

HAVE YOU SPOTTED THIS INVADER?



THE SPOTTED LANTERNFLY,

Lycorma delicatula (SLF for short) is an invasive insect that was discovered in southeastern Pennsylvania in 2014 and is currently spreading to nearby states via major travel and trade routes. Because SLF attacks a wide range of trees and some agricultural crops, it has the potential to greatly impact Connecticut's plant nurseries, vineyards, orchards, and even local parks and private homes. Early detection is vital for the protection of all Connecticut businesses and agriculture.



**SLF NYMPH
(ABOUT 1/2 inch)**

Young SLFs are black with white spots, and develop red patches as they grow. Adults are about 1 inch long with a 2-inch wingspan. The wings are spotted, the hindwings have conspicuous red patches.

SLFs have been associated with the tree-of-heaven, a fast-growing invasive tree often found alongside highways and woodland edges, old fields and urban areas. Areas with a population of tree-of-heaven are at a higher risk of getting SLFs.

Pictures of any SLF life stage can be submitted to The Connecticut Agricultural Experiment Station at

ReportSLF@ct.gov

For more details, please visit

portal.ct.gov/CAES-SLF



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The Connecticut Agricultural Experiment Station

Putting Science to Work for Society since 1875



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Spotted Lanternfly (*Lycorma delicatula*)

The Spotted Lanternfly (*Lycorma delicatula*) is an invasive planthopper that is native to China, India, and Vietnam. This insect was first detected in the United States in Pennsylvania in 2014. Since this initial detection, the Spotted Lanternfly has spread and established in multiple surrounding states, including Connecticut. This insect is a nuisance pest for homeowners and poses a threat to Connecticut's grape and orchard industries, as well as logging and general forest health.



Lawrence Barringer, Pennsylvania Department of Agriculture,
Bugwood.org

Description:

Spotted Lanternfly (SLF) nymphs have four instar (developmental) stages, and can usually be seen between April and October. The first through third instar nymphs are black with white spots, in the fourth instar stage nymphs are red (pictured right).



Lawrence Barringer, Pennsylvania Department of Agriculture,
Bugwood.org

Adults can be seen July through November, and are generally about an inch long and half as wide when their wings are closed. Their forewings are a tan/grey color with black spots. Their hind wings are bright red with the same black spots, though the hind wings are usually not visible when the insect is feeding or at rest. Spotted Lanternflies have yellow abdomens with black banding.



Lawrence Barringer, Pennsylvania Department of Agriculture,
Bugwood.org

Spotted Lanternflies lay their eggs between October and December and the egg masses can be found through late spring when the eggs start to hatch into nymphs. The egg masses are a discreet gray/brown color, and are typically covered in a waxy coating that looks similar to clay or mud.



Emelie Swackhamer, Penn State University, Bugwood.org

Hosts:

The primary host for the Spotted Lanternfly is the Tree-of-Heaven (*Ailanthus altissima*). SLFs have a number of other host plants including, but not limited to, grape, hops, apple, maple, walnut, and willow. SLF nymphs are more likely to feed on a wide variety of host plants, whereas adults tend to be more selective and will usually feed from *A. altissima*.



Lawrence Barringer, Pennsylvania Department of Agriculture, Bugwood.org

Damage:

The Spotted Lanternfly is considered a nuisance pest for home owners and residents in areas of infestation. The insects stress plants they feed from by sucking sap through their piercing-sucking mouthparts. They also excrete honeydew which encourages the growth of sooty mold and attracts other insects. We encourage Connecticut residents who see Spotted Lanternflies to report their findings. Reports, with photos if possible, can be submitted online on the CAES website at <https://portal.ct.gov/CAES-SLF>. Further questions or comments can be emailed to ReportSLF@ct.gov.



Richard Gardner, Bugwood.org

Information Sources:

Spotted Lanternfly, *Lycorma delicatula*
<https://www.invasive.org/browse/subinfo.cfm?sub=77293>

https://www.aphis.usda.gov/publications/plant_health/alert-spotted-lanternfly.pdf



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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 ornamentals. If you think you have SLF, do not panic! 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 through four nymphal stages. Nymphs are

Quick Facts

- SLF is a destructive invasive pest threatening agricultural and ornamental plants.
- As of June 2021, 3 towns in Connecticut have established SLF. Infestations have been found in 8 other states in the northeastern U.S.
- SLF does not bite or sting.
- 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.

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 until winter. This is the most obvious and easily detectable stage

