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PLANT DISEASES

Daylily Leaf Streak

What diseases bother daylily *(Hemerocallis)* in Illinois? There are only three that I have seen on this host: anthracnose, daylily rust, and leaf streak.

We occasionally see an anthracnose disease caused by the fungus *Colletotrichum*. This disease is associated with leaf scorch and can occur on stems. Usually, we see this fungus on injured tissue in hot, humid weather. It has not caused many problems on daylily and does not move to healthy tissue. Look for bleached, brown, or scorched tissue on the leaves, with small (pinhead-sized) masses of clear to yellowish spores. You'll need a hand lens to see these. Management does not involve chemicals but removal of dead tissue and any source of stress.

Daylily rust *(Puccinia hemerocallidis),* was first reported in the United States in 1999. It can be quite damaging, depending on the cultivar susceptibility, but it does not overwinter in Illinois. That has growers breathing a sigh of relief.

The disease of concern in this newsletter is daylily leaf streak, caused by *Aureobasidium microstictum*. We see this disease every year, but a recent case brought in by a new grower was fairly severe. So I thought possibly others are dealing with this problem as well. Symptoms begin as chlorosis along leaf midveins, often starting from the tip and moving down the leaf. Necrotic tissue follows. Small reddish brown flecks or spots develop in this tissue. This disease can be confused with rust, but there are no pustules and no rusty spores to wipe off on your finger. Leaves infected with daylily streak eventually end up with yellow and brown steaks and specks on the leaves. Daylily cultivars vary in susceptibility to streak, but generally the most severe result is streaking and death of infected leaves. Fruiting bodies of the fungus are difficult to find, but I find them to be most prevalent along the veins in folded leaves. Unfold the leaves and look along the brown spots near the vein. The fungus develops most quickly when temperatures are warm but not hot. You should be able to find daylily leaf streak in susceptible daylily beds now. It spreads by splashing spores or spores spread on animals (including us). To avoid spread of this disease, try to irrigate the soil rather than the foliage; and avoid working with plants when they are wet. Also try to keep plants thinned to provide better air movement.

For some images of daylily leaf streak, go to this Web site: http://www.daylilies.org/ahs_dictionary/leaf_streak.html. You can also visit the daylily rust information page at http://www.ncf.ca/~ah748/rust.html and scroll down to images of nonrust leaf problems for more images of leaf streak. Cultivars vary in their susceptibility to leaf streak, so you will see differences in your planting.

Baker and Simone once wrote an article about this disease called "Leaf Streak Disease Revisited." They suggest a four-step approach to management of leaf streak. The first is to be able to identify the disease. The Web sites listed can help you recognize infected plants. Second, growers are encouraged to implement cultural changes, such as removing affected foliage by pulling or cutting the entire leaf off the plant. At the very least, we need to remove dead leaves with brown spots and streaks in the fall. Don't let these overwinter and provide inoculum the next spring. Also, avoid overhead irrigation, which only helps spread the spores. The third step is to use fungicide options, if necessary. Compass is a Bayer product registered for use on daylily for this disease. It contains trifloxystrobin and is a local penetrant, which means it is locally systemic and has limited movement in the plant. Thiophanate-methyl has a general ornamental label and has been shown to be effective at preventing infection by the leaf streak fungus. The fourth step is for breeders: They are encouraged to avoid using leaf-streak-susceptible parents. Growers can also help by removing the most susceptible cultivars from their gardens. *(Nancy Pataky)*

INSV on Impatiens

Impatiens necrotic spot virus (INSV) appeared on some homeowners' impatiens plants this summer in Illinois. That is not unusual, despite efforts by growers to keep the disease out of production areas. INSV is a viral disease that has become far too common on ornamental plants in the United States It is in a

viral group called the tospoviruses. Another virus that causes similar symptoms is tomato spotted wilt virus. In fact, the two were considered strains of the same virus until the early 90s. INSV is more often found in ornamental plants, while TSWV is more common on vegetable and field crops. Both diseases cause leaf and stem ring spots, as well as mottling and mosaic patterns. There may be a wavy-line pattern through the foliage with parallel lines. The leaf spots may be yellow, white, gray, or brown/black. If you have never seen these viral diseases before, you might mistake them for fungal leaf-spotting diseases. Eventually plants will be stunted, with small leaves and poor plant vitality. I see INSV most frequently in impatiens. Both viruses are spread by thrips, usually the western flower thrips. The University of Illinois Plant Clinic can test for the diseases using immunostrip tests, a variation of ELISA (enzyme linked immosorbant assay) tests.

INSV is a big problem in the greenhouse industry because thrips are difficult to contol. It takes only one thrips (thrips is singular and plural!) to spread the virus, and many ornamental plants and weeds can host this disease. Annuals and perennials that are propagated in greenhouses and sold to the public may also have the virus. If you have purchased a virus-infected plant or flat of plants, you must deal with the problem all season or until the plant dies. It is generally believed that INSV will not overwinter in Illinos without a live host plant.

