The effects of Gibberellin and high and low light intensities on *Helianthus annuus* (Sunflower)

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Introduction

- Plant hormones are produced by plants. They can control germination, growth, metabolism, or other physiological activities. The hormone we were most interested in for this experiment is Gibberellin.
- Gibberellin, including Gibberellic acid, whose main purpose is to cause elongation of the stem: used to promoting the growth of plants, and seed germination (Harberd).
- Phototropism is the orientation of a plant or other organism in response to light, either toward the source of light (positive tropism) or away from it (negative tropism) (Li.)
- Goals of our Study
  - Determine how much the hormone Gibberellin can be effected by the intensity of light.
  - Determine which light intensity whether Gibberellin is present or absent shows the most negative or positive results. Such as; shoot elongation, germination of the seed, leaf length, and stem length, total biomass, and the visible effects of the two variable manipulated.

High Light No Gibberellin	**High Light Gibberellin**
Low Light No Gibberellin	**Low Light Gibberellin**

Methods

- We planted 40 sunflower seeds
- Our controls were the amount of water soil, fertilizer, and seeds used
- We divided the seeds equally into two groups, high and low light. Then, we applied gibberellin to ten seeds in the high light and ten in the low light
- We mixed ten milliliters of Gibberellin in when we watered each plant on week two and three
- We measured stem height and leaf length weekly for five weeks
- At the end of the experiment, we measured biomass, stem diameter, and number of leaves.

Results

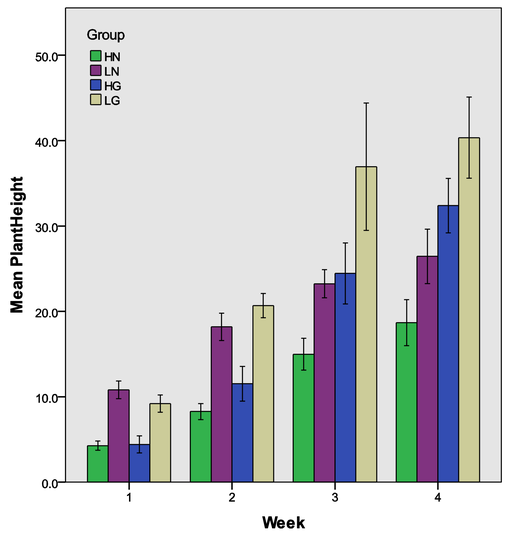

Figure 1- This shows the difference in plant height between high and low light along with the use of gibberellin for each week.

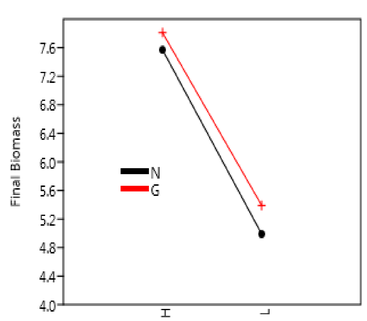

Figure 2- Light intensity and gibberellin shows a significant interaction (p = .064).

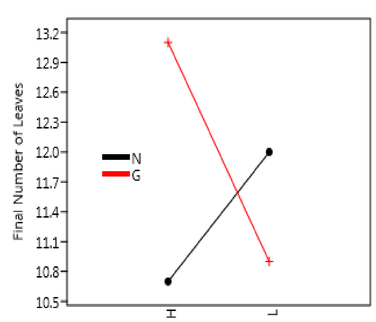

Figure 3- We found a weak significant interaction between light level and gibberellin leaf number (p = 0.092).

Conclusion

After the five weeks, we can conclude that the plants under the low light grew taller, but the ones under high light grew much stronger. We can conclude that this is because of the use of photosynthesis, the plants that were under low light needed more are to use photosynthesis so they obtained more leaves. The plants in the low light also grew faster in attempt to reach more light causing them to be weaker. Gibberellin also contributed to plant growth, but did not have as much of an affect. The plants that were treated with gibberellin in both high and low light grew significantly taller than the ones without, but it did not differ much between the levels of light intensity. Towards the end of the experiment, the high light plants were not able to grow to full potential because they were too close to the lights and burned. This caused our data to be not as significant as it could have been. The leaf length and final biomass graphs show that there is an obvious difference between the plants that do not have Gibberellin and the plants that vary in light, but there is no correlation between the data of the actual gibberellin and light effecting one another.

References

Harberd, Nicholas P., et al. "Gibberellin: inhibitor of an inhibitor of...?." *Bioessays* 20.12 (1998): 1001-1008.

Li, Xiaojie, et al. "Plant growth enhancement and associated physiological responses are coregulated by ethylene and gibberellin in response to harpin protein Hpa1." *Planta* 239.4 (2014): 831-846.