

Introduction

- Vesicular arbuscular mycorrhiza is the symbiotic relationship between the root systems of plants and a fungi that aids in nutrient intake. This relationship is mutualistic because the fungi aids in the uptake of macronutrients that are too large for some root systems, while the roots are a direct source of glucose and sucrose for the fungi. Fungi colonizes directly in the root system and maximizes surface area to aid the plant in nutrient uptake (Pace, 2013).
- There have been many studies published in scientific literature that support the theory that mycorrhizal fungi significantly increases average plant growth in a nutrient-poor substrate (Lei et al., 2013). Additionally, it has been found that it is possible to introduce mycorrhizal fungi to dead soil (sterilized) in order to revitalize the soil. This discovery can help rejuvenate agricultural areas that are in dire need of healthy substrate for the crops. In a field study, scientists were able to revitalize soil that had been sterilized in a lab as well as sterilized through metal pollution with the introduction of both commercial and indigenous (naturally sourced) mycorrhizal fungi (Macek, 2013).
- This research will be applicable to modern day agriculture because of the negative impact that anthropogenic soil pollution, climate change, and aggressive farming techniques has on the quality of soil and the size of crops. Farmers and scientists have noticed that it is both economically and environmentally profitable, because crop yield will increase and soils polluted with metals will once again be fertile.
- In our experiment, we are using arbuscular mycorrhizae species to test the effects of commercial mycorrhizal inoculum on plant biomass and comparing it with wild prairie mycorrhizae. The plants being tested are classified as C4 Grasses (warm-season), which consists of *Bothriochloa ischaemum* and *Andropogon gerardii*, both coming from the same seed source in Healy, Kansas.
- We hypothesize that the plants in our experiment will have the greatest increase in plant biomass, stem size, leaf area, and height of the grass when grown in soil with both the commercial mycorrhizal inoculum and the wild prairie mycorrhizae.

Methods

- 2 warm-season grasses: *Bothriochloa ischaemum* (Bot) and *Andropogon gerardii* (Ag).
- 4 treatment levels per species
 - o Sterile soil + or – commercial mycorrhizae
 - o Live soil + or – commercial mycorrhizae
- 6 plants of both species per treatment
- Measured the stem diameter at base of plant and height of the plant for the duration of the experiment
- After 8 weeks, plants were harvested to weigh root and shoot biomass
- Used ANOVA for statistical analysis