A few hosts of INSV include impatiens, begonia, vinca, cineraria, exacum, cyclamen, chrysanthemum, and alstroemeria; but there are many more flowering plants, vegetables, and weeds that can host this virus. Viral diseases remain with a plant until its death. For this reason, we need to remove infected plants (including roots) from the garden and try to prevent further spread. A concise and helpful publication available from Colorado State University Extension can be found at http://www.ext.colostate.edu/pubs/garden/02947.pdf. This report on greenhouse plant viruses describes INSV and TSWV in more detail and shows pictures of symptoms with which you should become familiar. *(Nancy Pataky)*

Crown Gall

When most people see a gall on a plant, they think of insects as the cause. Crown gall may resemble insect galls but is a disease caused by a bacterial pathogen, *Agrobacterium tumefaciens*. The bacterium enters the plant through a wound, and the plant forms a gall in response to this infection. Actually, crown gall is an odd plant disease. The bacteria cause uncontrolled cell division in the host plant, resulting in gall formation. Genetic coding from the bacterium actually becomes incorporated into the host genetic coding. As you can imagine, this disease system has been studied and used extensively in research on genetic manipulation with plants.

Many plant species are susceptible to crown gall. We usually see the galls on creeping euonymus; but it may occur on rose, lilac, willow, honeysuckle, and other common landscape plants. I have seen it on stems of raspberry and on weeping fig. The conifers are resistant to this disease.

The galls usually appear first as swellings on the stem near the soil line–thus the name, crown gall. Eventually, galls may appear on the trunk, crown, roots, and outer stems of the host plant. Young galls are white or tan, usually round, and are quite soft and spongy. As the gall ages, it develops an irregular, convoluted, rough, corky surface and a dark brown, hard, woody interior. These galls might be mistaken for insect galls. Cut into the gall to make the distinction. The galls from crown gall disease appear as a mass of undifferentiated tissues, whereas 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.

There are also some fungal galls that may be confused with crown gall. For instance, there is a Phomopsis gall on forsythia, a pine-oak gall rust on pine, and even a smut gall on corn. Diagnostic laboratories can help determine the cause of various galls.

Crown gall is quite persistent because *Agrobacterium* can survive in the soil more than 5 years without a host. It is easily spread in soil water or rain splash but can penetrate plants only through fresh wounds. Such wounds might be made during pruning, cultivating, transplanting, budding or grafting, or feeding by insects or other pests. If you let your dog run through the planting, enough wounding occurs to let the pathogen enter.

Control of this disease is very difficult. If you decide to remove plants and start over, you need to use plants that cannot host this disease. For instance, if you had a bed of creeping euonymus with crown gall, do not put healthy creeping euonymus back in that bed. With time, they will become infected. If you are moving to a new site, inspect new plants for galls. Do not buy plants with galls. Because plants may have the crown gall disease and remain symptomless, do not try moving seemingly healthy plants from your infected bed to the new site.

Some plants that are not reported to host crown gall include barberry, hornbeam, true cedars, ginkgo, golden-raintree, tuliptree, mahonia, spruce, linden, boxwood, catalpa, beech, holly, larch, magnolia, black gum, pine, Douglas-fir, bald cypress, hemlock, birch, firethorn, redbud, smoke tree, sweetgum, deutzia, serviceberry, yellowwood, yew, and Zelkova. As stated, the conifers do not host crown gall, so you can replace that infected euonymus ground cover with one of the recumbent junipers. For more information on crown gall, consult *Report on Plant Disease (RPD),* no. 1006, at http://www.ag.uiuc.edu/%7Evista/horticul.htm. *(Nancy Pataky)*

INSECTS

Scouting Watch

Fall webworm is numerous on trees throughout Illinois. This is the second generation in the southern half of the state, the only generation in the northern half. Eggs are laid over an extended period, so be watchful for new colonies to show up over the next month. These are easily controlled by pruning out the caterpillar-containing webs or just stripping the webbing and caterpillars off the branch. If insecticides are used, be sure to use enough pressure to penetrate the webbing.

May beetles have been numerous in the Jacksonville area, feeding on tree leaves at night. With most May beetles emerging in May, these represent a genus, *Phyllophaga,* with many species. Different species emerge at different times of the year and may have shorter or longer life cycles than the typical 3-year May beetle life cycle. Southern Illinois usually has a *Phyllophaga* with a 1-year life cycle that emerges in late July and looks similar in size and color to masked chafers. Jacksonville is considerably farther north, and the beetle is dark reddish brown, about 3/4 inch long. Damage was occurring in early August. Carbaryl (Sevin) or other labeled insecticide should provide effective control.

