Issue: 21-15
September 14, 2021

THE PURDUE LANDSCAPE REPORT

In This Issue

- Fall Armyworms: What next?
- Contorted Filbert: A Gnarly Problem Plant
- Hidden in the Leaf Pile: Luna moths, woolly bears, and swallowtails all need a safe place to “hibernate”
- Diagnosing Phytotoxicity on Landscape Plants

Fall Armyworms: What next?

(Doug Richmond, drichmond@purdue.edu)

Figure 1. A fall armyworm caterpillar with characteristic stripes and inverted, light-colored Y-shape on the head (John Obermeyer Photo).

The entire Midwest just experienced one the worst fall armyworm (Fig. 1) outbreaks in decades, but for turfgrass professionals and enthusiasts, it’s not over yet. These seasonal, but sporadic insects made their appearance at the end of August, decimating lawns and other managed turfgrass. But, now that the damage is done, our focus shifts from crisis to recovery, with an eye open to the next generation.

Fall armyworms, as their name implies, usually show up in the late summer and fall in this part of the country. These insects remain in subtropical climates for most of the year, but hurricanes and tropical storms that sweep northward during hurricane season can carry enormous numbers of adults into the interior of the continent, sometimes raining fall armyworms over the entire Midwest and Northeast. Once they fall out of the sky, those adult lay eggs in masses on vertical objects including the sides of structures and even the flags marking golf holes (Fig. 2). When enough egg masses are laid in close proximity to one another, the resulting larvae can be so numerous that they eventually overwhelm surrounding turf, chewing it to the ground (Fig. 3). The larvae that consumed your turf over the last few weeks have now pupated (Fig. 4) and are beginning to emerge as adults, so our efforts should shift accordingly.

Figure 2. A mass of fall armyworm eggs deposited on a golf flag (Cale Bigelow Photo).

Figure 3. A stand of turfgrass damaged by fall armyworm larvae at the end of August in West Lafayette, IN (Jim Scott Photo).

Figure 4. Fall armyworm pupae found at the soil surface in a stand of turfgrass damaged by the larvae (Jim Scott Photo).

Giving turfgrass the best opportunity to recover should be the top priority. While soil temperatures remain high, disturbing plant crowns should be avoided, so raking out dead material, core cultivating and slit seeding should be put on hold if possible. Instead, consider irrigating the turf if the soil is dry. Irrigation can help reduce soil temperatures and stimulate plant re-growth. If the turf is not fertilized, a very light fertilization (<0.5 lbs. of N per 1000 ft^2) may be in order, but keep in mind that well-maintained turf will generally not require additional nitrogen. If the turf isn't growing, don't mow it. In other words, do everything you can to protect the plant crowns as these will produce the new tillers and leaves that mark recovery.

Keep an eye out for the next generation of fall armyworm larvae. Almost all of the previous larvae have pupated and a few adults have begun to emerge. The adults resulting from the previous larval generation will soon busy themselves mating and laying eggs that will produce another, potentially destructive, larval generation. It's still early in September and there is likely plenty of warm weather left this season to move larval development along. However, the next generation is not likely to reinfest the same stands of turf. Adults will disperse and find "greener pastures" that are more suitable for their offspring. That means scouting for egg clusters and soap flushing for larvae are the best ways to identify potential infestations before they cause serious damage. If we get lucky, temperatures will moderate and put the brakes on fall armyworm development, but I wouldn't bet on it. The last half of September and first half of October could be interesting.

Fall armyworms are easy to manage and there are a number of insecticide active ingredients that will keep them in check (Table 1). Liquid applications are almost always preferable to granules since liquids provide better coverage and work more quickly. Granules also require rainfall or irrigation to release the active ingredient. Mowing just prior to application can increase penetration of the insecticide through the canopy and into the spaces where fall armyworms are active and feeding.

Table 1. Insecticide active ingredients registered for use against fall armyworms in turfgrass.

Insecticide Active Ingredient*	Insecticide Class
Beta-cyfluthrin	Pyrethroid
Bifenthrin	Pyrethroid
Carbaryl	Carbamate
Chlorpyrifos[a]	Organophosphate
Chlorantraniliprole	Diamide
Cyantraniliprole	Diamide
Clothianidin	Neonicotinoid
Deltamethrin	Pyrethroid
Dinotefuran	Neonicotinoid
Gamma-cyhalothrin	Pyrethroid
Indoxacarb	Oxadiazine
Lambda-cyhalothrin	Pyrethroid
Permethrin	Pyrethroid
Spinosad	Biorational
Steinernema carpocapsae	Parasitic nematode
Tetraniliprole	Diamide
Trichlorfon	Organophosphate
Zeta-cypermethrin	Pyrethroid

*Always consult label directions for specific timing and application recommendations.
[a]For use on golf courses and commercial sod farms only.

That's it ¾ focus on turfgrass recovery and regrowth, and be alert to egg masses and developing larval infestations. If another generation of fall armyworms unfolds, its potential impact on turfgrass winter-hardiness and spring green-up could be a significant concern.

