

The Web of Mycorrhizal Fungi: Identifying Associations Between Orchids, Ceratobasidium Fungi, and Trees

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The forest ecosystem contains a mycorrhizal fungi network that interweaves different organisms and facilitates nutrient and chemical transfers. The orchid *G. spectabilis* is an agent in this network, as it relies on fungi in the genus *Ceratobasidium* to germinate and grow. However, the relationship between orchids and fungi can be further complicated when these fungi simultaneously associate with other plants. Fungi that partake in this secondary relationship are called ectomycorrhizal (ECM) fungi and revealing whether or not *G. spectabilis* associates with ECM fungi is both essential for its conservation and key for understanding the complexity of forest ecosystems. Finally, as only a few studies have found *Ceratobasidium* to be ECM, this study can begin to show how widespread ECM associations are in *Ceratobasidium* fungi. A two-fold test was used to determine if an ECM relationship exists. The first test was an isotopic analysis of the orchid leaves, since ECM fungi would provide their hosts with a greater ratio of isotopes ^{15}N and ^{13}C . Second, the tree roots surrounding the orchid were amplified with primers specific to fungi used by *G. Spectabilis*. The isotopic analysis revealed a significantly higher concentration of ^{15}N ($p < 0.001$) and ^{13}C concentration ($p = 0.04$) in the orchid samples, suggesting a reliance on ECM fungi. The presence of the correct *Ceratobasidium* strains in both the amplified product and the DNA sequences indicated that the orchid's fungi associate with tree roots. Collectively, these results confirm an ECM association between this strain of *Ceratobasidium* fungi and trees.

Awards Won:

Second Award of \$2,000