



## *Rotala dhaneshiana*, a new species of Lythraceae from India

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### Abstract

*Rotala dhaneshiana*, a new species of Lythraceae collected from a semi-marshy area of Wayanad Wildlife Sanctuary in Kerala, India is described and illustrated. It is closely allied to *R. malampuzhensis* usually in having trimerous flowers, but differs in having 4-angled, narrowly winged stems, long epicalyx lobes alternating with sepals, obovate-apiculate petals, and absence of nectar scales. It resembles *R. juniperina*, an African species in having trimerous flowers but differs in having sessile, decurrent-based leaves and sessile pistil.

**Key words:** Endemic species, Kerala, Myrtales, Wayanad Wildlife Sanctuary

### Introduction

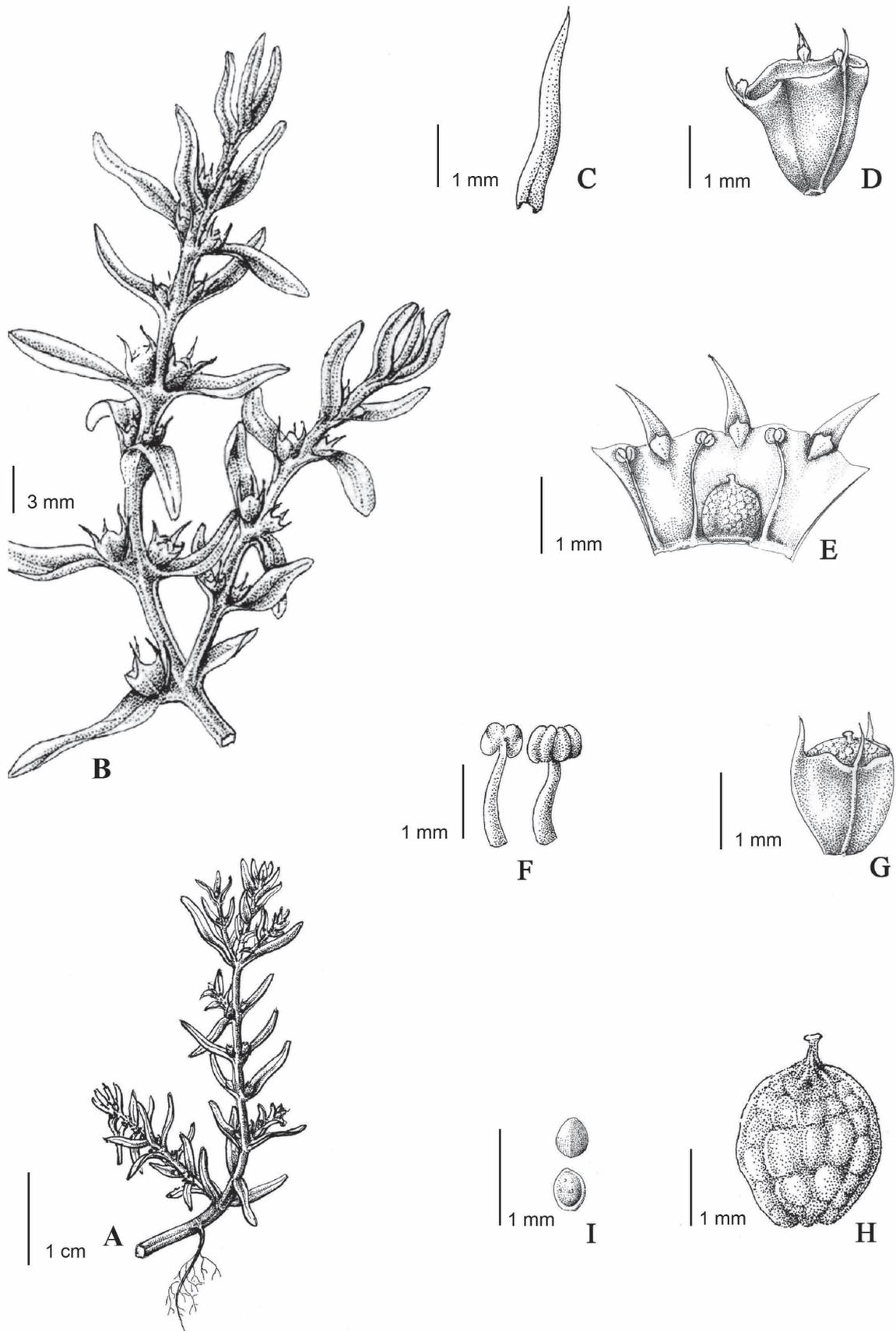
The genus *Rotala* Linnaeus (1771: 143, 175) (Lythraceae) has tropical and subtropical distribution and is represented by more than 50 species of aquatic or amphibious plants. Cook (1979) in his revision of the genus recognized 44 species including 19 Indian species. After Cook's revision, additional species were described from India: *Rotala cookii* Joseph & Sivarajan (1988: 143), *R. vasudevani* Joseph and Sivarajan (1989: 195), *R. malabarica* Pradeep *et al.* (1990: 59), *R. andamanensis* Mathew & Lakshminarasimhan (1990: 189), *R. belgaumensis* Yadav *et al.* (2010: 499), *R. tulunadensis* Prasad *et al.* (2012: 58), *R. khaleeliana* Sunil *et al.* (2013: 14), *R. meenkulamensis* Prasad & Raveendran (2013a: 105), *R. kasaragodensis* Prasad & Raveendran (2013b: 451) and *Rotala sahyadrica* Gaikwad *et al.* (2013), summing up 29 species of *Rotala* in India, of which 24 are from Peninsular India.

