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Influence of host phylogeny and leaf chemistry on foliar endophytic communities of *Quercus*

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Every major lineage of land plants is host to fungal endophytes—highly diverse, horizontally transmitted fungi that live within overtly healthy aboveground tissues such as leaves and stems. Numerous studies have addressed the diversity and biogeography of endophytes at scales ranging from a few meters to thousands of kilometers, revealing that endophyte community composition and diversity is influenced by biotic and abiotic factors, the relative importance of which appears scale dependent. In local communities, host factors (i.e., leaf age, tissue type, genetics, or evolutionary history) often explains the greatest variation in endophyte community composition. Leaf chemistry and morphology also can influence endophyte dynamics, but these factors often are confounded with host phylogeny such that the influence of leaf chemistry on endophyte assemblages is difficult to quantify. Here, we examined the impact of host phylogeny and leaf chemistry on the diversity and composition of foliar endophyte communities in >20 species of oak (*Quercus* L., Fagaceae) in four distinct biogeographic areas of North America. Oaks constitute the dominant woody plant genus of North America and are distributed in a range of habitats from Canada to Mexico. Two major lineages of *Quercus* (red oaks, section *Lobatae*; white oaks, section *Quercus*) have diversified in parallel, such that distantly related species with convergent leaf traits co-occur in the same geographic regions. We collected living, asymptomatic leaves of red and white oak species in each geographic location and examined fungal endophyte communities using high-throughput next-generation sequencing (NGS) of the ITS nrDNA region for each species. Total phenolic concentration was measured from subsets of the same tissue used for NGS. Here, we use fungal phylogenetic- and biodiversity informatics tools to (1) visualize the relationships of endophytic fungi to host phylogeny, leaf chemistry, and geography in an eco-evolutionary framework, and (2) evaluate the factors shaping endophyte distributions in species of *Quercus* at local and continental scales.