

Gardening Basics

Identifying Soil Drainage Issues

Many plants require well-draining soil. So, how do you know if you have soil drainage issues? Sometimes it's easy to tell if there are drainage issues in our landscape because of ponding water. However, understanding the drainage properties of your garden's soil is best done with a simple soil percolation test. It's also important to learn what nutrients your soil may need through soil analysis.

The soil is the source of all the elements plants need to grow including nutrients, organic matter, air, and water. Healthy soil is also the foundation of a water-efficient landscape, particularly in North Texas, where our soils are almost always poorly draining sticky clay. Soil that doesn't drain well can cause your plants' roots health problems such as root diseases, inability to take in nutrients, root system decay, and plant death. Soil that doesn't hold water adequately also causes plant health issues from drought stress and possible salt build-up in the soil and certainly requires more irrigation.

Soil texture describes the mix of the type of soil particle sizes - Clay (the smallest), silt (next largest), and sand (largest). Clay and silt soils have the highest water-holding capacity, and sand has the lowest.

Denton County has three soil regions with these types of soil textures:

- Blackland Prairie - mostly dark black to light, grey clayey soils
- Eastern Cross Timbers - mostly sandy loam
- Grand Prairie - a mix of clayey, limestone, and silty loams

There may be multiple types of soil textures in your landscape.

Soil Percolation Test

Soil percolation rate indicates how quickly water moves through the soil into the root zone of plants. A simple test can be done to assess the drainage properties of your soil.

Materials Needed

- Shovel or spade
- Water and a bucket or container
- A watch or clock

Steps

1. Dig a hole 6 to 8 inches wide and 2 feet deep. Tip: Be sure to know where the utility lines are before digging.
2. Fill the hole full of water and make a note of the time.
3. Put a yardstick in the hole every 15 minutes to measure in inches the amount of water drained from the hole. Make a note of the measurements.
4. Fill the hole a second time and make a note of the time.
5. Repeat Step 3 and note how long it takes for the water to drain again.



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Interpret the Test Results

Looking at the amount of time it took for the hole to drain completely in steps 3 and 5:

Less than 15 minutes = Excessive drainage and poor water holding capacity

15 to 30 minutes = Adequate drainage and water-holding capacity

30 minutes or more = Poor drainage and excess water holding capacity

Options to Improve Soil Drainage or Water Holding Capacity

Amendments can be added to your soil to improve how it handles water.

Excessive drainage/poor water holding capacity: Add 3" of finished compost and work it into the soil 6 to 10 inches with a garden fork or tiller. Finished compost has the color and texture of chocolate cake and doesn't have any recognizable plant debris in it, such as twigs, or food particles. Apply a 3-inch layer of organic mulch (bark mulch, pine straw, etc.) on top of the root zone of the plants to hold moisture in, leaving a 2-inch gap from the plant stem or trunk.

Poor drainage/excess water holding capacity: Add 3" of finished compost or expanded shale and work it into the soil 6 to 10 inches. Shale is crushed and kiln-fired to make expanded shale. It holds 40% of its weight in water and doesn't break down like compost, so it can be added to the soil only once.

Adding 3" of finished compost to your soil, even when the soil's drainage properties are good, always benefits the health of the soil and plants. Gently work the compost into the soil around the plant's root zone 3 to 4 inches.

Get a Soil Test Done

Over time the quality of your soil changes. A soil test can identify nutrient deficiencies, acidity, or alkalinity, amount of organic matter, and soil texture. Caring for your soil by identifying what is lacking and adding amendments like compost is key to growing healthy plants year after year. Of course, the soil test cannot identify issues with the amount of sunlight, pests, or drainage issues in your garden.

Texas A&M AgriLife Extension Service Soil, Water, and Forage Testing Laboratory offers a soil testing service for a nominal fee. The lab sends the result to you (mail or email), including which nutrients are needed and how much to apply. Use this link to obtain the Urban and Homeowner soil test form, which includes instructions for collecting samples, payment, and mailing: <http://soiltesting.tamu.edu/files/urbansoil.pdf>. The forms and sample bags are also available at the Denton County office of Texas A&M AgriLife Extension Service.

Taking these steps to understand your soil's drainage properties and the nutrients it needs will help you grow a healthy and beautiful garden.

Resources

"Improving Landscape Soils," Earth-Kind® Texas A&M AgriLife Extension, (accessed May 26, 2024)

<https://aggie-horticulture.tamu.edu/wp-content/uploads/sites/5/2010/10/soilimprovement.pdf>

"Percolation Test Demonstration", School of Integrative Plant Science, Cornell University, Fall 2020,

(accessed May 26, 2024), <https://www.youtube.com/watch?v=gEtTL6PpXjg>

"Soil Testing," Denton County Master Gardener Association, (accessed May 26, 2024),

<https://www.dcmga.com/garden-basics-soil-testing/>

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¹ Texas A&M AgriLife Extension is an equal opportunity employer and program provider.

The Texas A&M University System, U.S. Department of Agriculture, and the County Commissioners Courts cooperating.
