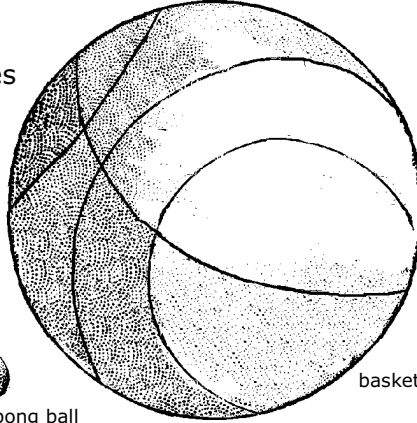


SOIL TEXTURE Science Page

SOIL PARTICLES

Soil is made up of particles of rock that have broken down over time. These particles vary in size. They are classified into three sizes—sand, silt and clay. Soil texture is a measure of how much sand, silt, and clay a soil contains.

Soil texture is important because it determines how fast water drains through a soil. It also determines how much water a soil can hold, and can be used by plants.



If a large clay particle were the size of a pea, then a silt particle would be as big as a ping pong ball or bigger, and a grain of sand would be the size of a basketball or bigger.



CLAY

Clay is less than 0.002 mm in diameter. Clay particles are extremely small, and can be seen only through an electron microscope.



Clay feels sticky when wet. It easily forms into a ball and a ribbon at least 5 cm long.

Water drains very slowly through clay soil. Therefore, clay soil remains saturated after a heavy rain. When this happens, there is little air in the soil, and plant roots cannot find oxygen. Clay soils can be difficult for gardeners to plant in.

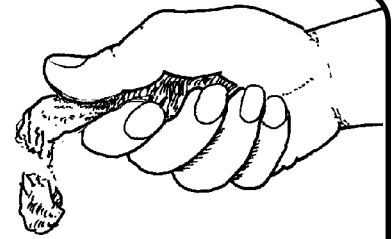
This clay soil is too wet. It's as sticky as gum!

This dry clay is as hard as concrete!



SILT

Silt is 0.002-0.05 mm in diameter. You can see silt particles only through a microscope.



Silt feels like flour.

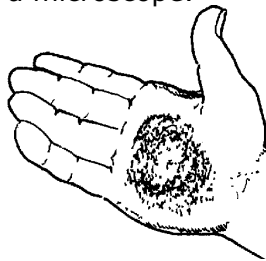
It forms into a ball that easily breaks apart. If you squeeze it between your thumb and fingers, it will not form ribbons.

SAND

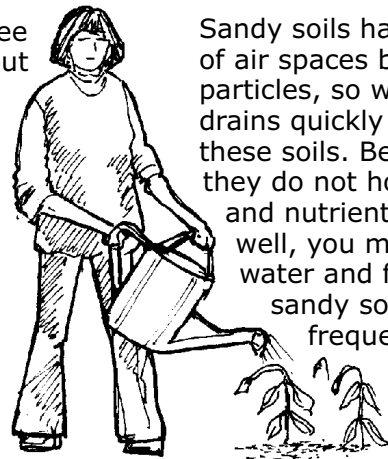
Sand is the largest size rock particle in soil—0.05-2 mm in diameter. You can see sand particles without a microscope.

No matter how much I water, these plants keep wilting!

Sandy soils have lots of air spaces between particles, so water drains quickly through these soils. Because they do not hold water and nutrients very well, you must water and fertilize sandy soils frequently.



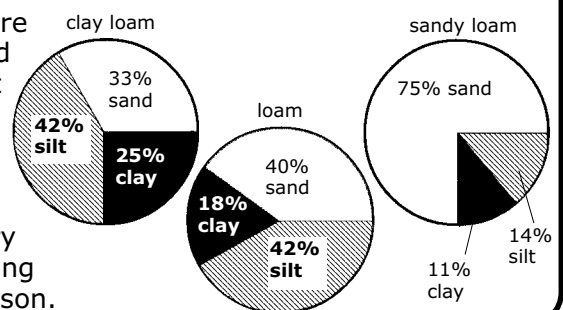
Sand feels gritty. You cannot make wet sand form a ball that holds together.



LOAM

Loam is a mixture of sand, silt, and clay particles. It is ideal for gardeners. Usually loam is easy to dig, and is neither too dry nor too wet during the growing season.

Composition of different types of loam soils





PUZZLE

Look at the pie graphs on the front of this page. They show the composition of different types of loam soils.

1. Which soil would form into the longest ribbon? _____ The shortest ribbon? _____
2. Which soil would feel the grittiest? _____ the stickiest? _____
3. Water would drain through which soil the fastest? _____ the slowest? _____
4. Which soil would hold the most water? _____ the least water? _____



TRY THIS!

Here are two simple methods for testing the texture of your soil.

1. Soil texture by feel

1. Take a small handful of soil, about the size of an egg.
2. The soil should feel as moist as a wrung out sponge. You should not be able to squeeze any water out of it. Spray with water if it is dry. Add more dry soil if it gets too wet.
3. Form the soil into a ball. Squeeze the soil between your thumb and forefinger. Gently push forward with your thumb to form a ribbon. Measure the length of the ribbon in centimeters.
4. Look at the chart on this page. Based on your results, what is the texture of your soil?

2. Soil texture by settling

1. Fill a liter-size jar 2/3 with water. Add soil until the water level is nearly to the top of the jar.
2. Put the top on the jar and shake vigorously. Set the jar on a level surface and wait for the particles to settle. The smallest particles may take several days to settle.
3. Observe the distinct layers of soil that settle in the jar. Are some layers thicker than others? What kinds of particles make up these layers?



SPOTLIGHT ON RESEARCH

Farmers in different parts of the world use soil texture to decide what crops to grow

All over the world, farmers have their own ways of classifying soils. In Burkina Faso, for example, farmers classify soils by texture and by how suitable they are for different crops. A sandy soil called Bflisri is suitable for growing peanuts. A loamy soil called Bfloogo is suitable for both red and white sorghum. Soil scientists recognize that they can learn from local farmers about classifying soils.

Source: Dialla, B.E. (1992). *The adaption of soil conservation practices in Burkina Faso: the role of indigenous knowledge, social structure and institutional support*. PhD dissertation. Iowa State University, Ames.



RIDDLE

What did the clay soil say when the sun came out?

Answer: "You crack me up!"

Soil Texture	How It Feels	How It Handles
sand	gritty; does not stain fingers	does not form a ball
loamy sand	gritty, stains fingers	forms weak ball that breaks easily
sandy loam	gritty	forms ball that does not break when handled carefully
loam	gritty	forms ball that does not break when handled carefully; forms ribbon 0.6-1.2 cm; does not show fingerprint when pressed
silt loam	feels like flour when moist and sticky when wet	forms ball that can be handled without breaking; will not ribbon
sandy clay loam	gritty	forms firm ball; forms ribbon 1.8-2.5 cm long
silty clay loam	sticky	forms ribbon 2.5-5 cm long; shows fingerprint when pressed
clay loam	sticky	forms ribbon 2.5-5 cm long; produces sheen when rubbed with thumbnail
sandy clay	plastic, gritty, and sticky	forms firm ball; forms ribbon more than 5 cm long
silty clay	plastic, sticky, not gritty	forms firm ball; forms ribbon more than 5 cm long
clay	sticky and plastic	forms strong ball; forms ribbon more than 5 cm long; very shiny when rubbed with thumbnail