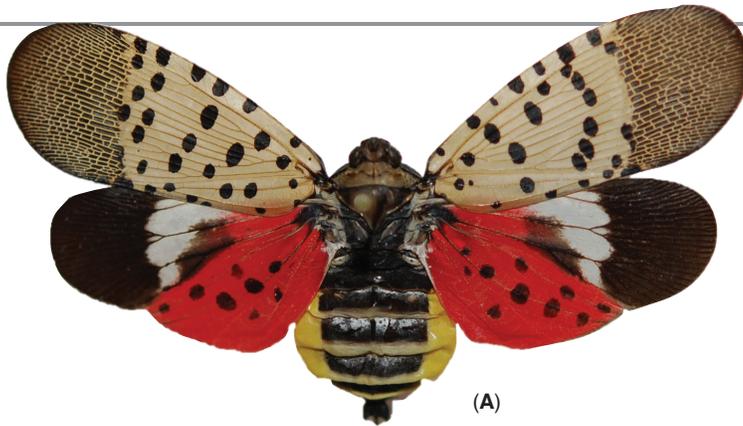


Pest Alert

Spotted Lanternfly

Lycorma delicatula (WHITE)
(Hemiptera: Fulgoridae)

The Spotted Lanternfly, *Lycorma delicatula* (White), an invasive planthopper, has been discovered in Berks County, Pennsylvania. It is native to China, India, Vietnam, and introduced to Korea where it has become a major pest. This insect attacks many hosts including grapes, apples, stone fruits, and tree of heaven and has the potential to greatly impact the grape, fruit tree, and logging industries. Early detection is vital for the protection of Pennsylvania businesses and agriculture.



*Photos courtesy of Park et al. 2009, *Biological Characteristics of Lycorma delicatula and the Control Effects of Some Insecticides*.

(A) Spotted Lanternfly showing the fore and hind wings (B) Resting against bark (C) Lateral view (D) Early nymphs (E) Late nymphs (F) Feeding on wild *Vitis* sp. (G) Weeping sap trail on tree (H) Egg mass covered in waxy coating (I) Old hatched egg mass on a trunk.

Identification:

The Spotted Lanternfly adult is approximately 1" long and 1/2" wide at rest. The forewing is grey with black spots and the wings tips are reticulated black blocks outlined in grey (A, B, C). The hind wings have contrasting patches of red and black with a white band (A). The legs and head are black; the abdomen is yellow with broad black bands. Immature stages are black with white spots, and develop red patches as they grow (D,E).

Hosts:

In the fall, adults congregate on tree of heaven (*Ailanthus altissima*) (F), willows (*Salix* sp.), and other trees, in groups of up to 20. Egg masses will be laid on medium to large trees, on trunk, branches, and limb bases. After hatching in the spring, nymphs will move off the tree and search out new hosts, including several kinds of agricultural crops. In Korea, it has been reported to attack 65 different species, 25+ of which are known to grow in Pennsylvania.

Signs and Symptoms:

Trees, such as tree of heaven and willow, will develop weeping wounds. These wounds will leave a greyish or black trail along the trunk (G). This sap will attract other insects to feed, notably wasps and ants. In late fall, adults will lay egg masses on host trees and nearby smooth surfaces like stone, outdoor furniture, vehicles, and structures. Newly laid egg masses have a grey mud-like covering which can take on a dry cracked appearance over time (H). Old egg masses appear as rows of 30-50 brownish seed-like deposits in 4-7 columns on the trunk, roughly an inch long (I).

What to do:

If you see egg masses, scrape them off, double bag them and throw them away. You can also place the eggs into alcohol or hand sanitizer to kill them. Please report all destroyed egg masses on our website listed below.

Collect a specimen: Specimens of any life stage can be turned in to the Pennsylvania Department of Agriculture's Entomology lab for verification. Directions for submission are on the reverse side of this alert.

