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THE PURDUE LANDSCAPE REPORT

In This Issue

Unexpected Dead Leaves? They might be the last sign of the 17-year cicada

(Elizabeth Barnes, barne175@purdue.edu)

Dead leaves covering trees (image 1) or on the ground beneath them (image 2) in July would normally be a worrying sign for tree health, but this year much of the damage can be blamed on 17-year cicadas. This damage is unlikely to cause serious trouble for healthy, large trees and management is relatively simple. The choice to prune or not to prune comes down to cost, aesthetics, and concern for the next generation of cicadas.

Image 1. Cicada damage is typically restricted to the small, outer twigs. Trees may be completely covered by cicadas or have a few isolated dead twigs. All trees in these images are expected to suffer no serious long term effects from this damage. Images by Clifford Sadof of Purdue University and Pennsylvania Department of Conservation and Natural Resources – Forestry.

Image 2. The dead twigs killed by cicada egg laying may break off the tree and litter the ground underneath. Image by Pennsylvania Department of Conservation and Natural Resources – Forestry.

Image 3. Cicada egg laying damage varies between tree species, but is consistently in a straight, length-wise line along the branch. Note that all four examples also have signs of either puncture marks, cracks in the bark, or some combination of the two. Images by John Ghent, Clifford Sadof of Purdue University, Tim Tigner of Virginia Department of Forestry, and Pennsylvania Department of Conservation and Natural Resources – Forestry.

How Cicadas Damage Plants

Cicada damage is similar to a light pruning and should not be an issue for healthy, mature trees. Cicadas damage trees when they lay their eggs in small twigs (3/16 to 1/2 inch in diameter) on deciduous trees and shrubs. They have a long, thin body part called an ovipositor that resembles a sewing needle that they stab into plants to lay their eggs. This action creates small holes and cracks in the bark (image 3). If enough cicadas lay their eggs

in a twig, it can damage the bark enough to kill the twig (image 1).

Recognizing Cicada Damage

The degree of cicada damage depends on insect density and the number of trees in the area. To determine if a tree or bush has been damaged by cicadas, ask the following questions:

1. Were there 17-year cicadas within 50 meters (~164 ft) of the tree this year? Cicadas do not travel very far. If there weren't noticeable numbers of 17-year cicadas nearby the damage was likely caused by something else.
2. Is the damage on a deciduous tree or bush? Cicadas rarely lay their eggs on evergreen trees and herbaceous plants. Damage on these types of plants is likely caused by something other than the cicadas.
3. What size of branches and twigs are damaged? Cicadas show a strong preference for small twigs (3/16 to 1/2 inch in diameter). As a result, damaged trees may appear as though their outer layer of leaves is dead while the inner leaves remain healthy (image 2). If larger branches are dead, the damage was probably not caused by cicadas.
4. Does the bark have typical egg laying damage? If you can reach the damaged twigs, look for a row of puncture wounds often connected by cracks length-wise along the branch. Their appearance may vary between tree species (image 3), but they will almost always be length-wise.

What to Do

Cicada damage should not be an issue for large, healthy trees but it is possible that the egg laying wound might act as an entry point for a pathogen or that some other issue might be mistaken for cicada damage. Therefore, regardless of how you choose to proceed we suggest keeping an eye on your tree and watching for signs of further issues (See our article on checking your tree for basic signs and symptoms of ill health).

Once you have confirmed that the tree has been injured by cicadas, there are several options for dealing with it depending on what your goals are.

- If you **want to remove the dead twigs or want to decrease the number of cicadas in the future**, you should prune the twigs within the next 3-4 weeks and move the trimmings to another site. Cicada eggs take from 4-6 weeks to hatch. If twigs are not trimmed before that time, many of the cicadas may hatch and drop into the soil. Although some of the cicada eggs are likely to be killed in the trimming process, many will survive. If the trimmings are left under your trees, the cicadas will burrow into the soil and begin the cycle again.
- If you **want to remove the dead twigs but want to protect the cicadas**, you should delay pruning until at least October. Although many cicada eggs will survive the trimming process, the best way to ensure their safety is to leave them on the tree until they hatch (~4-6 weeks). We suggest that you wait until fall to prune to avoid a late flush of leaves which could stress your trees or bushes.
- If **you are not concerned about the dead twigs and want to protect the cicadas**, you do not need to prune. The dead twigs themselves are unlikely to cause a serious issue for your trees or bushes.

Resources

Find a certified arborist
Cicada Information

Diagnosing Herbicide Injury on Ornamentals

(Kyle Daniel, daniel38@purdue.edu)

Diagnosing herbicide injury on ornamental plants can be difficult due to the sheer number of cultivated plants and the number of active ingredients used around ornamentals. Modern cultivars of ornamental plants include characteristics much different from the species, so it's important to know 'normal' to properly diagnose a problem.

Figure 1. Though this plant appears to be a variegated specimen,

this is actually burning bush with diuron injury. Photo by Kyle Daniel

There are several reasons that herbicide injury is common on ornamentals:

1) The landscape contains several/many different species of plants in a relatively small area.