During a recent floristic exploration in Wayanad Wildlife Sanctuary in Kerala, India interesting specimens belonging to the genus *Rotala* were collected. Critical study and analysis revealed that they are distinct from the hitherto known taxa of the genus and are described here as a new species.

### Taxonomy

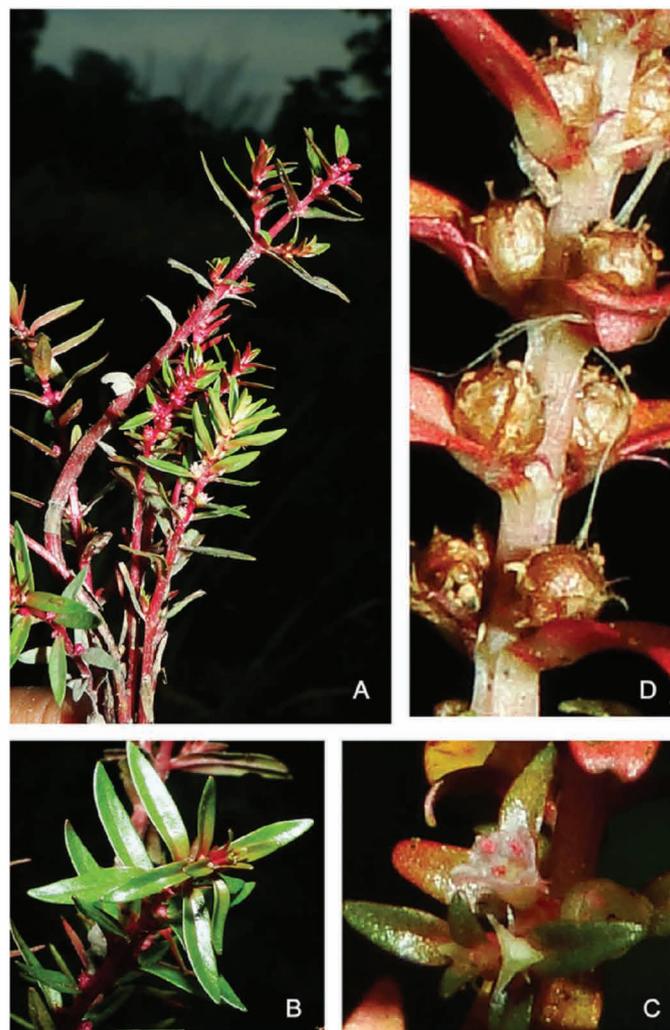
*Rotala dhaneshiana* Sunil, Ratheesh & Sivadasan, *sp. nov.* **Type:**—INDIA. Kerala: Wayanad District, Muthanga Range of Wayanad Wildlife Sanctuary, Maragadha, semi-marshy area, 900 m, 18 September 2012, *Sunil & Ratheesh Narayanan 2211* (holotype CAL!, isotypes MH!, TBGT!). Figures 1 & 2.

