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Seasonal Needle Drop

Around this time of year, the U of I Plant Clinic receives many calls regarding yellowing needles on evergreens. The appearance can be quite alarming to homeowners whose seemingly healthy evergreens suddenly turn yellow and drop large numbers of needles. Fortunately, most are witnessing a harmless and natural part of the plant's cycle. Despite the name, evergreen foliage does not stay on the plant forever. Evergreens commonly shed their less productive or older needles. Most pine species shed their needles after 3 to 4 years. The occurrence is more noticeable on some species, such as white pine, and less evident on others, such as spruce and fir.

Seasonal needle drop is usually confined to the innermost (oldest) needles. Homeowners should be more concerned when the new/current season's growth suddenly discolors, wilts, or drops from the plant. Damage occurring to the new growth could be the signal of a more serious pest or cultural problem. (*Travis Cleveland*)

Powdery Mildews

The days are getting shorter, the nights cooler: that's right, fall is here! There are a number of diseases we tend to see in fall due to the cooler temperatures and the shortened length of daylight. One of these diseases is powdery mildew.

Powdery mildew is caused by a large number of related fungal pathogens. It is common on a wide variety of hosts, including ornamental plants (examples: peony, phlox, rose, zinnia, lilac), vegetables (examples: beans, cucurbits such as cucumber, pumpkin, and squash), woody trees and shrubs (examples: oak, crabapple, rhododendron), and turf grass. Each species of the pathogen affects a smaller subset of hosts.

The disease gets its name from the white, powder-like fungal mat that is formed on the surface of the leaves and, occasionally, on the stems of affected plants. The fungi damage the plants by penetrating plant cells and parasitizing them. The fungal mat produced across the surface of the leaves also reduces the amount of sunlight available to the plant cells, interrupting photosynthesis.

Conidia (asexual) spores are formed during the spring and fall months. These spores are clear, oval- or barrel-shaped and are produced in long chains extending from the surface of the affected plant tissue. They are only visible under high magnification. Wind, rain, and insects move the conidia in the landscape. Conidia are produced continuously until environmental conditions trigger the production of the overwintering structures. As the disease progresses, fungal resting structures known as cleistothecia or chasmothecia containing sexual spores form; these are visible to the na-

ked eye or under weak magnification. These structures are small, black balls, similar in appearance to tiny poppy seeds. Spores are protected within the sphere where they overwinter and, in spring, the ball cracks open and the spores are released. Powdery mildew fungi also overwinter as fungal mats within plant tissue; as the plant tissue begins to grow in spring, so do the fungi which initiates a new year of infection.

Disease development is favored by repeated cycles of warm (80 degrees F), dry days with a relative humidity around 40 to 70 percent, and cool (60 degrees F), damp nights with a relative humidity of 90 to 99 percent. However, conidia can germinate and initiate infection under a wide range of environmental conditions (temperatures between 42 and 95 degrees F, relative humidity between 23 and 99 percent). Conidia can germinate, infect, and produce the next generation of conidia in as little as 3 to 4 days. This can lead to powdery mildew epidemics, especially in spring and, more frequently, in fall when the environmental conditions are ideal.

Powdery mildew is usually not considered an important disease in the landscape, except under certain conditions. If the plants are already stressed due to drought, pest pressures, or other unfavorable conditions, powdery mildew will exacerbate this problem. If environmental conditions favor disease development early in the season, the fungi may cause greater damage to the plant. Powdery mildew is a concern on highly susceptible varieties. Along with the white fungal mats on the surface of the plant, the fungi can also cause distortion of leaves and premature leaf drop, severely reducing the ornamental value of many plants.

Cultural management techniques are highly recommended to control powdery mildew. The disease is worst among plants grown in overcrowded, shaded conditions with poor air circulation. When planning new plantings, choose locations with well-drained soil and space plants appropriately. Avoid shaded locations for highly susceptible plants, including phlox, rose, and zinnia. Stressed plants are more susceptible to pathogens and pests, and less able to repair damage. Maintaining plant vigor by watering during periods of drought, mulching, fertilizing when appropriate, and removing dead or diseased plant tissue can reduce stress. Above-ground plant tissue of herbaceous perennials (stems and leaves) should be removed in late fall or winter, along with leaf litter from trees and woody shrubs.

Fungicide sprays are available. When applying, ensure thorough, even coverage across the entire plant, including the undersides of leaves. Fungicides should be applied when the disease is first noticed, and may need to be re-applied every 7-14 days to protect the new growth. Fungicides with the following active ingredients are recommended for powdery mildews: myclobutanil, potassium bicarbonate, propiconazole, sulfer, tebuconazole, thiophanate-methyl, and triforine. Because powdery mildew is caused by a number of different fungi, and because they affect a wide range of host plants, you will need to check the chemical label to ensure that the product is recommended for powdery mildew on the specific host you plan to treat. (*Diane Plewa*)

Red Oak Borer

Red oak borer, *Enaphalodes rufulus,* is a longhorned beetle that attacks live oak trees, causing primarily cosmetic damage to landscape oaks in the form of oval exit holes about one-half inch long in the trunk and piles of wood fibers and frass at the base of the tree. Woodpeckers make larger holes while feeding on the larvae. Exposed, damaged wood is blackish.

