

Euphorbia acolumella (Euphorbiaceae): a new species from Kadapa District of Andhra Pradesh, India

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Abstract: A new species of herbaceous *Euphorbia* is described from the Palakonda Hills of Kadapa District in Andhra Pradesh. It resembles *Euphorbia indica* Lam. but differs in certain characteristics such as stipules, male florets, capsules and seeds. This taxon is classified under the subgenus *Chamaesyce* section *Hypercifoliae*. The diagnostic features are compared and tabulated with closely related taxa in the present article.

Keywords: *Chamaesyce*, *Hypercifoliae*, India, Palakonda Hills.

Introduction

The genus *Euphorbia* L. is one of the largest tropical and subtropical genera in the family Euphorbiaceae containing over 2000 taxa (Yang *et al.*, 2012) featuring a special cyathium type of inflorescence. The genus has been classified into different subgenera and sections based on unique characters (Rafinesque, 1840; Boissier, 1862; Small, 1903; Millspaugh, 1913; Wheeler, 1939; Webster, 1967, 1994). The subgenus *Chamaesyce* Gray has the greatest diversity with around 600 taxa (Yang *et al.*, 2012) and is characterized by herbaceous habit with persistent leaves, sympodial branching due to lack of apical meristems, and possession of glandular appendages. This subgenus represents the most species-rich lineage of *Euphorbia* in India accounting for 35 percent of the taxa. It comprises 36 taxa, distributed across five sections: *Chamaesyce* Gray, *Elegantes* (Boiss.) Binojk. & N.P.Balakr., *Hypercifoliae* (Boisser) Pojero, *Longistylae* Binojk. & N.P.Balakr.,

and *Sclerophyllae* (Boiss.) Binojk. & N.P.Balakr. (Binojkumar & Balakrishnan, 2010) including the recently described *Euphorbia kadapensis* Sarojin. & R.R.V.Raju, *E. telanganensis* Sadas., K.Prasad & A.Ramakrishna, *E. vasudevaraoi* Hanum., Sarojin. & Raja Kullayisw. *E. yadagirensis* Sarojin. & Raja Kullayisw. (Sarojinidevi & Venkataraju, 2014; Sadasivaih *et al.*, 2022; Sarojinidevi & Raja Kullayiswamy, 2023; Raja Kullayiswamy *et al.*, 2023).

While conducting a field survey under the Dharmavana Nature Ark (DNA), Peninsular India Project one of the authors collected specimens of herbaceous *Euphorbia*. After critical examination, the specimens were identified as a new species of the subgen. *Chamaesyce* sect. *Hypercifoliae*.

Methodology

Live specimens were collected from the scrub forests of the Mabbuchintalapalli Village, Kadapa District, Andhra Pradesh, and stored in 80% ethanol. Herbarium specimens were prepared following the standard methods (Santapau, 1958; Jain & Rao, 1977). Flowers and fruits were used for microscopic observations and imaging, and a few cyathia were preserved in 70% ethanol for future reference. Microscopic images were taken with an Olympus stereo microscope SZ61, attached with a Magcam DC5 camera. To prepare samples for Scanning Electron Microscopy (SEM), pollen and seeds were dehydrated using 100% ethanol followed by air drying. After drying, samples were mounted on a stub with carbon tape. They were

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sputter coated with gold to increase conductivity. Finally, SEM images were captured using a Hitachi S-3400N microscope. Seeds were provided to the Dharmavana Nature Ark (DNA) for the *ex-situ* conservation of this species.

Taxonomic treatment

Euphorbia acolumella Sarojin. & Raja Kullayisw. *sp. nov.* **Figs. 1 & 2**

This species is closely related to *Euphorbia indica* Lam. in its branching pattern, oblong to elliptic leaves, and pubescent stems but differs in its lacinate stipules and bracteole, short peduncles of pistillate flower that are not pendulous, sub-equal limbs, and loculicidal capsules without a columella at the center.

Type: INDIA, **Andhra Pradesh**, Kadapa District, Mabbuchintalapalli, 14°21'23.8" N, 78°15'22.5" E, 358 m, 05.01.2023, *K. Raja Kullayiswamy* DNA-004 (holo MH!; iso BSID!, SKU!).

