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PLANT DISEASES

Decline of Ash

The usual variety of plant problems has arrived at the U of I Plant Clinic this spring. Ash samples have been among those of concern to homeowners and landscapers. Although some people are concerned with current leaf drop due to anthracnose, others are seeing a more chronic problem of ash decline. Anthracnose was discussed in issue no. 5 of this newsletter. Trees infected with ash anthracnose should be improving now as new leaves emerge in warmer temperatures. Trees with ash decline may not be faring so well. Conditions worsen with hot, dry weather.

Ash decline is a term that is often used loosely by many diagnosticians to refer to more than one condition. Ash decline might involve an infectious disease such as ash yellows disease or Verticillium wilt, an insect such as an ash borer, or environmental stress such as deep planting or girdling roots. Ash decline is used to indicate any decline of ash for which a single pathogenic cause has not been identified; it is a chronic problem, involving more of the tree over many years. It usually includes branch tip death, defoliation of branches to give the tree a sparse look, and a slow decline of the tree vitality. Affected trees may appear to be recovering each year in the spring and then decline once heat and drought occur.

There is no easy cure. Fungicides are not beneficial. Insecticides may help if a specific insect is identified. In general, for most ash problems, management is simply to remove dead wood and promote tree health through watering, mulching, and fertilizing.

Ash yellows is the disease that probably most resembles ash decline. This disease primarily affects white and green ash in the north-central and northeastern parts of the United States. It is a problem in Illinois, but one that is difficult to quantify because its presence is difficult to confirm. Ash yellows disease is caused by a phytoplasma (formerly called mycoplasma-like organism or MLO). These pathogens are somewhat like virus particles, cannot be cultured in a lab, and are spread by phloem-feeding insects. They are limited to the phloem tissue of the tree.

This disease is characterized by a loss of vigor over a period of 2 to 10 years before the tree dies, much like ash decline. Symptoms include short internodes (poor growth) and tufting of foliage at branch ends. Leaves become pale green to chlorotic (yellowed) and might develop fall colors prematurely. The tree may or may not defoliate, but the canopy generally appears sparse (as with ash decline). Cankers form on both branches and the trunk, causing twigs and branches to die back (as with ash decline). Witches'-broom sprouts of growth might appear on some branches but are more common on the trunk near the ground. Cracks in the trunk may appear in this area as well.

It is rare for an ash tree to recover from ash yellows. Many of the ash trees in Illinois are green ash, which do not show ash yellows symptoms as clearly as white ash. It is likely that this yellows disease is more common than we realize because the typical witches'-brooms and yellowing are not always seen with green ash, even when the disease is present. Instead we see only the cankers and stem dieback, conditions that suggest ash decline.

The ash yellows phytoplasma cannot be cultured in the laboratory on artificial media. Some testing services that offer specific PCR (polymerase chain reaction) tests can detect phytoplasmas in plant tissues. This is not a service currently offered at the University of Illinois Plant Clinic. AGDIA, Inc., a private company in Indiana, has such a service. You can read about AGDIA on the Web at http://www.agdia.com/. There are likely other labs that can help. The cost for phytoplasma testing varies with the number of samples being tested. Turn-around time also affects the cost; if you need results quickly, it costs more. For this test, AGDIA would need live, thick bark from the base of the tree. It must include phloem tissues and must be deep enough to prevent phloem tissue from drying out. It is advised that you call the testing service of choice before sending a sample. It is obvious why this disease has not been confirmed frequently in Illinois.

Verticillium wilt on ash also results in cankers and dieback and does not cause the typical vascular discoloration of most *Verticillium* infections. Refer to *Report on Plant Disease,* no. 1010, http://www.ag.uiuc.edu/%7Evista/horticul.htm, for more information on

Verticillium wilt. It is difficult and time-consuming to distinguish between ash yellows, Verticillium wilt, and ash decline in Illinois. Diagnosis of these ash problems is dependent almost entirely on symptoms that could be caused by a variety of problems.

At the Plant Clinic, *Verticillium* can be detected by traditional laboratory isolations of fresh, live-leaf petioles from symptomatic branches. Ash decline cannot be confirmed with laboratory isolations but can be diagnosed based on symptoms and adequate facts. Sometimes *Verticillium* is involved, sometimes ash yellows, and always some sort of site or environmental stress. *(Nancy Pataky)*

Turfgrass Irrigation and Leaf Spot Irritation

Plant pathologists often talk about the Disease Triangle: the pathogen, host, and environment. However, I firmly believe that the word "me" should be added to this equation. Whether you maintain turfgrass for personal or professional purposes, your actions greatly influence turfgrass health. In particular, as we enter summer, it is important to consider the enormous impact of a seemingly simple act called irrigation. As you read this article, countless pathogenic fungi are hanging out in your lawn and hoping for just one thing this summer: That you will irrigate the lawn lightly, frequently, and late in the day!

