

The Effects of Fungal Symbiosis on Growth Rate of *Cosmos sulphureus*

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Introduction

Traditional fertilizers result in nitrogen runoff that cause damaging algae blooms. Therefore, it is in the best interest of farmers and ecologists to seek natural alternatives, such as the use of endomycorrhizal fertilizer. This mutualistic relationship exists naturally between fungi and plant roots, allowing each to benefit from the other (Deacon, 1982). By comparing the growth rate of *Cosmos sulphureus* in soil treated with four different fertilizer types- a traditional fertilizer, naturally harvested fungi rich soil from Fairfield Osborn Preserve, Miracle Gro, and a commercial mycorrhizal fertilizer- our research observes the effectiveness of fungi in promoting the growth of plants with a fungal interaction (Amaranthus, Anderson, Weibe, 2017).

Hypothesis

We expect the traditional fertilizer to yield the best results due to its high demand; however, we do expect the endomycorrhizal rich soil to return better results than the naturally harvested and untreated soils.

Methods and Materials

In order to test our hypothesis, our group compared the effects of four different soil types, where each group was distributed equally into approximately 600mL containers. Our team collected four pots of soil from Fairfield Osborn Preserve from the base of Douglas Fir trees, *Pseudotsuga menziesii*. We chose these sample sites as this species has a known fungal interaction. We filled twelve other pots of the same size with generic potting soil and sorted the pots into three groups of four. We added Miracle Gro: Shake and Feed to one group, mycorrhizal fertilizer to another, and left the last group as the control with untreated potting soil. We then planted ten store-bought *Cosmos sulphureus* seeds into each pot. We watered them every other day in the SSU greenhouse, and recorded the rate of germination and growth for the following two weeks.

Results

Figure 1: The frequency of germinated seedlings within each category of soil type.

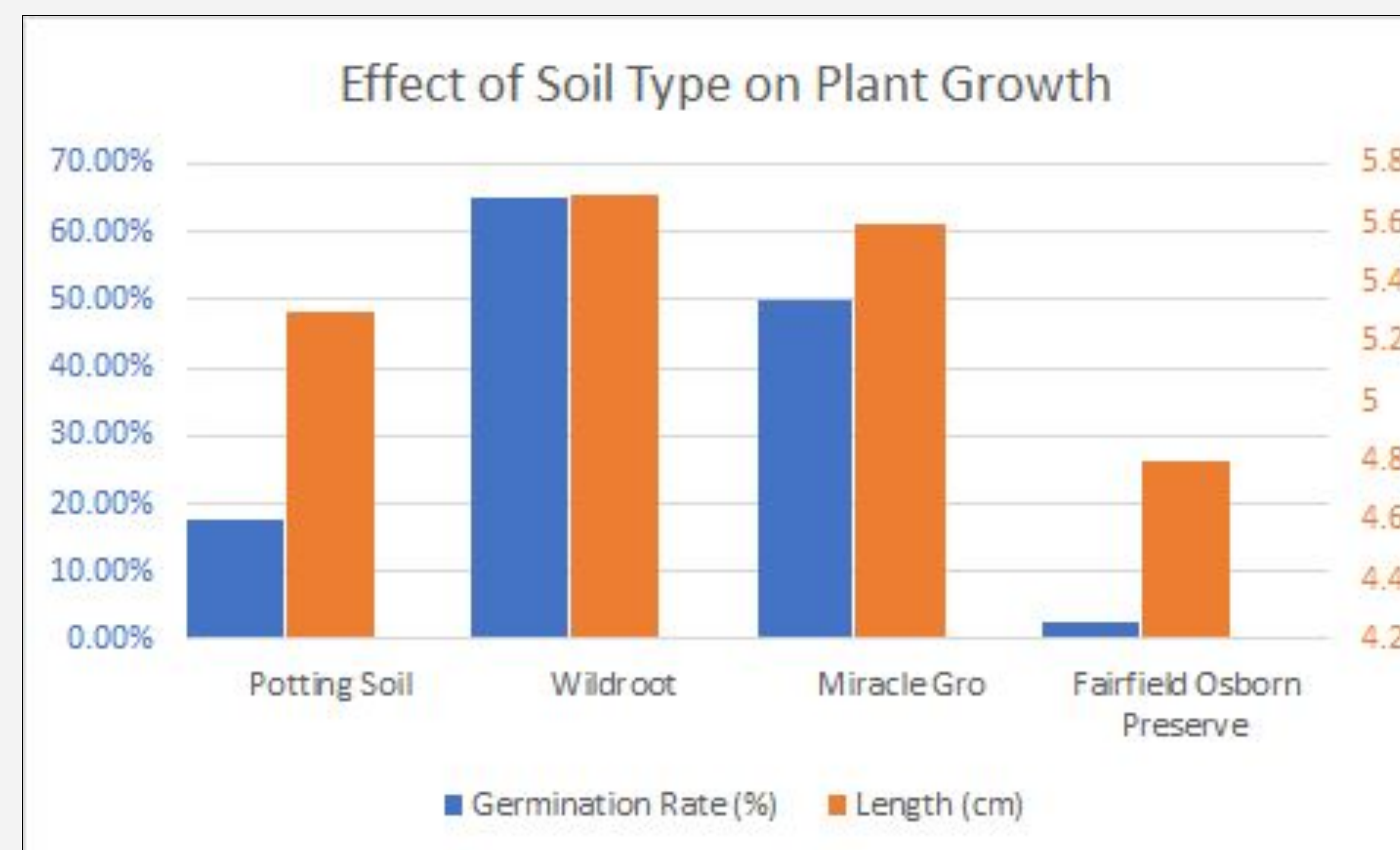


Figure 2: Samples after sprouting in the SSU greenhouse

Figure 3: Member Peter Newson waters the samples

Conclusion and Discussion

Based on our results, seeds planted in endomycorrhizal fertilized soil showed a marked improvement in germination rate compared to untreated potting soil and natural soil. Traditional fertilizer did outperform the other soil types, but by a slim enough margin that the fungal fertilizer could be used in its place. Local farmers, ecologists, and other agricultural businesses might be interested in using our results. This could be helpful in arguing for the use of ecologically-friendly fertilizer.

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