

# *Pilea hyalina* (Urticaceae), a new record for Asia from Peninsular India

Jeomol K.K. & P. Sunojkumar

Department of Botany, University of Calicut, Malappuram, Kerala – 673 635, India  
E-mail: jeomolmanudev@gmail.com; drsunoj@gmail.com

**Abstract:** *Pilea hyalina* Fenzl (Urticaceae), a species indigenous to the Neotropics is reported here as a new record for Asia based on collections from four South Indian states (Karnataka, Kerala, Maharashtra and Tamil Nadu). This species had previously been known to occur only in Central and South America, but has recently been reported from Hawaii and Belgium, outside its area of nativity. A detailed description along with an illustration and photographic images are provided. The number of species of *Pilea* in Peninsular India is seven, according to the present report.

**Keywords:** India, New record, *Pilea pumila*, *Pilea wightii*.

## Introduction

*Pilea* Lindl. (Urticaceae) is one of the most species-rich genera in the Eudicot Rosids and the largest genus in its family (Monro, 2006) comprising 600–715 species (Adams, 1970; Burger, 1977; Monro, 2004). It is widely distributed in the tropics, subtropics and warm temperate regions worldwide. Southeast Asia is considered as the center of morphological and phylogenetic diversity, while the Greater Antilles and the Andean countries as the centers of species diversity (Monro, 2006). Literature survey revealed a total of c. 35 species of *Pilea* in India (Hooker, 1888; Clarke, 1889; Tuyama, 1966; Chen & Monro, 2003; Chen *et al.*,

2007; Sojan *et al.*, 2017), with a greater diversity in the Northeastern states. In the Western Ghats, only six species (*Pilea angulata* (Blume) Blume, *P. kingii* C.E.C.Fisch., *P. melastomoides* (Poir.) Wedd., *P. microphylla* (L.) Liebm., *P. victoriae* V.Suresh & Sojan and *P. wightii* Wedd.) are reported (Fischer, 1928; Nayar *et al.*, 2014; Sojan *et al.*, 2017). The genus *Pilea* comprises succulent herbs, epiphytes and shrubs, growing in shallow substrates in moist and shaded habitats. It can easily be delimited from other genera of the tribe Elatostemateae Gaudich. by a combination of characters such as opposite leaves with linear cystoliths, single ligulate, intrapetiolar stipules in each leaf axil (sometimes reduced or absent), non-capitate cymose or paniculate inflorescence and 3–5-parted perigonium.

As a part of an ongoing taxonomic revision of the family Urticaceae in Peninsular India, the first author undertook extensive floristic explorations in different areas in Peninsular India during 2016–2019. Luxuriant growth of several populations of a pellucid and succulent stemmed species of *Pilea* was found growing in different parts of Peninsular India. A thorough morphological analysis of the collected specimens showed striking differences with Indian and Asian species reported so far. Extensive examination of the relevant literature and herbarium specimens housed in major herbaria (BSI, CALI, JCB, K, MH, P & TBGRI) helped us to infer that the taxon has been collected by many authors (Saldanha, 1984; Sasidharan, 1998; Jomy Augustine, 2000) previously but misidentified either as *P. kingii* C.E.C.Fisch. or *P. wightii* Wedd. The

newly collected species can be distinguished by a combination of characters such as sparsely hairy leaves with blunt serrations, 2–4 axillary cymes, peduncles shorter than the petioles, 2-tepaled male flowers and muricate, brown achenes against glabrous leaves with sharp serrations, single axillary cymes, peduncles longer than the petioles, 4-tepaled male flowers and smooth, pale white to pale yellow or green achenes in *P. wightii*. On the other hand, *P. kingii* differs in having large, unequal pairs of ovate-lanceolate leaves with acuminate or cuspidate apex, prominent stipules and 4-tepaled staminate flowers.

Information about this taxon has never been recorded in any of the publications from India or Asia. Hence a detailed search was conducted on literature pertaining to Neotropical *Pilea* (Miquel, 1853; Killip, 1937; Standley & Steyermark, 1952; Burger, 1977; Boufford, 1997; Monroe, 2001) which enabled us to identify the specimen as *P. hyalina* Fenzl which is native to Central America, Lesser Antilles, Mexico and South America (Acevedo-Rodríguez & Strong, 2012). This species is difficult to distinguish from the closely similar *P. pumila*, a species extending its distribution from North America to East Asia (Boufford, 1997; Chen & Monroe, 2003). The identity was further confirmed by Alex K. Monroe, Kew (Pers. Comm. dated 02.05.2019 & 04.10.2019). Therefore, the present study constitutes a new species record of *Pilea* for Asia. A comparison of morphological characters of closely similar species of *Pilea* is provided in Table 1 to facilitate precise identification.

