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

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Introduction:

- Plants and *Raphanus sativus* plants in particular, are similar to all other living organisms and require a few basic needs. The commonly known basic needs are water, air, light, and nutrients.
- Plants receive water through the scientific process known as osmosis. Osmosis occurs when water passes over and across a semi-permeable membrane from the side where water is in higher volumes to the side where water volumes are significantly lower (Navin 62).
- Aside from water another basic need is the nutrient sucrose. When plants are raised in the dark, as a way to increase sucrose, sugar additives are given to the plant through direct watering. However, adding sugar water is not a guaranteed way to boost sucrose levels. As well as nutrients, light and air are critical to the plants health (Hamilton 421).
- 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. During the process of photosynthesis plants utilize the energy of the sun to carry out chemical reactions which convert carbon dioxide into oxygen. As a result of the photosynthesis process sugars are produced which feed the plant

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.

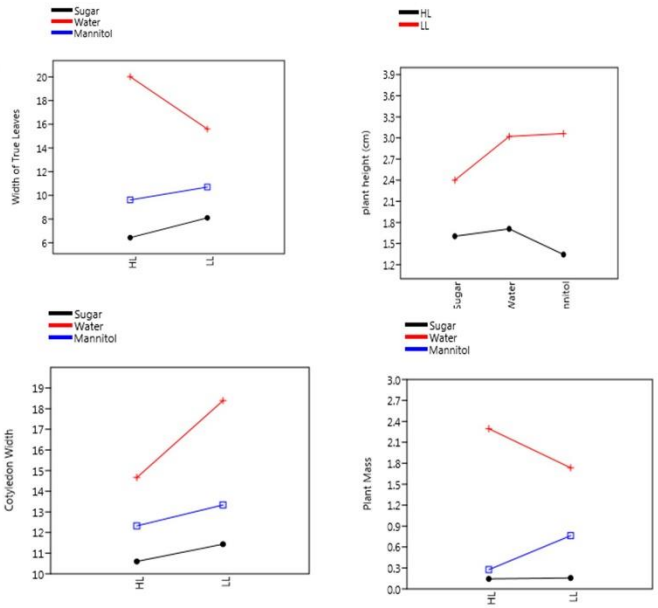
Methods:

- *Raphanus sativus* seeds were planted in four treatment groups (n=16) with two control pot per flat.
- Plants were watered daily with equal (~180 ml) volumes of DI water.
- Measurements of height of the plant and width of true leaves were taken once a week over the experiment period.

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.



Week Two

Week Three

Conclusion:

The most significant aspect of our results was the positive effect of light on plant growth. This can be interpreted as the higher light levels lead to the photosynthesis process occurring at a faster rate, resulting in the plants growing more.

There was a difference between plants grown with a sugar supplement and without, with those without supplements growing better. We interpret our results to suggest that higher levels of sugar solute caused osmotic stress on the plants. However, mannitol, which has the same osmotic effect as sugar, did not have as severe effect on growth.

We were able to physically observe large amounts of sugar crystals on the dead plants soil, suggesting that the plant could not properly undergo the osmosis process.

Fig: 5 The result of our labors – a radish!

References:

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