Prostrate herbs, up to 25 cm long. Latex milky. Stems branching radially from the stout root stock; stems sympodially branched; branches terete, pubescent; internodes 2.5–4 cm long; stipules interpetiolar, linear-lanceolate, lacinate, *c.* 1.5 × *c.* 1 mm, glandular trichomes present at stipular base, club shaped, 0.5 mm long. Leaves simple, opposite, sub-sessile; petiole *c.* 1.5 mm long, pubescent; lamina elliptic-oblong, 1–2 × 0.5–1 cm, sparsely hairy on adaxial, pubescent on abaxial, base oblique, margin entire, mucronate at apex, midrib prominent, lateral nerves obscure, 3–4 pairs. Cyathia 3–20 in axillary and terminal clusters; cyathial peduncles dichotomously branched, *c.* 3 mm long, pubescent. Involucre of cyathium turbinate, *c.* 2 mm long, pubescent; involucral bracts lacinate, *c.* 2 mm long; glands 4, oblong, *c.* 0.1–0.2 × 0.4 mm, pink; limb of gland sub-equal, white to pale pink, oblong, *c.* 0.2 × 0.4–0.7 mm. Staminate flowers 6–8, inserted within involucre, *c.* 1 mm long; bracteole lacinate, *c.* 0.4 mm long; anthers sub-globose, yellow, *c.* 0.2 mm long, dehiscence transversely. Pistillate flower

peduncle *c.* 1.2 mm long, straight (not laterally pendulous); ovary tricarpeal syncarpous, trilocular; styles three, fused from the base, *c.* 0.9 mm, long; stigmas simple, bifid at apex. Fruit is a loculicidal capsule, depressed globose, *c.* 4 mm long, dehisce to the middle (or less) from the top; cocci obscurely keeled, each lobe is free from other lobe; columella absent. Seeds 3 per capsule, ovoid to ovoid-oblong, *c.* 1.2 × *c.* 0.7 mm, brown, obscurely transversely furrowed, slightly rugulose.

Flowering & Fruiting: Flowering and fruiting from December to February.

Habitat & Distribution: *Euphorbia acolumella* is hitherto known from the Palakonda Hills, Kadapa District, Eastern Ghats, Andhra Pradesh, India. Plants were found growing in black gravelly soil, interspersed with calcium rock, in scrub forest near Mabbuchinthalapalli.

Etymology: The specific epithet "*acolumella*" refers to absence of columella in the capsule.

Notes: *Euphorbia acolumella* belongs to the subgen. *Chamaesyce* sect. *Hypercifoliae*, and is allied to *E. indica*, which is commonly found in cultivated fields. This species is found growing in the plains of scrub forests near the Palakonda Hills in Kadapa District. The plant exhibits unique features in comparison to its morphologically similar taxa such as multiple branches arising from a stout root stock, presence of club shaped glandular trichomes at the base and laterals of the lacinate stipules (Fig. 2f), staminate flowers showing lacinate bracteoles, pedicels of pistillate flower are short and not laterally pendulous, stigmas fused up to middle, bifid at apex, and depressed globose, capsules without columella. The tricarpeal capsule is a generic character of the genus *Euphorbia* except for *E. lathyris* L. which is drupaceous. Capsules of *Euphorbia* are generally 3-lobed, that dehisce to three bivalved cocci usually leaving a central columella. Each coccus splits up longitudinally into three valves along the inner structure ejecting the seed by the elastic twisting of the valves.