Though you may not notice it, the so-called "Helminthosporium" leaf-spotting fungi become active with warm (60˚ to 75˚F) and moist conditions in the spring. However, as mentioned below, improper irrigation, coupled with various summertime stress factors, pushes the disease epidemic along, which may lead to a far more visible and serious symptoms called melting-out. Severe "Helminthosporium" melting-out symptoms may be confused with a very different disease called summer patch (discussed in issue no. 6 of this newsletter). Although the end-point symptoms for both diseases are the same (that is, dead patches that must be renovated), there are some differences in how you might go about preventing each disease.

"Helminthosporium" leaf, crown, and root diseases are common on nearly all cool- and warm-season turfgrasses and are favored by prolonged leaf wetness and a variety of poor cultural practices and stress factors. Though there are many different fungi involved (now reclassified as species of *Bipolaris*, *Drechslera*, and *Exserohilum)* that are active over a wide temperature range, the control measures and fungal biology and symptoms are sufficiently similar, which makes it practical to discuss them together.

Leaf spots appear on the leaves from early spring to autumn as small, dark brown, or purplish red spots. These enlarge and develop light-colored centers, with purplish black borders. Infected leaf blades or entire plants may yellow, turn brown, wither, and die. Girdled leaf blades may drop prematurely. Crown and root rots usually appear in warm to hot weather as a reddish brown to black decay of the crown, rhizome, and root tissues. Infected areas may have a brownish cast. The turf is thin and weak and may have a drought-injured appearance or be killed, resulting in round to irregular patches that enlarge during the summer. This condition is called melting-out and is favored by wet weather. Stem, crown, and root rot occurs when feeder roots are shallow, few in number, or absent. Plants often wilt during midday, even with abundant soil moisture. Entire stands of turfgrass may be completely destroyed by severe crown and root rot.

Resistance is a key component in controlling "Helminthosporium" diseases, and many resistant turfgrass varieties are available. The National Turfgrass Evaluation Program Web site (http://www.ntep.org) is an excellent resource to help turf managers determine the level of disease resistance for particular varieties at various locations. However, the resistance is diminished when turfgrass is subject to stress. The following cultural practices help to reduce stress and promote steady growth and thus are also very important in managing "Helminthosporium" diseases:

(1) Irrigate deeply in the morning, but as infrequently as possible without causing stress. Water to the depth of the turf root system; that is, supply enough water in one irrigation to moisten the entire soil profile where roots are growing. Though you may find general irrigation guidelines, the best way to determine when to start and stop an irrigation cycle is to use a trowel or soil probe to check the soil moisture.

(2) Increase the mowing height as high as the turf species and use allow. Turf that is cut too short usually lacks density, has a shallow root system, and is stressed. For cool-season species, the recommended mowing height is 2 to 3 inches. When healthy and actively growing, turf can be mowed at the lower end of this range. However, mow at the higher end during warm–hot periods or for turf stressed by drought, disease, shade, insects, or traffic.

(3) Apply fertilizer only as needed to promote moderate growth, but do not overstimulate the turf in the spring and early summer.

(4) Keep the thatch layer below 1/2-inch thick by core-aerifying, power raking, or vertical mowing.

(5) Minimize the use of growth-regulator herbicides in disease-prone areas.

If disease cannot be adequately controlled by cultural practices, a number of effective fungicides are available. However, control is impossible after late spring or summer when disease is already severe. The use of fungicides is most practical and effective when applied preventively in the spring to disease-prone areas. Fungicide recommendations are provided in the *Illinois Commercial Landscape and Turfgrass Pest Management Handbook*, as well as the *Home, Yard, and Garden Pest Guide*.

For information about irrigation, mowing height, fertilization, and other aspects of turfgrass management, read the fact sheets provided by the U of I Extension Turfgrass Program at http://www.turf.uiuc.edu (click on the "Extension" link). *(Bruce E. Paulsrud)*

INSECTS

Bagworms

Well, it is that time of year to be thinking about dealing with bagworms *(Thyridopteryx ephemeraeformis)* in the southern and central Illinois. Newly hatched caterpillars (or larvae) are difficult to detect because they blend in with plant foliage. The caterpillars climb to the tops of trees and dangle on 1- to 3-foot strands of silk. These strands eventually are caught in the wind and detach, becoming streamers that keep the caterpillars aloft for hundreds of feet to many miles, depending on updrafts and wind speed. This process is referred to as "ballooning." Bagworms float until the silk catches on a plant or other object. It is important to note that caterpillars can balloon in the spring from nearby or even distant trees. Young caterpillars are small and cause only minimal damage to foliage, feeding on the epidermal and mesophyll layers, creating light areas on leaves. Avoid spraying an insecticide for at least 2 weeks after egg hatch, as this allows sufficient time for the caterpillars to complete the ballooning, settle down, and initiate feeding. An application during this time provides a high level of control. A second application may be needed a week or two later.

