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Correction

Our apologies to print subscribers: Last week, the printer accidentally ran a previous issue and sent it to the mailing center. We have included those four stories in the current print issue, indicated by a "no. 8" after the title of each article.

PLANT DISEASES

Decline of Ash/no. 8

The usual variety of plant problems has arrived at the University of Illinois 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 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 a term used to indicate any decline of ash for which a single pathogenic cause has not been identified. Ash decline 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's vitality. Trees with ash decline may appear to be recovering each year in the spring and then decline once heat and drought occur.

There is no easy cure for ash decline. 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 fertilization practices.

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. A great percent of the ash trees in Illinois landscapes are green ash. They do not show ash yellows symptoms as clearly as white ash. It is very 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; so 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 be deep enough to prevent phloem tissue from drying out. It is advised that you call the testing service of choice be-

fore 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/no. 8

Plant pathologists often talk about the "disease triangle," which includes 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 the summer season, 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 noted 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, summer patch (a disease 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. Spots 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 general brownish cast. 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, called melting-out, 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 when soil moisture is abundant. 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 to these diseases is diminished when turfgrass is subject to stress. The following cultural practices help to reduce stress and promote steady growth and thus are also 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 turfgrass species, the recommended mowing height range 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 of the range during warm–hot periods or when turf is stressed due to 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 ½ 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 detailed information about irrigation, mowing height, fertilization, and many other aspects of turfgrass management, read the fact sheets provided by the University of Illinois Extension Turfgrass Program at http://www.turf.uiuc.edu (click on the "Extension" link). *(Bruce E. Paulsrud)*

Pachysandra Problem

Pachysandra is a very popular groundcover. It has a deep green color and some fragrant flowers in early spring; and it is one of the few plants that can grow under evergreens or in dense shade. Unfortunately, the combination of high humidity, shade, and cool temperatures in spring is favorable for disease development. The Plant Clinic has received samples of pachysandra blight in the last month, caused by the fungal pathogen, *Volutella pachysandrae*. This pathogen infects plants following stress, such as winter injury, insect infestation, sunscald, or recent pruning. Dense plantings or thick mulch creates warm, moist conditions that can increase the likelihood of Pachysandra blight. An infection can occur at any time during the growing season but is most common in the spring.

The symptoms of this disease may not be obvious at first because it develops on stems hidden under leaf blades. If the pachysandra plants appear wilted or shriveled, check the leaves for brown blotches that may develop targetlike rings. Push foliage aside and look for blotches or cankers on stems. If the weather is moist, pink-to-orange masses of spores can be visible on the bottom of leaves. These spore masses are an easy-to-spot diagnostic sign of *Volutella pachysandrae*. Observation (with a microscope) of spores and structures called setae would confirm the diagnosis.

Because Pachysandra is more vulnerable to *Volutella* blight when stressed, locate plants in a site that is shady, moist but well-drained, with acidic soil and a high amount of organic matter. Controlling insects, improving air movement between plants, and mulching with a material that does not hold excess moisture also alleviate stress on Pachysandra and help to prevent disease development. Remove and destroy dead or diseased plant tissue. Fungicides may be applied as protectants at 10- to 14-day intervals. Look in the *Commercial Landscape and Turfgrass Pest Mangement Handbook* or the *Home, Yard, and Garden Pest Handbook* for names of specific products. For more information, consult *Report on Plant Disease,* no. 649, "Pachysandra Leaf and Stem Blight." This fact sheet is available in Extension offices or on the Web at http://www.ag.uiuc.edu/%7Evista/horticul.htm. *(Stephanie Porter and Nancy Pataky)*

Fire Blight . . . It's Back . . . Again!

There have been reports of fire blight in Illinois. Fire blight is caused by the bacterium *Erwinia amylovora,* which migrated with early European settlers to North America. Interestingly enough, it was the first bacterium reported to be a pathogen of plants and the first found to be spread by insect vectors.

We usually think of apple, pear, and flowering crabapple as hosts for fire blight; but it also infects other plants, such as firethorn, hawthorn, cotoneaster, quince, serviceberry, and mountain-ash. Young trees or hosts that have rapidly growing tissue/wood are more prone to infection. Heavy fertilization and pruning during the spring predispose trees to infection, primarily because these practices promote succulent new growth during environmental conditions favoring infection.