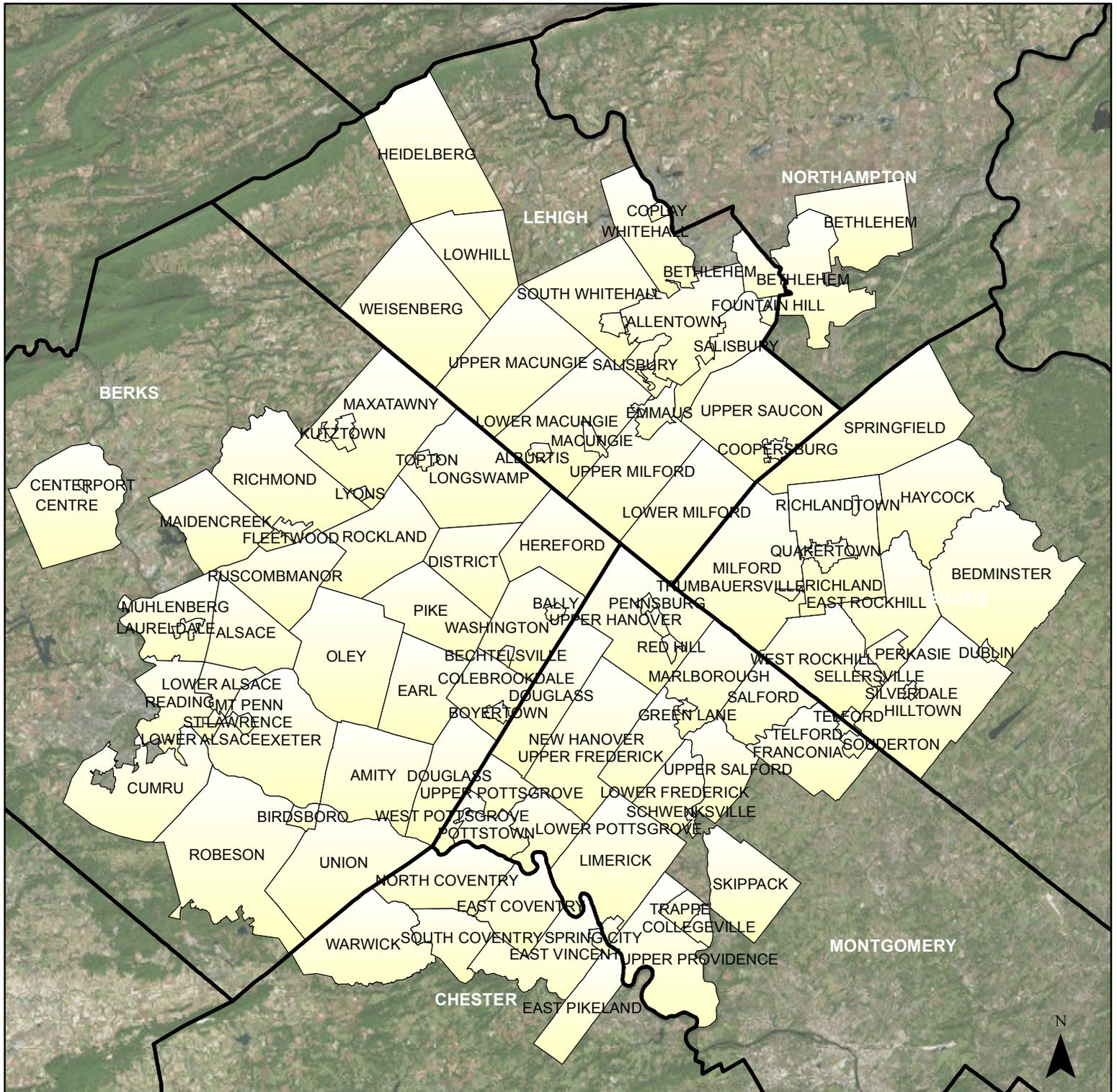
Take a picture: A photograph of any life stage (including egg masses) can be submitted to Badbug@pa.gov.

Report a site: If you can't take a specimen or photograph, call the Automated Invasive Species Report Line at 1-866-253-7189 and leave a message detailing your sighting and contact information.

