

Soil Science



Mid-Valley
STEM-CTE HUB



www.midvalleystem.org
midvalleystemctehub@linnbenton.edu
Linn-Benton Community College
Albany Campus - CC-212



Soil Science

The Soil Science Kit provides students with an opportunity to investigate one of Earth's most important natural resources through hands-on scientific inquiry. Using soil chemistry and texture testing tools, students collect and analyze soil samples to better understand the physical and chemical properties that support plant growth and ecosystem health. Students explore concepts such as pH, nutrient availability, soil composition, and land use while practicing authentic field and laboratory techniques used by environmental scientists, agronomists, and soil specialists. Designed for middle and high school learners, this kit supports investigations in earth science, environmental science, agriculture, and ecology.



Grade Level

6th - 12th

Group Size

Teams of 2

Time Duration

45–120 minutes for sampling and testing, with additional time for analysis or extended investigations.

Content of Kits

Components

- 1 Soil pH Testing Kit
- 1 NPK Soil Testing Kit
- 1 Soil Texture Testing Kit
- 1 Soil Texture Refill Kit
- 15 8 oz specimen jars
- 15 garden trowels



Usage

Getting Started

1. Inventory and Organize Materials

Begin by unpacking the kit and confirming that all testing supplies, specimen jars, trowels, and testing materials are present and in good condition. Organizing materials by student pairs before beginning investigations will improve efficiency during fieldwork and analysis.

2. Select Sampling Locations

Identify locations where students will collect soil samples. Consider selecting sites with different characteristics such as gardens, lawns, wooded areas, athletic fields, or disturbed soils to encourage comparison and analysis.

3. Review Sampling and Testing Procedures

Familiarize yourself with the pH, nutrient, and texture testing procedures before introducing the activities to students. Demonstrating proper collection and testing techniques will improve consistency and reliability in student data.

4. Prepare Data Collection Systems

Develop a method for students to record sample locations, observations, and test results. Data tables, field notebooks, or digital spreadsheets can help students organize information and support evidence-based conclusions.

Storage

- **Clean and Dry Equipment Before Storage**

After use, remove all soil residue from the trowels, specimen jars, and testing equipment. Allow all materials to dry completely before returning them to the kit to prevent corrosion, contamination, or damage to testing components.

- **Store Testing Materials in a Cool, Dry Location**

Keep the pH, nutrient, and texture testing supplies sealed and stored in a dry environment away from moisture and extreme temperatures. Proper storage helps maintain the accuracy and lifespan of testing materials.

Troubleshooting

- **Test Results Seem Inconsistent**

If results vary significantly between tests, ensure that soil samples are thoroughly mixed and that testing procedures are followed carefully. Running multiple tests from the same sample can help confirm results.

- **Soil Samples Are Difficult to Collect or Analyze**

If soil is extremely dry, compacted, or rocky, collect samples from several nearby locations and combine them for testing. Breaking apart large clumps before testing will improve consistency and accuracy.



Activity Guide

Beginner

Soil Detective

Students collect soil samples from different locations and investigate soil texture, color, and composition to determine how soils vary across environments.

Oregon Science Standards Alignment

MS-ESS2-1 & HS-ESS2-5

Procedure

1. Student pairs collect soil samples from multiple locations.
2. Observe and record soil color, texture, and visible materials.
3. Use the texture testing kit to classify soils as sandy, silty, clay-rich, or mixed.
4. Compare results between locations.
5. Discuss how soil characteristics may influence plant growth.

Intermediate

What Makes Healthy Soil?

Students investigate soil chemistry by testing pH and nutrient levels and evaluating how soil properties influence plant health and agricultural productivity.

Oregon Science Standards Alignment

MS-LS2-1 & HS-LS2-7

Procedure

1. Collect soil samples from several locations.
2. Measure pH and nutrient levels for each sample.
3. Record and compare results.
4. Research the soil requirements of different plants.
5. Determine which locations may be most suitable for agriculture or gardening.

Advanced

Soil and Land Use Investigation

Students investigate how land use practices influence soil health by comparing soils from agricultural, urban, forested, or landscaped environments.

Oregon Science Standards Alignment

- HS-ESS3-3 & HS-ESS3-4

Procedure

1. Collect soil samples from areas with different land uses.
2. Test texture, pH, and nutrient levels.
3. Compare results between sites.
4. Identify patterns related to land use practices.
5. Develop recommendations for improving soil health and sustainability.



Learning Extensions

STEAM Connections: Science

Learning Objectives:

- Investigate physical and chemical properties of soil, including texture, pH, and nutrient content.
- Collect, analyze, and interpret soil data using scientific tools and testing procedures.
- Explain how soil characteristics influence plant growth, ecosystem health, and agricultural productivity.
- Compare soil samples from different environments and identify patterns related to land use and environmental conditions.
- Develop evidence-based explanations about the interactions between soil, water, plants, and living organisms.
- Evaluate how human activities and land management practices impact soil health and sustainability.

Career Connections:

- **Soil Scientist** – Studies soil properties and how soils support ecosystems and agriculture.
- **Agronomist** – Investigates crop production and develops strategies for improving soil health and productivity.
- **Environmental Scientist** – Monitors environmental conditions and develops solutions to environmental challenges.
- **Conservation Scientist** – Works to protect natural resources and promote sustainable land management practices.
- **Geologist** – Studies Earth materials and the processes that shape landscapes and ecosystems.
- **Horticulturist** – Uses knowledge of soils and plant science to grow healthy plants and crops.
- **Natural Resource Specialist** – Helps manage forests, watersheds, and agricultural lands.

Essential Employability Skills:

- Data Literacy
- Critical Thinking
- Communication
- Collaboration
- Problem Solving
- Observation and Attention to Detail
- Environmental Stewardship





Resources and Accessibility

Safety Guidelines

- **Use Testing Materials Responsibly**

Students should follow all instructions when using pH and nutrient testing kits and avoid direct contact with testing reagents or solutions. Wash hands thoroughly after handling soil samples or testing materials.

- **Practice Safe Field Sampling**

When collecting soil samples outdoors, students should be aware of uneven ground, sharp objects, and potential environmental hazards. Garden trowels should be used carefully and pointed away from themselves and others during sampling.

Accessibility

- **Provide Multiple Ways to Participate**

Students can contribute by collecting soil samples, conducting tests, recording data, organizing materials, photographing samples, or analyzing results. Offering a variety of roles allows all students to participate meaningfully in investigations.

- **Use Multiple Methods of Observation and Data Collection**

Support learners with visual charts, color reference guides, verbal explanations, hands-on testing procedures, and collaborative discussions. Allowing students to communicate findings through writing, speaking, drawing, or digital tools helps make investigations accessible to diverse learners.

Library Catalog



Library Resources



Feedback

QR to feedback survey

