

The Differentiating Levels of Osmotic Pressure with Carbon Sources and the resulting Effect on *Raphanus sativus*

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Introduction:

- The radish plant is a fast growing crop that (*Raphanus sativus*) is scientifically classified in the Brassicaceae family and is commonly used for its edible vegetable root (Qiutong 22).
- Osmosis and photosynthesis are two physiochemical processes necessary for plants survival.
- Osmosis is responsible for maintaining the structure of plant cells by evenly distributing water across the cellular membrane.
- Turgor pressure continues to maintain shape of the plant cell but can be interrupted by differentiating levels of osmotic pressure causing an imbalance in the plant cell.
- During photosynthesis the plant synthesizes sunlight to produce sugars and other nutrients vital for plant survival ().
- Photosynthesis occurs primarily on the leaves of plants where guard cells are located that protect the stomata.
- light and air are critical to the plants health. Radish plants favor higher light levels as opposed to low light levels. The higher levels of light allow the process of the photosynthesis to be carried out at a faster rate (Cocucci 88).

Our objective in this project was to examine if added sugar water and lower and higher light levels had a noticeable affect on *Raphanus sativus* plant growth due to differentiating levels of osmotic pressure and Carbon sources.

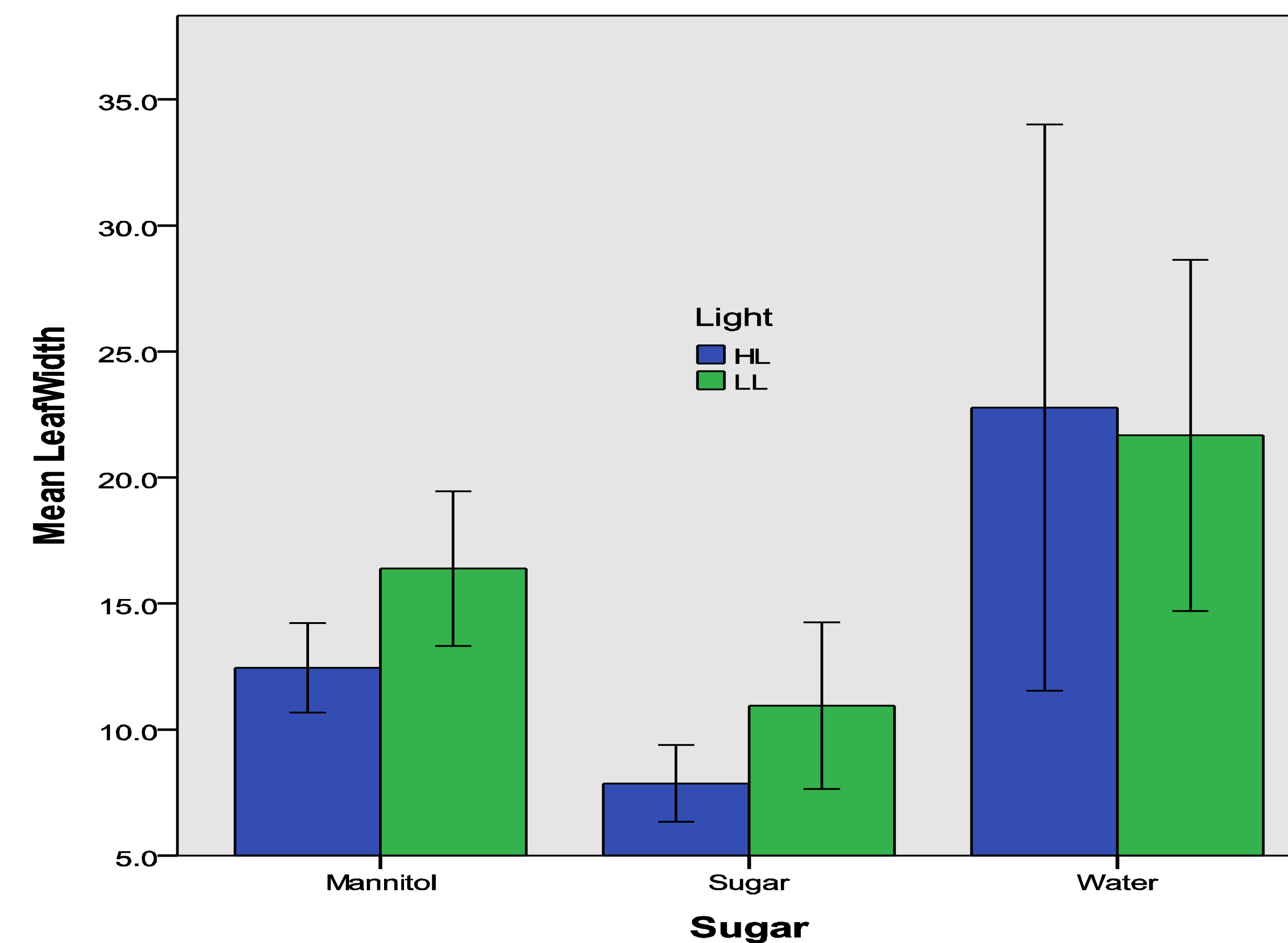
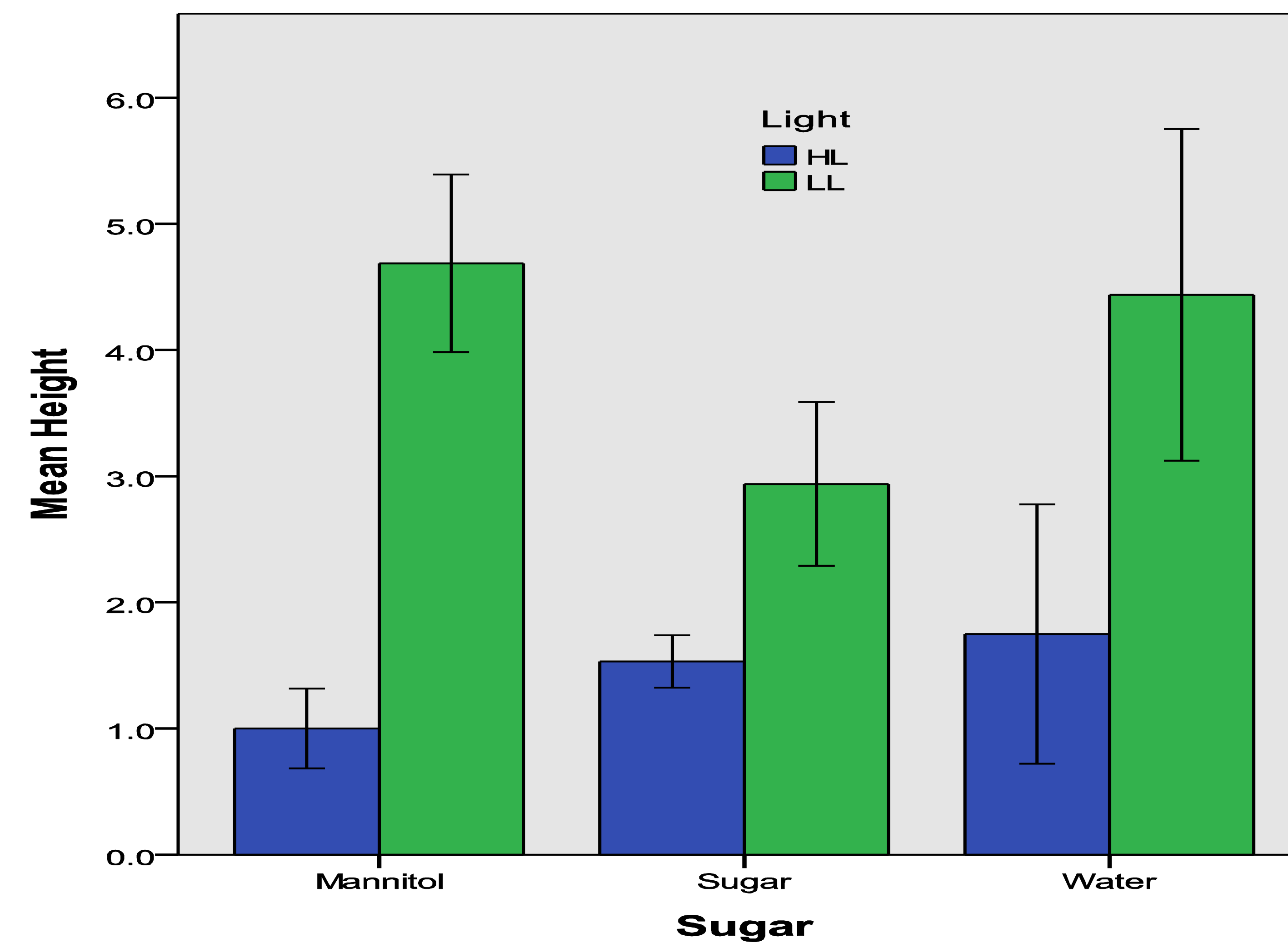
Methods:

