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Notes on distribution, population and conservation status of *Henckelia missionis* - an endemic species of Tamil Nadu

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ABSTRACT

This paper provides details of distribution, population and conservation status of *Henckelia missionis*, a little known and narrow endemic species of Southern Western Ghats of Tamil Nadu. Description of pollen grains, seeds along with color photographs of the species reporting here for the first time. A study on morphology of pollen grains and seeds using Scanning Electron Microscope and the distribution map of *H. missionis* is prepared by Arc GIS software is presented here.

Keywords: Conservation status, *Henckelia missionis*, pollen, seed surface, SEM studies

1. INTRODUCTION

Gesneriaceae is a family of flowering plants consisting of about 149 genera and more than 3000 species distributed mainly in tropical and subtropical regions with a very small number of species extending to temperate areas. The genus *Henckelia* Spreng., is naturally distributed in tropical and temperate regions of Asia with almost 75 species (Taram et. al., 2021, POWO 2022). In India 37 species and one variety have been recorded so far (Kanthraj et al. 2020, Janeesha & Nampy 2020, Taram et. al., 2021).

Janeesha & Nampy (2020) while revising the genus in south India, they propose to conserve the name *Henckelia missionis* (Wall. ex R. Br.) A. Weber & B.L. Burtt with a conserved type (MH 100111) from Kanyakumari district of Tamil Nadu since the type sheet at K(K001123777) is demonstrably ambiguous and doesn't permit a precise identification and application of the name. During their study, they were unable to locate the populations of the species in the field and considering the uncertainties in the population status they categorized the taxon as Data Deficient (DD). While surveying the floristic diversity of Kanyakumari wildlife sanctuary, the authors (KAS & RGV) located two populations of *H. missionis*. Considering its vulnerability, few specimens judicially collected without affecting its natural population and the same vouched for augmenting national references collection (MH). Field level

information like population, distribution pattern, micro habitat, phenology and major factors responsible for threats were documented and presented here.

