

Kranabetter, JM and MacKenzie, WH. 2009 Contrasts among mycorrhizal plant guilds in foliar nitrogen concentration and $\delta^{15}\text{N}$ along productivity gradients of a boreal forest. *Ecosystems*, in press.

Abstract

The distribution of plant species in boreal forest understories is hypothesized to reflect mycorrhizal guilds and associated adaptations for organic nitrogen (N) acquisition. In this study of a natural edaphic gradient, where supply rates of inorganic N increase with site productivity, we noted a decline in understory ectomycorrhizal, ericoid and arbutoid plant communities on productive sites, in contrast to a positive response by most arbuscular species. We then assessed the rate of change in foliar N concentration (N_{conc}) and abundance of ^{15}N ($\delta^{15}\text{N}$) of select plants from these mycorrhizal guilds. Two arbuscular plant species (*Rubus parviflorus* and *Viburnum edule*) had the sharpest increases in foliar N_{conc} with enhanced supplies of NH_4^+ and NO_3^- , but no differences in foliar $\delta^{15}\text{N}$. An ectomycorrhizal species, *Abies lasiocarpa*, and ericoid species, *Vaccinium membranaceum*, had parallel increases in both N_{conc} and $\delta^{15}\text{N}$ with soil N supply. The foliar $\delta^{15}\text{N}$ of two arbutoid plants (*Orthilia secunda* and *Pyrola asarifolia*) were as enriched as ectomycorrhizal sporocarps, likely indicating N transfer from mycorrhizal networks. The depletion of foliar $\delta^{15}\text{N}$ by ectomycorrhizal and ericoid plants on poorer sites likely reflected a high degree of N retention and photosynthate demand by fungi, whereas arbuscular plants may have had a less significant $\delta^{15}\text{N}$ response because of a more passive role by fungi in scavenging organic N. The results suggest differences in how mycorrhiza exploit diverse soil N supplies (recalcitrant and labile organic N, NH_4^+ , NO_3^- , and parasitized N) could be an important factor in boreal plant community composition.