Spotted Lanternfly Quarantine Map

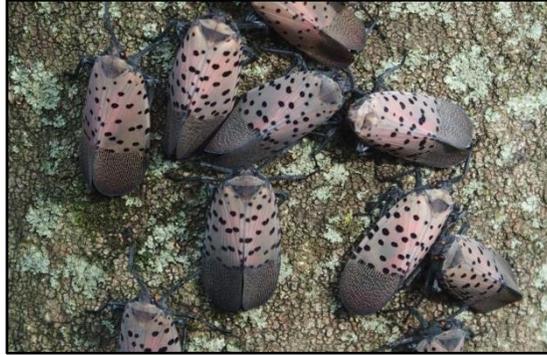


Municipalities Under Quarantine as of August 14, 2017





What to do if you Find the Spotted Lanternfly on your Property



The invasive spotted lanternfly has been found in southeastern counties in Pennsylvania. We are trying to eradicate this potential pest. **There is a quarantine order in place that prohibits movement of any living life stage of this insect to areas outside of the quarantine area. To find information about identifying the spotted lanternfly, current information about where it is known to exist, quarantine order, and compliance go to:**

www.agriculture.pa.gov/Protect/PlantIndustry/spotted_lanternfly

If you find a spotted lanternfly or a suspicious looking egg mass in a municipality **where it is not known to exist**, you should try to collect it and put it into a vial filled with alcohol to kill and preserve it, or at least take a good picture of it. Report it to the Pennsylvania Department of Agriculture (PDA) by emailing badbug@pa.gov or call the Invasive Species Hotline at 1-866-253-7189. Your discovery could add additional municipalities to the quarantined area.

If you find any life stage of spotted lanternfly in a municipality **where it is known to exist**, you should try to destroy it. This insect is considered a threat to some crops and many people are working to try to prevent it from spreading. Each female will lay up to 100 or more eggs in fall, so by destroying even one female, you are reducing the potential population for the future. To see a demonstration of destroying egg masses go to: https://www.youtube.com/watch?v=WoFp_MbDiE8.

In the late summer and fall, the spotted lanternfly prefers feeding on *Ailanthus altissima*, commonly known as the "Tree of Heaven." They can be found feeding on other plants and trees, but if you have *Ailanthus altissima*, you should start searching for spotted lanternfly on those trees. For information on how to identify *Ailanthus altissima* and how to control it, see this fact sheet: <http://plantscience.psu.edu/research/projects/vegetative-management/publications/roadside-vegetative-mangement-factsheets/3ailanthus-on-roadsides>.

The spotted lanternfly is not known to bite humans. You can kill spotted lanternflies mechanically, by swatting or crushing them. However, when you threaten them, they are able to quickly jump far away from you, so mechanical control is not easy to achieve.

People have asked if there are any natural enemies of the spotted lanternfly. Birds don't seem to like to eat them, and researchers have not yet found predatory or parasitic insects that are having a great impact on reducing the population. Over time, natural enemies often do find invasive insect species, but for now we are uncertain if this is happening on a level that is making a difference.

Many residents are asking if they can kill spotted lanternflies on their ornamental landscape trees by using a pesticide. In Pennsylvania, regulations require that a pesticide may only be used according to the directions on the label. In Pennsylvania the label must list the site (or location) where a pesticide (in this case an insecticide) may be used. There are insecticides available with labels that list ornamental trees as an allowed site. It is legal to use them on ornamentals trees, including *Ailanthus altissima*, to try to kill insects, including the spotted lanternfly. You can check at your garden center to see what they offer. Some of these products may be more effective than others, so you should take note if the product you tried worked well or not.

(continued)

Before you purchase an insecticide, there are other things to consider.

In some infested properties there are thousands of spotted lanternflies and many of them are very high up in trees. It will be difficult to reach the insects with a small can of spray or even a backpack sprayer. In this case you might consider hiring a professional tree care service to do the application.

Also, when the canopy of a tree is sprayed, the insecticide may come into contact with beneficial insects, including pollinators. People are looking for more specific methods to manage pests that reduce potential exposure of non-target organisms. This type of strategy is known as Integrated Pest Management (IPM). The PDA has been using an IPM strategy for spotted lanternfly infestations, and landowners may consider using the same IPM strategy on their properties, or hiring a professional service to do it.

IPM Strategy for the Spotted Lanternfly:

1. Locate *Ailanthus altissima* trees on the site. For reasons not understood, spotted lanternfly seem to prefer some individual *Ailanthus altissima* trees over others. Try to identify the specific *Ailanthus* trees that are most attractive to the insects, based on how many are feeding on them.
2. Destroy approximately 90% of the *Ailanthus altissima* trees, leaving only a few that are most attractive to the insect. They will serve as "trap" trees. It is recommended that you try to kill all the female *Ailanthus altissima* trees, because they produce seed and contribute to the spread of this invasive tree.

