



RESEARCH ARTICLE

# New distributional records of two plants (*Crotalaria* and *Vaccinium*) from Manipur, India

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## Abstract

*Crotalaria meghalayensis* Danda & A.K. Pandey, belonging to the family Fabaceae and *Vaccinium amakhangium* Panda & Sanjappa, belonging to the family Ericaceae, are reported here for the first time in Manipur, Northeast India. The occurrence of these two species extends their distributional range beyond the Meghalaya and Nagaland states of the Indian Union. The detailed morphological descriptions and colour photographic plates are provided for easy identification.

**Keywords:** *Crotalaria*; extended distributional-range; Manipur, Northeast India; *Vaccinium*

## Introduction

The state of Manipur, which is located in the Northeastern part of India, is an ecologically rich region with a unique topography. The rich biological diversity is exhibited by the state animal “Sangai” (*Rucervus eldii eldii*), an endemic brow-antlered deer and the state flower “Shirui Lily” (*Lilium mackliniae*), an endemic flower. Geographically, the state of Manipur lies between 23°50' to 25°42' N latitude and 92°59' to 94°46' E longitude, with an area of ca. 22327 sq. km. It shares borders with Myanmar to the East, Nagaland to the North, Assam to the West and Mizoram to the South. The state is divided into two major regions based on physiographic topology: the valley and the surrounding hills. The valley covers an area of ca. 1787 sq. km. with an elevation of 700 m above sea level and the surrounding hills cover an area of ca. 20540 sq. km. with an elevation range from 1500 m to 2900 m above sea level.

Senapati district is located in the north of Manipur state, having an area of ca. 3271 sq. km. It lies between 24°37' to 25°37' N latitude and 93°29' to 94°15' E longitude and the elevation ranges from 1060 to 1788 m above sea level. It harbours the state's highest peak, Mt. Esii, with an elevation of 2994 m and the Barak River, the longest river in Manipur, originates from the district. It receives abundant rainfall and its annual average rainfall ranges from 650–1450 mm. The region is mostly mountainous and inaccessible in many parts of the mountain ranges. Due to its climatically favourable conditions, the region is rich in flora and fauna. Important plants like *Rhododendron wattii*, *R. mecabaenum*, *Magnolia* spp., *Quercus* spp., orchids and many other lower plants are found in this region. The region falls under the micro-endemic hotspots (1). The region is rich in biological diversity, which has attracted many biologists and taxonomists to explore the region (2–15).

During the field collection, interesting species of *Crotalaria* and *Vaccinium* plants were collected. On further critical examination and consultation with literature (16–21) and herbarium, the specimens were identified as *Crotalaria meghalayensis* Danda & A.K. Pandey (Fig. 1 & Fig. 2) and *Vaccinium amakhangium* Panda & Sanjappa (Fig. 3 & Fig. 4), hitherto unknown in Manipur state, Northeast India. *C. meghalayensis* has only been reported earlier from Meghalaya (21), while *V. amakhangium* was reported from Nagaland state (16) and considered endemic to the state before the current report from Manipur. The occurrence of *C. meghalayensis* and *V. amakhangium* is a new addition to the flora of Manipur state and an extended distributional range for Manipur.

## Materials and Methods

The collection, pressing and preparation of herbarium specimens were done as per the conventional herbarium techniques (22, 23) and the herbarium specimens were deposited at the Herbarium, Botany Department of D.M. College of Science (DMH), Imphal, for future reference. The live photos of plants in their natural habitat and floral parts were taken from a Sony SLT-A58 and a Canon SX120 digital camera, respectively. All the morphological descriptions and measurements were based on living plant specimens.

## Taxonomic Treatment

1. ***Crotalaria meghalayensis*** Danda & A.K. Pandey, Syst. Bot. 41: 309. 2016. (Fig. 1. A–M & Fig. 2)

Plant perennial herbs, 50–70 cm tall, branched, young stems with fine sericeous hairs and sparsely pubescent older branches. Stem terete, non-striated. Leaves alternate, simple, lanceolate, 4.8–7.8 × 1.5–2.3 cm, adaxial foliar surfaces bear minute trichomes, densely aggregated along the central vein, the abaxial surfaces and

