

How Will the Seed Grow in that Soil?

Investigative Question: Will the same type of seed grow differently in different soil?

Goal: Students will develop understanding of seed growth and the effect different soils have on this growth.

Objectives: Students will design and conduct a scientific experiment to investigate whether plants germinate and begin to grow differently in different types of soil.

Knowledge: Describe ways that soil type affects seed growth. Deepen understanding of plant life cycles.

Skills: Develop science investigation skills. Use appropriate measuring tools to measure seed growth over time.

Value: Appreciate how the scientific investigation process helps us gain information and understanding about the world around us.

Virginia SOL: Science 3.1, 3.7, 3.8. Math 3.9, 3.17

Materials:

- Pea seeds
- Sand
- Clay
- Potting soil
- Soil tubes
- Plastic cups to hold the tubes
- Permanent marker for labeling tubes
- Volume measuring tool (will use beakers)
- Paper centimeter number lines to tape to soil tubes
- Tape
- Wooden stir sticks to press seeds to desired depth

Special Safety: Instruct students not to put fingers in their mouths after handling the soils.

Procedure for February visit

1. *Set-up-* Gather necessary supplies and divide into three groups: One set of three tubes for each group.
2. *Engage-* Connect back to the tree life cycle activity at Blandy. What did we measure and learn?
3. *Inquire-* What is soil? What do soils provide for plants? If we wanted to carry out an experiment on what type of soil seeds will grow best in, what are some of the steps we should take? Form a list of steps and factors to consider for an experiment. You might need to prompt students. Soil provides the support and nutrients necessary for plant growth. **Common misconception:** Plants gain mass by absorbing nutrients and water from the soil. Fact: Plants gain MOST of their mass by incorporating CO₂ into sugars through the process of photosynthesis. Most of a plant's mass comes from the air.
4. *Explain* that in order to test an idea, everything has to be exactly the same except the one thing we are testing and measuring (that is our data). Ask students to identify variables (things that could change) that need to be controlled (kept from changing), including the following:
 - a. amount of soil (volume or mass?)
 - b. type of seed
 - c. location of the plant as it grows (the quality and quantity of light and air)
 - d. amount of water
 - e. type of container

As a class, identify the variables to be used for judging which plant grows the best (height; general appearance, such as color, looks healthy or not; number of leaves). This will be the data they record.



5. Split class into three groups and distribute data sheets. Ask students to think about what they know as they discuss which soil the seeds will grow the fastest/best in. Instruct them to record this hypothesis on a data sheet.
6. **Assign tasks.** One student measures and gathers the sand; one measures and gathers the clay; one measures and gathers the potting soil. One student plants seeds to the same planting depth against the side of the tube and one student waters (with same amount of water for each tube), and one student can tape the centimeter number line to the outside of the tube.
7. *Students collect experiment materials* and set up their experiments.
8. Have them conduct their initial observations and record the information (there will be zero growth).

Procedure Following February Visit:

9. Ask students to discuss how often then should make observations of their plant growth. Decide as a class. Make regular observations on the plant growth. Ask students to sketch and write down descriptive details. Measure the growth using appropriate tools. Make observations for as long a period of time as you would like. A minimum of 2 weeks is recommended.
10. Graph the growth of the plants in each of the soil types at the end of the experiment period.
11. Discuss results as a class. In what soil did the seeds grow the most? In what soil did the seeds grow the least? Why? Use evidence/data to support your conclusions.
12. At the end of the observation period, use the following questions to focus discussion:
 - a. How can you tell that the plant is healthy?
 - b. Which soil produced the healthiest plants?
 - c. Which soil produced the tallest plants?
 - d. Why do you think this soil worked best?
 - e. Does what you discovered through the experiment agree with your hypothesis?
 - f. Do you think this soil would produce the same results with a different kind of plant? Why or why not?
 - g. What was the hardest variable to control during your experiment?
 - h. Why is it important to have more than one test planting for each type of soil?
 - i. What might you do differently next time?
 - j. Did this experiment make you wonder anything?
 - k. How could you test your new questions?

Possible Extensions: (optional)

- Choose to keep your pea plants growing until April and continue recording observations (Reinforces plant life cycle. The plants might go to seed or they might die.)
- Integrate technology- take photographs as part of the observation process and make a slideshow to demonstrate growth over time.
- **Activity modified from:** <http://durham.ces.ncsu.edu/wp-content/uploads/2012/07/Soil-solutions.pdf>
- **Other soil and plant experiment ideas**
<http://www.edu.gov.mb.ca/k12/cur/science/found/kto4/3c4.pdf>
<http://www.plantingscience.org/index.php?module=pagesetter&func=viewpub&tid=2&pid=1411>



SEEDS IN DIFFERENT SOILS Data Sheet

Name: _____

Setting up the experiment:

Ask a Question: What are you trying to find out about the seeds and different soil types?

Make a Hypothesis: How do you think your plants will grow?

Design Your Experiment: What will you do to set up your experiment? What data will you record? Write down the steps you will follow.

Conducting the experiment:

Collect your Data on the Chart.

Write down some of your observations: How did your plants grow in the three soil types? Think about shape, color, size, etc.

Explain Data: Why do you think your plant grew the way that it did?

Ask New Questions: What new questions do you have about soils and plant growth?

DATE	Record Height in Centimeters			Observations
	SAND	CLAY	POTTING SOIL	

