Public Abstract

First Name:Alice

Middle Name:Grace

Last Name:Tipton

Adviser's First Name:Candace

Adviser's Last Name:Galen

Co-Adviser's First Name:

Co-Adviser's Last Name:

Graduation Term:SP 2015

Department:Biological Sciences

Degree:PhD

Title:Restoration at the roots: mycorrhiza interactions and habitat restoration in glades and prairies

In a fragmented landscape, species diversity, richness, and abundance are largely determined by habitat characteristics such as patch size, successional age, isolation, and edge effects. Habitat patch characteristics may indirectly alter the distribution of organisms through impacts on their symbiotic partners, especially when the relationship is obligate. Arbuscular mycorrhizal fungi (AMF) are obligate symbionts, relying completely on host plants for carbon resources while providing plants with nutrients and water in return. AMF-plant interactions can play a crucial role in plant community restoration success.

I examined how AMF-plant interactions were influenced by patch size, isolation, restoration stage, and edge effect in fragmented glade habitat of the Missouri Ozarks. AMF colonization in plant roots of the plant community as a whole increased with the time since restoration began. In these rhizosphere samples and in roots from two plant species (*Rudbeckia missouriensis* and *Schizachyrium scoparium*), AMF colonization decreased from core to edge within glades. Soil exhibited substantial shifts in available nutrients across restoration age and from core to edge habitat, but surprisingly these changes were not correlated with AMF root colonization. This finding suggests that in Ozark glades, plant-AMF interactions are influenced by other habitat patch factors such as plant community composition, microbial community composition, and/or canopy cover.

I then explored whether addition of *R. missouriensis* and *S. scoparium* along with soil inocula collected from well restored sites can catalyze the spread of native microbial communities (including AMF) to surrounding vegetation, thus impacting plant establishment and growth in newly restored glade sites. Results suggest that impact of soil inoculum on nurse effects vary in magnitude and direction among host species. Thus a mosaic of habitat modification regimes could promote plant species diversity in glade restoration.

Finally, I examined how AMF community composition in roots of *S. scoparium*, *Ruellia humilis*, and the plant community at large change across glades and prairies that vary in restoration history and soil substrate. AMF communities on roots of both plant species and in the plant community at large differed between glades and prairies. Plants collected from glades had distinct AMF communities in calcareous versus acidic sites, which correlated with differences in soil pH. For plants collected in prairies, restoration stage was the biggest predictor of AMF community composition. AMF communities of remnant unplowed prairies differed from those of disturbed prairies regardless of soil substrate. Within disturbed prairies, sites that experienced industrial agriculture contained AMF communities with a greater abundance of *Claroideoglossum* sp. compared to grazed or remnant prairies. This suggests that human disturbance, such as grazing and plowing, differentially impact soil community composition in these grassland ecosystems.