

# Spotted Lanternfly Management for Residents

## Introduction

Spotted lanternfly (SLF), *Lycorma delicatula*, is an invasive planthopper, native to Asia, that was first detected in southeastern Pennsylvania in 2014. It feeds on many plants, including economically important crops like grapevines and some trees. Spotted lanternfly can be mitigated by following a few steps. First, make sure the insect you are seeing is the spotted lanternfly. Second, learn about its life cycle and habits. Third, determine what plants it is infesting and what it is not. Fourth, employ effective management strategies at the proper time of the year.

## Identification and Life Cycle

There is one generation of SLF per year. The eggs are laid in the fall and hatch in the spring. Egg masses are laid on hard surfaces (trees, covering decks, houses, outdoor equipment, rocks, etc.) and protected with a mud-like. Each egg mass contains 30–50 eggs. After hatching and before reaching adulthood, SLF goes

### Quick Facts

- SLF is a nuisance invasive pest threatening certain agricultural plants.
- SLF has been found throughout CT and in many other states.
- SLF does not bite or sting, nor does it carry diseases.
- SLF does not kill all trees it feeds on. SLF is a plant stressor that, along with other stressors, can cause significant damage to its host.
- Stop the spread of SLF by checking your car and any outdoor equipment (grills, mowers, firewood, etc.) when going in and out of restricted areas.
- Manage SLF on your property by scraping and destroying eggs, carefully using bands or traps on trees, removing preferred hosts, and using registered insecticides for control when appropriate.

through four nymphal stages, or instars. First instar nymphs are small ( $\frac{1}{8}$  to  $\frac{1}{2}$  inch) and can be hard to find. The first three stages (instars) are all black with white spots, and the last instar is red with white dots and black stripes (Figures 1, 6). SLF adults emerge in July and are active



**Figure 1.** The life stages of SLF, including an egg mass on a tree.

until winter. This is the most obvious and easily detectable stage because they are large (~1 inch) and highly mobile. Adults have black bodies with brightly colored wings. Only the adults can fly. SLF wings remain closed while they are feeding and walking. SLF forewings are gray with black spots, and the tips of the wings are black with gray veins.

## Current Distribution and Reporting



Spotted lanternfly has been found throughout CT and in many other states. **If you suspect you have found a SLF, snap a picture of it and file a report at [Connecticut Spotted Lantern Fly \(SLF\) Reporting \(arcgis.com\)](https://portal.ct.gov/CAES)**

The reporting portal may be reached by scanning the QR code above. You will be able to include your contact information, and upload photos, but you will not be contacted. All reports are confidential. Homeowners should use the SLF checklist ([slf-check-list.pdf \(ct.gov\)](https://portal.ct.gov/CAES)) if moving out of a regulated area to ensure no insects accompany the move.

## Feeding Damage

SLF can cause damage to host plants, including oozing sap from the trees, wilting, leaf curling, and tree dieback. SLF feeds using a piercing-sucking mouthpart tapped into the plant like a straw. When SLF feeds, it excretes honeydew, a sugar-rich liquid waste product. Honeydew serves as a substrate for sooty mold, fungi that thrive in sugary environments. SLF expels significant amounts of honeydew, and often the plant surface and the area around infested plants become coated with honeydew and sooty mold. This mold is generally harmless to

people but can damage the plant. If you see sooty mold or sticky areas on a plant or tree, it may be infested by SLF, but it could also be infested with other insects that produce honeydew, such as aphids, leafhoppers, or scales. Therefore, it is important to identify the cause of the mold, as control measures may differ for pests other than SLF. There is no way to prevent SLF from moving onto your property. Be aware that SLF is very mobile and management actions must be continuous to keep them controlled. SLF does not kill every tree on which it feeds. Plant death has only been observed in grapevines, tree-of-heaven, and some tree saplings. SLF is a plant stressor that, in combination with other stressors (e.g., diseases, weather), can cause damage to host plants. Following high infestation levels, flagging and canopy dieback of black walnut, willow, staghorn sumac, and maple have been reported. It is possible that after heavy feeding, multiple years of sustained damage, or particularly dry years, SLF may cause significant damage to ornamental and shade trees. However, currently SLF is predominantly considered a nuisance pest for residents, and death has not been reported in any ornamental or forest tree.

