

Untangling factors underlying distribution of forest orchids

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Factors driving species distribution patterns are key topic in current ecology. This goal is rather challenging in plants, which depend on mycorrhizal fungi for germination and subsequent growth, such as orchids. In view of dispersal and habitat limitation concepts, orchids are considered little limited by seed dispersal, but highly habitat specific. In contrast to this assumption, many theoretically suitable sites stay unoccupied. Using four forest orchids differing in fungal symbionts and demands for limestone substrate, we studied drivers of their distribution in a fragmented landscape. We combined analyses of seed dispersal and population genetic structure with seed sowing in occupied and unoccupied habitats and analysis of mycorrhizal fungi in soil, adults, seedlings and ectomycorrhizal tips from surrounding trees to untangle influence of diverse environmental predictors. While 95% of seed were trapped less than six meter from mother plants, gene flow study showed effective long distance transport. Germination success of all studied species was influenced by habitat (forest type and soil pH), together with presence/absence of suitable mycorrhizal fungi on the site, and the highest germination rate occurred at occupied sites. Although seed germinated also at unoccupied sites, dispersal limitation seems to play smaller role in orchid distribution than habitat limitation.