PLANT SCIENCE TODAY
Vol 12(4): 1-5
https://doi.org/10.14719/pst.8768

eISSN 2348-1900

RESEARCH ARTICLE

Three new additions to the orchid flora of Manipur, Northeast India

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Received: 09 April 2025; Accepted: 20 August 2025; Available online: Version 1.0: 11 November 2025; Version 2.0: 27 November 2025

Cite this article: Kazhuhrii E, Sochanngam K. Three new additions to the orchid flora of Manipur, Northeast India. Plant Science Today. 2025; 12(4): 1-5. https://doi.org/10.14719/pst.8768

Abstract

The state of Manipur has a unique geographical position and is rich in biological flora and fauna. Manipur also harbours a rich diversity of orchid species represented by 91 genera and 390 species. The present investigation on the orchids of Manipur, three interesting orchid species, viz. *Epipogium roseum* (D. Don) Lindl., *Habenaria pantlingiana* Kraenzl., *Liparis deflexa* Hook.f. were collected and reported for the first time in the orchid flora of Manipur. All three taxa belong to terrestrial ground orchids and one species, i.e., *E. roseum,* is a leafless, mycotrophic terrestrial orchid. In Manipur, the genus *Habenaria* Willd. and *Liparis* Rich. are represented by 11 species each, while the genus *Epipogium* Borkh. is a new generic addition to the orchid diversity of Manipur and a new extension of distributional records. *Epipogium* and *Habenaria* orchids were collected from Pudunamei village, Senapati district, while *Liparis* orchid was collected from Kachai village, Ukhrul district, Manipur. With the addition of these three taxa, the state of Manipur records a total of 393 species and 92 genera of orchid taxa. This data reveals the rich diversity of orchid species in the state of Manipur. Detailed morphological descriptions and colour photographs were provided for easy identification.

Keywords: *Epipogium; Habenaria; Liparis*; Manipur; new generic addition; Orchidaceae

Introduction

The Orchidaceae family is one of the largest flowering plants, having c. 697 genera and c. 29481 species and India has 155 genera and 1256 species of orchids (1-3). In Manipur, research indicates the presence of 90 genera and 389 species of orchids, including one newly recorded genus (4, 5). The work on the orchids of Manipur is dynamic and the latest addition of orchids occurs periodically. Many researchers have contributed to the orchid flora of Manipur, particularly in the Senapati and Ukhrul districts (6-12).

During the field survey in the Senapati and Ukhrul districts of Manipur, the authors came across some fascinating terrestrial orchids and those orchids were collected for further studies (Fig. 1). On critical analysis and examination of the available literature, those orchids were identified as *Epipogium roseum* (D. Don) Lindl., *Habenaria pantlingiana* Kraenzl. and *Liparis deflexa* Hook. f., which are hitherto unknown (13-20). In Manipur, the genus *Habenaria* Willd. and *Liparis* Rich. are represented by 11 species each, whereas the genus *Epipogium* Borkh. is a new generic addition (3, 4). With the addition of these three taxa of orchids in Manipur, the total number of genera is 92 and 393 species, respectively.

Materials and Methods

Field surveys were conducted at several locations in the Senapati and Ukhrul districts, Manipur. The terrestrial orchid plants were collected, dried, pressed and mounted on the herbarium sheet following the standard conventional procedure of herbarium techniques (21, 22). Field photographs were taken with a Sony DSLR Alpha 58 and a Cyber Shot DSC-WX200 camera and some photomacrographs were taken from a Hoverlabs stereozoom microscope (HV-ZOOM-IV TR) along with image viewing and processing software called "ImageView" to measure object sizes. All the collected specimens were properly labelled and deposited in the Department of Botany, D.M. College of Science (DMH), Manipur, for future reference. Detailed morphological descriptions and colour photo plates are provided for easy identification.

Taxonomic Observation of New Records

Epipogium roseum (D.Don) Lindl. J. Proc. Linn. Soc., Bot. 1: 177. 1857.