## Seasonal Host Phenology

SLF has a broad host range and has been recorded feeding on over 65 different plant species. Despite this broad host range, some plants appear to be more favorable to SLF than others. Numerous variables appear to determine the attractiveness of a particular plant, including what other plants species are available in the nearby landscape, the health of the plant, the time of year, the SLF population size, and how long SLF has been present in the area. We emphasize that not every tree needs to be treated. Scout the area first, and then consider treating if high populations are found. Nymphs seem to have an especially large host range, whereas adults seem to depend more on certain hosts. Table 1 lists the key plant hosts of SLF and the time at which SLF are most

likely to be found on these hosts. This table does not represent a comprehensive list of the plants on which SLF feeds; rather, it shows the patterns of SLF feeding that have been observed through the season. Plants are less

likely to serve as hosts for SLF as they begin to senesce at the end of the growing season. The patterns in host use may change with varying weather conditions, region, and other undetermined factors.

**Table 1.** Key plant hosts of SLF throughout the growing season.

| Host                                | Nymphs |      |      | Adults |           |         |
|-------------------------------------|--------|------|------|--------|-----------|---------|
|                                     | May    | June | July | August | September | October |
| Rose (cultivated, multiflora, etc.) |        |      |      |        |           |         |
| Grape (wild and cultivated)         |        |      |      |        |           |         |
| Tree-of-heaven                      |        |      |      |        |           |         |
| Black walnut, butternut             |        |      |      |        |           |         |
| River birch                         |        |      |      |        |           |         |
| Willow                              |        |      |      |        |           |         |
| Sumac                               |        |      |      |        |           |         |
| Silver/red maple                    |        |      |      |        |           |         |

## Management

### Stop the Spread

When you travel in, check your vehicle and any outdoor items you are moving (grills, outdoor furniture, landscaping supplies, mowers, sporting equipment, etc.). Check for SLF egg masses from September through June. Remember that egg masses may be underneath your vehicle or in your wheel wells. During all other times of the year, check for nymphs and adults, and keep your windows rolled up when you park. Don't store things or park under infested trees, and don't move firewood.

### Egg Scraping

Walk around your property to check for egg masses on trees, cement blocks, rocks, and any other hard surface. If you find egg masses on your property from September to May, you can scrape them off using a plastic card or putty knife (Figure 3). Scrape them into a bag or container filled with rubbing alcohol or hand sanitizer and keep them in this solution permanently. Egg masses can also be smashed. Remember that some eggs will be unreachable at the tops of trees, in other well-hidden areas, and throughout

your neighborhood and community. Be aware that this method may not reduce the number of nymph or adult SLF you see later in the year.

#### Steps of Spotted Lanternfly Management

- 1 Stop the spread
- 2 Scrape egg masses
- 3 Use tree traps to catch nymphs
- 4 Remove host plants
- 5 Apply insecticides

### Tree Traps

After the eggs hatch, nymphs will walk up the trees to feed on the softer new growth of the plant. Nymphs frequently fall to the ground, walk to trees, and walk back up the trunks. Tree trunks can be wrapped with traps to take advantage of this behavior to catch the nymphs where the insect is abundant (Figure 4). However, birds and small mammals can get stuck to the bands and are not recommended unless you cage your sticky bands in wire or fencing material wrapped around the tree. Sticky bands may be purchased online or from some garden centers. Push pins

can be used to secure the band. Reducing the width of the band, so that less surface area is exposed to birds and other mammals, can also help. These methods will capture SLF, but neither is an effective population control method and may not reduce the number of nymph or adult SLF you see later in the year. Funnel-style traps that consist of mesh wrapped around the tree that leads into a container to trap SLF (Figure 5) are more involved. Directions are available on the Penn State Extension website. In brief, the mesh (e.g., plastic netting) should be wrapped around the entire circumference of the tree and funnel into a container (e.g., inverted peanut butter jar or plastic bag) with a hole in the lid to allow SLF nymphs and adults to pass through. Check and change traps at least every other week (or more often in highly infested areas).

