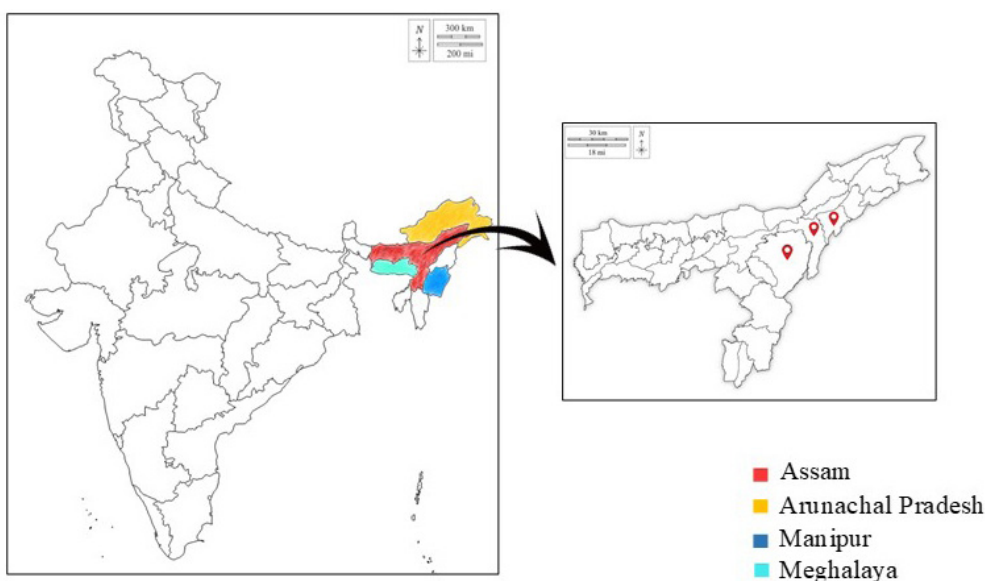


Conservation status of some endemic flora of northeastern states of India

The northeastern region of India is regarded as the home to numerous endemic plant species which fall within the demarcated regions of biodiversity hotspots of the country (Upadhaya et al. 2013). However, many of these species face threats due to habitat destruction, climate change, and anthropogenic pressures (Basnett & Ganesan 2022; Halder et al. 2024). This review explores some of the endemic plant species from northeastern region of India that fall within these categories, highlighting the urgent need for conservation efforts and further research. The primary objective of this review is to compile some endemic plant species of Assam, Arunachal Pradesh, and Meghalaya that have been assessed under various publications.

The findings include several orchid species from Assam, *Rhododendron* species from Arunachal Pradesh, and a diverse range of

endemic plants from Meghalaya, along with other plant species, all classified under various threatened categories. Assam lies within the transitional zone connecting the Indian, Indo-Malayan, and Indo-Chinese biogeographical regions. Its favorable climate, along with diverse topographical and edaphic conditions, promotes the abundant growth of a wide range of plant communities. The endemic orchids of Assam, which are crucial for ecological balance, ornamental value and their pharmacological properties, face threats due to habitat loss, overharvesting and illegal collection (Tiwari et al. 2023). Arunachal Pradesh occupies a strategically significant position at the intersection of the Indo-Burma and Himalayan biodiversity hotspots. The state's distinct phytogeographical, topographical, and climatic features create an ideal environment for diverse and unique floral species (Borah et al. 2024).



Map showing the distribution of endemic plant species of northeastern of India under RET categories

Given that it harbors nearly half of India's total flowering plant species,

Arunachal Pradesh is often regarded as the "center of evolutionary development" and the "cradle of flowering plants" (Chowdhery 2008). The region supports a rich diversity of endemic and native species. *Rhododendron* species in Arunachal Pradesh, known for their ecological and aesthetic significance and it is one of the largest genera of flowering plants. It is blooming across various elevations in the Himalaya and plays a crucial role in supporting seasonal movements of insects, birds, and animals. Given its significant ecological and economic value in this mountainous region, it stands

out as an important genus for further study and exploration (Basnett & Ganesan 2022). However, climate change and the growing demand for natural resources have increasingly threatened the natural habitats of Indian Himalayan *Rhododendron* over time (Basnett & Ganesan 2022; Halder et al. 2024).

