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INSECTS

Arborvitae Leaf Miner

We have gotten several inquires this year regarding the arborvitae leaf miner, *Argyresthia thuiella*. This leaf-mining pest is a caterpillar (Lepidoptera) that primarily feeds on arborvitae (*Thuja* spp.).

The adults are tiny, silver to gray moths with a wingspan of only 1/3 inch. The forewings contain brown and black markings. The legs and abdomen are light brown. The moths can be found flying around in June. The female moths deposit pinkish, scalelike eggs on the tips of plant foliage over a 5-week period. Eggs hatch in 2 to 3 weeks into very small (1/8-inch-long) yellow-green hairy caterpillars or larvae with a reddish tinge and shiny black head. The larvae burrow into the leaf scales and eat the inside of the leaf. Feeding injury starts in the summer and reaches a peak in the fall. Larvae normally tunnel into the growing points, killing affected tips. They start mining from leaf tips and move down toward the base. Their feeding causes the foliage to initially turn yellow and then brown, giving the plant a bleached appearance.

Foliage damaged from arborvitae leaf-miner feeding is very easy to distinguish from healthy foliage. Hold damaged leaves up to the light to see the larvae and frass within the leaf tissue. Although plants generally survive attack, continued feeding by heavy arborvitae leaf-miner populations may kill twigs and branches. The larvae overwinter within the mined leaves and feed for a short period of time in the spring before entering a pupa stage, which lasts approximately 3 to 5 weeks. Adults chew an exit hole from the mined leaves in late spring to early summer. There is one generation per year in Illinois.

Arborvitae leaf miners are attracted to *Thuja* planted in shady locations, so placing plants in the sun will help alleviate problems. In addition, pruning out heavily infested twigs or branches and placing debris in a sealed bag or other container removes leaf-miner larvae. Arborvitae leaf miner is highly susceptible to natural enemies, such as parasitic wasps (parasitoids), because they cannot escape being located within the plant tissues. However, the natural parasitoid populations may not provide sufficient control. As a result, the use of insecticides may be warranted. Insecticides recommended for controlling arborvitae leaf miner include abamectin (Avid), acephate (Orthene), and chlorpyrifos (Dursban). These materials are able to penetrate through the leaf surface and kill the larvae. *(Raymond Cloyd)*

Fletcher Scale

Fletcher scale, *Parthenolecanium fletcheri*, is a common pest in nurseries and on sheared hedges in landscapes. This scale feeds on arborvitae (*Thuja* spp.) and yews (*Taxus* spp.) and has been known to feed on *Pachysandra*. On yews they are generally located deep within the plant canopy. The female scales are approximately 1/4 inch long, round, and deep brown in color when mature. In Illinois, eggs produced by females hatch between May and early July into oval, flat, yellowish crawlers. Females can lay around 500 to 600 eggs and are capable of producing up to 1,000 eggs. Crawlers are active from mid-June to mid-July. They tend to congregate and feed on twigs and stems deep within the plant canopy. Fletcher scale feeding weakens plants, causing foliage to drop. They also produce copious amounts of honeydew, which is an excellent growing medium for black sooty mold fungi. There is one generation per growing season.

Fletcher scale can be managed using pest control materials including acephate (Orthene), chlorpyrifos (Dursban), diazinon, insecticidal soap, and summer oil. Applications should be made in mid-June when crawlers are active or when hills of snow hydrangea are in full bloom because the early crawlers are most susceptible to insecticides. Be sure that sprays penetrate the entire plant canopy.

Natural enemies may cause rapid declines in Fletcher scale populations because many predators are effective in controlling nymphs. As a result, use insecticides that are less harmful to natural enemies. Avoid the use of broad-spectrum insecticides that kill the natural enemies of Fletcher scale. *(Raymond Cloyd)*

Viburnum Borer

Viburnum borer attacks the base of *Viburnum opulus compacta* and other viburnums, causing dieback of the stems. There are actually two major species involved, the viburnum clearwing borer, *Synanthedon viburni*, and the lesser viburnum borer, *S. fatifera*. The larvae tunnel in the cambium from the soil line to several inches below the soil. Severe attack results in girdling below ground. Attack may also occur as high as 18 inches above ground, resulting in gnarled and scarred stems.