Limodorum roseum D.Don in Prodr. Fl. Nepal: 30. 1825. (Orchidaceae) (Fig. 2A-2L)

Plant grow up to 35 cm tall. Rhizome tuberous, fusiform to ovoid, 2-4 × 1-2 cm in diameter, multi-noded. Stem with 5-7 scattered sheaths, white with a pale pink, membranous. Rachis laxly to sub-densely 10-18 flowered, pendulous; floral bracts ovate lanceolate, 10 mm long and 2 mm wide. Flowers resupinate, white with purple spots on the lip; pedicel up to 5 mm long. Sepals spreading, linear-lanceolate, 9-11 × 2-2.5 mm, 3-veined, margin undulate, apex acute. Petals slightly shorter

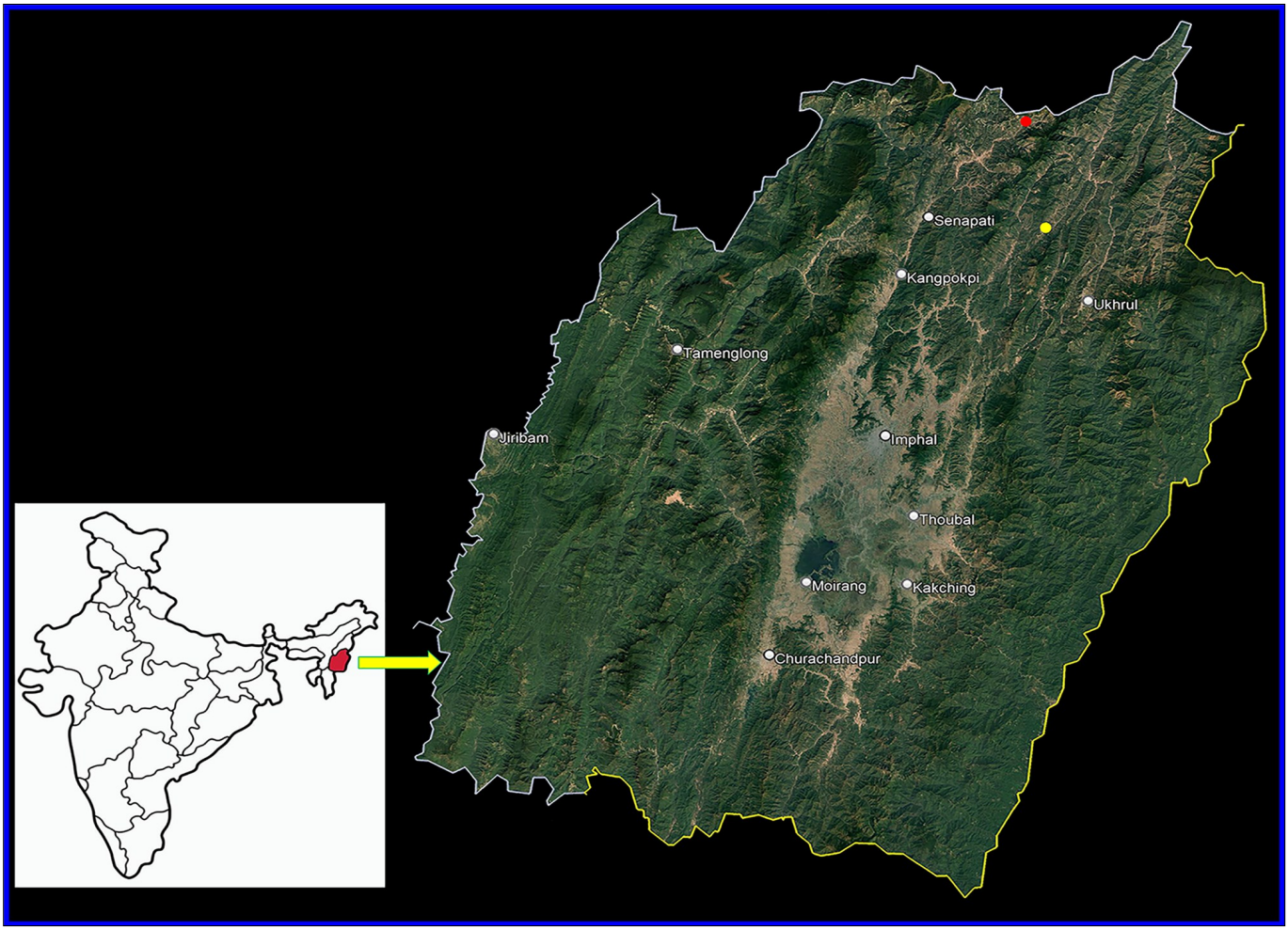

Fig. 1. Map showing the study sites. The red circle indicates Pudunamei village, Senapati district, where *Epipogium roseum* and *Habenaria pantlingiana* were collected; the yellow circle indicates the collection site of *Liparis deflexa* at Kachai village, Ukhrul district. © Google Earth.