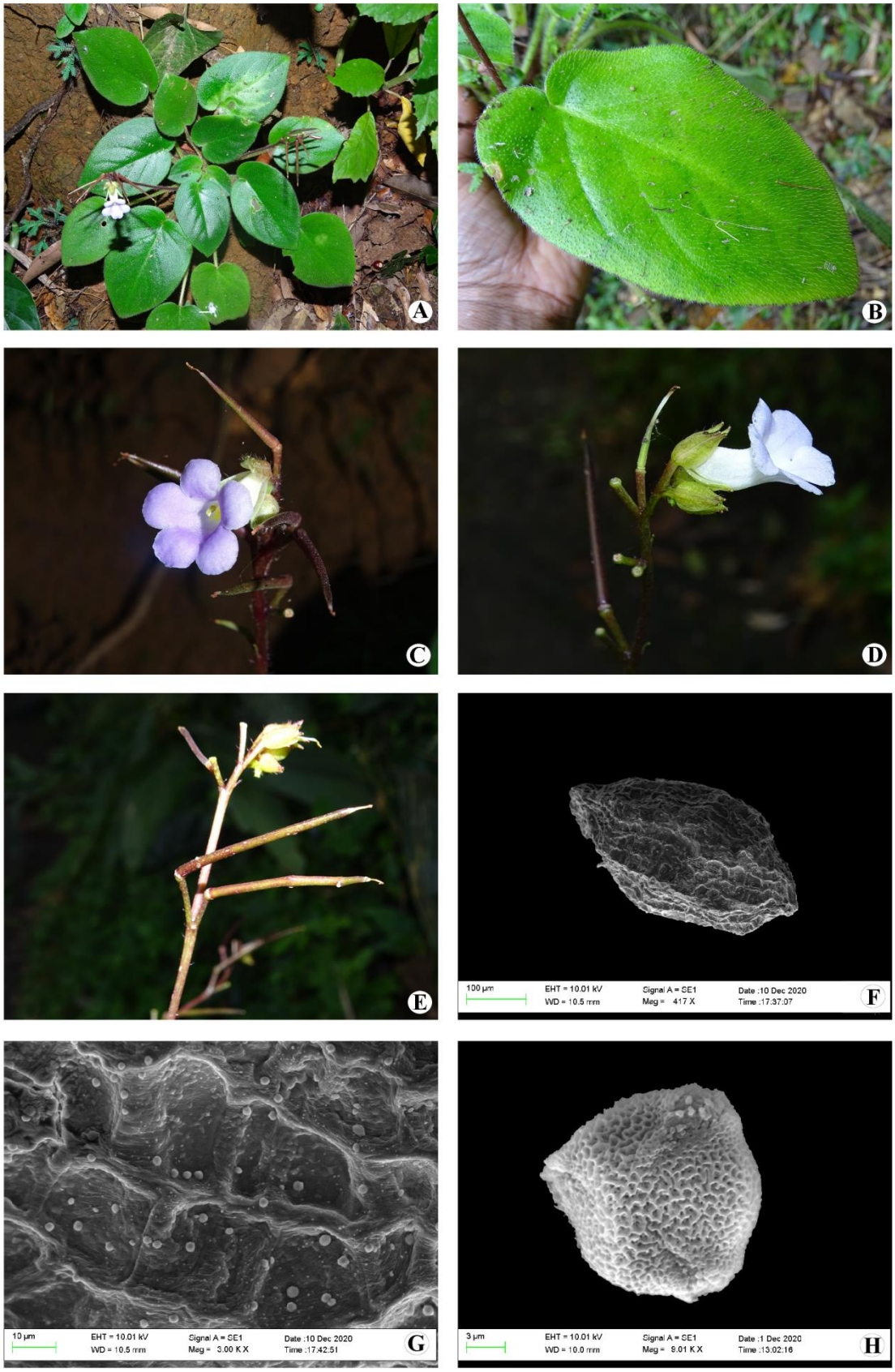

Figure 1. A. Habit, B. Close view of leaf, C. Single flower dorsal view, D. Single flower lateral view, E. Capsules, F. microphotograph of mature seed, G. microphotograph of ornamentation of seed, H. microphotograph of pollen gain

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Taxonomic Treatment

Henckelia missionis (Wall. ex R. Br.) A. Weber & B.L. Burtt, Beitr. Biol. Pflanzen 70: 350. 1998; T.S. Nayar et al., Fl. Pl. Western Ghats 1: 528. 2014. (Fig. 1).

Didymocarpus missionis Wall. ex R.Br., Pl. Jav. Rar. 119. 1839; Rama Rao, Fl. Pl. Travancore 295. 1914; Gamble, Fl. Madras 2: 988. 1924; A.N. Henry & Swamin., J. Bombay Nat. Hist. Soc. 76: 373. 1977; A.N. Henry et al., Fl. Tamil Nadu Ind., Ser I: Analysis 2: 132. 1987; M. Ahmedullah & M.P. Nayar, Endemic Pl. Indian Region 1: 143. 1987; M.P. Nayar & Sastry, Red Data Book Indian Pl. 3: 157. 1990; K.S. Walter & H.J. Gillet, IUCN Red List Threatened Pl. 291. 1997; Gopalan & A.N. Henry, Endemic Pl. India 114. 2000.

Roettlera missionis (Wall. ex R. Br.) Kuntze, Revis. Gen. Pl. 2: 476. 1891.

Didymocarpus membranacea Bedd., Icon. Pl. Ind. Or. 1: 39. 1874.

