# Soil Salinity

Lab Overview

In this lab students will analyze the soil conductivity (Ec) of soil in and around your city and county.

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| Pacing and Length of the Lab |
| Teacher Preparation Time | <60> min |
| Lab Investigation | <60> min |

Materials and Equipment

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| --- | --- |
| * Marking pens
 | * Stirring rod
 |
| * conductivity sensor
 | * Soil sample 40 mL (3)
 |
| * Graduated cylinder, 100-mL
 | * Distilled water, 250 mL
 |
| * Beaker, 250-mL (4)
 | * Labels
 |
| * Soil Maps (optional but helpful)
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Prerequisites

Students should be familiar with the following concepts:

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| --- | --- |
| * Conductivity
 | * Buffers
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| * pH
 | * total Dissolved Solids
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| * Ions
 | * Soil quality
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Teacher Lab Preparation

These are the materials and equipment to set up prior to the lab:

1. Calibrate all sensors according to their specifications. ([https://www.youtube.com/user/pascoscientific)](https://www.youtube.com/user/pascoscientific%29)

2. To dilute the soil sample, use a 1 part water to 1 part soil (i.e. 40cc water to 40cc soil) dilution ratio.

3. To test the pH of soil, students can collect soil samples from their school, neighborhoods and soils the instructor brings in. They should consider novel types of soil, for instance, from vacant lots, ditches and with permission from farms in your area.

From the student handout:

Sample Data

Table 1: Detailed observations of water sample locations

|  |  |
| --- | --- |
| Soil samples  | Observations |
| 1 Garden Soil (Sycamore) | Dark brown, feels slick, plants grow well in this soil  |
| 2 College Soil (Pescadero) | Gray, sticky, hard when dry, plants do not grow well |
| 3 Country Soil (Yolo) | Light brown, gritty, when powdery, many different crops are grown on this soil |

Answers will vary

Table 2: Stabilized pH

|  |  |
| --- | --- |
| Soil samples  | Ec (μS/cm) common unit deciSiemens per meter, **dS**/**m** = 1,000 μS/cm |
| 1 Garden Soil (Sycamore) | 117 |
| 2 College Soil (Pescadero) | 672 |
| 3 Country Soil (Yolo) | 102 |

Analysis & Questions

1. What effects do soils of high salinity have on plant growth? Why?

**The high salt concentration results in a movement of water out of the root cells into the saline soil in an attempt to establish an osmotic equilibrium. The plant becomes stressed, wilts, and eventually dies.**

1. Each plant type grows best within a certain range of pH values. What are some plants that will grow well in relatively acidic soils (pH 5.0 to 5.5)? What are some plants that will grow well in relatively alkaline soils (pH 7.5 to pH 8)?

**Some plants that grow well in relatively acid soils include blueberries, rhododendrons, strawberries, and potatoes. Some plants that grow well in relatively alkaline soils include beans, barley, and alfalfa.**

1. Which of the three soil types would be more efficient at neutralizing acid rain? Explain.

**Answers will vary, but students should choose the soil type that had the highest buffering capacity, since these buffering chemicals can neutralize acid.**