- Raphanus sativus* seeds were planted in four treatment groups (n=16) with two controls pot per flat.
- Plants were watered daily with equal volumes of DI water.
- Measurements of height of the plant and width of true leaves were taken once a week over the experiment period.

Experimental Setup

Low Light +Glucose	High Light +Glucose
Low Light +Mannitol	High Light +Mannitol

Results: The control plants grew the widest leaves, outperforming other groups. High light plants grew the tallest but produced a lower total biomass than low light plants. Plants grown without sugar were taller and had a larger mass than the plants grown with mannitol or sugar. No significant difference between the plants watered with mannitol and plants watered with sugar.



Conclusion:

- The most significant aspect of our results was the effect of light on plant growth.
- As well, there was a difference between our plants grown with a sugar supplement and without.
- We observed that higher levels of sugar solute caused osmotic pressure on the plants.
- In higher light levels the photosynthesis process occurred at faster time rates resulting in the plants growing at a faster rate.
- However, if the plants were unable to absorb particles of sugar it killed the plant entirely. We were able to physically observe large amounts of sugar crystals on the dead plants soil. Inferring the plant could not properly undergo the osmosis process.

	Plant Height	Leaf Width
Sugar	0.00917	6.982E-05
Light	2.709E-12	0.00287
Interaction	1.443E-05	0.695



Week Three



Week Two

References:

- Cocucci, Sergio M., et al. "Response Of Seedlings Of Radish (*Raphanus Sativus*) To Osmotic Shock And External Hydrostatic Pressure." *Physiologia Plantarum* 87.4 (1993): 609-615.
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- Qiutong, XU, and ZHANG Mingkui. "Oxytetracycline Uptake And Growth Of Radish Plants *Raphanus Sativus*In Agricultural Science & Technology15.7 (2014): Salisbury, F. B., and C. W. Ross. *Plant Physiology*. Belmont, CA: Wadsworth Publishing Company, 1992.