

Canopy Decline Field Diagnostics *by Dr. Stephanie Adams*

Trees have a limited number of ways to express their health problems. These expressions come in the form of what we call symptoms. Symptoms are a plant's expression of a change in their normal biology and physiology. Examples of symptoms include leaf spots, cankers, and wilt. Symptoms occur when something, such as an insect pest or a disease-causing microbe (pathogen), invade the plant's tissues and cause disruptions. These disruptions can prevent the movement of water from the soil, through the roots, up the stem and branches, and to the leaves.

When you see wilt symptoms only on one live-but-declining branch, you know that the causal problem can be found either on the leaves or lower down on the branch that supports those leaves. This is often seen in early stages of oak wilt and Dutch elm disease when beetles are responsible for introducing the fungal pathogens into branches in the upper canopy of the trees. It can also be seen

when cankers are girdling branches or when there is mechanical injury (example: squirrel chewing).

When you see uniform decline symptoms across the entire canopy of a tree (see white oak in figure 1) the problem can be found on the branches, stem, or roots that support the entire canopy. When doing field diagnosis of trees with this level of decline and we are asked what the problem is, the most accurate answer can only be, "For some reason water is not getting to the canopy." Then we have to investigate further to identify what might be causing the problem.

The next step in the diagnostic process is to generate a species-specific list of problems that could result in the symptoms being observed. For white oaks these reasons can include: drought, flooding, root rot of the fine/hair roots, and soil compaction/disturbance. A big part of the diagnostic process is using critical thinking skills to rule out items on this list.

Some of these will be answered if you get a history of the site. If there had been construction near the tree in the last 7-years it would be worth your time to check for soil compaction. Soil compaction can prevent water moving into the tree due to the loss of water- and air-pore spaces and mechanical injury which result in fine and woody root death. Dead fine roots do not absorb water.

Reflect on the recent precipitation history to determine whether it could be caused by drought. An easy way to identify flooding or too much water is to dig down to 10" (or one shovel scoop) and see if the soil is brown and healthy looking or if the soil is grey and smells sour or acid. If it is grey and bad-smelling, it indicates that there is too much water and the soils have become anaerobic (lack oxygen). This causes the death of fine roots.

Finally, inspect the fine roots. The fine roots are responsible for water and nutrient absorption and mycorrhizal associations. If they are not present or not healthy, the whole tree will suffer. Healthy fine roots are firm and round, they can be rolled between two fingers. The bark of these roots is



Figure 1. White oak (*Quercus alba*) with uniform dieback symptoms across the entire canopy.

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Don't forget to visit the IAA Website for updates on events, certification classes, and important issues impacting our industry.

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Illinois Arborist Association

Mission Statement

"Foster interest, establish standards, exchange professional ideas and pursue scientific research in Arboriculture"

President's Message

Hello members,

The IAA Board and office has done a terrific job putting together more than forty great opportunities to learn and connect with one another. I encourage everyone to check out our calendar of events on the IAA website. Attending these events and getting the chance to talk to one another allows for personal growth and some unbelievable gained knowledge. The branches of arboriculture spread in so many directions. Commercial, Utility, Municipal, Research, and others have different day to day operational goals. It's good to get to know one another so when our branches eventually cross, we all have a greater understanding of one another. Our rec climbs, TCC, golf outing, conferences, training, and social events allow us to spend time with one another which is a great benefit to not only each other, but our industry. The IAA Board looks forward to seeing as many people as possible at our upcoming events. Lastly, the busy season is getting started for many of us. Make sure you're ready. Get the proper training, give the proper training, and be safe.

Illinois Arborist Association President,

Tony Dati



Canopy Decline Field Diagnostics (cont.)

intact and firm and should not be easily peeled off. Inside of the roots, under the bark, is typically white to a creamy-white color. They usually smell



Figure 2. Healthy fine roots with the smallest class of roots. Orange-yellow threads are the hyphae of mycorrhizal fungi.

earthy. When the fine roots are present and healthy you can sometimes find the threads (hyphae) of mycorrhizal fungi among the roots (Figure 2). Unhealthy roots, or roots with root rots, are squishy and flat, the inside of the roots are tan, brown, to black in color, and the bark can easily be removed (degloved) from the inner root. They also lack the finest class of fine roots (Figure 3).

