Conservation
Fall 2011

Soil Reference Guide

Soils are divided into horizons, which are measured and described by using **color**, **texture** and **structure**. Most soils have a distinctive profile or sequence of horizontal layers. Generally, these horizons result from the soil processes of eluviation and organic activity. Soil horizons are identified by their properties and associated soil processes. Four general layers are normally present in a typical soil: **O (Organic layer)**, **A**, **B**, and **C horizons** (Figure 1)**.** This tidy order of horizons may be disrupted by flooding and human activities. Horizons are measured from the top of the A horizon down and up.

Please review **Figure 11.14** on page 222 of our text. Please review closely **Section 11.4: Soils**, which is found on page 221. You will want to refer to this section in your text in answering the questions for this lab.

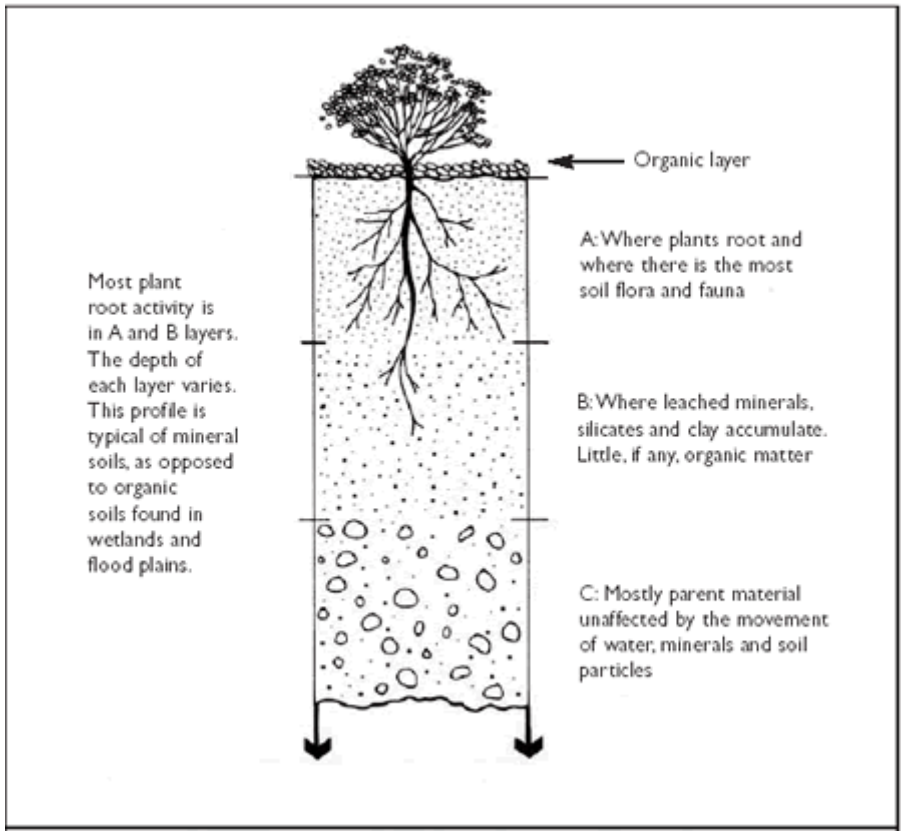


Figure 1: *Four soil layers found in a typical soil.*

COLOR:

The Munsell color chart uses specific alpha-numerical values to describe colors by specifying these three traits:

(1) Hue: how close the color is to either red, yellow, blue or purple,
(2) Value: the amount of black present, and
(3) Chroma: the strength of the color

This system allows everyone to describe colors consistently, and is commonly used in art, geology, soils and botany. In writing these colors, you record the information as hue, then value, followed by chroma. A generalized schematic showing the components of the Munsell color system is shown below.
For your lab, use the notebooks provided to determine the color of the soil that you are observing.

