

# Investigation Project

## *Title: How does your garden grow?*

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**Testable Question:** What amount of light is needed to best to grow tomato plants?

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### **Research:**

I found that most sources recommend a lot of light for tomatoes to grow. One really good source is the University of Missouri Extension Service web site: <http://extension.missouri.edu/explore/agguides/hort/g06461.htm> written by Lewis W. Jett, Division of Plant Sciences.

Because I'm doing my project in the winter, I had to grow them indoors. I found out that growing tomatoes indoors has some problems. First, I had to get tomatoes. We had to use seeds because it was hard to get tomato plants in the winter.

I had to simulate sunlight with grow lights. The sun gives off many colors of light. I found out that no one light source will give off all of those colors. But grow lights give off the colors that tomato plants need. (<http://forum.gardenweb.com/forums>).

I also found out that tomato flowers need to be pollinated, which is normally done by bees. But it can be done inside. (<http://edis.ifas.ufl.edu/CV266> - 81k)

I also found out that tomato plants need at least 75 days to produce tomatoes. That is ten weeks, but I only had six weeks to do my project. So I decided to measure the height and the number of leaves on the tomato plants instead.

I found out that tomato seeds need dark to sprout and that they sprout in about 10 days. Then they need light for the green plants to grow.

### **Hypothesis:**

Tomato plants will grow best when they get at least 12 hours of light each day.

### **Reason:**

People grow tomatoes in the summer. That makes me think that tomatoes need lots of light since there are longer days in the summer.

### **Materials:**

- 9 1 liter (1 quart) plant pots with holes in the bottom
- Tomato seed packet (Better Boy)
- Potting soil
- 3 florescent grow light sources with stands or hangers
- 3 light timers (24 hour)



- Watering can, 1 liter
- Clock to time amount of light
- 3 large boxes, or large cardboard walls that are opaque so no light gets in or out

**Time:** 40 days

**Variable I changed:** Amount of light the plants receive

**Variables that stayed the same:** Seeds, pots, soil, water, location

**Design:**

- 1 Use seeds from the same package. They should be healthy green and have about the same number of leaves.
- 2 Place three large boxes in an area that can stay dark for the whole time.
- 3 Place the same type and the same amount of soil in each pot.
- 4 Plant the five seeds in each pot, just under the surface of the soil.
- 5 Place trays under the pots to catch any water or dirt that spills.
- 6 Set up one light over each box and make sure that it shines evenly across all three pots.
- 7 Connect each light to a timer
- 8 Set the timers as follows (**See table 1.A**)
- 9 Keep the lights off until the seeds have all sprouted
- 10 Water the seeds with .5 liters of water every other day.
- 11 Once the seeds have sprouted, start the lights.
- 12 Water the plants every other day using .5 liters of water.
- 13 Measure the height of the tomato plants each week and count the number of leaves for 30 days after sprouting.
- 14 Calculate the average height and the average number of leaves for each set of three plants.
- 15 Record the average height and number of leaves each day.