*Rotala dhaneshiana* resembles *R. malampuzhensis* in having decussate leaves and usually trimerous flowers, but differs in having 4-angled stems, prominent long epicalyx lobes, obovate, apiculate petals, and absence of nectar scales.



**FIGURE 1.** *Rotala dhaneshiana* A. Habit. B. A portion of flowering twig. C. Bract. D. Single flower. E. Floral tube cut-opened showing pistil, stamens, petals and epicalyx-lobes. F. Stamens—abaxial and adaxial views. G. Mature fruit enclosed in floral tube. H. Capsule. I. Seeds. Drawings by T. Shaju from live specimens.

Erect marshy-terrestrial annuals, growing singly, not in tufts. Stems single, branched, up to 50 cm high, rooting from nodes below, branches erect, inconspicuously 4-angled, obscurely ribbed, often narrowly winged on younger branches, up to 4 mm diam., internodes slightly swollen, floral branches 2–16 cm long, rarely branched. Leaves simple, decussate, sessile, reddish-tinged when mature, 1.5–3.5 × 0.3–0.6 cm, linear-lanceolate to oblong, base slightly cordate to semi-amplexicaule, margin entire, apex acute, midrib prominent below, canaliculate above. Flowers solitary in axils, sessile, monomorphic, usually trimerous, occasionally tetramerous, 2.0–2.5 mm long and 1.0–1.5 mm diam.; bracts dimorphic, resembling foliage leaves, those on main stem larger, those on floral branches smaller, 2–6 × 0.5–2.0 mm, ovate or elliptic, usually red-tinged; bracteoles 2, reddish, 1.5–2.0 mm long, linear-lanceolate, tip acuminate, sometimes curved, equal to or exceeding floral tubes; epicalyx lobes narrowly triangular, tip acuminate, 0.75–1.0 mm long, longer and alternating with sepals; floral tube campanulate, reddish, glabrous, 1.5–2.0 mm long, sepals 3 or 4, each ca. 0.25 mm long, very shallowly-triangular; nectar scales absent; petals 3 or 4, persistent, obovate, apiculate at apex, rose to white in colour, ca. 0.25 × 0.2 mm long; stamens 3 or 4, inserted above the base of the floral tube, equaling to the level of floral tube, filaments white, 0.75–1.0 mm long, anthers globose, 2-celled, dehiscence introrse; ovary globose, sessile, 3-locular, slightly trilobed, 0.5–0.75 × 0.4–0.5 mm, style very short, ca. 0.25 mm long, stigma capitate. Capsule globose, 3-valved, equal to or slightly exceeding floral tube, ca. 1.5 mm long and ca. 1 mm diam., reddish; seeds numerous, plano-convex, 0.25–0.3 mm long, bright red.



**FIGURE 2.** *Rotala dhaneshiana* A. Habit. B. A portion of twig. C. Single flower. D. A portion of twig with mature fruits.

**Flowering & Fruiting:**—October–December.

**Ecology:**—*Rotala dhaneshiana* was collected from an open semi-marshy area in moist deciduous forest.

**Etymology:**—The specific epithet is in honour of Mr. P. Dhanesh Kumar, Divisional Forest Officer, South Wayanad Forest Division, Kerala who received the ‘Sanctuary Wildlife Award - 2012’, instituted by the Sanctuary Asia Magazine for his valuable and tireless efforts in protecting the forest of the State. He is a courageous forest officer and

a visionary environmentalist who has undertaken herculean tasks to protect the wilderness in various parts of India.

**Affinities:**—*Rotala dhaneshiana* is allied to *R. malampuzhensis* in having decussate leaves and usually trimerous flowers, but differs by 4-angled, ribbed, narrowly winged stems, long epicalyx lobes alternating with sepals, and obovate, apiculate petals. Presence of three linear nectar scales alternating with stamens in *R. malampuzhensis* is a distinguishing character which is absent in *R. dhaneshiana*. Nectar scales have been reported in species like *R. cookii*, *R. malabarica*, *R. malampuzhensis*, *R. mexicana* Schlechtendal & Chamisso (1830: 567), and *R. vasudevani* of Peninsular India. In *R. malampuzhensis* epicalyx lobes are minute or sometimes absent in contrast to the long and very prominent lobes of *R. dhaneshiana*. The new species also resembles the African *Rotala juniperina* Fernandes (1974: 126) in having dimorphic bracts, usually trimerous flowers, long epicalyx lobes alternating with sepals and absence of nectar scales, but differs in having sessile leaves with a decurrent base, reddish when mature, occasional tetramerous flowers, obovate rose to white petals, stamens inserted near base of the floral tube, sessile pistil and reddish seeds, while in *R. juniperina* leaves are petiolate with rounded base, green when mature, flowers consistently trimerous, petals elliptic and red, stamens attached slightly below the middle of the floral-tube, pistil stipitate and seeds white.

