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. 10 • June 27, 2007

PLANT DISEASES

Drought Stress and Tree Diseases

Most of Illinois has been without significant rain for the latter part of May and the first 3 weeks of June. Trees are suffering from drought stress. Even with relief from a few storms, symptoms may persist. Undoubtedly, the problem will appear again in August. Here are some tips on spotting this injury and watching out for your trees.

Drought symptoms may be chronic or acute. Acute symptoms appear within hours or days of drought stress and are usually recognizable. Wilting of foliage and stems and scorching of leaves are acute symptoms that may indicate drought stress. We usually recognize both as such and respond by watering the symptomatic plants.

Chronic symptoms, more difficult to recognize, appear over days to months. Slow plant growth, reduced leaf size, less-intense leaf color, leaf-spotting on species such as tuliptree and callery pear, early fall color (red maple), early defoliation (tuliptree), dieback of stems (linden, poplar, hickory), bark cracking, trunk bleeding, and predisposition to disease and insect problems may be chronic symptoms of drought stress.

Diseases can also cause some of these same symptoms, so how can you distinguish an infectious disease problem from drought stress? One tip is to look at the pattern. Drought, as with other environmental stress factors, usually affects groups of trees—all in the same soil type, all exposed to the same environmental conditions. If your maple is showing drought stress, it is likely that other maples in your town will appear similar. Generally, infectious diseases do not affect all plants in a group at once. Even in a group of Scotch pines, a disease like pine wilt may occur on only one or two trees.

Still, disease and drought stress go hand in hand. Drought-stressed trees (especially the defoliated) are more susceptible to stem-invading pathogens. Many fungi that cause cankers are prime examples. Botryosphaeria canker is more common on drought-stressed trees. Drought-stressed spruce trees are more susceptible to Cytospora canker. Severe drought weakens trees, so they are predisposed to infection by opportunistic fungi, including most of the canker fungi. Because drought can cause bark cracking, it may also provide a wound for canker fungi to enter the tree.

There are several ways in which drought predisposes plants to infection. For example, consider Armillaria root rot. Defoliation and drought cause the release of chemicals that stimulate *Armillaria* growth. Pines under drought stress lack the ability to make resins to protect against pinewood nematodes and pine wilt disease. Symptoms of Verticillium wilt are more pronounced in drought, in part because drought inhibits the tree's ability to "wall off" the fungus. Insects are involved in this complex as well. Drought-stressed elm trees are more attractive to the elm bark beetle, which may carry the Dutch elm disease fungus.

As you may have guessed, the take-home message here is to keep trees watered in extended periods of drought. Watch plants for symptoms, and respond to their needs. Maybe you have some indicator plants that show symptoms first and let you know it is time to water: for example, doublefile viburnum, azalea, dogwoods, forsythia, Japanese maple, redbud, and hydrangea. It also helps to control weeds and grasses that compete with trees and shrubs for water. Organic mulches over the root systems of trees (but not touching the trunk) help maintain soil moisture. When watering annuals and perennials in your garden, don't forget about your trees. *(Nancy Pataky)*

Cytospora (Leucostoma) Canker of Spruce

Cytospora (Leucostoma) canker is one of the most common diseases in Illinois landscapes, definitely the most common we see on spruce. It is found on trees growing in stressful conditions. Although it occurs on young trees, it is more common on trees at least 15 years old.

There are many spruces grown in Illinois. According to Michael Dirr in *Manual of Woody Landscape Plants,* spruces have shallow, spreading root systems and "prefer a moderately moist, well-drained soil." Some spruce species are more tolerant of dry conditions than others; but as a whole, spruces do not grow well in hot, dry conditions. Throw in a soil with low organic matter, put the tree in an exposed site (possibly in a new housing development), and you have a stressed tree. Drought stress also predisposes the tree to infection.

