



ACTIVITY A

SOIL TYPES ACROSS THE USA

Time Frame: Two to three 45-minute sessions (plus several weeks observing seedlings/plant)

Learning Objectives:

- Identify different types of soil and learn about the composition of each.
- Experiment with growing seeds in different types of soil.
- Learn that different regions of the country have different types of soil, making them more or less suitable for cultivating certain types of crops.

Materials for activity:

- Samples of different types of soil — all 6 types if possible (sandy, silty, clay, loamy, peaty, chalky)*
- Copies of “The Feel Test” worksheet
- Copies of “Soils & Seeds” instruction and observation sheets
- Blindfolds (optional)
- Vegetable seeds (tomato, bean, kale, corn)
- Small seedling pots for planting (one per soil type)
- Craft sticks and black markers for labeling plants
- Large spoons or garden tools for digging

*Soil samples available online at the Ag Classroom Store: agclassroomstore.com/soil-samples-soil-texture/

Overview:

In this activity, students rely on touch and feel while guessing the soil type. Then they work as small groups to try to grow plants in these different soils, making hypotheses about which type will yield more vegetables and how long it will take to sprout.

Connections:

- “What’s In Your Soil?” lesson plan | Farmer’s Spotlight, TogetherCounts.com
- Lesson B. What’s the Soil Type?

If you have completed the above, you may skip Part One activities and go straight to Part Two.

Part One

Teacher Preparation:

Set up “touch and observation” stations with a different soil type at each station. You may wish to break up samples into smaller amounts so that multiple students can make observations at the same time. For an extra challenge, you may wish to supply a handful of blindfolds and have students wear them while touching the samples. Put copies of “The Feel Test” worksheet at each station.

Familiarize yourself with the appearance and characteristics of each soil type in advance. Watch this video to see a demonstration if you like: [Soil Texture By Feel](#).

A. Introduction

1. Ask students if they know what the three basic types of soil are. After they give their answers, briefly describe them.
 - a. There are three basic categories of soil: sand, silt and clay. But, most soils are composed of a combination of the different types.
 - b. Clay particles are the smallest, while sand particles are the largest.
 - c. Sand doesn't hold water. Clay holds the most. Silt is somewhere in the middle.
 - d. Loam is the ideal type of soil for most farming. It provides all the necessary elements to grow many crops. It contains a balance of all three soil materials —silt, sand and clay — plus humus (dark, organic material that forms from decayed plant and animal matter). It has a higher pH and calcium levels due to its rich organic matter.
2. Referring to the reference information on the “The Feel Test” Worksheet and Reference, give a brief introduction to the six soil types.
 - Sandy
 - Silty
 - Clay
 - Loamy
 - Peaty
 - Chalky

B. “Texture and Feel” Soil I.D. Activity

Instructions:

1. Review the six soil types and tell students that they are now going to use their own sense of touch to try and identify different soil samples. You may need to go over some of the descriptors to make sure they understand what they are looking for.
2. Divide students into six groups so that they can rotate around the different stations.
3. Give each student “The Feel Test” sheet and instruct them on how to fill it out.
4. Each group will then go to a different table and begin making their observations. This should take only 2-3 minutes per table. Rotate groups until they have tested every soil sample.
5. Bring groups together to share guesses.
6. Reveal the soil types and allow students to compare their guesses.
7. Finally, ask students: Where in the U.S. do you think each of these soil types might be most common? They should explain their reasoning. (Note these hypotheses on the board. See the Teacher Reference section at the end of this lesson if you'd like ideas for prompting students.)

Part Two

Soils & Seeds Experiment

Instructions:

1. Divide the class into small groups, depending on the number of soil types you have available. Give each group a different type of soil and a pot. Give all the groups a few seeds of the same relatively stable crop (beans and peas are good options).
2. Have students record their soil type, seed type and light conditions. Ask if they can think of any other initial observations that might be important?
3. Working in small groups, students should come up with a hypothesis about a) how long they think the plant will take to sprout and b) the size, condition and color of the plant. Keep in mind that both beans and peas will take 6–8 weeks to bear fruit.
4. Tell students to read the watering instructions on the seed packet. Remind them they are responsible for watering their plant! They should be sure to measure the amount of water each time. Ask, “How will you keep track of when it’s watered? Who will take turns?” Have them collaborate to develop a plan.
5. Instruct students to record their daily observations with dated, detailed notes.

[Several weeks of observation. You may wish to add one of the Extensions below, or a lesson based on the resources listed, during this time to reinforce learning.]

6. After the plants have sprouted, or enough time has elapsed with no significant changes, report back to the class on what happened. Was your hypothesis correct or not? What factors do you think influenced your plant’s growth?

Extensions:

How Can You Improve Soil?

Challenge students to brainstorm ways to improve the growing conditions for their plants. (This may include combining different soil types and/or adding compost to their soil mixtures. See the Teacher Reference section below for ideas.) They should begin by doing research into the optimal soil types for their seeds, including ratios of soil components. When their initial “Soils & Seeds” experiment is complete, they might want to do an extra experiment by planting the same seeds in their new and improved soil.

Explore Soil Types Across the U.S.A.

[What Is Your State Soil?](#) | NRCS

You’ve heard of state birds, state flowers and state flags... Did you know you have a state soil as well? Click on this link to learn more. Write some notes about your soil:

- What is the name of your state soil?
- What is the main soil type?
- Is there one outstanding characteristic of the soil?
- Is the soil well suited for cultivating crops? If so, which kinds?