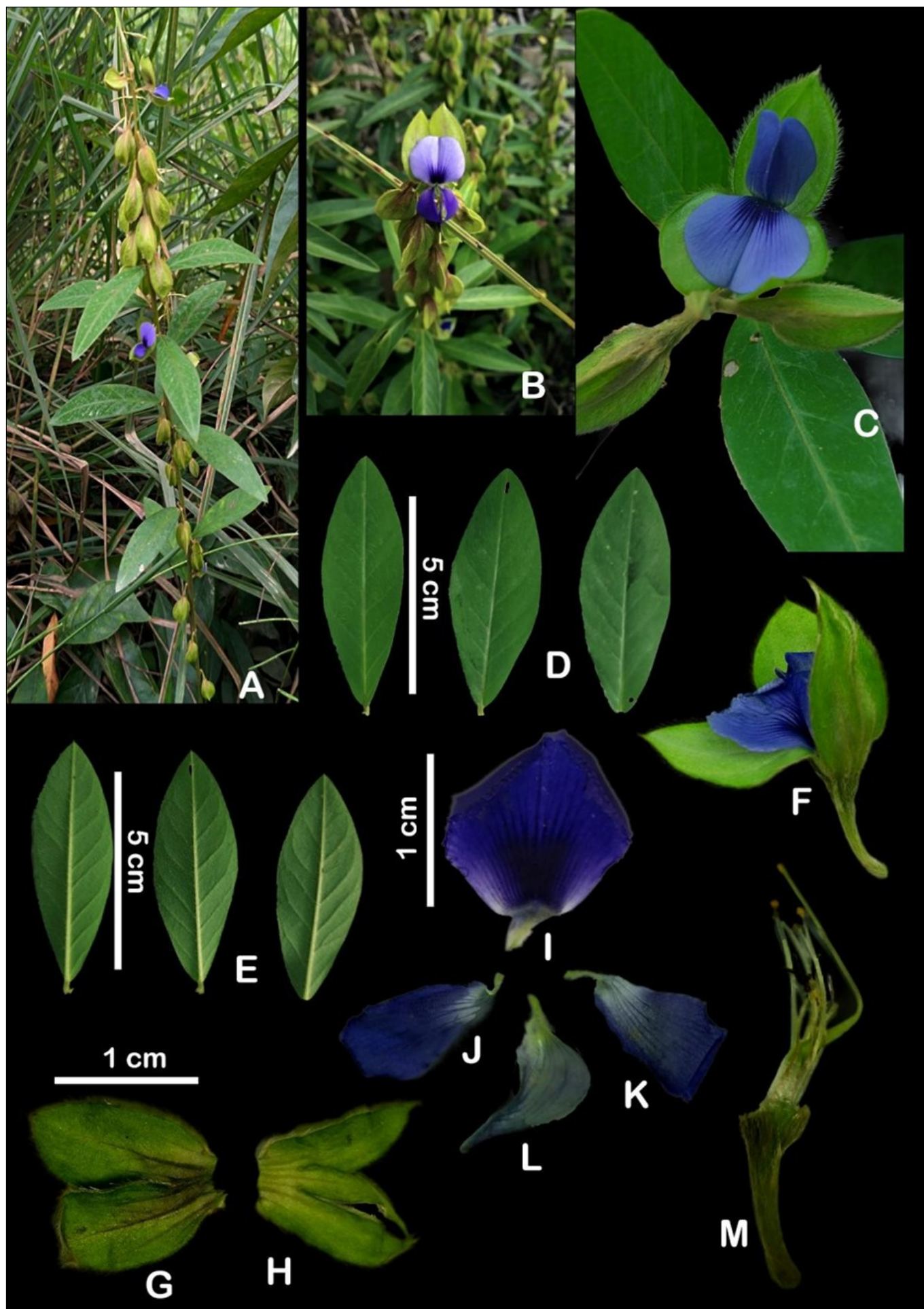


**Fig. 1.** *Crotalaria meghalayensis* Danda & A.K. Pandey. A. Habit; B–C. Enlarge view of flower; D. Leaves-dorsal view; E. Leaves-ventral view; F. Single flower; G. Calyx upper half; H. Calyx lower half; I. Standard corolla; J–K. Lateral petals, L. Keel; M–Androecium and Gynoecium.



Fig. 2. Herbarium specimen of *Crotalaria meghalayensis* Danda & A.K. Pandey.

