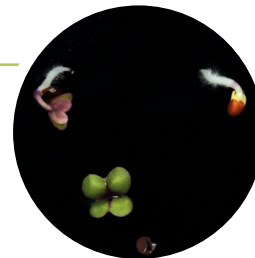


An Inquiry into Seed Germination

A Carolina Essentials™ Investigation

Student Worksheet



Overview

Crop failures can have significant negative effects on nations. A wheat failure in the Midwestern United States causes the price of bread and other foodstuffs to rise. One of the most critical stages in a crop's success occurs when the seeds are first sown. What factors influence seed germination and seedling growth? How can these factors be controlled? Having answers to these questions can be vital to a nation's well-being. In this activity, you will design and carry out an investigation to determine what factors influence seed germination and seedling growth.

In flowering plants, seeds develop from the ovules of a flower. Each seed contains an embryo with a source of food that sustains the young plant until it makes its own food. In early germination, seedlings demonstrate tropic responses to environmental stimuli such as light, touch, and gravity. Botanists describe tropic responses as positive, to indicate growth toward a stimulus, or negative, to indicate growth away from a stimulus.

Germinating seedlings exhibit positive phototropism in their shoots and negative phototropism in their roots. Seedlings also exhibit gravitropism, a directional response to gravity. Generally, roots grow in the direction of gravitational pull, and stems grow in the opposite direction.

Plants also rely on touch to navigate around obstacles and gain greater access to resources. This response is known as thigmotropism. Plant roots rely on touch to navigate around large particles in the soil. The stems of some plants exhibit a positive response to physical contact with another plant or with a nonliving object. This response enables vines to climb, which gives their photosynthetic parts greater access to sunlight.

Essential Question

What factors affect seed germination?

Investigation Objectives

1. Plan an investigation of a factor that affects seed germination.
2. Carry out the investigation and communicate the results to the class.

Safety Precautions

Wash and dry your hands after each activity. Use safety glasses.

Procedure

Experimental Design

1. List some factors you think may influence seed germination and seedling growth, and give a brief explanation of the expected influence. Share the factors during class discussion.

2. Choose a factor from your list and develop a question about seed germination that you can answer through experimentation. The question for investigation is:

SAFETY REQUIREMENTS



MATERIALS

100–150 radish or rye grass seeds

Potting soil (2–3 cups)

5–10 plastic cups (4–8 oz)

2 plastic spoons

1 permanent marker

Light bank

1 spray bottle

Paper towels

1 plastic bucket or other container for moistening potting soil

Rulers and other measuring instruments depending on student investigation designs

Continued on next page.

3. State a hypothesis for your experiment in this form: "If . . . then . . . because . . ." (If this variable is changed in this way, it will produce this change for this reason.) A hypothesis is not a guess; it is a predicted outcome based on prior knowledge.

Experimental Procedure

1. Give a description of the procedure you will use to test your hypothesis. Be as specific as possible. Include:
 - Materials needed and use of the materials
 - Data to be collected
 - Details on how you will analyze the data
 - Expected outcomes

Once your teacher has approved your plans, conduct your experiment and report your result.

Teacher initials _____

Disposal

Dispose of all plants as your teacher directs.

Data and Observations

Include a sample data table with variables and units.

Analysis and Discussion

1. How will you analyze the data you collect?
2. What will be graphed?
3. Construct sample axes with labels.

