Issue: 18-06
May 8, 2018

THE PURDUE LANDSCAPE REPORT

In This Issue

Purdue Turf and Landscape Field Day

(Kyle Daniel, daniel38@purdue.edu)

2018 Turf *and* Landscape Field Day

July 10, 2018 | W.H. Daniel Turf Center | West Lafayette, IN

This one-day event presents Purdue University's latest turfgrass research, landscape research, and education. Attendees will learn about current topics concerning the green industry, as well as see displays and demos of the latest management tools. This event provides a great networking opportunity with over 40 industry vendors available in the trade show.

The 2018 Turf and Landscape Field Day will again combine the expertise of the Purdue University Turf Program and the Extension Specialists from the Departments of Horticulture and Landscape Architecture, Agronomy, Pathology, Entomology, and Forestry. This provides the basis of the educational tracts offered — Lawn & Sports, Golf, and Landscape.

Exhibit at the Field Day Trade Show

Interested vendors should know this event successfully draws crowds of 475 to 600. The Field Day is a great opportunity to get noticed by Indiana green industry professionals.

Excellent sponsorships for added exposure for your company are still available.

Visit www.mrtf.org for exhibitor and sponsorship opportunity information or contact Aaron Patton at 765-494-8039.

Plan to Attend!

Pre-registration *(includes lunch)*:
Members $45.00
Non-members $75.00

Onsite registration *(lunch not included)*:
Members $65.00
Non-members $95.00

Register Online at www.mrtf.org or contact Aaron Patton at 765-494-8039.

SPECIAL: Become a new member of the Midwest Regional Turf Foundation (MRTF) before the Field Day and one person will get free admittance and lunch for the day's events! Contact Aaron Patton at 765-494-8039 for information.

PURDUE UNIVERSITY

MRTF Midwest Regional Turf Foundation

Sponsored in part by Midwest Regional Turf Foundation, Purdue University Turf Program, and the Department of Horticulture and Landscape Architecture.

We hope you can join us on July 10 for the 2018 Purdue Turf and Landscape Field Day.

Begonia Bacteria Brouhaha

(Janna Beckerman, janna@purdue.edu)

Fig. 1: As lesions continue to develop, necrotic areas spread, often in a v shape.

Xanthomonas is both an unfortunate, but regular occurrence in the greenhouse industry. Despite the efforts from numerous companies to supply 'clean plants', *Xanthomonas* (and other bacterial pathogens) regularly slip through. This year, it came in on begonia.

The pathogen. *Xanthomonas* is a genus of yellow colored bacteria that infect many species of plants (approximately 400!), causing spots and blights on leaves and stems (Fig. 1). The strain *Xanthomonas axonopodis* pv.*begonia* (formerly known as *X. campestris pv. begonia*) is specific to begonias, and does not readily spread to other plant genera. The abbreviation 'pv.' is short for 'pathovar', which is defined as a bacterial strain that is distinguished from other *Xanthomonas axonopodis* strains based upon the host plant it is pathogenic to). Begonias of all species are vulnerable to this pathovar, along with creeping saxifrage (*Saxifrage stolonifera*).

The disease cycle of *Xanthomonas spp.* often begins with contaminated seeds. The bacteria can also spread to healthy plants by pinching/pruning, misting of cuttings and seedbeds, by rainwater, by contaminated soil and even, possibly, by insects. Upon contact with a leaf surface, the bacteria grow on the surface of the leaf (epiphytically). Bacteria then enter into the host in three ways:

Fig. 2: Leaves collapse, and eventually the entire plant does as well.

- through wounds,
- through hydathodes, natural openings at the margin of the leaf. Bacteria can then become 'systemic' and can then spread throughout the vascular system of the plant (Fig. 2).
- through stomata, natural openings of the leaf, to colonize the leaf tissue.

Infected plants will not recover.

Infected plants are often asymptomatic, and escape detection, which is how plants are often delivered all over the world, but the problem not identified until weeks later. Stress, particularly heat stress, triggers infected plants to exhibit symptoms. To identify infected but asymptomatic plants, elevate greenhouse temperatures to 80°F day/70°F to 75°F night for seven to ten days. The combination of plant stress and rapid bacterial growth due to warm temperatures often produces symptoms in begonias. When roguing plants, make sure plants are dry, and use disposable gloves and aprons to minimize spread.