Contorted Filbert: A Gnarly Problem Plant

(Tom Creswell, creswell@purdue.edu)

Contorted filbert is an ornamental cultivar of European Filbert, (*Corylus avellana* 'Contorta'), grown for its twisted, gnarly stems. The plant is also sold under the name Harry Lauder's Walking Stick. While it's unique architecture can be impressive, it's highly susceptible to a fungal canker that can cause extensive damage to the tree. Eastern Filbert Blight is caused by the fungus *Anisogramma anomala* and occurs in most regions where filbert is grown. Spores of the fungus are spread by wind to new trees and by splashing water to new branches within an infected tree. Dying branches signal the presence of the disease but the contorted nature of the growth may mask the distortions, swellings and cracked bark caused by the cankers. If cankers are not pruned out quickly, they will continue to spread down the branches, eventually reaching the main trunk and killing the tree. This disease is difficult to control because spraying fungicides would only work if used every week throughout the growing season, making such treatments impractical. Pruning to remove the cankers requires cutting several inches below any sign of discolored wood and often requires removal of so many branches that the ornamental value of the tree is lost. Individual trees in the landscape may escape infection for many years if other filbert trees are sufficiently distant, however social distancing for this pathogen is measured in miles rather than feet, so most contorted filbert do eventually succumb. Infection takes place several months before the tree begins to show any symptoms so it's easy to miss existing first year infections. The dieback may continue to progress as those young infections begin to expand and create cankers. There are several resistant varieties of nut-bearing filberts but so far, no resistant varieties of contorted filbert.

Figure 1: Young contorted filbert tree showing extensive dieback

Figure 2: This branch shows swellings and bark cracks, symptoms that often point to a fungal disease.

Figure 3: The same branch with the bark peeled away shows the early stages of a fungal canker just below.

Figure 4: Multiple larger branches on this tree were infected, as shown by the raised black fruiting bodies of the fungus.

Figure 5: A closer view of the black fungal fruiting bodies of Anisogramma anomala.

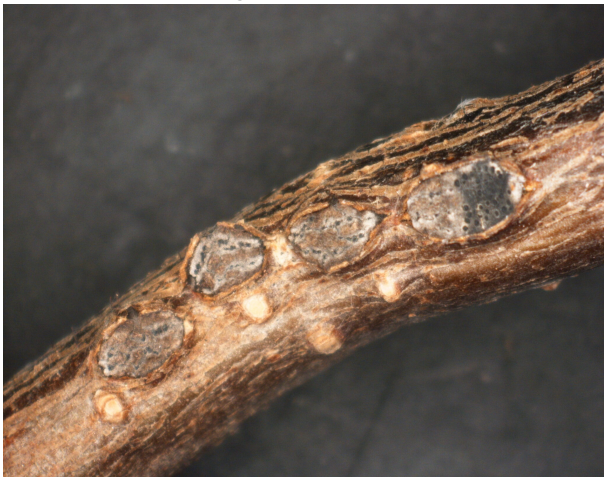

Figure 6: Swollen cankers are cut away to reveal groups of spore bearing structures, shown here as individual black dots.

Hidden in the Leaf Pile: Luna moths, woolly bears, and swallowtails all need a safe place to “hibernate”

(Elizabeth Barnes, barne175@purdue.edu)

Woolly bear caterpillars construct shelters like this one made from pine needles to protect themselves from the winter elements. They also commonly use leaf litter and other yard debris. Image by batwrangler on flickr.

Wandering fall caterpillars promise the presence of pollinators, bird food, and flashes of fluttering color in your yard next spring, but overly enthusiastic yard cleanup can make you lose out on these benefits. These insects can provide your spring plants with pollination and migratory birds with a snack. You can help them by changing the timing of your yard clean up.

Fall: Caterpillar Watching Season

Caterpillars are encountered more frequently in the fall for two reasons: their size and their hunt for a home. Many large caterpillars require a full growing season to reach their final stage. Come fall, caterpillars that might have easily blended in with a twig or leaf, are more likely to stand out to the human eye because of their sheer size. In addition, many of these caterpillars spend the winter in cocoons or chrysalises (pupae) or as caterpillars. They have adaptations to help resist the cold, but most still need a shelter to tuck themselves away in to stay safe. Caterpillars often cross paths with people when they go looking for these shelters. The most famous of these wandering fall caterpillars is the woolly bear caterpillar (aka the Isabella tiger moth), but many others like tussock moths, silk moths (e.g. Luna, Io, and polyphemus moths), and sphinx moths are also commonly encountered.

Luna moth cocoons are often difficult to see because they are generally wrapped in dead leaves. If the cocoon survives the winter, it will emerge in the spring as a soft green, 3 to 4.5 inch moth. Images by Greg Gilbert and wanderingnome on flickr.