Comparison of characters of *Rotala dhaneshiana* with *R. juniperina* and the closely similar species *R. malampuzhensis* is provided in Table 1.

**TABLE 1.** Comparison of characters of *Rotala dhaneshiana*, *R. juniperina* and *R. malampuzhensis*.

Characters	<i>R. dhaneshiana</i>	<i>R. juniperina</i>	<i>R. malampuzhensis</i>
Habit	Erect branched annuals	Erect profusely branched annuals	Tufted creeping annuals
Stem	Inconspicuously four-angled, narrowly winged on younger branches	Four-angled, conspicuously winged at angles	Terete, not winged
Leaves	Sessile, base decurrent, reddish when mature, 1.5–3.5 cm long	Petiolate, base rounded, greenish, 0.4–1.2 cm long, occasionally in whorls of 3	Sessile, base rounded, greenish, up to 1.5 cm long
Bracts	Dimorphic	Dimorphic	Monomorphic
Bracteoles	Equaling or exceeding the level of floral tube	Equaling the floral tube	Equaling the floral tube
Flowers	Usually trimerous, occasionally tetramerous	Strictly trimerous	Strictly trimerous
Epicalyx lobes	Ca. 1.0 mm long, longer than sepals	Ca. 0.75 mm long, longer than sepals	Minute, sometimes absent
Petals	Obovate, apiculate at apex, rose to white, 0.2–0.25 mm long	Elliptic, slightly apiculate at apex, red, up to 0.5 mm long	Elliptic, acute at apex, bright red, 0.2–0.25 mm long
Nectar scales	Absent	Absent	Three, prominent, alternating with stamens
Stamens	Inserted near the base of the floral tube	Inserted slightly below the middle of the floral tube	Inserted above the base of the floral tube
Pistil	Sessile	Stipitate	Sessile
Capsule	Obovoid, equaling or longer than the floral tube	Sub-globose, equaling the floral tube	Globose, longer than the floral tube
Seeds	Bright red	White	Bright red or yellow

**Distribution:**—*Rotala dhaneshiana* is restricted to semi-marshy areas in the moist deciduous forests at elevations of ca. 800–900 m. inside the Wayanad Wildlife Sanctuary. It is usually seen near temporary water bodies in the area and grows in association with *Eriocaulon quinqueangulare* Linnaeus (1753: 87), *Fimbristylis dichotoma* (Linnaeus 1753: 50) Vahl (1805: 287), *Imperata cylindrica* (Linnaeus 1759: 878) Beauvois 1812: 165), *Lindernia anagallis* (Burman filius 1768: 135) Pennell (1943: 252), *Cyperus tenuispica* Steudel (1854: 11), *Centranthera indica* (Linnaeus 1753: 603) Gamble (1924: 971) and *Arundinella leptochloa* (Nees ex Steudel 1853: 62) Hooker filius (1896: 76).

**Conservation:**—In both the locations of collections, populations of this new species are small. Our observations showed that there were less than hundred mature individuals in a 1 km<sup>2</sup> area each in Margadha and Nallorvayal, and the populations are highly fragmented. More field explorations are essential to assess a conservation status through IUCN guidelines and criteria (IUCN 2012, 2014); since it has not been evaluated until now, *Rotala dhaneshiana* is now categorized as ‘Not Evaluated’ (NE).

**Paratype:**—INDIA. Kerala: Wayanad District, Nallorvayal, 12 September 2013, *Sunil & Ratheesh Narayanan*

MSSH 4212 (Community Agrobiodiversity Centre (CAbC)-MS Swaminathan Research Foundation Herbarium, Wayanad!).

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