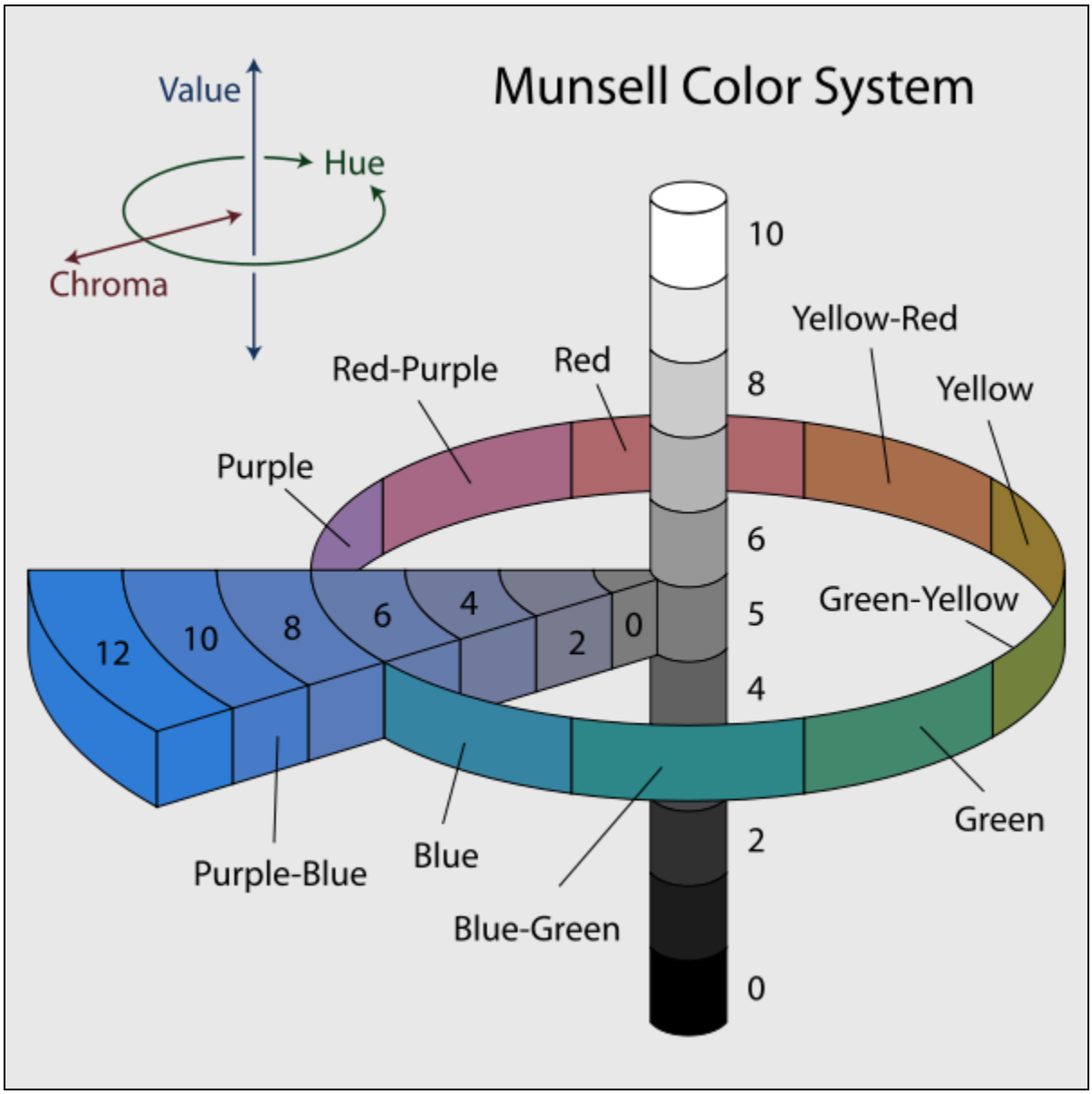


Figure 2. Schematic showing the components of the Munsell color system (Wikipedia Commons)

SOIL TEXTURES

Soil texture is largely defined by the diameter of the sediments present in the soil. To describe a soil's texture, you will need to estimate the amount of gravel, sand, silt and clay in each soil. In the field, this is typically determined by several tests using water and a sample of soil. The four sediment sizes to consider are:

(1) ***Gravel***, larger than 2 mm,
(2) ***Sand***, between 2 mm and 0.06 mm,
(3) ***Silt***, 0.05 to 0.004 mm, and
(4) ***Clay***, smaller in size than 0.004 mm.

Soils with an abundance of clay retain water well, but retard the movement of water through the soil because the spaces between the soil particles are small and water clings to the surface of the clay particles.

Soils with coarser grains have relatively large spaces between the grains, so water moves quickly through them, and the soil retains less water than soil with smaller particles. If soil has a mixture of clay, sand and silt it is called loam, and loam generally retains water well and has good drainage. The presence of loam, along with lots of organic matter, is best for growing crops.

