Mycorrhizal fungi help plants acquire nutrients from the soil in exchange for organic carbon. Mutualistic mycorrhizal associations seen in 90% of plants (4). Commercial mycorrhizae inoculum are becoming a more popular alternative to the natural fungus. Plant mutualism with mycorrhizae is greatly impacted by plant species due to different types of photosynthesis and favored growing conditions, and also sympatric/allopatric associations between the plants, fungi, and soil (1,2,3).

Sympathetic relationships between soil, plant, and native fungi result in better growth, survival, and overall fitness (6). Our goal is to determine the effects of commercial mycorrhizae vs. native mycorrhizae on plant growth depending on the sympatric/allopatric relationship between the soil, fungus, and plant.

We hypothesize that plants exposed to mycorrhizal fungi, whether it is commercial or native, will have the greater biomass than those without fungi. For this experiment, biomass will serve as an indicator of plant fitness.

### Methods

- Bothriochloa ischaemum (Bot) and Andropogon gerardii (Ag) seedlings were separated from growing flats.
- 4 treatment levels:
  - Live soil with inoculum (LI)
  - Sterile soil with inoculum (SI)
  - Live soil no inoculum (LN)
  - Sterile soil no inoculum (SN)
- Seedlings of each species were transplanted to "Cone-tainers" and labeled by species, treatment level, and replicate number.
- Inoculated groups were given ½ teaspoon of Plant Success Endo- and Ecto-Mycorrhizae.
- Tools were sterilized between different treatment levels and a thin layer of sterile soil was added to each "Cone-tainer" to prevent contamination.
- Height was recorded weekly for each plant, and plants were dried and weighed to determine their biomass.

### Results

Figure 1 shows the average above ground biomass of two plant species under four different treatments. Across all treatment levels, Bothriochloa showed higher biomass than Andropogon. For both plant species, sterile non-inoculated soil resulted in the highest average biomass.

Figure 2 shows the average height of plants after 8 weeks in different treatments. Plants grown in sterile soil with no inoculum grew higher than those in other conditions. Similarly to biomass, Bothriochloa grew taller than Andropogon in all treatments.

### Conclusion and Discussion

- Our findings did not support our hypothesis that treatments with mutualistic mycorrhizal associations would result in greater biomass.
- There was not a significant difference in biomass between the commercially added and the wild mycorrhizae.
- The lack of significance between wild and commercial fungi indicates it may be an effective replacement when wild fungi is absent.
- Inoculum treatment was significant to biomass (P=0.005) and height (P=0.028) of plants.
- Sterile, non-inoculated soil resulted in greater biomass and height in both species.
- This suggests that mycorrhizal associations did not benefit our specific grass species.
- The trade of carbon for nutrients between the fungi and plants has the potential to become parasitic, which could have resulted in the lower biomass of our inoculated treatments (7).
- It is also possible that if the experiment had run longer, we would have had different results, as mycorrhizae are usually required for grasses to complete their life cycle.
- Several of our grasses did not survive transplanting, lowering our sample sizes and potentially affecting our results.
- Additional research could be done to determine if the amount of inoculum added affects plant fitness, as it is possible too much of the fungus could parasitize plants.