Fire blight symptoms may occur on blossoms, fruits, shoots, branches, or rootstock. The tips of branches wilt, die, and may curve to form a "shepherd's-crook." Other times, there is no bending of tissue, but all leaf and stem tissue at branch tips is killed. Blossoms, the base of blossom clusters, or young fruits can become water-soaked, dull, and gray–green after petal fall. If humidity is high, drops of bacterial exudates may ooze from symptomatic tissue. All affected tissue eventually becomes brown or black. If the disease advances, bark may crack and ooze with bacteria. If the pathogen infects or progresses down to the graft union, the rootstock bark may be blackened, cracked, and water-soaked, with oozing bacteria.

If you suspect fire blight, you may submit a sample to the Plant Clinic for testing. The cultural recommendations for fire blight include planting a resistant or more resistant variety (if possible), fertilizing at low rates in early spring, and removing dead tissue in the fall. When pruning, dip clippers in 10% Clorox before every cut to prevent disease spread. Protective

copper sprays or systemic antibiotic applications are targeted toward bloom time because the flowers are a major infection site. If you had a fire blight problem in the past, a copper spray may used before green tip or when leaves are just emerging from buds. No chemical sprays are effective at this time of the year. If the disease is established in a planting, a copper spray can help to kill oozing bacteria, as well as protect wounded tissue, such as storm-damaged tissue, from infection. Refer to the *Commercial Landscape and Turfgrass Pest Management Handbook* or *Home, Yard, and Garden Pest Guide* for registered chemical options. For more details about this disease, refer to the U of I *Report on Plant Disease*, no. 801, "Fire Blight of Apple," available in Extension offices or on the Web at http://www.ag.uiuc.edu/%7Evista/horticul.htm. *(Stephanie Porter and Nancy Pataky)*

Lichens on Trees

Have you seen blue, green, yellow, or gray growths on the bark of your trees and wondered whether they were harmful growths? Maybe you know that these growths are lichens and still wonder whether you should be alarmed. We are frequently asked about these growths at the Plant Clinic. The growths are lichens, and they are not harmful to your trees. As Jim Schuster, University of Illinois Extension horticulture educator, puts it, if your tree has lichens and is dying, something else is killing it.

Lichens are blue–green growths often seen on tree trunks or branches, on rocks, or even on soil. They are composite plants made up of a nonparasitic fungus and a green or blue–green alga. They vary in form from foliose types to fruticose types to crustose types, which refer to the thickness and puffiness of the lichen. Depending on the alga and the fungus, the combination can cause the lichen to have different colors. Some may look yellowish; others appear in different shades of gray to green. The fungus collects nutrients, usually from the air, and transfers them to the algae, which then convert the nutrients into useable food. This food is shared with the fungus. This symbiotic relationship is mutually beneficial to the fungus and the alga. Lichens do not take nutrients from trees.

Schuster reports that more than 20 years ago it was very difficult to find lichens growing in Illinois or the Midwest because of air pollution. I have seen what seems to be an increase in lichens on landscape plants in recent years and wondered why. He said that the Clean Air Act forced changes resulting in cleaner air, allowing more kinds of lichens to find their way back into our environments. That may be a contributing factor. Whatever reasons are involved, lichens do seem to be more numerous in some areas of Illinois.

It has been his observation that young trees should be growing fast enough to prevent lichens from sticking to their stretching bark. He warns that a small tree covered with lichens may indicate a problem that is causing slow growth. The lichens are not the cause of decline but may serve as an early warning of stress. We have discussed deep planting and girdling roots in previous articles this year. Those problems seem to be among the most prevalent problems on young trees. *(Nancy Pataky)*

Oak Leaf Blisters and Peach Leaf Curls

These two diseases are caused by species of a fungus called *Taphrina*. It is odd to see a fungus infect two such different plant groups, but the two Taphrina diseases we are seeing now are peach leaf curl and oak blisters. Peach leaf curl occurs on edible peach, nectarines, and some ornamental *Prunus* species. We sometimes see it on ornamental plums or ornamental peach. Leaf curl or leaf blisters refer to a similar group of diseases on oak and occasionally on poplar. Leaf distortion and blisterlike growths or puckering of the leaves is common to all. The leaves are often thickened and almost crisp.