## Materials and Methods

The description of the species is based on live specimens collected from different parts of Peninsular India and collections maintained in Calicut University Botanic Garden (CUBG). A detailed comparative morphological study was carried out with specimens of closely resembling species and by referring to herbarium specimens housed at various herbaria (BISH, BR, BSI, C, CALI, F, HAL, JCB, K, MH, P, S & TBGRI). Field

photographs were taken with a Sony α65 DSLR Camera and morphological observations were made using a Leica M80 stereo microscope attached to a digital camera.

## Taxonomic treatment

***Pilea hyalina*** Fenzl, Denkschr. Kaiserl. Akad. Wiss., Wien, Math. –Naturwiss. Kl. 1: 256. 1849. *Adicea hyalina* (Fenzl) Kuntze, Revis. Gen. Pl. 2: 622. 1891. *Urtica arvensis* Poepp. ex Fenzl, Denkschr. Kaiserl. Akad. Wiss., Wien, Math. –Naturwiss. Kl. 1: 256. 1849, *pro syn. Lectotype* (designated by Monroe, 2001): PERU [Peruvia subandina], Cuchero [prope Cuchero ad fossas cultorum], 12.1829, *Poeppig s.n.* (C?).

*Pilea lundii* Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Math. Afd. ser. 5, 2: 299. 1852. *Adicea lundii* (Liebm.) Kuntze, Revis. Gen. Pl. 2: 623. 1891. *Lectotype* (designated by Monroe, 2001): BRAZIL [Brasilia], *s.loc.*, *s.d.*, *Lund s.n.* (C [C10019755 digital image!]).

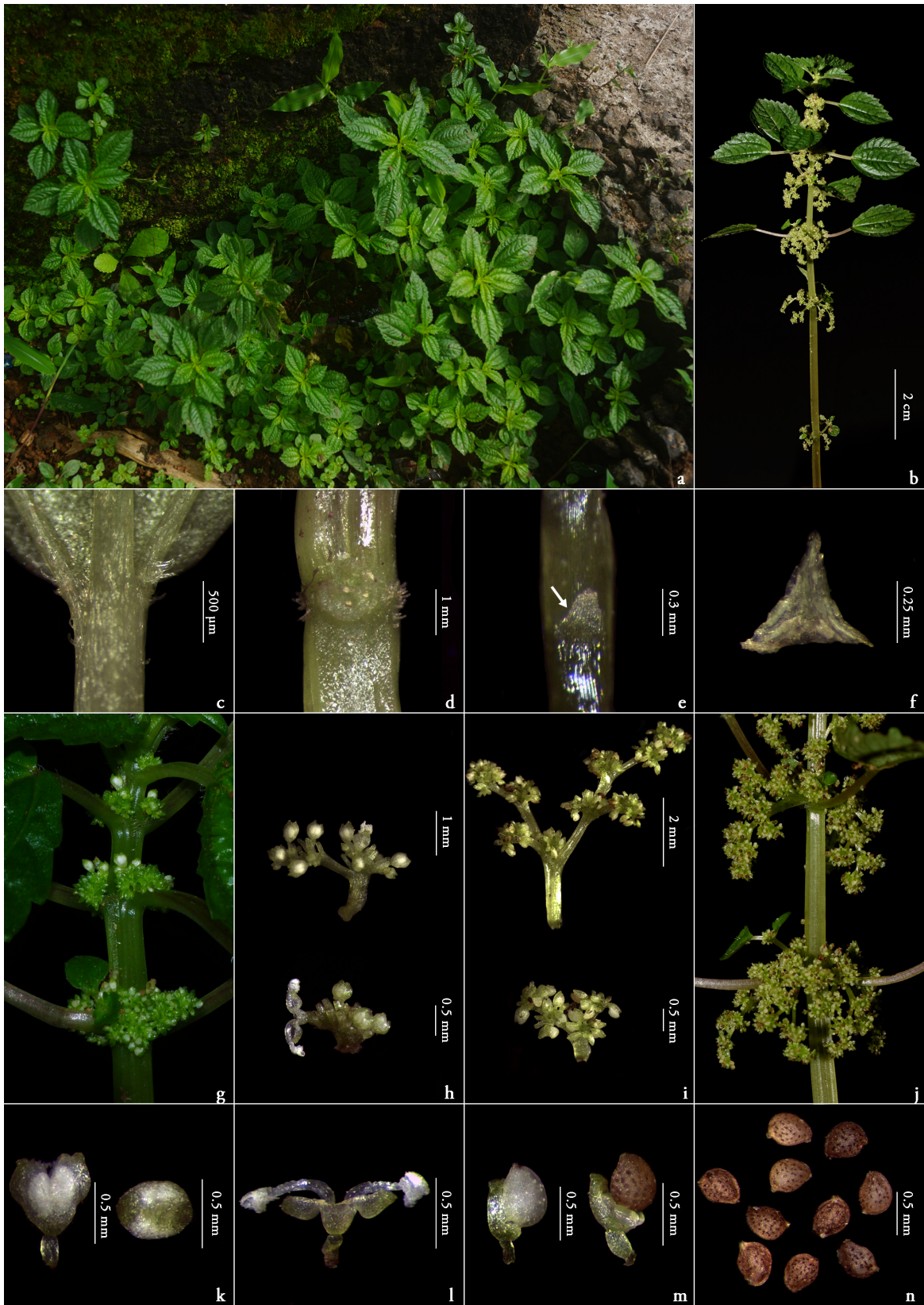
*Pilea scrobiculata* Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Math. Afd. ser. 5, 2: 300. 1852. *Adicea scrobiculata* (Liebm.) Kuntze, Revis. Gen. Pl. 2: 623. 1891. *Type*: MEXICO, Oaxaca, Trapiche de la Concepción [Trapiche de la Concepción Dep. Oajaca], 07.1842, *Liebm. s.n.* (holo C [C10019754 digital image!]).

