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SOIL TEXTURE ANALYSIS “THE JAR TEST”

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Soil is a medium comprised of soil particles, organic matter, water, air and living organisms, all of which are important to the overall health of the soil and the plants that grow in it. The three primary soil particles are sand, silt, and clay. The relative percentages of these components present make up the soil’s texture. Texture is important to overall soil and plant health as it relates to soil porosity, which refers to the pore spaces where air and water reside.

The ideal soil texture is a mix of sand, silt, and clay particles, known as a loam. In most cases the particles will not be balanced, and the soil will need to be altered by adding organic amendments. To evaluate soil texture, use a simple jar test to determine the percentages of sand silt, and clay. Once the percentages are calculated, the soil textural triangle can be used to determine the soil type.

Soil Texture Analysis “The Jar Test” Procedure

Materials:

- Straight edged, clear jar
- Permanent marker
- Ruler
- Watch or stop watch
- 1 tablespoon of powdered dishwashing detergent
- Mesh sieve or old colander

Procedure:



Jar filled a $\frac{1}{3}$ of the way full with soil.
Andrew Jeffers, ©2018, Clemson Extension

1. Using a mesh sieve or old colander, sift the soil to remove any debris, rocks, and large organic matter (leaves, sticks, roots, etc.).
2. Fill the jar $\frac{1}{3}$ full of the soil to be tested



Jar filled with water, leaving space at top.
Andrew "Drew" Jeffers, ©2018, Clemson Extension



Jar showing the coarse sand layer settled at the bottom of the jar.
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Jar showing the silt layer.
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Jar showing the clay layer.
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3. Fill the remainder of the jar with clean water, but leave some space at the top.

4. Add 1 tablespoon of powdered dishwashing detergent

5. Cap the jar and shake vigorously until the soil turns into a uniform slurry.

6. Set on a level surface and time for one minute.

7. Place a mark the outside of the jar, showing the coarse sand layer settled at the bottom of the jar.

8. Leave the jar in a level spot for 2 hours.

9. Mark the top of the next settled layer with the permanent marker. This is the silt layer.

10. Leave the jar on a level spot for 48 hours.

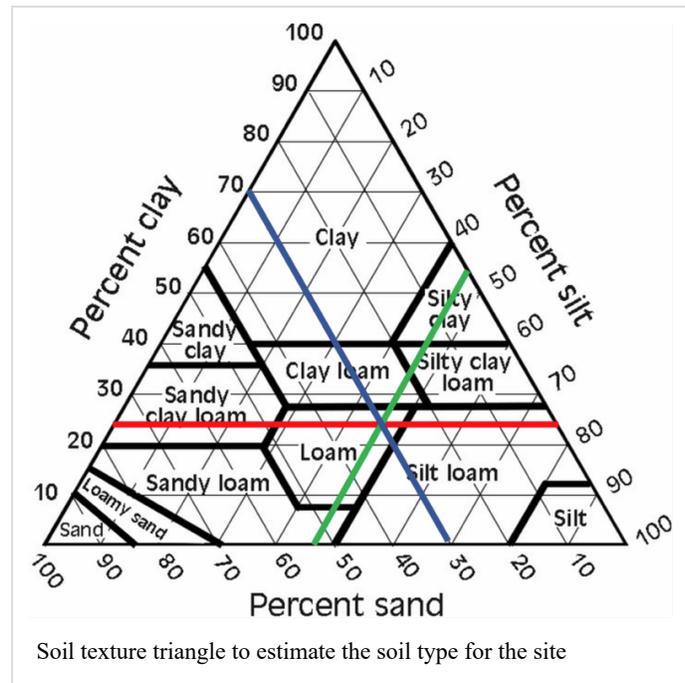
11. Mark the top of the next settled layer with the permanent marker. This is the clay layer that has settled on top of the silt layer.



Using a ruler, measure and record the height of each layer, and the total height of all three layers.
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12. Using a ruler, measure and record the height of each layer, and the total height of all three layers. Use the soil texture analysis worksheet below to record results.

1. Use the soil texture triangle to estimate the soil type for the site.
2. The clay percentages are listed on the left side of the triangle. Lines corresponding to clay percentages extend from the percentages reading left to right (see red line).
3. The silt percentage is on the right side, with lines extending downwardly, diagonally right to left (see green line).
4. The sand percentage is on the right side, with lines extending upwardly, diagonally right to left (see blue line).
5. Track the lines with the percentages measured and find the spot on the triangle where all three lines intersect. The region where these lines intersect indicates the soil type present. The example shown represents a loam soil texture.



Most soils in South Carolina will require some form of organic amendments. Adding organic matter to clay and sandy soil can help with:

- Nutrient holding capacity
- Improved drainage
- Reducing compaction

For more information on amending soils, see [HGIC 1655, Soil Conditioning – Establishing a Successful Gardening Foundation](#).

Soil Texture Analysis “The Jar Test” Worksheet

Measurements

Height of sand layer _____ inches / cm

Height of silt layer _____ inches / cm

Height of clay layer _____ inches / cm

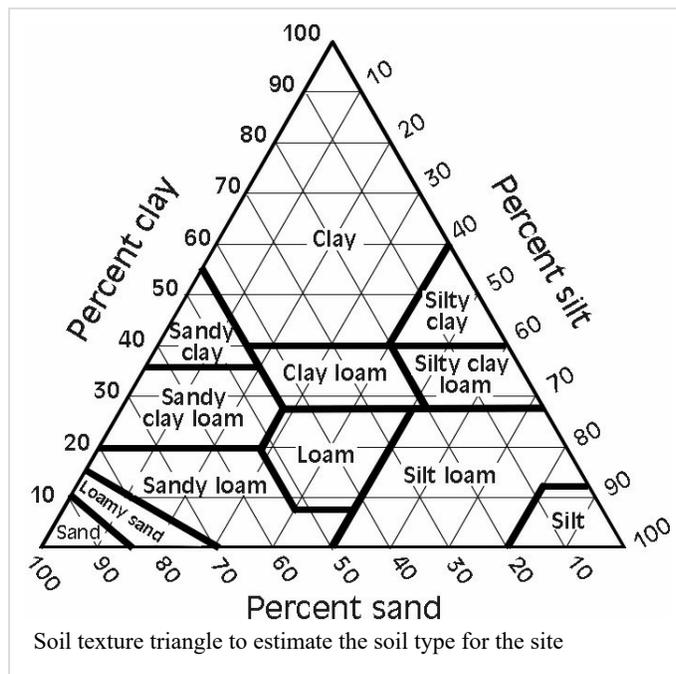
TOTAL HEIGHT OF LAYERS

_____ inches / cm

$\% \text{ SAND} = (\text{sand height}) / (\text{total height}) \times 100$
= _____ % SAND

$\% \text{ SILT} = (\text{silt height}) / (\text{total height}) \times 100$
= _____ % SILT

$\% \text{ CLAY} = (\text{clay height}) / (\text{total height}) \times 100$
= _____ % CLAY



If this document didn't answer your questions, please contact HGIC at hgic@clemson.edu or 1-888-656-9988.

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