Adult moths are clearwinged moths, bluish-black with yellow markings and a 3/4-inch wingspan. They fly during the day, mimicking the flight and appearance of wasps. Female moths lay their eggs at the base of the plant in June, particularly near wounds. The resulting larvae are white and legless with brown heads. They burrow just under the bark in the cambium area. Full-grown larvae are about 3/4 inch long. They pupate the following May to emerge as moths in June.

Severely attacked bushes typically have sparse foliage with just a few leaves at the tips of some stems and other stems totally bare. Damage seems to be most severe in the first 2 to 3 years after transplant into the landscape. The entire bush may die. Surviving bushes appear to grow out of the damage because mature plants appear to be free of the borer, but close examination frequently reveals damage that is several years old.

Male moths are attracted to pheromone traps. Spray the base of affected shrubs with chlorpyrifos (Dursban) 2 weeks after peak moth catch. Treatment during the second or third week of June is usually successful. Once the larvae get larger, they are susceptible to insecticidal nematodes. Drench the soil with *Heterorhabditis bacteriophora* or *Steinernema feltiae* in late August and keep the soil moist after treatment. *(Phil Nixon)*

PLANT DISEASES

Plant Clinic Request

The Plant Clinic has been doing a booming business lately. We appreciate the time most of you have taken to prepare plant samples and to get them to us in good shape. Most clients have also provided the required payment with samples. I am happy to report rapid turnaround times so far this season.

The amount and quality of supportive paperwork has not always been as helpful. Please take the time to write down details about symptom distribution in the entire planting area as well as the symptoms on one particular plant. A specimen data form is not required as long as you provide the information requested on that form. Describe how the symptoms have changed over time. Describe the condition of nearby plants. It is critical to know details about the planting site, plant material around the base of plants, chemicals used on or near the plants, soil type, available moisture, and any other facts that might be helpful.

The type of information described above often provides additional clues to the real problem-causing symptoms. As an example, a recent fruit sample was submitted for disease assay. No pathogens were detected. Because details had been provided on symptoms and fertilizer applications, additional specialists were consulted and the problem was identified as nutrient toxicity. Diagnosis is our service, but it is only as good as the sample and information provided. We can't afford the time to call 2,000 people for additional information and will often work with what we are provided. Please take the time to give this information to us.

Information about the Plant Clinic, fees, how to submit samples, a data form, directions to the clinic, etc. can be found on the Web at **http://www.cropsci.uiuc.edu/research/clinic/clinic.html.** *(Nancy Pataky)*

Foliar Nematodes

The words "plant nematode" generally bring to mind a root-related problem in Illinois. We also have some nematodes that cause problems to aboveground plant parts in this state. Pinewood nematode is a very common example. The foliar nematode of hosta has been identified occasionally in Illinois, and it is an up-and-coming problem in the landscape business. Foliar nematodes can overwinter here and may infest many herbaceous hosts.

Nematodes are microscopic unsegmented worms that live in plant stems, leaves, and roots. Foliar nematodes include several species from the genus *Aphelenchoides* that commonly feed inside leaves of hostas, as well as chrysanthemums and begonias. Many other perennials may also be infested, including anemone, creeping phlox, ground ivy, windflower, heuchera, and others. Plant infection occurs when the nematodes migrate from the soil surface up to the plant stems and onto leaf surfaces in a film of moisture. They enter leaves via stomates and begin feeding on parenchyma cells. The leaves eventually die and fall to the soil surface, where they are the source of reinfestation.

The most distinctive field symptom of foliar nematodes is lesion formation limited by leaf veins. Leaves with parallel veins display stripes of necrotic tissue; and, in plants with netted veins, the lesions have the appearance of an angular leaf spot. As damage increases, the tissue becomes necrotic and dries out, leaving a large dead patch of tissue. Leaf blotches progress down and outward in the plant from upper leaves. In plants with angular veins, these dead areas have a fan-shaped pattern that is yellow-brown to gray in color. Often there is a V-shaped, damaged area bordered by leaf veins. These symptoms should alert you to the possibility of foliar nematodes, but similar symptoms can also be caused by bacterial pathogens.

Although foliar damage is seldom lethal, plant aesthetics are ruined, and vigor is reduced. Plants under nematode stress are more susceptible to damage from other diseases and unfavorable weather conditions. Confirming foliar nematodes is relatively easy. Cut symptomatic leaf tissue into 1-inch squares and soak the leaf tissue in a shallow bowl of water. After 24 hours, the nematodes should be visible with a 10X hand lens. They will appear as whitish, moving strands. Rotting tissue can be infested with saprophytic nematodes so, when you are in doubt, consult a specialist.

