



# GOT COMPACTION? HOW TO IMPROVE SOIL DRAINAGE

*Charlotte Germane, Nevada County Master Gardener*

From *The Curious Gardener*, Summer 2011

Do you suspect you might have a drainage problem in your garden? If your soil does not drain quickly enough, your plants will drown.

## Soils in the foothills

Your soil drainage may not be as bad as you think it is. There's so much talk in the foothills about clay soil that some gardeners assume they have poorly draining soil, and grumble about it, when they actually have pretty respectable loam.

The USDA has mapped soil types and found that in the lower foothills the soil can be sandy loam over heavy sandy loam, or loam over clay loam. Above 2000 feet, it is typically loam over clay loam with cobblestones.

An unusual feature of foothills soil is the serpentine outcropping. This combines poor drainage with toxic levels of magnesium. If you need to grow in a serpentine soil area, use raised beds. The serpentine soil under the beds will not provide adequate drainage.

Another foothill soil issue that makes for poor drainage is "layered soil". Soil naturally transitions from one kind to another, but layered soil means soil that changes abruptly, making it hard for water to move through easily. Layered soil occurs naturally (soil on top of rock or a clay pan) and can also be created by digging with rototillers and heavy equipment.

## Check for poor grading, over-irrigation, and thatched lawns

Before you label your soil the culprit, walk your garden and evaluate the grading. It is possible that at the time of your home's construction, or during a later landscaping project, the soil was graded so the water drained toward an area with no easy outlet.

If you have an automatic sprinkler system, measure the output at each station. You might be providing (and paying for) the extra, unwanted water in your garden.

A heavily thatched lawn will not absorb a reasonable amount of water. Thatch builds up over time in turf, creating a barrier to the penetration of water. Renting a dethatcher and removing the thatch will help improve water absorption.

## Test your soil's drainage

The most important soil drainage information is available to you in your garden. The only tools you need to carry out two crucial diagnostic tests are your hands, a shovel, and a hose.

The **Drainage Test** is simple:

- Take your shovel and dig a hole 1-foot deep, and fill the hole with water. Allow to drain completely and then refill.
- Measure the amount of water that drains in an hour's time. If less than 2 inches per hour, you have poor drainage.

---

## UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION



**PLACER COUNTY**  
11477 E Avenue  
Auburn, CA 95603  
(530) 889-7385  
E-Mail: [ceplacer@ucdavis.edu](mailto:ceplacer@ucdavis.edu)

The University of California, in accordance with applicable Federal and State law and University policy, does not discriminate on the basis of race, color, national origin, religion, sex, disability, age, medical condition (cancer-related), ancestry, marital status, citizenship, sexual orientation, or status as a Vietnam-era veteran or special disabled veteran. Inquiries regarding the University's nondiscrimination policies may be directed to the Affirmative Action Director, University of California Agriculture and Natural Resources, 1111 Franklin, 6th Floor, Oakland, California 94607-5200, (510) 987-0096. United States Department of Agriculture, University of California, Placer & Nevada Counties cooperating.

**NEVADA COUNTY**  
255 So Auburn  
Grass Valley, CA 95945  
(530) 273-4563  
E-Mail: [cenevada@ucdavis.edu](mailto:cenevada@ucdavis.edu)

What do the test results mean? Clay soil is great at holding on to water, so much so that it may not let the water drain away fast enough. If your soil does not drain efficiently in the Drainage Test, then you need to take steps to improve the situation.

The good news? There are solutions to drainage problems!

### **How to improve soil drainage**

You have probably heard that soil in good physical condition has “good tilth” or structure. *Soil Texture* is the proportions of sand, silt and clay in the soil and cannot be altered. But, the *Soil Structure*, how particles in the soil aggregate, can be improved. Here’s how!

### **Add organic material**

You can improve tilth by adding humus (finished compost) to the soil. Humus and other organic materials help create larger pores in the soil, which give both water and air more room to pass through. Organic materials do break down over time, but the process of decomposition boosts microorganisms in the soil, and the microorganisms in turn improve soil structure. Add 2-3 inches of finished compost to your beds and incorporate with a garden fork or shovel.

### **Plant cover crops**

“Cover” crops are a traditional farming method for enriching the soil. These crops, such as vetch or clover, are not grown to maturity, but are planted, then eventually tilled or dug back into the soil before they set seeds. The crops assist in drainage both by breaking up the soil with their roots, and by acting as “green manure” when they are plowed back in.

### **Build a French drain**

One method of draining a water-logged area is to provide an artificial avenue for the water to go on its way. As we all know, water flows downhill. You can capitalize on a downward slope in your garden, or spend time digging, to create a trench with a 1 to 3 percent gradual slope. Fill the trench with rock and be sure there is a good outlet at the foot of the French drain.

### **Dig or drill through a hardpan or clay pan layer**

In the foothills the hardpan issues can be man-made, as a result of mining or construction activity. If you’re dealing with a hardpan situation, your topsoil drains well, but the water stops short when it hits a lower, impermeable layer. Hardpan less than 2-feet thick can be double-dug during the dry season, then watered and allowed to settle. Hardpan over 2 feet thick may need deep “ripping” or drilling.

There are many reasons for poor drainage, and many cures as well. Are you curious to see what your garden has to tell you about where the water is going?

### **References**

*Soil Survey of Nevada County Area, California*, 1993; U.S. Department of Agriculture, Soil Conservation Service and Forest Service. [http://soildatamart.nrcs.usda.gov/manuscripts/CA619/0/nevada\\_a.pdf](http://soildatamart.nrcs.usda.gov/manuscripts/CA619/0/nevada_a.pdf)

*California Master Gardener Handbook*, 2002, Dennis R. Pittenger, ed.; University of California, Division of Agriculture and Natural Resources, Publication 3382.

*Western Nevada County Gardening Guide*, 2010, UCCE Nevada County Master Gardeners.

“Soil Drainage, Garden Note #219,” 2009, Colorado State University Extension. <http://www.ext.colostate.edu/mg/gardennotes/219.html>

---

## UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION



**PLACER COUNTY**  
11477 E Avenue  
Auburn, CA 95603  
**(530) 889-7385**  
E-Mail: [ceplacer@ucdavis.edu](mailto:ceplacer@ucdavis.edu)

The University of California, in accordance with applicable Federal and State law and University policy, does not discriminate on the basis of race, color, national origin, religion, sex, disability, age, medical condition (cancer-related), ancestry, marital status, citizenship, sexual orientation, or status as a Vietnam-era veteran or special disabled veteran. Inquiries regarding the University's nondiscrimination policies may be directed to the Affirmative Action Director, University of California Agriculture and Natural Resources, 1111 Franklin, 6th Floor, Oakland, California 94607-5200, (510) 987-0096. United States Department of Agriculture, University of California, Placer & Nevada Counties cooperating.

**NEVADA COUNTY**  
255 So Auburn  
Grass Valley, CA 95945  
**(530) 273-4563**  
E-Mail: [cenevada@ucdavis.edu](mailto:cenevada@ucdavis.edu)