Water. Water management is disease management, in the case of all bacterial diseases. Avoid hanging begonias above other begonias (or geraniums over geraniums, etc.) to minimize the risk of any dripping water spreading bacteria. Water roots and not the foliage–Irrigate at low pressure directed at the media, minimizing splashing water from plant to plant. When possible, irrigate by drip rather than overhead; flood irrigation and capillary mats should be avoided. Anything that spreads a lot of water can spread a lot of bacteria. Avoid late day irrigation—the goal here is to reduce humidity. Dry foliage (especially at night) is recommended to minimize spread. Don't recycle or reuse irrigation water.

As always, spacing plants to avoid leaf to leaf contact is an important practice to prevent spread of many diseases (bacterial, botrytis, downy mildew, foliar nematode, etc.), including *Xanthomonas*.

Sanitation. Cleanliness is next to impossible in a greenhouse or nursery, but filth and messes can be managed or minimized. Infected plants and media should be bagged up, removed and disposed of. The bacteria can persist in crop debris and contaminated soil. Quaternary ammonium compounds (e.g., KleenGrow, GreenShield, Physan 20) are the best disinfectants to treat benches and greenhouse spaces to destroy these bacteria.

Pesticides. Although many products are labeled for bacterial control, most show very little reliable efficacy. They are best used as preventatives. Copper is considered critical for bacterial disease control (assuming the bacteria aren't copper resistant!), and the fungicide mancozeb, have been found to be very effective. Actiguard (Acibenzolar), along with biocontrol products Triathlon BA(Bacillus amyloliquefaciens) and Cease (Bacillus subtillis) have performed inconsistently in numerous trials, but your mileage my vary. See for yourself at the IR4 Bacterial Disease Summary.

Regardless of what product you decide to use, make sure your applications are done by a low-pressure spray to minimize the spread of bacteria and risk of plant injury. As you are trying to protect the plant, and especially its leaves, you want the pesticide to remain on the plant and not run-off. In my experience, controlling bacterial diseases in the greenhouse is predicated on good sanitation and management practices, as opposed to rescue sprays after symptoms develop.

What's as wide as your thumb, bright orange, and the latest threat to trees?

(Elizabeth Barnes, barne175@purdue.edu)

Spotted lanternfly is a nasty new pest that weakens plants, covers them with black mold, and can kill fruit trees, grapes, pines, and 70+ other species. It hasn't reached Indiana yet, but last fall it broke free of its quarantine and is on the move. Now is the time for you to learn how to recognize this pest, so you can report its presence and help any efforts to contain or eradicate this looming problem.

Where are they now? As of May 3rd, 2018, spotted lanternfly has been reported in isolated patches in Pennsylvania, Delaware, and New York. You might think that means they're not a threat to Indiana, but last summer they had only been reported in Pennsylvania! The insects in New York and Delaware were probably accidentally transported there by humans. Any states that people or goods move between are at risk not just those neighboring the infestations.

Who should watch for them? Everyone should be watchful, but particularly people who: 1. buy products (like stone or Christmas trees) from infested states, 2. travel to or go camping in one of the infested states during egg laying season (the fall), or 3. own or live near fruit trees, grapes, and tree of heaven.

What do they look like? Spotted lanternfly's striking orange and black bodies and large size make them easy to recognize in the adult and nymph stages (figure 1 A, C, and D), but their eggs are well camouflaged (figure 1 B). Eggs are laid on everything from Christmas trees to stone slabs.