2) There are many species of weeds found in the landscape, thus multiple herbicide modes of action are utilized.

3) Ornamental plants are often located near a monoculture (i.e. turf or agronomic fields) that use growth regulator herbicides, which can cause significant damage to ornamental plants.

The three most common causes of herbicide injury on ornamentals include:

1) Drift

2) Volatility

3) Misapplication

-Wrong time

-Wrong product

-Overspray

To properly diagnose herbicide injury, it's very useful to know a detailed history of the property. Fertilizer and pesticide applications, irrigation, soil amendments, and other details can help in diagnosing potential herbicide injury. Sometimes a client will not be familiar with the history of the site, so once other potential issues are eliminated (i.e. insects, disease), noting symptoms and recognizing where on the plant the damage occurs can be helpful in determining the herbicide causing the damage.

1) Contact damage: Necrosis occurs only where herbicide was applied (not translocated via the vascular system).

2) Translocated:

– Xylem mobile: Damage first appears in old growth due to water being needed for photosynthesis travelling to mature leaves. (examples: sulfentrazone, mesotrione)

-Phloem mobile: Damage first appears in new growth due to developing growth requiring sugars/photosynthate. (examples: 2,4-d, dicamba)

– Ambimobile: Damage appears in both old and new growth. (example: glyphosate)

Figure 2: Contact herbicide damage from paraquat on sycamore. Photo by Kyle Daniel

Figure 3: Damage from 2,4-d on sycamore. New growth demonstrates curling/epinasty. Photo by Kyle Daniel

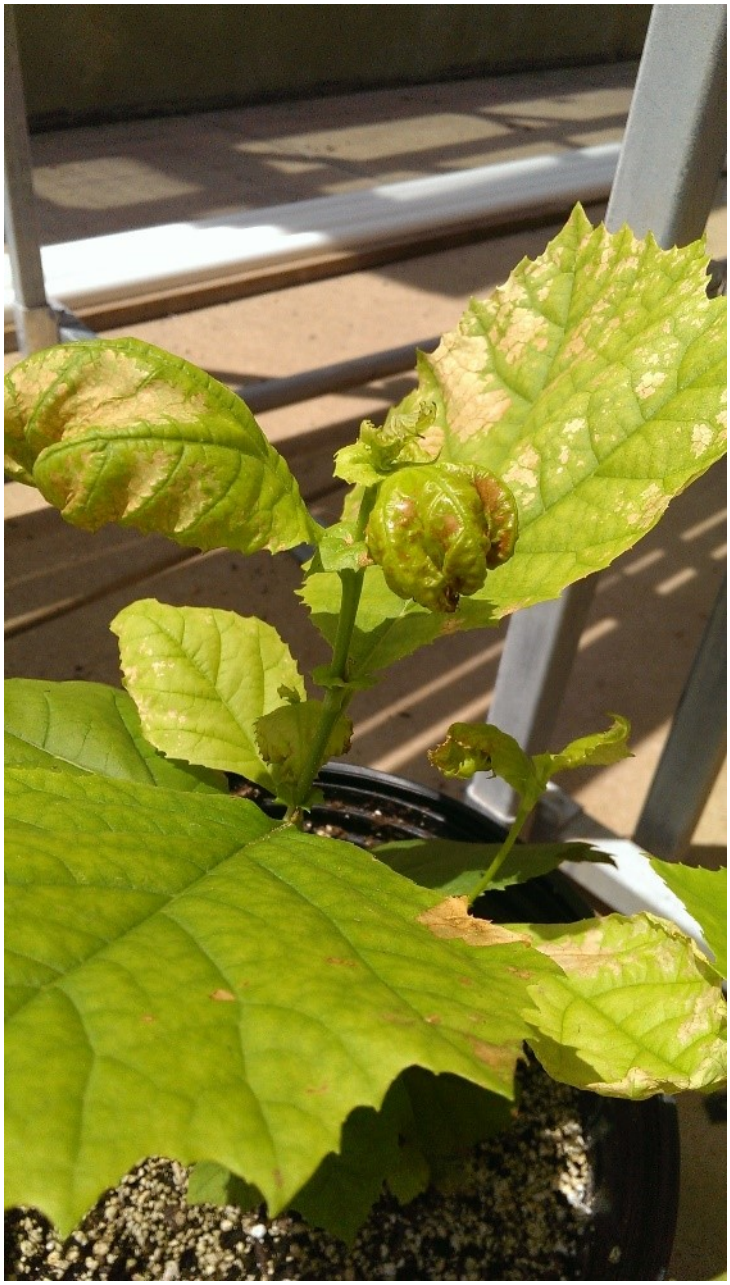

Figure 4: Glyphosate damage on sycamore. Older growth shows minimal symptoms, while new growth symptoms are similar to growth regulator herbicide injury (i.e. 2,4-d). Photo by Kyle Daniel

Rhizoctonia Web Blight

(John Bonkowski, jbonkows@purdue.edu)

Rhizoctonia is not very picky. The fungus has a very wide plant host range where it can act as an endophyte, not causing damage to the colonized plant; a mycorrhizal symbiont, in some cases being essential for the hosts survival, like in some orchid species; and, as we commonly see it, a pathogen that causes disease. Rhizoctonia is often founding attacking small plants, causing root rot, stem rot, and damping off of young and/or stressed plants in moist to wet weather (Figure 1).

