

Introduction

•Mycorrhizae is a fungus that grows in association with the roots of a plant in a symbiotic relationship. *Arbuscular mycorrhiza* (AM) symbiosis is one of the most widespread plant–fungus interaction, as it affects about 80% of terrestrial plant species in our ecosystems (Damien).

•Mycorrhiza aids in the uptake of nutrients from the soil by reaching zones of resources that the roots could not reach themselves (Allen)

•Stomata are responsible for regulating the flow of oxygen out of the plants, carbon dioxide into the plant, and retention of water (Hetherington, Woodward). An increase in stomata of plants could mean they will absorb more carbon dioxide from the air and produce more oxygen thus helping reverse global warming.

◦CO₂ in the atmosphere is responsible for ocean acidification (Hoegh-Guldberg, et. al) which has caused many species of fish to be reduced. This has caused fisherman in southeast Asia to begin fishing for jellyfish instead (Omori, Nakano)

Research question:

•Our initial question is if the plants with the added inocula will grow with more leaves by the end of our experiment, as compared to the plants without, as well as the number of stomata the plants have produced.

Hypothesis:

•This increase in nutrient uptake leads us to believe that the plants with mycorrhizae in their soil will have more leaves per plant than those grown in sterilized soil

◦Additionally those plants which we have added inoculated mycorrhizal fungi to will show greater leaf growth than those without.

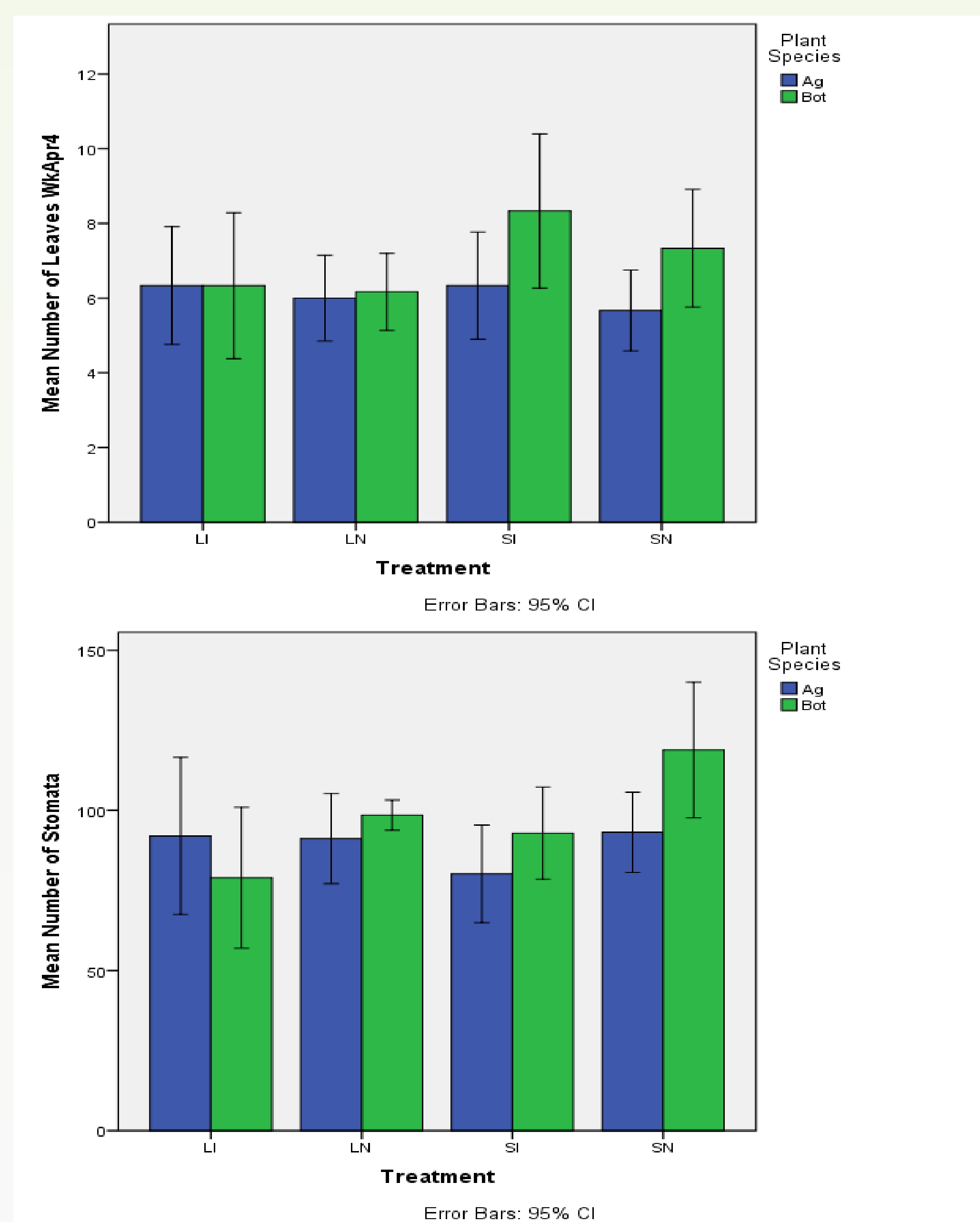
•We believe that because of this increase in size, it will necessitate more carbon dioxide in the plant and increase the number of stomata in plants in live soil and more so in live inoculated soil.

