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004 EPA STAR Graduate Fellowship Conference *Next Generation Scientists—Next Opportunities*

Potential edaphic effects of buffelgrass *(Pennisetum ciliare)* invasion

nvironmental Concerns

lant invasions lead to long-term declines native plant diversity

xotic plants may directly out-compete and displace natives, metimes driving natives to extinction (Vitousek et al. 1997).

oss of biodiversity may lead to a decline in erall levels of ecosystem functioning

vasive species may alter whole ecosystem regulation of rgy, water, and nutrient cycling (Vitousek 1990).

ontributions to the nitrogen cycle are species specific: each cies has a particular rate of nitrogen uptake, nitrogen rporation efficiency, and each has a unique composition of bon, lignin, nitrogen, and other nutrients in its tissues

xotic plant tissues, which decompose at different rates than ve plant tissues, may alter the nitrogen cycle by changing rate at which nitrogen is immobilized or mineralized

cological impacts of buffelgrass invasion e unknown

cosystems are hypothesized to be sensitive to species nposition as a result of a positive feedback in which higher nitrogen availability results in higher tissue quality, faster omposition, and higher nitrogen availability and vice versa" ops et al. 2002:455)

changes in the composition of the soil microbial community r the physiological capacity of the community, there may be system-level consequences (Waldrop et al. 2000).

Scientific Approach

•Hypothesis: Buffelgrass establishment alters nutrient cycling in native soils to its own benefit.

•I. Field Studies

--ARE THE PLANTS DIFFERENT?

On a monthly basis, root and shoot tissue from wild Buffelgrass and Tanglehead plants are being collected. Tissues are being analyzed for N, C, C:N, lignin, cellulose, and hemicellulose.

--DO THE PLANTS ROT AT DIFFERENT RATES? (FIG.1)

On a monthly basis bags containing root or shoot tissues from Buffelgrass or Tanglehead are being collected from three field sites. They are being analyzed for biomass loss, as well as changes in C,N, C:N, lignin, cellulose, and hemicellulose.

•II. Greenhouse Studies

--IS BUFFELGRASS MORE PRODUCTIVE IN SOIL IT HAS PREVIOUSLY INHABITED?

Sites were located across the desert southwest where wild Buffelgrass and wild Tanglehead stands occurred in close proximity. Soil was dug under each and transported to the greenhouse. A classic transplant experiment was conducted in a controlled setting. Results are being analyzed.

--IS BUFFELGRASS MORE CAPABLE OF CAPITALIZING ON NUTRIENT FLUXES THAN ARE NATIVES? (FIG 2.)

A nutrient addition experiment (N, P, N+P) was conducted with buffelgrass and 3 natives. Results are being analyzed.

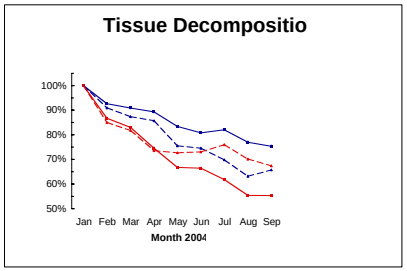

Figure 1. Differences in decomposition rates over time

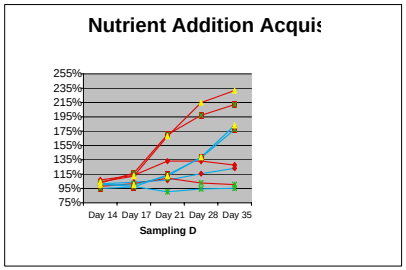

Figure 2: Differences in ability to capitalize on nutrients..

Impact

•Land Management

--Over 1 million hectares are sown in buffelgrass. Land managers hope to maintain cattle on their lands in South Texas and Mexico. The ecological ramifications are unknown.

•Basic Science

--This will add to our understanding of invasion biology, particularly in the understudied areas of potential soil alterations.

Citations: Knops, J. M. et al. 2002. Ecology Letters **5**:454-466; Vitousek, P. M. 1990. Oikos **57**:7-12; Vitousek, P. M., et al. 1997. New Zealand Journal of Ecology **21**:1-16.Waldrop, M. P. et al. 2000. Soil Biology and Biochemistry **32**:1837-1846

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