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THE PURDUE LANDSCAPE REPORT

In This Issue

Beat Back Borers Attacking Pines and other Cone Bearing Trees

(Cliff Sadof, csadof@purdue.edu)

Trees stressed by prolonged drought are more subject to attack by boring insects. This article provides tips and a video link on how to manage pines for borers.

Record breaking heat and sporadic rainfall during July of 2023 took their toll on landscape trees. Cone bearing evergreens, like white pines, are especially susceptible to drought and flooding. These environmental stresses reduce the ability of trees to defend themselves against boring insects. To make matters even worse, insect borers use their keen sense of smell to guide them to these stressed trees. Trees often take several years to recover from drought. Monitoring trees for early signs of decline is critical to a successful management program.

Early intervention can help you keep infested trees from becoming a breeding ground for borers that can destroy an entire planting. Trees that are more than half dead, or those whose needles are mostly yellow are usually too damaged to save. Removing these trees in late fall and winter removes the reproducing borers from the landscape *before* borers they can emerge to attack healthy trees. As an extra protective measure, insecticides can be applied on to the trunk to kill boring insects chewing into or out of the trees. Apparently healthy trees located near borer-infested trees can also benefit from a soil applied insecticides, like imidacloprid or dinotefuran applied in fall and early spring.

Figure 1. By the time all pine leaves are yellow, it is too late to save a tree.

Figure 2. Fine powdery sawdust left by bark beetles and fine shavings of sawyer beetles are signs that a tree may already be too damaged to save.

Figure 3. Zimmerman pine moth caterpillar in wound.

Zimmerman pine moth (ZPM)commonly attacks pine trees in late July. Adult female moths lay eggs at the junction of tree branches and the trunk and winters in cracks and crevices. In early spring, when forsythia bloom, larvae bore inside the trunk and can girdle and kill branches and trees leaders. These are the two times of year that this borer is most susceptible to insecticides. Note soil applied imidacloprid is not particularly effective against ZPM. Spruces and most pines are susceptible to this borer.

Figure 4. White-pine leader attacked by weevil.

White pine weevils attack the central leader of the pines, when forsythia bloom in early spring and Norway spruce in and will emerge from shoots in late July. When practical, pruning out the infested shoots before adults have emerged from shoots. Early spring application of long lasting insecticides, or soil applications of imidacloprid can also reduce problems with this pest.

Figure 5. Holes and pitch tubes of pine engraver beetle.

Several species of bark beetles attack pines in Indiana. They actively fly in April and May to attack trees. Adults mate on the trees in the spring and lay eggs in channels beneath the bark. Eggs hatch from egg laying chambers and make distinctive patterns before emerging as adults in mid-summer and again in September.

Figure 6. Bark of heavily infested pine trees can come off in sheets.

By the time pine sawyer beetles attack pine trees, they often have already been attacked by bark beetles and may even have been infested with the nematodes that cause pine wilt disease. Tree removal is the best option for control on these trees.

For more details on how to detect and manage borers, please view this short video in English Beating Back Borers on Pines and other Cone Bearing Evergreens, or Spanish Manejo de Barrenadores de Pino and consult the Purdue Plant Doctor web page.

Additional Resources:

Borers of pines and other needle bearing evergreens in the landscape

PlantDoctor YouTube Play list

Blasted Clematis Blight

(Janna Beckerman, jbeckerm@purdue.edu)

Wet summer weather always brings in a surplus of plant diseases, but few are as dramatic as clematis blight, caused by the fungus now called *Calophoma clematidina* (formerly *Ascochyta or Phoma clematidina)* (Fig. 1). The rest of us simply call it clematis blight or clematis wilt. Why the confusion with both the common and Latin names? Not surprisingly, the answer is complicated, but if you continue reading, it will be as clear as a summer day in Indiana, in 2023!

Figure 1. Clematis blight. Photo by Janna Beckerman.

Blight Versus Wilt

Clematis blight causes dead leaf spots (Fig. 2) that appear during wet weather, from late spring throughout summer. The spots are often light brown in the center with a dark ring between dead and healthy tissue. The edges of the spots may be defined by leaf veins, creating an irregular, mosaic appearance. Small, black pustules may be seen within the spots when using a hand lens.

