

The Effects  
of  
Elements on

Plant  
Growth

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Grade 9

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An involuntary growth response that is specifically related to an environmental stimulus is called a tropism. Such external stimuli include light, gravity, contact, water, and chemicals. In my experiments, I will be dealing with most of those.

On February 26, I took the seeds and placed them in potting soil. This I wrapped in newspaper and placed near a heater. Within a week they had sprouted and I prepared pots, filled with a mixture of one half commercial potting soil and one half top soil from our garden. For the next week, I kept them well watered and warm.

### Light

The positive response of plants to light is known as phototropism. During this experiment, the light (usually artificial light because of lack of strong, lasting sunlight) was always kept on the same side, so as you can see most of the <sup>plants</sup> are bending in the same direction.

### Heat

One of the plants had fungus on it from being so moist so I placed it in the heat (over

our radiator) The temperature was too great and it practically baked the plants. The leaves wilted and died and new ones are now being formed.

### Gravity

I was unable to experiment with the variable of gravity. The stems and roots of plants respond in opposite ways to gravity. No matter how you place the seed, the roots always grow downward and the stems always grow upward.

### Water

Water affects the plant very much in its growth. Some roots are believed to grow toward water, the growth response referred to as hydro-tropism. In my experimenting, one of the plants had less water than the others and you can see how it has stunted the growth.

### Chemicals

The response of plants to chemicals is known as chemotropism. It is with this which I will be dealing with the most.

## Colchicine

Colchicum is a poisonous plant from which colchicine is taken. Colchicine is a bitter drug that is used in small quantities to treat gout and rheumatism. When put on a plant, it can be an interesting experiment in genetics for it doubles the chromosome number in certain plants and produces a mutation. Giant marigolds and zinnias have been produced in this way. I am expecting the offspring of these plants to be giants.

I obtained the colchicine from a druggist in tablet form. I dissolved it in water, and put it on, as a day's watering on the 7<sup>th</sup> of March.

## 2,4-D (weed killer)

The weed-killer 2,4-D depends for its effectiveness on the stimulation of growth of broad-leaf plants to such an extent that it dies. It can (the plant) not transport or manufacture enough food and minerals for such a large plant.

2,4-D contains the following active ingredients:

- Isooctyl ester of 2,4-dichlorophenoxyacetic acid
- Isooctyl ester of silvex [2-(2,4,5-trichlorophenoxy)propionic acid]

The 2,4-D was put on the plants on Thursday, March 11 in the afternoon. Within a short time the leaves started to curl. It is possible that beans are not a broad leaf plant so 2,4-D will not stimulate their growth, only kill the plants.

#### Vitamin B

Vitamin B stimulates the growth of roots. I applied it on Monday, March 8, in a liquid form as the day's watering and have been doing so since.

The quality of the soil is very important! Good soil is loose with no large pieces of rock or soil in it. The seed needs enough air to sprout and cannot be placed too far beneath the surface. It should contain enough of the necessary minerals and be kept moist.

#### Fertilizer

On March 10, I added some fertilizer called Weller-gro to two of the plants. Within two days you could see a considerable difference in the growth. The fertilizer contained Nitrogen in various forms, Phosphoric acid, and Potash.

For more accurate observations, hundreds of plants should be used. This is impractical because of lack of room and limited materials in this project.

Getting the plants to grow well was difficult because of the time of year. We only had one or two sunny days so artificial light had to be used.

## Materials

24 Peat Pots	available at any garden shop	\$1.50
1 Package of string bean seeds	" "	.79
1 Bag of Potting soil	" "	.93
soil from our garden		
2,4-D (weed-killer)	ON HAND	
Heller-gro (fertilizer)	ON HAND	
Colchicine tablet	Druggist	
Vitamin B pill	Druggist	

## Bibliography:

Cornell Bulletins  
World Book Encyclopedia  
Britannica Encyclopedia  
Burpee seed catalog  
Biology text books