If you suspect the tree has a root rot, have them tested by the University of Illinois Plant Clinic. Having the root rot diagnosed will allow you to develop a management plan that is appropriate for the host tree species, the site, and for the causal pathogen.

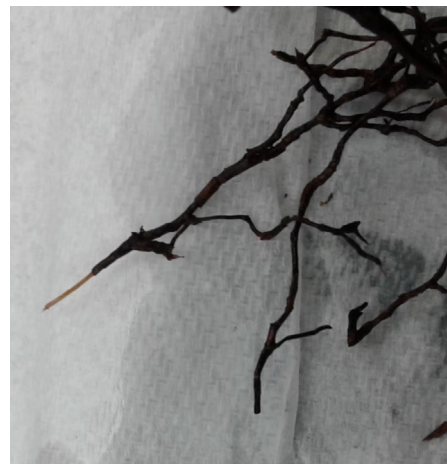


Figure 3. Fine roots with a root rot. Symptoms include a lack of the smallest class of roots (compare to roots in Image 3) and the bark is sloughing (degloving) from the center of the root.

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It's Mushroom Hunting Time! *by Mike Priller*



Morel mushrooms definitely rule the spring, but there are quite a number of other edible mushrooms that can be found growing in Illinois, including pheasant backs, oysters, chicken-of-the woods, chanterelles, lion's mane, and black trumpet. If you know your mushrooms, you can collect wild [edible mushrooms](#) all year long!

The best place to look for morels in Illinois is **along the edge of forested areas** where you find oak, elm, aspen and ash trees growing. In the early spring as the ground heats up, look for morels on slopes that face south in the open areas. As spring continues its warming trend, hunt for them along north-facing slopes deeper into wooded areas. Morel mushrooms begin to appear during spring's warming days in southern to central Illinois and about two weeks later in northern Illinois. Five species of morel mushrooms – the edible morels include the black, white and yellow morels – grow in the state.

Black morels emerge first from the end of March through early April with yellow and white morels springing up one to two weeks later, overlapping the black morel growing season.

The foraging season is over by the first two weeks in May in southern to central Illinois, but it continues for about two additional weeks in the northern part of the state. Morel foraging season lasts about four weeks in total for each mushroom type. Find some and enjoy...

Hen of the Woods

Hen of the woods fruits anytime from early September to late November and seems to be triggered by the first cold nights at the end of summer.



It is most often found around the bottom of the trunks of dead or dying oak trees, but under dead maple trees is a possibility. They are often hard to see because their color can blend in with fall leaves. Be prepared because when you find one, it could be bigger than you want to handle yourself. Look for a large rosette with spoon or fan-shaped caps. Once you find one, go back the next year and you're likely to find another. Hen of the woods is a fall delight. It has a rich flavor with a firm texture that lends

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~ Calendar of Events ~

April Events

April 25th - Spring Day of Service at Camp Fire- Kata Kani

Bolingbrook, Illinois

[Click here to register](#)

April 27th, NWMF (6:00pm - 8:00pm) Dr. Fredric Miller - Pest and Diseases of Trees Update

Moline, Illinois - Moline Public Works

[Click here to register](#)

April 29th, Tree Climbing Competition Demonstration Event (7:00am - 2:00pm)

Wheaton, Illinois - Cantigny Park

[Click here to register](#)

May Events

May 4th, Arborist Certification Exam (6:00pm -10:00pm) *Check in 5:30pm

Rockford, Illinois

[Click here to register](#)

May 20th & 21st, (8:00am) Illinois Tree Climbing Competition - Salt Creek Forest Preserve

Wood Dale, Illinois

[Click here to register](#)

May 23rd & 24th, (8:00am - 3:00pm) Tree Worker Domain - Present Day Climbing - Triangle Park

Lake Forest, Illinois

[Click here to register](#)

May 23rd - 25th, (8:00am) SIU Forestry Field Days - Dixon Springs Agriculture Center

Dixon Springs, Illinois

[Click here to register](#)

May 27th, (7:30am - 4:00pm) Tree Site & Selection Domain - Species Requirements Module

