PHYSICAL GEOGRAPHY

Introduction to Soils – Supplemental Information

Introduction to Soil Texture and Textural Classification

Soil texture is one of the most important soil properties, as it has a significant impact on land use and management. In general, coarse-textured soils (such as sand) have low organic content, low fertility, and low moisture- and nutrient-holding abilities. As the fraction of finer-textured particles increases in a soil, the soil fertility will increase, as well as the moisture- and nutrient-holding capacity. Textural analysis is done by determining the percentage of sand, silt, and clay in a soil. If the percentages of each size fraction are known, these values can be plugged into a textural analysis triangle (Figure 1) to determine the soil textural classification.

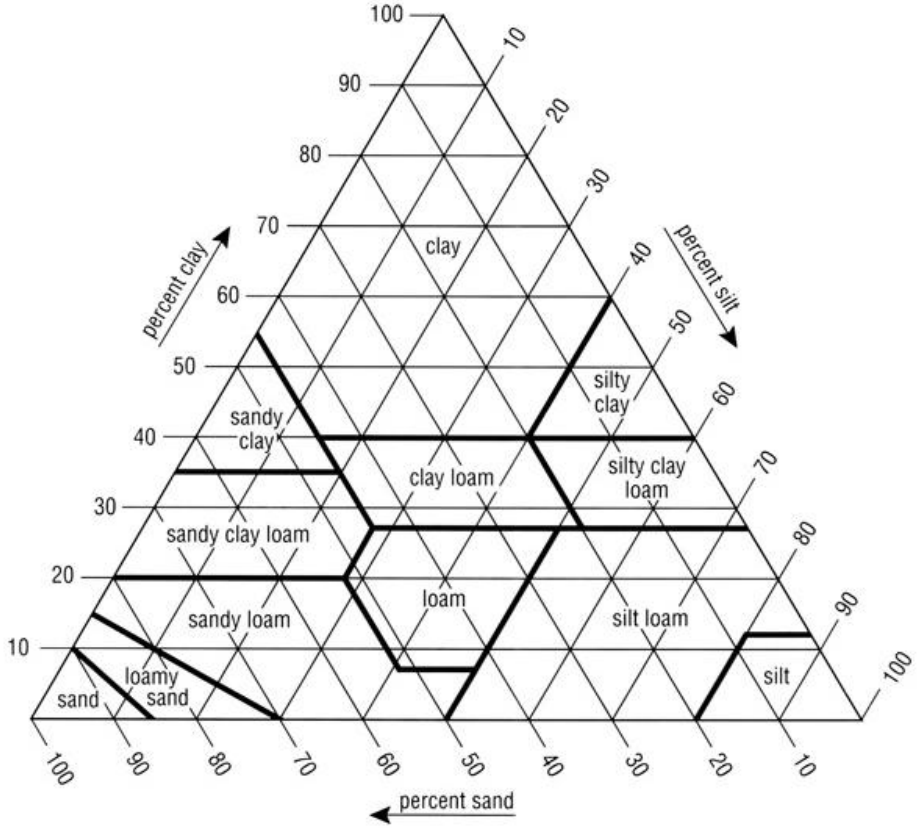
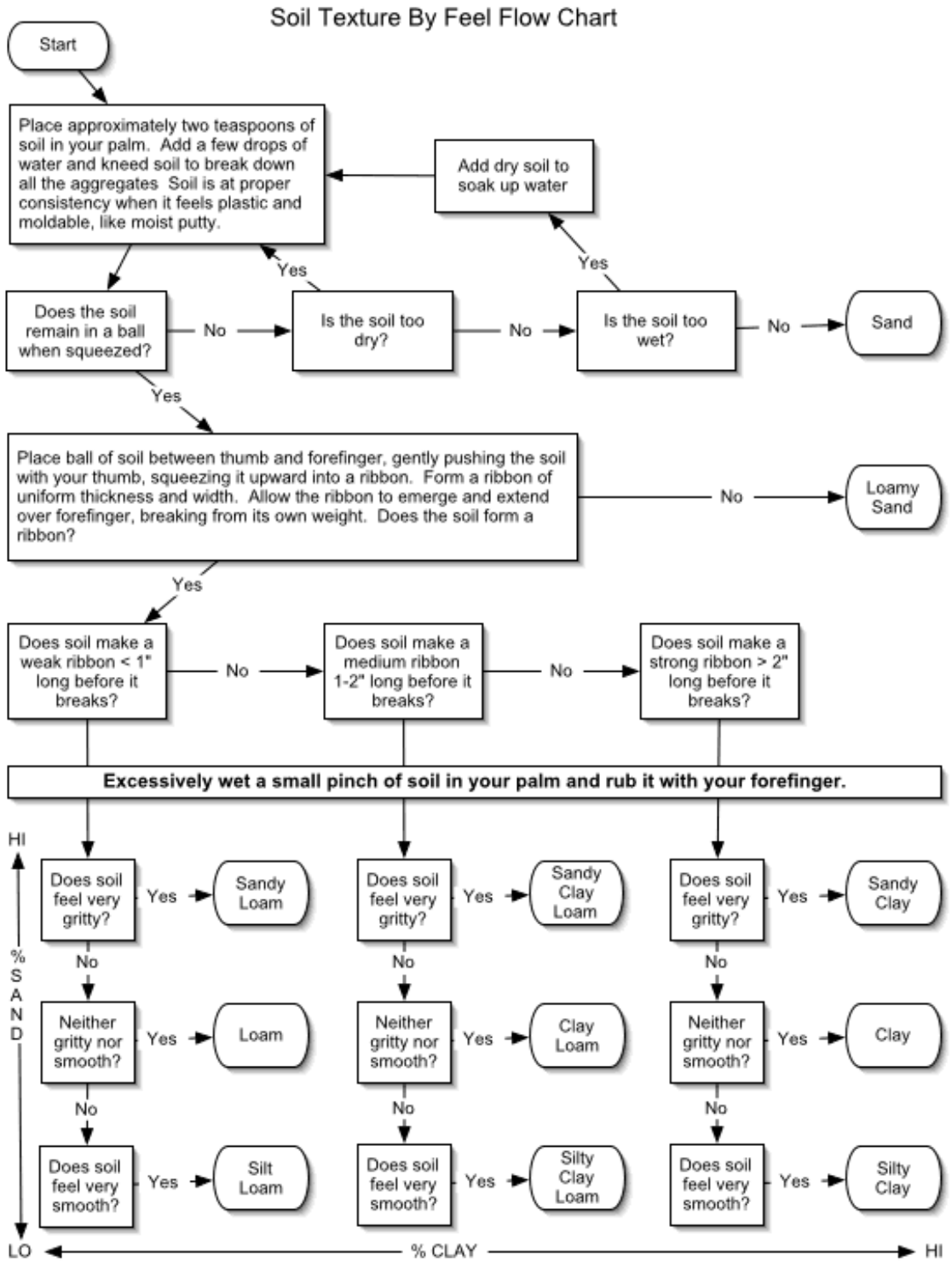