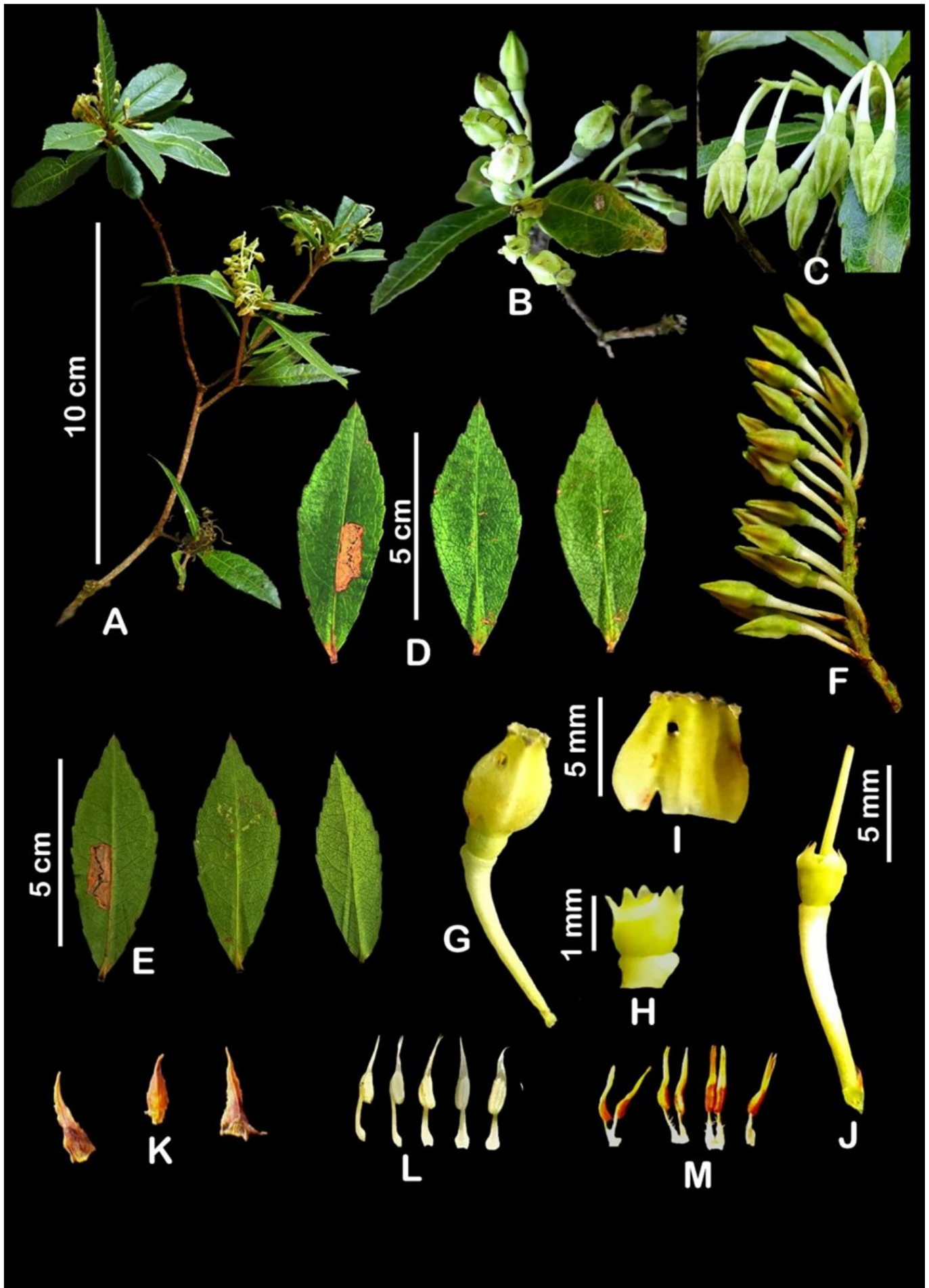


**Fig. 3.** *Vaccinium amakhangium* Panda & Sanjappa. A. A flower twig; B. Mature flower; C. Showing flowers unopened; D. Leaves showing dorsal surface; E. Leaves showing ventral surface; F. Inflorescence; G. Full flower; H. Calyx cup; I. Opened corolla dorsal view; J. Showing style; K. Bracts; L. Young anther; M. Mature anther.

