JBI101: How Do Plants Grow

Abstract: The goal of my project was to determine what the effect of sunlight is on the growth of bean plants. I planted 20 bean seeds and exposed them to different amounts of sunlight on north, south, east and west facing windowsills in my home. I measured the height of each plant once a week for 10 weeks. The bean plants which were placed on the south facing windowsills were taller than those on the other windowsills at the end of 10 weeks. I conclude that south-facing windows provide the best natural light for plant growth.

What was your research question or engineering problem?

It is a well-established scientific fact that plants use sunlight to produce energy through a process called photosynthesis (Photosynthesis). It is also known that plants are able to use different sources of light more or less efficiently to complete the process of photosynthesis (Prochnow, 69). Light is so important that plants can even grow in a certain direction as a result of exposure to light in a process called phototropism (Technische Universitaet Muenchen).

The light from south facing windows is commonly known to be best for house plant growth. East and west facing windows are said to be the next best. (The Houseplant Encyclopedia). Farmers who grow crops are also looking for ways to grow plants more efficiently. They have found a way to use space better by growing some plants in planters stacked on top of each other, but the plants still need just as much light. That light needs to be supplied by an LED light in the vertical farms. (Green Pie in the Sky).

I was trying to find out if the commonly believed assumption about south facing windows being best for houseplants is true at my home during the winter months. I want to know which windowsill I should I put my plants on to make them healthiest.

My research question was: Does plant growth as measured by plant height differ based on the direction the sunlight comes from?

My hypothesis is: Plants placed in south facing windows will grow taller than plants placed in windows facing other directions.

Explain your methodology and procedures for carrying out your project in detail, addressing the questions below.

I planted 20 lima bean seeds in recycled cardboard egg cartons using Miracle Grow potting soil. I placed 4 plants on each windowsill (north, south, east and west-facing). I placed the last 4 plants under a controlled LED grow light. Each plant received 1 teaspoon of water a week. I measured the height of each plant height once a week with a ruler and averaged the measurements for each location together. I collected data for 10 weeks.

The independent variable was the quality of the light source which was based on where I put each plant. The dependent variable was the height of the plants. How well they grew depended on the light source. The control group was the plants which were exposed to the LED light instead of to natural sunlight.

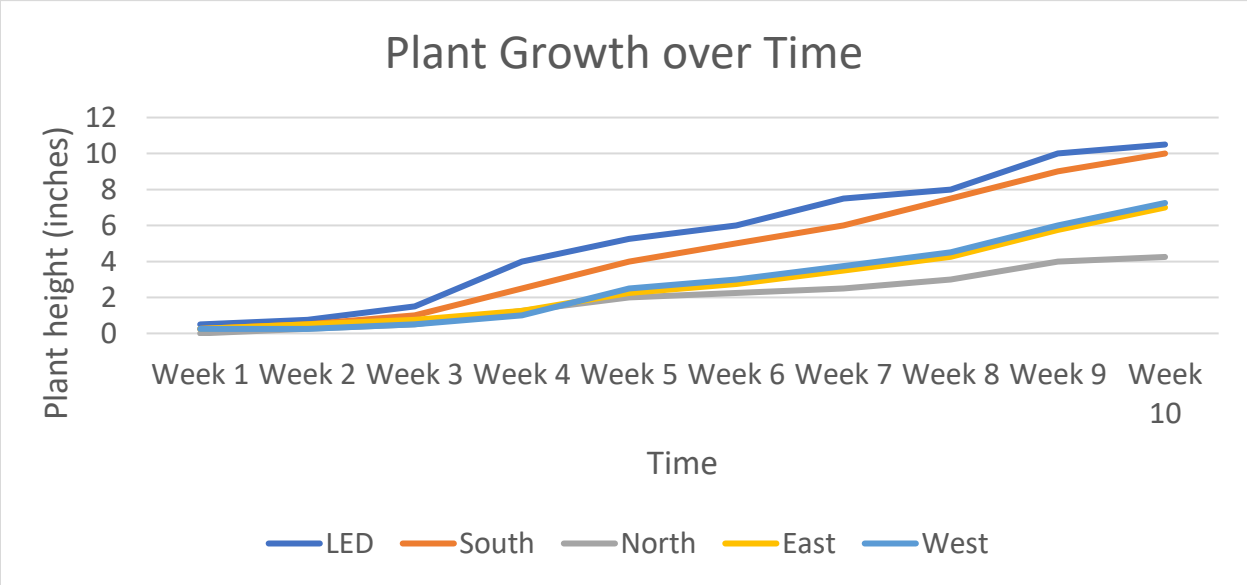
What was the result(s) of your project?

The table and chart below show the average height of the plants in each location at the end of each week. All measurements are recorded in inches. The table shows that all of the plants grew as the experiment progressed, but that they grew at different rates depending on where they were placed.

Table 1. Plant Growth Over Time

	LED	South	North	East	West
Week 1	0.5	0.25	0	0.25	0.25
Week 2	0.75	0.5	0.25	0.5	0.25
Week 3	1.5	1	0.5	0.75	0.5
Week 4	4	2.5	1.25	1.25	1
Week 5	5.25	4	2	2.25	2.5
Week 6	6	5	2.25	2.75	3
Week 7	7.5	6	2.5	3.5	3.75
Week 8	8	7.5	3	4.25	4.5
Week 9	10	9	4	5.75	6
Week 10	10.5	10	4.25	7	7.25

Chart 1. Plant Growth over Time



What is your interpretation of these results?

My background research and commonly held beliefs indicated that plants in south facing windows would grow best. The plants in the south facing window grew taller than the plants in the other windows. This means that the commonly held beliefs are likely correct.

These results could be wrong because it was an unusually cloudy winter which could have stunted plant growth. The plants in the different windows might have grown at different rates if it was sunnier. The results could also have been different for other types of plants.

I did not expect for the plants under the LED grow light to grow taller than the plants in the windows. I thought that natural sunlight would be better for plants than LED light.

What conclusions did you reach?

When I compared my results to my hypothesis, I found that the data supported my hypothesis that plants placed in south facing windows will grow taller than plants placed in windows facing other directions.

These results mean that south facing light is superior to north, east and west facing light for plant growth in house plants and that I should I put my plants on a south facing windowsill to make them healthy.

Further applications for this work could be for gardeners to make sure their house plants have as much south facing light as possible or even for big farmers who grow food for food stores to make sure their crops have access to south facing light.

Bibliography

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