

Epiphyte Diversity in Tea Plantations of West Bengal

Epiphytes, these plants do not grow in soil but rely on structural support from other surfaces, either living (like trees) or non-living (like rocks), provided there is sufficient moisture.

Epiphytes are classified into four types on the basis of their life forms as follows:

- Holo epiphytes: true epiphytes growing on host trees.
- Hemi epiphytes: first grow as a terrestrial plant and later adapt an epiphytic life form.
- Facultative: not true epiphytes – can grow as a terrestrial or as an epiphyte.
- Accidental: true terrestrial plants accidentally growing on host tree.

The study sites are the Terai and Doar tea gardens in West Bengal. They are predominantly tropical evergreen forests surrounded by numerous rivulets. The moist climatic condition, with an annual rainfall of 120–350 mm and a relative humidity of 99.4% support significant epiphytic biodiversity.

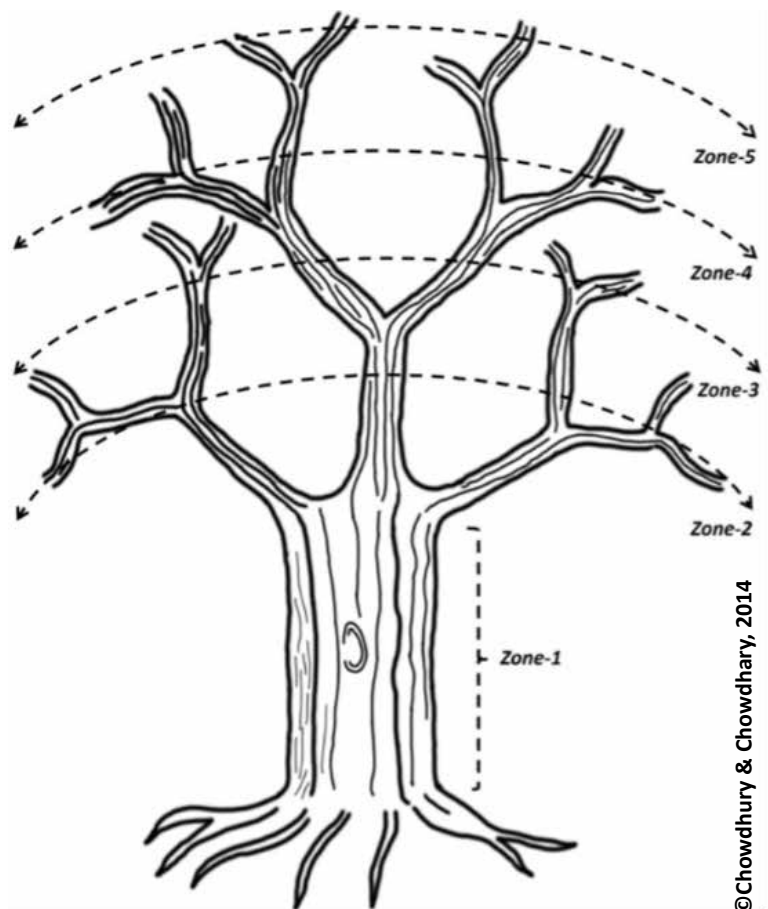
One measures the species diversity, abundance and the composition by measuring the status (commonly found, abundant or rare), zone preference, host preference, and distribution across different locations in region of the study.

Vertical stratification method by Johansson (1974) was used to analyse the **zone preference**. Vertical distribution of epiphytes on the host (tree) was studied. Host was divided into five zones as shown. Classification of species was

done on the basis of which zone they occurred in.

The data shows that the middle canopy layer hosts the highest diversity of epiphytes, while diversity declines towards the treetop. Zone 2 recorded the greatest abundance of both hemi epiphytes, holo epiphytes and accidental, followed by Zone 3. Zone 5 has lowest of all the classified epiphytes. Among the identified epiphytes, ferns and orchids dominated.

Interpolation and extrapolation analysis was used to assess whether species diversity were influenced by the different hosts and therefore the host preference. The analysis also evaluated how well the sampling effort represents the diversity of vascular epiphytes on different tree species.



Zonation diagram

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Vascular epiphytic species richness, abundance, and composition were high on these dominant shade trees in the tea gardens, such as H1 – *Mangifera indica*, H2 – *Albizia lebbek*, H3 – *Gmelina arborea*, H4 – *Ficus benghalensis*, H5 – *Alstonia scholaris*, H6 – *Albizia odoratissima*, H7 – *Artocarpus chama*, H8 – *Swietenia mahagoni*, H9 – *Dillenia pentagyna*, and H10 – *Litsea glutinosa*. The data shows that H1, H2, H5, H6, H7, H8, H9, & H10 had more than 50% sample coverage area of vascular epiphyte assemblages (VEAs). In comparison, H4 and H3 had 17% or less than sample coverage.

Further, **Diameter at Breast Height (DBH) analysis** examined the *variation in epiphyte abundance relative to tree girth*. The results show that the VEA was lowest on trees with a DBH of 1–2 m, peaked at 3–5 m, and saturated at 6–7 m. This indicates that DBH is a critical factor influencing the abundance and species richness of epiphytes in the study area.

In conclusion, the moisture-rich conditions of the tea gardens, combined with their diverse shade trees, make them a hotspot for epiphytic diversity. This interplay of environmental factors and host characteristics plays a pivotal role in shaping the epiphytic ecosystem.

JoTT article summarized:

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