*Pilea hyalina* Fenzl var. *longipes* Miq. in Mart., Fl. Bras. 4(1): 201. 1853. *Urtica longipes* Mart. ex Miq. in Mart., Fl. Bras. 4(1): 201. 1853, *pro syn. Type*: Not traced.

*Urtica succulenta* Salzm. ex Hook.f., Trans. Linn. Soc. London 20 (2): 182. 1847, *pro syn.*

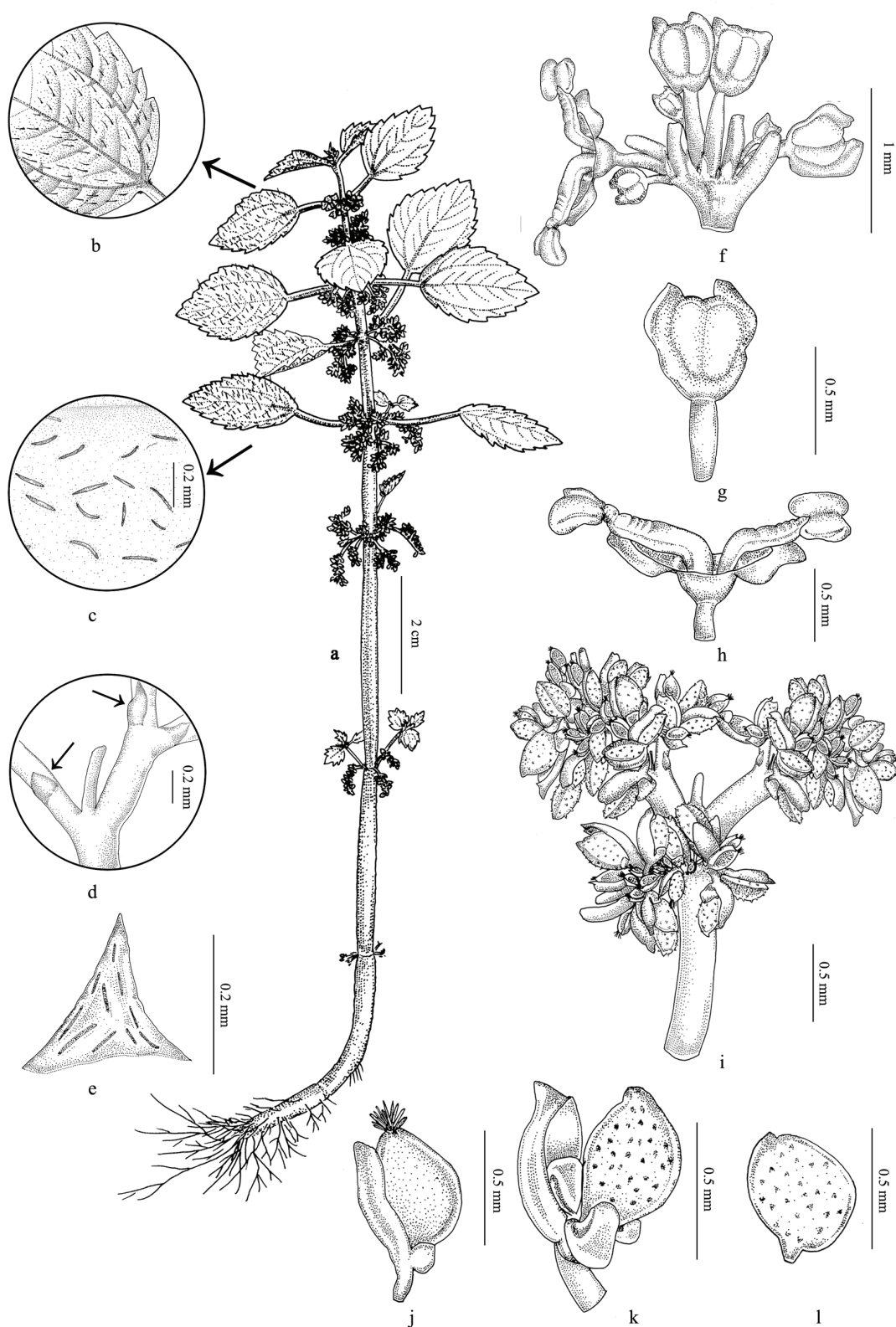
*Urtica pumila sensu* Euphras. ex Griseb., Fl. Brit. W.I. 159. 1859, *pro syn.*, non L. 1753. **Figs. 1 & 2**

Annual, succulent, terrestrial herbs, *c.* 40 cm tall, monoecious, non-stinging. Roots fibrous, shallow and adventitious off the lower part of stem in contact to soil. Stems erect or decumbent, pellucid, simple or with suppressed, short axillary branches, *c.* 8 cm long; internodes 4-angled to wavy at base,



**Fig. 1.** *Pilea hyalina* Fenzl: **a.** Habit; **b.** Flowering twig; **c.** Leaf base and petiole; **d.** Node showing hairs; **e.** bract; **f.** Stipule; **g. & h.** Staminate inflorescence; **i. & j.** Pistillate inflorescence; **k.** Male bud; **l.** Male flower; **m.** Female flowers; **n.** Achenes (a, m & n from K.K. Jeomol 151110; b–f, i & j from S. Resmi & K.P. Krishnapriya 156063; g, h, k & l from Dani Francis 157913, photos by K.K. Jeomol).





**Fig. 2.** *Pilea hyalina* Fenzl: **a.** Habit; **b.** Portion of lamina enlarged showing hyaline hairs and petiole; **c.** Portion of lamina enlarged showing cystoliths; **d.** bracts; **e.** Stipule; **f.** Staminate inflorescence; **g.** Male bud; **h.** Male flower; **i.** Pistillate inflorescence; **j. & k.** Female flowers; **l.** Achene (a–e & i from *S. Resmi & K.P. Krishnapriya* 156063, f–h from *Dani Francis* 157913; j–l from *K.K. Jeomol* 151110, drawn by K.K. Jeomol).