Cankers are dead areas on branches or trunks. They may girdle and kill the branch, or they may partially limit movement of water and nutrients. On spruce, a sappy exudate is usually associated with the canker; this sap is a thin layer, not the large blobs found with some insect

pests, such as pine shoot moths. The wood under the bark of a tree with Cytospora canker is brown (dead) rather than green or white. The disease infects lower limbs first, slowing moving up the tree, killing branches as it moves: Most trees lose a limb each year to the disease. Species affected include mostly Colorado blue and Norway; but other spruce species, as well as Douglas-fir, balsam fir, hemlock, larch, and red and eastern white pine, may have this disease. A U of I fact sheet, "Cytospora or Leucostoma Canker of Spruce," *Report on Plant Disease,* no. 604, is available at http://www.ag.uiuc.edu/%7Evista/horticul.htm. Most Illinois Extension offices also have copies.

Managing Cytospora canker involves removing dead branches and trying to improve tree vitality. Do some sleuthing to find out what conditions are stressful to the tree. Correct as many as possible. Fungicides are usually of little value in control of this disease. *(Nancy Pataky)*

Hosta Scorch and Possible Look-Alikes

Hostas grow best in shade or partial shade. They thrive where there is a good amount of soil organic matter to help retain moisture. If hostas are grown in full sun, especially in soil with low organic matter, they develop yellow foliage with ***scorched*** margins. Under drought conditions, leaves become pale or dull and leaf margins scorched. This is not an infectious disease. You will not find any fruiting bodies or spores of a pathogen on these leaves. Watering the soil early in the day helps temporarily, but planting in a semi-shaded or shaded site in high-organic-matter soil is the best long-range management.

If you have scorch symptoms on your hostas and are concerned that you may be missing something bigger, here are some diseases to consider: anthracnose (common), Sclerotium blight (occasional), foliar nematodes (rarely), Fusarium crown and root rot (rarely), and viruses (occasional).

The only disease that might be confused with environmental scorch is **anthracnose**. This disease is caused by aspecies of the *Colletotrichum* fungus. It thrives in warm, wet weather; so it may appear on irrigated hostas. I would not expect to see it in drought conditions where plants have not been irrigated. Symptoms include large irregular spots with darker borders. The centers of spots often fall out, and leaves become tattered and torn. Fruiting bodies are small (pinhead-sized) masses of clear spores with small, black, hairlike structures (setae) sticking out of the spore mass. Obviously, the symptoms are a bit different than scorch symptoms. Scorch is not caused by a pathogen and does not have spores or fruiting bodies.

Fusarium root and crown rot is a problem we have seen a few times, especially in production areas. This disease causes leaf yellowing, stunting, rotting of roots, and death of crown tissues. It can be distinguished from scorch by inspecting the roots. Plants with environmental scorch have white roots or roots with white growing tips.

Sclerotium blight has become a serious disease of hostas because it is persistent and causes collapse of the foliage. Initially, lower leaves wilt and brown. In a short time, the upper leaves also wilt; and close inspection shows a soft, brown rot of the base of petioles. The fungus, *Sclerotium rolfsii,* appears as a fluffy, white mass of mycelium on the petioles and surrounding soil. Tiny tan, mustardseed-sized sclerotia (fungal structures) can be seen in this mycelium and on the soil. Symptoms do not appear similar to scorch.

Foliar nematodes on hosta are also relatively new to our area. At this time, we are not seeing a big problem in Illinois, but the possibility is real. Nematodes are microscopic roundworms that cause disease. They are pathogens much like a fungus or bacterium, but they require moisture to infect; and they live within the plant. The foliar nematodes are in the genus *Aphelenchoides*. On hosta, the nematode feeds in the leaf, producing brown areas between veins. The brown areas in the foliage may take on various shapes, usually limited by veins. Scorch may also occur between veins; but unlike foliar nematodes, it also involves leaf edges and leaf tips.

Viruses that infect hostas cause mottling of the foliage, crinkling, stunting, and some necrosis. The symptoms do not resemble leaf scorch.

Keep these diseases in mind when trying to confirm a case of environmental scorch. *(Nancy Pataky)*

INSECTS

Japanese Beetle Adults Likely Numerous

Japanese beetle adults are being found throughout Illinois. In southern Illinois, large numbers are being found, with reports of individual pheromone traps collecting a 5 gallon bucket full of beetles per day. In central Illinois, small numbers of beetles have been found on linden, grape, and other favored host plants. Typically, heavy emergence in central Illinois occurs around June 21 to 25, and it appears that will hold true again this year. Occasional beetles are being found in northern Illinois, but full emergence typically occurs during the first week of July in that part of the state.