Be careful handling *Ailanthus altissima* wood, leaves, and branches. Chemicals in the sap of this tree can cause headaches, nausea, and possible heart problems. Wear gloves and protect yourself from exposure.

When you cut down *Ailanthus altissima* trees, they will sprout profusely from the stumps and can grow back in a few years. Because they regenerate so easily, it is highly recommended that you treat the stumps with a herbicide to kill them and prevent them from sprouting new shoots.

Herbicides that are labelled for this use usually contain one of the following active ingredients: triclopyr, dicamba, imazapyr or glyphosate. Use the herbicide carefully and according to the label directions. Alternative methods for using herbicides to kill *Ailanthus altissima* trees include foliar sprays, basal bark applications, and a method called frill application or "hack and squirt." For more information about these methods go to <http://extension.psu.edu/publications/uh174>. Whatever method you choose, remember that you will have dead *Ailanthus* trees which may eventually have to be removed.

3. Treat the remaining *Ailanthus altissima* trees with a systemic insecticide that will move throughout the tree. The insecticide must be applied according to the label and at the right time of year for the trees to absorb it. When spotted lanternflies feed on correctly treated trees, they will die. Systemic insecticides that are labelled to treat ornamental trees usually contain the active ingredients dinotefuran or imidacloprid. The PDA is using dinotefuran in their IPM strategy.

Treating only a few trap trees with a systemic product can reduce the amount of insecticide used in the environment and may help conserve beneficial insects.

It is important for landowners in the affected area to avoid spreading the spotted lanternfly. One good practice is to avoid parking your vehicle under trees when the adults are present. Spotted lanternflies that are living in the trees can lay eggs on the cars that are under the tree. Females will lay eggs on many objects including lawn furniture, rocks, fence posts, rusty metal, firewood, and other items. Inspect all items, including the wood from killed *Ailanthus* trees, and destroy any living spotted lanternflies or egg masses before you move them out of the area. If you must move items from inside the affected area, complete this checklist to be in compliance with the quarantine:

http://www.agriculture.pa.gov/Protect/PlantIndustry/spotted_lanternfly/Documents/SLF%20Checklist%202011-12-2014.pdf

Many sites within the infested area have high populations of spotted lanternflies. Every resident who effectively uses control measures will help to reduce the potential for this insect to spread to new territory.

Prepared by: Emelie Swackhamer, Horticulture Extension Educator, Montgomery County, February, 2017.

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Penn State College of Agricultural Sciences research and extension programs are funded in part by Pennsylvania counties, the Commonwealth of Pennsylvania, and the U.S. Department of Agriculture.

Where trade names appear, no discrimination is intended, and no endorsement by Penn State Extension is implied.

This publication is available in alternative media on request.

How to Eliminate or Control Spotted Lanternfly Adults:

If you find Spotted Lanternflies in a municipality where they are known to exist, you should try to kill them.

The most effective way to eliminate these insects is to disrupt their favorite food and hang-out. In late summer and fall, Spotted Lanternflies prefer feeding on *Ailanthus altissima*, commonly known as the "Tree of Heaven." They can be found feeding on other plants and trees, but *Ailanthus altissima* is their favorite host. Here's an excellent resource to help you identify the tree:

https://pubs.ext.vt.edu/content/dam/pubs_ext_vt_edu/420/420-322/420-322_pdf.pdf

If you have *Ailanthus* on your property: please consider reducing the number of *Ailanthus* trees, then treat remaining "trap trees" with insecticides. This is a longer-lasting solution than simply spraying insects you see.

More detail about this process can be found at the following websites:

http://www.agriculture.pa.gov/Protect/PlantIndustry/spotted_lanternfly/Documents/What%20to%20do%20if%20you%20find%20spotted%20lanternfly%20on%20your%20property%20fact%20sheet%20February%202017.pdf

http://www.agriculture.pa.gov/Protect/PlantIndustry/spotted_lanternfly/Documents/Spotted%20Lanternfly%20Property%20Management.pdf

If you want to kill Spotted Lanternflies without controlling *Ailanthus*:

When there are only a few insects, you can kill spotted lanternflies by swatting or crushing them. For large populations, two kinds of insecticides are widely available that will kill Spotted Lanternfly adults. **Contact insecticides** kill spotted lanternflies when the chemical contacts the insect directly. **Systemic insecticides** are absorbed by the tree and kill insects feeding on it. **ALL** insecticides must be used as directed on the label. Take the time to read the label carefully and follow the directions. This increases your safety, the safety of the environment, and the effectiveness of the insecticide.