Wheaton, Illinois (Cantigny Education Center)

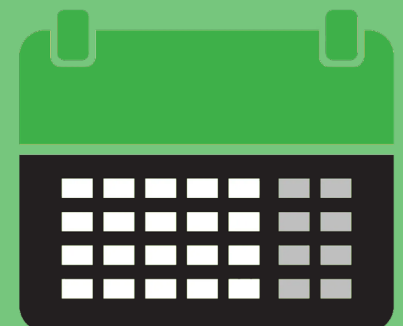
[Click here to register](#)

July Events

July 12th - 13th, IAA Annual Summer Conference

Normal, Illinois

[Click here to register](#)



It's Mushroom Hunting Time! (cont.)

itself to almost any recipe. It is usually bug free, at least inside the flesh. Pick over it but unless it is over the hill you will not find much bug larvae. It is also easy to store. Chop it into pieces and store in re-closeable bags in the freezer. It is also good for you. Studies are beginning to reveal immune enhancing and cancer preventing properties.

Try searching out these fall mushrooms abundant this time of year. It is fun to search for these mouth-watering delights, but it's important to be certain what you have is hen of the woods and not a poisonous look-alike. There are mushroom identification books or the internet to guide you in the right direction. Hen of the woods is a meaty mushroom, it's delicious in soups or my favorite, a simple Sauté:

- 1 pound hen of the woods mushrooms
- 2 tablespoons butter
- 2 tablespoons olive oil
- 2 large shallots, finely chopped (I personally use 1 medium shallot)
- 1 clove garlic, minced
- 1 teaspoon fresh thyme leaves (no stems), finely chopped
- Salt and pepper to taste

Brush any soil off mushrooms and cut into 1-inch dice. Melt butter with oil in large skillet over medium-high heat. When butter stops sizzling, add mushrooms; sauté until tender, about 4 minutes. Add shallots, garlic, thyme, salt and pepper. Sauté 2 minutes and serve. ENJOY!!!!

Chicken of the Woods

Where to find Chicken of the Woods? Its taste is amazing! It tastes like chicken! But



before tasting it, you have to hunt it. Chicken of the woods is not that rare! It is actually quite common. But you still have to know where to find it. The mushroom known as “chicken of the woods” is commonly found in Illinois during the fall.

There are two species of chicken of the woods mushrooms: The *Laetiporus cincinnatus*, which has a creamy colored underside, and *Laetiporus sulphureus*, which has a yellowish appearance and is also known as the "Sulfur Shelf."

The size of chicken of the woods can range from 2 to 10 inches in diameter, and they grow as a broad, (rather stunning) fan-shaped mushroom on the side of trees. They grow in multiple overlapping layers that resemble small shelves or the layered shingles of a roof in appearance. The mushroom caps can appear smooth or slightly wrinkled depending on the state of maturity and age, but chicken of the woods do not have gills like many popular types of mushrooms you'll find at the supermarket. As they grow, they commonly change color; chicken of the woods can start out as a yellow to orange color and fade to a pale shade of cantaloupe or white when they mature. The mushrooms are most commonly found on the side of tree trunks, old stumps, or injured roots.

Many people who are new to [foraging](#) (for mushrooms and other delectable food items) will note that chicken of the woods mushrooms are fairly simple to find. Given that they are located growing on the sides of trees, chicken of the woods aren't exceptionally difficult to spot — and because of their unique appearance, they're not easily confused with other mushroom varieties.

Chicken of the Woods is likely to grow on dead or dying trees. They can be found regularly on deciduous trees and it grows best on Oak trees. It can sometimes be found on eucalyptus, yew, sweet chestnut, and willow.

Here a just a few of the mushrooms locally found in Illinois and the Midwest, get out and enjoy the Hunt!!! You will enjoy the “fruits” you find.

