

Poorly Drained Soils: What should I do?

Fact Sheet 2.3

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Preparation for planting is the key to success in establishing landscape plants. Site analysis and proper planting assure rapid plant establishment and healthy growth, provided environmental factors are favorable. Investigate surface and internal water drainage in the landscape. Check for areas where water collects, drains slowly or stands for long periods. This fact sheet discusses the relationship between proper drainage and landscape trees.

SOIL COMPACTION AND DRAINAGE. Many landscape plants die because they are planted in soil that is too wet or too dry. Soil with good porosity throughout the rooting depth allows large quantities of water to move through the soil profile without affecting plant roots unless there is a naturally high water table at the site. Typically, a soil contains about 50 percent solid materials and about 50 percent pore space, filled by air and water. In poorly drained soils, most of the pore space is filled with water for long periods of time, leaving too little air.

Many landscape sites do not have ideal drainage. During rainy weather, water may stand on the soil surface or drain very slowly. Consistently wet soils often have an odor caused by anaerobic bacteria in the soil.

Poor drainage can occur naturally. Bright soil colors indicate good water drainage, while a dull color or grayish tint could indicate poor drainage. Soils that are considered a challenge in landscape sites include:

- Somewhat poorly drained: Soil is wet for prolonged periods, but not all the time.
- Poorly drained: Soil remains wet for a large portion of the year.

- Very poorly drained: Soil remains wet year-round as the water table remains at or near the surface year-round.

Poor drainage often occurs when contractors remove topsoil during construction of new homes, leaving only subsoil. The amount of topsoil reapplied may be unknown. Also, during construction, heavy equipment may compact the soil reducing air space.

Poor drainage can also result from improper shaping of the yard, leading to ponding in low areas or around the foundation, or due to failure to properly remove runoff water from roofs, downspouts and streets.



Poor planting site due to drainage problems in an urban setting.

Even if soil has not been removed or added during construction, the drainage patterns of unaltered native soils also may change. A hard pan may occur in areas that have had a lot of heavy equipment and traffic.

CORRECTIVE ACTION: An easy method to determine the drainage of a site is to dig a hole 12 inches long, 12 inches wide and 12 inches deep. Fill the hole with water. If the water drains in fewer than three hours, the drainage is excellent, and plants suited for dry locations will perform well. However, this method should be done only when the soil is moist. Poorly

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drained soils may drain excessively when the soil is dry giving the false impression of good drainage. Distributing large amounts of compost or organic material throughout the soil medium can greatly improve the water-holding capacity of the soil.

If the water takes from three to 12 hours to drain, then the drainage is adequate for most landscape plants (about 1 inch per hour). If it takes more than 12 hours, then the drainage is poor. But before corrective action is taken, dig a little deeper to see if there is an impermeable layer of soil that is restricting water movement. Although it is difficult to change the soil, you can alter the site to minimize the poor physical drainage. Check several locations in the landscape. Select trees that are tolerant of the wet conditions or change the site to meet the needs of the plants. In areas where it would be difficult to use equipment, dig a dry well to break through the hard pan. After the planting hole is dug, use a posthole digger to dig a hole about 12- 15 inches deep in the bottom of the planting hole. Fill this hole (dry well) with porous material, such as gravel. Then plant the ornamental tree. The dry well should allow the soil to drain below the hardpan layer. This method will only work properly if the well actually goes all the way through the restrictive layer. If it doesn't, the well will hold water like the rest of the planting hole.

Another way to handle a drainage problem is to raise the height of the soil. Elevate the site by adding 10-12 inches of well-drained topsoil, compost or other organic matter to raise the planting zone. The amendment should be tilled into the soil to provide a homogenous medium for the plants. The root zone of the tree is then adequately above any poor internal drainage. The addition of organic amendments should be addressed on a case-by-case basis

Adding an organic amendment to an individual planting hole is not recommended. Extensive research has determined that organic amendments placed in the planting hole do not result in a larger root system or encourage root penetration into the native soil. Organic matter should be incorporated uniformly throughout the projected root zone, as opposed to

putting it into the planting hole. At least a 1 percent increase in organic matter is required to have an effect on the water- and nutrient-holding capacity of a soil. Avoid using more than 50 percent organic matter, because plant problems may result from humic acids and other organic compounds. Apply the amendment uniformly over the existing soil that has been deep tilled (8-12 inches). Till or work the amendment in the soil until a homogenous mixture is developed.

Sometimes the problem can be solved by shaping the surface to allow runoff or by diverting excess water. Sometimes, the only way to overcome poorly drained soils is to install drain tile. In this extreme condition, make sure the drain tiles are installed to move soil water away from structures and ornamental trees. Drain tiles are an expensive technique to modify the planting area, but the results are typically worth the effort.

SUMMARY. Soil conditions and drainage play a key role in the success or failure of trees in the landscape. It is important to analyze the site prior to planting and take corrective action to ensure the success of your trees.

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