Pennsylvania law requires that pesticide labels list the site where a pesticide (such as an insecticide) may be used. In Pennsylvania, insecticide labels do not have to specifically list the targeted insect. There are insecticides labeled for use on ornamental trees and around buildings. These products are legal to use on the sites listed in order to control Spotted Lanternflies in Pennsylvania.

Penn State Extension is currently testing to determine which insecticides are most effective in controlling adult spotted lanternflies. Preliminary results show insecticides with the active ingredients **dinotefuran, imidacloprid, carbaryl, and bifenthrin** are effective at controlling the spotted lanternfly. Neem oil and insecticidal soap provided some control, but results varied, and insects sometimes took several days to die.

Examples listed below are some of the available insecticide products containing the most effective ingredients studied (*dinotefuran, imidacloprid, carbaryl, and bifenthrin*).

EXAMPLES OF PRODUCTS CONTAINING INSECTICIDES LABELED FOR USE IN LANDSCAPES AND GARDENS:

Contact insecticides (bifenthrin, carbaryl) - apply when adult insects are present:

AVALON INSECTICIDE
BIFEN 7.9F SELECT
FERTI-LOME BROAD SPECTRUM INSECTICIDE
FLEE READY-TO-USE YARD SPRAY
HOME MD MAXIMUM DEFENSE YARD CONCENTRATE
LESCO CROSSCHECK PLUS MULTI INSECTICIDE
MAXXTHOR SG
ORTHO MAX PRO
SEVIN
TALSTAR SELECT INSECTICIDE
UP-STAR GOLD INSECTICIDE

Systemic insecticides (imidacloprid, dinotefuran) – most effective when applied in spring and summer, before adults build up:

BAYER ADVANCED 12 MONTH TREE & SHRUB INSECT CONTROL
BONIDE ANNUAL TREE AND SHRUB INSECT CONTROL WITH SYSTEMAXX
COMPARE-N-SAVE SYSTEMIC TREE & SHRUB INSECT DRENCH
GREEN LIGHT TREE & SHRUB INSECT CONTROL WITH SAFARI
MONTEREY ONCE A YEAR INSECT CONTROL II
ORTHO BUG B GON YEAR-LONG TREE & SHRUB INSECT CONTROL CONCENTRATE
SPECTRACIDE TREE & SHRUB INSECT CONTROL
TRANSTECT 70 WSP INSECTICIDE
VENOM INSECTICIDE
ZYLAM LIQUID SYSTEMIC INSECTICIDE

EXAMPLES OF PRODUCTS CONTAINING INSECTICIDES FOR USE ON VEGETABLES, FRUIT, BERRIES AND GRAPES:

WHEN USING INSECTICIDES ON EDIBLE CROPS: It is especially important to follow directions for chemical application and timing from harvest as stated on the label.

AGWAY COMPLETE FRUIT TREE SPRAY
BONIDE COMPLETE FRUIT TREE SPRAY LIQUID
BONIDE EIGHT INSECT CONTROL FLOWER & VEGETABLE ABOVE AND BELOW SOIL INSECT GRANULES
HI-YIELD VEGETABLE & ORNAMENTAL INSECT CONTROL GRANULES
SEVIN
VEGETABLE GARDEN SOIL INSECTICIDE

The products listed above are registered for use in specific settings. Read the pesticide label and follow the directions, including application rates, methods, and appropriate protective clothing and equipment.

THE LIST IS PROVIDED BASED ON CURRENT PRODUCT REGISTRATIONS. THIS IS NOT AN ENDORSEMENT OF ANY PRODUCT OR PESTICIDE PRODUCER. THIS IS NOT A COMPLETE LIST OF POSSIBLE LABELED PRODUCTS OR BRANDS.

THESE INSECTICIDES HAVE NOT ALL BEEN TESTED AGAINST SPOTTED LANTERNFLY SPECIFICALLY, AND ADDITIONAL EXPERIMENTS ARE NEEDED TO DETERMINE THEIR EFFICACY.