Results

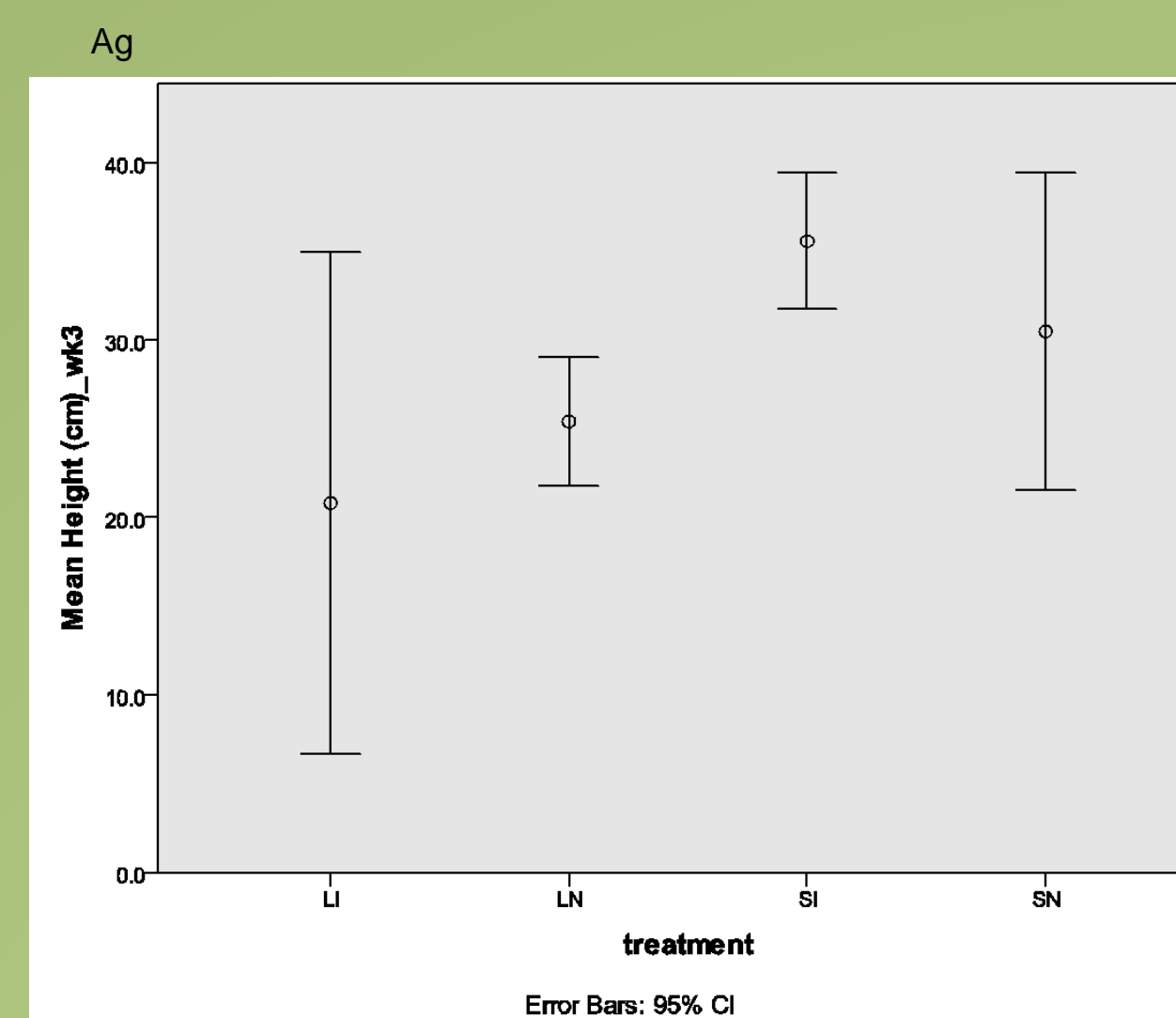


Figure 1

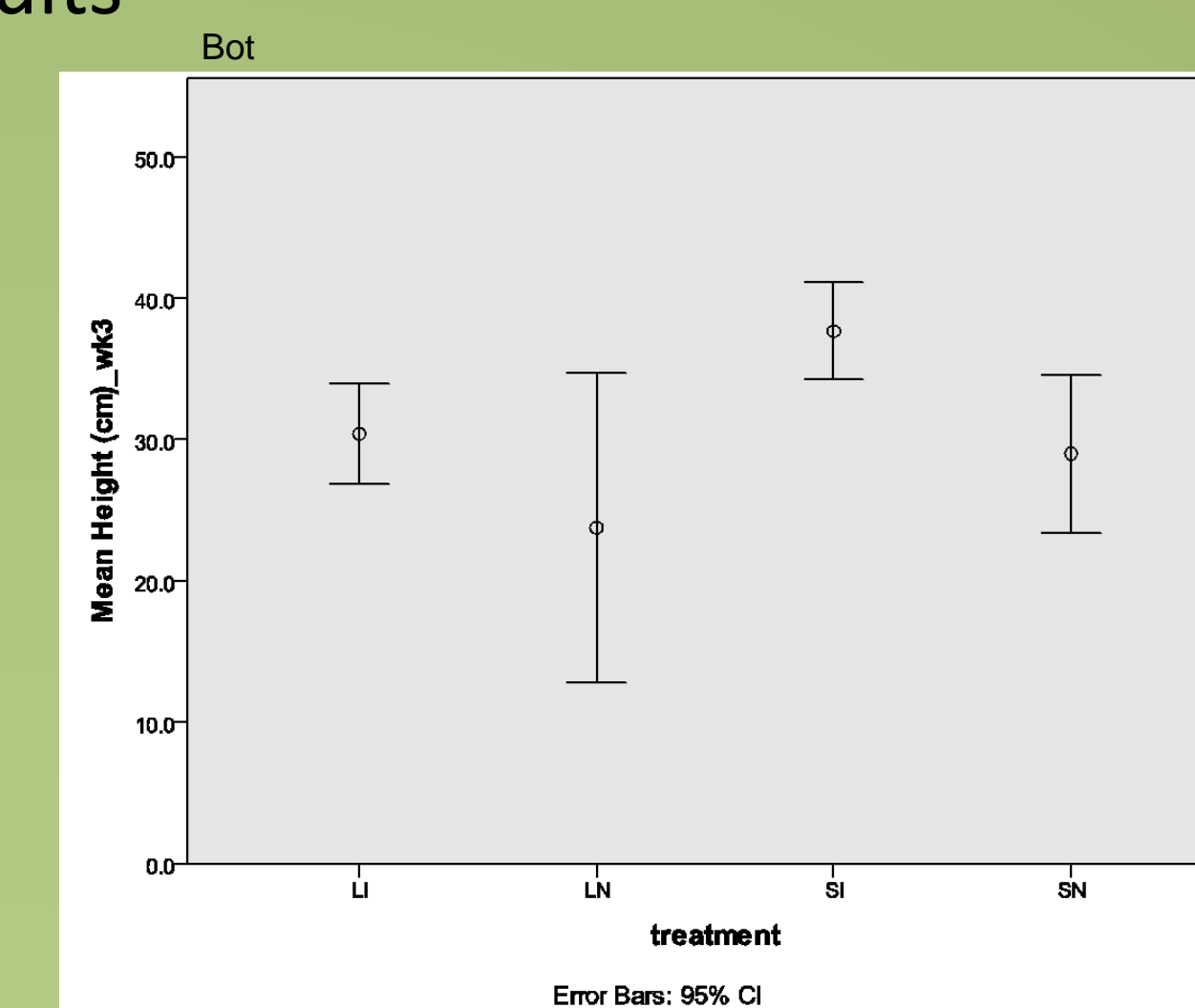


Figure 2

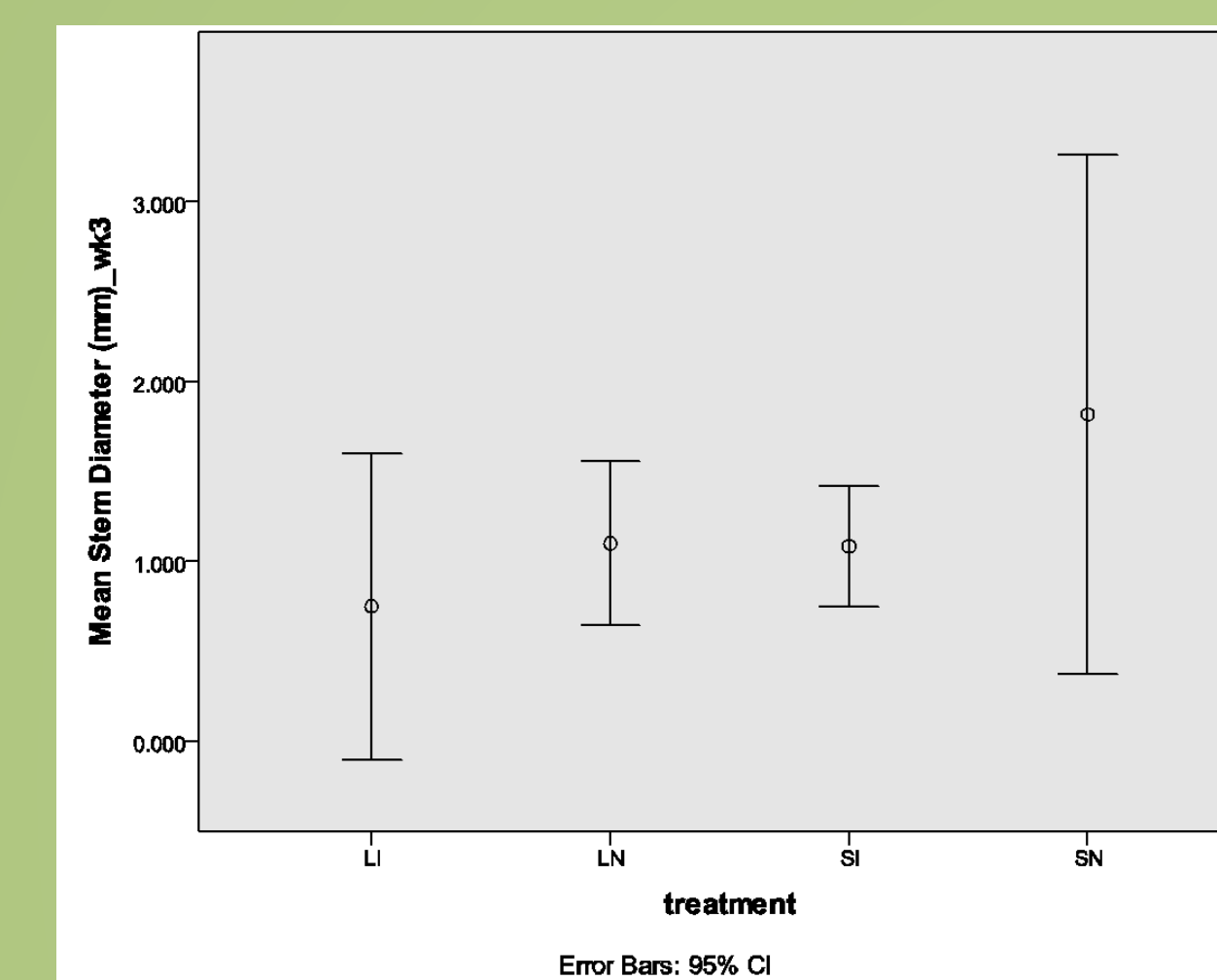


Figure 3

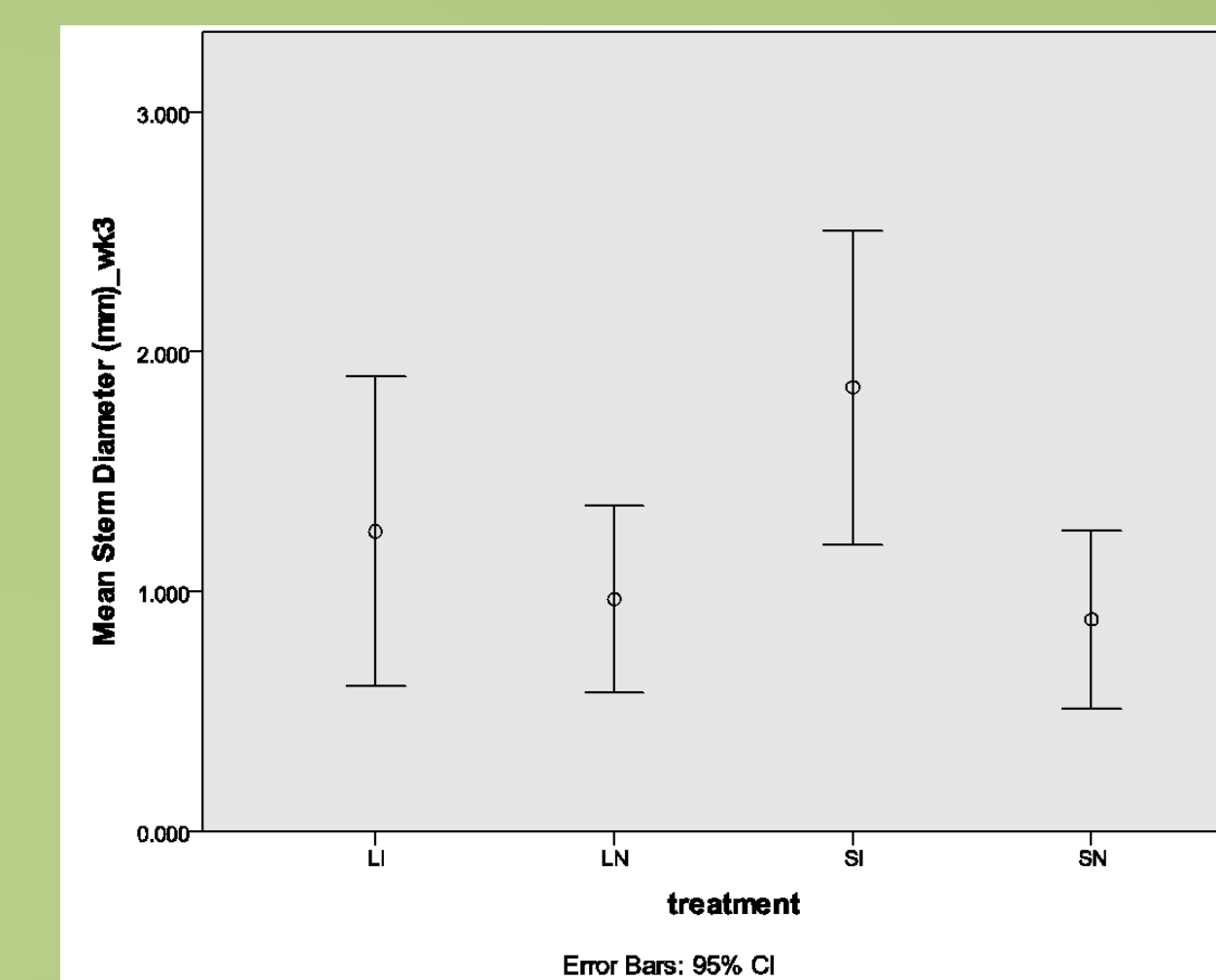


Figure 4



Results continued

Ag

Mean height

- Soil treatment had a significant effect, refer to Figure 1 ($F = 8.443$, $p = .009$)
- Inoculum treatment had an insignificant effect, refer to Figure 1 ($F = .005$, $p = .942$)

Stem Diameter

- Soil treatment had an insignificant effect, refer to Figure 3 ($F = 2.327$, $p = .143$)
