

Starting with Healthy Soil: Explore the Physical, Chemical, and Biological Properties of Your Soil

Physical properties:

Test the physical properties of the soil in your schoolyard, including **texture** and **soil moisture**.

Soil Texture

Different plant species require different soil textures in which to grow. Determine the texture of your soil by conducting a [ribbon test](#) or [jar test](#) with your students. The [soil texture pyramid](#) and [soil calculator](#) will help determine the quantities of sand, silt, and clay in your soil sample, guiding you towards your soil's texture type. Or you can [collect a soil sample](#) and send it to [Rutgers Soil Testing Lab](#) for analysis.



- **Clay** is fine-textured soil.
- **Silt** is medium-textured soil.
- **Sand** is coarse-textured soil.
- **Loam** is a mix of sand, silt, and clay.
- **Organic** soil contains a high percentage of organic matter, such as decaying leaves.

RESOURCES FOR LESSONS ABOUT SOIL TEXTURE

- [Landscape for Life: The Role of Soil in Sustainable Gardens – Soil Texture](#)
- [Soil Science Curriculum – Using Soil Textural Triangle](#)
- [Garden Lesson Plan: Soil](#) (UE)



Soil Moisture

Soil moisture is a physical property of soil. Different soil types can hold various amounts of water; this is called **soil moisture**. The amount of water that plants need to survive is stored in the soil. Different plant species require different amounts of water. Knowing the amount of moisture your soil holds will guide your selection of plants that prefer either dry, moist, or wet soil conditions. Use the definitions below to determine the overall soil moisture of your garden. You and your students can also [assess the soil moisture content by appearance and feel](#).

- **Dry soil:** water does not remain on the ground after a rain.
- **Moist soil:** soil is damp, and occasionally saturated.
- **Wet soil:** soil is saturated, except during drought.

RESOURCES FOR LESSONS ABOUT SOIL MOISTURE

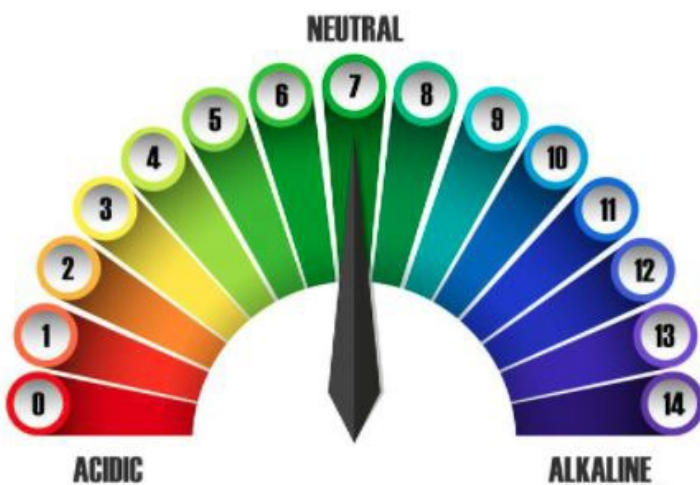
- [Learning Activity: Soil Moisture](#) (UE, MS)
- [Project WET: Dirt to Dinner](#) (UE, MS)
- [Project WET: The Breathing Boreal Forest](#) (MS, HS)

Chemical Properties:

Test the chemical properties of the soil in your Jersey-Friendly Schoolyard, including the **pH** and nutrient levels.

Soil pH

Determine your schoolyard soil's pH, which is a chemical property of soil. It is the measurement of the acidity or alkalinity of the soil. The pH scale ranges from 0 to 14. A pH of 7 is neutral, a pH less than 7 is acidic, and a pH greater than 7 is basic. Soil pH is important because it affects the availability of nutrients to the plants and the activity of soil microorganisms beneficial to plants.



Each plant species requires a certain soil pH in which to grow. Knowing the pH of the soil in your garden will guide your selection of plants that require either acidic, slightly acidic, neutral, alkaline, or very alkaline soil. Determine the pH of your soil by conducting a pH test with your students, or [collect a soil sample](#) and send it to [Rutgers Soil Testing Lab](#). Conduct the tests using soil collected in the area where you plan to install your Schoolyard garden.