Summer Conference

July 12th & 13th, 2023 (Wednesday – Thursday)

Bloomington-Normal Marriott Hotel & Conference Center – 201 Broadway Avenue, Normal, Illinois 61761



THURSDAY ALL DAY: 13 JULY 2023

7:00 to 8:00 am: Check in and Breakfast

8:00 to 8:15 am: Welcome and Announcements (**Toni Dati**)

8:15 to 9:00 am: Field Program at ISU

Arboretum (Approximately 45 minutes per session and 3 groups rotating between sessions with Chelsi Abbott, Fredric Miller, and Aaron Schulz/Steve Lane)

- Group A: Field Diagnosis of Abiotic and Biotic Diseases – Chelsi Abbott
- Group B: Field Diagnosis of Insect and Mite Pests – Fredric Miller
- Group C: Tree Risk Assessment: An Overview of Advanced Tools and Methods – Aaron Schultz/Steve Lane

9:00am to 9:45am:

- Group A: Tree Risk Assessment: An Overview of Advanced Tools and Methods – Aaron Schultz/Steve Lane
- Group B: Field Diagnosis of Abiotic and Biotic Diseases – Chelsi Abbott
- Group C: Field Diagnosis of Insect and Mite Pests – Fredric Miller

9:45am to 10:15 am: Mid-Morning Break

10:15am to 11:00am

- Group A: Field Diagnosis of Insect and Mite Pests – Fredric Miller
- Group B: Tree Risk Assessment: An Overview of Advanced Tools and Methods – Aaron Schultz/Steve Lane
- Group C: Field Diagnosis of Abiotic and Biotic Diseases – Chelsi Abbott

11:00am – 12:00 noon

Attendees walk the campus, look at the other tree issues, and enjoy the arboretum.

12:00 to 1:00 pm: Lunch and View Exhibits and Visit with Vendors

1:00 to 2:15 pm: Using Lab Techniques for Disease Diagnosis – Stephanie Adams

2:15 to 3:00 pm: Introducing the IAA Advanced Training Program for 2023 and Beyond – Aaron Schultz, Steve Lane, and IAA Advanced Training Committee

3:00 to 3:15 pm: Closing Comments and Wrap Up –

WEDNESDAY EVENING:

JULY 12th, 2023

5:00 to 6:00 pm: Dinner, Open Bar, and “Catching Up and Renewing Old Contacts”

7:00 to 8:30 pm: Subject

Matter Round Tables

Discussions

- **Field Diagnosis of Abiotic and Biotic Diseases** – Chelsi Abbott
- **Diagnosis of Insect and Mite Pests** – Fredric Miller
- **Tree Risk Assessment: An Overview of Advanced Tools and Methods** – Aaron Schultz/Steve Lane
- **Using Lab Techniques for Proper Disease Diagnosis** – Stephanie Adams

(Attendees will rotate between Round Tables at approximately 20 minute intervals)



Mark Your Calendar: 41st IAA Annual Conference November 6-8, 2023!

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Why Attend?
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2023 Tree Climbing Championship Prize Packages

2023 ArborMaster TCC Climbing Kit Prize Package

The Illinois Arborist Association is pleased to announce the 2023 ArborMaster TCC Climbing Kit Prize Package for the Tree Climbing Champion (TCC), held in conjunction with the chapter's 2023 Tree Climbing Championship (TCC) event.

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The Challenge of Managing Scale Insects *by Dr. Fredric Miller*

Of all of the insects we have to deal with on our woody plants, scale insects are probably some of the most challenging. There are several reasons for this, the first being scale insects do not really look like typical insects. Yes, they have the standard equipment of six legs, a pair of antennae, and mouthparts, but they are not always easily seen or recognized. Second, because of their protective waxy coverings they are usually very well-protected from any contact insecticides. Third, scales can blend in with their environment and look like a part of the bark or other plant parts. Finally, the most vulnerable stage of scales is during the “crawler” stage or 1st instar scale which limits the application window for using contact insecticides.

In this article I will discuss the two major groups of scales, the biology and identification of some of the more common scales we encounter, their importance as woody plant pests, and suggested scale management

tactics. Keep in mind, there are always exceptions, so the information I present here is in very general terms. For more specifics on a particular scale species, consult the references at the end of this article.