The Spotted Lanternfly: Tips for Handling Yard Waste in Quarantined Areas



The invasive spotted lanternfly has been found in southeastern counties in Pennsylvania. We are trying to eradicate this potential pest. **There is a quarantine order in place that prohibits movement of any living life stage of this insect to areas outside of the quarantine area. To find information about identifying the spotted lanternfly and current information about where it is known to exist, the quarantine order and compliance go to:**

www.agriculture.pa.gov/Protect/PlantIndustry/spotted_lanternfly

- **Learn about spotted lanternfly and its host plants. Report any capture, photos or sightings of this insect in areas outside of the current quarantine** to badbug@pa.gov or 1-866-253-7189.
- **Know which municipalities are included in the quarantine order.** Additional municipalities will be added if new discoveries occur.
- **Avoid moving this insect** on woody plant debris, such as fallen trees or branches and tree trimmings, and also any living plants, equipment, building materials, or other objects. Businesses may avoid possible fines by entering into a compliance agreement through the Pennsylvania Department of Agriculture (PDA). Plant nurseries, nursery stock dealers, and mulch producers should contact their plant inspector for compliance information. For information to contact your regional PDA office, go to www.agriculture.pa.gov/regional-offices/Pages/default.aspx.
- **Inspect yard waste and other items and destroy egg masses.**
- Non-commercial residents should use the [compliance checklist](#) when moving items from within the quarantined area to outside areas.
- **Movement of fallen leaves is not regulated under the spotted lanternfly quarantine.**

(continued)

- When working in the quarantined area, if possible, **chip all woody debris on-site to no larger than 1-inch pieces in each of two dimensions**. Even within the quarantined area, it is a better practice to move chips rather than move larger woody debris.
- If you can, **leave all chips or woody debris on-site**. The next best option is to take chips or debris to an organic materials recycler within the quarantine area.
- To kill viable insects or eggs in chipped material, the following **composting procedure must be followed before moving it** out of the quarantine area.
 1. Compost piles must be a minimum of 200 cubic yards.
 2. Internal temperature at a depth of 18 inches must reach 140° F (60° C) for four (4) continuous days.
 3. After the interior of the pile is successfully treated, the exterior of the pile needs to be rotated to the center. Using a front-end loader or a bulldozer, remove the outer layer of the compost pile to a depth of three (3) feet.
 4. Start a second compost pile using the recently-removed cover material as a core.
 5. Cover this second compost pile by moving the core material from the first compost pile as a cover at least three (3) feet deep.
 6. Allow the second compost pile to remain undisturbed until the temperature reaches 140° F (60° C) for at least four (4) continuous days.
 7. After the chips have been successfully composted according to these directions, the resulting composted material meets compliance requirements.
 8. Mulch being offered for sale and moving out of the quarantine area is required to be certified by PDA. Please contact your regional plant inspector for information.



Branch with spotted lanternfly egg masses

Prepared by:

Emelie Swackhamer, Horticulture Educator, Penn State Extension, Montgomery County

Kathy Salisbury, Horticulture Educator, Penn State Extension, Bucks County

February, 2017

extension.psu.edu

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How You Can Comply with the Spotted Lanternfly Quarantine Regulations

There is a new invasive insect in southeastern Pennsylvania, *Lycorma delicatula*, commonly known as the spotted lanternfly (SLF). This insect has the potential to be harmful to grapes, stone fruit, and trees. To try to limit the spread of SLF, the Pennsylvania Department of Agriculture (PDA) has established a quarantine order in municipalities where SLF already exists. All residents and businesses must comply with the regulations.

The PDA has the authority to fine anyone who willfully violates the quarantine order.

Here are some tips to help you avoid spreading SLF and be in compliance with the regulations.

- 1. Learn about which municipalities are included in the quarantine order. The area of the quarantine will continue to change as new discoveries are made.** As you move into and out of the quarantined area, you must make sure that you are not transporting any living life stages of the SLF to new areas which are not yet included in the quarantine. If you believe you have discovered SLF in any area outside of the current quarantined area, report your discovery to the PDA by sending a picture to badbug@pa.gov or calling 1-866-253-7189. The most recent quarantine map can always be found in the publications list at this site: http://www.agriculture.pa.gov/protect/plantindustry/spotted_lanternfly/Pages/default.aspx
- 2. Learn about what SLF looks like in every stage of its development throughout the year.**



The young nymphs are black with white spots and can be present from May until October.