We can assess the particle size present by various tests:

Moist Cast Test: Involves squeezing (compressing) a moist soil sample in your hand. If the soil holds together (*i.e.,* forms a cast), then toss from hand to hand to test strength of cast. The more durable the cast means that more clay is present.

Ribbon Test: Roll moist soil into cigarette-shape between palms of hands, then roll out between thumb and forefinger forming the longest, thinnest ribbon possible. A longer and thinner ribbon means that more clay is present.

Feel Tests: Includes graininess test and stickiness test.

Graininess Test: Soil is rubbed between thumb and fingers to assess the percent sand by the grainy feel of the sample.

Stickiness Test: Knead a saturated soil sample until the stickiest point is reached. Then compress between the thumb and forefinger. The degree of stickiness is determined by noting how strongly it adheres to the thumb and forefinger upon release of pressure and how much it stretches. It will be sticker if there is more clay present.

SOIL STRUCTURE

Soil structure is a description of how the soil breaks into chunks (peds). Peds may be large to small, platy to equant, and durable to friable. Take a sample of undisturbed soil in your hand. Look closely at the soil in your hand and examine its structure. Possible choices of soil structure are:

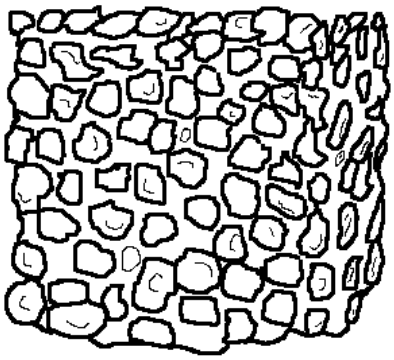
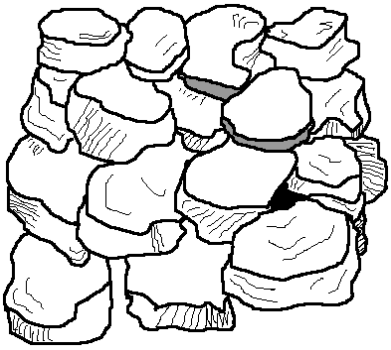
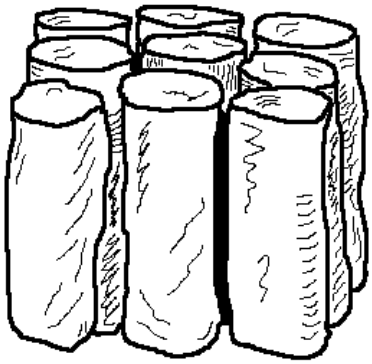
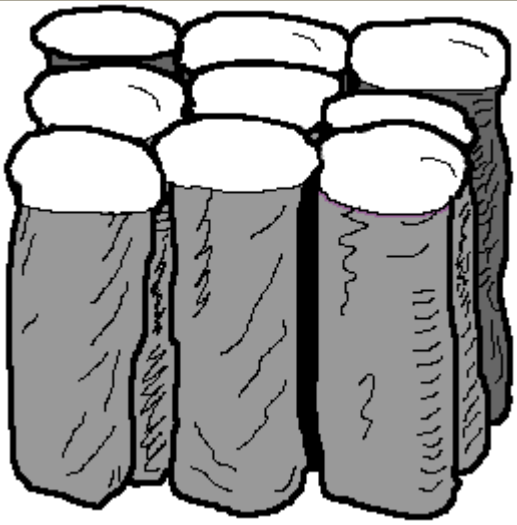
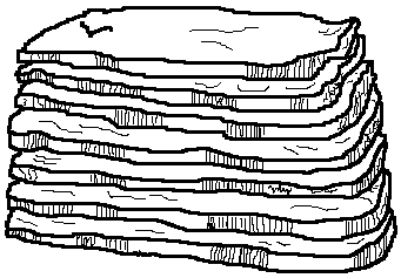
		
Granular: Resembles cookie crumbs and is usually less than 0.5 cm in diameter. Commonly found in surface horizons where roots have been growing.	**Blocky**: Irregular blocks that are usually 1.5 - 5.0 cm in diameter.	**Prismatic**: Vertical columns of soil that might be a number of cm long. Usually found in lower horizons.
		
Columnar: Vertical columns of soil that have a salt "cap" at the top. Found in soils of arid climates.	**Platy**: Thin, flat plates of soil that lie horizontally. Usually found in compacted soil.	**Single Grained**: Soil is broken into individual particles that do not stick together. Always accompanies a loose consistence. Commonly found in sandy soils.

Figure 3: Soil Texture Guide (NASA)