The Effects of Mycorrhizal Inoculation on *Desmanthus illinoensis* and *Monarda fistulosa*

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Desmanthus illinoensis

Monarda fistulosa

Introduction

- The symbiosis between mycorrhizal fungi and plants is a mutualist relationship that benefits both organisms in different ways.
- Mycorrhizae can increase the nutrient uptake and crop yield of plants [5].
- Plants can benefit mycorrhizae by providing them with a source of carbon [2].
- Mycorrhizal fungi is found naturally in the soil and in fact, 90% of plant species interact with mycorrhizal fungi [4].
- The relationship between plants and mycorrhizae can create benefits in fields of study like agroforestry [6], in grassland communities [1], and can be used in sustainable farming practices [7].
- The species used in this research were ***Desmanthus illinoensis*** (Illinois bundleflower) and ***Monarda fistulosa*** (Wild bergamot).
- Our research purpose was to answer the question of whether the capability and potential of commercial mycorrhizal inoculum was greater in its effectiveness when compared to that of wild mycorrhizae on plant growth.

Hypothesis: We predict that the commercial mycorrhizae treatment in sterilized soil will have the largest average plant biomass, plant height, and average surface area of the leaves.

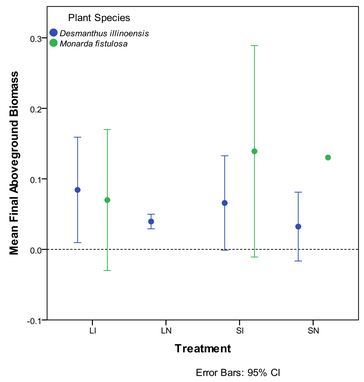

Figure 1: Mean above-ground biomass for *Desmanthus Illinoensis* (Di) and *Monarda Fistulosa* (Mf).

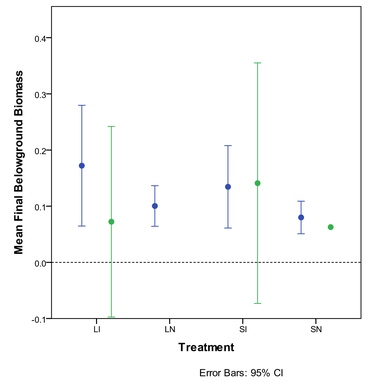

Figure 2: Mean below-ground biomass for *Desmanthus Illinoensis* (Di) and *Monarda Fistulosa* (Mf).

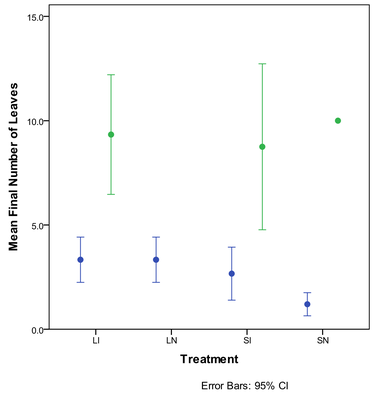

Figure 3: Mean final number of leaves for *Desmanthus Illinoensis* (Di) and *Monarda Fistulosa* (Mf).

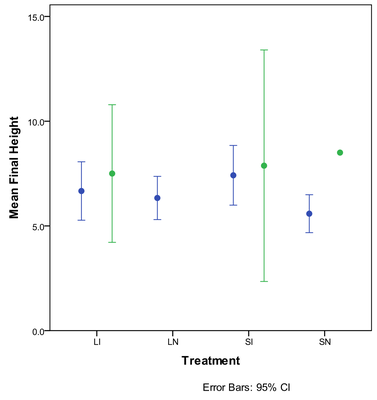

Figure 4: Mean final height for *Desmanthus Illinoensis* (Di) and *Monarda Fistulosa* (Mf).

Figures 1-4: Treatments were: Living prairie soil inoculated with commercial mycorrhizae (LI), sterilized prairie soil inoculated with commercial mycorrhizae (SI), living prairie soil inoculated without commercial mycorrhizae (LN), and sterilized prairie soil inoculated without commercial mycorrhizae (SN).

Results

- Desmanthus grown in living prairie soil inoculated with commercial mycorrhizae (LI) had a significantly higher leaf count compared to Desmanthus grown in the other treatment groups (LN, SI, SN).
- Soil treatment and inoculum had no effect on the other dependent variables (p value > .05).

Dependent Variable	Independent Variable	F Statistic	P Value
Above-ground Biomass	Inoculation Treatment	.854	.364
	Soil Treatment	.799	.380
Below-ground Biomass	Inoculation Treatment	3.131	.089
	Soil Treatment	.144	.708
Height	Inoculation Treatment	.088	.769
	Soil Treatment	.000	1.000
Number of Leaves	Inoculation Treatment	.095	.760
	Soil Treatment	5.372	.029

Materials/Methods

- Each plant species was grown in four different control groups, Treatments were: Living prairie soil inoculated with commercial mycorrhizae (LI), sterilized prairie soil inoculated with commercial mycorrhizae (SI), living prairie soil inoculated without commercial mycorrhizae (LN), and sterilized prairie soil inoculated without commercial mycorrhizae (SN).
- For a period of three weeks, each week the individual plants were measured for survivorship, height (cm), and number of leaves.
- On the fourth week, plants were removed from their soil for drying and weights were taken for biomass.
- We performed a 3-way ANOVA testing the effects of inoculation, soil, and plant species.

Discussion/Conclusion

- After analyzing and comparing the data and graphs (Figures 1-4), we concluded that our hypothesis was not supported.
- The only significance we found was when the *Desmanthus Illinoensis* was grown in living prairie soil and inoculated with commercial mycorrhizae (LI).
- The survivorship of the *Monarda fistulosa* was very low, so we predict that effected the outcome of our experiment, and further research is needed. Monarda would need a longer time to establish before being transplanted.

References

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