The Effects of Mycorrhizal Colonization on Leaf Area Index.

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Introduction

- Around 90% of terrestrial plants on earth have a symbiotic relationship with mycorrhizal fungi (Krishnamoorthy 2016). Arbuscular mycorrhizal fungi form symbiotic relationships with 75% of terrestrial plants (Cavagnaro 2017), with both the plant and the fungi benefitting from their association with one another. In an experiment published by Elsevier B.V done on olive trees it has been shown that the presence of mycorrhizal fungi has increased growth, shoot elongation, and our main point of focus, leaf area (Khabou 2014).
- In this study, we will be testing two species of terrestrial plants and the effect that mycorrhizal fungi, or lack thereof, will have on the leaf area of our plants. Not only has mycorrhizal fungi been shown to increase areas of plant growth, it has also been shown to help manage salinity and other kinds of stress in plants so this would possibly help eliminate any outside factors that may or may not affect the outcome of our experiment (Khalil 2011).
- The relationship between plants and arbuscular mycorrhizae is consistently beneficial to the plant and aids in durability to exterior threats or stressors on the plant (Krishnamoorthy 2016). In some cases the presence of the mycorrhizal fungi changed the distribution of the root/shoot system and the leaf area (Pankoke 2015). We will look at the leaf area as a representation of the biomass of the grasses shown, in order to understand whether the presence of the mycorrhizae is beneficial, harmful, or negligible in the growth of the plant. In this experiment, we will be able to compare the interactions of commercial and natural mycorrhizae as well as sterile and non-sterile soil and how these variables are either an aid or a hindrance to the plants' growth and overall health.

Methods

- We conducted our experiment on two warm season prairie grasses *Bothriochloa ischaemum*, and *Andropogon gerardii* which had both been in sterile soil to prevent any contamination in the study.
- Beginning our experiment, we first transplanted the *Andropogon gerardii*, and *Bothriochloa ischaemum* into separate pots with six individuals of each species in the four test groups.
- The four test groups were sterilized soil with no inoculum, non-sterilized soil with no inoculum, sterilized soil with inoculum, and non-sterilized soil with inoculum.
- The plants were arranged on a flat in the grow room in a way that they alternated evenly between the groups to allow for each plant to get an equal amount of light and water.
- In order to determine the relation to type/presence of mycorrhizae and soil type on plant growth for the two plant species we measured the total leaf area of each of the four different test groups being grown, and then averaged the leaf area of each variety of the two species. We also gathered the dry weight of the above and below ground at the conclusion of the experiment to verify any effect of the mycorrhizae and soil type had on the plants.
- We entered our final data into the SPSS computer program in order to find the p value and determine if there was a statistical difference of the above ground biomass, below ground biomass, and the mean leaf area.

Results

Legend:
LI- Live Inoculum SN- sterile no inoculum
LN- Live no inoculum SI- sterile inoculum

Figure 1

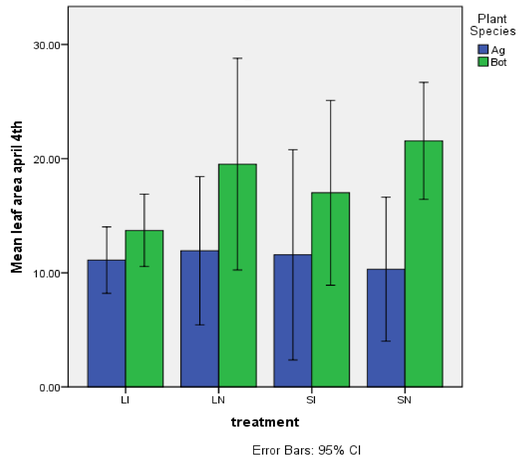

Figure 1 details the leaf growth of *Bothriochloa ischaemum* (green) and *Andropogon* gerardii (blue). The y-axis measures the mean leaf area, while the x-axis specifies the treatment that the soil received. The leaf growth did not show a statistically significant difference (p>.05).

Figure 2

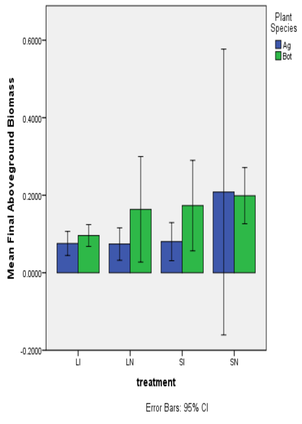

Figure 3

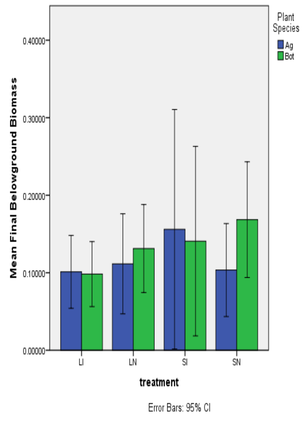

Figure 2 shows the above ground biomass while Figure 3 shows the below ground biomass. In each of these figures there is not a statistically significant difference in the biomass of each plant type of plant and the treatment levels (all P>.05).

Discussion and Conclusion

In our research we set out to find if there would be a significant growth difference in the two warm season grasses *Bothriochloa ischaemum* and *Andropogon gerardii* in the presence of natural mycorrhizae, commercial mycorrhizae and completely sterile environments. Based on our analysis of the final results we have found that in the time we were allotted there was not a statistically significant difference between the four test groups. However, if given more time to grow the results show that there may have been a significant difference. Previous research has found that these warm season grasses and invasive species such as *Bothriochloa ischaemum* depend heavily on mycorrhizae for growth (Wilson and Hartnett 1998, Wilson and Hickman 2012). If future research were to be done on this same experiment it would be recommended to have a larger test groups and a greater amount of time for the plants to grow.

Literature Cited

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Acknowledgments

Thank you HHMI for funding this experiment. Thank you Dr. Steets for your botanical leadership and knowledge.