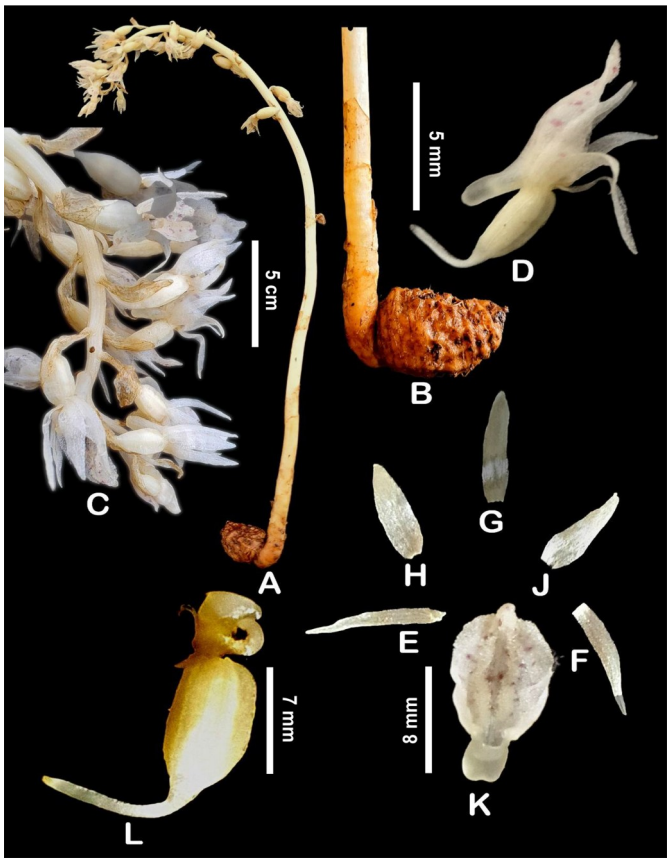

Fig. 2. *Epipogium roseum* (D.Don) Lindl. A. Habit; B. Tuber; C. Inflorescence; D. Side view of single flower; E-F. Sepals; G-J. Petals; K. Lip; L. Ovary with column.

than sepals, linear-lanceolate, 7-10 × 2-3 mm, apex sub-acute to acute; lip elliptic-ovate, concave, 12-14 × 6-9 mm, margin erose-denticulate, spur at base, with pale pink spots on lip; spur cylindric, 5 mm long, shorter than ovary, apex obtuse. Ovary up to 7 mm long. Anther sub-globose; capsule broadly ovoid-ellipsoid, 6-8 × 5 mm in diameter.

Flowering and fruiting

May-September

Distribution

India, Angola, Borneo, Cameroon, Central African Republic, China, Congo, Fiji, Ghana, Guinea, Gulf of Guinea Is., Hainan, Japan, Jawa, Kenya, Laos, Lesser Sunda Is., Liberia, Malawi, Malaya, Maluku, Myanmar, Nansei-shoto, Nepal, New Caledonia, New Guinea, New South Wales, Nigeria, Pakistan, Philippines, Queensland, Solomon Is., Sri Lanka, Sudan, Sulawesi, Sumatera, Taiwan, Tanzania, Thailand, Tibet, Uganda, Vanuatu, Vietnam and Zaïre

Specimen examined

India, Manipur, Senapati district, Pudunamei village, 1600-1750 m, 25°31'77.40''N and 94°09'10.18'' E, *Kazhuhrii Eshuo*, *KE100081.*

Habitat

This saprophytic orchid grows in open deciduous forests in association with *Alnus nepalensis, Ageratina adenophora* and other herbs.

Notes

Epipogium roseum is an ephemeral saprophytic orchid that can

be distinguished from others by having a fusiform tuber and small and resupinate flowers with pale pink spots on the lip. This saprophytic orchid has been reported in India from Arunachal Pradesh andhra Pradesh, Himachal Pradesh, Jammu & Kashmir, Karnataka, Kerala, Maharashtra, Meghalaya, Odisha, Sikkim, Tamil Nadu, Uttarakhand and West Bengal (20).

Habenaria pantlingiana Kraenzl., Orchid. Gen. Sp. 1: 892.1901.

Habenaria cirrhifera Ohwi in Acta Phytotax. Geobot. 1: 141. 1932. (Orchidaceae) (Fig. 3A-3Q).

