



CHECK YOUR TIES!
TREE TIES CAN
GIRDLE THE TREE
TRUNK IF LEFT IN
PLACE TOO LONG
OR IF TOO TIGHT!

TSU NURSERY NEWS TO USE

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WEED OF THE MONTH: Cyanobacteria aka *Nostoc* (and various other species)

Have you noticed a greenish-brown slime covering the gravel or soil in and around a container production area or shade house? This gelatinous mat is commonly mistaken as algae, but is most likely a cyanobacteria (a photosynthetic bacteria) referred to as *Nostoc* that can produce its own food by utilizing sunlight, carbon dioxide, and available nutrients. Cyanobacteria can be beneficial to the environment (they produce oxygen and fix nitrogen), but *Nostoc* mats are very slippery and pose a safety and health hazard for nursery workers. *Nostoc* thrives in hot, high moisture environments (container pads, greenhouses, etc.), absorb excess nutrients (runoff from nursery containers), and can grow on numerous surfaces throughout the nursery (soil, gravel, fabric barrier, concrete, etc.). Although *Nostoc* may become dry and flaky and seem to die under low moisture conditions, these organisms can survive for long periods of drought and be revived when moisture becomes available. Poor drainage and excessive nutrient runoff from containers enhances *Nostoc* growth and spread. Best management practices for controlling *Nostoc* include reducing the number of irrigations per day to allow the surface areas to dry between irrigation events and irrigating for shorter periods to minimize nutrient leaching from containers. Dried *Nostoc* residue can be physically removed by raking/grading, but leftover material will regrow and care must be taken to not infest new areas. Unfortunately, chemical control of *Nostoc* has proven difficult and with varied success due to the multiple species found in nurseries. The pesticides TerraCyte PRO (sodium carbonate peroxyhydrate) and Zerotel 2.0 (hydrogen peroxide + peroxyacetic acid) have been reported to kill *Nostoc* in nursery settings, but multiple applications will be required. Please contact Dr. Anthony Witcher (awitcher@tnstate.edu) for more information on nursery weed control practices.



Cyanobacteria, *Nostoc*.species PHOTO CREDIT: Dr. Anthony Witcher



WHEN ROOTS GO WRONG! Girdling roots are lateral woody 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, and visa versa, as they put pressure on the trunk. Affected trunks/stems will eventually become weak and the tree may die from the girdling roots alone, or in conjunction with environmental stresses or insect/disease attack. Girdling roots may girdle other roots. Cultural practices like fertilization, irrigation and pruning will not offset the slow growth and premature death caused by girdled roots.

SYMPTOMS AND DIAGNOSIS. One of the most obvious symptoms of root girdling is a flattened or depressed trunk, on one or multiple sides. Non-girdled trees rarely show this abnormal development. This indicates that something is pressing on the trunk, below ground. Usually tree trunks flare out where they enter the ground. Girdling roots will prevent the collar flare. The threat depends on the size of the root and the amount of the tree's trunk affected. Other symptoms of girdling roots include: leaf scorch, early fall color, early leaf drop, damage on one or two branches; abnormally small leaf size; excessive twig dieback, the appearance of large, dead or leafless branches (flagging); a thin crown, overall stunting; and/or leaning, and increased susceptibility to environmental extremes and other biotic problems. Many of these symptoms can also be characteristic of other causes, such as drought or nutrient imbalances. The only sure way to determine if a girdling root is the cause of a problem is to examine the root system and its relationship to the tree trunk before installation. Examine the tree before it is installed.

GENETICS OR CULTURAL PRACTICES? Many tree roots tend to circle naturally, such as sugar, red and Norway maple, pine and magnolia. Cultural practices that may cause girdling include poor growing practices. The formation of girdling roots can be triggered by nursery and transplanting practices. If held in containers too long, roots may begin to circle. These circling roots can eventually girdle the tree. Poor planting techniques may also cause roots to girdle. Buried root collar tissue and the formation of girdling roots is often associated with placing too much soil over the roots. When root systems are buried, less oxygen and water is available. The roots will grow up towards the surface of the soil and tend to encircle the trunk. The more deeply buried the roots are, the fewer the roots available for the tree to become established. Additional practices that can adversely affect natural growth include planting in a hole that is too small so roots cannot easily spread out; planting container grown trees that have roots growing in a circular pattern; and planting a bare root tree by twisting roots to fit into a small hole.

PREVENTION. First and foremost, inspect the root system before planting. When planting trees with circling roots, be sure to loosen these roots from the container root ball and spread them out in the planting hole before back filling. Remove any girdling root on bare-root plants. Cut through any circling roots of container-grown plants in a few places. 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 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. If a planting hole is not dug wide or deep enough, bare-rooted stock may be twisted into the hole in order to make the plant fit. This practice can cause roots to circle the trunk and become girdling roots. 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. Just remember, girdling roots can be prevented. It's all about observation and correct propagation and installation!



Girdling roots (above) and flattened trunk (below) on tulip poplar; PHOTO CREDIT: Amy Dismukes



River birch held in container too long; PHOTO CREDIT: Amy Dismukes