UNIVERSITY OF ILLINOIS EXTENSION
HOME, YARD & GARDEN PEST NEWSLETTER
College of Agricultural, Consumer and Environmental Sciences, University of Illinois at Urbana-Champaign
Illinois Natural History Survey, Champaign

No. 3 • May 9, 2007

PLANT DISEASES

Two Common Ivy Leaf Spots

Even with the abundant choice in available ground cover species these days, English ivy *(Hedera helix)* is still a popular option for either sunny or shady locations. It holds its leaves, has a nice dark green color, and can grow on trees and structures without harmful effects. It even tolerates alkaline or acidic soils and has salt tolerance. Sounds perfect!

Of course, no plant is perfect, at least not forever. English ivy frequently hosts fungal leaf spots or a bacterial leaf spot disease, all of which can be unpleasant in appearance. These diseases can be difficult to distinguish. Because chemical options differ for fungal and bacterial pathogens, it pays to know how to distinguish these two groups.

If you have had problems with ivy leaf spots in the past, the spots (lesions) should be visible now on older leaves. Infected plant parts should have been removed in early spring, but you can still do this when foliage is dry. Working with wet plants may spread the disease. Remove dead leaves, stems, and other accumulated debris. This old, infected material serves as a source of inoculum that can splash onto new growth if allowed to remain. Thinning the stand in this manner also helps open it to better air movement, quicker drying, and less disease pressure. If possible, avoid overheard irrigation.

The bacterial leaf spot on ivy *(Xanthomonas campestris* pv *hederae)* is the most damaging. It causes leaf spots that begin as dark green, wet-looking spots that may grow to 1/2 inch or more. Usually, fresh spots have a yellow halo. As lesions age, they become brown, often cracked. This bacterium can infect shoots and stems. Rain easily splashes bacteria to healthy leaves in rain.

The fungal leaf spots may be caused by many fungal species, the most common being *Colletotrichum trichellum*. Lesions are usually more irregular than those of the bacterial leaf spots and slightly larger. Fungal leaf spots are dry, brown, or reddish brown. The distinguishing feature is the presence of fungal fruiting bodies in the lesions of fungal leaf spots. If you remember, bacterial pathogens do not form fruiting bodies. Only fungal pathogens provide these clues.

In addition to cultural management suggestions listed above, there are chemical options. Where these diseases have been a problem in the past, sprays should be initiated when the new leaves begin to unfurl. Applications are protective, so they are especially critical in late spring and early summer. Bacterial disease controls include Aliette, Alude, Camelot, Champion, and Magellan. Be sure to follow label directions carefully. Fungal disease control options include many products (too numerous to repeat here), as listed in the Illinois *2007 Commercial Landscape and Turfgrass Pest Management Handbook*. For more information about these diseases, consult *Report on Plant Disease*, no. 652, "Leaf Spot Diseases of English Ivy," available on the Web at http://www.ag.uiuc.edu/%7Evista/horticul.htm. *(Nancy Pataky)*

Spruce Needle Casts

Needle cast diseases are caused by fungi that infect new growth during the growing season but do not cause needle loss until the following winter or spring. Because this group of diseases causes needles to drop from the tree, they are called needle casts. **Rhizosphaera needle cast** has become a common needle disease of Illinois spruce trees.

Rhizosphaera infects needles 12 to 15 months prior to symptom appearance. One-year-old needles turn purplish brown, and 2-year-old needles drop off the stem. The current-season needles remain green. Successive years of infection cause significant injury to branches, eventually producing an unsightly spruce that is sparsely foliated, and only at branch tips. The diagnostic feature to look for with Rhizosphaera needle cast is the lines of fruiting bodies on the needles. These pinhead-sized structures emerge from needle stomates, thus appearing in lines. They are more visible in moist weather; and you may need a hand lens to see them in dry periods.

This disease occurs most commonly on Colorado blue spruce, producing significant injury. It may also appear on other spruce species. Norway spruce, however, is resistant to Rhizosphaera needle cast. The fungus

lives over winter in old, infected needles. Young needles can be protected with fungicide applications, starting when new needles have begun to expand. Most of the options are contact fungicides, as listed in the Illinois *2007 Commercial Landscape and Turfgrass Pest Management Handbook*; but two products with some upwardly systemic activity are registered (Spectro and TwoSome). Because older growth may also be infected on stressed trees, sound horticultural practices to promote tree health are recommended.

For years, the only spruce needle cast of concern in Illinois has been Rhizosphaera needle cast. **Lirula needle cast** *(Lirula macrospora)* is another needle cast of spruce common in Canada and Alaska, but that disease has not been a threat in Illinois.