Herb, perennial. Leaves 6–10, ovate to elliptic, obliquely cordate at base, entire at margins, acute to acuminate at apex, 5.5–12.1 × 3.5–7.3 cm, membranaceous, densely strigose adaxially, white pellucid hairs mainly on nerves abaxially; veins 6 pairs, slightly impressed above, raised beneath; petioles 6.5–16 cm long, densely strigose. Cymes 2–4, axillary, 5–10-flowered; bracts two, linear, ca. 4 mm long; peduncles terete, 15–30 cm long, densely strigose, brown. Flowers 1.2–1.7cm long; pedicels terete, 8–10 mm long. Calyx 5-lobed, connate at base; lobes lanceolate, acute at apex, 5–8 mm long, sparsely glandular hairy outside towards apex, glabrous inside. Corolla sub-infundibuliform, bilabiate, 5-lobed; lower lobes 3, upper lobes 2; lobes entire, rounded, pale blue, throat with yellow markings, papillate hairy throughout. Stamens 2, adnate to the base of corolla, included, glabrous; anthers reniform, bearded. Staminodes 2; antherodes present. Ovary ovoid; style terete, glabrous; stigma obliquely subcapitate. Capsules cylindrical, 2.6–3.7cm long, plagiocarpic, dehiscing loculicidally along the dorsal side, with persistent stigma. Seeds broadly ellipsoid, acute at apex, 434.7µm × 238.4µm, dark brown, pitted.

Pollen Morphology

Pollen grains with three equatorial, colporus apertures and exine having verrucate tectum with granular aperture membrane. The range of polar axis (P) ranges from 16.8 to 18.1µm, and the equatorial diameter (E) ranges from 15.3 to 16.01µm.

Microstructures of seed surface

Exocarp cells reticulate, mostly homogeneous and homogeneity gradually reduced towards apex; anticlinal wall pitted, distal appendages thick, slightly wavy; periclinal wall convex, verrucate.

Flowering & fruiting:

August to December.

Habitat:

Very rarely occurring in moist shady rock cervices in semi-evergreen and evergreen forests.

Distribution:

Endemic to the southern Western Ghats, with aggregate pattern of distribution (Kanyakumari Wildlife Sanctuary, Tamil Nadu).

Conservation status:

A population of 4 individuals observed in Maramalai of Azhagiyapandipuram forest range and another population with 8 individuals in Adikavu Odai of Kaliyal forest range of Kanyakumari wildlife sanctuary at an elevation between 300–700 m in tropical wet evergreen and tropical semi-evergreen forests occurring less than 1 km^2 (Fig. 2). The taxon has been evaluated against the criteria as described in IUCN (2019) and the conservation status of this plant is provisionally recommended as Critically Endangered (CR) as per B1, B2(a,b), C2(a) & D. The area of occupancy is estimated to be less than 10 km^2 and its habitat is severely fragmented inside the sanctuary. Major threats to the population noted during the study period are habitat destructions like landslides, removal of top canopy and infrequent rains. A road towards the plantations passes through the habitat in Maramalai, further threatening its population.

