TARLETON STATE UNIVERSITY
Timberlake Biological Field Station

ABSTRACTS

Microbial contributions to rhizosphere soil aggregation in a semi-arid agroecosystem

Grant Falvo[a,b] and Barbara Bellows[b]

[a] School of Sustainability, Arizona State University, Tempe, AZ 85287
[b] Department of Wildlife, Sustainability, and Ecosystem Sciences, Tarleton State University, Stephenville, TX 76402

Microbial populations have been implicated in the causal chain for soil aggregation. Studies examining this process in the rhizosphere of semi-arid grasses are sparse. We sampled soils from the rhizosphere of Texas Wintergrass, as well as the surrounding top and subsoil, in the riparian buffer of a cattle grazing ranch in central Texas. We found that the rhizosphere had significantly ($p < 0.05$) greater degrees of aggregation than the top and subsoil as measured by mean weight diameter. We found that this was due, in part, to the significantly ($p < 0.05$) higher concentrations of organic carbon and glomalin related soil protein. This was supported by the evidence of a significantly ($p < 0.05$) lower carbon to nitrogen ratio found in the rhizosphere soils. Combined, this evidence points to the mechanism that Texas Wintergrass exudes low carbon to nitrogen ratio photosynthates to feed arbuscular mycorrhizal fungi which in turn, produce glomalin, a known soil aggregator. This indicates that Texas Wintergrass cooperates with its microbial symbionts to augment the suitability and stability of its niche. Our findings also show that slaking is one of the main processes controlling aggregation in these seasonally dry soils. Future studies should examine how microbial aggregation agents affect moisture content