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Introduction

Plants have a unique symbiotic relationship with mycorrhizae fungus. **The mycorrhizae attach to the host plant's roots making them have a larger surface area to uptake water and nutrients.** This benefit has lead some plants to adapt and secrete strigolactone into the soil so that mycorrhizae hyphae grow at a faster rate and are able to find plant roots faster (2). Like most species, mycorrhizae are competitive in nature and have adapted to trait-specific techniques for surviving and battling for space and resources (3). **In return for the greater uptake of water and nutrients, the mycorrhizae obtain photosynthetic carbon and amino acids directly from the host plant (5).** This leads us to believe that mycorrhizae are a staple in plant growth and development.

Previous research has shown that some species of plants have the ability to attach to multiple mycorrhizal fungi species and thus have a faster growth rate than those that only attach to one or none (4). It has also shown that certain plants are better at attracting mycorrhizae than other plants, such as *Sorghum bicolor* (1). Therefore, we thought it would be interesting to look at both native and non-native plant species reactions to soil that is inoculated with various mycorrhizal treatments. **Our objectives of this experiment is to see if there is a difference in the amount of nutrient uptake and growth of plants with four different soil treatment types.** Also, we are looking to see if there is a difference in nutrient uptake and growth between two plant species, the *Sorghastrum nutans* which is native to Oklahoma and the *Sorghum bicolor* which is a crop species not native to Oklahoma. **We hypothesize that both *Sorghastrum nutans* and *Sorghum bicolor* in the living prairie soil that is inoculated with mycorrhizal will have a greater height and chlorophyll content than those in the sterile soil with no mycorrhizal inoculum.**

Methods

- In this experiment we transplanted *Sorghastrum nutans* from Johnston Seed CO. Enid, OK and *Sorghum bicolor* from "Macia" variety; USDA.
- Twenty-four tubes were filled with sterilized soil while another twenty-four tubes were filled with living prairie soil. Twelve of each plant were then placed into the two different soil types.
- Of those twelve, six were inoculated with commercial mycorrhizal fungi. We transplanted each plant into its tube by putting the roots first into a hole that was made with a scoopula.
- Rulers were used to measure stem height and a SPAD meter was used to measure chlorophyll content of each plant each week for five weeks.
- An ANOVA test was used to determine significance between the four treatment groups.



