The Effects of Commercial VS. Native Inoculum on Growth of *Helianthus annuus* and *Ratibida columnifera*

Annie Cowles, Nathan Stewart, Reece Wright

Department of Plant Biology, Ecology, and Evolution | Oklahoma State University | Stillwater, OK

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Introduction

- Arbuscular Mycorrhiza (AM) fungus has a symbiotic relationship with most flowering plants, as much as 90% (Lu et al., 2015).
- The reason that the plant grows more efficiently is that there is an increase in nutrients uptake (Dickie et al., 2015).
- It has been discovered that there is more specifically an increase in Nitrogen and Potassium uptake, which are two important nutrients in photosynthesis (Lu et al., 2015).
- There is generally a positive correlation between the fungi presence and plant growth such as an increase of chlorophyll content (Sharma et al., 2016).
- Plants with AM fungi had an overall increase in growth, number of leaves and biomass (Mwangi et al., 2013).
- **We believe that there will be a positive correlation of the presence of AM inoculum and the chlorophyll amount, number of leaves, and plant biomass.**

Methods

- We set up four treatment methods that had six replicates of *Ratibida columnifera* and six replicates of *Helianthus annuus*.
- We had a total of forty-eight plants made up of twenty four replicates of the two species.
- The first treatment had commercial inoculum present and non-sterilized prairie soil, the second had commercial inoculum present with sterilized prairie soil, the third had no commercial inoculum present with non-sterilized prairie soil, and the fourth had no commercial inoculum present and sterilized prairie soil.
- Every week we tracked the growth of each plant by leaf chlorophyll content using a SPAD meter, and counting the number of leaves.
- On the eighth week we measured shoot versus root biomass after harvesting.
- At the end of the testing period we analyzed the results using ANOVA and SPSS to determine what the effect, if any, the inoculum had on the plant's chlorophyll content, leaf number, and biomass.

Results

Figure 1: Effect of Inoculum on Shoot Biomass

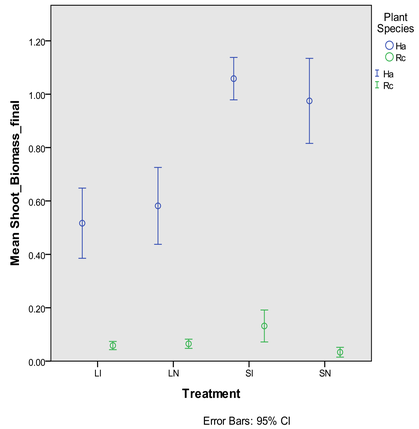


Figure 2: Effect of Inoculum on Leaf Number

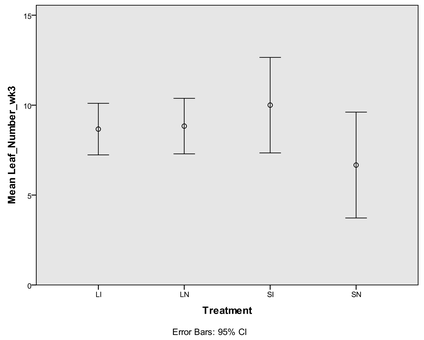
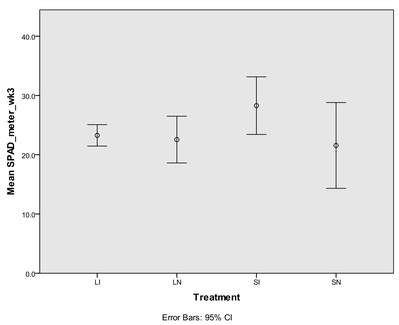


Figure 3: Effect of Inoculum on Chlorophyll Content



- We found a significant soil treatment effect on shoot biomass for both species (F=84.89, P=.000) [Figure 1]
- We found a significant species effect on shoot biomass (F=719.479, P=.000) [Figure 1]
- We found no significant effect of any treatment group on leaf number in *Ratibida columnifera* (F=2.511, P=.088) [Figure 2]
- We found no significant effect of any treatment group on chlorophyll content in *Helianthus annuus* (F=1.445, P=.275) [Figure 3]

Discussion & Conclusion

- None of the results supported the hypothesis that commercial inoculum versus native inoculum would have an effect on the plant growth through chlorophyll content or number of leaves.
- We believe that the reason there were no significant effects from the different treatment groups on chlorophyll content or leave number was because of the short duration of the experiment, which did not allow enough time for significant differences within each treatment group to develop.
- There was a slight effect of inoculum in sterile soil on *Helianthus annuus*, but the effect was insignificant, having a P-value of .059.
- In terms of shoot biomass, when sterilized prairie soil was present both species of plants exhibited a significantly larger final biomass range than when non-sterilized prairie soil was present.
- Final shoot biomass also presented a significant variance between the two species, with *Helianthus annuus* having a higher average final shoot biomass than *Ratibida columnifera* across all treatment levels.
- If we were to conduct further research one thing we would adjust would be recording a variable that more accurately represent plant growth such as shoot height, or expanding the duration of the experiment testing period to allow for more mature growth in order to reflect a more significant change within each treatment group.

References

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