**Table 1.** Comparison of morphological characters of closely similar species of *Pilea*

Characters	<i>P. hyalina</i> Fenzl	<i>P. pumila</i> (L.) A.Gray	<i>P. wightii</i> Wedd.
Stems	Quadrangular	Quadrangular	Terete
Petioles	Unequal in pairs, 2–3.5 cm long	Sub-equal in pairs, 0.4–4.5 cm long	Unequal in pairs, 3–6 cm long
	Glabrous except near leaf base on abaxial surface	Sparsely puberulent on adaxial surface	Glabrous on both sides
Stipules	Inconspicuous, free, triangular, <i>c.</i> 0.5 mm long, deciduous,	Conspicuous, free, ovate-oblong, 2–3 mm long, deciduous	Conspicuous, connate, triangular, 2–2.5 mm long, persistent
Leaves	Elliptic or elliptic-ovate or ovate, sub-equal, bluntly serrate, apex acute	Elliptic or rhombic or ovate, sub-equal, rounded or acutely serrate, apex shortly acuminate, caudate or acute	Cordate-ovate, unequal, deeply serrate, apex acuminate
Leaf surfaces	Hyaline-strigillose above, glabrous below	Sparsely pilose on both surfaces	Glabrous
Inflorescences	2–4 per node	1 or 2 per node	Solitary
Peduncles	Shorter than petioles	Shorter than petioles	Longer than petioles
Male tepals & stamens	2–3, never 4 (in protologue)	4	4
Female tepals	3, unequal, dorsal oblong-cucullate, lateral triangular	3, nearly equal, linear-lanceolate	3, unequal, dorsal oblong, lateral triangular
Achenes	0.2–0.5 × 0.2–0.4 mm, muricate, yellow-brown or pale brown at maturity with dark brown tubercles, lateral surface without a raised marginal ring	1.3–1.7 × 0.6–1.1 mm, smooth or with coral warts not verrucate, pale yellow to brown, occasionally with small black or purple coral-warts markings, lateral surface with a raised marginal ring	1–1.2 × 0.6–0.7 mm, smooth, pale yellow or green, lateral surface without a raised marginal ring

*c.* 5 cm long, 2–5 mm thick at base, glabrous or with a few short blunt hairs near node, translucent green. Stipules 2, intrapetiolar, free, triangular, *c.* 0.5 × 0.5 mm, obscure, glabrous, translucent. Leaves opposite-decussate, equal or subequally paired; petioles 2–3.5 cm long, longer than inflorescences, adaxially canaliculate, glabrous except near leaf base, hairs *c.* 0.4 mm long, translucent; laminae equal or subequal, elliptic or elliptic-ovate or ovate, 2.5–8 × 2–7 cm, basifixed, base cuneate-obtuse, margins bluntly serrate except near base, 3–10 serrations on each sides, apex acute, membranous, sparsely hyaline-strigillose above, glabrous below, lustrous green above, pale green below; venation trinerved, basal lateral veins not curved, evanescent towards

apex, lateral nerves 5–7 pairs; cystolith linear, inconspicuous on both surfaces. Inflorescences unisexual, monochasial cymes, male and female crowded in the same leaf-axils, short peduncled. Staminate inflorescences 0–2 per axils, 0.5–3 cm long, 10–15-flowered, smaller than and at the base of pistillate cymes, the male flowers usually develops and falls-off early, sub-sessile or pedunculate; peduncles 0.5–1.5 mm long, persistent, glabrous, translucent; bracts triangular, *c.* 0.4 × 0.4 mm, glabrous, translucent, with linear cystoliths. Male buds ovoid from top-view, obovate and compressed from lateral-view, *c.* 1 mm long, 0.3–0.6 mm in diam., glabrous; pedicels *c.* 0.5 mm long, glabrous, translucent; tepals 2, *c.* 0.5 mm long, corniculate,

cymbiform, connate about halfway to base, sub-apical appendage c. 0.1 mm, translucent to greenish; stamens 2; filaments inflexed in bud, translucent; anthers white. Pistillate inflorescences 2–4 per axils, 2–15 mm long, 30–120-flowered; peduncles 1–4 mm long; bracts triangular, c.  $0.4 \times 0.4$  mm, glabrous, translucent, with linear cystoliths. Female flowers c. 0.7 mm long, curved downwards; pedicels c. 0.4 mm long, glabrous, green; tepals 3, strongly unequal, dorsal one large, oblong-cucullate, c. 0.5 mm long, shorter than ovary, green, lateral tepals triangular, c. 0.2 mm long, glabrous, translucent; staminodes 3, scaly, c. 0.5 mm long, shorter than ovary, translucent; ovary ovoid, 0.4–0.5 mm long, stipitate, tubercled, white; stigma pencillate. Achenes ovoid to widely ellipsoid,  $0.2\text{--}0.5 \times 0.2\text{--}0.4$  mm, biconvex, length : width ratio 1 : 1, slightly curved at apex, muricate, yellow-brown or pale brown with dark brown dots.