A "new" fungus that infects spruce needles has been found in some Midwest states in the last few years. The fungus is a ***Stigmina*** species *(S. lautii).* Symptoms are very similar to those caused by *Rhizosphaera,* with the difference in the fruiting body. Instead of firm, pinhead-like structures, the fruiting structures of *Stigmina* are more like little pin cushions, with black spores sticking out from these structures. They may be more scattered in arrangement, rather than in nice rows on the needles. Researchers are uncertain of the effect of infection by *Stigmina*. Very little is known about the biology, and it is not even known whether the fungus is a pathogen. Similarly, it is not known how long the fungus has been present. Some say that *Stigmina* has been present on spruce for several years and may have been misidentified as being *Rhizosphaera,* based on symptoms observed in the field. We will post any new information received concerning this fungus on spruce. *(Nancy Pataky)*

Crown Gall Easy To Spot Now

Crown gall is a bacterial disease. The pathogen is *Agrobacterium tumefaciens*, so named because of the tumor-like growths it produces. The galls appear as a mass of undifferentiated tissues on stems above or below the ground. The bark on these galls eventually splits, giving galls a roughened appearance. There are hundreds of plant species susceptible to this pathogen, including euonymus, grape, rose, apple, crabapple, and raspberry.

The bacterium survives in the soil and enters the plant through a wound. The host plant forms a gall in response to this infection. Crown gall is a unique plant disease, with bacteria causing uncontrolled cell division in the host plant, resulting in gall formation. Genetic coding from the bacterium becomes incorporated into the host genetic coding. This disease system has been studied and used extensively in research on genetic manipulation with plants.

Because the bacterium causing this disease survives for long periods (many years) in the soil, the disease is nearly impossible to control. Once you have an infection, you either live with weakened plants or replace them. Obviously, you must use a plant species that does not host this pathogen. Unfortunately, many plant species are susceptible to crown gall. Conifers are resistant to this disease. Some plants that are *not* reported to host crown gall include bald cypress, barberry, beech, birch, black gum, boxwood, catalpa, true cedars, deutzia, Douglas-fir, firethorn, ginkgo, golden-raintree, hemlock, holly, hornbeam, larch, linden, magnolia, mahonia, pine, redbud, serviceberry, smoke tree, spruce, sweetgum, tuliptree, yellowwood, yew, and Zelkova. As stated, the conifers do not host crown gall, so an infected euonymus ground cover could be replaced with one of the recumbent junipers. Do not buy plants with galls. Because plants may have crown gall disease and remain symptom free, do not try moving seemingly healthy plants from your infected bed to a new site.

Insects can cause galls that look like crown gall. Insect galls have galleries, or pockets, with or without insects present. Abnormal growths on plants, sometimes called burls, can also resemble crown gall infection. The bark of the host usually remains on the burls but is not present on galls of crown gall. Consult *Report on Plant Disease (RPD),* no. 1006, "Crown Gall," for details about this disease. It is available on the Web at http://www.ag.uiuc.edu/%7Evista/horticul.htm *(Nancy Pataky)*

INSECTS

Emerald Ash Borer Awareness Week

May 20 to 26, 2007, is being recognized nationwide as Emerald Ash Borer Awareness Week. Federal, state, and local agencies and groups are planning various educational activities and releases to the mass media on emerald ash borer during that week. It is thought that a concentrated effort in a short period will attract the public's attention and increase their awareness and knowledge of this insect that has the potential to eliminate ash trees from North America.

Local park districts, municipalities, companies, agencies, and other entities are encouraged to help with this educational effort. If you are able to contact local media, schools, or others to help get out the word about emerald ash borer, your efforts will be appreciated.

Emerald ash borer adults are expected to emerge in Illinois in mid-May, so the awareness week will probably coincide with news concerning its appearance. It is likely that additional areas of infestation will be found at this time and over the weeks to follow.

If this campaign succeeds, the number of calls and inquiries about emerald ash borer is likely to increase dramatically. This is also a warning to be ready for an influx of interest about this pest. Although there are many excellent sources of information on emerald ash borer, a good place to start is the Illinois Department of Agriculture's site at http://www.agr.state.il.us/eab/. *(Phil Nixon)*

Leafminers

Leafminer larvae live inside the leaves of many trees, shrubs, vines, and herbaceous plants. They feed on the mesophyll, the spongy and palisade cells between the upper and lower epidermises of the leaf. This environment within the leaf provides a moist area that is protected from at least some predators and parasites. As a result, many insect species have adapted to this lifestyle, including flies, moths, wasps, and beetles. With this being a popular way to make a living, a number of predatory and parasitic insects have also adapted to feeding on leafminers.

The adult fly, wasp, moth, or beetle inserts its eggs into or onto the leaf tissue. Many leafminer adults also lay down a pheromone, a hormone produced outside of the body, that lets other leafminer adults know that this leaf or part of the leaf is already taken. As a result, a leaf commonly contains only a single leafminer, or the leafminers tend to be located at a distance from each other in the same leaf.

The hatching larva tunnels through the leaf tissue, feeding on the mesophyll cells. In a leaf, chlorophyll is contained primarily in the mesophyll cells, causing leaves to be green. As these cells are eaten by the leafminer larva, whitish or light-colored areas appear because the remaining epidermal cells tend to be mostly transparent. With these epidermal cells being exposed to drying as the mesophyll cells are eaten away, they soon turn brown and die. Thus, recent mines are whitish and older mines are brownish, making it easy to tell whether the leafminer is still actively feeding.