Japanese beetle adults were numerous in Illinois in 2006. Factors that decrease their numbers are reduced fall moisture and deep frozen soil. Japanese beetle grubs need about 11 inches of precipitation in summer and fall to develop properly. Less rainfall results in considerable larval mortality. Last fall's rainfall probably provided sufficient moisture for high larval survival. In larger urban areas, irrigation of lawns and other turf areas helps to reduce the effects of dry fall weather.

Japanese beetle grubs descend deeper into the soil in the fall as soil temperatures drop; but unlike some other white grubs, most do not tunnel deeper than 11 inches. Mortality is heavy when the grubs are in frozen soils for

more than 2 to 3 weeks. Several years ago, the soil in central Illinois froze to about 18 inches deep, while that in northern Illinois froze 3 feet deep. These soils stayed frozen for over a month. The following summer, the Japanese beetle adult emergence appeared to be about one-third of the previous year's emergence. Last winter, we experienced very cold temperatures with little snow cover for a couple of weeks, but then we received heavy snowfall across much of the state that insulated and protected the soil from freezing deeper. In central Illinois, the soil froze only about 6 inches deep; in northern Illinois, the soil froze deeper but did not stay frozen for very long. There did not appear to be enough deep-freezing of the soil last winter to cause a reduction in the number of Japanese beetles. *(Phil Nixon and Morton Arboretum)*

Japanese Beetle Identification and Habits

Adult Japanese beetles are stocky and range from about 3/8 to 1/2 inch long. They are metallic green with coppery wing covers. There is a row of white spots along each side of the abdomen just below the wing covers, as well as two white spots on the back end of the abdomen. These white spots consist of patches of white setae (hairs). Males tend to emerge first and are strongly attracted to newly emerging females. It is common on turf to observe "balling," a spherical mass 1 to 2 inches in diameter consisting of male Japanese beetles with a female Japanese beetles in its center. This "balling" typically occurs as the females are emerging in late June in central Illinois, earlier in southern Illinois, and later in northern Illinois.

Mated females tunnel into the soil to lay eggs, preferring moist soil and apparently green, actively growing grass. The white grubs that hatch feed on turfgrass roots from early August until the turfgrass root zone soil temperature drops below 60°F. The grubs then tunnel deeper into the soil for the winter, returning to feed on turf roots when the temperature in that area rises to 50°F. The larvae pupate later in the spring, emerging as adults in June to early July, depending on latitude.

Adult beetles feed on the upper, sunlit leaves of smartweed, linden, crabapple, birch, willow, rose, grape, brambles, and many other trees and shrubs. They typically feed through the upper leaf surface and the internal mesophyll, leaving the lower surface or epidermis intact. Although damaged leaves are initially whitish, the exposed lower epidermis soon turns brown. The beetles also eat holes through the leaves, as well as eat the leaf margins. This damage can be heavy enough that the upper portion of the tree or shrub is stripped of leaves. Damage in high-emergence areas typically causes all the leaves on small trees and shrubs to turn brown or fall off, and the upper half of the crown of medium-sized trees such as crabapples to have brown or no leaves.

The beetles are present in large numbers for about 6 weeks, becoming much less common around mid-August. Individuals can be found into early October, and there is evidence that small numbers of adults emerge in late summer. The adult beetles tend to fly to new hosts about every 3 days. This flight is commonly 3/4 to 1-1/2 miles. For this reason, controlling the adults to reduce the injury caused by their larvae to turfgrass is not effective. Similarly, controlling white grubs in turf to reduce leaf-feeding by the adults is not recommended. Control only the stage that is causing damage. When treating for adults, protect only those ornamental plants where the damage will be obvious, such as small trees and shrubs near entrances to buildings. It is usually not practical, nor economical, to try to protect all of the attacked plants in the landscape. Avoid treating plants where the damage will be less noticeable. *(Phil Nixon)*

Japanese Beetle Management

Pheromone traps are available that contain a pheromone (externally produced hormonelike chemical) attractive to male Japanese beetles. They also contain a floral lure attractive to female beetles. Yellow vanes and funnel (the beetles are attracted to yellow) lead to a bag or other container to hold the trapped beetles. Research shows that beetles are attracted from a considerable distance to areas near the traps but then switch their seeking behavior to food plants, resulting in heavier plant damage near traps. Even though the traps catch large numbers of beetles, we do not recommend their use except in unusual situations.