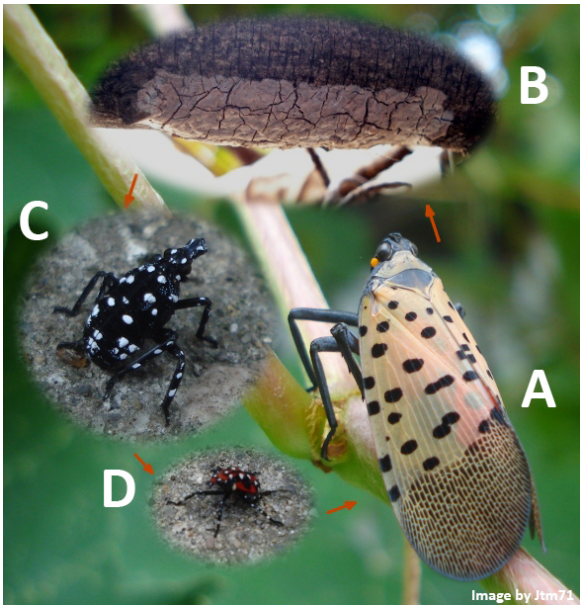

Figure 1. The life cycle of the spotted lanternfly (not to scale): A. Adult stage at rest, B. egg stage, C. 1st instar nymph, and D. fourth and final instar nymph.


Figure 2. A pinned spotted lanternfly specimen. The bright orange, yellow, and black patterns seen here are hidden while the insect is at rest but become prominent when it is in flight.

Figure 3. A large congregation of adult spotted lanternflies on a tree trunk in Pennsylvania.

What are the signs and symptoms? In the nymph and adult stages, these insects are large, brightly patterned (figure 2), and often congregate in large groups (Figure 3). In addition, they are messy feeders that pierce branches and trunks to suck on tree sap and drip their liquid excrement to the ground and bark. Eventually this sap, called honeydew, becomes infested with a black sooty mold that coats everything under the tree.

What do I do if I see one? As with any invasive insect, if you think you've found one, catch or photograph it and report it. Catch nymphs and adults (don't worry, they don't bite!) and scrape off eggs, put them in a plastic bag, and place them all in the freezer. This action prevents them from spreading and the sample helps entomologists confirm your find. Once you've tried to catch or photograph it, report it by using the GLEDN app, calling the Indiana DNR at (866) NO-EXOTIC, or emailing depp@dnr.IN.gov.

If you want to know more about spotted lanternfly or to receive training on how to report invasive insects, you can register for one of three free workshops in southern Indiana this May!

Tulip Fire

(Tom Creswell, creswell@purdue.edu)

The recent jump from Winter to Summer (with 2-3 days of Spring somewhere in there) got folks out looking at Tulips in full bloom now in northern Indiana. The only thing marring the view in one local planting was an outbreak of tulip fire, caused by the fungus *Botrytis tulipae*. The disease first shows up as small spots on the leaves (Fig. 1) or flowers (Fig. 2) or may cause stem collapse (Fig. 3). Under favorable conditions blighting can be extensive and give the appearance that the plant has been burned, hence the name tulip fire (Fig. 4). There are dozens of species of Botrytis which attack thousands of types of plants but *B. tulipae* has a particular affinity for tulips and is found around the world.


Fig. 1: Leaf spot on tulip leaves caused by the fungus Botrytis tulipae. Photo by G. Ruhl

Fig. 2: Spots on tulip flowers caused by the fungus Botrytis tulipae. Photo by S. Jensen, Cornell Univ.

Fig. 3: Botrytis infected tulip stems collapse rapidly. Photos by J. Beckerman

When Botrytis infections kill whole leaves the outer bulb scales and roots of the plant may become infected. The fungus then forms small black masses of fungal tissue on the bulb and roots, known as sclerotia (Fig. 5) that are resistant to heat, cold and drying out. These serve as a source of spores (Fig. 6) the next spring which are spread by wind to infect new plants when the weather is wet and cool.

Fig. 4: Tulip planting with extensive blighting (tulip fire) caused by Botrytis tulipae. Photo by M. Hansen, VPI

Fig. 5: Sclerotia of Botrytis tulipae on the roots of potted tulip. Photo by S. Jensen, Cornell Univ.

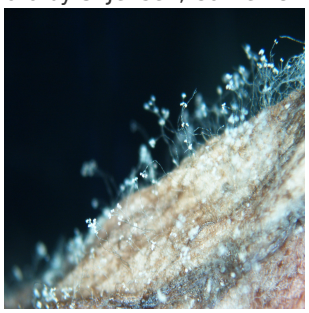

Fig. 6: Botrytis spores.

