SOIL PH

Driving Question

Does soil taken from different locations have the same pH?

Materials and Equipment

- pH sensor
- Beaker, 250-ml (3)
- Graduated cylinder 100-mL
- Marking pens
- pH calibration buffers, 4 and 10
- Wash bottle
- Hand trowel or shovel
- Sealable plastic bag, quart/liter size (3)
- Distilled water, 400 mL

Background

pH is an abiotic factor in the agricultural ecosystem that must be monitored to keep crops healthy and productive. Chemically speaking, pH is the measure of hydrogen ions (H^+) in the soil. This scale ranges from 0 (highly acidic) to 14 (highly alkaline). Distilled water, with a pH of 7, is a neutral solution. Most crops prefer a neutral to slightly alkaline soil pH but there are exceptions, notably citrus trees, which prefer acidic soil conditions.

Safety

Follow these important safety precautions in addition to your regular classroom procedures:

- Wear safety goggles at all times

Procedure

1. Put on your safety goggles.

2. Using a clean hand trowel dig at least eight centimeters deep. Collect three 60 mL soil samples. Place each sample into a sealed plastic bag.

3. Label the bags of soil with the location where each sample was collected.

4. Connect to the pH sensor and open the AGR 12 Soil pH.spklab file.

    - If the lab file is not available create a new experiment with a digits display of pH.

5. Crush the soil that is in the bag so there are no clumps, the sample should be as uniform as possible.

6. Place 60mL of each soil sample into each of the three 250 mL beakers. Label each beaker indicating the location it was collected.

7. Add 60mL of distilled water to each beaker, mix it, thoroughly. Let the samples stand for 10 minutes prior to data collection to promote hydrogen ion (H^+) dissociation and allow sediments to settle.

8. Calibrate pH sensor. Rinse the sensor with distilled water.

9. Place the sensor into the first beaker and monitor data without recording. Gently stir the mixture until the reading stabilizes (as much as 60 seconds). Make sure the sensor is in the mid-point of the water column, not resting in the sediment. Record the final value in Table 1.

10. Repeat step 9 for the remaining soil samples rinsing the sensor thoroughly between each sample.

Table 1: Stabilized pH readings for soil samples

	Soil sample location and observations	pH
1		
2		
3		

Analysis

1. Record your observations in table 1 as well as the pH. Your observations may show; soil color, texture, organism, rocks or anything that is unusual.

2. Why did we add water to the soil sample?

3. Why did we rinse the sensor with distilled water before testing each sample?

4. Why was the soil crushed?

5. Based on your pH results only, would any of the soil samples from your three collection sites be capable of supporting a healthy agricultural crop?

6. How could you safely alter your soil in order to improve it ability to support agricultural crops?

7. What did you notice about the different types and numbers of living organisms in your soil samples? What might this indicate about the health of soil in your area?

8. What evidence of human interaction or interference could you identify when collecting your samples? How do you think this interaction has altered the original condition of the soil?