

THE FUNGUS AMONG US: The effects of mycorrhizae fungi on grasses

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Conclusion:

During our experiment, the data collected showed no significant difference between any of the treatment groups or between species, with the exception of total biomass in the Sterilized/inoculated treatment in *Bothriochloa ischaemum*, but the confidence level proved not to be significant. Our replicates showed complete survivorship, which is unusual in that these species, according to two separate studies done by Duell et al and Wilson et al, require Mycorrhizal fungi associations to complete their life cycles. (Wilson 2011, Duell 2016) This fact leads us to believe that our study did not allow enough time for these differences to manifest.

Considering the very limited scope of our experiment, in both time and data, we would like to see an experiment in which we would be given an entire growing season in which to collect data and to revisit this particular set-up of factorial design. This would allow us to see if the findings of a longer-term study would greatly change the outcome of the data set. We believe that if allowed to repeat this experiment, with the greater period, a very significant result would be reported.



Works Cited

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Figure 1: Mean Stem Diameter over all treatments with 95% confidence level Figure 3: Mean Total Biomass over all treatments with 95% confidence level

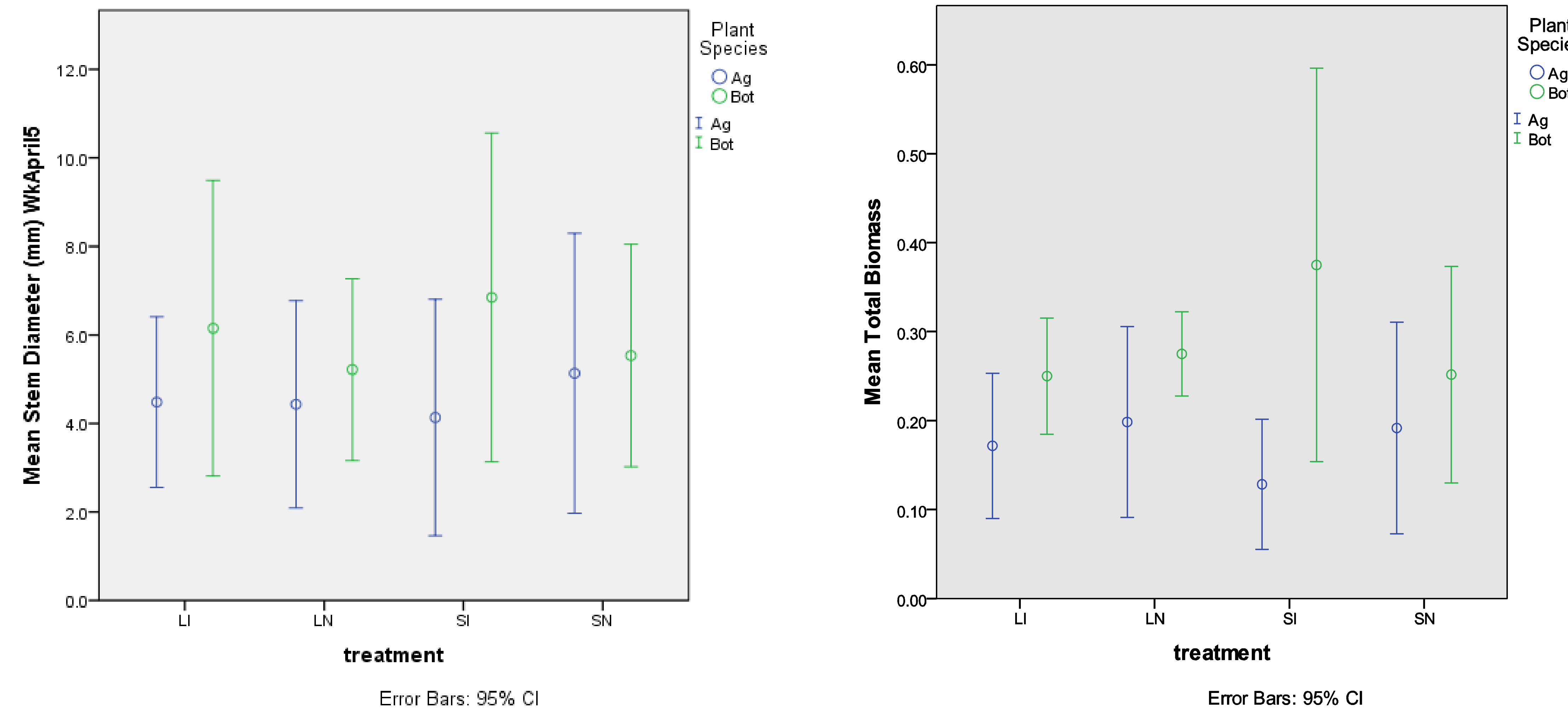


Figure 2: Mean of Average Chlorophyll Content over all treatments with 95% confidence level