If your trees have had problems and you did not spray a dormant fungicide this winter, you are most likely experiencing the problem again. Symptoms include distorted, thickened leaves and early leaf drop. Leaves turn downward and inward and may become red or purple. The disease may cause yield loss in edible peach but is not seriously harmful on its own to ornamental species. Still, repeated yearly infection may weaken a tree and predispose it to other problems. The causal fungi survive over winter in buds and twigs. They infect leaves and flowers in the cool, moist weather of early spring, from bud swell to bud opening (ideally, temperatures are 50˚ to 70˚F).

Fruit growers can easily control this disease with a single dormant fungicide spray applied in the fall after leaf drop or in the early spring before bud break. This practice is common for commercial growers. A dormant fungicide spray is not the same thing as a dormant oil spray. Home fruit growers in Illinois who use a dormant fungicide and are careful to provide full coverage of buds do not have problems with leaf curl. Landscape managers should focus on promoting tree health through pruning, watering, and fertilization. Fungicides are not usually recommended for ornamental trees unless the disease is a chronic problem. It is too late to spray fungicides to fight this disease now. If you are having problems with curl and blisters, mark your calendar for a late-fall or winter fungicide application so you don't forget.

Some complain of ineffective sprays. If you have used a dormant fungicide spray and did not control this disease, check these possibilities. Did you spray thoroughly enough to obtain complete coverage of the stems and buds? The fungus overwinters in bud scales and cracks and crevices of the bark, so thorough coverage is necessary. Did you use the right chemical? Was timing correct? Chemicals must be applied in the dormant season, which means either late fall or early spring before buds swell. Fungicides for homeowners are listed in the *Home, Yard, and Garden Pest Guide.* Fungicides available to commercial growers are listed in the *Commercial Landscape and Turfgrass Pest Management Handbook.* For more on leaf curls and blisters, consult *Report on Plant Disease,* no. 805, "Peach Leaf Curl and Plum Pockets," or no. 663, "Oak Leaf Blister." Both are available in Illinois Extension offices or on the Web at http://www.ag.uiuc.edu/%7Evista/horticul.htm. *(Nancy Pataky)*

INSECTS

Bagworms/no. 8

Well, it is that time of year to be thinking about dealing with bagworms *(Thyridopteryx ephemeraeformis)* in the southern and central portions of 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 (or velocity). 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. The young caterpillars are small and cause only minimal damage to foliage. They feed on the epidermal and mesophyll layers, creating light areas on leaves. It is recommended to avoid spraying an insecticide for at least 2 weeks after egg hatch, as this allows sufficient time for the caterpillars to complete the ballooning process, 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 that is still hanging on trees 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 is feeding on. The caterpillars remain in the bag for the rest of their life. Young caterpillars are 1/8 to 1/4 inch long and 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 inch in length and consume entire needles or leaves—mainly stripping the branches at the top of the tree. As the caterpillars mature, and the food source declines, their damage progresses downward on the plant. Stripped conifer branches usually die. A severe bagworm 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 an infestation. Bagworm caterpillars feed for about 3 months. On certain plant species, female bags are found at the top of the plant canopy, whereas male bags are located near the bottom. This arrangement makes it easier for females to effectively disperse a pheromone, which attracts males.

In late summer, around mid-August, bagworms pupate inside the bags. It takes about 7 to 10 days for them 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 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. Additionally, 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 previously 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 result in the need for a second application. With their early egg hatch this year, it is recommended to apply at this time southern Illinois and in mid- to late June central Illinois. Application in northern Illinois should be made in late June to early July. Scouting trees and shrubs within 2 weeks after an application will be helpful in making sure that no additional bagworms have blown in and in evaluating control efforts. *(Raymond A. Cloyd)*

Scouting Watch/no. 8

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, the flies 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. Adults eat semicircular and elongated notches from the leaf margins of yew, euonymus, clematis, and many other plants. Larvae feed on the roots of yew, pruning off smaller roots and eating through the 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, but 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 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 the adult 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)*

Scouting Watch/no. 9

Spruce spider mite is being found in high numbers on arborvitae and dwarf Alberta spruce in central Illinois. Even with the high temperatures of Memorial Day Weekend, these mites are still active. Soon they will lay eggs and stay that way through the summer. Remember that this mite feeds primarily in the spring and fall. Various miticides, including bifenthrin (Talstar), insecticidal soap, and summer oil, are effective.

