**Five Soil Tests**

**Soil Organic Matter**

Organic matter is the soul of your soil. By feeding your soil microbes with organic matter you help create a balanced soil ecosystem that will better drain and retain water and supply nutrients to your plants as they need them. The soil is alive! The chart below shows the amount of soil microorganisms present in just a cup of soil. Though mostly unseen, these microorganisms are critical to soil health. So while you are testing the soil to determine the pH, soil composition and compaction in these following tests, don't forget that most soils will be improved with the addition of organic matter.

**Organisms typically found in one cup of undisturbed native soil:**

<table>
<thead>
<tr>
<th>Organism</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacteria</td>
<td>200 billion</td>
</tr>
<tr>
<td>Protozoa</td>
<td>20 million</td>
</tr>
<tr>
<td>Fungi</td>
<td>100,000 meters</td>
</tr>
<tr>
<td>Nematodes</td>
<td>100000</td>
</tr>
<tr>
<td>Arthropods</td>
<td>50000</td>
</tr>
</tbody>
</table>

**Ribbon Test**

Take a handful of moist soil and roll it in your hand to the size of a ping-pong ball. Squeeze the soil ball between your thumb and fingers in the palm of your hand to make a ribbon. Stand the ribbon straight up in the air. If you can't form a ribbon, then the soil is at least 50 percent sand and has very little clay. If the ribbon is less than two inches long before breaking, then your soil has roughly 25 percent clay in it. If it is two to 3 1/2 inches long, then it has about 40 percent clay. If the ribbon is greater than 3 1/2 inches long and doesn't break when held up in the air, then it is at least 50% clay.

**Jar Test**

Put one inch of dry, crushed garden soil in a tall quart jar. Fill the jar 2/3 with water and add one teaspoon of a dispersing agent such as Calgon or table salt. Shake the jar thoroughly and then let the contents settle. Sand will settle to the bottom in about one minute. Measure the depth of that layer. Silt will settle in four to five hours. You should see a color and size difference between the sand and silt layers. If not, measure the depth of both layers and subtract the sand depth from the total to determine the silt depth. The clay takes days to settle. Determine its depth in the same way as for the silt. Some of the smallest clay particles may remain permanently in suspension and will not set out.

By measuring the depth of each layer of soil particles, you can figure the percentage of sand, silt and clay in your soil. For example, if you have a 1/4-inch-deep layer of sand on the bottom and the overall depth of the soil in the jar is one inch, then your soil has about 25 percent sand in it.
**Percolation Test**

Dig holes one foot deep by two feet wide in various places in your garden or landscape. Cover the holes with plastic to let the soil dry out. Once it's dry, fill the hole to the top with water and time how long it takes for the water to completely drain. The ideal time should be between 10 and 30 minutes. If the water drains in less than 10 minutes, then your soil will tend to be dry out quickly in summer. If it takes 30 minutes to four hours to drain, you can still grow most plants but will have to water slowly to avoid runoff and to allow the water to soak deeply. If your soil takes longer than four hours to drain, you may have a drainage problem.

One caveat: Extremely dry soils, especially those with large amounts of clay, tend to crack. The water in the drainage test will leave quickly because of these cracks, not because of good structure.

**Compaction Test**

The simplest way to see if your soil has a hardpan or compaction layer below the surface is to take a metal rod and walk around your property sticking it into the ground. If you can’t easily push the rod into the soil at least six to eight inches deep, then you need to improve the aeration of your soil. If you push it down and consistently meet resistance at a certain depth, then there may be a hardpan layer.

To further check for a compaction layer, dig a one- to two-foot-deep hole in the garden and look at the profile. A hard pan appears as a horizontal layer of soil that looks denser with less crumbly soil particles than the topsoil, has few roots or earthworms and may even be a darker color than the rest of the soil.

Another way to tell if you have a hardpan layer is to dig up a plant and examine the roots. If they're white, vigorous and well-branched and extend at least six to eight inches deep, then your soil has good structure. If the roots are one to two inches deep, mushy and gray colored, they are infected with a bacterial rot. If they are shallow, brittle and black, they're infected with a fungal rot. Both diseases are enhanced by poor drainage either from a high water table or a compaction layer.

**pH Test**

To check if your soil is severely alkaline, take a tablespoon of dried garden soil and add a few drops of vinegar. If the soil fizzes, then the pH is above 7.5. The free carbonates in the soil react with the acid at a pH of 7.5 and above.

To check for acidity in the soil, take a tablespoon of wet soil and add a pinch of baking soda. If the soil fizzes, then the soil is probably very acidic (pH less than 5.0). The ideal pH for most plants is 5.5 to 7.5. A few plants prefer more extreme conditions. Remedy for acidic or alkaline soil: If your pH is on the extreme end of either range, take a soil test to determine the exact pH. Add the appropriate amounts of dolomitic limestone (for acidic soils) and sulfur (for alkaline soils), according to the soil test.