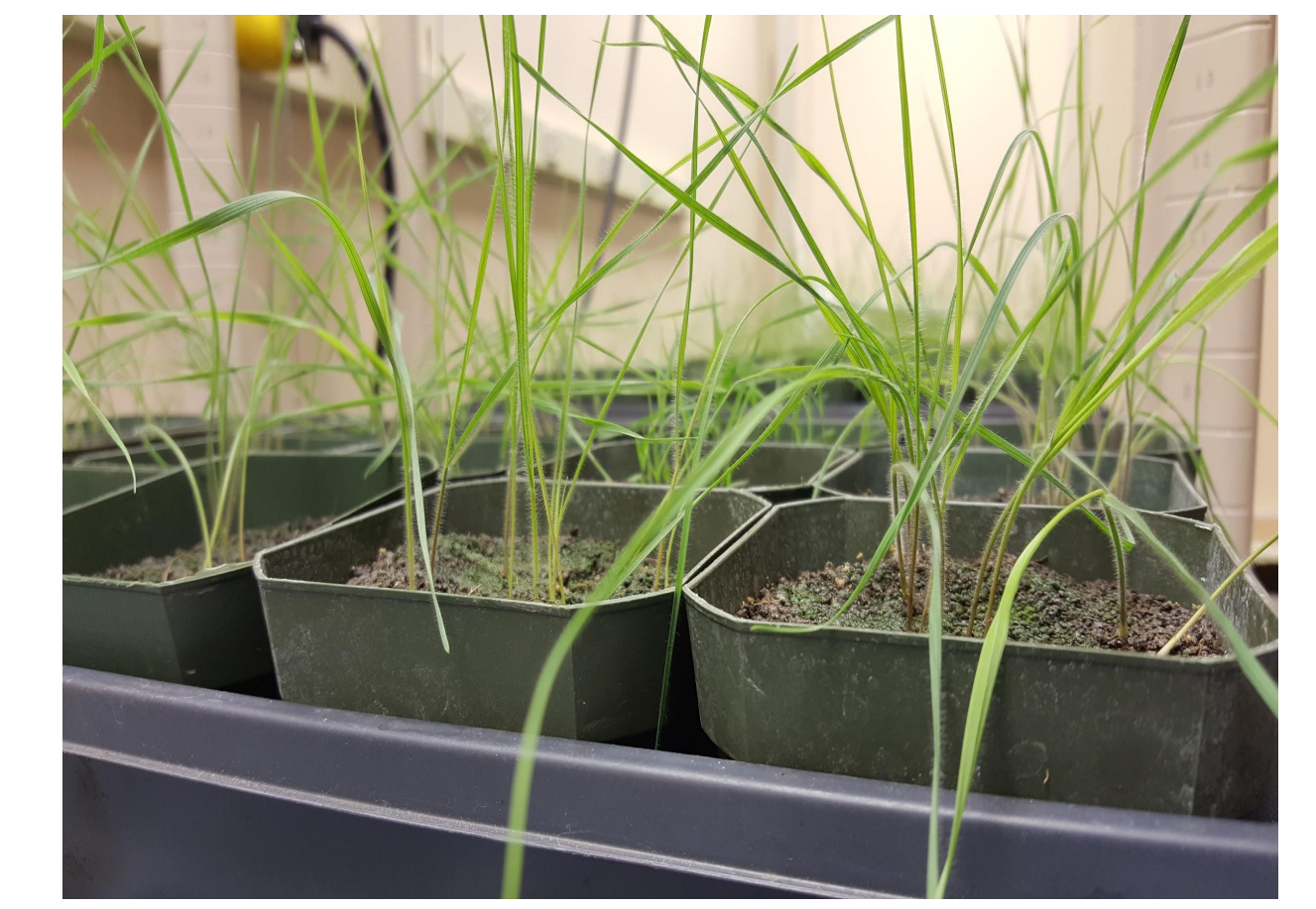


The Effect of Biochar on the Growth of Prairie Grass Species

Erin Lahowetz, Ali Fletcher, Ivy Banks, and Dr. R. Laungani
Biology Department, Doane University, Crete, NE 68333



1. Introduction:

Increases in atmospheric CO₂ from burning of fossil fuels is a key driver of climate change. Biochar, plant carbon (C) that is pyrolyzed, has been the focus of several studies to help combat climate change. Biochar can act as a C sink when applied to soil. This soil sequestration prevents the C from returning back to our atmosphere via microbial decomposition. Biochar has been applied to soil in agriculture, has been used for soil restoration, and can increase crop growth. However, its impact on prairie plant species is unclear. We examined the effect of biochar on the growth of native, exotic, and invasive prairie plants to ensure addition of biochar is safe to sequester C in prairie reserves without harming the local ecosystem.

2. HYPOTHESIS

The growth of the prairie grass species will all be equally increased by the addition of biochar.