Masked chafers are present in some areas of northeastern Illinois. For years, Jim Fizzell, former Extension adviser and active consultant, has reported masked chafer beetles emerging in the Park Ridge area in late July, which is a couple of weeks after the beetles typically die. Masked chafer adults are unable to feed and die within a week or two of emergence. These beetles have been positively identified as *Cyclocephala,* masked chafers. Although of scientific interest, the white grubs produced by these beetles will be killed if imidacloprid (Merit) or halofenozide (Mach 2) was applied earlier in the summer. However, if trichlorfon (Dylox) is applied in early August, it would likely be ineffective when these white grubs hatch in mid-August. This could explain live grubs a few weeks after a Dylox application. *(Phil Nixon)*

Zimmerman Pine Moth

This is the time of year to "really" be on the lookout for the larval or caterpillar stage of Zimmerman pine moth, *Dioryctria zimmermani,* actively crawling on the bark of trees. The caterpillar stage is highly exposed and susceptible to an insecticide spray application. Zimmerman pine moth larvae feed on a wide range pines; however, they seem to prefer Scotch and Austrian pines. Larvae bore into trees and create masses of pitch at branch whorls on the trunk or on shoots near the terminal leader. Extensive tunneling by the larvae may kill terminal leaders. Heavily infested terminals curve downward, resembling a fishhook. Repeated attacks at the trunk, by the larvae, can cause tops to break off, which may ruin the aesthetic appearance of trees. Young trees are more susceptible to attack and more attractive to adult females for egg laying, most likely due to transplant stress.

It is imperative that exposed caterpillars come into contact with insecticide sprays before they enter the bark. Once they enter the tree, it is too late. The insecticide permethrin (Astro) can be used to control the caterpillar by spraying the bark and foliage. It is recommended to use high-volume sprays to drench the stem and bark because a thick canopy of pine needles may prevent sprays from reaching the trunk. *(Raymond A. Cloyd)*

White Grubs

The white grubs have hatched. We are finding 8 to 10 grubs per foot square in irrigated turf in the Urbana area of east-central Illinois, marginally enough grubs to cause obvious turf injury. Typically, 10 to 12 or more grubs per foot square are enough to cause turf dieback. The Urbana area had a relatively light flight of adult Japanese beetles and very few masked chafers. Japanese beetles were much more common in the Bloomington and Peoria areas, so it is likely that those and other areas that experienced high numbers of Japanese beetle and associated tree and shrub damage will have higher numbers of grubs. With the very dry conditions in much of northeastern Illinois, we expect high grub numbers in irrigated turf, especially in areas or neighborhoods where most of the turf was not irrigated or was watered irregularly, causing the beetles to concentrate in the watered, green turf.

Check for white grubs by cutting through the turf with a heavy knife and pulling up the sod: The grubs

will be in the root-soil interface in moist turf and 2 or 3 inches deeper in dry soils. Tilling up the exposed soil with your knife exposes these deeper grubs. If you cut a square that is 1 foot long on each side, the number of grubs found is the number per foot square. Check several areas of the turf to get an accurate idea of the grub numbers. Usually a half dozen or so samples is sufficient. There will be more grubs where there has been more irrigation, such as greens, tees, and fairways of golf courses. In home lawns, grubs are more prevalent next to flower beds and vegetable gardens that were watered more than the lawn. Usually, grubs are more numerous in the front yards because people tend to water their front yards more than their backyards.

White grubs are C-shaped, white, and up to 1 inch long. They have legs and brown heads. Those found in Urbana on August 5 were 1/4 to 1/3 inch long, probably in the second larval instar. Most of the grubs will molt to the third and final larval instar by the end of August, remaining in that stage through the winter and much of the spring before pupating in June.

Marginally high grub numbers, 10 to 17 or so per foot square, can normally be tolerated by the turf if it is well-watered. Roots grow as fast, or faster, than the grubs can eat them. Higher grub numbers or numbers over 10 per foot square in irregularly irrigated turf should be treated to avoid injury. Injury appears as wilted, brown turf that pulls up easily due to many of the roots having been eaten off.

Trichlorfon, sold as Dylox, is very effective when applied to turf with active grubs. Watered in with at least 1/2 inch of water, it should kill about 95% of the white grubs within 3 days. Make sure that the turf is watered and that the grubs are up in the root zone because Dylox lasts only about 5 days before breaking down. If the grubs stay deeper in the soil due to dry soils for at least 5 days after application, they may not be killed by the insecticide.

Insecticidal nematodes, such as *Heterorhabditis bacteriophora,* are also be effective, killing about 60% of the grubs. Be sure to follow the label directions on application. If the nematodes are allowed to dry on the grass blades or thatch before being watered in, many die, and control is greatly reduced. Realize that if there are 20 grubs per foot square, 60% control reduces their numbers to about 8 per foot square, below the level where severe damage is likely. *(Phil Nixon)*

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Major authors are Phil Nixon, (217)333-6650, Fredric Miller, (708)352-0109, and Raymond Cloyd, (217)244-7218, entomologists; Nancy Pataky, (217)333-0519, plant pathologist; Bruce Paulsrud, (217)244-9646, pesticide applicator training; and Tom Voigt and David Williams, (217)333-0350, and Michelle Weisbrook, (217)244-4397, horticulturists. Phil Nixon is the executive editor of the *Home, Yard, and Garden Pest Newsletter*. This newsletter is written by faculty in the Department of Natural Resources and Environmental Sciences and the Department of Crop Sciences. It is edited by Mary Overmier and typeset by Virginia Cuppernell, Information Technology and Communication Services.

For subscription information, phone (217)333-2666 or (800)345-6087, or e-mail acesnews@uiuc.edu. Web subscriptions are available (http://www.ag.uiuc.edu/cespubs/hyg).