

Willie and the Beanstalk

Which Way Is Up?

Science

Materials

Per group:

Clear plastic cup
Solid colored cup (clear cup must nest inside)
Potting soil
Scoops for potting soil
Paper towels
6 seeds (soybeans, corn or green beans)
Markers
Science Journal
Student Handout A: Lab Write-Up
Student Handout B: Plant Growth Data Sheet

Grade Level: 6-8

Time: One 50 min. class periods + daily observation for 15-20 days

Standards:
Life Science

For Kansas standards, visit www.ksde.org

Overview

The students will “plant” seeds between a paper towel and the side of a cup. The orientation of the seeds are circled and labeled to determine the effect of tropisms on the orientation of the seeds. Potting soil is placed on the inside of the paper towel and more seeds are planted there. The plants then are compared to germination time, height, and leaves.

Objectives

1. Students will understand what conditions affect the growth of a plant from a seed.
2. Students will identify which tropism(s) is/are being exhibited by the plant.
3. Students will make a hypothesis about which seed will grow the fastest.
4. Students will be able to record observations.

Background Information

Tropisms are when a plant reacts to internal conditions that determine how the plant will grow and respond to external stimuli. There are three types of stimuli: touch, light and gravity. Each response can be either positive or negative. Hormones made within the plant controls the plants responses to the tropisms. Only a very small amount of a hormone is needed to cause the response. These hormones are ethylene, auxin, gibberellins, cytokinins, and abscisic acid.

Preparation

1. Set up planting station for students.
2. Make copies of Student Handout A and Student Handout B.



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Instructional Format

1. Share and discuss background information with students.
2. Students follow the experiment procedures.
3. Students answer conclusion questions (assessments).

Procedures

Teacher will do experiment first to show students the steps.

1. Fold a paper towel in half and place against the inside of the clear cup.
2. Fill the cup 2/3 full inside the paper towel with potting soil.
3. Carefully place 4 seeds between the cup and the paper towel. Spread the seeds evenly around the cup about halfway from the top of the cup. Orient the seeds so that one points down, one to the left, one up and one to the right.
4. With the marker, place a circle around the seed on the outside of the clear cup.
5. Below the circle, label the seed as to the orientation.
6. Insert the clear cup into the colored cup (it will create a dark environment).
7. Plant two seeds in the middle of the cup, about 1-1/2" apart and 1/2" deep.
8. Water the seeds, making sure the paper towel is wet.
9. Observe the seeds daily and record growth for 15-20 days on Student Handout B: Plant Growth Data Sheet.
10. Water as necessary to keep the paper towel damp.
11. Responds to Student Handout A: Lab Write-Up questions in science journal.

Conclusion Questions (Assessments)

1. Name the various types of tropisms that affect plant growth.
Touch, light and gravity
2. Why was the second cup used to cover the clear cup?
The second cup is used to block the light from directly hitting the seed.
3. What other behaviors affect plant growth?
Soil type, water, soil nutrients, space to grow, sunlight, etc.
4. How does this relate to human growth? (innate behaviors)
The environment, nutrients, and water all affect how humans grow.
5. Which plant grew the fastest? The slowest?
Answers may vary.
6. What condition affected the plant growth?
Gravity and light



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Resources

Exploring Kansas Crops Educator's Guide (2004). Unit 2 – Growing Kansas Crops (27-52). Kansas Foundation for Agriculture in the Classroom. To order, visit www.ksagclassroom.org.

Adapted from lesson plan created by Jeanette Bosch, Wichita, KS.

Want More? Extensions

Transplant the seeds to soil. Allow them to grow for a few weeks and determine their height. Compare the amount of growth to the amount of time for both growth periods.

Compare the number of leaves produced over time.

Transplant the seedlings to soil and then vary the conditions in which they grow for the next two weeks. Use light versus dark, regular soil versus potting soil, amount of water and/or temperature as some of the variables to control.



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Lab Write Up

Answer the following questions in your science journal.

Problem (5 pts) State why we are doing this lab.

Hypothesis (5 pts.) State what you think will happen.

Experiment (30 pts.)

Materials

Procedure

Raw data in a table or list

Analyze Data (10 pts)

Calculations – show your work

Trends that you found from calculations

Conclusion (10 pts), 5-10 sentences

Was the hypothesis correct? Explain.

Summarize the data

Reasons for possible errors in the experiment

Give changes you would make to the experiment



