

The Dirt on Soil

Some call it dirt, some call it soil . . . and some have other unmentionable names for that stuff beneath our feet, especially here in Oklahoma. So, what exactly is soil, why is it so important, and how can it be improved so plants will grow and thrive?

What is Soil?

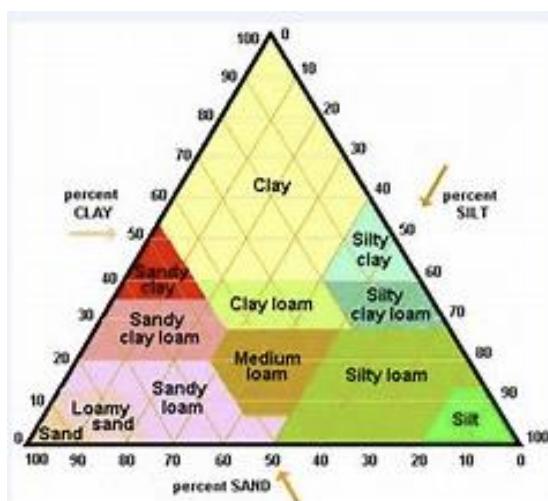
As rock weathers, it erodes into mineral particles. As combined with the product of decaying organic material (humus), organisms, air and water, the result is a substance we call “soil”. Accordingly, a normal soil composition would be 25% air, 25% water, 49% mineral, and 1% organic material.

Texture vs. Fertility

The mineral particles from weathered rock are sand, silt and clay. Sand is the largest particle; silt an intermediate size; and clay the finest.



The percentages of these particles contribute to the **texture** of the soil, ranging from an ideal loamy soil (approximately 40% sand, 40% silt, 20% clay) to not-so-optimal combinations, from rocky to gumbo (heavy clay) and everything in-between. However, soil **fertility** is a function of how air, water and nutrients are retained, chemically bound, released, and used by plants. Both texture and fertility align for optimal plant health.



Soil Management:

As far as texture goes, each particle type contributes to soil performance. Sand provides drainage and aeration. Clay plays a role in chemical retention of nutrients (there are 16, including the three most familiar: nitrogen, phosphorus and potassium), as well as pH. pH is simply a measure of soil acidity, or acid content, which allows for proper absorption of nutrients. Therefore, a significant imbalance in the textural composition has a direct impact on plant growth and health.

A soil test is always recommended first to determine the soil's capacity to furnish nutrients to plants. See [Soil Testing Leaflet - L-249](#). There are many benefits to a soil test:

- **pH:** Is the pH in the proper range? The pH scale runs from 1-14 (1 is most acidic; 14 is most alkaline/basic; 7 is exactly neutral). Most plants absorb nutrients optimally within the 6-7 pH range, including most vegetables. Additions of lime or sulfur will raise or lower the pH respectively, but the soil test will provide guidance as to how much adjustment is needed.
- **Nutrients:** Identify and address specific nutrient deficiencies and target without costly and ineffective overfertilization.
- **Environment:** Protect the environment and the plants. Phosphorus and potassium are often added, but are rarely needed as they are immobile in the soil and can build up over time. Excessive phosphorus runoff to waterways is especially harmful to fish, aquatic life and the general environment, and should be avoided.

Organic material (humus) and commercial fertilizers can be very effective when used to correct deficiencies disclosed by the soil test. Humus can improve the soil structure by lightening a heavier soil (i.e. clay), increasing water retention in lighter soils (i.e. sandy), aid in erosion prevention, and release existing nutrients previously bound in the soil. Only a small amount of nitrogen and other necessary nutrients are provided by humus. Commercial fertilizers provide usable nutritive compounds in appropriate amounts for soils requiring greater improvement.

General Tips:

- Avoid tillage when soil is wet, as this forces air and water out, thus deteriorating the soil structure.
- Raised bed gardening can be effective in poorly drained areas.
- As nitrogen is used or leached quickly, side-dress several inches from roots and a couple inches into the soil.
- Organic material may be used as a side dressing or tilled into the soil.

- Starter solutions, special fertilizers for young transplants, can get them off to a good start.

A wealth of information can be found on tulsamastergardeners.org about soil. OSU fact sheets on fertilizer and organic material use, soil testing, raised bed gardening and soil and nutrient management are linked below.

Improving Garden Soil Fertility HLA-6007

<http://pods.dasnr.okstate.edu/docushare/dsweb/Get/Document-2659/F-6007web.pdf>

Tulsa Master Gardeners Lawn and Garden Help – Soil Basics

http://tulsamastergardeners.org/lawngarden/lg_soil.html

Tulsa Master Gardeners Lawn and Garden Help – Soil Testing

http://tulsamastergardeners.org/lawngarden/lg_soiltesting.html

Tulsa Master Gardeners Lawn and Garden Help – Soil Amending

http://tulsamastergardeners.org/lawngarden/lg_soilamending.html

Tulsa Master Gardeners Lawn and Garden Help – Soil Classification Calculator

http://tulsamastergardeners.org/tipstechniques/soil_clas_calc.htm

Soil Testing Leaflet

<http://pods.dasnr.okstate.edu/docushare/dsweb/Get/Document-6026/L-249.pdf>

Oklahoma Homeowner's Handbook for Soil and Nutrient Management – E-1003

<http://pods.dasnr.okstate.edu/docushare/dsweb/Get/Document-5685/E-1003.pdf>

Raised Bed Gardening HLA-6033

<http://pods.dasnr.okstate.edu/docushare/dsweb/Get/Document-1102/HLA-6033web2015.pdf>