Figure 2. Clematis blight close-up. Photo by Janna Beckerman.

Blight is defined as “a disease or injury of plants marked by the formation of lesions, withering, and death of parts (such as leaves and tubers)”. Understanding how a single fungal pathogen can produce symptoms of blight or wilt is more readily understood by revisiting the disease triangle. If the foliage is affected earlier than the stems, leaves turn brown and ‘blight’. However, if the crown or stems are infected first, leaves may wilt and then discolor. Symptom development depends upon site of infection, how susceptible the host plant is and how conducive the environment is to driving disease.

Unfortunately, wilt is the term often used to describe a subset of plant diseases that infect and spread through the vascular tissue (examples include oak wilt, Verticillium wilt and Dutch elm disease, to name but a few). *Calophoma* is not a vascular pathogen and unfortunately, should not have been called a wilt, even though wilting is a common symptom associated with the disease. *Calophoma* penetrates into the epidermal cells where it spreads throughout the tissue, unlike true wilts that only spread within the vascular tissue.

Phoma, Ascochyta and Calophoma

So, why all the Latin names? Prior to DNA analysis of fungal samples, plant pathologists and mycologists could only examine the fruiting bodies and spores under a microscope (Fig. 3). These structures were then compared to previously compiled descriptions of fungi. One system for fungal identification, devised by the Italian mycologist Pier Andrea Saccardo, consisted of over 1200 hand drawn images of fungi (not surprisingly called the Saccardoan system), using the asexual spores (conidia) and fruiting body. As seen in Figure 3, the fungus that causes clematis blight produces both one-celled spores (*Phoma*) and/or two-celled spores (*Ascochyta*). However, DNA analysis is consistent that the same fungus is producing both one- or two-celled spores, and both are now identified as *Calophoma*.

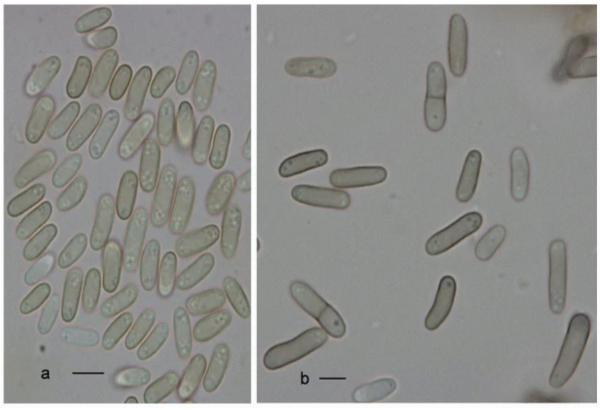

Figure 3. Conidia of Phoma clematidina in vitro (a) and in vivo (b). Bars = 5 µm. From Golzar, et al 2011. First report of Phoma clematidina the cause of leaf spot-wilt disease of Clematis pubescens in Australia. Australasian Plant Dis. Notes 6, 87–90. https://doi.org/10.1007/s13314-011-0030-x

How to Right the Blight

Clearer than the diagnosis and taxonomy is the management of this disease, although “Phoma” diseases have always been challenging. Start with disease-free material, sited to receive at least 6 hours of sun per day, keeping plants well-spaced to allow foliage to dry to protect against foliar disease.

Make sure you know your clematis group to know how and when to prune appropriately. Lee Reich has an excellent article on how to prune each group of clematis. Pruning at the appropriate time to keep the canopy open and to remove diseased tissue is another component of disease management. Thick, dense, overgrown clematis provide an extremely conducive environment for this disease, so pruning to improve canopy airflow and to reduce leaf wetness is important to keep plants healthy. Keep in mind that some varieties of clematis only flower on old wood, and pruning to eliminate disease tissue may also eliminate blooms! After pruning (and when appropriate) preventative applications of fungicides in early spring through summer may be needed to keep plants looking good season-long. In the landscape, Daconil Weatherstik, Emblem, Orkestra, Pageant, Palladium, Postiva, and Trinity are all labeled for Phoma control in the landscape. Applications need to begin to protect new growth (early spring) and continued as per label recommendations during wet weather.