So, why are scales important pests of our woody plants? Scales are sap-feeders and can rob the plant of vital nutrients and water which are the essential ingredients in photosynthesis, by which plants make their “food” (i.e. carbohydrates and sugars). While low levels of scales on a plant may not be very harmful, heavy scale populations can kill twigs and branches, and weaken the plant to the point where it is susceptible to lethal secondary wood-boring insects, pathogens and/or abiotic factors. In some cases, they can kill whole plants if left unchecked. Also, the infested plant will look “sickly” and may not provide the desired benefits and attributes of a healthy plant. Additionally, the honeydew that is produced by the soft scales provides a ready food source

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The Challenge of Managing Scale Insects (cont.)

for the sooty mold fungus which will cover the stems and leaves with a black, soot-like coating which is very unsightly and interferes with photosynthesis. Typically, scale populations do not explode or build up nearly as rapidly as other sap-feeding insects and mites such as aphids and spider mites, but must be monitored over time and managed before they reach damaging levels..

Scale insects are divided into two major groups, soft scales and armored (i.e. "hard") scales. Additionally, there are some very important differences between the two groups including their appearance, biology, pest status, and management tactics. **Soft scales** are generally "helmet-shaped"; produce honeydew (a clear, sugary, sticky liquid), have one generation per year, and the "crawlers" (i.e. first nymphal life stage upon hatching from the egg) are more mobile than their armored scale "cousins moving from the twigs and branches upon hatching to the foliage and back again. Examples of common **soft scales include the lecanium scale complex, cottony maple, and magnolia scales.** In contrast, armored scales are more flat in cross section (i.e. lateral or side view), resemble a target with a point in the center with concentric circles, do not produce honeydew, have two or more generations per year, and the "crawlers" are much less mobile than soft scale crawlers. Because of their reduced mobility, generations of armored scales tend to settle close together resulting in multiple generations of scale bodies over time. They can be easily overlooked and may even blend in with the bark. Commonly encountered **armored scales include pine needle, euonymus, obscure, and oyster shell scales.** Additionally, I have received reports of **gloomy scale** becoming a problem in areas of south-central and southern Illinois.

So, let's review the biology of some of the soft scales. The majority of soft scales

overwinter as immature, fertilized females. In the spring, the immature females complete their development, lay eggs, and the eggs hatch in late spring.

The **lecanium scale (Parthenolecanium corni)** is helmet-shaped, about the size of a pencil eraser, initially may be a light brown eventually changing to a dark brown to inky black. The scale has a very broad host range including many common landscape trees and shrubs and is commonly found on the twigs and branches of host twigs and branches (Johnson and Lyon, 1988). Lecanium scale crawlers are active in spring when *Hydrangea arborescens* 'Grandiflora' is in full bloom (900-1,200 DD50). Other good indicator plants include wild carrot (*Daucus carota*), Ohio buckeye (*Aesculus parviflora*), elderberry (*Sambucus canadensis*) all in bloom (Orton, 2007). Lecanium

Cotton maple scale (Pulvinaria innumerabilis) has a similar life cycle (i.e. crawlers present at 900 to 1,200 DD50 with similar indicator plants), but is most commonly found on silver maple (*Acer saccharinum*) (Johnson and Lyon, 1988, Orton, 2007). However, cottony maple scale may also infest hackberry (*Celtis occidentalis*), ash (*Fraxinus* spp.), honey locust (*Gleditsia triacanthos*), Malus spp., sycamore (*Platanus occidentalis*), Prunus spp., willow, and linden (*Tilia* spp.), and woody shrubs such as flowering quince (*Chaenomeles speciosa*), sumac (*Rhus* spp.), currants (*Ribes* spp.), roses (*Rosa* spp.), spirea (*Spiraea* spp.) lilac (*Syringa* spp.), and viburnum (*Viburnum* spp.) (Johnson and Lyon, 1988). Cottony maple scale can be easily recognized by the large female cottony-like egg sacs associated with the dark brown scale body. From the distance, the scale looks like popcorn, but definitely does not taste the same. This scale also produces copious amounts of honeydew which will accumulate on car windshields, hoods, and door handles, sidewalks, decks, and deck furniture. This is when the homeowner first notices an infestation.

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The Challenge of Managing Scale Insects (cont.)