### Host Removal

Tree-of-heaven (*Ailanthus altissima*) is an invasive plant that is common in landscapes and disturbed areas, such as along the sides of roads. This is a preferred host tree for SLF, and current management efforts are focused on removing it or using it as a trap tree by treating it with insecticide. Tree-of-heaven grows rapidly; it can reach up to 100 feet tall and 6 feet in diameter.

The bark of mature tree-of-heaven looks similar to the outside of a cantaloupe. When crushed, the leaves and stems have a foul odor that many describe as rotten peanut butter. They spread by seed and will also produce “clones” by their roots. This tree can be mistaken for other native species, including black walnut, hickory, and staghorn sumac. For help identifying and

controlling this invasive plant, see <https://portal.ct.gov/CAES-SLF> for the tree-of-heaven identification fact sheet. Use recommended methods to apply herbicide to the tree from July to September and wait at least 30 days before removing the tree. Failure to apply herbicide will result in new growth from the stump and/or roots. Even when treated with herbicide, multiple applications may be necessary over time to completely kill the tree. These trees can get very tall, so seek the help of a tree care service if necessary. Other undesirable invasive species, such as oriental bittersweet, can support populations of SLF and can also be removed. While tree-of-heaven is a preferred host, SLF feeds on a large variety of plants, including many of the ornamental trees commonly found in residential landscapes. Removing these may not be preferred and may not help reduce SLF on your property; refer to the next section for further guidance.



Figure 4. A banded tree covered in chicken wire to prevent mammal and bird bycatch.



**Table 2.** Select management options appropriate for the time of year.

|  | Jan. | Feb. | March | April | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. |
|--|------|------|-------|-------|-----|------|------|------|-------|------|------|------|
| Don't move any life stage                        |      |      |       |       |     |      |      |      |       |      |      |      |
| Scrape/smash eggs                                |      |      |       |       |     |      |      |      |       |      |      |      |
| Use tree traps                                   |      |      |       |       |     |      |      |      |       |      |      |      |
| Contact insecticides <sup>a</sup>                |      |      |       |       |     |      |      |      |       |      |      |      |
| Systemic application imidacloprid <sup>b</sup>   |      |      |       |       |     |      |      |      |       |      |      |      |
| Systemic application of dinotefuran <sup>b</sup> |      |      |       |       |     |      |      |      |       |      |      |      |

<sup>a</sup>after hatch and avoid bloom; <sup>b</sup>Professional licensed application only



**Figure 5.** A funnel-style trap wrapped around a tree to capture SLF.

Emelie Swackhamer



**Figure 6.** Late stage SLF nymphs. Photo credit: Victoria Smith, CAES

## Chemical Control

Insecticides that are registered by the Environmental Protection Agency (EPA) and Connecticut may be used to treat SLF on your property. All EPA-registered insecticides have an EPA registration number and a label with instructions for safe, appropriate, and legal use at sites (vegetation) where SLF may be found. Some insecticides available in other states or over the internet

may not be registered or legal for use in Connecticut. Home remedies should also not be used against SLF because they may be unsafe to humans, pets, and plants, ineffective, and could be illegal. Insecticides can kill insect pests on contact and/or by being present systemically in a plant on which they feed.

## Contact Insecticides

Insecticides that are available to homeowners in Connecticut are contact sprays. They must be used according to the directions on the product label, but generally are sprayed directly to SLF and surfaces where they feed and walk, which is often the base of a tree where spotted lanternflies are abundant. The

duration of control after application (i.e., residual activity) varies depending on the type of insecticide used. In Tables 3, the name of the active ingredients, representative product trade names, toxicity to birds, fish and bees, control, and residual activity (how long it stays active against SLF) are noted for most materials registered in Connecticut. Some formulations of insecticides are available for general use while others require a pesticide license. Specific products listed are not an endorsement and not all available products are listed or may be available at local outlets. Consult your gardening centers for assistance. Note that most available insecticides registered for use in Connecticut will not have SLF listed as a target pest on the label. If the intent is to treat ornamental plants and trees infested with SLF on the property, select insecticides specifically labeled for use on ornamental trees and shrubs. Connecticut law allows the application of an insecticide for control of a pest not listed if the site is included on the label. For example, similar sounding products may be labeled for just garden vegetables, grapes, fruit trees, or household insects, not ornamental trees and shrubs. Licensed arborists and landscape professionals can be hired to spray for SLF.

