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PLANT DISEASES

Red Maples Show Stress

Many red maples have recently shown stress symptoms throughout Illinois. Callers report red leaves near the top of the tree, smaller than normal leaves, some branch decline, and overall poor appearance.

It is likely that various problems are to blame, depending on the tree in question. Verticillium wilt is one possibility. That fungal pathogen can infect any of the maples and cause decline, dieback, wilting, and branch death. Verticillium wilt was discussed in issue no. 6. Vascular streaking of the branches is an excellent diagnostic tool for identifying this disease. Laboratory cultures can prove the fungus is present.

Most of the samples that we have seen were not infected with *Verticillium*. They had small leaves with a red cast. Stem growth on these samples was only 1 inch annually for the last 3 years—a clear indication of stressed conditions. Michael Dirr, in *Manual of Woody Landscape Plants*, says that red maple is very tolerant of different soil conditions but prefers slightly acidic, moist soils. He also adds that chlorosis shows on foliage of trees in high-pH soils. The actual limiting element may be iron or manganese, but the cause is the high-pH soil that ties up these elements. Drought stress aggravates the chlorosis problem.

Another problem on this species is potato leafhopper–feeding injury. In issue no. 7, Raymond Cloyd discusses this insect and the injury it can cause on many species, including maple. Feeding, especially on red maples, results in stunted tree shoots and leaves that curl downward, with brown to black edges. There are three to five generations of this insect per year, so damage still may be occurring.

What do you do if your red maple is showing stress? Look for potato leafhoppers on the newest leaves. Look for vascular streaking of the wood, and send to a lab to confirm Verticillium wilt. Have a soil pH test run to determine whether your tree is in an appropriate site and whether you need to supplement nutrients. Refer to *Report on Plant Disease (RPD)*, 603, "Iron Chlorosis of Woody Plants." Sometimes spraying an iron or manganese chelate (available at garden centers) on the foliage quickly identifies which element is limiting. If the foliage is deficient in these micronutrients, it turns darker green within a week of spraying. Try to provide more water to this species during drought stress. The tree does best on moist sites. Consider a general tree fertilizer in the fall. By then, you will know whether the fertilizer should be an acid fertilizer, based on your soil test.

One other problem we occasionally saw in the past was a very rapid decline of an entire red maple tree. In many cases, this was caused by a graft incompatibility. Red maples available in the trade now are usually produced on their own roots, eliminating the possibility of graft incompatibility. *(Nancy Pataky)*

Did Winter Kill My Trees?

Trees and shrubs that died over winter are quite obvious now. Most other vegetation is covered with green foliage, while winter-killed material is stark or has small tufts of leaves scattered throughout the plant. Advice in the spring would be to give the plant time to recover. By now, plants should have developed some new leaves if the plant had any chance of recovery. The Plant Clinic has received many complaints of trees and shrubs that did not survive. What factor or factors caused the death of so many trees and shrubs this winter?

The usual complaint we hear is that the tree or shrub looked fine in the fall and was dead this spring. If that were the case, the logical assumption is that winter injury is the culprit. Freeze injury during dormancy is one possibility. Another possibility is the injury that occurs following a sudden drop in temperatures in the fall. Cold acclimation usually occurs as temperatures fall. If temperatures fall rapidly (overnight), however, plant tissue are often injured. Cold damage can also occur in the spring when there is a cold snap just as tissues begin to expand. In that case, plants have begun deacclimation and are more susceptible to cold temperatures. Authors Sinclair, Lyon, and Johnson, in *Diseases of Trees and Shrubs*, discuss these possibilities. Although individual cases of cold injury occurred, the general temperature conditions of the past winter in Illinois do not seem to account for the number of winter fatalities of trees and shrubs. Besides, we would expect all similar species in an area to be affected if cold injury were the only factor. That was not the case.

It is possible that the plants that supposedly looked fine last fall were already under stress. Drought stress is a likely key player in Illinois. Acute drought stress is obvious to most gardeners because plants wilt during the day and rehydrate at night. Symptoms are sudden and easy to see. A slow, continual lack of water as experienced last summer and fall, on the other hand, causes a reduced growth rate, reduced leaf size, off-color foliage, and stem dieback. These symptoms might not be obvious because they happen slowly over the season. We saw these symptoms on many plants last year, especially white pine, birch, and lindens. In many cases, frequent, shallow irrigation kept trees alive but also caused shallow root development. Trees with a shallow root system are not able to withstand more drought stress as readily as trees with deeper roots. The past winter was dry for most of Illinois; and winds are thought to have been a factor in the final desiccation of already drought-stressed trees.

