

Lesson: Science Grades 4-6 Life Cycles and Plants



Farmer McGregor, How Does Your Garden Grow?

Farmer McGregor had a wonderful garden stocked full of delicious food for the local animals. How did his garden grow?

Overview

Objective

Students follow the beginning of the growth process of a variety of seeds, recording and evaluating data as growth progresses.

Students use estimation, calculations and variables to find out how a variety of different situations change data.

Students compare and evaluate data.

Students record and present collected data in chart form for comparison with other data.

Academic Content Standards:

Ohio science academic content standards, benchmarks and grade-level indicators are currently in draft form. The suggested alignment to science strands for this lesson is subject to change as the draft standards are revised.

- ❖ Possible alignments: Ohio Academic Content Standards for Science: Life Cycles and Scientific Inquiry Standard

- ❖ National Science Education Standards: Life Science and Science as Inquiry

Getting Started

Materials

For each student group:

- 1 quart size Mason jar and lid
- Paper towels
- Access to water
- Seeds soaked in water the night before being used, (suggestions include beans, peas, radishes, carrots, various flowers- ones likely found in a vegetable garden such as Farmer McGregor's garden, and those eaten by the animals in the story)
- Journals (made with a construction paper cover and blank pages or with inserted data collection sheets or other materials)
- Colored pencils
- Measurement tools (use metric).

For the class:

- Large data collection chart
- Miracle Grow fertilizer powder added to water
- Food coloring
- A closet
- Heat lamp or other source of constant light
- Refrigerator access.
- Prepare two or three extra jars. One or use as a "control," and the other(s) to replace "mishaps.")

Handouts: Sample data collection pages

Technology

Graphing or spreadsheet software for the collection and organization of information.
Digital camera for visual recording of the plant growth process (post along side of the plants or on a chart).

Vocabulary

- Lifecycle
- Interpret
- Describe
- Compare
- Variable
- Environment
- Environmental change

Lesson

Orientation Activity

Discuss the types of plants that grow in Farmer McGregor's garden. Make a chart of suggestions.

Learning Activity

NOTE: Time schedules may vary depending upon the grow situation. Make adjustments as necessary.

Distribute materials to each group of 4 students. Each group will have a quart size Mason jar and lid, a collection of seeds, several paper towels, masking tape, a marker or Sharpie pen, small container of water, observation journal.

Assist students with the description and identification for each type of seed. Students will record an illustration of each seed in their journals, along with an assigned seed number for seed identification. See *Handout* for sample seed data collection.

Guide students to measure each of the seeds and record the measurements on the data collection sheet. Be sure to use metric measurement, millimeters. See *Handout* for sample daily measurement.

The group works together to prepare the container for the seeds. Be sure that the sides are clean and clear. Moisten one or two paper towels and place them flat along the sides of the jar. (The moisture will cause them to "stick to the side.") Place one of each seed between the paper towel and the glass side of the jar. Be sure to space the seeds apart, and at least five centimeters from the bottom of the jar. On the outside of the jar, place a piece of masking tape next to each seed with the seed number written on it. Pour enough water in the jar to cover the bottom, being careful not to pull the paper towels away from the side. If necessary, place a piece of tape along the top edge of the paper towel, at a couple points, to attach it to the side of the jar. Screw the lid tightly onto the jar. Label the top of the jar with a piece of masking tape with the group name or the names of the students in the group. Place the jars near a window but not in direct sunlight. Make an extra jar or two to use for emergencies and also as a control later in the activity.

In the journal for Day One, each student illustrates and writes a description of the jar and seeds. Each student also makes a prediction of what will happen to the seed over the next 24-48 hours.

On Day Two, students conduct qualitative and quantitative observations of the seeds, recording data on the charts and in their journals. (For students who have difficulty with open-ended data collection, provide guiding prompts in their journals such as, "Describe the appearance of each seed." "Measure the length of each seed tail." "Color a picture of each seed showing the texture and growth.")

Seed descriptions will include measurement of the tails of the seeds, illustrations showing size and color, description, texture and any changes. At the end of scheduled class time, review observations with the group. This will help those who are struggling with what to include. Indicate that each group might have slightly different results. Be sure to add enough water to keep the bottom of the jar covered. Each student makes a prediction for the next 24-48 hours

Continue in this manner until the majority of seeds have recognizable tails and growth. Skip days, making observations every other day to observe more obvious growth. Noticeable changes will occur in about 1- 1-½ weeks. Have students individually record their thoughts about the seeds. Evaluate which seed grew the fastest. Evaluate which seed changed the most. Predict what would happen if conditions changed such as, less water, too much water, fertilizer added, change in sunlight, etc.

Randomly select situations for each group. Suggestions include:

- Group One adds water as usual and places their jar in total darkness for all hours of the day.
- Group Two adds water as usual and places their jar in light for all hours of the day
- Group Three adds no more water to their jar and places it in the same location.
- Group Four adds colored water (red works best) to their jar, as usual, and places it in the same location.
- Group Five adds Miracle Grow to the water and places it in the same location.
- Group Six adds water as usual and places their jar in the refrigerator for either half or all of the day

(Your "extra" jar acts as the control, adding water and keeping it in the same location.)

Students continue to make observations and collect data in their journals. Be sure to indicate with a colored line or other demarcation, the day that the conditions changed for the group. Add data collected daily to the class chart.

After several days, depending upon the changes occurring in the plants, conduct a class discussion to process the data and results. Have each group prepare a conclusion and inference regarding the effects of the change on their plants. Use the control as the comparison device. Each group presents their findings to the class. Use the data on the chart to confirm and compare results.

Each student writes a final journal entry describing their findings and how they compared to the rest of the class. Included in this entry should be how plants react to changes in their environment.

Collect journals on the “off days” of observations to monitor how students are recording data. Make notations and suggestions to help them be more complete and accurate.

Collect journals at the end of the activity to find examples of observation, inferences, data collection, evaluation, and processes.

Evaluation and Follow-up

Assessment Tools and Methods

Student journal entries and recorded observations.

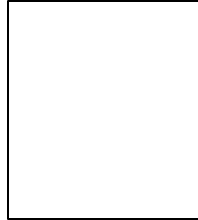
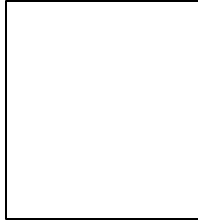
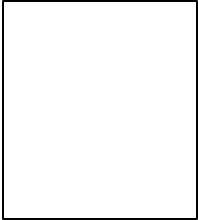
Student analysis, evaluation and conclusion of data.

Interdisciplinary Connections

Language Arts: Written descriptions of plant growth in chart and word form.

Handout

Day _____



#1 _____

#2 _____

#3 _____

#4 _____

#5 _____

Seed 1:

Seed 2:

Seed 3:

Seed 4:

Seed 5:

Prediction for next 24-48 Hours:

Seed	1	2	3	4	5
Day					
1					
2					
4					
6					

8					
10					
12					
14					

Group	Quantitative Observations	Qualitative Observations
1 List variable		
2 List variable		
3 List variable		
4 List variable		