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Biotic and abiotic factors affecting phorophyte preference in epiphytic orchids: a pilot study from southern China.

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Epiphytic orchids exhibit varying degrees of phorophyte tree specificity. Some orchid species show a strong phorophyte preference, while other species associate with a broad range of tree hosts. Although trees that carry epiphytic orchids play a crucial role in orchid life cycle, little is known about this phorophyte-epiphyte relationship. We performed a pilot study to investigate why epiphytic orchids prefer or avoid certain phorophyte trees. We selected two orchid species, *Panisea uniflora* and *Bulbophyllum odoratissimum* co-occurring in a forest habitat in southern China. *Panisea uniflora* was found to grow on *Quercus yiwuensis*, but avoided *Pistacia weinmannifolia* trees. The latter phorophyte host carried *B. odoratissimum* that was never found to colonize *Q. yiwuensis*. We also selected *Beilschmiedia percoriacea* as a neutral tree, carrying several epiphytes, but neither *B. odoratissimum* nor *P. uniflora*. We analysed a number of biotic and abiotic environmental factors potentially influencing the relationship between studied orchids and trees, including bark and orchid root fungal diversity. We hypothesised that the tree host specialization of the studied orchids was influenced by the presence of orchid mycorrhizal fungi, which were in turn biased toward particular tree species. Both morphological and molecular culture-based methods, combined with metagenomic analyses, were used to assess fungal communities associated with studied orchids and trees. A total of 232 fungal species in 72 genera were isolated from bark samples. Ascomycetous fungi belonging to *Cladosporium*, *Cyphellophora*, *Fusicolla*, *Penicillium*, *Pestalotiopsis* and *Trichoderma* were dominant. The highest fungal diversity was observed on neutral trees with 71 taxa, followed by *P. weinmannifolia* trees with 47, and *Q. yiwuensis* with 31. Metagenomic analysis confirmed the presence of significantly different fungal communities on the three investigated tree species. Different fungi were also found associated with the two analysed orchid species. Fungal diversity, influenced by bark features, may affect tree selection by epiphytic orchids.

Keywords: epiphytic orchids, phorophyte trees, fungal communities, orchid mycorrhizal fungi, bark.