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### RESEARCH ARTICLE

#### *PILEA VICTORIAE* (URTICACEAE), A NEW STRIKING SPECIES FROM THE MURAL FLORA OF WESTERN GHATS, INDIA.

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#### Abstract

A new species of *Pilea* Lindley. from Palakkad gap region of Western Ghats of Kerala is described and illustrated as *Pilea victoriae* sp. nov. IUCN status, distribution, phenology, phenetic relationships, plastid genome variation and its affinities are discussed.

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#### Introduction:-

*Pilea* Lindley (1821) is the largest genus in the family Urticaceae comprising about 715 species (Monro 2004) distributed throughout the tropics, subtropics and temperate regions (with the exception of Australia, New Zealand and Europe). The main revision of the Urticaceae was done by Weddell (1847, 1852) and additional treatments were published by Gaudichaud (1830), Bentham & Hooker (1883), Engler (1894) and Friis (1989). Southeast Asia is the center of morphological and phylogenetic diversity for *Pilea* whilst the Greater Antilles and Andean countries are the centers of species diversity (Monro 2006). Recently, several new species were described from Central America, Costa Rica and China (Monro 1999, 2000, 2001, 2004,; Monro *et al.* 2012) and Monro (2006) proposed a phylogenetic framework for the strategic revision of *Pilea*, based on cpDNA, nrDNA and morphology.

The genus *Pilea* Lindley is easily distinguished from other Urticaceae members by its opposite leaves with a single ligulate stipule (the latter rarely much reduced or even absent) in each axil and pistillate flowers with a 3–5 parted asymmetrical perigonium. The majority of species are succulent herbs, epiphytes or small shrubs growing in heavy shade at altitudes between 1000 and 3000 m above sea level (Monro *et al.* 2012). Within Western Ghats 5 species are recognized (Gamble and Fischer 1923) and all five species are distributed in different geographical regions of Kerala (Sasidharan 2013).

As part of ongoing research on the diversity of flowering plants in Western Ghats of Kerala, S. India, the authors undertook several field trips during 2009–2014. During this the authors observed and collected an interesting species

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of *Pilea* growing in the Campus of Govt. Victoria College, Palakkad, Kerala. Later the same species was collected from Kollengode and Malampuzha regions of Palakkad district and Perinthalmanna region of Malappuram district. The species shows affinities with the common *Pilea*, *P. microphylla* but differs in many attributes. Their affinities are discussed and position within the subdivision of the genus with respect to Weddell (1869) and Chen (1982) is indicated, which although not phylogenetic, is based on the most comprehensive world-wide treatment of the genus.

#### **Taxonomy:-**

*Pilea victoriae* V. Suresh & Sojan *sp. nov.* (Fig. 1 & 2)

**Diagnosis:** *Pilea victoriae* V. Suresh & Sojan *sp. nov.* closely resembling *P. microphylla* but differs and easily distinguished by its erect stem with basal branching, 2–2.5 mm long ovate stipule, orbicular leaf blade of equal or sub-equal size at each node and pistillate inflorescence bearing 3–22 flowers. (Table 1).

**Type:-**INDIA, KERALA: Palakkad District, Victoria College Campus, 130 m MSL, (10° 47' 4.8804" N; 76° 39' 5.8392" E) 07 August 2013, *Sojan Jose and V. Suresh* 091 (holotype, CALI, isotypes, MH, CMPR, CATH).

Herb to 10 cm; epiphytic or epipetric. Stems prostrate then erect, pale grey-green or pale green-brown, semi transparent, glabrous, the raphides elliptic to punctiform; internodes 2.5–8 mm long, angulate in cross-section. Stipules 0.3 mm long, ovate, acute, pale green. Leaves petiolate, opposite, petioles at the same node sub-equal, 2–3.5 mm long, glabrous; lamina 2–4.5 × 2–3 mm, orbicular, apex minutely acute, base cuneate, margin entire; upper surface dark green, glabrous, midrib depressed; lower surface pale grey-green, glabrous, glandular, midrib raised, base towards the middle of lamina. Inflorescences 6–15 per stem, unisexual; bracts 0.4–1.0 mm long; bracteoles 0.5–0.75 mm long. Staminate inflorescences 1 per axil, 1 mm long, bearing 2–4 flowers in a compact head; peduncle 0.4–0.5 mm long, glabrous; pedicels 0.15–0.2 mm long, glabrous. Staminate flowers 0.6 × 0.4–0.5 mm, Pinkish brown; tepals 4, 2.5 mm, glabrous, the subapical appendage 0.75 mm, corniculate, glabrous; stamens 4. Pistillate inflorescences 1 or 2 per axil, 1.5–2 mm long, bearing 14–20 flowers in a compact head; peduncle 1–1.3 mm long, glabrous; pedicels ca. 0.25 mm long, glabrous. Pistillate flowers 0.75–1.0 mm long, adaxial tepal 0.675–1.25 mm, oblong, ellipsoid or ovoid, the dorsal tepal appendage ca 0.5 mm, oblong or ovate; the lateral tepals 0.5–0.675 mm, asymmetrically ovate. Infructescence 2–2.5 × 1–1.5 mm; achenes 0.4–0.5 × 0.15 mm, compressed, ellipsoid. (Figure 1 & 2).