Illinois has fared well this spring with frequent rains. When drought hits again, help your trees by watering deeply on a weekly basis as long as drought occurs. Watering turf around the trees is usually not adequate for tree needs. A long, slow soak in the drip line is helpful, as are hose end root-injection tools. Check tree books to determine the relative water needs of your tree. Birch, for instance, requires more water than most other trees, so it shows deficit more quickly. Most tree feeder roots are in the top 18 inches of soil. When watering the roots via the soil surface, apply at least an inch of water in each watering. If you use a soil injector, put the injector into the soil to about 18 inches. Injectors give a slower release of the water, but it is deeper into the soil with less loss to evaporation and surrounding turf. A disadvantage to injectors is that you can't be certain how much water you are applying. *(Nancy Pataky)*

Rose Rosette

Rose rosette, also called witches' broom of rose, causes the plants to form very thick, redder than normal stems with many times the normal number of thorns. Symptoms are obvious. You might think that your plants have been affected by a herbicide, but other nearby plants are not affected. The disease seems to show in spurts, possibly related to increases in population of the eriophyid mite vector. Infected plants cannot be cured and must be removed from the garden, roots and all.

Rose rosette is caused by a double-stranded RNA, which means it is a viruslike disease. It cannot be cultured in a lab; but fortunately, symptoms are distinct. The new growth usually appears deep red, both on leaves and stems. On some cultivars, the infected growth is an odd green color, as with a nutrient stress. Stems are stubby, soft, and brittle, with deformed leaves that may show crinkling, distortion, or a mosaic of green, yellow, and red. An infected plant produces numerous lateral shoots that grow in different directions, giving the plant a witches'-broom appearance. These shoots are typically deep red and much larger in diameter than the canes from which they grow. Thorns on these stems are more numerous than normal, giving the stem an almost hairy appearance. Plants usually die within about 22 months of infection. Because of the way roses are propagated, rose rosette is often identified in the nursery, and infected plants are pulled before they get into the retail market. Sometimes, there are escapes, or plants are infected after they are in the garden.

The vector of this disease is an eriophyid mite, a mite so small that 20 could fit on a pinhead. Eriophyid mites are much smaller than red spider mites, which are commonly seen on plants; but you can see them with a 10x or stronger power magnifying glass. Grafting can also spread rose rosette disease.

Multiflora rose is the most common host of this disease, but it has been reported on cultivated flowering varieties. Climbers, hybrid teas, floribundas, miniatures, and a number of old variety roses have been infected. Hybrid teas typically show a color that is more yellow than red. So far, no other host besides rose has been found. Our clinic has seen a few cases of this disease on hybrid roses in the past few years.

Currently, infected plants cannot be salvaged. Plants with symptoms should be dug up and destroyed (including roots) when first noticed. It is strongly suggested that multiflora and garden roses be separated as far as possible from each other. The efficacy of mite control has been questioned in control of this disease; but if miticides are used, research suggests that the critical mite-transmission time is May and June. Concentrate your efforts in those months.

A few have asked whether rose rosette could be used as a biological control for muliflora rose. Although this might work in theory, the chance of causing infection to nearby desirable roses is great and should prohibit this practice. For details of this disease, consult *Report on Plant Disease (RPD),* no. 666, "Rose Rosette Disease." *(Nancy Pataky)*

INSECTS

Black Turfgrass Ataenius

Black turfgrass ataenius first-generation larvae are nearing full size across Illinois. If they have not been scouted, with high populations being treated, damage

is likely to appear on the tees and greens of golf courses by early July.

Black turfgrass ataenius is a small, white grub that overwinters as an adult beetle in moist, fallen leaves and similar protected locations. In the spring, typically as Vanhoutte spirea is blooming, the 1/4-inch-long, cylindrical, black beetles fly to golf courses to lay their eggs. They are found in the clippings baskets of greens mowers at that time. Eggs are laid over the next couple of weeks, with egg hatch occurring a couple of weeks later.

The larvae are similar in appearance to other white grubs, being white and C-shaped, with legs and brown heads. However, they are much smaller than other white grubs, being only about 1/4 inch long when full-grown. Rather than a raster pattern on the underside of the last abdominal segment, they have two large pads. Because they are smaller, each grub does not eat as much root tissue as larger species, so higher grub numbers are required to cause injury. Cut through the sod and pull it back to scout for grubs in the root system. The damage threshold for black turfgrass ataenius is 50 per square foot, as compared to 10 to 12 for the larger species of white grubs. In heavy infestations, 150 to 300 black turfgrass ataenius grubs per square foot is common. Over 1,000 grubs per square foot have been found.

Damage is similar to that of other white grubs. Because the roots are eaten off the grass plants, the blades wilt and turn brown. Where there are high numbers of these grubs, roundish brown areas of turf become evident. Heavily damaged turf peels back like a carpet from the soil because there are few roots left to keep it attached.