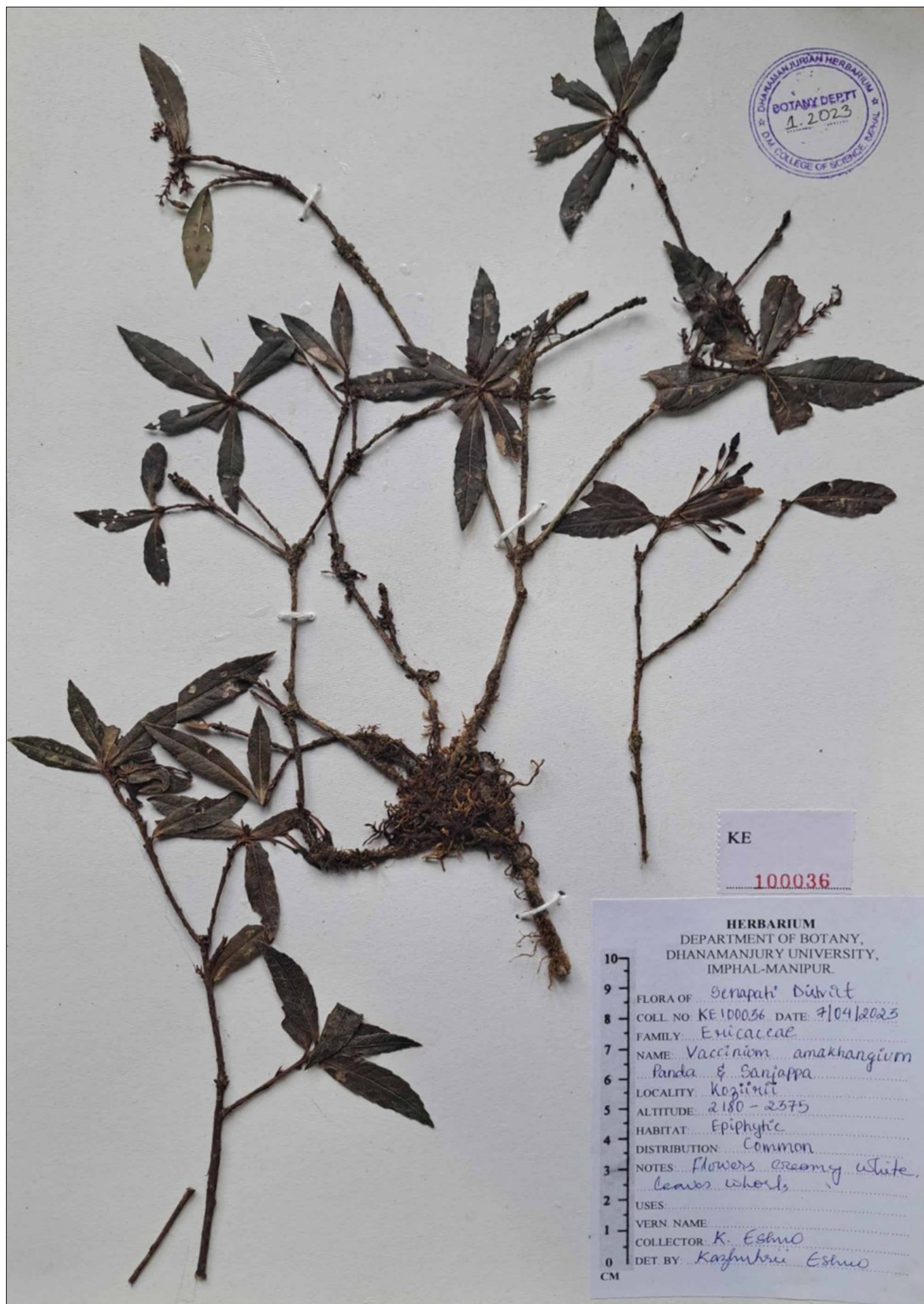


Fig. 4. Herbarium specimen of *Vaccinium amakhangium* Panda & Sanjappa.

leaf margins are densely hirsute, petiole 0.1–0.2 cm long. Inflorescence terminal raceme, corolla violet-bluish, unguiculate, bracts linear-lanceolate, elongated, ensheathed in a soft pilose indumentum. Calyx two-lipped, villous, inner surface texturally smooth, densely hirsute, externally tubular base ranges from 0.2–2.3 cm; lobe margin entire, densely elongated hairs imparting a ciliate semblance to the rim. Upper lip bilobed,  $1.4\text{--}1.9 \times 1.3\text{--}1.6$  cm, oblong, abruptly acute apex, tip mucronulate, imbricate; lower lip tri-lobed,  $1.3\text{--}1.6 \times 1.0\text{--}1.3$  cm, lanceolate, apex acute, valvate. Standard petal,  $1.2\text{--}1.3 \times 0.8\text{--}1.0$  cm, obovate to sub-orbicular, lamina glabrous, notched apex, two ridge-like callosities present at the base, fleece-like covers at margins, wing petals,  $0.8\text{--}0.9 \times 0.3\text{--}0.4$  cm, oblong, rounded apices. Keel petals,  $1.0\text{--}1.3 \times 0.3\text{--}0.5$  cm, sub-angular, with rostrate and twisted beak, paleaceous-tomentose or silvery with white silky hairs. Androecium diadelphous (5+5): five stamens bear base-attached, arrowhead-shaped anthers shorter, 0.6–0.7 cm long; the alternate five exhibit filaments of 1.1–1.3 cm long, ovoid anthers, 0.05–0.06 cm. The gynoecium is hypogynous, sessile, glabrous, 1.0–1.7 cm, style 0.8–1.0 cm long, geniculate and with a simple stigma. Fruit pods, elliptic-oblong, smooth, prolonged at the tip and supported on short pedicels,  $1.3\text{--}1.5 \times 0.5\text{--}0.7$  cm. pod containing 10–20 seeds, kidney-shaped, with a glistening coat ranging from golden-yellow to beige.

