

Niche differentiation in both microhabitat and trophic interactions contributes to high local diversity of Euphorbiaceae in a tropical tree assemblage

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Abstract

Understanding the mechanisms that drive community assembly in species-rich tropical forest remains a fundamental challenge in ecology. Here, we integrated trait dimensions, metabolomics, and phylogeny to test whether interspecific variation over multivariate trait dimensions contribute to coexistence among Euphorbiaceae species. We measured 41 functional traits related to resource acquisition, photosynthetic capacity, hydraulic safety and efficiency, and defense in all 26 Euphorbiaceae species in a 20-ha forest dynamics plot in tropical southwestern Yunnan, China. Network analysis revealed that a small number of traits with high network centrality reflected variation in ecological strategy among the Euphorbiaceae. Further, we observed significant turnover with respect to these high-centrality traits over environmental gradients at distinct spatial and temporal scales. Whereas resource-utilization traits and the habitat associations they mediate exhibited consistent phylogenetic signal. Phylogenetic divergence in chemical defenses likely represents an additional trait dimension that enhances local diversity of closely related Euphorbiaceae in southwestern China.

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