Mature larvae pupate in July and emerge as adults for a second generation. This second generation is in the larval stage when the larger white grubs such as Japanese beetle and masked chafers (annual white grubs) are present. However, black turfgrass ataenius larvae develop fully in the fall, pupate, and emerge as adults. These adults fly to overwintering sites. Many golf courses contain ideal sites, typically with a screen of trees between adjacent fairways. The fairways are built up, which allows water to run off into these forested, interfairway areas, creating ideal, moist leaf litter for the adult beetles to overwinter. Also, they are close to the fairways, tees, and greens in the spring.

Larval damage is most likely in the wettest areas of turf. On a golf course, larval numbers are heaviest in swales on fairways and areas around greens where water drains off and tends to puddle. Larvae are probably common on tees and greens because they are watered more frequently than other locations.

Typically, damage occurs on highly maintained turf, making this mainly a golf course pest. Although home lawns commonly have a small num-ber of larvae, damaging numbers are found on highly maintained lawns that are heavily fertilized, irrigated, and mowed frequently. In these situations, damage typically occurs in a swale, where water collects.

Black turfgrass ataenius is a scarab beetle, as are all white grub species. Scarabs are a large family of beetles in which most of the species are scavengers. They include the dung beetles, which feed on manure, and other species that are found in rotting wood, where they probably feed on the wood rot fungi. It is thought that black turfgrass ataenius may be attracted to highly maintained turf because high fertilization results in heavy growth, with more thatch, clippings, and other decaying plant material. Irrigation levels associated with highly maintained turfgrass provides the moist conditions that also attract this insect.

Management involves the application of imidacloprid (Merit) or halofenozide (Mach 2) in the spring about 2 weeks after high beetle numbers are found in clippings baskets. Merit and Mach 2 are long-lasting insecticides that should last long enough from the spring application to provide control on the second generation of black turfgrass ataenius and the larger white grubs in August. However, scouting is recommended in the first half of August to be sure that these grubs are being controlled. Damaging infestations of black turfgrass ataenius larvae can be treated with trichlorfon (Dylox). Dylox kills the grubs within 3 days, rather than the 3 weeks it takes for Merit and Mach 2. The insecticidal nematode, *Heterorhabditis bacteriophora* (Hb nematode), is also effective against the larval stage. *(Phil Nixon)*

Gypsy Moth

Homeowners in the northern portion of Illinois where gypsy moth is present often feel frustrated in how to deal with it; however, an understanding of the behavior of gypsy moth may provide a way to deal with this plant-feeding pest. During this time of year, the later-instar larvae crawl down trees during daylight hours. Wrapping burlap near the base or up to 6 feet from the base of trees provides shade and shelter for older larvae when they seek out resting places during the day. Later on in the year, the larvae crawl down trees to pupate. Physically removing caterpillars (and then the pupae) during the day and placing them into a solution of soapy water may reduce the number of damaging larvae, particularly under low populations, and potentially reduce the number of moths.

Questions are often asked by homeowners regarding the effectiveness of biological controls or natural enemies of gypsy moth. Gypsy moth is susceptible to attack by various natural enemies such as parasitic wasps (parasitoids), predators, and pathogens (fungi and viruses). The major parasitic wasps are the egg parasitoid, *Ooencyrtus kuvanae,* and a parasitic fly of the caterpillar, *Blepharipa pratensis*. A large predatory beetle, *Calosoma sycophanta,* feeds on gypsy moth caterpillars. A fungus, *Entomophaga maimaiga*, which has been found in Illinois, causes a disease in gypsy moth larva that kills them. It was introduced into the United States in 1909. However, it was undetected for over 80 years until it was recovered again in the late 1980s. This fungus overwinters as a resting spore within dead caterpillars. It infests live caterpillars in the spring. The abundance of the fungus depends on wet weather because the fungus performs best under moist conditions. The spores (conidia) are spread by wind and infect other caterpillars. The fungus can kill caterpillars within a week. *E. maimaiga* infects gypsy moths at low populations. It is possible that this fungus, which is found in the soil, may follow the spread of gypsy moth.

During outbreaks or when populations are high, gypsy moths may be killed by a viral organism known as nucleopolyhedrosis virus (NPV). Naturally occurring in all gypsy moth populations, the virus has the capability to persist in the soil. Infection occurs when larvae consume leaves contaminated with the virus particles. Once inside the gypsy moth larvae, the virus disintegrates the internal organs, resulting in death. Before dying, the larvae migrate to the tip of branches and hang down in a characteristic J-shape. Eventually, the body becomes a mass of viral particles, which seep out and fall onto leaves below. Unlike *E. maimaiga*, the virus only occurs under outbreak conditions, because caterpillars are generally crowded and stressed from lack of food.

Additionally, vertebrate animals such as mice or shrews feed on gypsy moth caterpillars. However, like many of the natural enemies of gypsy moth, they don't kill enough gypsy moth caterpillars to prevent or minimize defoliation of trees. *(Raymond A. Cloyd)*

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