Results

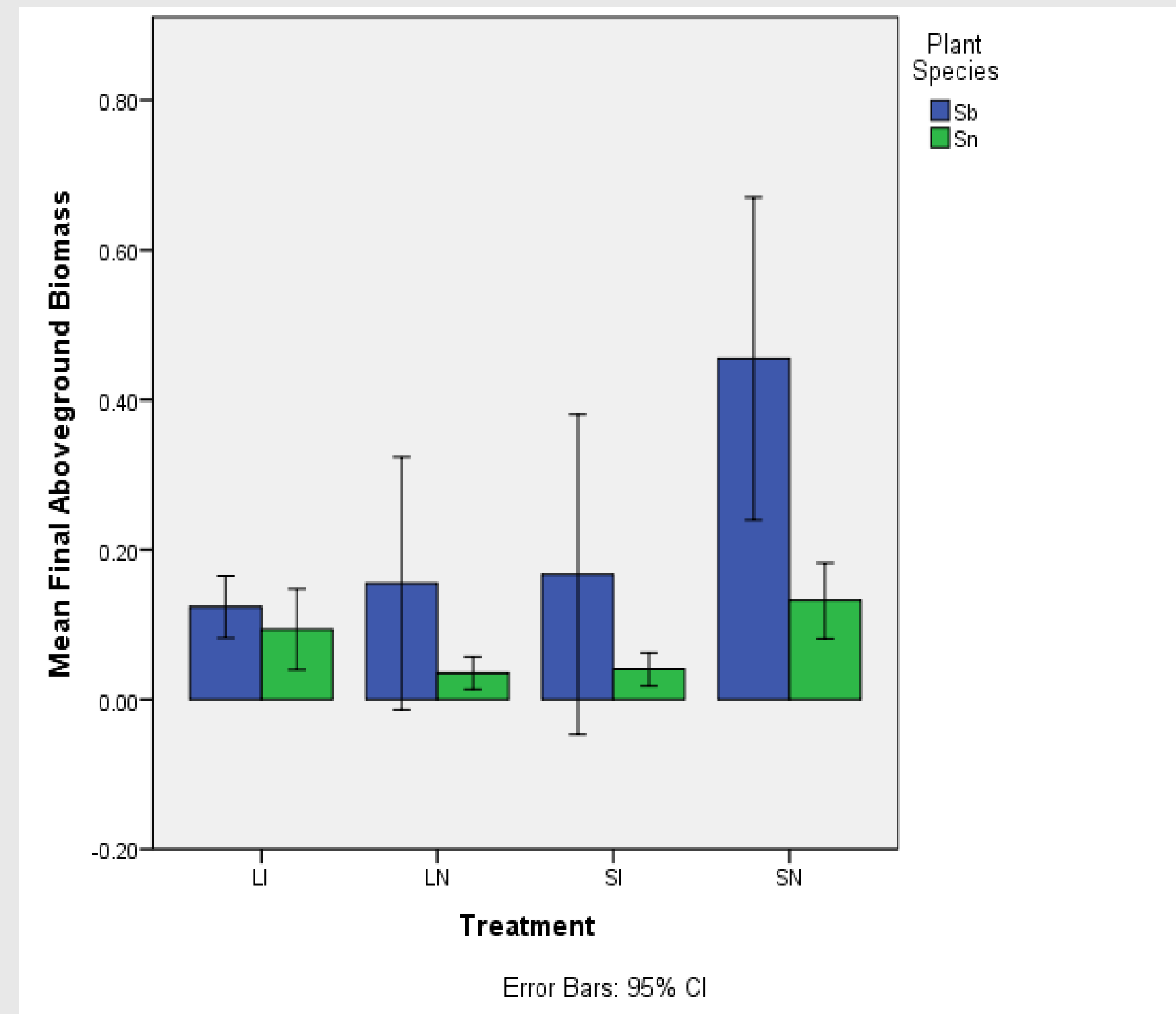


Figure 1. The effects of treatment type on the above ground biomass for both the *Sorghum bicolor* (Sb) and *Sorghastrum nutans* (Sn).