Nematodes are disseminated by water. This includes rain, dew, overhead sprinklers, wet gardeners, wet gardening equipment, and possibly wet animals. It is always best to work with plants when they are dry. Nematodes can also survive in a dormant state for up to a year in leaf debris in warm climates. In Illinois, the nematode probably survives in the protection of the crown of plants protected by mulches. The best pest management practices we can recommend are:

1. Buy disease-free (symptomless) plants and propagating stock.
2. Do not water foliage. Water the soil.
3. Remove and destroy infected plants.
4. Disinfect tools if you are working with suspect plants.

Foliar nematodes are extremely difficult to eradicate once they are established. Follow the above suggestions to avoid a problem. Nematicide recommendations are not available. Consult the disease report *RPD* no. 1102, *Foliar Nematode Diseases of Ornamentals*, for more details. The *RPD* is available in Extension offices or on the web at **http://www.ag.uiuc.edu/~vista/horticul.htm.** *(Molly Pate and Nancy Pataky)*

Verticillium Wilt, "The Early Dying Disease"

Verticillium wilt is a plant disease that commercial growers, farmers, gardeners, and homeowners around the world should recognize. The fungal pathogens that might be involved are *Verticillium dahliae* and *Verticillium alboatium.* The disease has been called the early dying disease because it causes wilt, branch death, and quick decline of plants. Hundreds of plant species, including trees, shrubs, groundcovers, vines, vegetables, fruits, herbaceous ornamentals, and flowers, can contract this disease. We see symptoms any time from early summer through autumn. The time of infection may depend on the plant species and the geographic location. Research confirms that stressed plants are more susceptible to infection.

This pathogen may be seed- or soilborne and can survive for decades in the soil. Flowing water, strong wind, seed, tools, or machinery can introduce this disease into new geographic locations. It may also be present in apparently healthy plants. The roots of susceptible plants come into contact with soil contaminated with the *Verticillium* pathogen. The pathogen then enters wounds in roots and grows into the cortex. The fungus produces spores in the roots. These spores are transported systemically upward in the xylem. Spores are then lodged throughout the plant, and new hyphae grow, intensify, and spread farther. *Verticillium* survives as small resting bodies in diseased plants and eventually returns to the soil.

Symptoms of Verticillium wilt may be restricted to one branch. Although sudden death of the plant is possible, a slow decline over a season or two is more likely. Spore germination and hyphal growth cause a staining of the vascular tissue in streaks. This symptom is characteristic of the disease but not proof of infection. Stained areas can be tested in a lab; the fungus can be successfully isolated from stained tissues.

Symptoms may be acute and include curling, drying, wilting, dieback, or death of foliage. Foliage may be red or yellow between veins. Chronic symptoms such as slow growth, sparse foliage, stunted leaves and twigs, leaf scorch, abnormally heavy seed crops, and dieback can indicate stress caused by the previous year's infection. Acute and chronic symptoms can affect a plant at the same time. Acute

symptoms that occur after more than 1 year of remission indicate a new upward thrust of the disease. If the stem remains alive, *Verticillium* will grow close to the meristematic regions and allow continuous infection each year.

There is no cure for Verticillium wilt, and it may kill plants. Still, there are many cultural and preventive strategies to manage the disease. Always start with healthy, disease-free seed and avoid susceptible species. Identify and start managing Verticillium wilt as early as possible in established plants. Supply balanced fertilization and provide adequate irrigation to improve the health of the plant. You can help the tree "wall off" the infection. Branches and trees with wilt symptoms should not be removed immediately as they may recover in response to fertilization and watering. Remove dead wood to avoid problems with wood rots and decay. When dead wood is removed, it should be burned, not chipped and reused in the landscape. Because the disease is soilborne, use only resistant species to replace *Verticillium*-infected plants. At the Plant Clinic, we usually see Verticillium wilt in maple, redbud, smoketree, ash, and catalpa. Some suggestions for replacement plants can be found in *RPD* no. 1010, *Verticillium Wilt Disease*. When planting a flower garden, keep in mind that snapdragons, geraniums, and peonies are susceptible, while begonias, hollyhocks, and zinnias are resistant to Verticillium wilt. It is advantageous to control weeds in the landscape because many can serve as a source of inoculum. Dandelions, pigweed, horse nettle, and velvetleaf are all susceptible to *Verticillium*.
(Stephanie Satterlee and Nancy Pataky)

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