LANDSCAPE FOR LIFE™

Based on the principles of the Sustainable Sites Initiative™

Student's Manual

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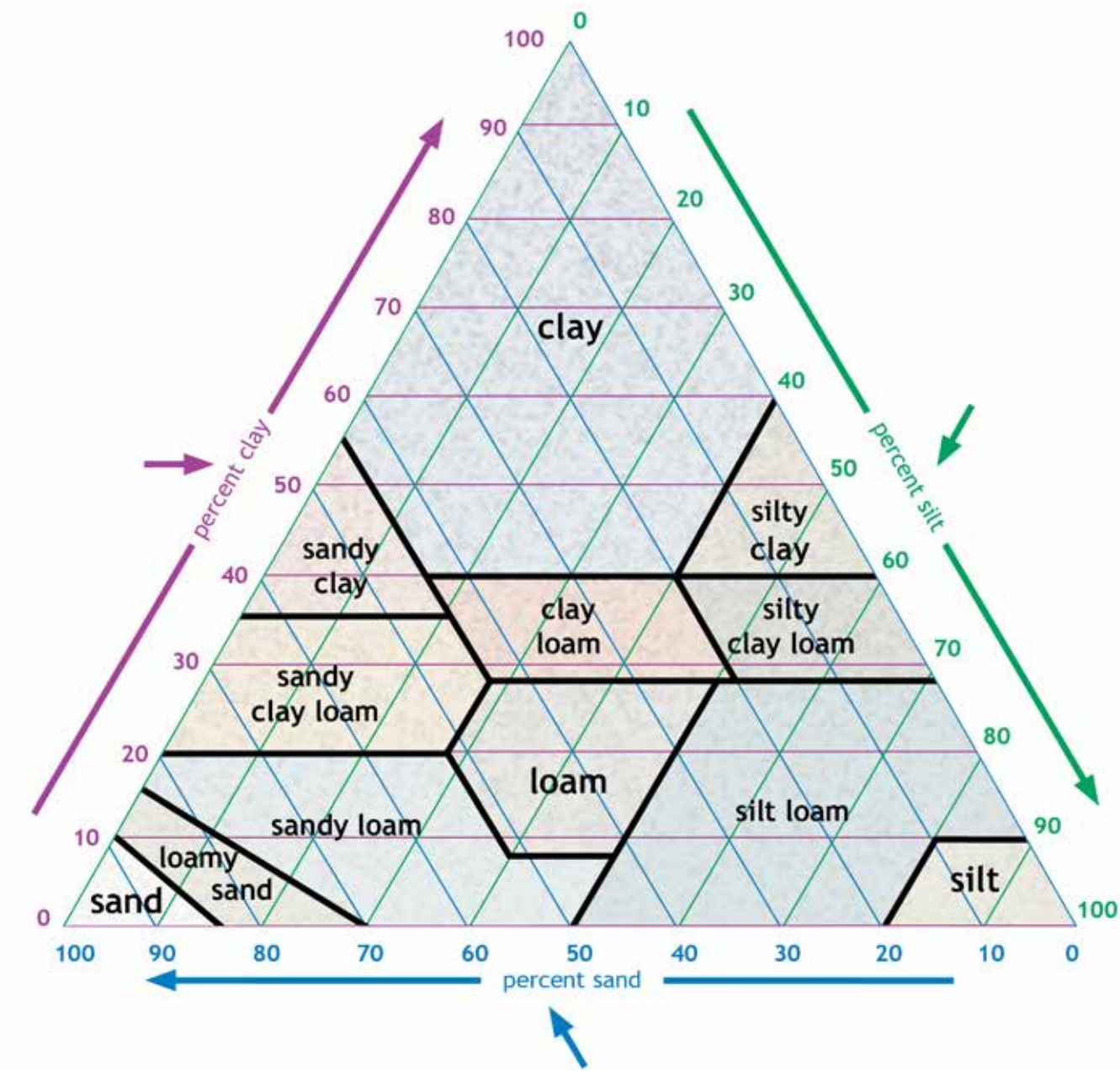
United States Botanic Garden