Smaller flowered clematis species, like *Clematis alpina, C. macropetala, C. montana*, and *C. viticella* are reported to be resistant based upon grower survey (van de Graff et al. 2001), but keep in mind that ‘true’ species clematis aren’t widely grown, an actual cultivar trial was never performed, and all of these species are incorporated into different larger flowered cultivars.

Clematis blight is unsightly, but rarely fatal on its own. Remember: 1. Make sure plants receive at least 6 hr of sunlight; 2. Prune and space plants so they aren’t crowded and leaves can dry; 3. Apply fungicides to prevent disease and 4. Prune out and dispose of infected tissue.

References:

van de Graff, P., O’Neill, T.M., Chartier-Hollis, J.M., and Joseph, M. E. 2001. Susceptibility of clematis varieties and species to stem infection by *Phoma clematidina* as an indicator for resistance to wilt. European J. of Plant Pathology 107:607-614.

Help IR4 Help You!

(Kyle Daniel, daniel38@purdue.edu)

Help IR4 Help You!

The IR-4 Project provides the research necessary for pesticide registration on ornamental plants. IR4 operates as a unique partnership between the U.S. Department of Agriculture (USDA) – both the National Institute of Food and Agriculture (NIFA), the Cooperative State Research Education and Extension Service (CSREES), the Agricultural Research Service (ARS), the State Agricultural Experiment Stations (SAES), the U.S. Environmental Protection Agency (EPA), the agrochemical industry, commodity groups, and growers.

The IR-4 Project is seeking your help to identify which pathogens, pests and weeds are most difficult to manage because you do not have enough crop protection tools for a solid rotational and integrated management program. Please take just 5 minutes of your time to fill out this survey which will guide how IR-4 focuses research funds for 2024 and 2025! Let people know if your industry needs assistance better managing everything from Asplenium to Zinnia!

Another Case of Mortality from Planting Trees Too Deep

(Kyle Daniel, daniel38@purdue.edu)

Stop me if you’ve heard this one…. A tree is in a slow decline year after year. You are called to your client’s property only to find the root flare well below grade.

Figure 1. A tree that’s planted too deep can have bark decay from too much soil moisture around the trunk.

Most professionals in the Green Industry have encountered this at some point in their career. The most common reason for the slow decline of trees in the landscape is due to the depth of planting and girdling roots. Deep planting can cause a number of deleterious problems, including an increase in circling/girdling roots restricting vascular tissue and decay of protective bark (Fig. 1). The vascular tissue in the bark is located on the outer portions of the trunk, while the anatomy of roots contains the vascular tissue in the center. This is why roots can graft with roots and stems can graft with stems, but also why roots can girdle the stems of trees (Fig. 2)

Figure 2. Root girdling can occur on trees that didn't have a root correction during transplanting and/or being planted too deep. Restriction of vascular tissue in the trunk will decrease the amount of water and nutrients taken up by the tree.

Excessive mounding of mulch (aka volcano mulch) (Fig. 3) can contribute to tree decline, very similar to a tree planted too deep. It's important to remember that keeping mulch several inches away from the trunk is imperative in tree health.

Figure 3. Volcano mulch can cause the same problems that a tree planted too deep can experience.

If a newly transplanted tree is planted significantly too deep, a faster decline can occur, especially in plants that can't tolerate 'wet feet' (aka too much soil moisture) (Fig.4). In heavy-clay soils, the negative effects on tree health increase by creating a bath-tub situation by water not draining expeditiously after a rainfall or irrigation event.

Figure 4. Decline of this juniper is caused by this tree being planted too deep.

Figure 5. The root flare on trees in natural areas is very visible. This gives a lesson on proper planting into the landscape.

The root flare should be visible when transplanting trees into the landscape (Fig. 5). If no root flare is present, which is often on many conifers and smaller deciduous trees, the top most root should be considered at grade, or top of the root ball.

Always make sure to plant at grade, though there are a few minor exceptions, and never plant below grade (Fig. 6). Planting correctly is vitally important to the long-term viability of trees.

