

Girdling Roots

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Girdling roots are lateral roots that emerge at or slightly below the soil surface and cut into at least one side of the main trunk. These roots restrict the movement of water and nutrients to the leaves as they put pressure on the trunk. Affected trunks/stems will eventually become weakened and the tree may die in five to fifteen years from the girdling roots alone, or in conjunction with environmental stresses or insect/disease attack. Cultural practices like fertilization, irrigation, and pruning will not offset the slow growth caused by girdled roots. Once identified, they should be treated promptly.

Causes and Prevention

Buried root collar tissue and the formation of girdling roots is associated with placing too much soil over the roots. The formation of girdling roots is triggered by nursery and transplanting practices, soil obstructions, and other unknown factors.

When plants are held in containers for too long, many roots begin to circle around the pot (Figure 1). These circling roots can eventually girdle the tree. When

Figure 1: Roots growing in containers frequently begin circling if the plant is held in the container for too long



planting trees and shrubs with these circling roots, be sure to loosen these roots from the container root ball and spread them out in the planting hole before back filling. Circling roots two or more years old will be woody and may have to be cut and removed from the root system because they will have taken the permanent shape of the container and cannot bend enough without breaking. Although this reduces the size of the root system, it will prevent the development of girdling roots in the future.

When a planting hole is not dug wide enough or deep enough, bare-rooted stock may be twisted into the hole in order to make the plant fit. This undesirable practice can cause roots to encircle the trunk and become girdling roots. Be certain to make planting holes wider than the root area in order to prevent girdling roots from forming.

Another major cause of girdling roots is planting in very compacted soil where the new roots have difficulty growing out of the planting hole and into the surrounding hard soil. Roots can circle at the bottom of the planting hole, not unlike those growing in an undersized container. Eventually, several of these roots can begin girdling the trunk (Figure 2). Other soil obstructions like foundations, curbs, or large rocks

can also deflect roots and may contribute in some cases to the development of girdling roots.

Figure 2: Roots circling a small planting hole. These roots girdled the trunk, weakening the tree and causing it to fail during a high wind event



Symptoms and Detection

Trees which leaf out late, have small chlorotic leaves or needles, drop their leaves early, and are dying back should be checked for girdling roots, particularly if the normal flare or buttress swell is absent. Note, however, that not all girdled trees exhibit the crown symptoms commonly attributed to girdling roots.

Probably the most reliable aboveground indicator of a girdling root is a trunk indentation or flattening at the base of the bole. Non-girdled trees rarely show this abnormal development.

Most affected trees are not severely girdled, with few roots ever circling more than 50% around the bole. Since most girdled trees are girdled by more than one root, careful examination around the entire circumference of the trunk may be necessary. Species like sugar maple, Norway maple, and white pine are particularly prone to forming girdling roots. Soil excavation is often needed to detect girdling roots.

A large majority of girdling roots are found in the top several inches of soil, although they can develop at a

greater depth. Frequently, they can be seen on the surface where erosion has removed one or two inches of soil from around the base of the trunk. Some girdling roots will be present at the soil line.

Treatment and Removal

A girdling root must be removed in a manner that will minimize injury to the trunk cambium located beneath the root. First, excavate soil from around the girdling root, uncovering the entire length to be removed. Using a chisel or saw, cut the root at a point 6 – 12” out from the trunk (Figure 3). The final cut is made where the root attaches to the trunk. This prevents the root from being pulled violently away from the embedded area, causing extensive cambium injury if the root happens to be under tension. It is important to note that occasionally it is best to leave the girdled root where it is after it has been cut as the trunk and cambium would be damaged severely by gouging out the deeply embedded root. Detach and remove the root if it is not embedded very deeply or allow the root to decay away over time.

Figure 3: Removal of a small girdling root located beneath the soil surface



Very large girdling roots should not be completely removed since they may be supplying large amounts of water and nutrients to the canopy. They may be removed in stages over time to allow the tree to slowly compensate for the loss of water and nutrient flow. If dieback occurs, removing dead branches is recommended.