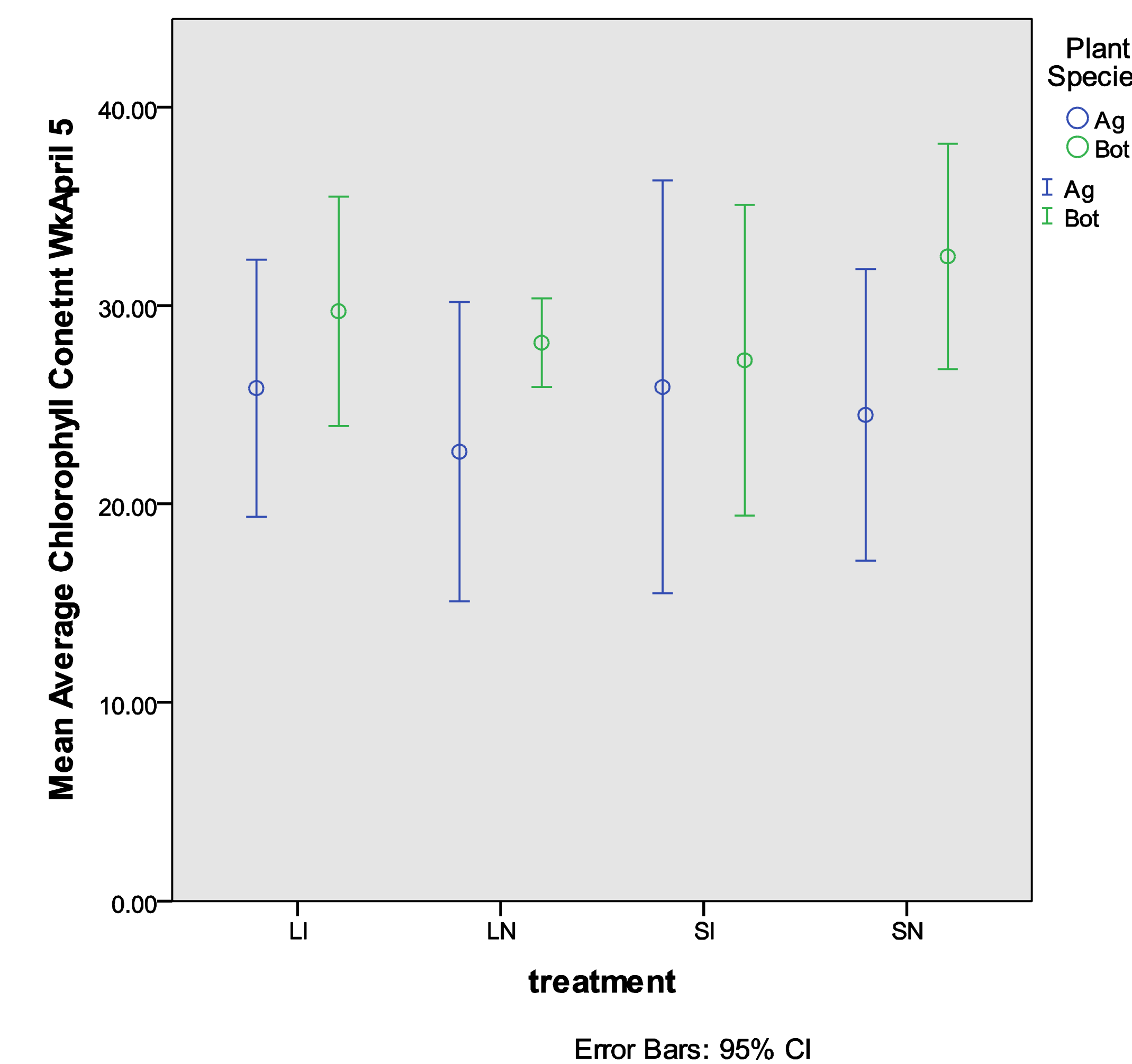


Figure 4: F-Statistic and P-value comparison for measured traits

Trait	F Statistic	Overall Treatment Effect	Live vs. Sterilized Soil	Inoculate vs. No Inoculate	Sterilization-Inoculate Interaction
Biomass	2.81	0.018	0.688	0.948	0.387
Stem Diameter	1.28	0.648	0.657	0.673	0.829
Chlorophyll Content	0.73	0.284	0.626	0.998	0.271

*Additional Lab Partners did not wish

Introduction:

In a study done by Makarian Hassan, mycorrhizal fungi was shown to greatly decrease stress and increase overall fitness of a plant. Mycorrhizal fungi has been aiding plants for around 500 million years. A plant inoculated with mycorrhizae will likely be more fit due to increased nutrient uptake. Mycorrhizae that is native to the same area as the inoculated plant will increase this effect. (Hassan 2016, and Megan 2016) Also, as shown in a paper by Wilson et al, many plants have developed a dependence on mycorrhizae to complete their life cycles. (Wilson 2011, Duell 2016) For our experiment, we studied the effects of inoculating two types of prairie grasses with commercial and wild mycorrhizal fungi. We hypothesized that the plants inoculated will have both a higher stem width and chlorophyll content. We also investigated whether one type of mycorrhizae was better than the other or if both in combination was better. We wanted to find out if size of the plants as was stated in the proposals we read. plants and soil coming from the same area does in fact, increase overall

Materials and Methods:

Our group utilized *Bothriochloa ischaemum* "Iron Master" and *Andropogon gerardii*. Seeds were obtained from Sharp Brothers Seed Company in Healy, KS. Seeds were placed into a vermiculite medium, germinated, and then transplanted into individual RC10 containers. During transplant, plants were divided randomly into one of four treatment levels using a full factorial design, to include:

