**Being a Good Gardener Begins with Getting to Know Your Soil...**

You must not be afraid of getting dirty if you want to grow healthy plants. Understanding the characteristics of the soil in your yard is key to growing healthy plants. The experiments listed here will help you become familiar with the soil’s physical and chemical characteristics. Becoming familiar with these characteristics will help you understand your soil’s physical structure, drainage, and pH.

**The Equipment:**

Before you begin, gather these common household items for the experiments:

- Hands
- Spade
- Water Bottle
- Straight-sided Jar with Lid
- Trowel
- 12" Ruler
- Small plastic sandwich bag or brown lunch bag
- Powdered dish washing detergent
- Shovel
- Bucket + hose
- Timer / stopwatch
- pH home test kit

**The Experiments:**

Follow these simple experiments to get a better understanding of your soil characteristics:

1. **Texture Hand Test**
2. **Texture Jar Test**
3. **Percolation Test**
4. **pH Test**
Texture Hand Test

A soil’s texture speaks a lot about the soil’s ability to drain water and capture nutrients. The texture of soil varies on a continuum from coarse to fine. The size of the soil’s mineral particles sand, silt, and clay, determine how coarse or fine the soil is. Generally loams are the most desirable garden soils. Don’t worry. Almost any texture of soil can produce beautiful plants. Knowing the soil’s texture will help you make better plant selections, ones that will succeed because they are chosen specifically in relationship to your garden’s soil.

What You’ll Need:

Step 1:
Dig a couple inches down into the soil layer. Moisten the soil, if it is not already moist.

Step 2:
Take about a cup of soil from the root zone, not the surface.

Step 3:
Do the following tests.

Test A - Feel Test
Rub some moist soil between your fingers.
- Sand feels gritty.
- Silt feels smooth.
- Clays feel sticky.

Test B - Ribbon Test
Squeeze a moistened ball of soil in your hand.
- Coarse textures (sand or sandy loam) soils break with slight pressure.
- Sandy loams and silt loams stay together but change shape easily.
- Fine textured (clayey or clayey loam) soils resist breaking.

Test C - Ball Squeeze Test
Squeeze a moistened ball of soil out between your thumb and fingers.
- Sandy soils won’t ribbon.
- Loam, silt, silty clay loam or clay loam soil ribbons less than 1 inch.
- Sandy clay loam, silty clay loam or clay loam ribbons 1 to 2 inches.
- Sandy clay, silty clay, or clay soil ribbons more than 2 inches.
02 Texture Jar Test - Part I
A more sophisticated experiment you can perform at home to understand the soil’s texture.

What You’ll Need:

Step 1:
Collect soil. If your garden area is small, like a small gardening bed, take a sample from the middle of the bed. If the area is large, like a lawn, collect small samples at evenly spaced intervals across the area. Then mix these small samples together to form a representative sample.

Step 1 (continued):
To collect soil, scrape away the first two inches of soil and dig a hole 6 inches down. Then place a trowel full of soil (free of large organic matter and rocks) into a plastic bag and label the bag with the soil’s origin.

Step 2:
The soil must be sifted before testing, spread it out on an old cookie tray to dry for a day or so. Once the sample is sufficiently dry, sift it through a wire-mesh sieve or an old colander to remove small stones and roots and to break down any lumps of soil.

Step 3:
After sifting, place a cupful of the soil into a straight-sided jar and add a tablespoon of powdered dishwashing detergent. The detergent is a surfactant, which keeps the soil particles separate, resulting in a more accurate test. Fill the jar to the top with water, screw the lid on, and shake the jar for three minutes to thoroughly combine the soap, soil, and water, and to make sure no soil is stuck to the bottom or sides of the jar.

Step 4:
Then set the jar on a flat surface to let the sediment settle.

Step 5:
As the sedimentation progresses, check the sample periodically to watch the layers form and to note the size of the particles settling out.

