

# Love (Mycorrhiza) Takes Root

Sam Roper, Madison Taylor, and Tori Lee

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



## Introduction

The goal of this experiment was to understand the effects commercial and natural mycorrhizae have on water content and chlorophyll count. Several studies have shown that wild mycorrhizae are more positive effect on plant growth than commercial mycorrhizae [4]. In fact, some studies have shown that commercial mycorrhizae have little to no effect on plant growth, even when adding two and three times the recommended amount [3]. In general, the mutualistic bond formed by mycorrhiza with the plant host provides a higher uptake of nutrients and water for the plant [1]. This is particularly true for plants in nutrient poor soils [5]. One study has shown that arbuscular mycorrhizae cause plants to have a higher concentration of water in their leaves during drought conditions when compared to sterile soil [2]. This research is needed because there are few studies that derive the relationship between plant water content, chlorophyll presence, and type of mycorrhizae inoculum. We predict that the natural mycorrhizae will have a positive effect on chlorophyll count, overall higher water intake, and a larger biomass compared to commercial inoculated and mycorrhizae free counterparts.

## Methods

- Both *Salvia azurea* (Sa) and *Desmodium canadense* (Dc) were placed in appropriately labeled soil and given the correct mycorrhizae treatment. Some were grown in natural perisoil, and some were sterilized. Some were given natural mycorrhizae, and others were given Commercial Inoculum (Root Naturally Endo Mycorrhizae). See below.
- Each week, the chlorophyll count was recorded for each plant using a SPAD meter.
- At the end of the 5th week, the above ground wet biomass was taken, and, a week later, the above ground dry biomass was taken to derive the plant water content.
- An anova was conducted using SPSS with a 95% confidence interval to analyze the data.

		Soil type	
		Live(L)	Sterilized(S)
Mycorrhiza type	Commercial Inoculum(I)	LI	SI
	Natural(N)	LN	SN

