younger branches green, older stems grey, segments (internodes) 8–15 cm long, ellipsoid in shape, slightly twisted. **Stipules** modified into spines, spine shield ellipsoid, spines divaricate, grey to black 5–8 mm long. **Leaves** found on shoot apex, early caducous 1–3 mm long triangular, obtuse at apex. **Inflorescence** terminal and axillary on dichotomously branched cymes, peduncles dyads (rarely triads), 2–4 pairs at each eye; primary peduncles up to 6 mm long and secondary peduncles up to 8 mm long. **Cyathia** 10–12 mm long, involucre cupular, 6 mm across, involucre bracts oblong, ciliate at apex, 0.7–0.9 mm long; glands 5–6, transversely elliptic-oblong, 1.5–2 × 0.8–1 mm, yellowish-green, largely pitted. **Staminate flowers** in 5–6 fascicles and 4–5 flowers per fascicle, 2–2.5 mm long, bracts lacinate, 1.5 mm long, bifid at apex; anthers dithecous, ellipsoid, 0.5 mm long, yellow. **Pistillate flower** laterally pendulous, 6–8 mm long, pedicel 4–5 mm long; styles 3, free from the base, each slightly bifid at apex. **Capsules** trigonous, glabrous, each lobe acutely keeled and recurved. **Seeds** globose to sub-globose, 1.5–2 × 1.2–1.8 mm, smooth, brown.

Distribution: The new species is known from the scrub forests of Rachakunta Palli and Lankamalla region in Kadapa District, as well as the Srisailam area of the Nandyal District, Andhra Pradesh, India.

Phenology: Flowering in February and fruiting (capsules) during March to April.

Habitat: *Euphorbia ellipticaulis* occurs predominantly in rocky crevices, coexisting with other taxa such as *Euphorbia antiquorum* L. (Euphorbiaceae) *Phyllanthus palakondensis* Raja Kullayisw. & Sarojin. (Euphorbiaceae), *Cymbopogon* spp. (Poaceae), *Carissa spinarum* L. (Apocyanaceae), *Croton scabiosus* Bedd. (Euphorbiaceae), *Grewia tenax* (Forsst.) Fiori, (Malvaceae) and *Commiphora* sp. (Burseraceae). The species is typically found at an elevation range of 250–530 m.

