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THE PURDUE LANDSCAPE REPORT

In This Issue

Horned Oak Galls Can Make a Mess out of Pin and Related Oaks

(Cliff Sadof, csadof@purdue.edu)

The horned oak gall making wasp, *Callirhytis cornigera* (Osten Sacken) causes pin and willow oaks to produce large numbers of round, spiked woody galls up to 2 inches in diameter around the stems of pin and willow oak trees. These galls will girdle limbs and can kill the portion of the branch that extends from the gall. Galls can't be removed without cutting twig tissue. On small trees gall makers can significantly alter the shape of trees when they attack the structurally significant branches like the central leader. Heavy infestations can kill oaks in urban plantings.

Figure 1. The horned oak gall maker can produce large galls with and without horns. In the older literature these galls were also called gouty oak galls.

Figure 2. Adult gall making wasps emerge from horns or holes in galls in the spring and lay eggs on young expanding oak leaves.

Female wasps emerge from woody galls in early spring (April) and lay eggs into the swelling leaf buds. Each egg hatches into a larva that produces a small blister gall along the vein on the undersides of leaves. In summer (June) adults fly from leaf galls and lay eggs into twigs. The resulting galls become visible the following spring as small bumpy areas on twigs. Over the summer each twig gall expands and increases in size. Galls continue to grow two years until adults emerge in early spring to lay eggs on to leaf buds. Large groups of individual galls will grow together over this time to create spiked galls along branches. These galls can eventually girdle twigs and kill branches.

Figure 3. Eggs laid by the wasp produce galls on the midribs of leaves. Adults emerge from these galls in June to lay the eggs on twigs that produce galls and new adult wasps 33 months later.

Figure 4. Small galls on the right side of the photo taken in late July are galls produced from females who laid eggs on twigs in June of the previous year (13 months). Galls of this size will not produce adult wasps. It has been 25 months since gall makers laid eggs in these medium size galls. Adults will emerge the following April (33 months) to lay eggs in expanding oak leaves. These 37-month old galls had wasps emerge 4 months earlier in April.

Remove young expanding twig galls as soon as they are visible in the spring. Cutting off old, dried galls is not necessary. Applications of insecticides can kill leaf galls, but do not reduce the number of new stem galls produced. Research conducted to date has been promising, but slow going. Use of long-lasting products such as emamectin benzoate injections every two years in May have been shown to reduce the production of stem galls. But with a 33-month life cycle, it takes a long time to start seeing results. Don't expect miracles.

What Happened to Surflan (oryzalin)?

(Kyle Daniel, daniel38@purdue.edu)

Surflan (oryzalin) is a part of many preemergence weed control programs. Being in the dinitroaniline (DNA) herbicide family (along with trifluralin, pendimethalin, prodiamine, and others), this product controls many weeds with minimum phytotoxicity to landscape plants. Oryzalin is also on the lower end of preemergence herbicide pricing, thus increasing the use of this product. You may have noticed that Surflan has been in short supply or completely unavailable at your distributor over the last year.

Figure 1. Surflan is in short supply, but there are plenty of other products that can be substituted.

Finding oryzalin has not been difficult to find in just your area, as this is a worldwide problem. Global supply has been dwindling for over a year. There has been some speculation that the production factory of this product had previously been damaged.

https://weeds.ces.ncsu.edu/2021/01/surflan-oryzalin-limited-supplies-and-uncertain-future/

The United States is not alone in the impact of losing this product, as oryzalin has been used extensively in the Australia nursery industry for many years. Greenlife Industry Australia has also reported the discontinuance of oryzalin, and the importance of finding alternative products.

https://www.greenlifeindustry.com.au/communications-centre/pre-emergent-herbicide-formulation-change

Surflan is not the only herbicide that uses oryzalin. In addition to Surflan, some combination herbicides that contain oryzalin include Rout, XL, and Surflan XL. Some of these products may still be available, but the supply will dwindle down until the oryzalin stock is depleted.

When considering a replacement, it is important to consider the primary weeds at the location, soil type, and your herbicide rotation to prevent resistance. To stay with the same family of herbicides, replacements in the landscape and nursery can include trifluralin (Preen), pendimethalin (Pendulum), and prodiamine (Barricade), or a combination product. The DNA herbicides share similar characteristics that are important to consider. Photodegradation (breakdown of the herbicide by the sun) and volatility are relatively high compared to most other herbicides. All of the DNA herbicides require a rain event or irrigation soon after application to prevent these potential problems. Another way to prevent these problems, and potentially give some time for the rainfall or irrigation, is by

placing these products below mulch when possible.

https://www.purduelandscapereport.org/article/above-or-below-mulch-should-you-apply-preemergence-herbicides-before-or-after-mulching/

As with replacing glyphosate, there is not a perfect replacement (https://www.purduelandscapereport.org/article/beyond-roundup-alternatives-to-consider-adding-to-your-weed-management-plan/). It will be important to match the weeds present with the best herbicide.