Periodical cicada is being found in small numbers in northeastern Illinois. We are expecting the northern Illinois brood, Marlatt's XIII, to emerge next year. This brood extends north of a line from northern Iroquois County on the east southwest to northern Sangamon County and then northwest to Rock Island County. A few stragglers emerge the year before and the year after a major brood. Because they are few in number, these stragglers tend to be quickly eaten by birds and other predators, they have difficulty finding mates, and their progeny tend to be eaten by predators. As a result, they do not build up into heavy numbers that cause damage. With a major emergence predicted next year in northern Illnois, planting small trees in areas where emergence has been heavy in the past should be avoided this year and next spring.

Mimosa webworm will be attacking honey locust and silk tree (mimosa) in southern Illinois. This first generation will web together only two to three leaflets, which will turn brown from the window-feeding. If these are abundant on the trees, treatment with acephate (Orthene), *Bacillus thuringiensis kurstaki* (Dipel, Thuricide), carbaryl (Sevin), spinosad (Conserve), or other labeled insecticide is warranted. Moths that emerge in a few weeks will lay their eggs back into these damaged areas, with the second generation of caterpillars webbing and feeding on several entire leaves together. In central Illinois, early damage should start showing up in a week or two.

Peachtree borer can be successfully treated at this time with permethrin (Astro) applied liberally to the base of the trunk so that it runs down into the soil around the base of the tree. Larvae attack purpleleaf plum, flowering cherry, and other *Prunus* species if they are newly transplanted or getting old. The larvae feed in the cambium just below the soil surface, caus-

ing gummosis to appear at the soil line, as well as killing the tree by girdling. *(Phil Nixon, Greg Stack, Arborsmith)*

Potato Leafhopper

Now is the time to be on the lookout for damage by potato leafhopper, *Empoasca fabae,* on ornamental landscape trees such as crabapple *(Malus* spp.), birch *(Betula* spp.), ash *(Fraxinus* spp.), and maple *(Acer* spp.). Red maples, in particular, are extremely susceptible to potato leafhopper feeding, whereas silver, sugar, and Norway maples are more tolerant.

Potato leafhoppers, both adults and nymphs, have piercing–sucking mouthparts, which they use to feed within the vascular tissues of plants—primarily the xylem. During the feeding process, potato leafhoppers inject a toxic substance into plant tissues. Feeding, especially on maples, results in stunted shoots and leaves that curl downward, with brown edges. This damage makes infested trees appear as though they have been sprayed with a phenoxy-based herbicide such as 2, 4-D. On ash trees, feeding by potato leafhopper adults and nymphs creates small, white or yellow spots on leaves, which results in a stippled appearance that closely resembles twospotted spider mite *(Tetranychus urticae)* feeding injury. Similar to twospotted spider mite, potato leafhoppers remove chlorophyll (green pigment) from leaves. Potato leafhoppers do not overwinter in Illinois because the eggs are sensitive to the cold temperatures. Adults are blown north, from the Gulf of Mexico, into Illinois by prevailing winds from early May through June.

Potato leafhopper adults settle into alfalfa fields during spring migration; after the first cutting of alfalfa, they migrate onto ornamental landscape trees. Adults are about 1/16 inch in length, wedge-shaped, and pale green, with distinctive white eyes. Females lay eggs in the veins on leaf undersides. Eggs hatch, within 9 days into light green nymphs that are typically found on leaf undersides and tend to move sideways when disturbed. Nymphs undergo five instars before molting into adults. Adults and nymphs look very similar, except that adults are larger and possess wings, which enables them to fly. The wings are held rooflike over the body. Potato leafhopper activity may be assessed by the presence of empty, white cast-skins located on the underside of leaves. There may be up to five generations per year in Illinois.

