

LESSON 9 - Seed Sprouting Experiment

Overview:

Students will conduct experiments to determine the affects of water quality on plant germination and growth.

Levels:

Grades 3-8

Utah Core Curriculum Correlations:

Science

4th - Standard 1

Objective 1

Objective 2

8th - Standard II

Objective 1

Earth Systems

7th & 8th - Standard IV

Objective 1

Math

6th - Standard 1

Objective 3

Skills:

Observing, Measuring, Analyzing, Comparing,
Describing, Inferring

Objectives:

Students will : 1) conduct experiments using variable water quality levels, and 2) observe and analyze the impact of water quality on seed germination and

growth.

Materials:

(For each group)

- Marigold seeds (2-3 seeds per egg carton section)
- Egg cartons (4 sections per group)
- Potting soil
- Water
- Vegetable oil
- Dish Soap (not biodegradable)
- Table Salt
- Containers for mixing and water (one per type of pollutant)
- Other pollutants (fertilizer,etc.) (optional)

Time Considerations:

45 minutes with periodic 10-minute follow-ups for 4 - 6 weeks.

Setting/Group size:

Classroom/individual or pairs

Safety Considerations:

It's best to use "pollutants" that are non-toxic and safe for students to handle (i.e. vegetable oil in place of motor oil).

Background:

As the second driest state in the country, Utah does not get much water from rain or snow. Because of the dry climate, the streams that surround the Salt Lake Valley are important to plants, wildlife, and humans as a source of water. It is important that the quality of this vital water source is maintained and pollution is minimized.

When it rains in urban areas such as the Salt Lake Valley, storm water (produced from rain or snowstorms) often washes nutrients and toxic substances from streets, parking lots, and lawns down into storm drains. Once in the storm drain, the storm water is piped directly to the nearest streams or Jordan River. The result is that nutrients and toxic substances end up in many water sources, destroying wildlife and plant habitat, and threatening the health and well-being of all living things that rely on the water.

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The following experiment demonstrates how pollution can affect the germination and growth of plants.

Getting Ready:

1. Divide the egg cartons so that each group has four sections.
2. Make copies of the **Seed Germination and Growth Observations** sheet, one per student

Doing the Activity:

1. Begin by asking the students what types of pollution might wash from streets, parking lots, and yards down into storm drains? Have students brainstorm a list (oil, antifreeze, grease, dirt, lawn fertilizer, litter, leaves, grass clippings, and pet waste). What happens to the fish, aquatic insects, plants, wildlife, and humans that depend upon this water when it becomes polluted? Through this experiment students will have an opportunity to observe the effects of water pollution on seed germination and plant growth.
2. Review the components of **Habitat** with students (food, shelter, water, space), and remind students that in setting up this experiment, students will be creating a habitat for the seeds.

NOTE: Keep in mind that students will be experimenting with different kinds of pollution and it's likely that some of the habitats will not sustain life.

3. Fill the egg carton sections 3/4 full with moist potting soil. Make four of these habitats and label 1 to 4; number one should be the control habitat where no pollution will be added.
4. Provide students with a list of pollution available for the experiment. Students must choose 3 types of pollution, one for each of the remaining egg carton sections. On the OBSERVATION worksheet, students should list the selected pollutants under CONTENTS.
5. Mix water with each pollutant in containers (one per pollutant). Add one pollutant to each of the 3 habitats, until soil is moist but not soggy.
6. Put 2-3 seeds in each section and cover with a thin layer of soil. Place the habitats where they will receive plenty of light and heat.
7. Discuss with students what they think will happen in each habitat. Have students complete the PREDICTION section of the worksheet.
8. After one week, have students record plant growth in their habitats. Continue to record plant growth until it becomes obvious which habitats can/cannot sustain life. Have students record observations on their worksheet.

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9. Discuss with students the similarities between the habitats they constructed and natural habitats. How do the "artificial habitats" satisfy habitat requirement needs? Did they provide food, water, shelter, and space for the seed? Discuss with students the effects of pollution on their habitats. Did some of the polluted habitats sustain life? Did some of the control habitats not sustain life? Living things can survive in polluted environments, but the quality of the habitat decreases with the presence of pollution and often life cannot be sustained.

10. Finally, have students brainstorm ways they and their families can improve the quality of storm water and habitat for plants and wildlife.

Extensions:

1. Have students research ways in which plants are being used to improve the quality of polluted environments.

2. Have students investigate the area around the school. Are there sources of pollution that might decrease the habitat quality? Are there indicators, such as unhealthy vegetation, that pollution might be effecting the area? What might be the source?

Assessment ideas:

Ask students to write several paragraphs comparing and contrasting their observations of the growth and development of the marigold seeds in each habitat.

Observer Name:

Seed Germination and Growth Observations

Habitat #1 (control)

Habitat #2

Habitat # 3

Habitat #4

Content:	Habitat #1 (control)	Habitat #2	Habitat # 3	Habitat #4
Predictions:				
Observations : (plant height, leaf color, stem thickness, shape, etc.) week 1				
week 2				
week 3				
week 4				
week 5				
week 6				