The older nymphs are black and red with white spots and can be present from June until October.



The adults (shown at rest) can be present from July until late December. The adults are 1 to 1 1/4 inches long.



An adult showing the red underwings when disturbed (photo credit: Nancy Bosold)



The egg masses can be on trees, rocks, or any other solid object and can be present from September through May.



The empty remains of the eggs that have hatched can be found at any time of the year.

To see additional pictures of SLF go to:

<http://extension.psu.edu/pests/spotted-lanternfly/photos/spotted-lanternfly-what-to-look-for>

- 3. You should avoid parking or storing things under trees in infested areas.** The female SLF often lays eggs on

(continued)

objects that are under the trees she is feeding on. **You should try to change your habits about where you park.** Park vehicles in open fields, away from tree lines, or in a closed garage if possible. You should not store things that you might need to move to outside of the quarantined area under infested trees. These things include firewood, tools, construction supplies, equipment, or any other solid object.

4. Inspect all items that you need to move from within the quarantined area to areas outside the quarantined area. You should remove and destroy any SLF that you find before you move the item. Also check all vehicles, trailers, campers and equipment including around windshield wipers, grills, wheel wells, and truck beds. Inspect plant material, woody debris, lawn furniture, construction supplies, tools, and all solid objects. Remove SLF manually or use a pressure washer. You can destroy mobile stages of SLF mechanically by crushing them. Destroy eggs by smashing them or scraping them into a container of rubbing alcohol.

5. All businesses should consider entering into a compliance agreement with the PDA. A compliance agreement states that you know how to follow the rules of the quarantine order and agree to do all you can to ensure that the items you transport are not carrying SLF. The PDA is maintaining a list of companies who have set up compliance agreements at http://www.agriculture.pa.gov/protect/plantindustry/spotted_lanternfly/Pages/default.aspx, and people check this list to find companies who are in compliance. You will also receive documentation to share with your customers to show that you have a compliance agreement with the PDA. Contact your regional PDA office for more information: <http://www.agriculture.pa.gov/regional-offices/Pages/default.aspx>

6. If you need to move items that are not related to a business from within the quarantine zone you must also inspect the items, remove and destroy any living life stages of the SLF. There is a checklist for residents of the quarantined area. This is a legal document to show that you are in compliance. You can print the checklist, fill it out, sign it and take it with you when you move the item(s).

The checklist is available at this link: http://www.agriculture.pa.gov/Protect/PlantIndustry/spotted_lanternfly/Documents/SLF%20Checklist%2011-12-2014.pdf

7. If you sell plants, you should have them inspected by the PDA and receive a phytosanitary certificate. Pennsylvania law requires horticultural businesses that produce and/or sell plants to have either a Nursery/Greenhouse License or a Nursery Dealer's License. When you have a license plant inspectors will check your plants and if they are found to be free of pests, you will receive a phytosanitary certificate as proof of this inspection. <http://www.agriculture.pa.gov/Protect/PlantIndustry/Phytosanitary/Pages/default.aspx>

8. If you sell and/or produce mulch you must use specific practices to ensure it does not harbor SLF. The specific practices are outlined in the fact sheet at this link: http://www.agriculture.pa.gov/Protect/PlantIndustry/spotted_lanternfly/Documents/The%20Spotted%20Lanternfly%20and%20Handling%20Yard%20Waste.pdf

You should note that the SLF regulations do not apply to grass clippings or autumn leaf collection. We believe that the SLF does not lay eggs on these light weight objects. Clippings and leaves may be moved from the quarantine area if necessary, as long as the truck and/or trailer you are hauling them with has been checked.

The regulations of the spotted lanternfly quarantine order are in place to prevent the SLF from being spread by people. This pest is not just a concern to agricultural and horticultural professionals, it is a community concern. To protect the agriculture industry, we need everyone to be aware of the best practices to avoid spreading SLF and use these practices in their daily activities.

You can see the official quarantine order, a summary in plain language and find more information at this link: http://www.agriculture.pa.gov/protect/plantindustry/spotted_lanternfly/Pages/default.aspx

Additional information is at this link:
<http://extension.psu.edu/pests/spotted-lanternfly>

Prepared by: Emelie Swackhamer, Horticulture Extension Educator, Montgomery County, June, 2017.