Lady Bird Johnson Wildflower center
THE UNIVERSITY OF TEXAS AT AUSTIN

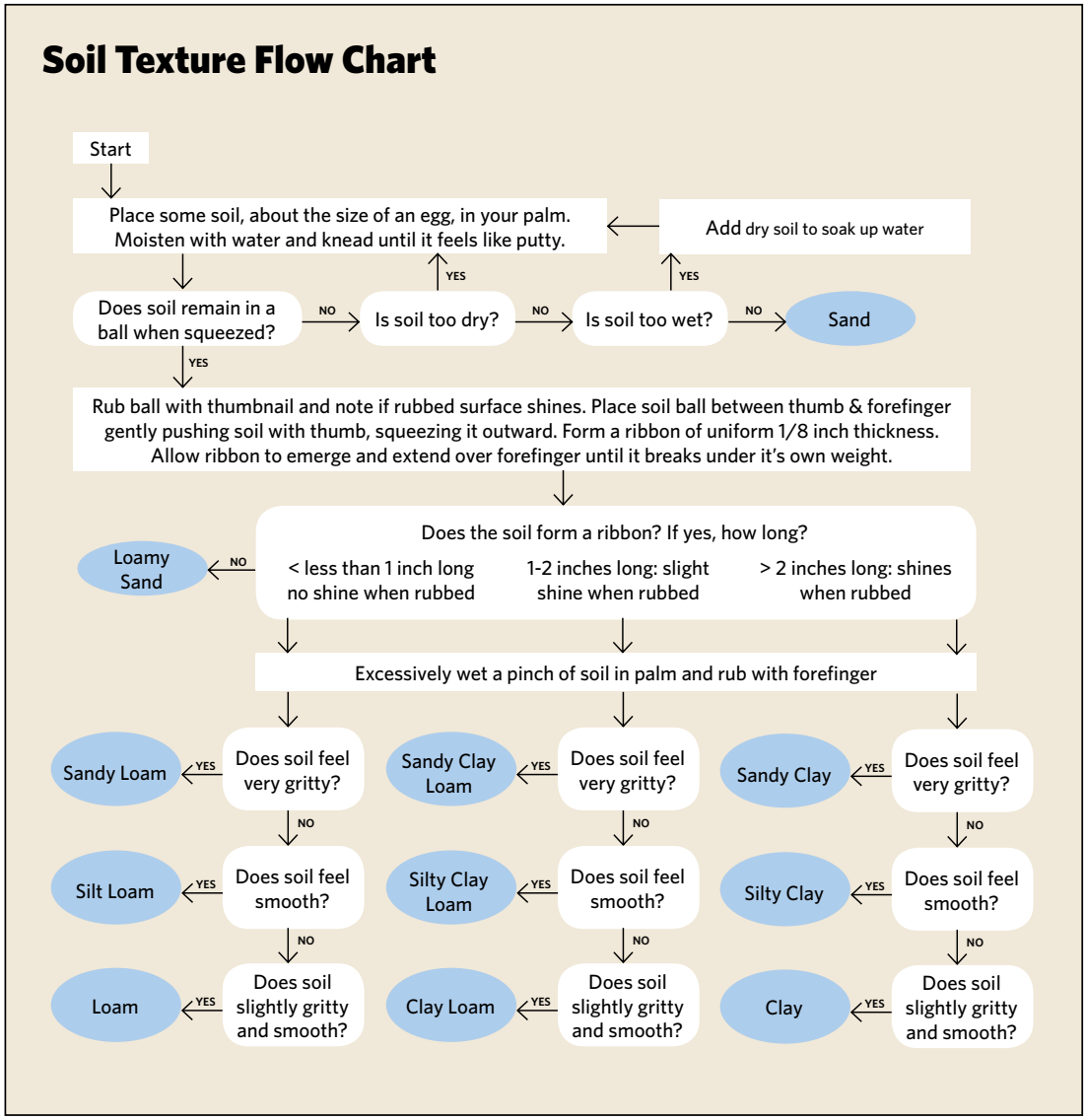
Soil Texture Triangle



Scientists divide soil into 12 textural classes. The soil texture triangle can help determine which class of soil you have.

- *After conducting the jar test to determine the percentages of sand, silt, and clay in your soil, locate the percentage of clay in your soil on the left side of the triangle and follow the purple (clay) line across.*
- *Next, find the percentage of sand along the bottom of the triangle and follow the blue (sand) line up to where it intersects with the purple (clay) line you identified.*
- *The green (silt) line at this intersection represents the percentage of the silt in your soil sample. The shaded area that contains the point where the lines intersect is you soil's textural class.*

The soil texture flow chart is a basic tool that can help determine soil texture.



Soils are rarely pure sand, silt, or clay but rather a mixture of all three. Based on the relative proportions of these particles, they are grouped into 1 of 12 textural classes that compose the soil texture triangle (See Page 20 or Appendix 3). Sands and loamy sands, for example, are more than 70 percent sand and share the characteristics of sand. Clays, sandy clays, and silty clays are more than 40 percent clay and exhibit the characteristics of clay. **Loams**, commonly celebrated in gardening literature, share the attributes of several soil types—good aeration, drainage, moisture, and nutrient retention. Use the soil texture triangle to determine soil type.