Methods

- We planted 24 plants of each of two species, *Bothriochloa ischaemum* and *Andropogon gerardii*, into 4 treatment groups- sterilized soil free from mycorrhizae, sterilized soil with mycorrhizal inocula added, live soil with no mycorrhizae added, and live soil with mycorrhiza added.
- Each week we counted the leaves of each plant. The second week we took the most mature leaf on each plant and painted the ventral side with clear nail polish. We let it dry, the applied clear tape and peeled off slowly. This was our stomata sample. Under a microscope we counted the number of stomata down one line of cells for 1 cm.
- At the end of the experiment we separated the above and below ground biomass and weighed each separately to compare results.

Measurements

- In both cases of the number of leaves and in the number of stomata, the *Bothriochloa ischaemum* species outnumbered the *Andropogon gerardii* species.



Results

Variables Compared by F and Sig

VARIABLE	F	P
Number of Stomata	3.413	0.006
Number of Leaves	2.087	0.067
Aboveground Biomass	4.966	0.000
Belowground Biomass	2.465	0.034

Table 1. Results of two-way ANOVA

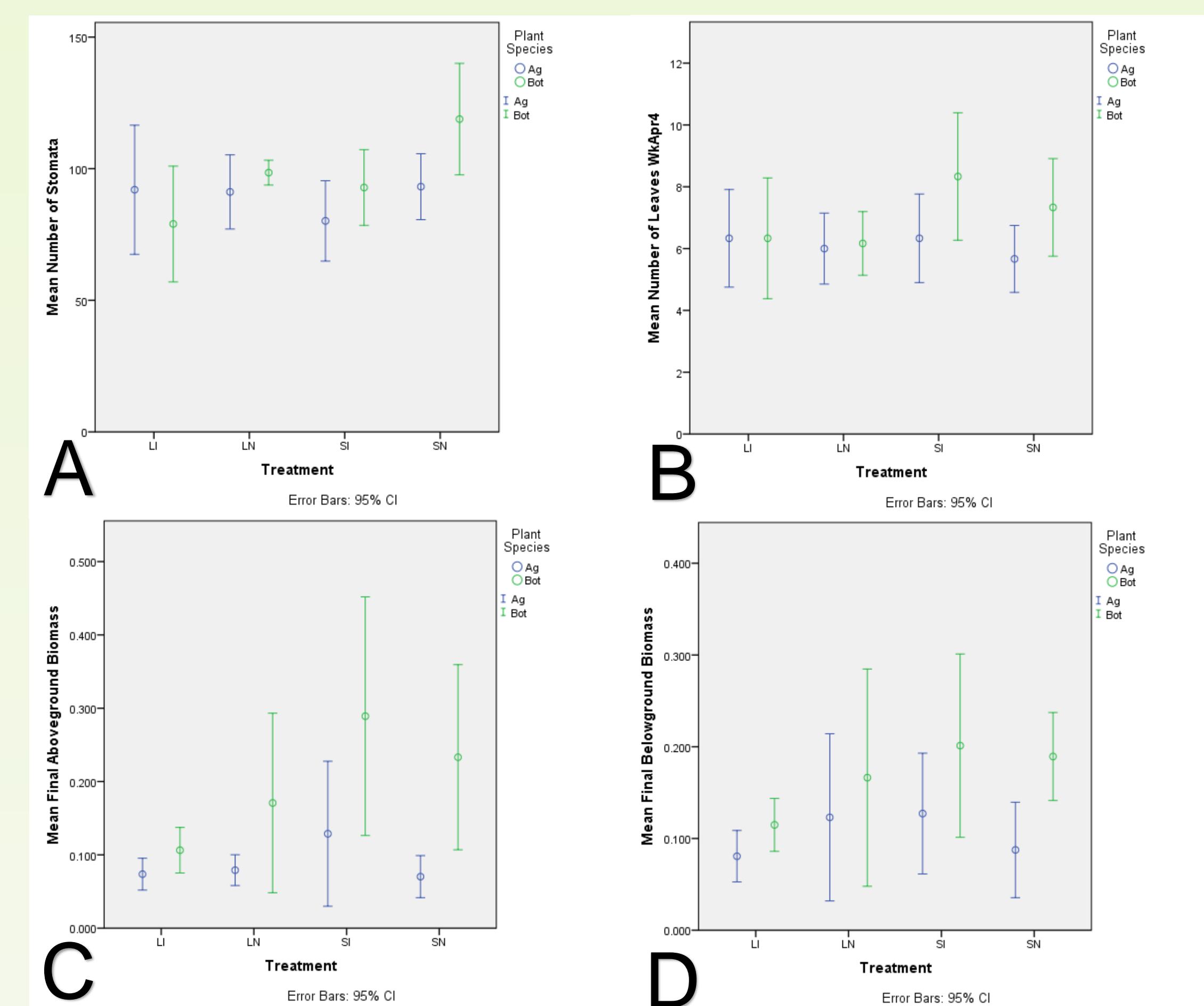


Figure 1. Box plots showing comparison of A-Number of Stomata B- Number of Leaves C-Aboveground Biomass D- Belowground Biomass

