Saline soil conditions and watering frequency on *Brassica rapa*

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Introduction

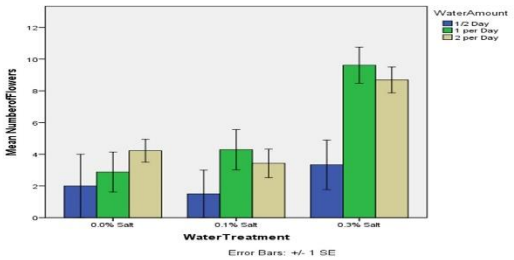
The Salton Sea in California is becoming more of an ecological disaster with each passing year. Farmers continue to use commercial fertilizers that are great for growing crops but leave subsequent by-products (such as salt, nitrogen, and phosphorus) in their wake (1). These by-products are captured by runoff and taken downstream into the Salton Sea. Runoff has lead to eutrophication and high saline concentrations of the waters in the sea. Plants, along with several species of animals, that rely on the sea for sustenance are now quickly disappearing from the region due to this process (4&5). In light of this ecological disaster, we wanted to explore the effects of saline soil conditions and watering frequency on plants. This experiment is meant to simulate the affects that this ecological event would have on plants in order to give us an increased understanding into how this afflicts plant life around the sea and other saline environments. The salinity variable will look to analyze how increased saline conditions affect the plants ability to grow and thrive around the sea (2). The watering frequency variable is meant to simulate possible rainfall dilution that may have aided plants further away from the direct runoff source. We hypothesize that plants subjected to minimal saline conditions and high frequency watering will exhibit the most consistent and favorable growth among all test groups.

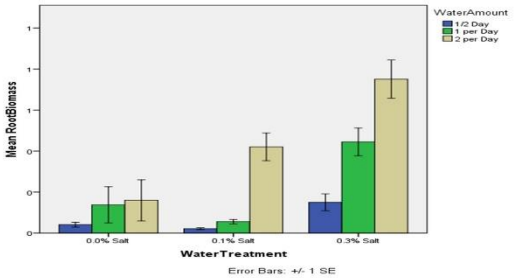
Methods

- 18 No salt watered twice daily
- 18 No salt watered daily
- 18 No salt watered every other day
- No salt (control)
- 3 0.1% salt groups of 18 each with varying water frequencies listed
- 3 0.3% salt groups of 18 each with varying water frequencies listed
- We used the provided soil with good permeability and provided all groups with equivalent light exposure.
- Salt conditions were watered with corresponding saline concentrations prior to planting to simulate saline soil. Salt conditions would receive normal watering throughout the week. Every lab the soil is deconcentrated with salt water.
- All plants receive 20ml of water per treatment
- Measured high, # of flowers, # of leaves, root/shoot biomass at end of experiment.
- 162 plants in total. 18 replicates per group
- 3x3 design

Results

In analysis of our data we found many consistent relationships as a product of watering frequency and saline concentrations. Almost all of the represented graphs display relationships that separate the manipulated conditions from the controlled group. This therefore provides supporting evidence that watering frequency and the saline concentration in soil does indeed have an effect on the ability of a *Brassica rapa* to grow. Some control graphs may differ from the saline concentration graphs however, this actually further strengthens the data as the saline conditions were consistent with one another. In other words, the control is expected to have different trends.





References

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2. Taek-Ryoun, Kwon. "Physiological Studies of Salinity Tolerance of Brassica Species." Proquest. Coventry University, 1997. Web. 19 Nov. 2016.

3. Conrath, U. "Priming as a Mechanism in Reduced Systematic Resistance in Plants." Google Scholar. European Journal of Plant Pathology, 2001. Web. 19 Nov. 2016.

4. Ryther, John H. "Nitrogen, Phosphorus, and Eutrophication." AAAS, 12 Mar. 1971. Web. 19 Nov. 2016

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Discussion

Overall it appears that our hypothesis is not supported as the 0.3% salt concentration groups had more favorable growth in every measured category but flowering. Evidence does support the watering frequency aspect of our hypothesis though as most conditions had their greatest growth with increased watering. A possible takeaway from our results leads us to believe that *Brassica rapa* have the ability to prime themselves for harsh conditions (3). It also seems that there may exist a saline sweet spot for soil that enables flowers to bloom more successively. We are also curious as to whether the relationship is the same among other related plants. All of these topics can be looked into for future experimentation.