Testing Soil Texture—Understanding and testing your soil texture is a critically important step in plant selection. Often we do not need to significantly alter or amend the soil if we match our plants to the existing soil texture. Sandy soils, which lose water and nutrients relatively quickly, will require plants that are more **adapted** to living in dry, nutrient-poor soils. Clay soils, which tend to retain water, often require plants that can withstand wet or flooded soil conditions. You can achieve a better understanding of your soil texture by performing a few simple tests at home. To gain a basic sense of soil texture, begin by

feeling and squeezing a handful of moist soil in or near your garden. Soil dominated by sand will tend to feel gritty, falling apart when shaped into a ball. Silty soils are composed of slightly smaller particles than sand giving them a smooth, velvety feel. Clay soils contain small particles that group together readily, contributing to its sticky feel and ability to hold together when shaped into a ball (See Page 21 or Appendix 3). Depending on your needs, a jar test can help you achieve a more exact measurement of type of particles that compose the soil. Instructions for performing each of these tests can be found below.

Determining soil texture and structure

Activity

In this activity you will learn different techniques to determine the texture and structure of garden soils.

I. The Jar Test

Supplies:

- ☐ **Water**
- ☐ **2 cups of soil**
- ☐ **Wet paper towels or wash rag**
- ☐ **Quart-sized jar with lid**
- ☐ **1 teaspoon of liquid dish soap**

How to conduct the jar test

After removing stones or debris, place 2 cups of garden soil in a quart-sized jar. Add 1 teaspoon of liquid dish soap. Fill the jar to the top with water and close the lid tightly. Gently turn the jar upside down right-side up for about a minute to mix. Let it sit for a day so the particles can settle out.

Calculate the percentages of sand, silt, and clay in the jar. The position of sand, silt, and clay are dependent on the size and weight of each of the particle types. Sand should sink to the bottom of the jar due to its relatively large size. In addition to its position, the sand layer is typically lighter in color than the silt or clay soil layers. Silt, being the middle-sized particle, is found between the sand and clay layer. The clay layer, with the smallest sized particles, is found at the very top of the soil layers.

After identifying each of the soil types in the jar, place a ruler against the outside to measure the 1) total amount of soil in the jar in centimeters and 2) the amount of each soil type in centimeters. The final percentage of sand, silt, and clay can be

found by dividing each of the soil types by the total amount of soil in the jar and then multiplying by 100.

Percent of sand = (amount of sand in cm/ total amount of soil in cm) × 100

Percent of silt = (amount of silt in cm/ total amount of soil in cm) × 100

Percent of clay = (amount of clay in cm/ total amount of soil in cm) × 100

Compare each of these percentages to the soil texture triangle on page 20 to determine the texture class. First, locate the percentage of clay in their soil on the left side of the triangle and follow the purple line across. Next, find the percentage of sand along the bottom of the triangle and follow the blue line up to where it intersects with the purple line. The green line at this intersection represents the percentage of silt in the soil sample. The shaded area that contains the point where the lines intersect is the soil's textural class.

II. Additional Tests

The Feel Test—Rub a small amount of moist soil between your fingers. If it feels coarse and gritty, the soil is probably dominated by sand. If it feels smooth and velvety, it is most likely a silt soil. If the soil clings together and feels sticky, it probably is largely composed of clay.

The Squeeze Test—Squeeze a moist soil sample in your hand and examine it closely. If soil clods resist crumbling and do not change shape when squeezed, you are likely working with a heavy clay soil. If clods break apart into individual particles, like cake mix, the soil probably is predominantly sand. Loam soils tend to stay together when squeezed, but unlike heavy clay soils, they change shape easily.

Soil structure can be related to other factors besides particle composition. For example, big clods may also be an indication of compaction, even in soils with relatively little clay. Sterile loam soils, in which natural microbial action has been impaired, are unable to form even small aggregates.

The Ribbon Test—Squeeze a moist ball of soil out between your thumb and fingers. If the ribbon that is formed easily breaks and is less than 1" you likely have a sandy soil. If the formed ribbon is between 1-2" your soil is likely composed of silt particles. Finally, if the ribbon holds together and is greater than 2" before breaking, your soil has a high concentration of fine-texture clay particles.

The soil texture flow chart on page 21 provides a series of questions that may guide you through the soil tests described above.