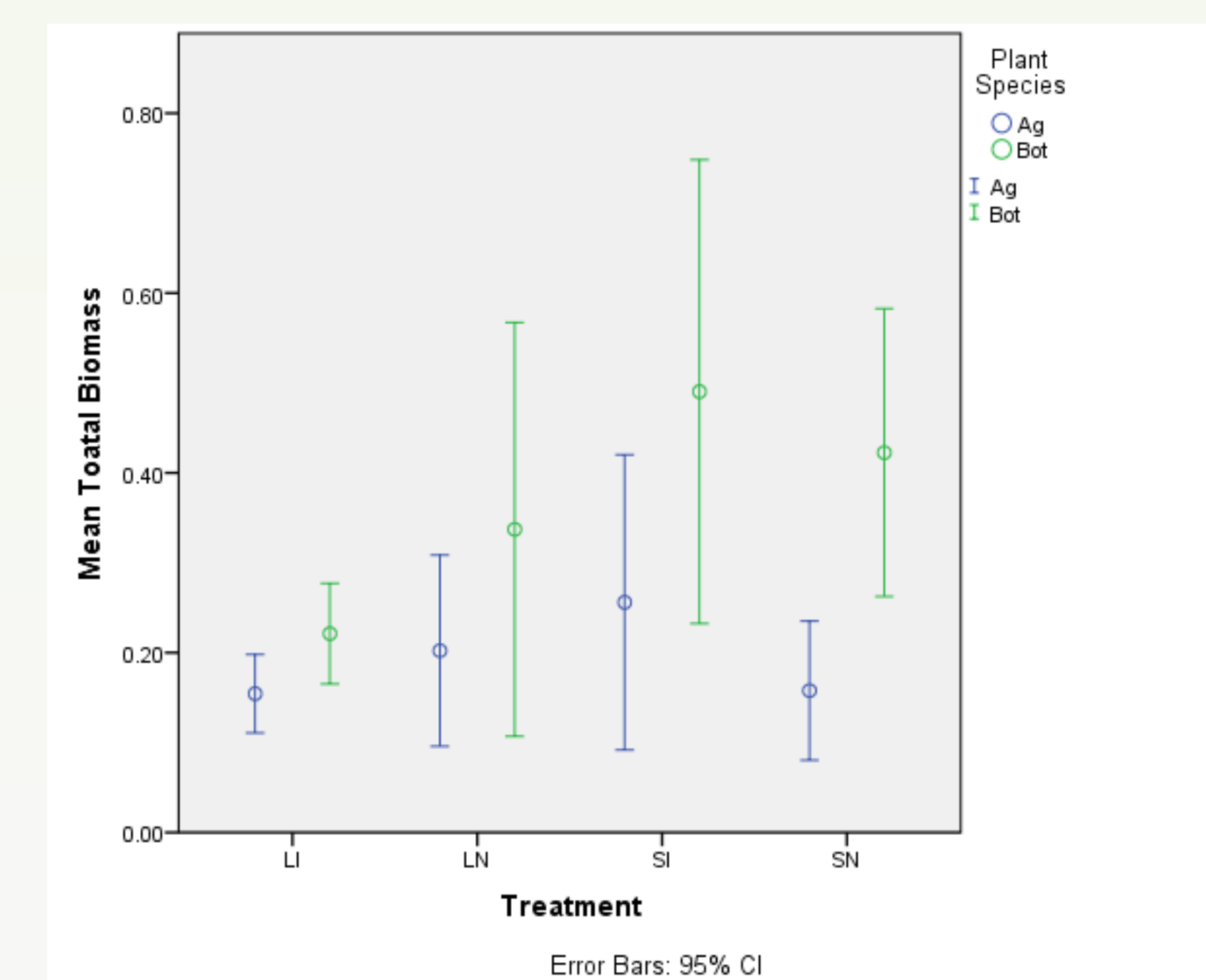


Figure 2. Box plots showing comparison of the total mean biomass over every treatment type.

Conclusion

Bothriochloa ischaemum was more responsive to the sterilized soil throughout the experiment and was generally the tallest in these treatment groups and had the greatest number of leaves. Future research could allow for more time to measure the continued growth and stomata count. Additional time could allow for not only the biomass measurement but also the amount of fibrous root compared across the treatments, which could show additional results we couldn't see before.

References

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