Probably one of the more challenging soft scales we encounter is the **magnolia scale (*Neolecanium cornuparvum*)**. It is native insect and is the largest of our soft scales reaching about ½ inch in length (Johnson and Lyon, 1988). It only feeds on magnolia including *Magnolia acuminata*, *M. stellata*, *M. quinquepeta*, and *M. soulangeana*. Because of its size, the scale produces copious amounts of honeydew which leads to heavy levels of the sooty mold fungus on twigs, branches and leaves of the host plant making them very unsightly. In late April or early May, the overwintering 1st instar nymphs become active and continue to grow and develop throughout the summer turning from a gray early on to a fleshy pink and finally a deep purple with a white powdery covering. Young crawlers emerge in later August through early September and which wander about for a short time eventually settling on twigs in preparation for overwintering (Johnson and Lyon, 1988). **The big difference with the magnolia scale is the crawlers are not present in early summer like other soft scales, so crawler sprays should be applied in late summer when they are active.**

Armored scale biology is somewhat similar, but these scales tend to have a much narrower host range with the exception of the oyster shell scale, and tend to overwinter as eggs except for euonymus scale which overwinters as a fertilized female.

The pine needle scale (*Chionaspis pinifoliae*) resembles 1/8 inch long white flecks on the needles of pines and spruces and is most common on Scots pine (*Pinus sylvestris*) and mugo pine (*P. mugo*). It can also be found on Colorado blue spruce (*Picea pungens*) (Johnson and Lyon, 1988). In spring, the eggs hatch and bright red crawler emerge from under the dead female scale (200 to 350DD50) for the first generation.

Indicator plants include horse chestnut (*Aesculus hippocastanum*), crabapple (*Malus* spp.), and honeysuckle (*Lonicera korolkowii* 'Zabelii'). Second generation crawlers will begin to appear around 1,600 to 1,700 DD50 when *Hydrangea arborescens* 'Grandiflora' blossoms are turning white to green (Orton, 2007). Second generation pine needle scale will continue to develop into late summer-early fall, the males and females will mate, and the females will lay eggs that overwinter. The male and females scales die, but may remain on the needles for several seasons.

Euonymus scale (*Unaspis eouynmi*) is an exotic scale that feeds primarily on *Euonymus*, *Buxus*, *Hedera*, *Hibiscus*, *Lonicera*, *Pachysandra*, and *Prunus* spp (Johnson and Lyon, 1988). In my experience, euonymus appears to be the most common host in our area. The scale overwinters as an adult female and evidently it did not get the memo regarding overwintering as an egg like other armored scales. Female scales are gray to brown and circular while the males resemble an elongated white fleck. Both sexes can be found both on the foliage and the woody parts of the plant (Johnson and Lyon, 1988). In spring, the overwintering female lays her eggs when *Spiraea x vanhouttei* finishes blooming (900 to 1,000DD50) and continues for about one month. Egg hatch and crawler activity begins when *Hydrangea arborescens* 'Grandiflora' is in early bloom. All scale stages are present on current season's growth when the blooms of *Hydrangea arborescens* 'Grandiflora' blooms are changing from white to green or when *Catalpa speciosa* is blooming. A second generation occurs in mid-summer to late summer (Orton, 2007).

The obscure scale (*Melanaspis obscura*) and gloomy scale (*M. tenebricosa*) have somewhat similar life cycles. The obscure scale is considered one of the more serious scale pests of residential and parkway shade trees in the eastern United States, but is not a problem

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on forest trees (Miller and Davidson, 2005). Principle hosts of **obscure scale** include *Quercus* (particularly pin oak), *Castanea*, and *Carya* spp. (Johnson and Lyon, 1988). This scale differs from the other armored scales as it produces only one generation per year. On pin oak (*Q. palustris*), males and females overwinter and then begin to mature in early May. Eggs are laid in July through September. Peak crawler activity is usually in July, but may appear in August on white oaks (*Q. alba*) and in July on red oaks (*Q. rubra*) (Miller and Davidson, 2005). The scale is very tiny (i.e. size of pin head) and heavy infestations will look like ashes have been sprinkled on the trunk and main branches. The scale prefers to infest the underside of main branches and the tree trunk (Johnson and Lyon, 1988). Heavy infestations can kill twigs and branches.