Use the “What’s Your State Soil?” worksheet (see the Worksheets & Downloads section at the end of this lesson) if you like.

[Dig Deeper: State Soils Booklets](#) | Soils 4 Teachers

This resource provides more detailed information for deeper research. What are other factors that would affect growing? Climate, vegetation, landforms, rocks, waterways, etc.? Delve deeper to investigate these factors and other, such as acidity, permeability and water capacity.

[Take a Virtual Road Trip](#) | Smithsonian National Museum of Natural History

Explore the State Soil Interactive feature. Select a postcard and take a journey from state to state to discover the range of different soil types across the country.

Teacher Reference:

[General Soils and Soil Texture](#) – Grades 5-8 | Soils4Teachers

[Soils and Plant Growth](#) – Grades 5-8 | Soils4Teachers

[Soil Quality Information](#) | Penn State Extension

What is healthy soil and how do we achieve it?

[USDA Map: Farm Resource Regions](#)

[State Agriculture Facts](#) | National Agriculture in the Classroom

See “Soil & Climate” facts for each state.

[Map of the U.S. Showing Dominant Soil Orders](#) | University of Idaho

[Maps of Soil Composition Across the U.S.](#) | NASA

The proportion of sand, silt and clay contained in soil across the U.S. affects the amount of water it can hold. Farmers and gardeners are particularly interested in soil composition because it affects the amount of water stored in the soil that is available to plants, or the “available water capacity.” Soils with more sand tend to drain water faster than soils with more clay, while soils with more silt tend to have intermediate drainage properties.

[Soil Types of North America](#)

[Soils of the Western U.S.](#)

[Soils of the Northwest Central U.S.](#)

[Soils of the Midwestern U.S.](#)

[Soils of the Southwestern U.S.](#)

[Soils of the South Central U.S.](#)

[Soils of the Southeastern U.S.](#)

(Unavailable for Northeastern U.S.)

Worksheets & Downloads:

“Feel Test” Reference Sheet – Soil Types & Characteristics

<p>Clay</p> <p>Feels slightly sticky Rolls up into a ball when moist Feels slimy when wet, smooth when dry Lumpy and dense (heavy) Hard as a rock when dry Pros: Holds more nutrients than many soils (if properly irrigated) Cons: Few air spaces, drains poorly</p>	<p>Peaty</p> <p>Feels spongy Does not form a ball when moist Dark brown or black color Rich in organic matter Pros: Protects roots during very wet months, holds water during dry months Cons: Can get very dry in summer</p>
<p>Sandy</p> <p>Feels gritty Does not form a ball when moist Crumbly when moist Drains freely Pros: Easy to cultivate, warms quickly in spring Cons: Dries out quickly, nutrients easily washed out of soil</p>	<p>Chalky</p> <p>Usually stony Solid, soft rock, breaks down easily Alkaline, with a pH of 7.5 or more Pros: Fertile and drains freely Cons: Lacking in some minerals, holds little water and dries out easily</p>
<p>Silty</p> <p>Feels smooth and soapy Forms a ball when moist but crumbles Heavier than sand Retains moisture Richer in nutrients (more fertile) than sandy soil Easier to cultivate than clay Pros: A very good soil if well managed Cons: Soil structure is weak and easily compacted</p>	<p>Loamy</p> <p>Feels smooth but slightly gritty Forms a slightly sticky ball when moist but crumbles easily Good structure Drains well but retains moisture Pros: Full of nutrients, easy to cultivate Cons: Prone to erosion</p>

“Feel Test” Worksheet

Instructions:

1. Record your observations for each soil sample. Focus your observation mostly on texture.
2. Then, using the attached reference sheet, make a guess at what type of soil each sample is.
3. After the soil types are revealed, record and compare to your guess.

	Observations	Soil Type Guess	Actual Soil Type
Sample #1			
Sample #2			
Sample #3			
Sample #4			
Sample #5			
Sample #6			

“Soils & Seeds” Experiment – Instruction Sheet

1. On each observation sheet, record the soil and seed type.
2. Also record your hypothesis about how the soil type will affect the growth of the seed type. Do this on each sheet.
3. Each day, record your observations for each seed sample. These observations will include:
 - a. weather and light conditions (sunny, partly cloudy, cloudy, etc.)
 - b. measurements (height in cm)
 - c. general observations (color, plant condition, soil changes, leaf shape, etc.)
4. To ensure that the plants are watered each day, come up with a plan for who will do the watering and when.
5. After the experiment has been completed, reflect on whether or not your hypothesis was correct.

Hypothesis: _____

Reflection on hypothesis: _____

“Soils & Seeds” Experiment – Observation Sheet

Soil Type: _____ Seed Type: _____

	Weather & Light Conditions	Measurements	Observations
Day 1			
Day 2			
Day 3			
Day 4			
Day 5			
Day 6			
Day 7			
Day 8			
Day 9			
Day 10			
Day 11			
Day 12			
Day 13			
Day 14			
Day 15			

What's Your State Soil?

Name of Your State: _____

Name of Your State Soil: _____

Soil Profile:	<i>Color Your State Soil Layers</i>
Surface layer	
Soil type:	
Characteristics (color, texture, etc.):	
Subsoil	-----
Soil type:	
Characteristics (color, texture, etc.):	
Substratum	-----
Soil type:	
Characteristics (color, texture, etc.):	
NOTES	
Main crops grown:	
Reason soil is good/not good for growing crops:	
Other:	