

Hidden players in evolution: The impact of mutualistic fungal *Epichloë* endophytes on niche breadth and diversification across *Poa* (bluegrass)

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Understanding what factors promote species' range expansions and speciation is a central goal in ecology and evolutionary biology. Grasses (Poaceae) are one of the most ecologically and evolutionary successful taxonomic groups and have undergone extensive global radiations. Yet, the underlying processes responsible for their success remain largely unknown. One hypothesis is that symbiotic relationships could be underpinning the radiation of this group, with *Epichloë* spp. thought to be a hidden player. Infecting up to 20-30% of grass species, *Epichloë* endophytes can provide a range of advantageous traits to their hosts, including defence from herbivores, drought tolerance, and enhanced nutrient uptake, and are known to expand species' range limits. However, it is unclear whether these benefits can scale up to have macroevolutionary consequences and influence diversification of clades. In this study, the hypothesis was tested that plant associations with *Epichloë* expand niche breadth and drive diversification

in *Poa*, a diverse clade of ~600 cool season grass species that are known to form relationships with *Epichloë* spp. Information on endophyte status was compiled and ecological niche models for over 100 *Poa* species constructed. Using a range of phylogenetic comparative methods, the evolutionary history of *Epichloë* and *Poa* was investigated and the role of endophytes on the evolution of niche breadth and diversification in this group assessed. *Epichloë* endophytes were found to have played a crucial role in the evolution of *Poa*, and accelerated niche breadth evolution. Despite this, little evidence was obtained showing that *Epichloë* spp. significantly influenced diversification dynamics of this plant group. Overall, this study provides insight into how symbiotic interactions can influence the ecological and evolutionary success of species and contributes to understanding of factors underpinning biodiversity across the Tree of Life.