- Commercial mycorrhizae inoculum absent—sterilized prairie soil (No mycorrhizae present)
- Commercial mycorrhizae inoculum absent—non-sterilized prairie soil (Wild type mycorrhizae only)
- Commercial mycorrhizae inoculum present—sterilized prairie soil (Commercial type mycorrhizae only)
- Commercial mycorrhizae inoculum present—non-sterilized prairie soil (Both commercial and Wild type mycorrhizae)

Each treatment contained six replicates per species for a total of forty-eight plants. The type of commercial inoculum utilized was Sustainable Agricultural Technologies Endomycorrhizae. Soil for this experiment was gathered at the OSU Research Range Station, which is ten miles west of Stillwater, OK. Half of the soil was then sterilized in an autoclave to kill all soil microbes. The remaining soil was left untreated to conserve the native microbes, including native, wild mycorrhizae. Data was collected on Survivorship, Stem Diameter using digital calipers, and Average Chlorophyll Content using a hand held SPAD meter. Data was collected once per week for a total of eight weeks. Measurements other than Survivorship were begun in the fifth week. In the eighth week, plants were harvested and prepared for drying, then left to dry. Final biomass measurements were taken in the ninth week. All data was then analyzed using ANOVA Statistical Data Analysis Software.



Results:

We did not have any significant difference between inoculation or soil treatment levels for Biomass, Stem Diameter, and Chlorophyll Content. (See Figure 4.)