Plants up to 90 cm tall, tuberous, fleshy; stem erect, stout, herbaceous, green, cylindrical, with 6-9 leaves in the middle and 3-5 bract-like leaflets upwards. Leaves are oblong-lanceolate or obovate-lanceolate, 11-21 cm long, 3.5-7 cm wide, with an apex acute to acuminate; leaf sheath up to 2.5 cm. Inflorescence 6-16 cm long, a raceme with many dense flowers; flowers green, flower stem glabrous, pedicel 8-10 mm long. Bracts 12-15 mm long, 2-3 mm wide, lanceolate, apex long acuminate; sepals green, apices long acuminate, median sepal 32 mm long, 4-6 mm wide at the base, boat-shaped, apex long and acuminate, curved; lateral sepals green, spreading, obliquely ovate-lanceolate, 22 mm long, 4-5 mm wide, 3-nerved, apex long, acuminate, twisted, pointed tip; petals deeply bilobed, lobes filiform, 22 mm long. Lip deeply tri-lobed from the base, lobes filiform, 18-22 mm × ca. 0.7 mm, lateral lobes long, linear, more or less equal with mid-lobe, mid-lobe long, linear; spur cylindrical, 18 mm long, drooping, slightly broader at apex, longer than ovary. Ovary ca. 15 mm long, twisted, curved at apex; pollinia 5 mm long, viscidia orbicular and small. Capsule ca. 15 mm long, 3-5 mm in diameter.

Flowering and fruiting

July-October

Distribution

India, Bhutan, China, Japan, Nepal, Thailand and Vietnam.

Specimen examined

India: Manipur, Senapati district, Pudunamei village, 25° 31’52.25’’N & 94°09’18.33’’E, 1600-1850 m, *Kazhuhrii Eshuo*, *KE 100029.*

Habitat

The terrestrial orchid grows in an open forest along with other herbaceous plants like *Ageratina adenophora*, *Globba* sp., *Jasminum* sp., herbs and grasses.

Notes

Habenaria pantlingiana can be easily distinguished from the field by having 6-7 leaves in the middle, green flowers, sepals and petals filiform, lip deeply tri-lobed from the base filiform. This terrestrial orchid taxon has been previously known to occur

Fig. 3. *Habenaria pantlingiana* Kraenzl. A-B. Inflorescence; C-D. Whole flower in side and front view; E. Bract; F. Median sepal; G. Dorsal sepals; H-J. Petals; K. Lip with spur; L. Column with ovary; M. Spur; N. T.S. of ovary; P. Pollinia; Q. Fruits.

in India from Arunachal Pradesh, Jharkhand, Meghalaya, Nagaland, Sikkim and West Bengal (17, 19).

Liparis deflexa Hook.f., Fl. Brit. India 5: 697. 1890.

Leptorkis deflexa (Hook.f.) Kuntze in Revis. Gen. Pl. 2: 671. 1891. (Orchidaceae) (Fig. 4A-4L)

Plant herbs, pseudo-stem ovoid-oblong, 1-5 cm long, with membranous sheath, multi-noded. Leaves 2, opposite, plicate, glabrous, blade ovate-lanceolate, 8-14 cm long, 3-5 cm wide, margin entire, apex acute to acuminate. Inflorescence raceme; floral bracts ovate-triangular, acute to acuminate, membranous, dark green; flowers in terminal raceme, resupinate, green to yellowish-orange green, 12 x 8 mm in diameter. Pedicel and ovary twisted, up to 9 mm long. Dorsal sepals oblong-lanceolate, 7-8 mm long, 1-1.6 mm wide, 3-5 nerved and longer than petals. Petals deflexed, oblong-falcate, long and slender, 6-7 mm long, 1-1.6 mm wide; lip flabelliform, with 2 contracted auricles, dull green to yellowish green when mature, margin dentate, apex shallowly bilobed; column compressed from back to front, short, incurved, green, deltoid wings; anthers terminal. Capsule clavate, 2 cm long.

Flowering and fruiting

August-September

Distribution

India, Cambodia, China, India, Laos, Myanmar, Nepal, Sri Lanka, Thailand and Vietnam.

Specimen examined

India, Manipur, Ukhrul district, Kachai village, 25°13'49.83''N & 94°15'18.51''E, 1200-1400 m, *Sochanngam Kashung, SKA 00001*.

Habitat

The terrestrial orchid is growing in the open forest along with other herbs and grass.

Notes

Liparis deflexa can be easily distinguished from other *Liparis* plants in the field by having two opposite leaves, green flowers, petals deflexed and a lip flabelliform with a dentate margin. This terrestrial orchid has been reported in India in the states of Assam andhra Pradesh, Sikkim, West Bengal, Goa, Karnataka, Kerala, Tamil Nadu and Chhattisgarh (3).