Layer Results:
- Sand particles are the heaviest of the three and settle out of the solution after about a minute.
- The sand layer is coarser in texture than the silt and clay. Silt is the next heaviest particle and will settle out after about an hour.
- The silt layer is darker than the sand. Clay, the lightest particle in the mix, can take from one to two days to settle out of the solution. The clay layer that settles on top is fine textured and light in color.
02 Texture Jar Test - Part II

Step 1:
To figure out the percentages of sand, silt, and clay in your sample, measure the total amount of sediment with a ruler.

Step 2:
This number represents 100 percent of the soil sample. To derive the percentages of sand, silt, and clay in the sample, measure the amount of each layer and divide by the amount of total sample.

Step 3:
Derive the percentages for each layer of sand, silt, and clay.

Step 4:
Finally use a soil texture triangle to interpret your results.

Step 5:
a. Locate the clay percentage of your soil on the left side of the triangle and follow the white line across.
b. Then locate the sand percentage along the base of the triangle and follow the white line up to where it intersects with the white line you selected.
c. The white line at this point represents the percentage of silt in the soil sample.
d. The shaded area that contains your point describes your soil’s textural class.

Understanding Your Results:
- Generally, sandy soils tend to be low in organic matter content, low in ability to retain moisture and nutrients, and drain rapidly.
- Finer-textured soils generally are more fertile, contain more organic matter. They are better able to retain moisture and nutrients, and permit less rapid movement of air and water. All of this is good up to a point.
- When soils are so fine-textured as to be classified as clayey, however, they are likely to exhibit properties which are somewhat difficult to manage or overcome. Such soils are often too sticky when wet and too hard when dry to cultivate.
Before digging, understand where your utilities are.

Fill the hole with water and let it drain (This step is to saturate the soil). This may take a short period to one day.

Dig a hole in the garden one to two feet wide by one to two feet deep.

After the water drains the first time, refill the hole with water, and note how long it takes for the hole to empty.

Understanding Your Results:

• Ideally well-draining garden soil should drop 1-2 inches per hour.
• Drainage rates that are slower than the ideal reveal that the soil is too heavy with clay (or that other conditions might be a cause, like a layer of bedrock beneath).
• If your soil drains much quicker than the ideal rate (1-2 inches in 15 minutes or less, as opposed to an hour), it’s likely that your soil’s so porous because it contains too much sand.
• Again, both drainage problems – too slow or too fast – can be corrected by incorporating 2-4 inches of organic compost into the top 1 foot of soil.
• Adding sand may improve drainage in heavy, clay soils. However, more lasting and beneficial effects will be achieved by adding organic matter.
**pH Test**

A soil’s pH is a measurement of its acidity or alkalinity. The pH of the soil affects the availability of different plant nutrients. Home test kits are available at local gardening stores and centers. These will provide a rough estimate. For further investigation, you can have your soil professionally tested. Knowing the pH of your soil will help you select plants adapted to grow in your soil’s pH conditions.

**What You’ll Need:**

- The pH scale runs from 1 to 14. 1 represents the most acidic and 14 represents the most alkalinity. 7 on the scale is neutral.

- Most plant nutrients are available at a neutral pH. Soil microbes are also most diverse and active at a neutral pH range.

- In strongly acidic soils, (pH 4.0 – 5.5) the following nutrients are in limited supply: phosphorus, potassium, calcium, and magnesium.

- In strongly alkaline soils, (pH 8 – 10) the following nutrients are in limited supply: phosphorus, iron, copper, zinc, and manganese.

**Understanding Your Results:**

**Further Resources**

The Washtenaw Conservation District, among many other county extension offices, also offer soil testing which helps in determining soil nutrient levels and deficiencies. The following link has helpful documents on how to prepare, pack, and ship your samples for their analysis. The Conversation District also has soil sample test boxes for purchase as well.

[Washtenaw Conservation District Soil Sampling](#)

**Conclusion**

By completing these easy experiments, you will have a better understanding of the characteristics of the soil in your yard or garden. By matching the soil characteristics to the plants you want to grow, will produce better lawns, vegetables, flowers, and trees.