90th Annual ESA Meeting

Monday, August 8, 5:00 PM - 6:30 PM, Exhibit Hall 220 A-E, Level 2, Palais des congrès de Montréal

Effects of nitrogen on ectomycorrhizal abundance and diversity from red oak seedlings grown in contrasting soils.

Turner, Greg[*,1, 2], Lewis, J.D.[1], Schuster, W.S.F.[3], [1] Fordham University, Armonk, NY[2]West Chester University of Pennylvania, West Chester, PA[3] Black Rock Forest Consortium, Cornwall, NY

ABSTRACT- Variation in soil nitrogen availability may influence spatial patterns in ectomycorrhizal (ECM) fungal colonization and diversity. Further, the effects of soil nitrogen availability may vary between ECM fungal communities associated with different forest types. Although differential responses by ECM fungal communities to soil nitrogen supply may have cascading effects on plant growth and survival, few studies have examined whether fungal communities vary in response to soil nitrogen availability. To better understand how ECM communities are influenced by nitrogen, a greenhouse study was conducted to examine (1) whether ECM abundance and community properties varied on seedlings grown under contrasting nitrogen levels, and (2) whether ECM abundance and community properties varied on seedlings grown in soil from contrasting host assemblages under contrasting nitrogen levels. To address these questions, seedlings were grown at one of three nitrogen treatments (0.01, 0.1, and 1.0*M* NH_4NO_3) in soil cores extracted from beneath *Quercus rubra* and *Tsuga canadensis* trees in a watershed in the Hudson Highlands of New York. *Q. rubra* was used as the host bait seedling because it is common in this watershed. Across soil sources, ECM abundance, measured as mean colonized root tips per plant, decreased 136% from the low to high nitrogen treatment. Similarly, richness was lowest in the highest nitrogen treatment. Diversity, however, was not significantly affected by nitrogen. Across nitrogen treatments, ECM abundance did not significantly differ between soil sources, but ECM richness and diversity were 62 and 114% higher, respectively, on seedlings grown in oak compared to hemlock soils. Increasing nitrogen was associated with significant increases in total plant mass, shoot mass and stem height, but there were no significant effects of soil source on plant growth parameters, and there were no significant interactions between nitrogen and soil source on any parameter. These results suggest that reduced host receptivity under high nitrogen supply affects ECM abundance and richness, and that greater affinity for red oak seedlings by ECM morphotypes found in oak compared to hemlock-associated soils affects ECM community properties.

Key words: ectomycorrhizae, nitrogen, red oak, diversity