Stem Girdling Roots

(John Bonkowski, jbonkows@purdue.edu)

Determining the cause of dieback and decline symptoms in landscape trees can be very difficult due to the many cultural, environmental, and biological factors that could be involved. The first place you should look for a culprit when dealing with this type of tree problem is the base of the trunk and the roots. Stem girdling roots (SGR) are one of the most common and preventable causes for long-term tree decline.

An SGR is as it sounds: a root that girdles the stem. This is important because it is the tree unintentionally killing itself as it grows, leading to long-term decline. Root and trunk diameter increase as they grow and if they are in contact with each other, they will create a layer of compression that begins to strangle the tree, disrupting the flow of water and nutrients moving from the roots and carbohydrates moving down from the leaves (Figure 1, 2). The rate of root and trunk growth is not exceptionally fast and the effects of the SGR takes time to become apparent, if it is apparent at all. Some trees to not exhibit the typical decline symptoms, but instead they may begin leaning in the landscape or fail and fall over during heavy winds due to the roots completely girdling the trunk, creating acute compression at one point, and leading to structural instability. These types of situations can cause trees to either have a one-side trunk flare, no trunk flare (especially if the SGR is below the soil line), or have a thickened area at the root-trunk interface (Figure 3, 4, 5).

Figure 1. A single root girdling to primary roots and part of the trunk of a tree.

Figure 2. A stem girdling root partially hidden under turfgrass.

Figure 3. A maple tree that lacks a root flare due to a stem girdling root.

Figure 4. Swollen base of a tree due to an SGR.

Figure 5. Multiple stem girdling roots wrapping the base of a tree leading to a large swollen trunk.

SGRs tend to develop due to external factors such as adverse site conditions or improper planting procedure. If the soil is severely compacted or the roots come into contact with an impermeable surface, the roots will grow in a direction in order to get around the impediment. If the roots are unable to grow around the compacted area, it may circle back towards the tree and begin to encircle the tree. These roots may eventually grow into the stem and become SGRs.

How do SGRs develop if your soil is not compacted or the tree isn't planted in an enclosed space with limited area? Planting a bare-root tree into a hole that is too small for the root system can lead to forcing roots into different directions or even circling the planting hole. If a tree is planted at the correct depth, you can cause SGRs to develop by applying too much mulch (i.e. volcano mulch). The tree can be tricked into thinking that the soil line became higher and put out adventitious roots into this "new soil" and potentially become encircling roots, although this is not always the case.

One of the most common problems that lead to SGRs are pot-bound nursery stock (Figure 6, 7). The longer a plant is grown in a container, the greater the chance there will be roots that hit the side-wall of the pot and begin to grow around the outer edge. If the tree was re-potted with some force, the roots can be pushed into different directions that might lead them SGRs as well. Air pruning containers can get around this issue since the roots stop growing as soon as they come into contact with air and are being used with greater frequency in the industry.

Figure 6. A newly planted tree with an existing encircling root that will develop into an SGR. Photo Credit: Carrie Tauscher

Figure 7. An encircling root that was cut at planting to avoid a future SGR. Photo Credit: Carrie Tauscher

Removal of girdling roots, when identified, can remediate the issue if the SGR is not too severe (very large root proportional to age/size of tree OR very deep compression into stem). In many cases the roots that need to be removed are fairly large in diameter still play an important role of providing a conduit for secondary and tertiary roots to move water and nutrients into the body of the tree. If multiple SGRs are present on one tree, it may be necessary to remove the worst affecting root first and allow the other to remain for some time (one or two seasons) to acclimate to the loss of a major root before removing the other root.

Where possible, it is a much easier and less damaging task in preventing SGRs from developing. This means ensuring you have good soil conditions (not compacted), adequate space for the planting hole, and screening your trees either prior to purchase or planting for encircling roots and SGRs. Please see the following link for recommendations concerning tree installation.

https://www.extension.purdue.edu/extmedia/FNR/FNR-433-W.pdf

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(Kyle Daniel, daniel38@purdue.edu)

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