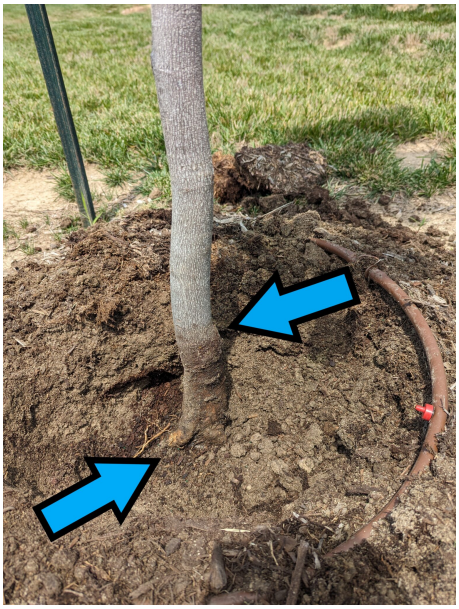

Figure 6. This tree was planted significantly too deep and has led to decline and death.

Resources:

Using Pneumatic Digging Equipment to Correct Root Deformations, Deep Planting, and Compaction on Established Trees

Stem Girdling Roots

New Invasive Predator of Honeybees

(Bob Bruner, rfbruner@purdue.edu), *(Tom Creswell, creswell@purdue.edu)* & *(Cliff Sadof, csadof@purdue.edu)*

A new invasive insect of concern has been identified in the state of Georgia. In August of 2023, Georgia's Department of Agriculture, along with the USDA, confirmed the presence of the yellow-legged hornet, *Vespa velutina*, outside of the city of Savannah. To date, this is the only confirmed identification of this insect in the United States; it has already established in Europe, the Middle East, and parts of Asia outside of its native range. *V. velutina* is a native of the subtropical and tropical regions of southeast Asia, and it is not yet clear how it arrived in North America. Much like the northern giant hornet, previously known as the Asian giant hornet or 'murder hornet', this insect will attack honeybee hives in search of food and represents a potential danger to the beekeeping industry.

Figure 1. Yellow-Leg Hornet. Image Credit: Allan Smith-Pardo, Invasive Hornets, USDA APHIS PPQ, Bugwood.org

Yellow-legged hornets are predators and will regularly attack honeybees to provide food for their young, though it is possible they could attack other, similar species. Since honeybees concentrate their numbers in hives with a lot of in-and-out traffic, they provide an excellent opportunity for the hornets to hunt and provide food for their young. The hornets are effectively ambush predators, waiting in front of hive entrances and capturing workers with their legs as they leave the hive. The hornets then dismember the bees, returning to their young with only the thorax, which contains the largest amount of protein. However, it is believed that yellow-legged hornets only represent a lethal threat to weaker hives that are already experiencing problems; it is also too early to tell how already-existing honeybee issues, such as mite and disease issues, will interact with the presence of this insect.

The yellow-legged hornet, much like other members of Order Hymenoptera, is a social insect. They create oval or egg-shaped nests in trees that can house as many as 6,000 individuals. Colonies are composed of a foundress and her young, who become the workers within the colony. Female hornets will overwinter within tree hollows, leaf litter, or other environmentally stable locations, and once spring arrives, they start their own colony and give birth to new workers who care for young and hunt.

As with any new invasive species, it is critical to successful identify it and differentiate it from other species of wasps and hornets that we experience in the Midwest. At a glance, the yellow-legged hornet is barely discernable from European hornets, yellowjackets, and similar insects; they possess aerodynamic shapes with heavy yellow and black color patterns like many of their cousins. The most easily identified trait is their namesake: the legs of this insect tend to be black closer to the body, with the lower half of the leg bright yellow. The segments of the abdomen follow a similar pattern, with those segments closer to the center of the body being dominated by black, steadily becoming more yellow as you reach the tip of the abdomen. The yellow-legged hornet is also approximately an inch in length, with reproductive individuals sometimes reaching an inch and a half.

While remaining observant will be critical to reporting any invasive species, there are a few things to keep in mind about the yellow-legged hornet. This insect has only been found in one location in Georgia; no other states have any sightings or confirmed reports of this insect. There is also no evidence the insect has established a population in Georgia, there is only one confirmed sighting. The best course of action for now is to be vigilant and report any potential sightings by calling 1-866-NOEXOTIC, or you can contact our local Purdue Extension educator for assistance.

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