Investigating Plant Nutrition

Fast Plants and Fertilizer

Edgenuity Unit: Ecology Lesson: Cycles of Matter
Time: 4 weeks 60 minutes on Day 0 and ~5 minutes per day after

Learning Target

I can design an experiment to determine the best amount of nutrients to add for plant growth.

Materials

• Wisconsin Fast Plant seeds (standard)
• 4 deli container growing systems
  ○ 16 oz. deli container
  ○ 8 oz. deli container
  ○ Wicking cord or string
• Labels
• Q-tips
	• Light box – growing house
	  ○ 2 crates
	  ○ Aluminum foil
	  ○ Hanging light fixture
	  ○ 24 watt CFL
	• Potting soil
	• Wisconsin Fast Plant fertilizer

Green plants make their own food through the process called **photosynthesis**, but they also require nutrients they obtain from the soil. Nutrients in Fast Plant fertilizer are nitrogen, phosphorus, and potassium. Farmers need to decide each season how much fertilizer they should add to their fields. If fertilizer additions are doubled, will the crops produce more than previous years? Fertilizer can be expensive – will the additional yield cover the costs of more fertilizer use? Fertilizer that is not used by plants can have harmful environmental impacts, including eutrophication. During eutrophication, nitrogen and phosphorous are washed into lakes and cause too much algae to grow, which can decrease the amount of oxygen available to rest of the living things.

Notes on Nutrients in Fertilizer

- Nitrogen
    - Optimum: Plants are rich green and protein content increases.
    - Deficient: Plants are stunted and light green in color; lower leaves are yellow, stem is slender.
    - Excessive: Plants have very lush foliage with sappy, soft stems; flowering is delayed.

- Phosphorous
    - Optimum: Plants have a vigorous start due to stimulated root formation and growth; phosphorus also stimulates flowering and aids in seed formation.
    - Deficient: slower growth and delayed flower and pod development; leaves are dark green and dull; root system is poor with little branching; stem is slender.
    - Excessive: Plants have very lush foliage with sappy, soft stems; flowering is delayed.
- Potassium
    - Optimum: plants have increased vigor and disease resistant.
    - Deficient: Leaves can be mottled; flowers do not achieve vibrant yellow color; stem is slender.
    - Excessive: Plants have dark foliage and stiff stems and leaf branches.

Day 0

1. Answer the questions below:

If nutrients are important for your plants to grow, develop, and reproduce, is there some particular amount of fertilizer that is best for the plants?

In the previous investigation with Fast Plants, there was a suggested amount of fertilizer to add. Do you think that there is a minimum amount of fertilizer that plants must have to grow, develop, flower, and produce seed? How can you find out?

If fertilizer is good for plants, is more fertilizer always better? How can you find out?

What are some characteristics that you could observe to determine the best amount of fertilizer to add? Circle the one characteristic that you will observe.

2. Complete the top row of the data table by writing in the characteristic that you will be observing. You will complete the rest of the table with your daily observations.

Days	**Characteristic:**	**Days**	**Characteristic:**
1		15	
2		16	
3		17	
4		18	
5		19	
6		20	
7		21	
8		22	
9		23	
10		24	
11		25	
12		26	
13		27	
14		28	

Procedures:

3. Plant the seeds in 4 containers using the following directions:
4. Poke a hole in the center of the bottom of the 8 oz. deli container.
5. Cut a wick 12-14 cm long, wet thoroughly with water and insert 2 cm into bottom of 8 oz. deli container.
6. Pour ¼ cup of soil into the 8 oz. container.
7. Label containers based on the amount of fertilizer that was added.

8. Spread fertilizer pellets evenly on top of the soil. Put a different amount in each container and make sure that one container has NO fertilizer added.
9. Add ½ cup of soil on top of fertilizer pellets.
10. Sprinkle water over soil until it is dripping from the wick.
11. Place 5 seeds in a circle pattern on top of the soil.
12. Cover seeds with ¼ cup of soil.
13. Pour 1 cup of water into the 16 oz. deli container.
14. Set the small container on top of the larger container.
15. Place in light box and cover front (the plants will need plenty of water and 24 hours of light!)

<u>Days 1-28</u>

1. Make an observation each day and record it in the previous table.

<u>Day 28</u>

1. Compare your observations to your predictions before you started. Answer the following questions:

If nutrients are important for your plants to grow, develop, and reproduce, is there a particular amount of fertilizer that is best for the plants? What evidence backs up your answer?

Do you think there is a minimum amount of fertilizer that plants must have to grow, develop, flower, and produce seeds? What evidence backs up your answer?

If fertilizer is good for plants, is more fertilizer always better? What evidence backs up your answer?

Source: Wisconsin Fast Plants