#### **Molecular Phylogeny:-**

Molecular phylogeny of *Pilea* has been done previously by Monro (2006), in which he has analyzed the *Pilea* spp. based on the trnL-F and ITS sequences. To analyze the position of *P. victoriae* in it, ITS gene of *P. victoriae* has been sequenced and the same of the *Pilea* species has been downloaded from GenBank. The sequences were aligned using multiple sequence alignment tool of the genomics package Geneious (www.biomatters.com) followed construction of the phylogenetic tree using the PHYML plugin for Geneious according to Guindon and Gascuel (2003). Following Monro (2006) *Lecanthus peduncularis* was used as the out group and the tree has shown that *P. victoriae* has more lineage to *P. peperomifolia*, a Latin American species than that of *P. microphylla* (Figure 3). *P. victoriae* was grouped in a clade that contained *P. costaricensis*, *P. succulent*, *P. daguensis*, in addition to *P. peperomifolia*, whereas *P. microphylla* was included in the clade *P. spathulifolia* and *P. thymifolia*. This clearly established the status of *P. victoriae* as a taxon new to science.

**Phenology:— Flowering** throughout the year under favourable natural conditions.

**Etymology:—**The species is named after Government ‘Victoria’ College, Palakkad, Kerala, India in recognition of its more than 125 years of service to the education sector of the state.

**Distribution, ecology & Biotic association:—**So far *P. victoriae sp. nov.* is collected from three different localities of two districts viz. Victoria College Campus, Malampuzha and Nemmara regions of Palakkad district and Perinthalmanna region of Malappuram district, Kerala. Good populations were observed in these areas in an altitudinal gradient 100–200 m. But each population is restricted to a particular area of the collection localities.