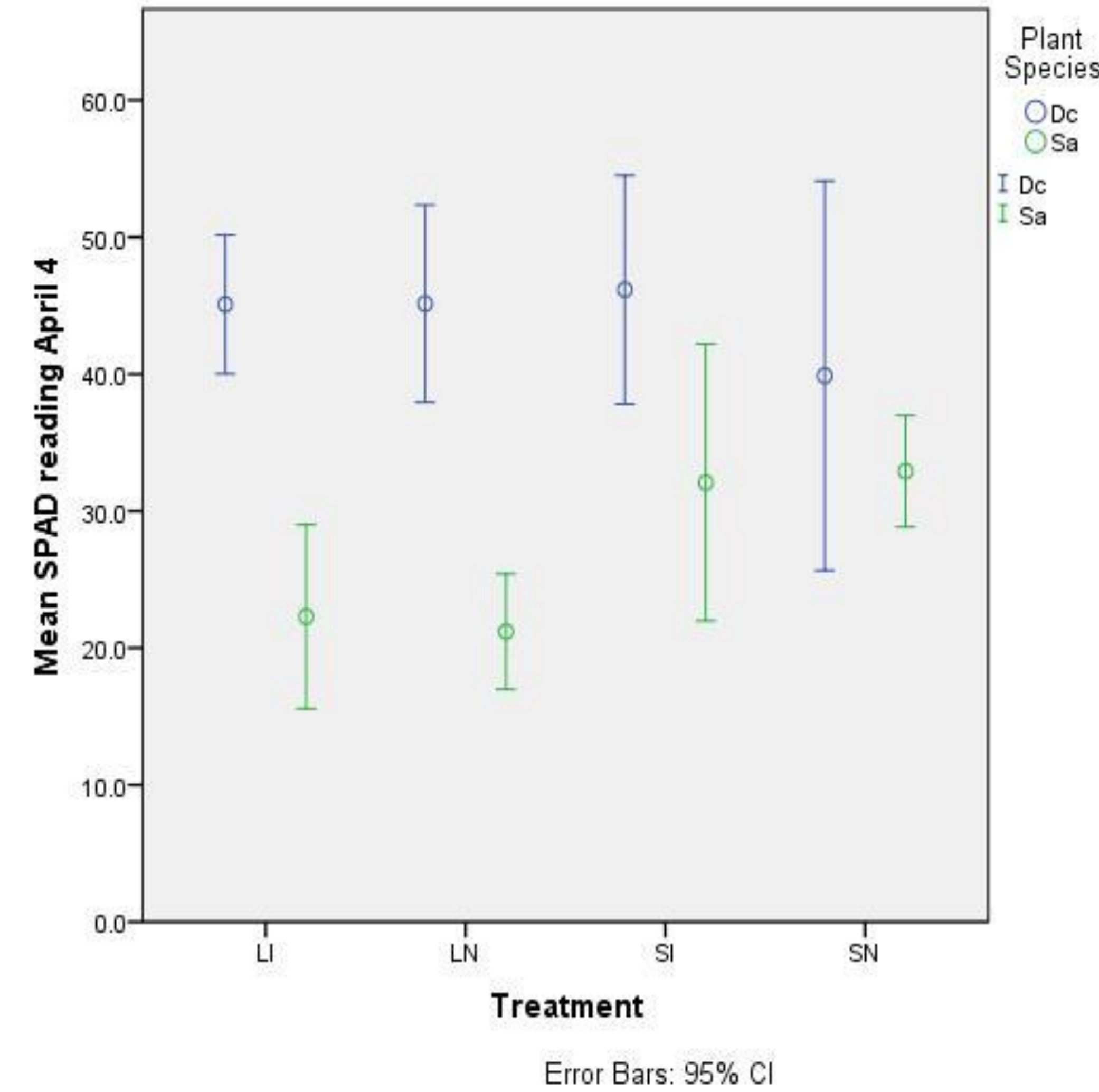


Figure 1: Average SPAD reading for final week per treatment level for each plant type.