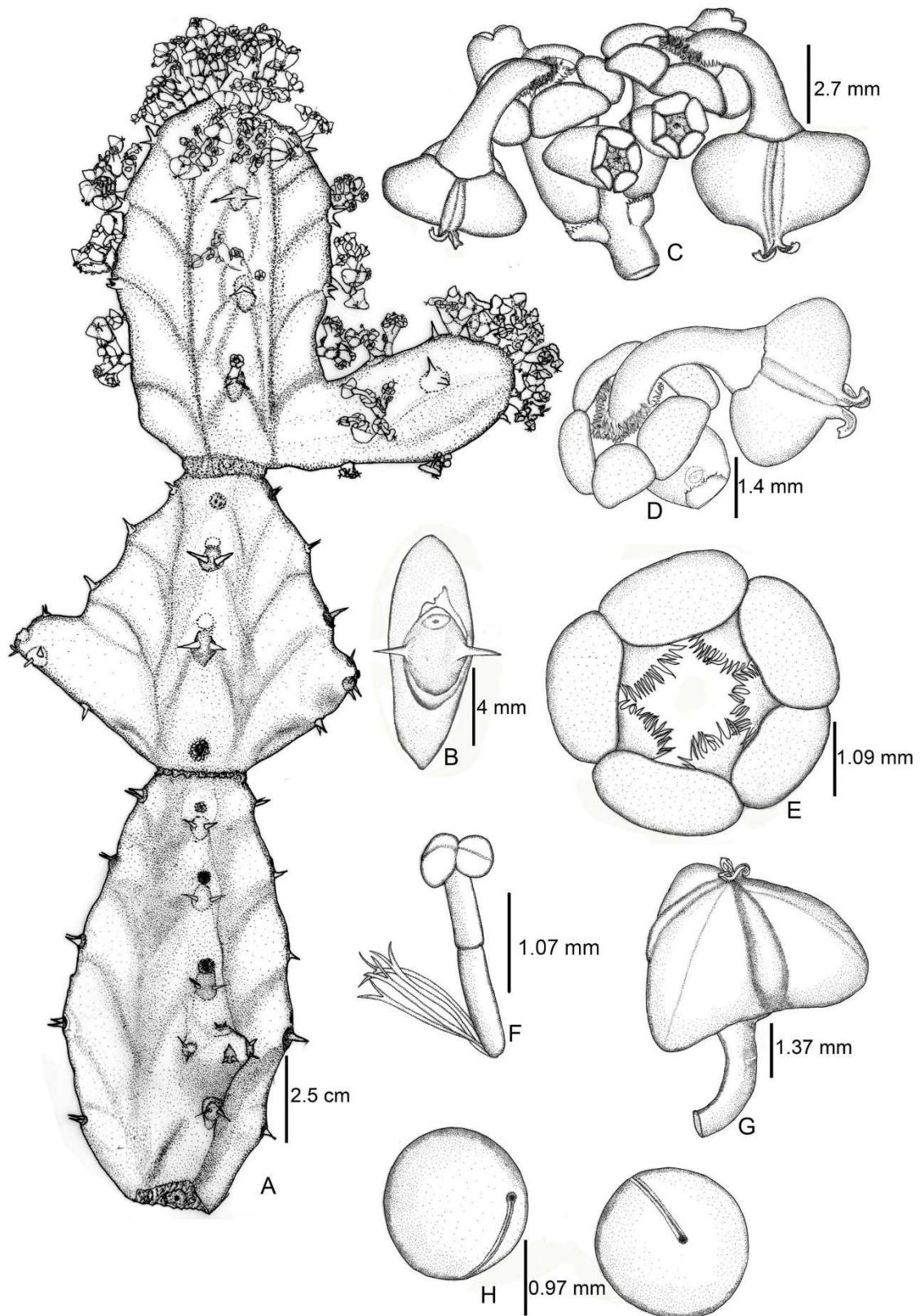


Fig. 1: *Euphorbia ellipticaulis* Sarojin. & Raja Kullayisw. sp. Nov. **A.** Habit; **B.** Spine shield; **C.** Pair of cyathia; **D.** Cyathium; **E.** Involucre with glands and bracts; **F.** Staminate flower with bracteole; **G.** Capsule; **H.** Seeds. (Illustrated by Sarojinidevi Naidu)

