

## Problems With Over-Mulching Trees and Shrubs

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**M**ulching trees and shrubs is a recommended cultural maintenance method with many benefits, yet it can literally kill plants if mulch is applied improperly. A mountain of mulch, piled high against the tree trunk, does not kill a tree immediately—it results in a slow death. Over-mulching is a waste of mulch (and money!). It is a leading cause of death of azalea, rhododendron, dogwood, boxwood, mountain laurel, hollies, cherry trees, ash, birch, linden, spruce, and many other landscape plants.

### Over-Mulching Can Kill

How does over-mulching kill trees and shrubs? The most common causes are:

**Oxygen starvation.** Suffocation of the tree roots is the most common cause of tree and shrub death from over-mulching. Repeated applications can contribute to waterlogged soil/root zone by slowing soil water loss via evaporation. With water occupying most soil pore space, air content is minimal and diffusion of oxygen is essentially blocked. Roots need oxygen for respiration. When soil oxygen levels drop below 10%, root growth declines. Once too many roots decline and die, the plant dies.

When shallow rooted plants are planted in mounds of mulch, oxygen levels can begin to decline below plant needs. This is especially common in the spring and the fall, which are critical periods for root growth, and during other wet periods. Oxygen deprivation is also prevalent in soils that do not have good drainage.

Symptoms may take several years to appear, depending on the plant and the soil type. Symptoms include off-color, yellowing foliage (chlorosis), abnormally small

leaves, poor twig growth, and dieback of older branches. Unfortunately, by the time the symptoms are noticed, it is generally too late to correct the problem. At this point, the plant is usually in a state of irreversible decline, and will most likely die.

**Inner bark death of aboveground root flares.** Inner bark (phloem) death comes from the piles of mulch placed directly against the stems/trunks of trees and shrubs. The root flare stem and trunk tissue is quite different from root tissue—it cannot survive a continually moist environment, and must be able to breathe through lenticels. When mulch is piled near trunks, gas exchange decreases, stressing and ultimately killing the inner bark (phloem) tissue. This also occurs when trees are planted too deep (the root flare is buried). Phloem death may also occur when pop-up sprinkler heads continually saturate the mulch placed against the plant's trunk.

Once the inner bark dies, roots become malnourished and weakened, with a subsequent reduction in water and nutrient uptake. The entire health of the plant is thus affected. If such wet conditions continue long enough, the phloem tissue may die, starving the roots since they then receive none of the essential photosynthates produced by the leaves.

**Disease.** Most fungal and bacterial diseases require moisture to spread and reproduce. Trunk diseases gain a foothold into the moist, decaying bark tissue under the mulch. Once established, the disease organisms ultimately invade the inner bark, starving the plant, and finally kill the plant. Often this scenario is accompanied by bark beetles and borers, that are also attracted to stressed plants, expedite the decline, and also allow entrance of other fungal pathogens into the plant.



**Excess heat.** The wet mulch layers piled up next to the trunk may begin to heat up when the bark begins to decompose. This scenario is similar to composting, where temperatures within inner mulch layers may reach 120° to 140° F. This high heat may directly kill the inner bark/phloem of young plants, or may prevent the natural hardening off period that plants must go through in the fall in preparation for the winter. **If the trunk flare tissue is not sufficiently hardened off before freezing weather arrives, the tissue may die, the roots may starve, and the plant will decline.**

### Other Drawbacks of Over-Mulching

The **soil pH**, or acidity level, may also be changed by the continuous use of the same type of mulch. In particular, pine bark mulch is quite acidic (pH of 3.5 to 4.5), and can cause the soil to become acid with constant use year after year. After the soil becomes acidified, some nutrients are not available to the plant, and others, such as iron, manganese, and zinc, become readily available at high, toxic levels. Symptoms of micronutrient toxicity mimic those of *Phytophthora* wilt. Sometimes, plants cannot tolerate micronutrient toxicity, becoming stressed and killed by secondary disease organisms and insects.

On the other hand, hardwood bark is initially acidic, but ultimately may cause the soil to become too alkaline (basic), causing acid loving plants (such as azaleas and rhododendron) to decline because of micronutrient deficiencies of iron, manganese and zinc. Symptoms appear as yellowing of foliage, often with prominent green veins. To avoid the above mentioned problems, regularly check the soil pH and rotate the type of mulch used.

Piles of mulch next to the trunk may also provide cover for chewing rodents such as mice and meadow voles. These rodents live under the warm mulch in the winter and chew on the nutritious inner bark. This often goes unnoticed until the following spring when the “tree doesn’t look good.” If the trunk is girdled (>50% chewed around the trunk), there is little that can be done to save the plant outside of bridge grafting.

“Fresh,” or non-aged (uncomposted) mulches may cause **nitrogen deficiencies** in many young plants.

Decomposing bacteria need an ample supply of nitrogen to break down the mulch. Since bark mulches have little nitrogen available, the bacteria utilize the soil nitrogen. This process may cause nutrient deficiencies, especially if the mulch is mixed down into the soil and is of a fine texture. Look for symptoms of leaf yellowing on new growth. This is considered a temporary condition.

### Standard Mulch Recommendations

Mulch may thus be one of the best or one of the worst things you can do for your plants. Mulch depth should standardly not exceed 3 inches. However, on poorly drained soils, mulch depths should not exceed 2 inches, especially for shallow rooted plants. Wet soils may not need any mulch. Coarser textured mulches can be placed a bit deeper due to better oxygen diffusion into the soil. Finer textured mulch, such as double shredded mulch, may need only a 1- or 2- inch layer.

If you have a problem with excess mulch, dig through the landscape to see how deep the mulch really is. A light raking of existing mulch may be all that is needed to break through the crusted or compacted layers that can repel water. Pull mulch back from plant stems and trunks—a rule of thumb is 3 to 5 inches away from young plants, and 8 to 12 inches away from mature tree trunks. Visually look for the presence of a root flare; if not visible, at least some may be partially buried and must be exposed. Remove all soil or mulch up to the junction of the roots and trunk collar (taking care not to damage the tender bark) to expose the root collar. Leave the resulting well open and exposed to air. Research shows that an amazing number of plants have rapidly improved in color and vigor within months of root collar excavations.

In conclusion, mulch may be “worth its weight in gold,” but it must be applied properly for it to pay off (and not cause damage...).

### Reference

C. Carlson. 1998. Off the Leaf newsletter #303. (May/June).

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Desktop publishing by Rutgers-Cook College Resource Center

Revised: April 2000

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