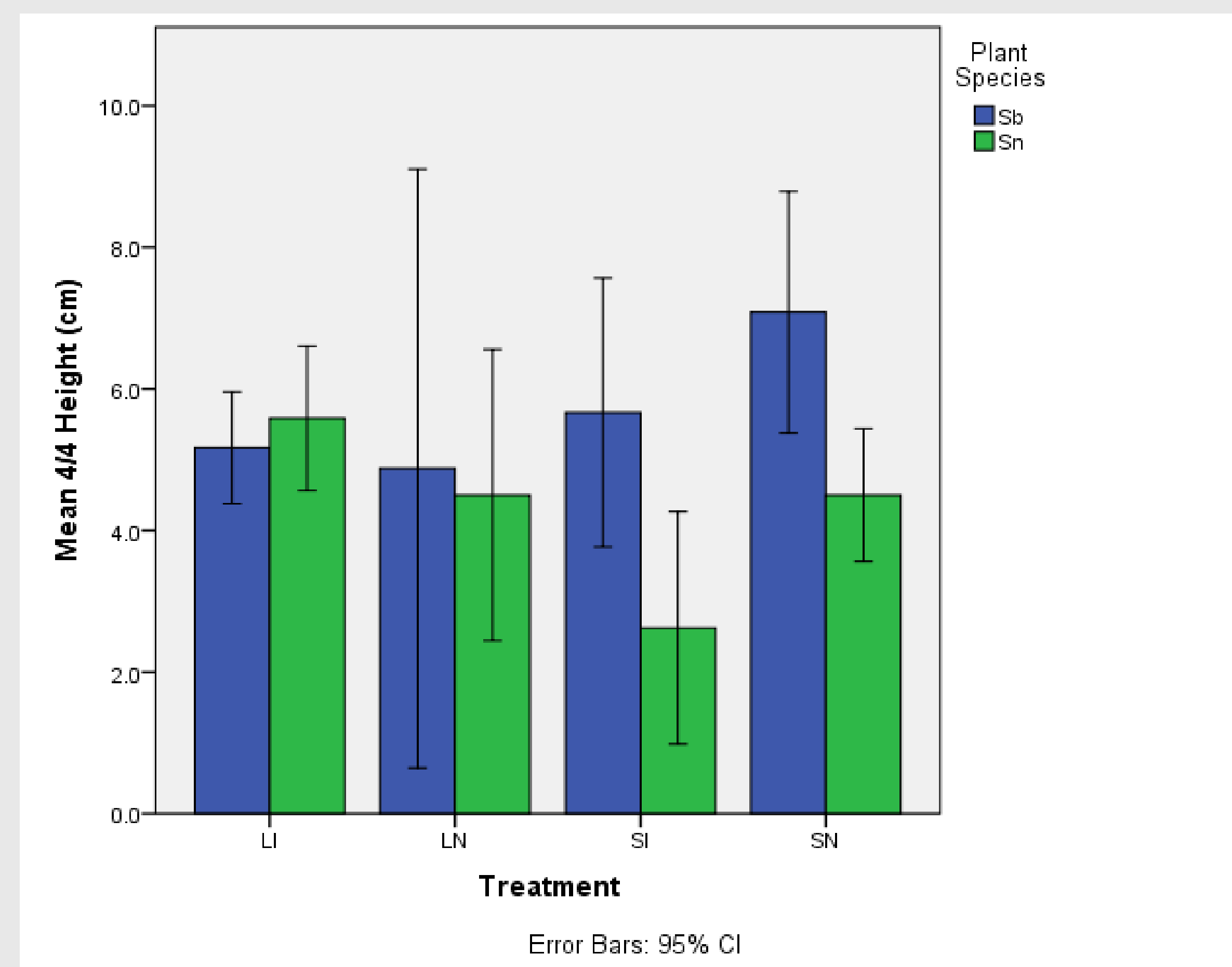


Figure 2. The effects of treatment type on the final height (recorded on 4/4/17) for both *Sorghum bicolor* (Sb) and *Sorghastrum nutans* (Sn).

Conclusions

After five weeks of collecting data, our results showed marginally insignificant difference between either the chlorophyll content or the stem height of plants that were inoculated with commercial mycorrhizae and the plants that were not inoculated. There was also a marginally insignificant difference between either the chlorophyll content or the stem height of the *Sorghum bicolor* (Sb) and *Sorghastrum nutans* (Sn) in the living prairie soil or the sterilized soil. Therefore, there is no difference between plant growth of native Oklahoma species and non-native species. It was seen however, that there was a difference based on the interaction of soil type and inoculum.

The interaction effect was significant as the plants had opposite effects depending on both soil type and inoculum. The Sn plants in live soil would grow more when inoculated but the opposite was observed in sterile soil. The same effect was seen in Sb plants. The biomass of Sn plants was shown to be greater in inoculated live plants than in non-inoculated live plants. The opposite was observed in sterile soil where non-inoculated plants produced greater biomass. In Sb plants however the non-inoculated was observed to produce greater biomass whether it was in sterile or live soil.

Overall, our results showed that our hypothesis was supported and that both *Sorghastrum nutans* (Sn) and *Sorghum bicolor* (Sb) in the living prairie soil inoculated with mycorrhizal did have a greater stem height and chlorophyll content than those in the sterile soil with no inoculum. Although our hypothesis was proven correct, our results were of marginal insignificance therefore we would suggest replicating this study with larger sample sizes to confirm the significant difference between soil treatment types. Further research on mycorrhizae and its relationship with other species would also be useful so that we may better understand the relationship mycorrhizae have with various types of plants.

Literature Cited

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