- Inoculum treatment had an insignificant effect, refer to Figure 3 ($F = 2.477$, $p = .131$)

Bot

Mean height

- Soil treatment had a significant effect, refer to Figure 2 ($F = 5.889$, $p = .025$)
- Inoculum treatment had a significant effect, refer to Figure 2 ($F = 8.862$, $p = .007$)

Stem Diameter

- Soil treatment had an insignificant effect, refer to Figure 4 ($F = 1.549$, $p = .228$)
- Inoculum treatment had a significant effect, refer to Figure 4 ($F = 9.064$, $p = .007$)

Discussion

- In conclusion, our findings do not support nor deny our hypothesis that the plants in our experiment will have the greatest increase in plant biomass, stem size, and height when grown in soil with both the commercial mycorrhizal inoculum and the wild prairie mycorrhizae.
- Our research suggested that while there was not statistically significant results regarding the use of mycorrhizal inoculum there was statistically significant data showing that our plants had a greater above ground and below ground biomass when grown in sterilized soil rather than wild collected soil that is known to already consist of wild prairie mycorrhizae. This leads us to believe that there may not have been a symbiotic relationship between the species of grass that we tested and the wild prairie mycorrhizae found in the soil.
- Given the association between the use of sterilized soil and a wild collected soil in our results we believe that there is further research that we could propose regarding the types of mycorrhizae in native soil as well as their relationships with different species of grasses.

Literature Cited

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