Caterpillars and Your Yard

In addition to turning into some of the most charismatic insects (Luna moths, monarchs, swallowtails, etc.), caterpillars play a complex and pivotal role in the ecosystem. Many bird species rely on caterpillars during their nesting period. These insects are tiny packets of protein and other nutrients that growing birds need to survive. Encouraging a healthy crop of caterpillars can be just as effective at drawing birds to your yard as a birdfeeder. Once caterpillars turn into moths or butterflies, they play another key role in the garden. Many butterflies and moths are important pollinators. Keeping them alive over the winter helps ensure they'll fill these roles in the spring.

"Hibernating" Caterpillars

Swallowtail caterpillars often attach their chrysalises to dead plant material in the fall. The chrysalises are brown and resemble dead leaves. In the spring, the swallowtail butterflies emerge and look for flowers to drink from. They are just one of many butterfly and moth pollinators. Images by Vicki DeLoach.

Caterpillars and other insects (e.g. solitary bees) often tuck themselves away in places that would be perfectly safe in an unmanaged field or forest but are dangerous for them in a yard or landscaped area. Many insects use dead plant matter like dead leaves, fallen tree trunks, or standing dead vegetation for insolation and camouflage during the winter. Luna moths, for example, bind together leaves to make themselves a crunchy sleeping bag to spend the winter. The dead leaves can help hide the moth's cocoon from hungry animals and insolate them from the winter weather. They are so well camouflaged that they can be raked into a leaf pile without being noticed. As long as they are not diseased, putting fallen leaves in mulch piles or in the woods rather than burning or throwing them away can help ensure Luna moths and other beneficial insects survive into the next year.

Caterpillars and solitary bees both use dead plant stocks to overwinter. Many hide inside the stems, but other attach themselves to the outside. Some species of swallowtail butterflies spend the winter as a chrysalis that looks like a dead leaf. They attach themselves to twigs, dead plants, and tree trunks. Removing dead stems in gardens in the fall runs the risk of killing these butterflies and other pollinators. With some careful planning, you can keep your yard butterfly, moth, and bee friendly while also making it tidy and disease free (Learn more here: https://www.purduelandscapereport.org/article/protect-pollinators-and-plants-with-a-balanced-fall-garden-cleanup-plan/).

Cover photo by Sue Thompson

Diagnosing Phytotoxicity on Landscape Plants

(Kyle Daniel, daniel38@purdue.edu)

Phytotoxicity is damage to plants caused by chemicals, fertilizers,

or pesticides. Phytotoxicity can be a positive (killing weeds) or a negative (damage from pesticides on ornamental plants), depending on the intended results. Some of the common phytotoxic effects can show symptoms such as stunting of leaves and whole plant, necrosis (death), chlorosis (yellowing), abnormal growth (i.e. twisting/epinasty, cupping), discoloration, root damage, or bark cracking.

Figure 1. Herbicide phytotoxicity to sycamore from 2,4-D.

The most common reasons for phytotoxic symptoms include:

- Herbicide injury
    - Herbicide phytotoxicity can occur when drift, volatilization, or other misapplication occurs when a herbicide is applied. The symptoms vary widely depending on the herbicide mode of action and the plants that are damaged. All of the symptoms mentioned above can occur when damage is caused by herbicides.
- Fertilizer burn
    - Fertilizer phytotoxicity can occur when a liquid fertilizer is applied to leaves during hot temperatures and low humidity. Fertilizer burn can also be caused by high electrical conductivity (EC) (salts from the fertilizer) in the soil. Typical symptoms include necrotic (dead) plant tissue at the margins of the leaves. To correct the high EC in the soil, deep irrigation can be applied to leach out the salts or gypsum can be applied around the root system to deactivate the salts.
- Insecticide/Fungicide applications
    - Typically insecticide and fungicide applications don't cause any type of phytotoxicity to plants, though when applied during extremely hot temperatures they can cause some damage. To prevent this from occurring, apply during the early morning hours and avoid any of these applications in the middle of the day during the hottest days of the summer. Typical symptoms include necrotic and/or chlorotic damage to the entire leaf area.
- Improper tank cleaning
    - Proper tank cleaning is essential when using multiple types of pesticides (i.e. herbicides, insecticides, etc.) or modes of actions of herbicides in one tank. You would typically observe the worst damage where the application began and decrease in damage as the spraying continues through the landscape/plants.

Figure 2. Insecticide phytotoxicity from an application made in an urban area while temperature were in the 90's.

To diagnose phytotoxicity, there are some key steps:

- Find out the history of the site.
    1. Previous pesticide and fertilizer usage in the area.
    2. Weather conditions when applications were made

to the site.

- Diagnose abiotic vs. biotic symptoms.
    1. Are the symptoms random (biotic) or in a pattern (abiotic)?
        1. If abiotic, whole plants and/or multiple plants will be affected.
        2. If biotic, symptoms will be on various parts of the plant with no pattern.
- What are the symptoms?
    1. Does the history of the site indicate the cause could be due to past applications?
- If a determination can’t be made, send samples to the Purdue Plant and Pest Diagnostic Lab.

Purdue Landscape Report © Purdue University - www.purduelandscapereport.org
Editor: Kyle Daniel | Department of Horticulture and Landscape Architecture, 625 Agriculture Mall Dr., West Lafayette, IN 47907