Red oak borer damages many oak species in the both red and white oak groups, preferring northern red, black, scarlet, Nuttall, water, and overcup oaks. Maples can also be attacked. It has a two-year life cycle, with young larvae primarily tunneling in the cambium, tunneling deeper into the sapwood in the latter part of their first year and during their second year. Larvae also tunnel in the bark. Tunneling into the wood degrades the value of the wood as lumber. Sapwood tunnels are flattened ovals about one-half inch wide and ten inches long.

Adult beetles emerge in the Midwest in odd-numbered years, being most common during June and July but are present from May to October. They are about two-thirds to one inch long with long antennae. They are covered thickly with short golden hairs, which are worn away, exposing the reddish-brown surface below. The posterior ends of the elytra extend into sharp points along the midline. Adult mated females lay one to four eggs in each small niche that they chew into the bark, laying about 200 eggs per female. Larvae are whitish and elongate with tiny legs and dark mouthparts.

Biological control is performed by downy and hairy woodpeckers, eliminating about 40% of the young larvae. However, their chipping away at the bark to reach the larvae causes obvious aesthetic damage as seen in the photos. About 30% of older larvae are killed sap beetles, ants, and fermenting sap.

Contact insecticide sprays to kill hatching larvae is not practical due to the adult beetles being present for six months even though most eggs and subsequent larval hatching occurs during June and July. Many systemic insecticides, such as imidacloprid, are unlikely to provide control because they function primarily to kill the adult beetles when they feed on the leaves and red oak borer adults do not feed on leaves and twigs like emerald ash borer and many other borers. Emamectin benzoate, sold as Tree-Age, is likely to be effective, but I have not seen any efficacy test results on longhorned borers.

Mechanical control in the form of threading a soft wire up the tunnels to pierce and kill individual larvae has been shown to be effective. Insects are much poorer at healing wounds than we so even a slight piercing of the larva is likely to cause it to bleed to death. (*Phil Nixon*)

Planting for Pollinators

The reductions in honey bees and other pollinators in recent years have been making headlines in the mass media. There are a number of factors associated with these declines including loss of habitat, parasites, disease, genetics, poor nutrition, and pesticide exposure. Perhaps the biggest factor is loss of habitat.

Not only are urban areas expanding, eliminating some rural areas, but rural

areas appear to have much less habitat for pollinators. The use of the broad-spectrum herbicide glyphosate (Round-up and others) over GMO resistant crops has resulted in fewer "weeds" in crop fields to support pollinators. In addition, farmers appear to be mowing roadsides more than a couple of decades ago, and many broadleaf plants that serve as food sources for pollinators do not survive mowing.

Urban areas are also at fault with many landscapes having been transitioned away from flowering plants. Landscapes that consist of turf along with a few shrubs and trees are easier to maintain. Although some of the trees and shrubs are attractive to pollinators when blooming, they generally don't have as long of a blooming season as annual or perennial flowers. Various media efforts are targeted at reversing this trend. They are encouraging homeowners to include more plants in their landscapes that are pollinator friendly. These efforts result in increased clientele requests for information and plantings of pollinator food plants.

Plants that are attractive to adult pollinating insects have shallow nectaries and abundant pollen. Many annual flowers fit these parameters. In a seed catalog, those annuals listed as being butterfly or bee friendly are good choices. The following trees, shrubs, and perennials are also appropriate and generally require less maintenance than annuals.

American basswood
Pussy willow
Prairie rose
Leadplant
Wild bergamot
Purple giant hyssop
Prairie blazing star
New England aster
Showy goldenrod
Wild lupine
Eastern waterleaf
Spotted geranium
Smooth penstemon
Butterfly milkweed
Purple prairie clover
Eastern purple coneflower
Riddell's goldenrod

A number of the above plants are also appropriate larval food plants such as pussy willow for viceroy butterflies and milkweeds for monarch butterflies. Several trees are food plants for the larvae of several butterflies. Honey bees and other bees feed their larvae pollen and nectar so the above plants also function as larval food plants. Wasps feed insects to their larvae, and the larvae of many adult beetle pollinators are also insect predators. Other pollinator beetle larvae live in rotting wood. (*Phil Nixon*)

Emerald Ash Borer

The Emerald Ash Borer (EAB) has been confirmed in 14 new counties, including five that are located outside the current state quarantine zone intended to prevent the spread of the beetle.

The quarantine boundaries will probably be expanded in November once all of the EAB traps have been evaluated. It will include the new detections in Logan, Menard, Perry, Sangamon and Williamson counties, as well as two other counties outside the quarantine, Peoria and Tazewell, where EAB was detected for the first time earlier this year.

The detections were made by Illinois Department of Agriculture employees as they retrieved and analyzed the purple traps the department placed across the state to detect the presence of the beetle.

- In Logan County, the ash borer was found on North St. in Atlanta.
- In Menard, it was discovered at Deerpath Lane and Oakland Ave. in Petersburg.
- The Perry County find was made on Reed Rd. in Du Quoin.
- In Sangamon County, the trap was located in an ash tree on Reynolds St. near Douglas Park.
- And, in Williamson County, it was detected on McDonald St. in Marion.

The EAB traps also led to new confirmations in eight counties within the quarantine. Those counties are Coles, Douglas, Ford, Marshall, Piatt, Shelby, Warren and Woodford. An additional detection was made in Edgar County by an Eastern Illinois University professor and later confirmed through samples collected by IDOA staff.

Newly-infested counties are encouraged to begin putting the quarantine restrictions into practice. (*Phil Nixon, slightly modified press release from IDA*)