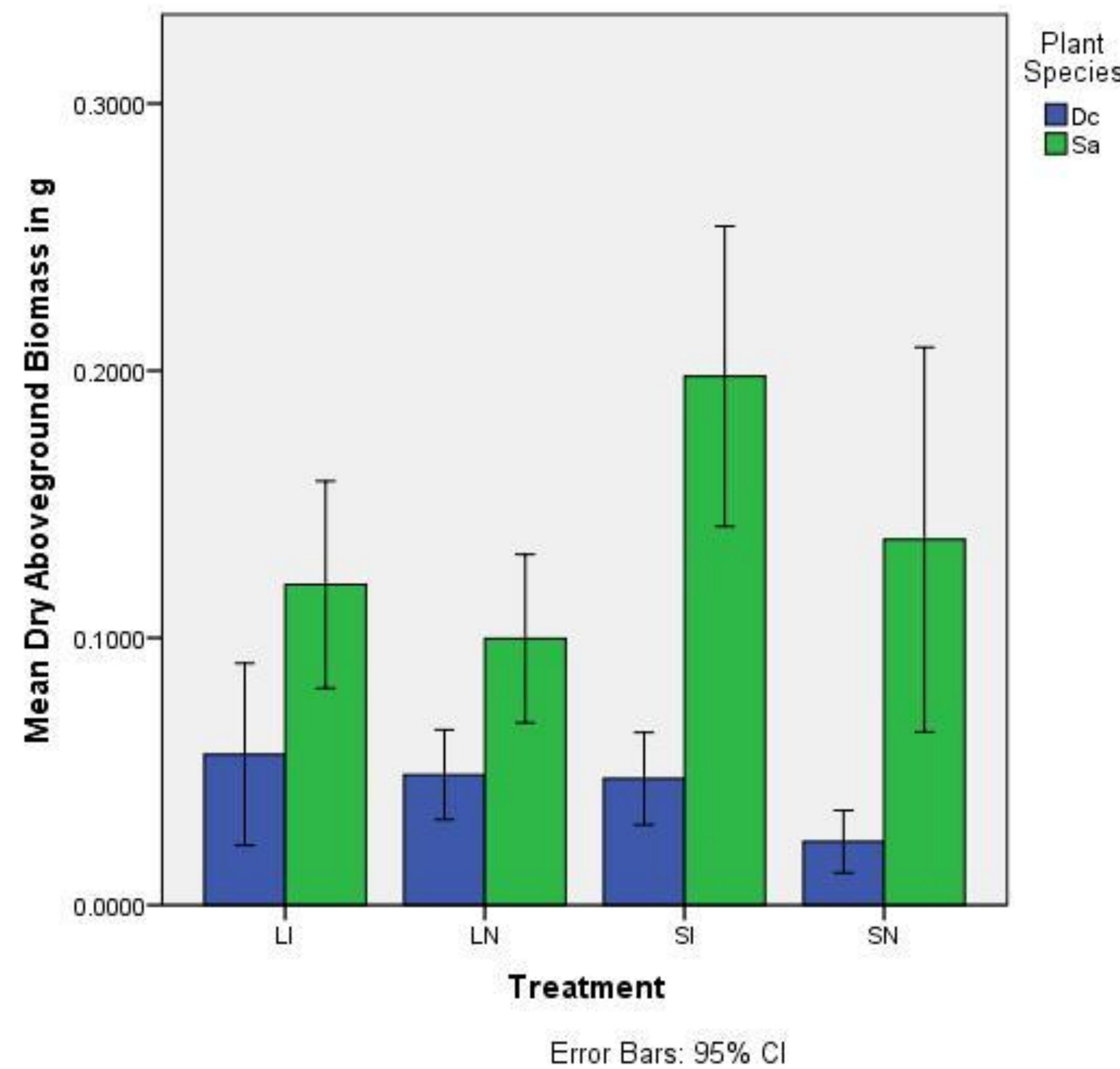


Figure 2: Mean dry above ground biomass for each plant species in each type of treatment.



## Results

After running the three-way anova, Figure 1 showcased that the soil treatment alone had a marginally insignificant effect on chlorophyll count ( $p=0.064$ ). There was a significant interaction effect between soil treatment and plant species by chlorophyll content as well ( $p=0.007$ ). Sa had a negative response to live soil while Dc had a negative effect for sterile soil. In Figure 2, the dry aboveground biomass was higher for Sa across all treatment types. The soil treatment was marginally insignificant for above ground biomass ( $p=0.078$ ) and the inoculum treatment resulted in greater above ground biomass ( $p=0.016$ ). We observed a similar interaction effect between soil and plant species as we did in chlorophyll content ( $p=0.002$ ). Figure 3 had no significant factors. Water content was measured using a ratio of aboveground dry biomass to aboveground wet biomass.