I have received reports of gloomy scale being more common and becoming a problem in southern Illinois. Gloomy scale (*Melanaspis tenebricosa*) has a similar life cycle to obscure scale, but preferred hosts include silver maple (*Acer saccharinum*) and red maple (*A. rubrum*). Other hosts include sugar maple (*A. saccharum*), elm (*Ulmus* spp.), hackberry (*Celtis occidentalis*), and sweetgum (*Liquidambar styraciflua*). The scale is similar in appearance to obscure scale and may resemble clusters of pin-head-sized “bumps” on the bark that may look like lenticels. Immature gloomy scales will appear cream-colored while adult females turn to pink or purple. Gloomy scale can be very challenging to control because the insects tend to settle close together (common with most armored scales) resulting in layers of scales, eggs are laid over an extended period which results in an extended active crawler period, and crawlers tend to settle underneath older scale clusters which affords them protection from contact insecticides and natural enemies (Johnson and Lyon, 1988,

Miller and Davidson, 2005). This extended life cycle can lead to plant stress and in some cases, plant death (Johnson and Lyon, 1988).

Our final armored scale, **oyster shell scale (*Lepidosaphes ulmi*)** has a brown and gray race as has been observed by Mr. Don Orton (Orton, 2007). This scale has many potential woody plant hosts including both trees and shrubs. For a list of host plants, consult Johnson and Lyon, 1988, Miller and Davidson, 2005, and Orton, 2007. Both races overwinter as eggs. Young, brown-race crawlers emerge in mid-spring (275 to 500DD50) when *Spiraea x vanhouttei* is in full to late bloom and gray-race crawlers are active when *Spiraea x vanhouttei* has finished blooming (400-600DD50). The gray race has only one generation per year (common north of I-80) while the brown race has two generations per year. Second generation crawlers are active when *Hydrangea arborescens* ‘Grandiflora’ blossoms are turning from white to green (1,600 to 1,700DD50) (Orton, 2007).

Here are a few helpful clues to for proper field diagnosis and identification. First, the scale you see on your plant is typically the female. Most adult male scales are very small winged insects and rarely observed exception being the male euonymus scale appears as a white fleck. **Second,** most scale insects are fairly host specific and their common name usually coincides with their primary host. For example, euonymus scale is only found on euonymus plants and magnolia scale on magnolia species. Like all things in biology, there are exceptions. Oyster shell can be found on many different woody plant and tree hosts and the lecanium scale complex is common on many fruit trees and ornamental plants. **Third,** know where the scale resides on the host plant. For instance, obscure scale of pin oak likes to live on the trunk and the undersides of the main branches, and pine needle scale is typically found on the needles of host pines. In contrast,

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euonymus scale can be found on the woody portions of the plant (twigs and stems) as well as the leaves. The same goes for oyster shell scale, but it is more common on the trunks, stems, and branches of woody plants. Finally, look for the absence or presence of honeydew and sooty mold (black fungus lives on the honeydew) on the leaves and stems. If you do not see honeydew or sooty mold, you know it is an armored scale and not a soft scale.

With the exception of the magnolia scale (crawlers emerge in late summer-early fall), most soft and armored scale crawlers are active in early to mid-spring (i.e. May to early June), but is weather dependent. Where possible, make sure of degree days (DDs) and plant phenology to fine-tune insect life stage development and timing of management tools. The young scale crawlers are very vulnerable to any kind of a contact insecticide, but once they molt to the next instar (i.e. stage of an insect between molts), they are pretty well protected from any contact spray due to the waxy, water-proof covering they secrete. If you choose to use a contact crawler spray, be sure to thoroughly cover the plant to make sure the roaming crawlers come in contact with the insecticide, but at the same time very careful not to harm beneficials (i.e. predators and pollinators). Spraying very early in the morning or late in the evening, when honeybees are not as active, can help minimize bee kill. Avoid spraying around flowers or when plants are in flower to minimize exposure to pollinators. Also, be very aware of honeybee hives in your area and be a good neighbor and notify the

local beekeeper well in advance that you will be spraying. Keep in mind that honeybees can fly a mile or more in search for good nectar sources. Systemic insecticides can also be used, but are only effective against soft scales and not armored scales. For additional information on scale identification, biology, pest management, and specific insecticide recommendations refer to the references at the end of this article and/or consult the University of Illinois Extension for the latest products, rates, and timing of applications.