Netting is used to provide complete protection. Rosarians protect prize individual buds and blooms or even entire plants with netting. Backyard blueberry growers use netting as well. Shadecloth with a high light transmittance, spun-bound polyester row covers, netting sold in fabric stores, window screening, and other meshes all work well.

Insecticides provide effective control of adult Japanese beetles. Imidacloprid (Merit) moves systemically through the tree to provide control. Soil applications require 2 months to move through the tree and so are not practical now for this year's infestation. Imidacloprid (Imicide, Pointer) injected into the trunk or root flare takes only 2 weeks to move through the tree. Occasionally, about one tree in seven, the imidacloprid does not provide control systemically, so you need to watch for this. Once in the tree, the imidacloprid should be effective for at least a year.

Carbaryl (Sevin), clothianidin (Arena), cyfluthrin (Tempo), and dinotefuran (Safari) provide about 2 weeks of protection per foliar spray. With the beetles present for about 6 weeks, three applications are typically required.

Because the adult beetles prefer foliage previously damaged by other Japanese beetles when they change hosts, early hand-removal of beetles is effective. In the late afternoon and evening, disturbed beetles fold their legs and drop to the ground. By holding a widemouth

jar of rubbing alcohol (isopropyl alcohol) or soapy water under beetles and poking at them, one can easily collect a pint or so in less than an hour. If this is done every day or two for the first couple of weeks after the beetles emerge, subsequent damage through the summer is reduced. Although labor-intensive, this may be a viable option for clientele. *(Phil Nixon)*

Gypsy Moth

Gypsy moth larvae are causing damage in new areas in northeastern Illinois. After becoming widespread in Lake County, the most northeastern county in the state, several years ago, they have been moving relatively slowly through adjoining counties. However, this year they appear to be spreading more rapidly again with higher populations. There have been heavy infestations in Naperville, Glen Ellyn, and other areas of Cook, DuPage, and McHenry Counties. These infestations were not treated until the caterpillars were large, resulting in relatively poor control.

Gypsy moth caterpillars are hairy, dark-colored, with a double row of blue and red balls down the back. Fully grown caterpillars are 1-1/2 to 2 inches long. They prefer to feed on the foliage at the top of trees, but more feed lower in the canopy as larval populations rise or as preferred leaves are eaten. Oaks are preferred, but many other tree species are also attacked. At this time of year, caterpillars soon form brown pupae about 1 inch long, embedded into silk.

Adult moths emerge in a few weeks. Male moths have brown wings with black V-shaped markings and a 1-1/2-inch wingspan. They are excellent fliers, commonly in flight during the day around trees containing female moths. Female moths have white wings with black V-shaped markings and a 2-inch wingspan. Those in Illinois and throughout the Midwest are unable to fly. After mating, female moths lay an egg mass that is about 1 inch long by 3/8 to 1/2 inch wide. The egg masses contain up to 1,000 eggs and are covered with the buff-colored hairs of the female's abdomen. Egg masses are typically laid under loose bark or on top of the bark of attacked trees. However, egg masses can be laid almost anywhere. The eggs overwinter and hatch the following spring at oak leaf emergence.

In general, controlling caterpillars with insecticides becomes more difficult as the caterpillars grow older. Gypsy moth is no exception. Treatment at this time with insecticides is likely to provide very poor control. Several inch-wide burlap bands around the trunk of infested trees will attract many pupating larvae so that they can be removed and destroyed. Otherwise, make notes of locations of infested trees to scout them and provide effective control next year. Egg masses can also be removed and destroyed from now until next spring. *(Phil Nixon, Susan Grupp, James Schuster, Morton Arboretum)*

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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