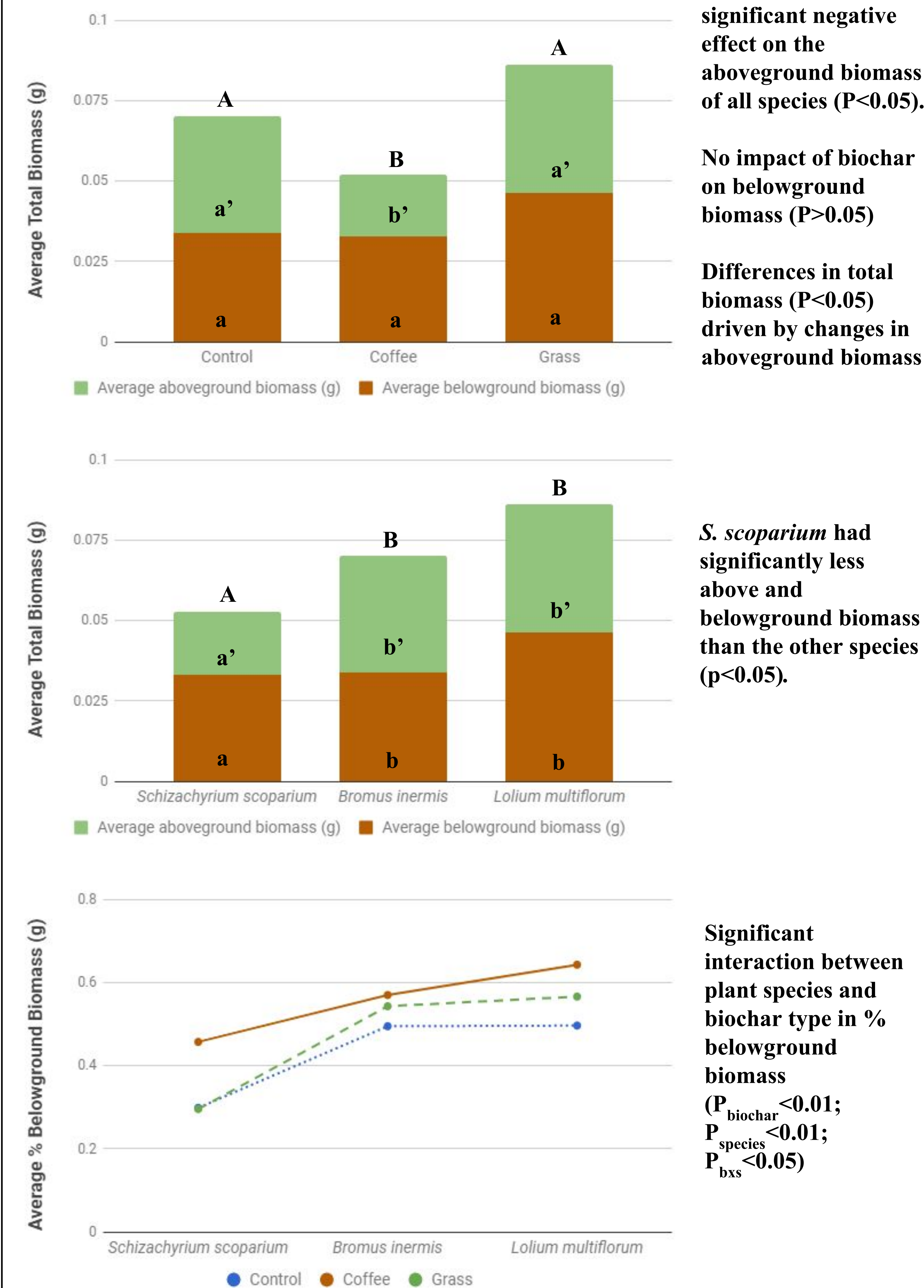
3. Methods:

- Collected and sieved prairie soil to 2mm
- Produced biochar via pyrolysis at 400°C for 30 min from used coffee grounds or grass litter (1:1 mix of *Bromus inermis* and native prairie grasses)
- Local grassland species: *Bromus inermis* (invasive), *Lolium multiflorum* (non-invasive), and *Schizachyrium scoparium* (native)
- 6.4:260g biochar to soil ratio per pot (=10 ton/ha)
- 36 pots per species, 12 pots per treatment: coffee biochar, grass litter biochar, control (no biochar)
- Grew plants for 39 days
- Harvested and weighed above and belowground biomass (g)

RESEARCH QUESTION:

How will biochar affect the growth of invasive, non-invasive, and native prairie grass species?

4. Results:



- *S. scoparium* showed the largest increase in belowground allocation with coffee biochar
- Grass biochar appears to have a small affect *B. inermis* and *L. multiflorum* belowground allocation. Grass biochar has no effect on belowground allocation in *S. scoparium*
- Coffee biochar reduced total biomass of all species
- Total biomass of *B. inermis*, the invasive species, was negatively impacted by coffee biochar but increased greatly with grass biochar
- *B. inermis* has been shown to have a very aggressive root system (Wilson and Fink, 2011) and therefore increases in their below ground allocation could negatively impact prairies.
- Increase in belowground allocation in *S. scoparium* could help prairie C storage
- Grass biochar does not seem to have a positive impact on the growth of *S. scoparium* (native)

5. TAKE HOME MESSAGE:

C storage via biochar has a direct impact in the growth of prairie grass species, and *B. inermis* may be managed by the use of coffee biochar but further experimentation is needed

Acknowledgements:

Doane University Biology Department, Spring Creek Prairie Audubon Center
Fink, Krista A., and Scott D. Wilson. "Bromus inermis invasion of a native grassland: diversity and resource reduction." *Botany* 89.3 (2011): 157-164.