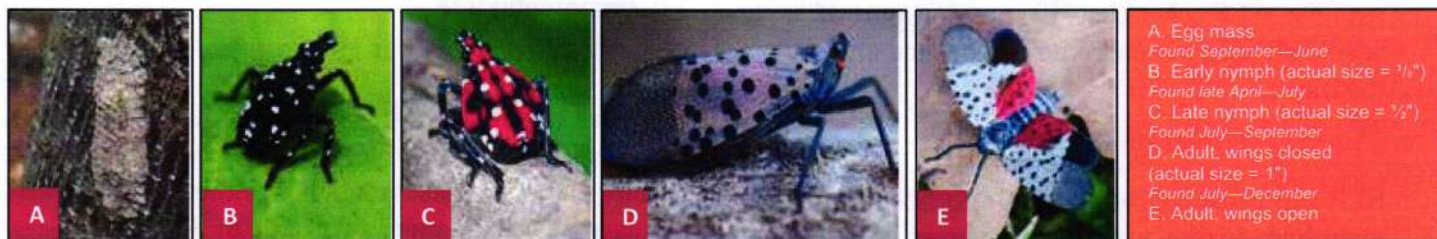
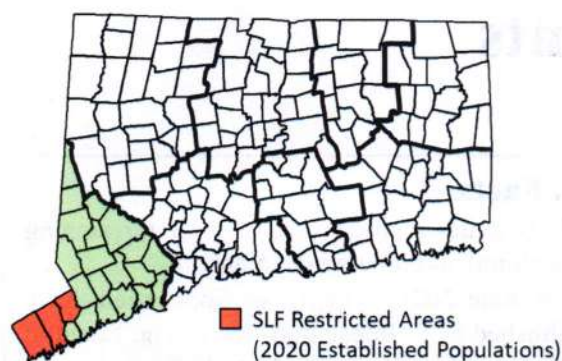


Figure 1. The life stages of SLF, including an egg mass on a tree.

This fact sheet is based on the text and template produced by Penn State Extension in collaboration with the Pennsylvania Department of Agriculture and the United States Department of Agriculture. Portions rewritten and updated for Connecticut. Material used with permission.

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



An SLF state quarantine goes into effect for all Connecticut July 1, 2021 with regulated areas defined as established populations of SLF. This would include portions of Fairfield County detected in 2020 (Greenwich, Stamford, New Canaan). More towns will be added to the regulated areas when additional populations of SLF are confirmed. **If you suspect you have found a SLF, snap a picture of it and send it to ReportSLF@ct.gov or fill out our SLF Reporting Form on our website.** Please include in your email your contact information, any photos, and any other pertinent information. Permission by residents and businesses for state and federal plant inspectors to examine host trees on private property will be helpful in determining the extent of the infestation. All reports are confidential. Homeowners should use the SLF checklist if moving out of a regulated area to ensure no insects accompany the move.

Feeding Damage

SLF can cause serious 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. Consequences of direct feeding damage to the host trees have not been quantified. SLF does not kill every tree on which it feeds. Some plants are at more risk than others. 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 significant 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 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 and out of the quarantine zone, check your car and any outdoor items you are moving (grills, outdoor furniture, landscaping supplies, mowers, etc.). Check for SLF egg masses from September through June. Remember that egg masses may be underneath your car 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 3. Scraping SLF egg masses from a tree.



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 ^a												
Systemic application imidacloprid ^b												
Systemic application of dinotefuran ^b												

^aafter hatch and avoid bloom; ^bProfessional licensed application only



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

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



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

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

Stay up to date by visiting:

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

[Spotted Lanternfly \(psu.edu\)](https://portal.ct.gov/CAES/CAPS/CAPS/Spotted-Lanternfly---SLF)

[USDA APHIS | Spotted Lanternfly](https://portal.ct.gov/CAES/CAPS/CAPS/Spotted-Lanternfly---SLF)

This fact sheet is based on the resident SLF template produced by Penn State Extension in collaboration with the Pennsylvania Department of Agriculture and the United States Department of Agriculture; and some text elements, especially the list of insecticides for Connecticut, revised for Connecticut by Dr. Kirby Stafford and Gerda Magana, CAES. Original © The Pennsylvania State University 2020 and used with permission. Penn State version revised May 2020 by Heather Leach, Emelie Swackhamer, Amy Korman, and Brian Walsh. Originally prepared by Heather Leach, David Biddinger, and Greg Krawczyk.

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Tree-of-heaven ID:

Tree-of-heaven (*Ailanthus altissima*) is fast-growing and 'opportunistic,' often found growing in disturbed soils or along edges of industrial areas, between railroad tracks, edges of greenhouses, etc. It has a strong unpleasant odor, sometimes described as burnt peanuts.

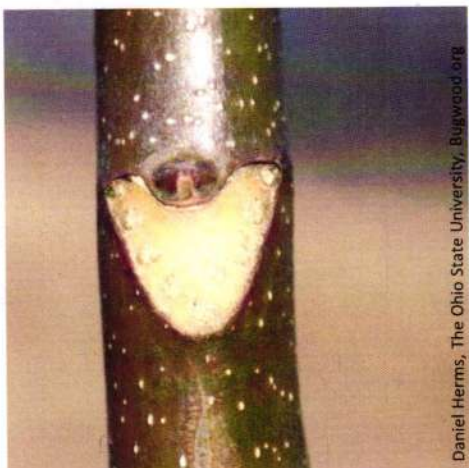
Leaves: Pinnately compound with 11-41 leaflets, alternate, large (1-3 feet long). Leaflet base uneven and toothed.

Note large 'bumps' on leaflet teeth. These are the scent glands that give tree-of-heaven its odor.



Seeds: Papery winged single samaras, red/orange or yellow, hanging in large clusters. Seeds may stay on tree through winter.

Bark: Smooth in young trees, mature trees have rough, pale gray bark similar to a cantaloupe skin.



Leaf Scar: Large, triangular or shield shaped. Does not enclose the lateral bud.



Compare sumac (*Rhus* sp.), with serrated leaflets and no scent glands. Leaf scars are C-shaped and encircle the lateral bud. Fruits are berry-like, growing in large panicles that turn bright red as they ripen.