Figure 1. Textural analysis triangle. The triangle is used by extending lines from the appropriate starting points into the middle of the triangle. For example, if a soil was found to have 40% sand, 40% silt, and 20% clay, the soil would be classified as a loam.

If the percentages of each size fraction are unknown, a simple field test can be done to determine the soil textural classification. The procedure for this test is outlined in the flowchart

on the following page. You will be using this test to determine the textural classification of the actual soils used in this activity.



Soil Color

Soil color is another property commonly used to distinguish among soils and can be used to interpret other soil properties, such as age and mineral content. Dark brown to black soils are indicative of a high organic content; red and yellow soils may have elevated iron levels; and white flecks are likely due to the presence of calcium carbonate. Soil color charts are the most convenient method for determining a soil's color. A Munsell Book of Soil Color Charts contains about one-fifth of the entire range of known soil colors.

Munsell colors are systematically arranged based on three variables: **hue**, **value**, and **chroma**. **Hue** indicates the relationship of the color to red, yellow, green, blue, and purple. Hue is designated by the notation on the upper-right of the color chart page. **Value** indicates the lightness (as opposed to darkness) of a soil's color. On a color chart page, the value increases as you go down the page (lightest colors are located at the top of the page) and the notation is found along the left margin. **Chroma** indicates the strength of color (the departure from neutral) and its notation is found along the horizontal scale along the bottom of the page.

Questions

For each of the following soil samples, use the textural analysis triangle to determine the soil texture classification.

1. 70% clay, 20% sand, 10% silt

2. 60% silt, 10% sand, 30% clay

3. 47% sand, 32% silt, 21% clay

4. 22% sand, 22% silt, 56% clay

5. 7% silt, 41% clay, 52% sand

6. Why do certain sands feel grittier than others?

7. Why do some soils form a longer “ribbon” than other soils?

8. In order to obtain the most accurate results for a soil texture by feel test, the soil shouldn’t be too wet or too dry. How does the moisture content affect the results of this test?

9. Some soils are better suited for certain uses than others. For each of the following land uses, give example(s) of soils well-suited for that use and example(s) of soils poorly suited for that use. Explain your reasoning for each.

    a. Growing crops, especially corn

    b. Building a home

    c. Locating a cemetery

    d. Digging a pond for swimming