Get To Know Your Soil

University of California
Agriculture and Natural Resources   ■ UCCE Master Gardener Program

When a home gardener asks the Help Desk about a plant problem, one of the first questions asked may be "what kind of soil do you have?"   What we're really asking is "what's your soil texture?" Soil texture is the relative amounts of sand, silt and clay particles that are in your soil and is its single most important characteristic. Soil texture can't be changed. Armed with the knowledge of soil texture a home gardener can make more informed decisions about what to plant, how best to fertilize, how to best to irrigate, and how to generally manage the soil.

University of New Hampshire

What is Soil? The soil helps hold a plant in the ground, and provides the plant roots oxygen, water, and nutrients important for plant growth. Soil is about 45% mineral particles, 20-30% air, 20-30% water, and 5% organic matter. The mineral and organic matter are the soil solids while air and water fill the spaces, called pore spaces, formed when the soil particles aggregate or group together. The size and quantity of pore spaces play a role in how well a soil holds water and air. When soils become compacted due to foot traffic or heavy equipment the soil particles are pressed closer together reducing the amount of pore space. Reduced pore space means less room for air and water in the soil.

Sandy Soils Sand particles are the largest of the soil particles ranging from .05 to 2.0 millimeters in size. Large particles means fewer but larger pore spaces. Sandy soils are easy to work, and have good aeration, that is air and water moves easily through them. Consequently, sandy soils have low water holding capacity. Water enters sandy soil easily but drains away quickly carrying nutrients with it.

Clay Soils Clay particles are very, very small, less than .002 millimeters in size. Clay soils have small pore spaces but lots more of them and overall more pore space then in sandy soil. Clayey soils have very good water holding capacity, are high in nutrients, but have poor aeration, and are more easily compacted. Clayey soils often can have drainage problems.

Silty Soils Silt particles are small, .002 millimeters to .005 millimeters wide. Silty soils have medium - high water holding capacity, medium aeration, and medium high nutrients. Silty soils can be more easily compacted than sandy soils.

Particles Sizes The figure, here on the right, from the Colorado Master Gardeners, shows the relative sizes of sand, silt, and clay particles found in the soil, with coarse sand being the largest and clay being the smallest.
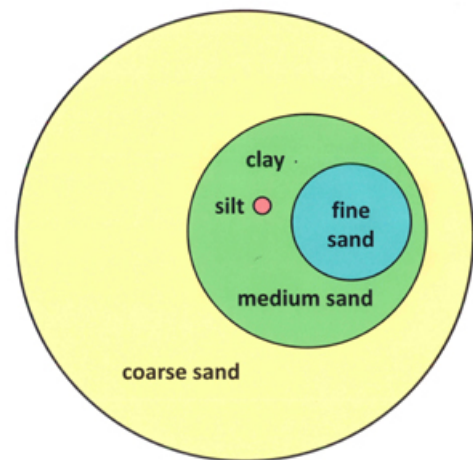
Classes of Soil Texture Most soils are a combination of sand, silt and clay. Loam, the ideal soil for gardening is equal parts sand, silt, and clay. The USDA has developed 12 major textural classes of soil as depicted in the Soil Triangle. In Alameda County we have a variety of soils, and the soil in your garden may vary from one spot to another.

Soil Texture Tests Can home gardeners determine what kind of soil they have? Of course!There are two tests that don't require any special equipment and can be done by any home gardener. The first is

the Soil Texture by Measure test and if done correctly should give a fairly good reading of your soil texture. A quicker method for the adventurous and those who like to get their hands dirty is the Feel Method. This method can be very accurate for the experienced professional working in the field and for the rest of us it will get us in ball park.
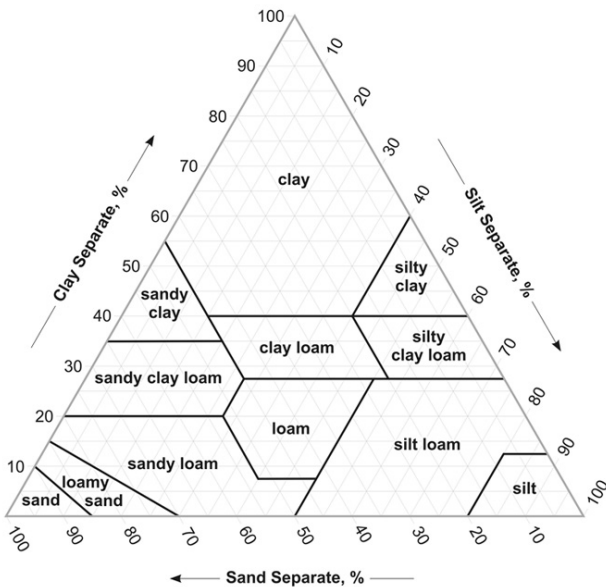
The How To's of Soil Testing To get going, start with collecting a soil sample. Collect where your plants grow, at root zone, 0-6 inches deep. Scrape away the mulch, leaves and rocks before collecting. Use a sieve or screen to remove rocks, gravel, and bits of leaves or bark. Then go to Colorado Master Garden Program website http://www.ext.colostate.edu/mg/gardennotes/214.html for easy step-by-step instructions for both tests. Also the UC Davis International Programs Office had a very good YouTube video for the feel method. Check it out at https://www.youtube.com/watch?v=GWZwbVJCNec . Go out there and get to know your soil!

Soil Texture v. Soil Structure So now you know what kind of soil texture you have. But as mentioned above you can't change a soil's texture - a sandy soil is a sandy soil. But you can improve your soil's structure. Soil structure is the way the soil particles aggregate together. Good soil aggregation will improve water retention, aeration, and drainage.

Organic Matter and Soil Structure No matter what soil texture you have adding organic matter such as compost to your soil will improve the structure. Organic matter will add nutrients to a sandy soil and help it retain water. In a clay soil organic matter will help improve aeration and drainage, and in silty soils it will help maintain aeration and drainage. In the coming months we'll talk more about tips for managing particular types of soils.

More Soil Testing Want to know more about your soil? Garden centers have home test kits for determining the quantity of the important nutrients nitrogen (N), phosphorous(P), and potassium (K) as well as soil pH. The accuracy of these kits varies but can give you an approximation. If you want to go the professional route, the Help Desk maintains a list of California soil testing companies. Call or email us for a copy. This list is not comprehensive and is not an endorsement of any specific business. Soil testing labs vary in the types of tests they offer and the recommendations they provide, if any. Please contact specific labs for the services they offer. These labs may or may not provide testing services for contaminants.

Got home gardening questions?

The Alameda County Master Gardener's help line is staffed Monday, Wednesdays and Thursdays from 10 a.m. to 1 p.m., 510-639-1371 or email us at anrmgalameda@ucanr.edu If emailing please provide the following information:

- Name, phone number and city
- Problem description - name of plant if applicable, when the problem began, cultural history such as watering, fertilizing, pruning, pesticides, etc.
- Photographs of the problem, if possible