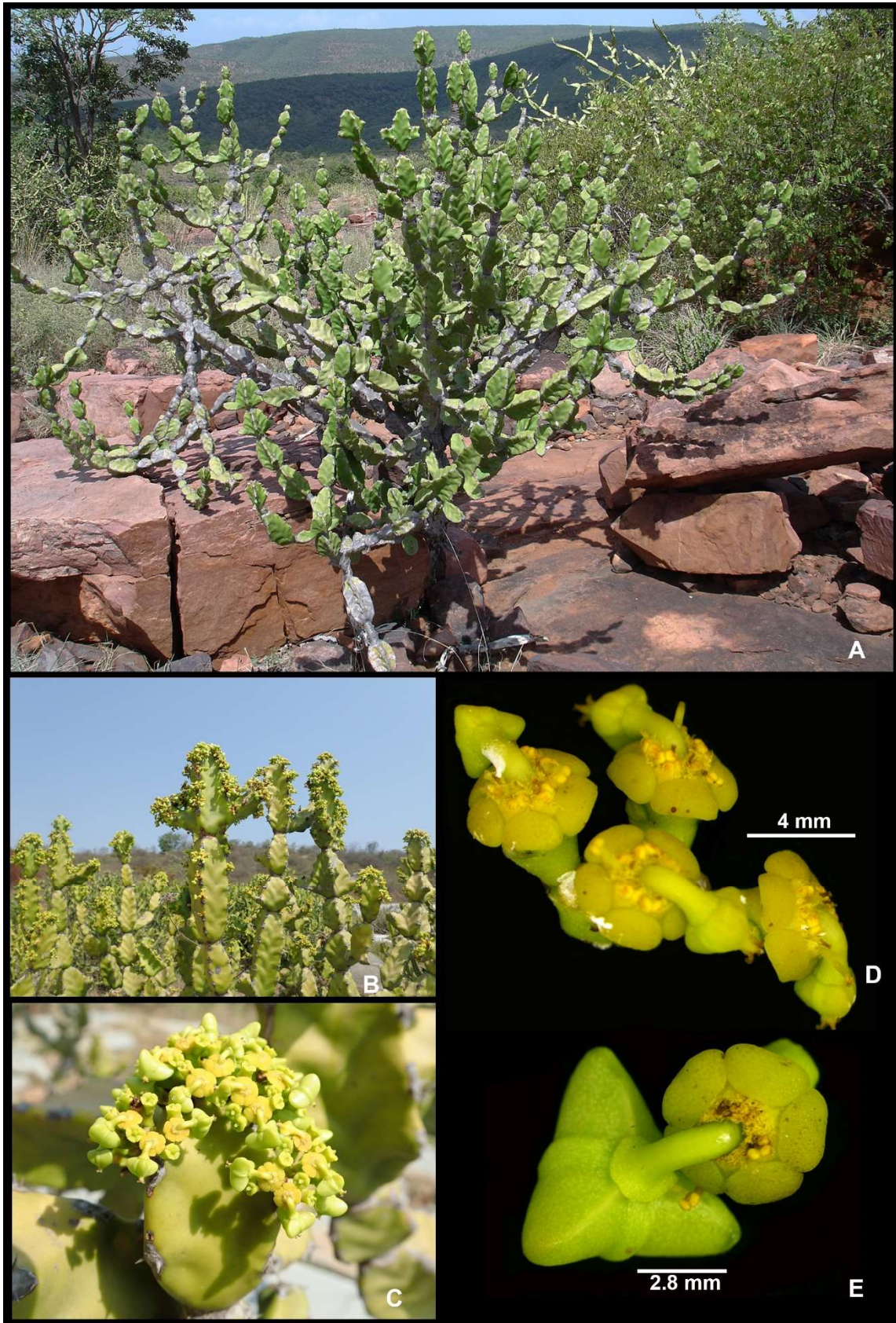


Fig. 2: *Euphorbia ellipticaulis*: A. Habit; B. Branches with inflorescence; C. Cyathia at shoot apex; D. Pair of cyathia; E. Cyathium.

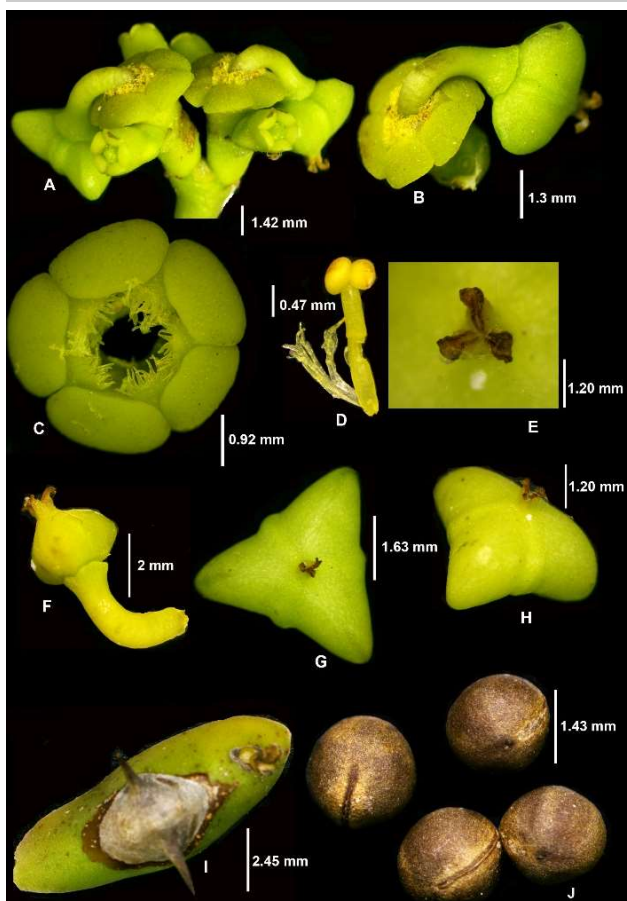


Fig. 3: *Euphorbia ellipticaulis*: **A.** Paired cyathia; **B.** cyathia; **C.** Involucre with glands and bracts; **D.** Staminate flower with bracteole; **E.** Style; **F.** Young pistillate flower; **G.** Capsule top view; **H.** Side view of capsule; **I.** Spine shield; **J.** Seeds

Etymology: The specific epithet “*ellipticaulis*” is based on the key character of the elliptic shape of the branch segments or internodes.

DISCUSSION

The subgenus *Euphorbia* comprises species exhibiting either terete or angled stems. The present taxon is characterized by a 3–5-angled stem, each internode including the main stem exhibiting an ellipsoid shape, an attribute not observed in any other known Indian succulent *Euphorbia* species. A comparative analysis with *Euphorbia tortilis* was conducted due to the rarely twisting nature observed in one or two mature branches. *Euphorbia tortilis* was first reported by Ainslie and Rottler (1826) who noted its resemblance to *Euphorbia antiquorum* L. but distinguished it based on its more prominently twisted branches. Subsequently, Wight (1844–45) provided the first formal description and illustration of *E. tortilis* in *Icones Plantarum*. He emphasized the necessity of further microscopic examination of cyathia for accurate taxonomic placement

within this group. Later, Binojkumar and Balakrishnan (1994) designated a neotype specimen from Tarangambadi, Thanjavur District of TamilNadu, housed at (MH) accompanied by a detailed morphological description and illustrations. *Euphorbia ellipticaulis* sp. nov. exhibits significant morphological differences from *E. tortilis* and *E. antiquorum* cyathial characters, leading to its taxonomic delimitation as a new species.

Euphorbia costatolata B. De Jong, Malpure & Mahal. and *E. ellipticaulis* sp. nov. occur in the same habitats within the Srisailam, Dornala and Pulivendula regions of Andhra Pradesh, typically in scrub forests (**Figs. S2-S4**). Although both species share the characteristic ribbed stem, they differ distinctly in all other morphological characters.

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Supplementary materials are available from Journal Website