### **Systemic Insecticides**

Systemic insecticides are absorbed by tree roots, bark, or leaves and are moved through its vascular system to other parts of the tree, killing SLF as it feeds on any part of the tree. Systemic insecticides can provide good to excellent control for several weeks to several

months, depending on the chemical and method of application. However, most systemic insecticides are in a group called neonicotinoids that include imidacloprid and dinotefuran. These are restricted use chemicals in Connecticut, available only to properly licensed pesticide applicators and arborists. They are not available for homeowner use. Property owners can hire a certified professional arborist or pesticide applicator to make these insecticide applications. Professional licensed arborists have specialized training and equipment to treat trees. Systemic insecticides can be applied by soil drench around the base of the tree, a bark spray on the trunk of the tree, a direct spray on the leaves, or tree injection. Systemic insecticides should only be applied to actively growing trees, so they should not be applied in late fall or winter. Systemic insecticides injected into a tree requires special equipment used by tree care professionals. With soil drenches, insecticide is taken up by the roots and moved into the rest of the tree. Ideally, soil drenches work best when applied in the early summer to trees that had high SLF populations in the past and are likely to have them again. To protect pollinators, soil drenches of systemic insecticides should be applied by the arborist or land care professional after a tree's flowers have faded. Soil drenches and bark sprays of systemic insecticides may take several days or weeks to move within the entire tree; so, unlike contact sprays, you should not expect immediate results. Depending on the product and rates used, systemic insecticides have

**Table 3.** Contact insecticides to control egg masses or nymph and adult SLF.

| Active Ingredient                         | Representative trade names                                    | Chemical class                 | Toxicity                      | Comments  |
|---|---|--------------------------------|-------------------------------|---|
| Acephate                                  | Orthene Turf, Tree, & Ornamental<br>Acephate 97 WDG           | Organophosphate                | Bird M<br>Fish N - S<br>Bee H | Wide uses crops, nursery plants, public health                                |
| Azadirachtin                              | Azatrol, Azatin,<br>Azamax, Safer BioNeem                     | Insect growth regulator (IGR)  | Bird N<br>Fish M<br>Bee N     | Neem-based, OMRI listed. Some professional use only, SLF data needed          |
| Beta-cyfluthrin                           | Tempo SC Ultra<br>BioAdvanced (several)                       | Pyrethroid                     | Bird M<br>Fish H<br>Bee H     | Excellent control and residual (up to 2 weeks) activity                       |
| Bifenthrin                                | Bifen Select, Ortho Max,<br>GardenTech                        | Pyrethroid                     | Bird M<br>Fish H<br>Bee H     | Many labels restricted or professional use only; excellent control & residual |
| Buprofezin                                | Talus 70DF, Centaur WDG<br>IGR                                | Insect growth regulator (IGR)  | Bird -<br>Fish -<br>Bee -     | Contact IGR, for landscape ornamentals, target nymphs<br>SLF data needed      |
| Carbaryl                                  | GardenTech, Bonide and<br>other Sevin labels                  | Carbamate                      | Bird S<br>Fish N<br>Bee H     | Excellent control, good residual activity for several days                    |
| Essential/botanical oils                  | Many products with<br>diverse ingredients                     | Oil                            | Bird N<br>Fish N<br>Bee N     | Under evaluation, efficacy varies widely                                      |
| Insecticidal soaps                        | M-Pede, Safer, Bayer<br>Advanced Natria                       | Potassium salts of fatty acids | Bird N<br>Fish N<br>Bee N     | Good control, poor residual activity  |
| Malathion                                 | Malathion, Ortho, Bonide                                      | Organophosphate                | Bird M<br>Fish H<br>Bee H     | Excellent control, poor residual activity                                     |
| Natural pyrethrins                        | PyGanic, Pyrenone, Garden<br>Safe                             | Pyrethrin                      | Bird N<br>Fish H<br>Bee M     | Excellent control but poor residual activity                                  |
| Neem oil                                  | 70% NEEM Oil, Natria<br>Neem Oil                              | Oil                            | Bird N<br>Fish S<br>Bee N     | Good control, poor residual; some products allowed organic production         |
| Paraffinic oil or horticultural spray oil | JMS Stylet Oil, Volck Oil<br>Spray                            | Mineral oil                    | Bird -<br>Fish -<br>Bee -     | Good control, but poor residual for N, A; fair control egg masses             |
| Soybean oil, Canola oil                   | Golden Pest Spray Oil<br>Natria Multi-Insect Control          | Oil                            | Bird N<br>Fish N<br>Bee N     | Fair control egg masses   |
| Spinosad                                  | Conserve SC Turf &<br>Ornamental, Ortho Tree &<br>Shrub Conc. | Spinosyns                      | Bird S<br>Fish S<br>Bee H     | Not all products labeled for trees or ornamental vegetation                   |
| Tau-fluvalinate + tebuconazole            | Bayer Bioadvanced 3-in-1                                      | Pyrethroid + fungicide         | Bird H<br>Fish H<br>Bee N     | Excellent control, poor residual activity; some products commercial use only  |
| Zeta-cypermethrin                         | Amdro Quick Kill Outdoor<br>Insect Killer Concentrate         | Pyrethroid                     | Bird S<br>Fish H<br>Bee H     | Excellent control, poor residual  |

