
Soil Texture Feel Test

Activity Overview

Students collect soil samples and classify soil texture using a soil texture feel test key.

Objectives

Students will:

- Manipulate and feel soil to classify soils by texture using a key
- Understand the relationship between soil particle size and plant
- Growth and water

Subjects Covered

Science

Grades

K through 12

Activity Time

1 hour

Season

Any

Materials

Soil samples, spray bottles of water, paper toweling, Key to Soil Texture by Feel.

State Standards

Science:

Ask questions, plan investigations, make observations, predictions (C.4.2)

Select multiple information sources (C.4.3)

Use scientific equipment (C.4.4)

Use data to answer questions (C.4.5)

Support conclusions with logic (C.4.7)

Ask new questions (C.4.8)

Identify questions using available resources (C.8.1)

Identify data and sources to answer questions (C.8.2)

Use inferences and observations (C.8.4)

Use knowledge, models, and theories to explain results (C.8.5)

Explain data & conclusions (C.8.7)

Background

Soil is made up of three particle sizes—sand, silt, and clay. Sand is the largest particle (0.05 to 2 mm diameter); silt is intermediate (0.05 to 0.002 mm); and clay is the smallest (less than 0.002 mm). Soils have different textures depending upon the proportions of sand, silt, or clay particles in the soil. A soil texture is graded into 14 texture classes such as sand, sandy loam, silty clay loam, loam, sandy clay, or clay. Sandy soil is any mix with over 90% sand; sandy loam is 70% sand, 15% silt, and 15% clay; clay soil is 50% clay, 25% silt, and 25 % sand; heavy clay is any mix with over 60% clay.

The texture of the soil influences the moisture holding capacity of soil, the drainage rate, and the soil's ability to hold nutrients. Coarse, sandy soils drain water quickly and are poor storehouses of nutrients. Plants must be able to tolerate droughty conditions in most sandy soils. In clay soils water drains slowly; as a result, soil remains wet for long periods and often root development is hindered. Plants growing in clay must be able to tolerate long periods of excessive moisture with low oxygen conditions or to endure dry, hard soil. The medium texture of silt-sized particles creates a loamy soil that is well drained and holds nutrients. It is ideal for most plant growth. Consequently, different soils support different plant species or communities. Determining the soil texture of your restoration plot is one of the informational tools for assessing which community type the soil will sustain.

Soils can be classified into texture classes by the way they feel and respond to handling. Sand feels gritty and the grains do not stick together when squeezed. Silt feels velvety or flour-like when dry and forms a weak ribbon when wet. Pulverized dry clay feels smooth; aggregates and clods are very hard and difficult to crush by hand. Wet clay feels sticky or very smooth and satin-like when rubbed and forms a long, flexible ribbon.

Activity Description

Collect soil samples from different areas around the school grounds. Collect 1 and 1/2 cups of soil per sample for your classroom.

The following soil texture feel test using a key will help you classify your soil. Step-by-step directions are written on the key.

Extensions

- Soil textures vary from one horizon (soil layer) to the next; therefore, try to determine the texture in each of the A, B, and C horizons. Learning the soil texture of each horizon will help you assess the soil's permeability at different levels. In some soils, the water drains quickly in the topsoil but drains poorly in subsoil. In this example, plant/community selection

Soil Texture Feel Test (cont.)

Evaluate questions, hypotheses, conclusions (C.8.9)

Discuss results (C.8.10)

Identify further questions (C.8.11)

Ask questions, build hypotheses, design investigations (C.12.1)

Identify issues, questions, research; design & conduct investigations (C.12.2)

Evaluate data (C.12.3)

Use explanations & models to describe results (C.12.5)

Present results (C.12.6)

Understand physical properties of objects (D.4.1)

Group/classify objects based on properties (D.4.2)

Use rocks, minerals, and soils vocabulary (E.4.1)

Identify different physical & chemical properties of earth materials (E.4.2)

Use earth and space science vocabulary (E.4.3)

Describe changes on the earth's surface (E.8.3)

Analyze influence of living organisms on earth's systems (E.8.4)

Find connections among living and non-living things (F.4.4)

would be modified due to the change in soil texture. See Earth Partnership for Schools activity “Soil Profile Investigations” for more information about soil horizons.

- Classify and compare soil textures from different plant communities such as restored prairies, remnant prairies, woodlands, old fields, and lawns.
- Take soil samples in the schoolyard and send samples to a soil testing lab for professional testing and analysis. If you live in Wisconsin, soil testing is available through the UW Soil & Plant Analysis Lab. Go to the Website at <http://uwlabs.soils.wisc.edu/madison/> for sample collection directions and testing information.
- Classify and compare soil texture at different locations on a slope or in eroded areas. Which particles collect at the base of the slope or remain on top? Which particles erode first? Is the pattern similar to particle movement on a slope? Can you predict which soils are more susceptible to erosion?
- See Earth Partnership for Schools activity in the Rain Garden Curricular Sampler, “Identifying Your Soil for Rain Gardens.”