Meghalaya, encompassing the Garo, Khasi, and Jaintia Hills, forms part of the Indo-Burma biodiversity hotspot. A significant proportion of India's total plant diversity, including numerous endemic, rare, and primitive flowering plant taxa have been documented within Meghalaya. The region's exceptional biodiversity is largely influenced by its varied topography, altitude

Endemic plant species status as per individual assessment.

| | Family | Species | Region | Individual assessment | References |
|----|---------------|-------------------------------------|-------------------|-----------------------|----------------------|
| 1 | Orchidaceae | <i>Vanilla borneensis</i> | Assam | R and T | Baruah et al. 2017 |
| 2 | Arecaceae | <i>Calamus nambariensis</i> | Assam | T | Baruah et al. 2017 |
| 3 | Lauraceae | <i>Phoebe hainesiana</i> | Manipur, Assam | EN | Devajit et al. 2022 |
| 4 | Ericaceae | <i>Rhododendron concinnoides</i> | Arunachal Pradesh | T | Paul et al. 2005 |
| 5 | Ericaceae | <i>Rhodeodendron santapauii</i> | Arunachal Pradesh | EN | Paul et al. 2005 |
| 6 | Ericaceae | <i>Rhodeodendron subsansiriense</i> | Arunachal Pradesh | EN | Paul et al. 2005 |
| 7 | Annonaceae | <i>Goniothalamus simonsii</i> | Meghalaya | EN | Upadhaya et al. 2013 |
| 8 | Annonaceae | <i>Trivalvaria kanjilalii</i> | Meghalaya | EN | Upadhaya et al. 2013 |
| 9 | Aquifoliaceae | <i>Ilex khasiana</i> | Meghalaya | CR | Upadhaya et al. 2013 |
| 10 | Aquifoliaceae | <i>Ilex venulosa</i> | Meghalaya | EN | Upadhaya et al. 2013 |
| 11 | Nepenthaceae | <i>Nepenthes khasiana</i> | Meghalaya | CR | Upadhaya et al. 2013 |
| 12 | Orchidaceae | <i>Paphiopedilum insigne</i> | Meghalaya | VU | Upadhaya et al. 2013 |
| 13 | Ranunculaceae | <i>Clematis apiculata</i> | Meghalaya | EN | Upadhaya et al. 2013 |
| 14 | Rubiaceae | <i>Ophiorrhiza subcapitata</i> | Meghalaya | EN | Upadhaya et al. 2013 |
| 15 | Sterculiaceae | <i>Sterculia khasiana</i> | Meghalaya | EX | Upadhaya et al. 2013 |

CR—Critically Endangered | EN—Endangered | VU—Vulnerable | T—Threatened | R—Rare.

differences, and distinct climatic conditions. Additionally, its sub-Himalayan location and the abrupt elevation of hills from the surrounding plains have contributed to a high degree of endemism, further emphasizing its ecological significance (Tiwari et al. 2023). However, the biodiversity of the state is increasingly threatened by shifting cultivation, deforestation, forest fragmentation and urbanization (Upadhaya et al. 2013).

Despite the rich biodiversity of northeastern India, there is a considerable research gap in the conservation assessment of its endemic flora. Strengthening conservation policies, promoting in situ and ex situ conservation efforts, and increasing research funding are essential to ensure the survival of these species. Local communities and indigenous knowledge must also be integrated into conservation frameworks to achieve sustainable outcomes. Future research should focus on evaluating the status of newly identified species and implementing conservation strategies that align with ecological sustainability and biodiversity preservation in northeastern India.

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