Management: In small plantings remove infected leaves and flowers as they show up and any bulbs that become infected. Plant only high-quality tulip bulbs that show no evidence of decay. Plant in areas that have good air movement.

In larger plantings, such as public gardens, managers may wish to protect plantings with fungicide sprays when conditions are favorable for disease development.

Don’t Be Bewildered by Brown Boxwood Leaves

(Cliff Sadof, csadof@purdue.edu)

Brown and yellow boxwood leaves are common after a long cold winter. Papery brown leaf parts can be caused by de-icing salt and drying winds. Circular bumps can be caused by boxwood leafminers (Figure 1) and fine scrapes by boxwood spider mites (Figure 2).

Figure 1. Circular leaf blisters on top surface of boxwood leaf caused by boxwood leafminer.

Figure 2. Typical leaf scraping caused by boxwood spider mite injury. They winter as eggs on leaves and stems.

Figure 3. Boxwood leaf mine with yellow maggot inside.

Figure 4. Clear windows on leaf undersides chewed by boxwood leafminer maggots.

What are boxwood leafminers?

Boxwood leafminers, *Monoarthropalpus fla*vus, are the worm like maggots of small orange gnats that feed inside boxwood leaves (Figure 3). Just prior to pupation in (May this year in Lafayette, IN), leaf miners chew clear windows on the leaf undersides when boxwoods are in full flower (Figure 4). Adult boxwood leafminers are small bright orange gnats (Figure 5). Adults emerge from the leaves in late spring after boxwoods have completed flowering when weigela shrubs are in bloom in late May or June. Adults fly for about a month and lay eggs on leaves that hatch into orange maggots that feed all summer inside bumpy orange mines. Mines are somewhat blister like and can be revealed by splitting the leaf and peeling back the leaf tissue.

Figure 5. Adult boxwood leafminer.

Do all boxwoods get leafminers?

Although most little leaf and common boxwoods (*Buxus sempervirens*, and *B. microphylla*) are susceptible to this insect, some varieties are resistant to this pest including "Handsworthiensis", and "Vardar Valley". Planting resistant varieties can avoid the need for using pesticides and the potential for spider mite outbreaks that may result from their application. A complete listing of resistant varieties is available at the end of this post.

How to manage my boxwood leafminer problem?

Boxwood leafminers can be controlled by pesticide applications that either kill adults before they lay eggs, and or kill the early stage larvae soon after they begin feeding inside the leaf. Systemic applied insecticides tend to be more effective than contact insecticides because they kill leafminers that hatch from eggs laid in the leaf tissue. Soil applied systemic insecticides including dinotefuran, and imidacloprid can be applied to the soil soon after boxwoods have stopped flowering. This will allow enough time for the product to be taken up into the leaves, while reducing exposure to pollinators. Although these products are effective against both the boxwood leafminers they can increase problems with boxwood spider mites. Many products containing spinosad (Fertilome Borer and Bagworm Killer, or Captain Jack's Deadbug) are labeled to reduce leafminer problems and do not cause mite outbreaks. I could find no reference in the literature that shows they are effective against this boxwood leafminer.

What are boxwood spider mites and can I manage them and boxwood leafminer?

Boxwood spider mites (*Eurytetranychus buxi*) are small spider like animals that winter as eggs on boxwoods and are active during the early part of summer. Adults and immature stages feed on the underside of leaves by piercing leaf tissue and producing small scrapes of discolor. Boxwood spider mites and boxwood leafminer can be controlled when adult leafminers are flying by applying a product labeled for this use that contains bifenthrin,(eg Bug B Gone, Eight, Home Defense).. Landscape professionals,

can apply a foliar systemic called avermectin (Avid) that will kill adult flies, maggots in the leaves, and spider mites. These applications will have minimal impact on pollinators because adult flight occurs after boxwoods flower.

Useful Links.

Resistant Boxwoods (Thanks to Joe Boggs OSU)
http://www.boxwoodsociety.org/uploads/54_1_2014_Summer.pdf#page=9

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