**Does the amount of light plants are exposed to when they are growing affect their height?**

**Title:** The effect of the amount of light on the height of a growing plant.

* Written in the “The effect of the IV on the DV” format

**Introduction:**

The growth of plants may seem like a simple experiment; however, the ideas being studied and evaluated in this experiment have an important function in today’s global society. The agricultural industry is responsible for “approximately 42 percent of the world's laborers” ([Agriculture:](http://globaledge.msu.edu/industries/agriculture) Introduction . Agriculture and farming play an important role not only in what we eat, but the economy.

Plants, just like humans, have needs. These necessities include light quantity, light quality, temperature, water, and nutrition (http://ag.arizona.edu/pubs/garden/mg/botany/environmental.html). “The more sunlight a plant receives (up to a point), the better capacity it has to produce plant food” (AZ Master Gardener Manual: Environmental Factors). The amount of light the plant receives affects the productivity and health of the plant.

This experiment will be looking at the amount of direct sunlight and the effect it has on the height of plants. The height of the plant will be used as a proxy measure of general health of the plant. The independent variable in this experiment is the amount of light plants are exposed to. The dependent variable is the height of the plant. Controlled variables in this experiment include the batch of plants, amount of food each plant receives, type of food each plant receives, amount of water each plant receives, source of water each plant receives, area that the plants receive no light, area that plants receive direct light, time of day plants receive light, time of day plant height is measured, wattage of light bulb, number of days each plant receives light, and number of plants that receive specified amount of light.

* Purpose of the experiment and why it’s important
* Basic background on what it is you are studying
* Variables

**Hypothesis:** If three sets of plants are grown with differing amounts of light (no light, 4 hours of direct light daily, 8 hours of direct light daily, and 12 hours of direct light daily), then the plants receiving 12 hours of sunlight daily will grow to be the tallest.

* Written in “If… then” format

**Materials**:

12 identical plants (same type of plant from the same batch, similar/same beginning height)

Ruler

12 lamps

**Methods**:

1. Obtain 12 identical plants
2. At 8am, place plants that receive direct light on the work bench.
3. Set lamps directly above plants.
4. Set timer.
5. After 4 hours, 8 hours, and 12 hours remove light and plants from work bench.
6. Measure the height of the removed plants (measure from the edge of the container to the top of the highest stem).
7. Set in dark closet until 8am the next day.
8. Repeat for 14 days.
* Detailed step by step procedures

**Data**

|  |  |  |  |
| --- | --- | --- | --- |
| **Date** | **4 hours of light** | **8 hours of light** | **12 hours of light** |
| **Day 1** | 3cm | 3cm | 3cm | 3cm | 3cm | 3cm | 3cm | 3cm | 3cm |
| **Day 2** | 3cm | 3cm | 3cm | 3cm | 3cm | 3cm | 4cm | 4cm | 5cm |
| **Day 3** | 3cm | 3cm | 3cm | 4cm | 4cm | 4cm | 5cm | 5cm | 7cm |
| **Day 4** | 4cm | 3cm | 4cm | 5cm | 4cm | 4cm | 6cm | 6cm | 7cm |
| **Day 5** | 4cm | 4cm | 4cm | 5cm | 5cm | 5cm | 6cm | 7cm | 9cm |
| **Day 6** | 4cm | 4cm | 5cm | 6cm | 6cm | 5cm | 8cm | 8cm | 13cm |
| **Day 7** | 5cm | 6cm | 5cm | 6cm | 6cm | 6cm | 11cm | 11cm | 15cm |
| **Day 8** | 7cm | 7cm | 6cm | 7cm | 7cm | 6cm | 11cm | 12cm | 16cm |
| **Day 9** | 8cm | 9cm | 7cm | 8cm | 9cm | 8cm | 11cm | 14cm | 16cm |
| **Day 10** | 8cm | 9cm | 8cm | 10cm | 10cm | 10cm | 13cm | 14cm | 19cm |
| **Day 11** | 9cm | 9cm | 10cm | 12cm | 11cm | 11cm | 12cm | 14cm | 19cm |
| **Day 12** | 9cm | 9cm | 9cm | 13cm | 13cm | 13cm | 15cm | 16cm | 20cm |
| **Day 13** | 10cm | 19cm | 10cm | 14cm | 14cm | 13cm | 17cm | 18cm | 21cm |
| **Day 14** | 10cm | 9cm | 11cm | 17cm | 14cm | 14cm | 18cm | 19cm | 20cm |

\*\*\* Bar or line graph presenting data

**Data Analysis**

On average the plants that were given 12 hours of sunlight daily grew to be the tallest. The average height of the plants that received 12 hours of light daily was 19cm. The average height of the plants that received 8 hours of light daily was 15cm, and the average height of the plants that received 4 hours of light daily was 10cm. The data supported the hypothesis stating that “if three sets of plants are grown with differing amounts of light (no light, 4 hours of direct light daily, 8 hours of direct light daily, and 12 hours of direct light daily), then the plants receiving 12 hours of sunlight daily will grow to be the tallest”. The data and hypothesis correlate with what is already known about plant growth, and that the quantity of light received positively correlates with growth.

Plants H and J supposedly “shrank” during the course of the experiment. On day 11 plant H shrank 1 cm in height, and on day 14 plant J shrank 1cm in height. This data does not fit with the trends established throughout the experiment. Human error with measurement is the most possible cause for this erroneous data.

* State averages and trends
* State and discuss whether the data supports the hypothesis
* Discuss errors in the data

**Conclusion**

This experiment tested the effect of direct light on the height that identical plants grow. Nine plants were tested, and subjected to differing amounts of direct light (4 hours, 8 hours, and 12 hours). It was found that plants subjected to 12 hours of direct light daily grew to be the tallest, growing on average over 17cm throughout the course of the 14-day experiment. There was a direct correlation between the amount of direct sunlight and height of plant growth.

This experiment was not void of error. There were two data points that did not follow the established growth trend: plant H’s measurement on day 11 and plant J’s measurement on day 14 were attributed to human error.

This experiment supports the idea that the amount of light directly affects plant height. This can be further studied by adding variables such as type of food to see if one variable is more prominent than the other. This can influence a wide variety of agriculture from small personal gardening to large scale farming.

* Summarize the main points: what was tested, simple methods, briefly state results
* Sources of error
* Affirm or deny hypothesis, possibilities for further studies

**Works Cited**

"Agriculture: Introduction." *Agriculture GlobalEDGE: Your Source for Global Business Knowledge*. University of Michigan, 2013. Web. 30 Apr. 2013.

"AZ Master Gardener Manual: Environmental Factors." *AZ Master Gardener Manual: Environmental Factors*. University of Arizona, 1998. Web. 30 Apr. 2013.