*Flowering & fruiting:* Flowering and fruiting from August to February.

*Habitat:* On moist, shady mossy rocks, moist vertical earth cuttings, tea plantations and along water courses.

*Distribution:* Belgium, Central America, Hawaii, Lesser Antilles, Mexico, South America and India.

*Specimens examined:* INDIA, **Karnataka**, Kodagu district, Abbi falls [Abbey falls], 28.12.1978, *Cecil J. Saldanha, P. Prakash & S.B. Manohar* KFP5577 (JCB digital image); Bhagamandala,  $\pm 898$  m, 26.10.2016, *K.K. Jeomol* 151114 (CALI); Cheyandane, on the way to Chelavara waterfalls,  $\pm 979$  m, 25.10.2016, *K.K. Jeomol* 151110 (CALI); Madikeri [Mercara], Kushalnagar, 30.10.1981, *Cecil J. Saldanha, B. Gurudev Singh & Shiva Prakash* KFP13966 (JCB digital image). **Kerala**, Idukki district, Munnar, Lockhart tea plantation,  $\pm 1499$  m, 05.09.2019, *K.K. Jeomol* 169250 (CALI); Painavu, 06.08.2017, *K.K. Jeomol* 151183 (CALI); Periyar Tiger Reserve, Mlappara, 110 m, 20.11.1998, *Jomy Augustine* 17911 (CALI); Kozhikode district, Muthapampuzha, Thenpara,  $\pm 576$  m, 27.08.2018, *Dani Francis* 157913 (CALI); Thamarasserry Ghats,

7<sup>th</sup>–9<sup>th</sup> hairpin, 03.02.2017, *K.K. Jeomol* 156071 (CALI); Malappuram district, Calicut University Botanical Garden (cultivated, originally from Sulthan Bathery, Wayanad), 15.11.2019, *K.K. Jeomol* 169295 (CALI); Wayanad district, Edakkal caves,  $\pm 1100$  m, 18.10.2017, *K.K. Jeomol* 156035 (CALI); Kurumbalakotta, 01.09.2018, *K.K. Jeomol* 157920 (CALI); Pookode, 750 m, 10.10.1997, *M.K. Shyja* 52685 (CALI); *Ibid.*,  $\pm 783$  m, 18.10.2017, *K.K. Jeomol* 156027 (CALI); St. Mary's College Campus, Sulthan Bathery,  $\pm 925$  m, 16.09.2017, *K.M. Manudev* 156002 (CALI); Thalimala to Chembra peak, 02.11.2017, *S. Resmi & K.P. Krishnapriya* 156063 (CALI); Thirunelli [Tirunalli], on the way to Brahmagiri,  $\pm 850$  m, 18.08.1980, *V.S. Ramachandran* 68220 (MH). **Maharashtra**, Sindhudurg district, Chaukul, 05.09.2017, *K.K. Jeomol* 154240 (CALI); Thillari Nagar, 20.09.2018, *K.K. Jeomol* 157968 (CALI). **Tamil Nadu**, Nilgiris district, Coonoor, 25.01.2017, *K. Shinoj & Manu Philip* 151166 (CALI); Ooty,  $\pm 2210$  m, 26.10.2017, *S. Resmi* 156052 (CALI); Pambar estate, 900 m, 18.08.1964, *J.L. Ellis* 20476 (MH).

*Notes:* *Pilea hyalina* is distinct by its short peduncled inflorescence, invariably 2-tepaled male flower, unequal 3-partite female tepals, sub-oblique, ovoid and muricate, brown achenes. In the Neotropics, the species is considered as a weed and is known outside its native place recently as an invasive species in Belgium and Hawaii, through accidental introduction (Verloove, 2006; Lau & Frohlich, 2012). Pacific Island Ecosystem at Risk (PIER) by the Institute of Pacific Islands Forestry has listed *P. hyalina* as a high risk, nursery weed (US forest service, continuously updated).

The course of the introduction of this species to India is still uncertain. Availability of herbarium specimens 40 years old and considering its occurrence in different areas in Peninsular India, it can be suggested that the species could have been introduced long before as propagules along with other exotic ornamental plants and flourished in humid conditions and got naturalized here. This can be corroborated by the introduction and

naturalization of the congener *P. microphylla* (L.) Liebm. Though not extensively distributed as the latter, the species is propagated by viable seeds.

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