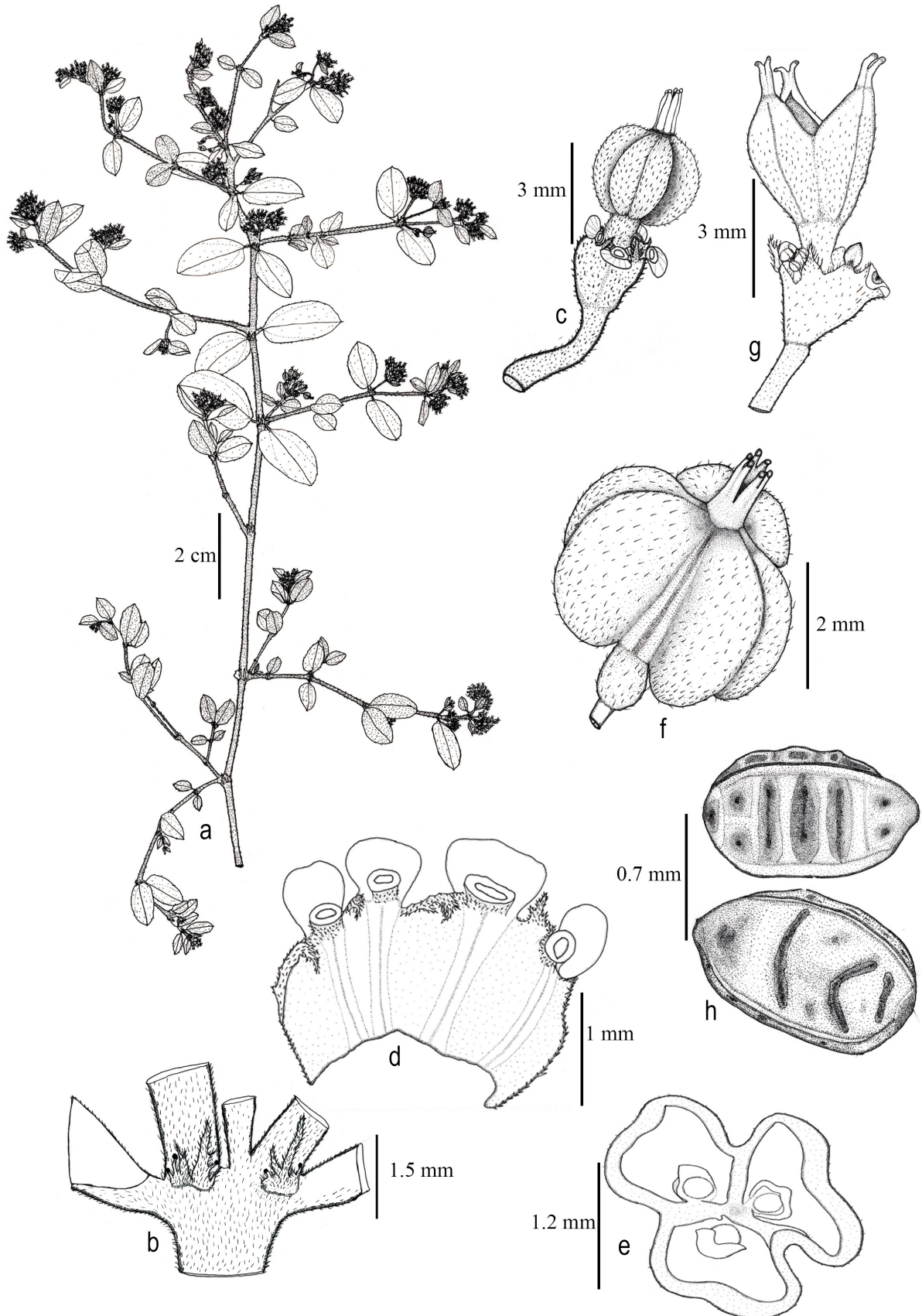


Fig.1. *Euphorbia acolumella* Sarojin.& Raja Kullayisw.: **a.** Habit; **b.** Stipules and glandular hairs; **c.** Cyathium; **d.** Involucral lobes with limbs and glands; **e.** Ovary—transverse section; **f.** Capsules; **g.** Dehiscent capsule; **h.** Seeds (drawn by Naidu Sarojini Devi).