**Table 1.A**

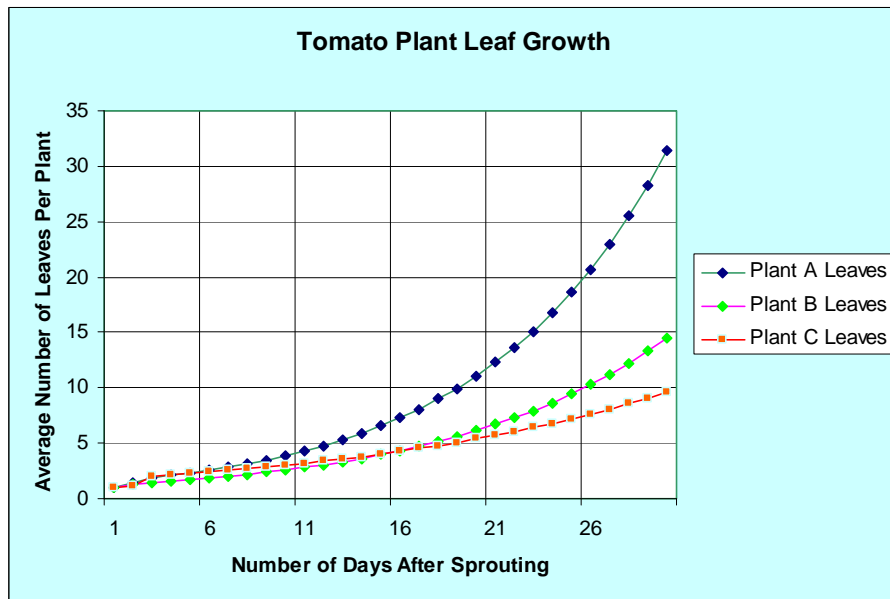
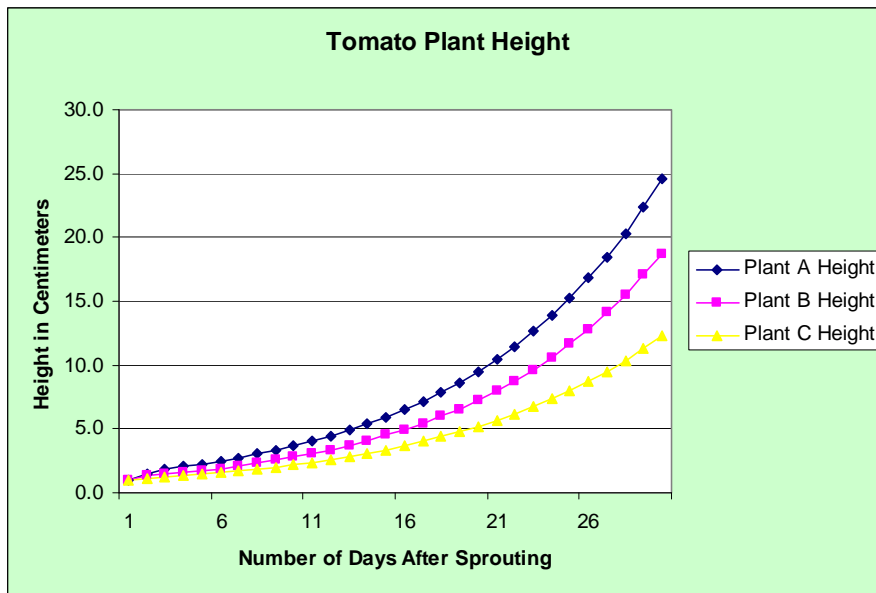
	Amount of Light
A	12 hours of light
B	8 hours of light
C	6 hours of light



### Data (seeds sprouted on days 9 and 10)

Time	A Plants (12 hours light)		B Plants (8 hours light)		C Plants: (4 hours light)	
Day	Height (cm)	Leaves	Height (cm)	Leaves	Height (cm)	Leaves
11	1.0	1	1.0	1	1.0	1
12	1.5	2	1.3	1	1.1	1
13	1.9	2	1.4	1	1.2	2
14	2.1	2	1.6	2	1.3	2
15	2.3	2	1.7	2	1.4	2
16	2.5	3	1.9	2	1.6	2
17	2.7	3	2.1	2	1.7	3
18	3.0	3	2.3	2	1.8	3
19	3.3	4	2.5	2	2.0	3
20	3.7	4	2.8	3	2.2	3
21	4.0	4	3.1	3	2.4	3
22	4.4	5	3.4	3	2.6	3
23	4.9	5	3.7	3	2.8	4
24	5.3	6	4.1	4	3.1	4
25	5.9	7	4.5	4	3.4	4
26	6.5	7	4.9	4	3.7	4
27	7.1	8	5.4	5	4.0	5
28	7.8	9	6.0	5	4.4	5
29	8.6	10	6.6	6	4.8	5
30	9.5	11	7.2	6	5.2	5
31	10.4	12	8.0	7	5.7	6
32	11.5	14	8.7	7	6.2	6
33	12.6	15	9.6	8	6.7	6
34	13.9	17	10.6	9	7.3	7
35	15.3	19	11.6	9	8.0	7
36	16.8	21	12.8	10	8.7	8
37	18.5	23	14.1	11	9.5	8
38	20.3	25	15.5	12	10.3	9
39	22.3	28	17.0	13	11.3	9
40	24.6	31	18.7	15	12.3	10





**Results and conclusion:**

The data shows a clear difference between plants that received 12 hours of light and those that received only 4 hours of light. In addition, the data shows that plants that received 12 hours of light produced many more leaves than those that received less light. Since leaves are the powerhouses of plants, the number of leaves helps to know how strong the plant is. The results provide strong evidence that light is a very important factor in growing tomato plants. My hypothesis is supported by this data.