Additional Resources

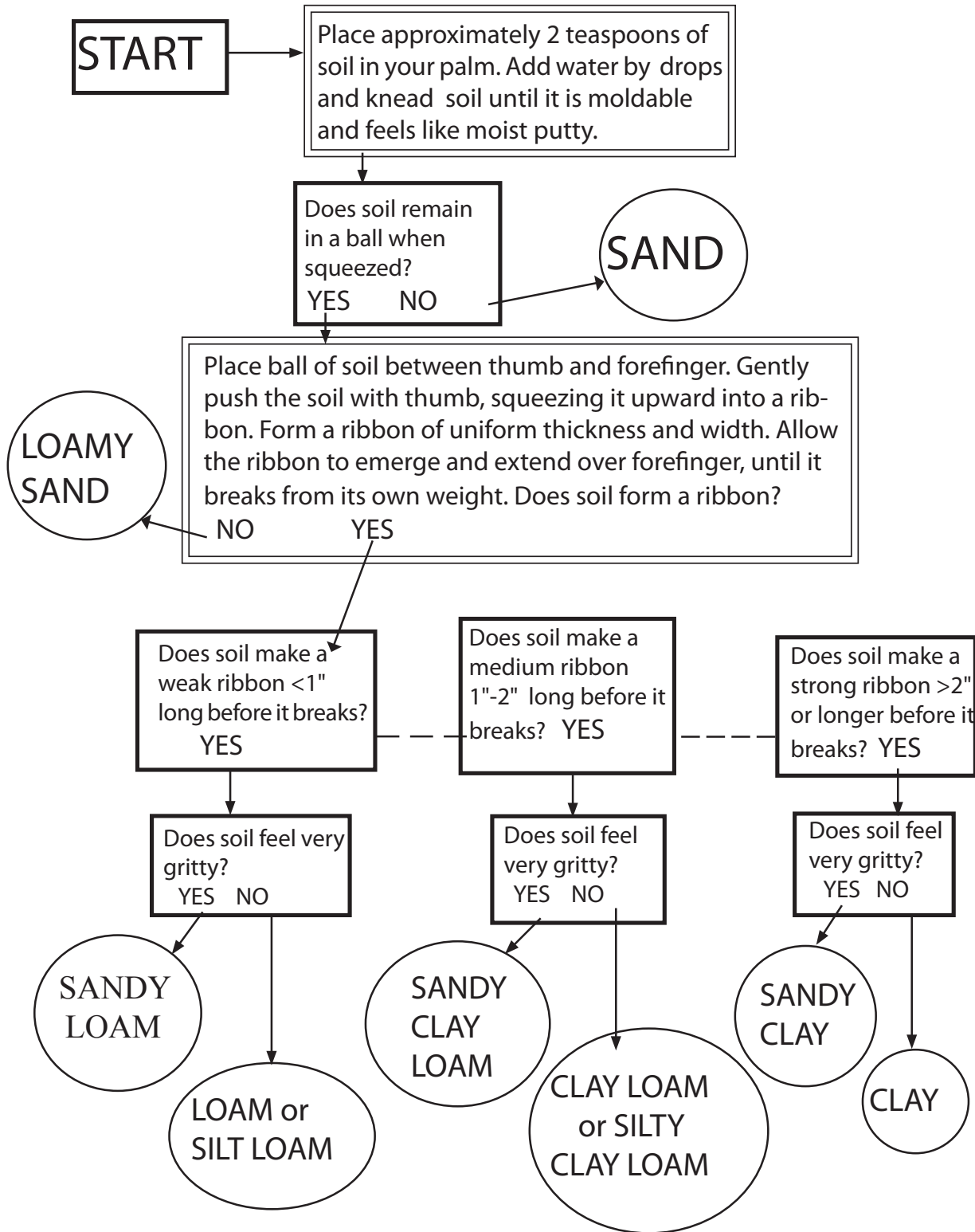
- Hausenbuiller, R.L. (1972). *Soil science: Principals and practices*. Dubuque, Iowa: WM. C. Brown Company Publishers.
- Clymire O. *A child's place in the environment series: Unit 2 protecting the soil*. Lakeport, CA: Lake County Office of Education and Konocti Unified School District. <http://www.acpe.lake.k12.ca.us/>
- Soil Science Society of America's comprehensive website has a wealth of resources, lessons and links. <https://www.soils.org/lessons/resources/>

Assessments

- Explain how soil is classified and two to three properties of each soil textural type.
- Explain the relationship between soil particle size and plant growth and water.
- Determine the soil texture of three soil samples.

Key to Soil Texture by Feel Handout

Begin at the place marked "start" and follow the flow chart by answering the questions, until you identify the soil sample. Please note that soils having a high organic matter content may feel smoother (siltier) than they actually are.



Source: Adapted from WOW!: The Wonders of Wetlands, Environmental Concern Inc.