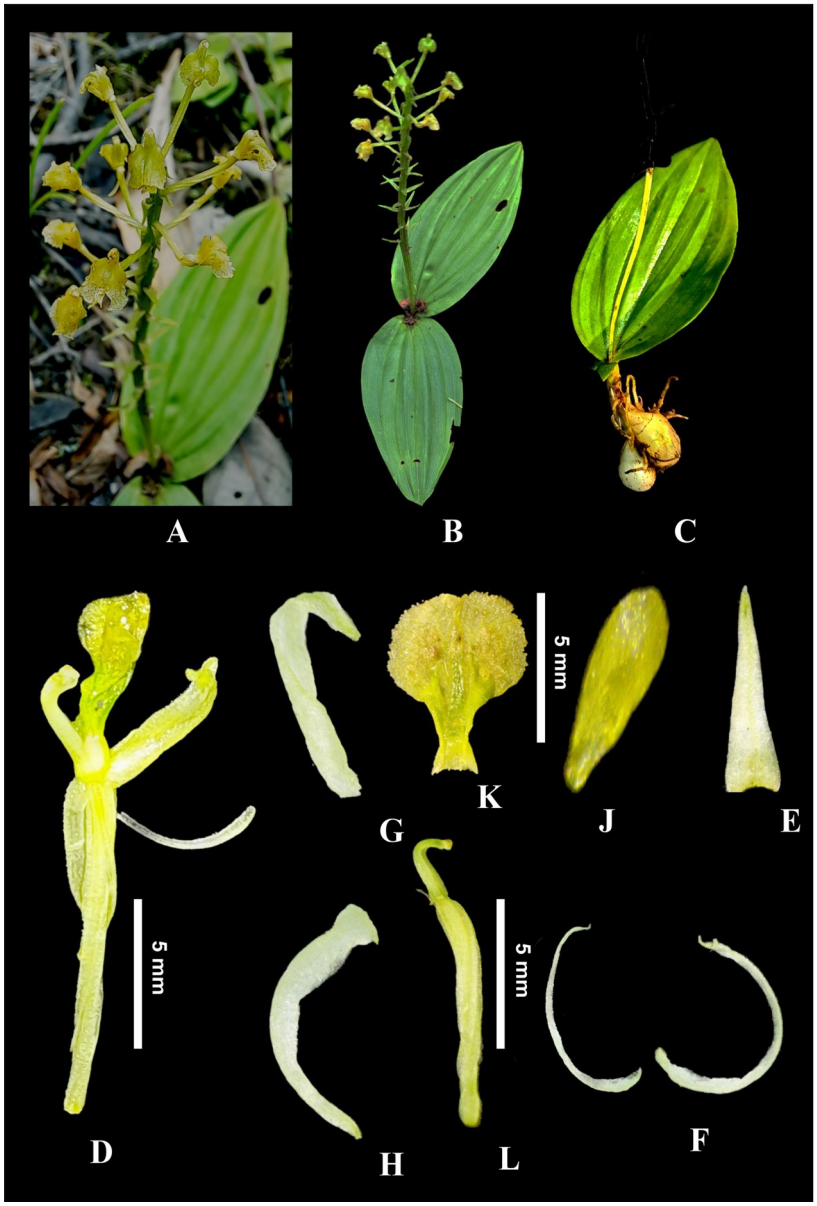

Fig. 4. *Liparis deflexa* Hook.f. A-B. Plant habit with inflorescence; C. Tuber with single leaf; D. Whole flower; E. Bract; F. Sepals; G-H. Lateral petals; J. Dorsal petals; K. Lip; L. Column with ovary.

Acknowledgements

The authors thank Mr. Nenuo Eshuo Mao and Adahe Pfoziiro for helping during the field collection. The financial support received from the Department of Science & Technology (DST), Government of Manipur, Order No. 23/05/2023 (R&D-Biotech) DST, is greatly acknowledged. The facility provided by the Department of Botany, Dhanamanjuri University, Manipur is duly acknowledged. We thank the reviewers for their constructive comments that enhanced this work.

Authors' contributions

KE carried out fieldwork, identification of specimens, herbarium preparation, designed the concept and drafted the manuscript. SK carried out fieldwork, photo plate preparation and revision of the manuscript. All authors read and approved the final manuscript.

Compliance with ethical standards

Conflict of interest: Authors do not have any conflicts of interest to declare.

Ethical issues: None

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Peer review: Publisher thanks Sectional Editor and the other anonymous reviewers for their contribution to the peer review of this work.

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