Holding a mined leaf up to the light makes it easier to see the entire mine, including smaller areas that were eaten when the larva was newly hatched. If the larva is still present, one can frequently see the silhouette of the feeding larva. Also obvious will be the fecal material deposited by the larva. One drawback of being a leafminer is that you are forced to live with your feces.

Fully grown larvae chew their way through the leaf epidermis to the leaf surface and typically drop to the soil to pupate, although some moth larvae spin a cocoon and pupate on the leaf surface. With the diversity of insects that live as leafminers, the size and appearance of emerging, full-grown larvae vary. Those of flies and wasps are typically legless and usually 1/16 to 1/8 inch long. Many fly larvae are bright yellow, pink, or red when they emerge to pupate. Moth and beetle emerging leafminer larvae are typically legless as well, but are commonly 1/4 to 1/2 inch long. The adult emerges from the pupa to attack more leaves. Leafminers typically have more than one generation per year. Some leafminer flies have several generations per year.

Because newly hatched leafminer larvae are very small, they tend to make small, narrow tunnels through the mesophyll. Some leafminer larvae continue to make narrow tunnels that meander through the leaf; they are referred to as serpentine leafminers. Their narrow, winding tunnels appear somewhat serpentlike, that is, snakelike. Columbine and honeysuckle leafminers are serpentine leafminers. Other leafminers may form slender, snakelike tunnels initially but soon turn to feeding on the mesophyll cells in a broad area, resulting in what is called a blotch mine. Birch and holly leafminers are blotch leafminers. Blotch mines are commonly bounded by leaf veins, resulting in straight-sided mines. Other blotch mines cross leaf veins and become more rounded in shape.

Although leafminer damage is obvious, it usually has little effect on plant health. Although the mesophyll that is eaten does not produce sugars for the plant, the undamaged cells in the leaf continue to produce. An exception to that is when the leafmining is so extensive that it causes leaf drop. Birch leafminer is the only one that causes leaf drop in Illinois and only in the northernmost row of counties. Farther south, the damage is noticeable but not severely damaging. Holly leafminer may produce enough aesthetic damage in southern, particularly southeastern, Illinois to warrant control but rarely causes leaf drop. In states to the east and south, holly leafminer damage can be very severe. Systemic insecticides are recommended for control of both leafminers.

Because leafminers typically have several generations per year, removing and destroying mined leaves while the larvae are still inside can reduce the number of mined leaves later in the season. Leaves that still have whitish mines should still contain the larvae; the larvae have usually already left the mines if the mines are brown. *(Phil Nixon)*

Bronze Birch Borer

It is now time to treat for bronze birch borer in southern Illinois. Treat in central Illinois around the middle of the month, and treat in northern Illinois towards the end of this month. The application of imidacloprid (Merit, Imicide, Pointer) as a bark spray or trunk injection provides effective control. Application to the soil is less

effective because it takes several weeks to move through the tree, but it will still provide some control this year.

Bronze birch borer is a native species in the same genus as emerald ash borer and attacks the tree in a similar manner, except that it attacks declining birches instead of ash. Bronze birch borer attacks mostly nonnative, white-barked birches as their growth starts to slow down, typically when the trees reach 10 or more years old. It attacks younger trees that are mechanically damaged or planted in poor sites. Native white-barked birches are attacked much later in life, as they decline into old age. Whitespire, a variety of an Asian species, is resistant to the borer, but many other Asian and European varieties and species are very susceptible to attack. River birches are also resistant to attack, and Heritage is a variety of river birch commonly planted because of its light-colored bark.

Adult bronze birch borer beetles lay eggs under loose bark and in bark cracks near the top of the tree. The hatching larvae tunnel through the cambium. If the tunneling circles the stem, this girdling kills the stem beyond that point. Leaves turn brown and fall off. Early attack is recognizable as dead, leafless branches at the top of the tree. In subsequent years, the beetles attack lower and lower on the tree until the entire tree dies.

Bronze birch borer larvae are elongate, white, and flattened, with obvious beadlike segments. Fully grown larvae are about 1 inch long. The larvae feed through the summer, overwinter as larvae, and pupate in the cambium area in spring. Although the life cycle can be completed in 1 year, a 2-year life cycle is more common. Adult beetles emerge through D-shaped holes during vanhoutte spirea bloom in mid spring. Cross-sections of adult beetles are flattened ventrally and rounded dorsally, that is, D-shaped. They are about 1/2 inch long and appear bullet-shaped from above, being quadrate in front and tapered posteriorly. As the name indicates, they are bronze in direct sunlight but appear blackish in indirect light. The adult beetles feed on the leaves of alder, poplar, and birch, but this feeding is not severe. *(Phil Nixon)*

Home, Yard, and Garden Pest Newsletter is prepared by Extension specialists from the University of Illinois at Urbana-Champaign and the Illinois Natural History Survey. Information for this newsletter is gathered with the help of staff members, Extension field staff, and others. Karel Jacobs and Donna Danielson of The Morton Arboretum also provide information and articles.

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