Insecticides must be applied to susceptible trees before potato leafhoppers cause severe plant damage. Insecticides recommended for controlling potato leafhoppers include the pyrethroid-based products bifenthrin (Talstar), cyfluthrin (Tempo), lambda-cyhalothrin (Scimitar), and permethrin (Astro). If plant damage has already occurred, then insecticide applications will prevent further damage, and any new growth will appear normal beyond the damaged leaves. It is important to regularly scout susceptible trees to minimize the potential for potato leafhoppers to cause severe foliar damage, which can ruin the aesthetic appearance of ornamental landscape trees. *(Raymond A. Cloyd)*

Pine Tortoise Scale

We have received several inquires regarding control of pine tortoise scale, *Toumeyella parvicornis*, in particular, timing of insecticide applications. Pine tortoise scale feeds on many types of pine trees, including Scots, Austrian, and red. Immature females, which are round, brown, and wrinkled in appearance, overwinter on twigs. Eggs are laid underneath the body of adult females. Eggs hatch into young crawlers in late June or July. Crawlers eventually establish in suitable locations and initiate the feeding process. Crawlers may spread to other plants via wind currents or by birds. Females are capable of producing up to 500 crawlers (that's a lot!). Males, similar to other scale species, develop into winged individuals, which fly and mate with females. The males cannot feed and eventually die. There is usually one generation per year.

Pine tortoise scale feeding causes yellowing of needles, stunted needle growth, and even death of pines under extensive populations. Young pine trees are more susceptible to pine tortoise scale than mature trees, and foliage closer to the ground tends to support higher populations of pine tortoise scale than foliage higher in the tree canopy. In addition, pine tortoise scales produce large quantities of honeydew, which serves as a growing medium for sooty mold fungi. Under heavy infestations, entire trees may appear black in color.

Insecticides recommended for control of pine tortoise scale include acephate (Orthene), bifenthrin (Talstar), cyfluthrin (Tempo), insecticidal soap, and horticultural (= summer) oil. These insecticides need to be applied when the crawlers are active to achieve maximum control of pine tortoise scale and alleviate problems next year. *(Raymond A. Cloyd)*

Black Cutworm

Black cutworms are numerous on golf course greens throughout Illinois. Black cutworms overwinter in the southern United States and fly up into Illinois in the spring. Moths were found in high numbers in pheromone traps placed throughout the state from mid-April through early May this spring. We are now seeing the damage from the caterpillars that hatched from the eggs laid by these moths.

Black cutworm larvae grow well on creeping bentgrass, perennial ryegrass, and tall fescue, with over

80% growing up to pupate. Almost as many survive on varieties that contain endophytes. On Kentucky bluegrass, fewer than 10% of the larvae survive. As a result, damage is heaviest on greens and other golf course areas planted to bentgrass. In home lawns, even those planted to tall fescue and perennial ryegrass, damage is not noticed because of the height of cut.

Damage on greens appears as circles 2 to 3 inches in diameter where the grass blades are eaten down to the crowns. Frequently, there is a shallow hole in the center of the circle. Cutworm caterpillars feed at night, tending to feed in a circle, as far as they can reach, with their posterior end frequently inserted in a shallow hole. These damaged areas are most numerous within 30 or so feet from the green apron because the cutworms like to hide in the taller turf around the green during the day, commuting onto the green at night to feed. Feeding damage looks like ball marks where a golf ball skipped across the green, rubbing off the grass blades. Thus, golfers do not recognize the damage as being caused by an insect.

More serious damage is caused by insect-feeding birds, such as starlings, robins, grackles, cowbirds, and blackbirds. In feeding on the cutworms in the early morning, they pull up a small divot 1/2 to 1 inch across. These little divots are large enough to deflect putts, causing golfers to get upset. The sand in these divots also quickly wears the edge of greens mowers blades, causing the blades to require sharpening and replacing more often.

Black cutworm larvae are dark-colored and heavy-bodied. They can be flushed from the turf with a teaspoon of 5% pyrethrum or 1 tablespoon of dishwashing detergent in a gallon of water. Distribute this evenly over a foot square of turf; a watering can works well. With a couple of minutes, the irritated larvae come up onto the turf surface. Only two to three cutworms per foot square are enough to result in noticeable injury. An application of bifenthrin (Talstar), carbaryl (Sevin), deltamethrin (DeltaGard), halofenozide (Mach 2), spinosad (Conserve), or trichlorfon (Dylox) controls the caterpillars. Insecticidal nematodes are also effective.

Cutworm moths lay their eggs near the tip of grass blades, so frequent mowing and clipping removal reduce caterpillar numbers 75 to 97%. Dump clippings baskets well away from greens and other bentgrass areas. Over 90% of the eggs survive the mowing process, so dumping the clippings at the green apron results in caterpillars that can easily attack the green. Top-dressing the green with sand also reduces the number of cutworm larvae. *(Phil Nixon)*

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