A female bagworm still hanging on a tree from last year may contain from 500 to 1,000 eggs. Newly hatched caterpillars have emerged from the bottom of the bags in late May, about 2 weeks earlier than usual. They should be hatching in northern Illinois in early June. Each caterpillar creates a tiny silk bag, or case, covered with material from the host plant it feeds on. The caterpillars remain in the bag for the rest of their life. Young caterpillars, 1/8- to 1/4-inch long, initially feed on the epidermal tissue on one side and mesophyll layer, causing leaves to appear whitish before turning brown. Young caterpillars typically start feeding at the top of trees and shrubs.

Older larvae are 3/4 to 1.0 inch long and consume entire needles or leaves—mainly stripping branches at the top of the tree. As caterpillars mature, and the food source declines, damage progresses down the plant. Stripped conifer branches usually die. A severe infestation can completely defoliate a plant, which may result in death of branches or the entire plant. This is especially true for evergreens that don't normally put out a flush of growth following defoliation by bagworms. Deciduous trees and shrubs that have been infested generally produce new growth and are able to survive. Bagworm caterpillars feed for about 3 months. On certain plant species, female bags are found at the top, whereas male bags are located near the bottom of the plant canopy. This arrangement makes it easier for females to effectively disperse a pheromone that attracts males.

In late summer, around mid-August, bagworms pupate inside the bags. It takes about 7 to 10 days for bagworms to change from pupa to adult, depending on the temperature. The males, which are "ugly" black moths with clear wings, emerge through the bottom of the bag and fly off to mate with females. Females never develop into winged moths and lack eyes, wings, legs, and antennae: They just remain inside the bag, producing eggs before dying. Eggs are the overwintering stage. There is only one generation per year in Illinois.

Handpicking and destroying bags from fall through midspring is very effective in removing the overwintering eggs before they hatch. Bags should be placed into a plastic container and disposed of quickly.

Insecticides recommended for controlling bagworms include *Bacillus thuringiensis* var. *kurstaki* (Dipel or Thuricide), cyfluthrin (Tempo), trichlorfon (Dylox), and spinosad (Conserve). Insecticide applications are most effective on the young caterpillars. Older caterpillars, in bags that are at least 3/4-inch long, are more difficult to control. Also, females tend to feed less as they prepare for reproduction—thus reducing their susceptibility to insecticide sprays. The bacterium *Bacillus thuringiensis* is effective on young caterpillars, but the material must be ingested: So thorough coverage of all plant parts is critical. Spinosad works by contact and ingestion and is very effective in controlling bagworms. Cyfluthrin and trichlorfon are recommended for larger caterpillars. Again, thorough coverage of all plant parts is essential, especially the tops of trees where bagworms typically initiate feeding. As mentioned, insecticides should be applied about 2 weeks after eggs hatch. This allows the bagworms to blow around, permitting the caterpillars to complete the ballooning process. Insecticide applications made too early usually results in the need for a second application. With this year's

early egg hatch, it is recommended to apply at this time in southern Illinois; in mid- to late June in central Illinois; and in late June to early July in northern Illinois. Scouting trees and shrubs within 2 weeks after an application is helpful in making sure that no more bagworms have blown in and in evaluating control efforts. *(Raymond A. Cloyd)*

Scouting Watch

Cottony maple scale has produced their large, white egg masses in Ogle County and other areas of northern Illinois. These eggs will hatch in a couple of weeks into light gray crawlers that will crawl out onto the leaves to feed until fall. Crawler sprays are effective but kill the beneficial twice-stabbed lady beetle. See the article on this insect in the May 18, 2005, issue of this newsletter for details.

Fungus-attacked anthomyiid flies are being found on the end of the branches of trees and shrubs. Anthomyiid flies are gray and look like house flies but slightly smaller. Many of them are leafminers or root feeders in the larval stage, and they are not generally considered to be pests of ornamental plants. They are attacked by a fungus that apparently causes the fly to crawl to the end of the branch before it dies from the fungus. It hangs onto the branch as it dies and then white fungal hyphae grow out of the insect and further attach it to the branch. Presumably, this allows the spores of the fungus to be spread on the wind more effectively. In some years, these dead flies on the ends of branches are so numerous that the plants appear to be attacked by them. Obviously, there is no damage caused by or control needed for dead flies. If you have a client that requires their removal, they are usually attached too tightly to be knocked off with a water spray. They usually require hand-removal.

Black vine weevil adult damage has been found in northern Illinois. The adults eat semicircular and elongated notches out of leaf margins of yew, euonymus, clematis, and many other plants. Larvae feed on roots of yew, pruning off smaller roots and eating through bark of larger roots. They cause dieback and plant death in nurseries. In landscapes, they are usually not numerous enough to cause serious root damage, so control is usually not needed there. Only females are known of this insect, and they must feed for about 2 weeks before they can lay eggs. During this time, they are susceptible to acephate (Orthene), befenthrin (Talstar), and cyfluthrin (Tempo). Because the adults hide in the leaf litter on the soil, spray the foliage heavily to allow the insecticide to run off into the leaf litter. Be sure to use enough pressure to penetrate interior foliage, where most of the feeding on yew occurs. Because adults emerge over a period of time, spray three times at 2-week intervals to obtain a high level of control. *(Phil Nixon and Morton Arboretum)*

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