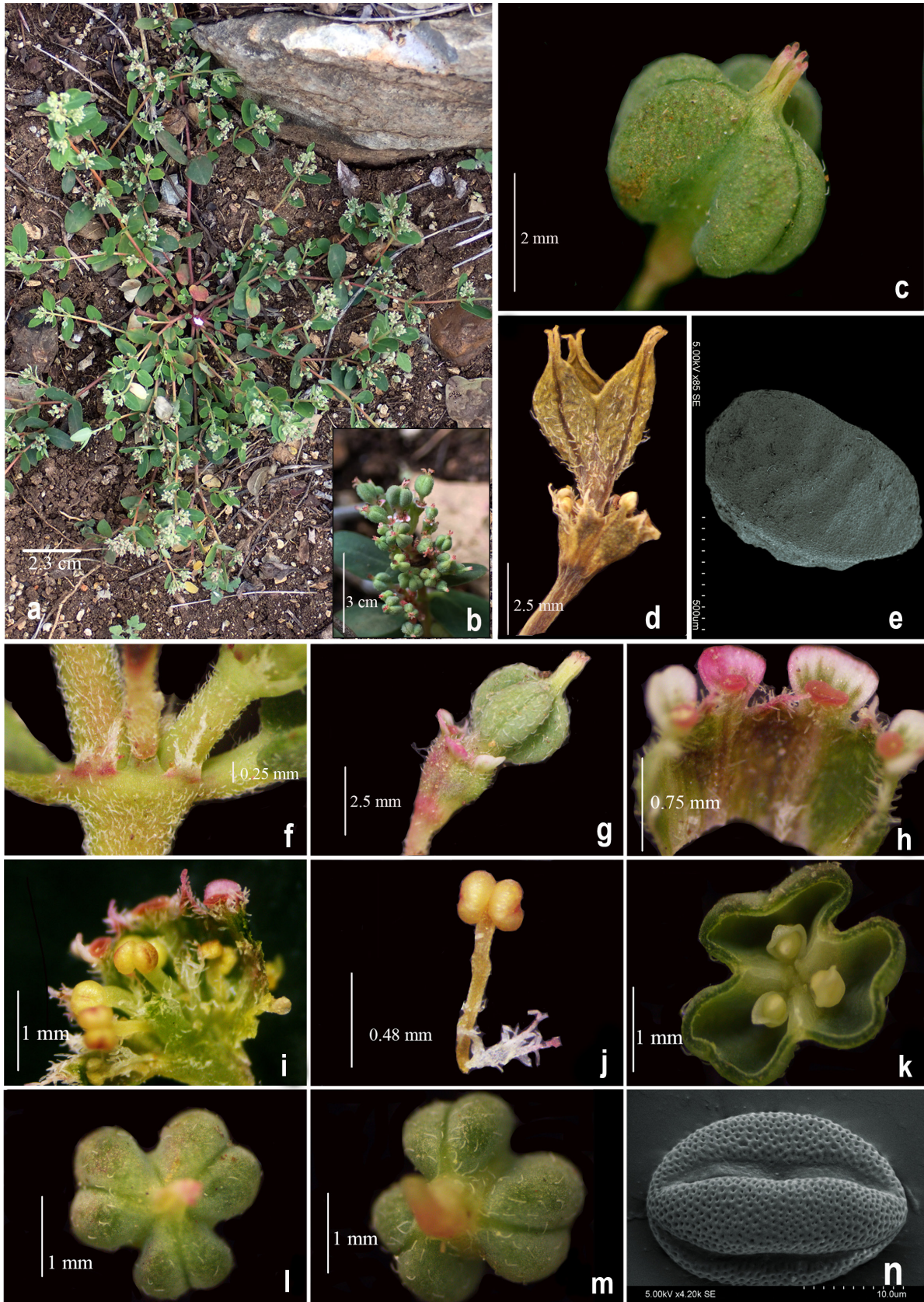


Fig. 2. *Euphorbia acolumella*: **a.** Habit; **b.** Cyathia at shoot apex; **c.** Pistillate flower; **d.** Capsule lobes after seed dispersal; **e.** Seed (SEM image); **f.** Stipules and glandular hairs; **g.** Cyathium; **h.** Involucre lobes with limbs and glands; **i.** Involucre split opened; **j.** Staminate flower with bracteole; **k.** Ovary—transverse section; **l.** Capsules top view; **m.** Capsule bottom view; **n.** Pollen grain (SEM image).

Table 1. Comparison between *Euphorbia acolumella* with allied species.

Characters	<i>Euphorbia acolumella</i> Sarojin. & Raja Kullayisw.	<i>Euphorbia indica</i> Lam.
Leaves	Mucronate apex, pubescent on abaxial, sparsely hairy on adaxial, lateral nerves 3–4 pairs	Obtuse at apex, crisped pubescent on abaxial and adaxial, lateral nerves 5–7 pairs
Stipules	Linear-lanceolate, laciniate	Triangular, setaceous
Staminate flowers	6–8, not in fascicles; bracteoles laciniate, hirsute	3–4, in 2 or 3 fascicles; bracteoles filiform, glabrous
Pistillate flowers	Gynophore pubescent; styles fused from the base; stigmas simple	Gynophore hirsute; styles free from the base; stigmas capitate
Capsule	Depressed globose, loculicidal, each lobe separated by septa; dehisce to the middle (or less) from the top	Sub globose, schizocarpic, lobes are connate; dehisce to the base
Columella	Absent	Present
Seeds	Slightly rugulose	Ridges and shallows

The presence of a loculicidal capsule and absence of the central columella (Fig. 2d & k) in *Euphorbia acolumella* is a noteworthy character within the genus *Euphorbia*, and has not been previously documented. Due to the absence of the columella, the capsule shape became depressed globose, dehisce to the middle (or less) from the top and also is important for seed dispersal. So far, all reported *Euphorbia* species feature a columella at the centre axis of the capsule.

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