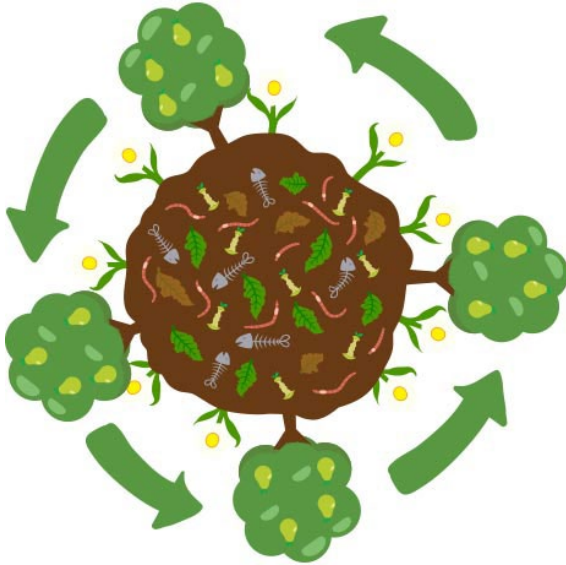
- **Acidic soil** is 6.0 and lower on the pH scale.
- **Slightly acidic soil** is between 6.1 – 6.5 on the pH scale.
- **Neutral soil** is between 6.6 – 7.3 on the pH scale.
- **Slightly alkaline soil** is 7.4 – 7.8 on the pH scale.
- **Alkaline soil** is 7.9 and higher on the pH scale.

RESOURCES FOR LESSONS ABOUT SOIL PH

- [USDA Soil Science Curriculum: Soil pH, What affects it, What it affects, Managing it, Testing it](#) (AG)
- [AgSTEM: 3 Simple Soil Lessons for Children \(composition, water retention, pH\)](#) (LE, UE)
- [Science North: Soil Acidity](#) (UE)
- [Edible Schoolyard: Soil pH](#) (MS)
- [Soil Testing 1, 2, 3: Nutrients and pH](#) (MS)
- [Agriculture in the Classroom: What's Your pH?](#) (HS)

Soil Nutrients

Plants derive their nutrients from the soil. The three macronutrients needed by all plants are nitrogen (N), phosphorus (P) and potassium (K). Since excessive amounts of nutrients can harm plants, it's important to get the soil tested to determine need before applying anything. To determine the types and quantities of nutrients in your schoolyard soil, you can send a soil sample to [Rutgers Soil Testing Lab](#) for analysis, or you and your students can test the soil for NPK using a classroom kit such as RapiTest.



RESOURCES FOR LESSONS ABOUT SOIL NUTRIENTS

- [Teacher's Guide: Soil, Food, Health](#) (AG)
- [University of Nebraska: Why is soil nutrition important in crop production??](#) (UE, MS, HS)
- [Kids Gardening: Lessons to Grow by – Plant Needs, Nutrients](#) (LE, UE)
- [Soil Testing 1, 2, 3: Nutrients and pH](#) (MS)
- [Fertilizers and the Environment](#) (MS)
- [Fertilizers and the Environment](#) (HS)
- [Agricultural Land Use: Impacts of Fertilizer](#) (HS)



Biological Properties:

"Slater bugs" by jeans_Photos, CC BY 2.0.

Healthy soil is full of life! Soil provides habitat for millions of organisms, hard at work under your feet. These underground organisms transfer energy to plants through their roots. Plants are primary producers which supply the energy to keep the above-ground food web cycling. Provide lessons to your students that introduce them to the **soil food web** and how these organisms **keep soil and plants healthy**.

RESOURCES FOR LESSONS ABOUT SOIL ORGANISMS

- [Field Guide to Soil Food Webs](#) (AG)
- [Kids Gardening – Soil is Alive!](#) (MS-HS)
- [Soil Science Society of America: Soil Food Web](#) (UE, MS, HS)

General Resources About Soil

- [Ocean County Soil Conservation District - Healthy Soil Resources](#)
- Invite a soil educator to your classroom. Contact Becky Laboy, Education Outreach Specialist, Ocean County Soil Conservation District at education@soildistrict.org or 609-991-1534.
- [Massachusetts Audubon – Digging into Soil](#) (PKK)
- [NRCS Soil Lesson Plans](#) (AG)
- [NRCS - Soil Food Web](#)
- [Rutgers NJAES Soil Management](#) (soil texture, pH, organic matter, plant nutrition, nitrogen in the soil, soil testing)
- [The Dirt on Soil](#) (LE, UE)
- [Pinelands Preservation Alliance – Up Close and Natural Curriculum](#) (AG); specifically:
[NJ Geology and Soils](#) (HS)
- [Rutgers Soil Testing Laboratory](#)
- [New Jersey Soil Health Assessment Guide](#)
- [“Kiss the Ground” Educational Movie, Lessons and Activities](#)
- [Pinelands Soil Unit](#) (UE)
- [Pinelands Soil Unit](#) (MS)