Effects of commercial and wild mycorrhiza on aboveground to belowground biomass ratio in *Bromus inermis* and *Elymus canadensis*

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Introduction

- The purpose of this research is to elucidate how wild and commercial mycorrhizal fungi effect the growth habits of *Bromus inermis* and *Elymus canadensis*.
- Arbuscular mycorrhizal fungi are a type of microorganism that, throughout most soils, form a relationship with most herbaceous plants which in most cases is beneficial to both the plant and the fungi (1).
- Thus, due to their ability to aid in basic plant growth and development, these fungi are being used to help struggling plants in harsh habitats, crops grown in over-tilled soils, and even in the basic food crops that are being produced.
- Mycorrhizal fungi can be adapted to certain plant cultivars and not work well with aiding plant growth to others.
- A series of tests in an experiment using salinized soils shows that certain cultivars of fungi can increase growth of tomato plants in high salt conditions (4). These fungi can aid in the growth and development of plants growing in harsh conditions.
- The mycorrhizae were aiding in the uptake of the nutrient as to keep the plants from becoming deficient, therefore aiding in the growth of the endangered plants seedlings (2).
- While some fungi can have a mutually beneficial bond with their local plants, some can be parasitic and adapt to take the most advantage of the plant common to their location (5).
- In addition to local adaptation, a study of the effects of the fungi on drought resistance of wild jujube plans concluded that when jujube plants are inoculated with a certain cultivar of mycorrhizae they experience 100% colonization, and even under drought conditions they saw colonization over 93.1% (3).
- **We hypothesize that the plants that are grown in the commercial mycorrhiza or the sterile soil will have a higher shoot to root ratio as the plant will require more roots to be able to access nutrients.**

Methods

- The species of plants that were used were *Elymus canadensis* and *Bromus inermis*.
- This experiment is setup so that we will have four different test groups. Test group 1 is Commercial mycorrhizal inoculum present, non-sterilized prairie soil. Test group 2 is Commercial mycorrhizal inoculum present, sterilized prairie soil. Test group 3 is Commercial mycorrhizal inoculum absent, non-sterilized prairie soil. Test group 4 is Commercial mycorrhizal inoculum absent, sterilized prairie soil.
- Each week during lab measurements were taken to track the progress of the experiment. We measured height of the shoot and number of live / dead plants. At the end of the experiment we measured below and above ground biomass.
- A 3 way anova will be performed using SPSS software.

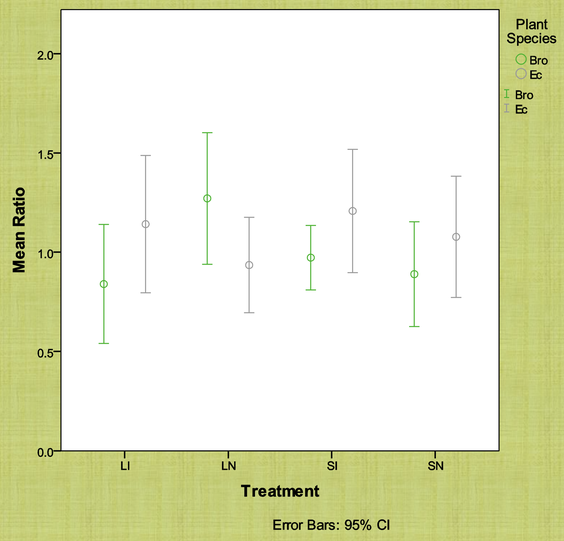

Figure 1: The mean ratio between aboveground and belowground biomass (above/below) of *Bromus inermis* and *Elymus canadensis* with the four treatment levels: live soil inoculated, live soil not inoculated, sterile soil inoculated, sterile soil not inoculated.

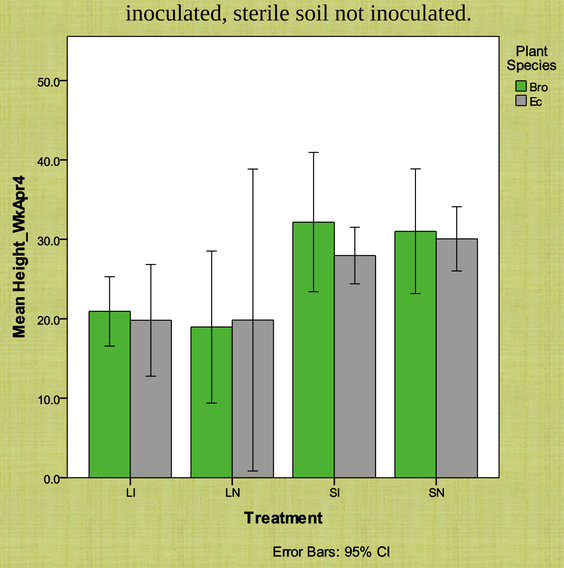

Figure 2: The height of the tallest leaf blade at week 4 of *Bromus inermis* and *Elymus canadensis* with the four treatment levels: live soil inoculated, live soil not inoculated, sterile soil inoculated, sterile soil not inoculated.

Results

- We did not find any significant differences (p = 0.05) between the shoot and root ratio of any of the treatment groups.
- We did not find any significant differences between the mean height of the tallest leaf of any of the treatment groups.
- We did not find any significant differences between the mean height of the tallest leaf when the two species were compared.

Discussion

- The hypothesis of our experiment was not supported by our results due to the insignificance of the data we collected. Our results found no significant difference in the height of overall plant or shoot to root biomass ratio as a result of inoculation treatment, soil treatment, or plant species. We also did not find any significant different in the biomass of the plants as a whole.
- Due to the similarity of the species we speculate that the similar habits of growth of these grasses lead to the insignificance of our data. We speculate that variance of our data between the four treatment groups is due to the fact that annual prairie grasses, which both of our grasses are, have very low responsiveness to mycorrhizae. In fact *Bromus inermis* was found to have an antagonistic relationship with mycorrhizae (6).
- We speculate that our results were not significantly different because the scale used to measure biomass was not adequately precise for the detail we needed for this experiment. We also believe that the large variance of this data can be attributed to the small sample size of the experiment, leading to an insignificant difference between the treatments.
- We suggest that in future research larger sample sizes, more precise measurement tools, and perhaps a greater number of plant would lead to a greater understanding of relationship between mycorrhizal fungi and plants.

Elymus canadensis and *Bromus inermis*.

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