NEWSPAPER ARTICLES

What's Wrong with My Soil? – Nothing Grows in My Garden! (July 13, 2019)

by Karen Dressel, UCCE Master Gardener

You moved to a new home and plants don't seem to grow, or your existing gardens are no longer lush and productive. The problem is likely the soil. Soil is composed of weathered rock and organic matter, water and air. The magic in healthy soil is the organic matter - small animals, worms, insects and microbes. These flourish when the soil elements are in balance. Soil requires room for air and water to move around the mineral particles to create a healthy environment. A shortage of one or more of these elements disrupts the ecosystem and impacts plant health. Generally, good soils are loose enough to dig easily. Also, excess water will drain freely, and soil will remain moist, not wet, after watering.

Soil health can be disrupted by compaction - compressing the soil particles tightly together by vehicle, equipment or pedestrian activity or working ground that is too wet. This results in soil that repels water, or when wet, is unable to dry out. It is also low in oxygen needed by plants. This is a common problem in areas of new construction.

Excessive tillage and/or use of inorganic (chemical) fertilizers can also disrupt the soil ecosystem and cause environmental damage.

To be able to improve your soil it is essential to understand the soil type and structure:
Clay soil: Clay soil particles are very small and flat and tend to pack together so tightly there is hardly any pore space. Lack of pore space means clay soils are low in both organic matter and microbial activity. When clay soil is wet, it feels lumpy and sticky and is unworkable. When dry, clay soil is rock hard and difficult to dig.

Sevile Adobe Clay

Yokohl Clay Loam

Sandy soil: Sand particles are large; the soil feels gritty and dries out fast. Sandy soil warms up quickly in the spring. Because it drains so well, it may not retain nutrients as water washes through.

Silty soil: Silt particles are medium- sized and feel like flour when dry and feel slippery when wet. It is usually rich in nutrients and easily cultivated but can be compacted easily. While a good soil for the garden, drainage needs to be managed.

Loamy soil: Loam is a relatively even mix of sand, silt and clay. It feels fine-textured and slightly damp. It has good structure for drainage, retains moisture, is full of nutrients, warms up quickly in the spring but does not dry out quickly in the summer. Loamy soils require replenishing with organic matter regularly.

Hanford Sandy Loam

Visalia Sandy Loam

Of course, there are soils of various combinations of the above types. To determine your soil types, a soil lab can be consulted, or simple tests can be used:

Squeeze test: Grab a handful of damp soil and squeeze it. If it is sticky and slick to the touch and remains in shape when you let go, it is clay. If it feels gritty and crumbles apart when you let go, it is sandy. Loamy and silty soils will feel smooth and hold shape for a short period.

Jar test: Add soil to about a third of a clear quart jar. Then add water to almost full, screw on the lid and shake to break up any soil clumps. Let the jar sit without disturbing for 12 hours or overnight. In a few minutes the sand portion will settle to the bottom of the jar. Mark this level on the jar without shaking or moving it. After several hours, the silt particles will settle on to the sand and be a slightly different color. Again, mark the silt level on the jar without shaking it. Overnight the clay particles will settle over the silt layer. Mark this layer again. The organic particles will be floating in murky water over these layers. If not full of floating organic particles, you will need to add organic matter to improve your soils. The thickness of the layers will help identify the predominate soil type.

To improve problem soil type and structure:

Sandy: Lightly work in 3 to 4 inches of organic matter such as well-rotted manure or finished compost. Mulch around plants, without touching stems, stalks or trunks. Mulch helps retain moisture and cools the soil. Add at least 2 inches of organic mulch each year.

Clay: Minimize tilling or spading. Lightly work in 2 to 3 inches of organic matter into the soil. Gypsum can also be added to improve porosity and drainage. Add at least 1 inch of organic matter annually in the fall. Keep foot traffic out of growing areas by using paths, steppingstones or raised beds.

Silty soil: Add at least 1 inch of organic matter annually to the top few inches of soil to avoid surface crusting. Prevent soil compaction by avoiding unnecessary tilling (roto-tilling or deep spading) and walking on planting areas.

Compacted soil: The best way to improve soil compaction is to make sure it doesn't happen – avoid tilling soil when it is too wet or too dry. Don't till more than once a year, if at all. Keep foot and vehicle traffic to a minimum and off of planting areas. Large areas that are already compacted, such as lawns, can be loosened via aeration. Machines remove plugs of soil from the ground or puncture the ground to give room for the soil to "breathe". Also sprinkling with organic compost and/or Gypsum (calcium sulfate) can help over time. For smaller areas lightly work in organic materials and amend with Gypsum. Earthworms are another way to help improve soil compaction over time. Add worms to garden beds along with organic materials, and the worms will eat their way through compacted soils, leaving behind burrows and droppings to aerate and fertilize the ground.

Soil pH is another important aspect to understand a healthy growing area. The pH level indicates relative acidity or alkalinity. A pH test measures the ratio of hydrogen (positive) ions to hydroxyl (negative) ions in the soil water. When hydrogen and hydroxyl ions are present in equal amounts, the pH is considered neutral (pH 7). When hydrogen ions prevail, the soil is acidic (pH 1-pH 6.5). When hydroxyl ions prevail, the soil is alkaline (pH 6.8-pH 14). Most essential plant nutrients are soluble (available to the plants) at pH levels 6.5 to 6.8. If the pH is much lower or higher the nutrients become less available, and plant health can suffer. There are soil pH meters available at garden stores, or soil can be professionally tested at local laboratories.

To raise the pH level to make soil less acidic, powdered limestone can be added, or Dolomitic limestone can be applied in the fall. To acidify the soil, ground sulphur is usually added. Other organic materials such as pine needles, peat moss and oak leaves can also help acidify the soil. Changing soil pH can take months to show results.

Once you have improved your soil problem, continue to retain the soil health with annual additions of organic matter. Also, use mulch to retain moisture and keep the soil cool, and, finally, prevent compaction by avoiding walking on or in planting areas. You will then have happy plants.

The UCCE Master Gardeners will be available to answer your gardening questions at the following venues in July:

Visalia Farmers' Market – Every Saturday morning (8-11 am), Visalia Sears parking lot on Mooney.

Hanford "Thursday Night Marketplace" – every second Thursday (5:30 – 9:00 pm) through October.

Porterville Farmers' Market @ Sierra View Hospital – every Thursday (8-11:30 am) through June 27.

Masters Gardeners also maintain the Tulare County Courthouse Roses and the Ralph Moore Memorial Garden on the 3rd Wed. (approx. 8-10 am) of each month and are available for questions.

For answers to all your home gardening questions, call the Master Gardeners in Tulare County at (559) 684-3325, Tuesdays and Thursdays between 9:30 and 11:30 am; or Kings County at (559) 852-2736, Thursday Only, 9:30-11:30 am; or visit our website to search past articles, find links to UC gardening information, or to email us with your questions: http://ucanr.edu/sites/UC_Master_Gardeners/

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