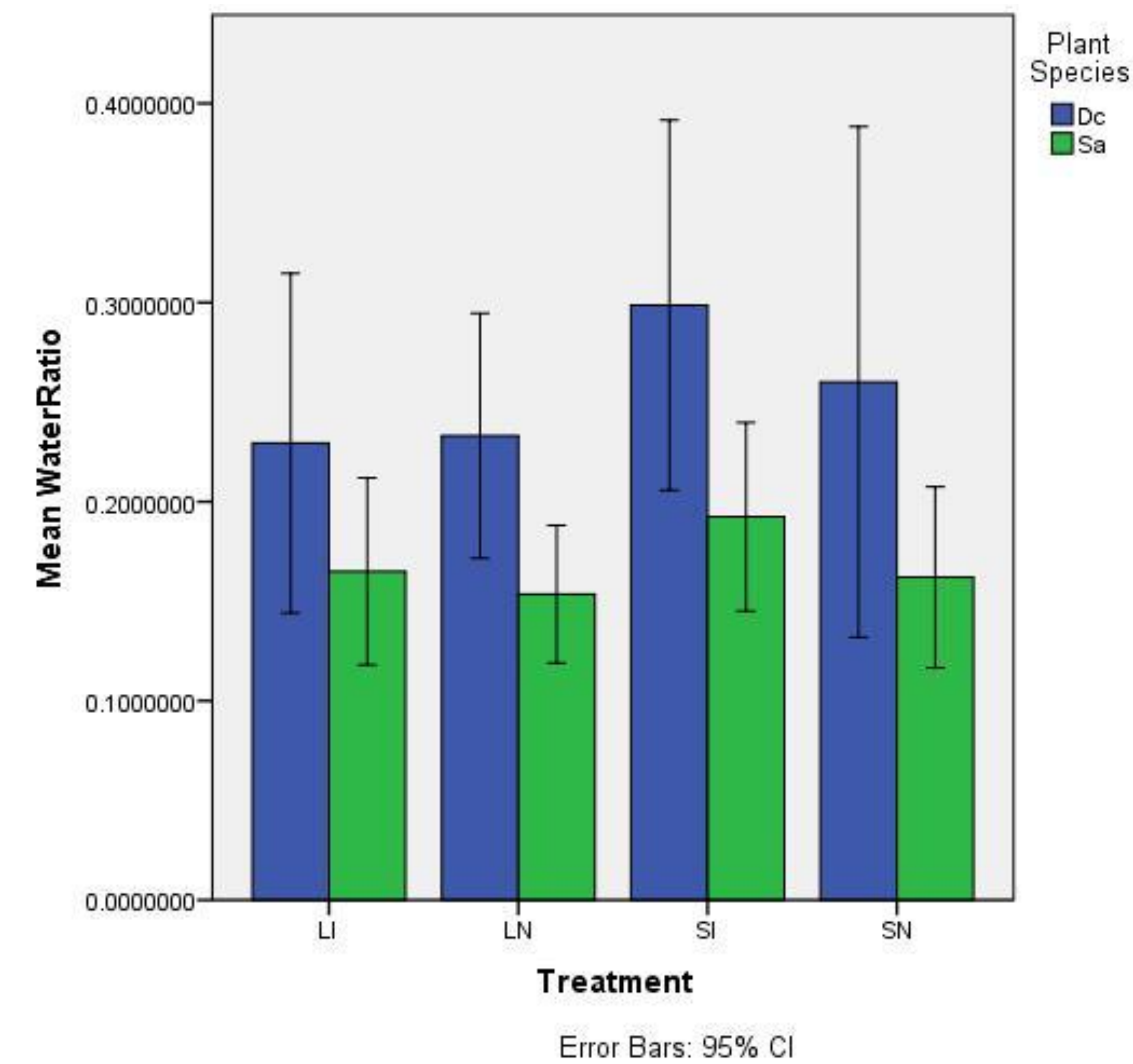


Figure 3: Average water ratio (ratio of above ground wet biomass) of each plant species in accordance to each treatment level.



## Conclusion

Our hypothesis was not supported. Mycorrhizae did not consistently increase overall plant growth between the plant and soil types. It also had no significant effect on water content in either of the species. When analyzing our data, we found an error in one of the numbers. The dry aboveground biomass was significantly higher than the wet above ground biomass, which is believed to be due to an error with the scale we used. We decided to discard this one set of numbers to ensure our data was consistent throughout the graphs. Our experiment yielded a few marginally insignificant results. To determine whether or not these factors (soil treatment for above ground biomass and chlorophyll content) could be significant, more tests could be run with larger sample sizes. To expand upon this research in the future, scientists can increase the duration of the experiment to include the full life cycle of each species. They can also look at species that are known for benefiting from mycorrhizae interactions for a more equal species comparison. Our results indicate that these species react to wild mycorrhizae differently, with Sa reacting negatively to live soil whereas Dc responds positively. The results of this research helps to understand the complex relationships between mycorrhizae, plant biomass, chlorophyll count, and water content for these two species of plant.

## Literature Cited:

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