Always be sure to read and follow the label when applying insecticides!

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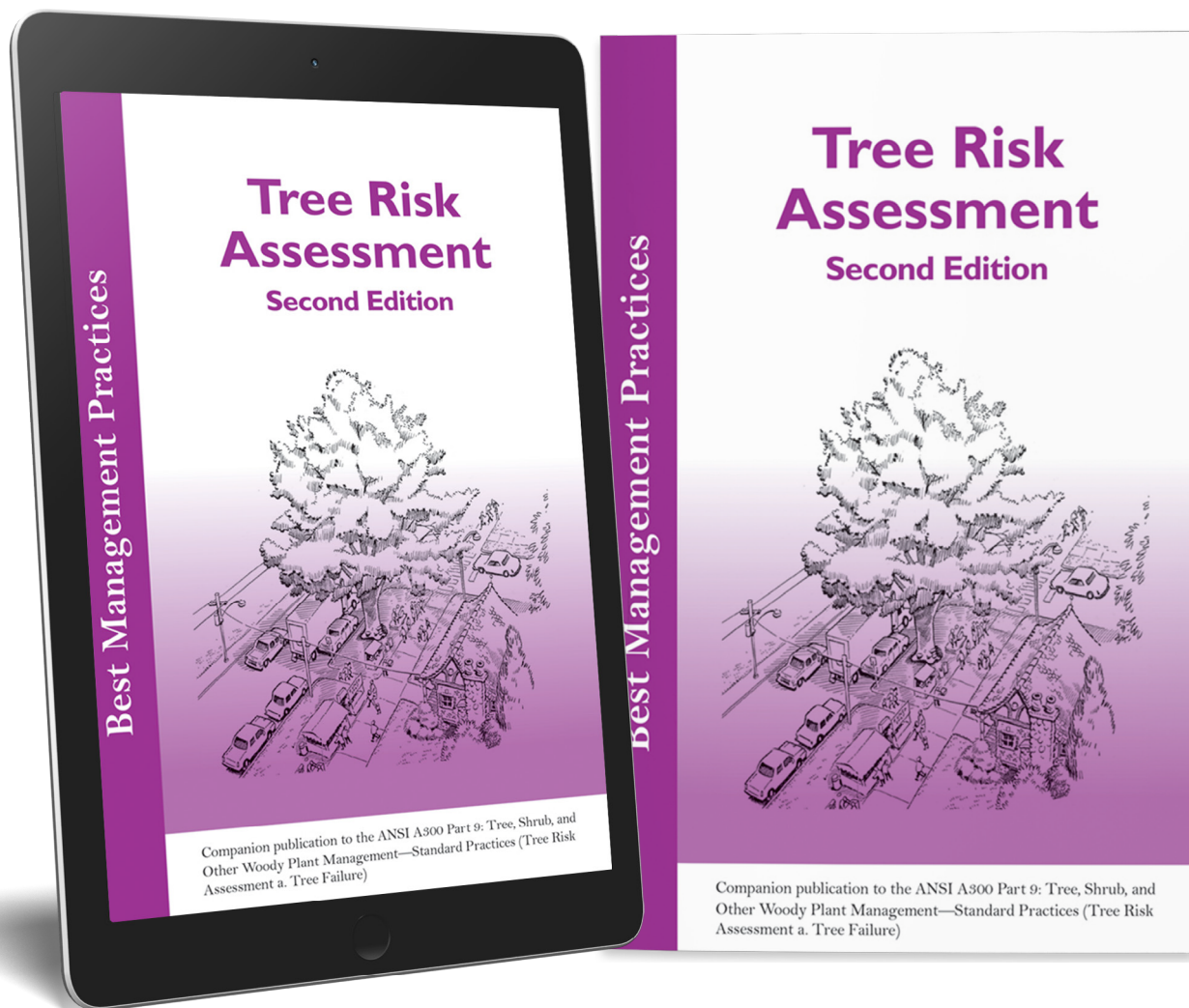


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BEST MANAGEMENT PRACTICES: TREE RISK ASSESSMENT

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Illinois Trees



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