

DIVERSITY, SPATIAL DISTRIBUTION AND HOST PLANT ASSOCIATIONS OF WILD EPIPHYTIC ORCHIDS IN THE ROYAL BOTANIC GARDENS, PERADENIYA, SRI LANKA

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Orchidaceae is one of the most species-rich families of angiosperms, but data on orchid assemblages in managed botanical landscapes in Sri Lanka remains limited. This study assessed the diversity, spatial distribution, and host plant associations of wild epiphytic orchids in the Arboretum section of the Royal Botanic Gardens, Peradeniya. A systematic field survey was conducted to record orchid individuals, GPS locations, and evaluate host tree characteristics, including bark texture, diameter at breast height and root attachment patterns. Orchid species were identified using standard taxonomic floras, while diversity indices and statistical analyses were performed using SPSS Version 23. A total of 470 individual orchids representing seven epiphytic species were recorded across 46 host tree species. The assemblage consisted of *Cymbidium aloifolium* (most abundant, 28.72%), *Dendrobium macrostachyum* (least abundant, 2.97%), *Aerangis hologlottis* (11.27%), *Polystachya concreta* (9.78%), *Vanda testacea* (12.34%), *Thrixspermum pulchellum* (21.06%), and *Luisia tristis* (13.82%). The Shannon–Wiener index ($H' = 1.80$) indicated moderate orchid diversity, while Simpson's diversity index ($D = 0.816$) suggested high species variability with low dominance. Spatial analysis revealed a clustered distribution pattern associated with suitable host trees and favorable microclimatic conditions. *C. aloifolium*, *L. tristis*, and *P. concreta* were widely distributed, whereas *D. macrostachyum* showed a restricted distribution. *A. hologlottis* and *T. pulchellum* exhibited clustered distributions, while *V. testacea* was moderately widespread. Most orchid individuals occurred in lower canopy and branch microhabitats, with *T. pulchellum* frequently occupying branch-end habitats. Host association analysis showed that orchids colonized a wide range of host tree species, with *Bischofia javanica*, *Lagerstroemia speciosa*, and *Dipterocarpus zeylanicus* supporting the highest orchid richness. Orchid abundance was significantly associated with bark texture, with rough fissured bark supporting greater occurrence than rough medium bark (Cramer's $V = 0.841$, $p < 0.05$, $SE = 0.4072$ and 0.5276 , respectively). In contrast, orchid abundance was not significantly related to host tree DBH ($r = 0.062$, $p = 0.516$). However, host trees supporting deeply anchored orchids had significantly greater DBH than those supporting surface-spread orchids ($t = 3.147$, $p < 0.05$). These findings highlight the importance of bark characteristics and habitat heterogeneity in shaping epiphytic orchid communities and emphasize the conservation value of mature rough-barked host trees in managed tropical landscapes.

Keywords: bark texture, biodiversity, epiphytic orchids, host plant association, spatial distribution, Royal Botanic Gardens - Peradeniya