In Connecticut, product may be used if the product is registered for the site and purpose of use listed in the label (e.g., vegetable garden versus ornamental trees). Efficacy and residual activity based on available trial data in Pennsylvania. Toxicity notes: N = nontoxic, S = slightly toxic, M = Moderately toxic, H = Highly toxic, - data not available. Note: The listing of any products is not an endorsement or specific recommendation of the product or company. Other products with the same active ingredient should work the same way, but they may have different rates or formulations.

the advantage of longer residual activity (several weeks to several months) over contact insecticide applications. Research is ongoing to identify the insecticides that are most effective on SLF while posing the least risk to humans, pets, beneficial insects, and the environment. Additional field trials are being conducted to test the efficacy and residual activity of a wider range of the insecticides that are available to residents. Nontarget effects of listed insecticides on beneficial insects, including pollinators, when used for SLF have not been evaluated. Treating an entire property is not suggested since these insecticides are not specific to SLF. Only treat areas where SLF is abundant.

### **Potential Nontarget Effects of Insecticides Water Contamination**

Every precaution should be taken to protect surface water and groundwater from pesticide contamination. Trunk injections by certified arborists pose the smallest risk to contaminating water because the insecticide goes directly into the tree. Soil drench applications by an applicator should only occur directly adjacent to the trunk of the tree, as directed on the label. Soil drenches should not be applied to sandy soils or where the water table is shallow. Both dinotefuran and imidacloprid can persist in groundwater

for extended periods. When exposed to sun, both of these compounds break down readily. To protect surface water, systemic insecticides will not be applied near open water sources (ponds, lakes, streams).

### **Pollinators and Other Insects**

Many of the trees on which SLF have been observed feeding in high densities are also pollinated by bees (e.g., maples and oaks). It is possible that trees treated with systemic insecticides could have insecticide residue in the flowers and nectar the following spring. Neonicotinoid insecticides, in particular, have been associated with bee health decline. Additionally, there are many native insects that utilize these trees at the same time as SLF (e.g., caterpillars, beetles, lady beetles, lacewings, parasitoid wasps) and could be affected by the treatment.

Pyrethroids can also be damaging to beneficial insect populations and could cause populations of secondary pests, such as mites and scale, to increase. Generally, systemic insecticides are considered to have a reduced impact on beneficial insects compared to broad-spectrum foliar-applied insecticides.

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Stay up to date by visiting:

<https://portal.ct.gov/CAES/CAPS/CAPS/Spotted-Lanternfly---SLF>

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