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Mycorrhizal ecology of an endemic terrestrial orchid

Orchidaceae is the largest family of plants and is extremely diverse. Interactions of orchids and other elements, including fungi, in their habitat are equally diverse and complex. Because terrestrial orchids require fungi for germination, establishment, and persistence, they and their fungal partners are a prime example of a complicated and obligatory interaction between microbes and plants. Yet, the identity, specificity, and role of orchid associated fungi in ecosystem underwriting is very poorly understood. We are investigating fungi associated with a photosynthetic terrestrial orchid endemic to a single California County, where the climate is Mediterranean. By using fungal ITS analysis and sequences of the ITS fragments, the identity of the root-colonizing fungi from seven sites across the natural distribution of the orchid is determined. Preliminary results show these fungi primarily are Ascomycetes and Basidiomycetes that also form ectomycorrhizae with coniferous trees. While some of these (e.g., *Phialocephala* spp. and *Pseudorchis straminea*) have been reported from temperate terrestrial orchids, photosynthetic and non-photosynthetic, most have not previously been reported as orchid endophytes. Other fungi belonged to *Ceratobasidium* (Basidiomycota), *Neonectria* (Ascomycota), *Phomopsis* (Ascomycota), *Tricholoma* (Basidiomycota), and *Hohenbuehelia* (Basidiomycota), most of which are reported to be coniferous ectomycorrhizae. Our results indicate that Ascomycetes, especially those forming ectomycorrhizae with the surrounding vegetation, may be equally critical to the persistence of this species than saprophytic or rhizoctonia-forming Basidiomycetes, which are generally believed to be primary orchid endophytes.