#### Flowering and fruiting

Flowers from August to September. Fruiting from September.

#### Distribution

**India:** Meghalaya, Manipur [present report].

#### Specimen examined

India, Manipur, Senapati district,  $25^{\circ}17.66.85'$  N and  $94^{\circ}13.4502'$  E, Elevation 1026 m, K.K.1005, Herbarium of Department of Botany, Dhanamanjuri University (DMH).

#### Ecology

The specimen was collected from a disturbed habitat along the roadside and near the Barak Riverbeds, where it predominantly coexists in close spatial association with a heterogeneous assemblage of ruderal and pioneer species, viz., *Cymbopogon* sp., *Mimosa* sp., *Bidens pilosa*, *Conyza* sp., *Artemisia* sp., *Dioscorea* sp., etc.

#### Notes

*C. meghalayensis* was reported as a new species from Meghalaya (21). It was considered an endangered species and endemic to Meghalaya by the authors. However, in the present study, we considered this taxon as Least Concern (LC) as per the IUCN Red List. The occurrence of this taxon indicates a new distributional range extending to the state of Manipur.

2. ***Vaccinium amakhangium*** Panda & Sanjappa, Bull. Bot. Surv. India. 50(1–4): 1–8. 2008. (Fig. 3. A–M & Fig. 4).

Epiphytic shrub, bulbous, erect or pendant, stem profusely branched, terete. Leaves alternate, spiral at base, pseudovercillate, 3–6 leaves at each pseudovercillate, simple, serrulate, lanceolate,  $2\text{--}8 \times 1.2\text{--}2.5$  cm, apex acute to acuminate, glabrous, dorsal dark green, ventral side light green; petiole subsessile, short, 1–2 mm long. Inflorescence terminal raceme, up to 6 cm long, 8–16 flowered; pedicel 1 cm long; bract triangulate, apex acuminate, up to 4 mm long, 1.5 mm wide; brownish, scaly. Calyx 5, triangulate, apex acute,

margin smooth, calyx cup green, 1 mm long; corolla tube creamy white, 6–8 mm long, bulge at middle, throat narrower, petals extrose, hairy, papillose; stamens 10, 5 mm long, dorsifixed, filament short, 2 mm long, anther brown, 3 mm long; ovary smooth, globose, light green, axile placentation; style 6 mm long, stigma truncate. Fruit not seen.

#### Flowering and fruiting

Flowers from April–May, fruit not seen.

#### Distribution

**India:** Nagaland, Manipur [present study area].

#### Specimen Examined

India, Manipur, Senapati District, Koziirii, Mao,  $25^{\circ}30.5480'$  N and  $94^{\circ}6.1990'$  E, Elevation 2180–2373 m, KE100036, Herbarium of Department of Botany, Dhanamanjuri University (DMH).

#### Ecology

The plant grows extensively as an epiphyte on tree trunks like *Quercus* sp., *Myrica* sp., *Alnus* sp. and fallen tree trunks on the soil at an altitude ranging from 2180–2375 m above mean sea level.

#### Notes

*V. amakhangium* was reported as a species from Nagaland state (16). It was cited as an endemic species to Nagaland state by the authors. The taxon is considered as Least Concern (LC) as per the IUCN Red List in the present study; however, it could become Vulnerable to Threatened or Endangered if deforestation occurs in its present habitat in the future. The occurrence of this taxon in the study site indicates a new distributional range extending to the state of Manipur.

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#### Authors' contributions

KE conceptualised the study, drafted the main manuscript and identified the specimens and collected the data. SK contributed to drafting the manuscript, methodology development and revision of the manuscript. KL was responsible for fieldwork collection, preparation of the photo plates and revision of the manuscript. KK carried out fieldwork collection, contributed to the methodology and prepared the herbarium specimens. UL assisted in herbarium preparation and methodology. AMD conducted field collection and contributed to herbarium preparation. All authors read and approved the final manuscript.

## Compliance with ethical standards

**Conflict of interest:** Authors do not have any conflict of interests to declare.

**Ethical issues:** None

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