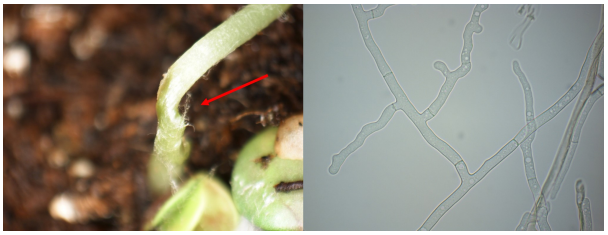

Figure 1: Left – Damping off caused by Rhizoctonia with hyphae visible growing from the affected stem; Right – microscopic image of Rhizoctonia hyphae.

Figure 2: Chrysanthemums showing web blight symptoms in both the upper and lower canopy. Note that symptoms are more severe in the lower canopy.

Figure 3: Web blight symptoms on container grown rosemary (left) and arborvitae (right).

Figure 4: Begonia infected with Rhizoctonia, causing leaf blighting and some defoliation.

Another disease caused by certain strains of Rhizoctonia, which is not seen as often, is described as web blight due to the profuse amount of fungal hyphae covering the infected tissue which is killed fairly rapidly. Foliage may develop small tan, dark brown, or black lesions that expand overtime to blight infected tissue (Figure 2 and 3). Defoliation may occur, leading to foliage falling on uninfected leaves below (Figure 4) or blown by wind to neighboring plants, but blighting can occur so rapidly and the fungus can produce so much mycelium that the leaves are held onto the plant. On individual plants, symptoms tend to develop in the inner canopy first, but when plants are crowded, blighting can occur throughout the entire canopy. At first glance, symptoms may look like gray mold, but the lack of spores and gray coloration can help separate it from a Botrytis infection, especially when using a hand lens. Symptoms can develop within 4-7 days during summer months, favored by temperatures between 68 and 90 degrees Farenheit, with fastest spread between 75-86 F.

Rhizoctonia is a primarily a soilborne fungus that does not readily produce spores. It grows as hyphae in the soil, within/on plants, and survives as sclerotia during periods of adverse environmental conditions. Sclerotia are dense aggregates of hyphal tissue that tend to darken over-time. These structures can last live for years within the soil and continue to germinate and infect plants. Either by hyphae or by sclerotia, Rhizoctonia is easily spread by introducing contaminated soil from one location to another or from infected plants to healthy plants. Water splash during rainy weather can lead to some soil movement into the canopy where the fungus may begin to infect susceptible hosts.

Disease severity is higher in situations where there is high relative humidity and low air circulation, which typically is seen in nurseries and greenhouses with high plant densities and plants with dense canopies. Web blight is best managed by cultural practices, where possible, but fungicide applications can help in mitigating the damage this fungus causes. Scouting for this disease, especially when it is a known problem, should be done on a weekly basis due to how quickly the disease can develop and spread.

Production systems

– Avoid overhead irrigation; irrigate early in the day
– Avoid overcrowding
– Do not re-use potting media; if re-using pots and flats, wash thoroughly/sanitize as needed
– Use clean/healthy starting material
– Increase air flow by increasing plant spacing (and use of fans in greenhouse conditions)
– Avoid moving soil or potting media from one location/block to another
– Avoid handling or working in plants when wet
– Remove and destroy infected plant material

Landscape Settings

– Avoid overhead irrigation; irrigate early in the day
– Avoid overcrowding
– Prune limbs to increase air circulation within the canopy
– Apply mulch to reduce the potential for water splashing soil into the canopy
– Remove and destroy infected plant material

Table 1: Select list of hosts susceptible to web blight

Common Name	Genus Scientific Name
Arborvitae	*Thuja*
Azalea	*Rhododendron*
Barrenwort	*Epimedium*
Bee Balm	*Monarda*
Begonia	*Begonia*
Chrysanthemum	*Chrysanthemum*
Columbine	*Aquilegia*
Dahlia	*Dahlia*
Dianthus	*Dianthus*
Douglas Fir	*Pseudotsuga menziesii*
Fern	*various*
Gerbera Daisy	*Gerbera*
Goldenrod	*Solidago*
Hibiscus	*Hibiscus*
Holly	*Ilex*
Hydrangea	*Hydrangea*
Iris	*Iris*
Juniper	*Juniperus*
New Guinea Impatiens	*Impatiens hawkeri*
Peony	*Paeonia*
Rosemary	*Salvia*
Stonecrop	*Sedum*
Tickseed	*Coreopsis*
True Fir	*Abies*
Verbena	*Verbena*
Zinnia	*Zinnia*

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