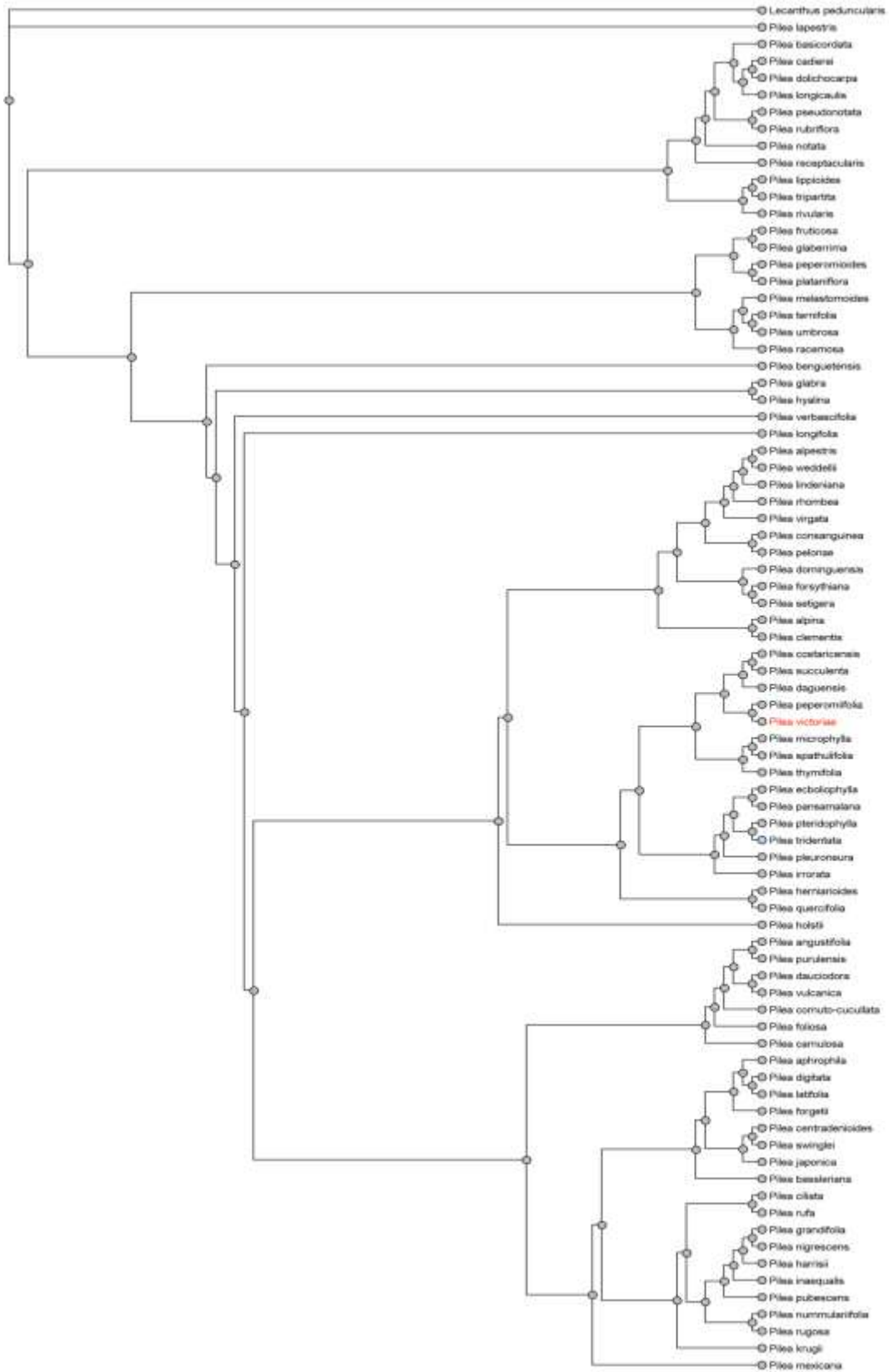
**Conservation status:-** The new species is very common and abundant in these collected localities. More than 12 populations were observed in these 5 localities and a total of around 200-1000 individuals were recorded. According to our current knowledge of and using the IUCN strategies and Criteria (IUCN2012), *Pilea victoriae sp. nov.* is tentatively classified as Endangered (EN A4ab; B1b(i,ii,iv)+2b(i,ii,iv); C2a(i); E).



**Figure 01:-** *Pilea victoriae* sp. nov. A. Habit; B. Basal branching; C. flowering twig; D. & E. Adaxial and abaxial views of leaf; F. Stipule; G. Pistillate inflorescence; H. Staminate inflorescence. (Photos: Sojan Jose, Suresh V., Hareesh V.S., & Robi A.J.)



**Figure 02:-** *Pilea victoriae* sp. nov. A. Habit; B. & C. Adaxial and abaxial views of leaf; D. Staminate inflorescence; E. Pistillate inflorescence; F. Capsule. (Drawn after V. Suresh & Sojan Jose 091 by V.S. Hareesh)



**Figure 03:-** Molecular phylogeny dendrogram of *Pilea spp* showing the relative position of *Pilea victoriae* sp. nov. with respect to other members based on ITS sequence comparison.

**Additional specimens Examined:** INDIA. Kerala, Palakkad, Kollengode, 8 August 2011, *Sojan Jose & Suresh V 043* (GVCH!); Sekaripuram, 02 January 2015, *Sojan Jose & Suresh V 105* (GVCH!); Pallavur, 15 September 2014, *Suresh V & Sojan Jose 110* (GVCH!) Malappuram, Thirumanthamkunnu, 28 May 2014, *Sojan Jose 186* (GVCH!) (GVCH-Govt. Victoria College Herbarium);

**Table 1:-** Diagnostic morphological characters of *Pilea victoriana* with *P. microphylla*

Character	<i>P. microphylla</i>	<i>P. victoriana</i>
Stem nature	Stems drooping or ascending when older	Stem prostrate then erect
Internodal branching	Present, very common	Absent or very rare
Petiole	Less than 1.5 mm	2–3.5 mm long
Leaf shape	Leaf blade elliptic-obovate or spatulate of unequal size at each node	Leaf blade orbicular of equal or subequal size at each node
Stipule	Triangular, 0.5 mm long	Ovate, ca. 0.3 mm long
Pistillate inflorescence	Bearing 5–10 flowers	Bearing 14–20 flowers
Lamina length/ breadth ratio	2–2.7	1.1–1.4

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