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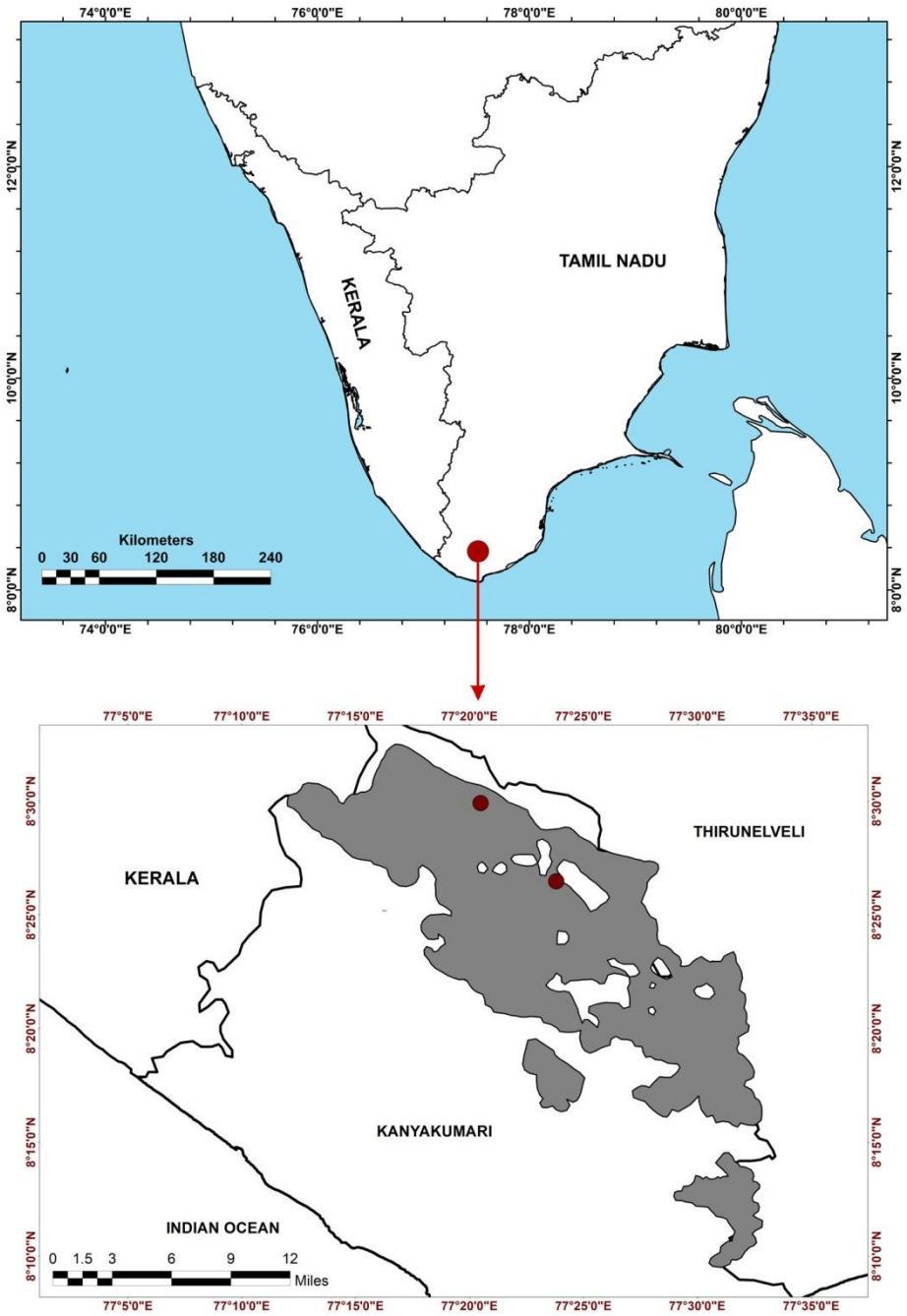

Figure 2. Map showing distribution of *Henkelia missionis* in India

Specimens examined:

India, Tamil Nadu, Kanyakumari district, Kanyakumari wildlife sanctuary; Maramalai, N 08° 26.532', E 077° 24.225', 656 m, 07.11.2019, K. A. Sujana & R. G. Vadhyar 147015 (MH); Adikavu Odai, Kodhayar Beat, N 08° 29.543', E 077° 20.293', 328m, 14.11.2019, K. A. Sujana & R. G. Vadhyar 140894 (MH); Kalikesam river side, Balamore, 700 m, 31.08.1976, A.N. Henry 48151 (MH); Kilaviarumalai- Balamore, 480 m, 28.07.1977, A.N. Henry 49421 (MH).

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Authors Contribution

Sujana K.A. & Rakesh G. Vadhyar: Investigation, Conceptualization, Visualization, Data curation and Writing
M. Boopathiayyanar: Software and Data Curation.

Ethical approval

Henckelia missionis species was used in the study. The ethical guidelines of plants & plant materials are followed in the study for collection & identification with the help of Botanical Survey of India.

Funding

This study has not received any external funding.

Conflicts of interests

The authors declare that there are no conflicts of interests.

Data and materials availability

All data associated with this study are present in the paper.

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