Megan Pallo, Education

University: University of Missouri
Year in School: Senior
Hometown: Independence, Missouri
Faculty Mentor: Dr. Candace Galen, Biological Sciences
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Variation in soil communities across a heterogeneous habitat

Megan Pallo, Katie M. Becklin, and Candace Galen

Environmental variation can impact the distribution of species in ecological communities. In alpine communities willows (Salix sp.) significantly affect the conditions experienced by soil biota in understory verses open meadow habitats. This study describes the distribution of collembola (springtails) and mycorrhizal fungi across the alpine willow-meadow ecotone. We surveyed the abundance of collembola and mycorrhizae in open meadow and willow understory habitats. We conducted the survey at three altitudinal sites on Pennsylvania Mountain (Park County, Colorado, USA) in June and July of 2008. We evaluated the abundance of ectomycorrhizae, endomycorrhizae, and collembola living in the leaf litter and soil. The distribution of these organisms differed between habitats. Overall, endomycorrhizae were more abundant in the open meadow, whereas ectomycorrhizae and collembola were more abundant in the willow understory. Within the collembola community most species were equally distributed between habitats. However, Folsomia candida was more abundant in the willow understory. We also found evidence that collembola may affect mycorrhizal colonization. In particular, the abundance of ectomycorrhizae and collembola was positively correlated in the open meadow, but not in the willow understory. To clarify whether leaf litter contributed to the distribution of these organisms we compared leaf litter biomass to collembola and mycorrhizal abundance. In the willow understory there was a negative relationship between the abundance of endomycorrhizae and leaf litter biomass. There were no correlations between the amount of leaf litter and the abundance of ectomycorrhizae or collembola. These results suggest that leaf litter can affect the soil community; however, other factors are also likely important. Future research should consider other effects of willows, such as shading and temperature, on the soil community.