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Spotted Lanternfly Regulations:

What the General Quarantine Means for Moving Items

Spotted Lanternfly, *Lycorma delicatula*, is a new threat to Pennsylvania and the United States. It lays egg masses of 30-50 eggs wherever there's a flat surface – meaning that many home items easily transported can pack this pest and help it spread quickly. Therefore, a general quarantine over any area found to harbor the Spotted Lanternfly means that any material or object that can spread the pest cannot be moved.

Experts are still learning about this threat to agriculture in Pennsylvania and the United States and how to combat it.

Current Quarantines

- **Counties: Berks** (Longswamp, Rockland, District, Hereford, Oley, Pike, Earl, Washington, Colebrookdale, Amity, and Douglass townships; including Bally and Bechtelsville) **Montgomery** (Douglass, New Hanover, Upper Hanover townships) **Lehigh** (Lower Macungie Township) **Chester** (South Coventry Township)

Regulated Articles and Limitations Imposed by the General Quarantine

- Any living life stage of the Spotted Lanternfly.
- Brush, debris, bark, or yard waste.
- Landscaping, remodeling or construction waste.
- Logs, stumps or any tree parts.
- Firewood of any species.
- Packing materials like wood crates
- All plants and plant parts.
- Outdoor household articles like RVs, lawn mowers, chairs, grills, tarps, tile, stone, deck boards, and trucks or other vehicles not stored indoors.

You can move these and similar items if

- You have a valid certificate or limited permit that shows that the item has been inspected and determined free of Spotted Lanternfly, or if you have entered a compliance agreement that shows you have the understanding to identify the pest and can ensure the items you transport aren't carrying it.
- You are driving through the quarantined area and are transporting your item in a way that makes it unlikely to harbor the pest as you pass through.
- You complete a certification checklist.

For Additional Information:

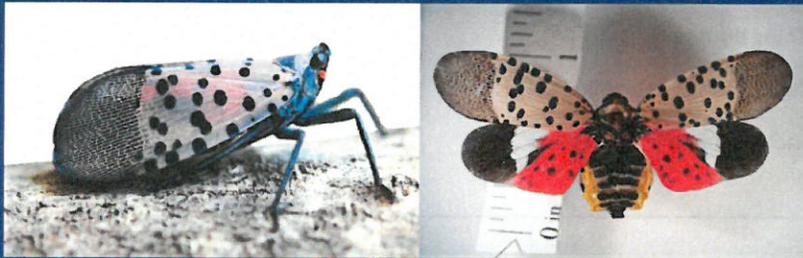
- <http://pda.state.pa.us/SpottedLanternfly/>
- Quarantine Questions: Dana Rhodes 717-772-5205 danrhodes@pa.gov
- To report possible Spotted Lanternfly: 1-866-253-7189 or badbug@pa.gov

With your assistance we can stop the spread of Spotted Lanternfly, and increase our chances of eradication of this pest.

Checklist for Residents Living in Spotted Lanternfly Quarantine Areas

IMPORTANT: Before you move outdoor items from the quarantine area, check for spotted lanternfly egg masses, adults, and nymphs. Make sure all items are pest free before you move them. Help keep this pest from spreading.

If you find any of these life stages of the Spotted Lanternfly, remove, devitalize, place in a sealed bag, and dispose of bag in the garbage.



Adult Spotted Lanternfly, present in autumn months.

Fresh Spotted Lanternfly egg mass (outlined in red). Egg masses are present in autumn and winter months, blending in with their surroundings.



Spotted Lanternfly nymphs, present in spring and summer months. (Images from Park et al. 2009)

By signing this checklist, I am confirming that I have inspected my vehicle and those items I am moving from the Spotted Lanternfly quarantine area, and do not see any egg masses or insects in or on anything I am moving.

Signature _____ Address _____ Date _____

Please sign, date, and keep this checklist in your vehicle with you – use it each time you need it.

For more information, visit the Pennsylvania Department of Agriculture website:

www.pda.state.pa.us/spottedlanternfly

Checklist for Residents

Living in Spotted Lanternfly Quarantine Areas

IMPORTANT: Before you move outdoor items from the quarantine area, check for spotted lanternfly egg masses, adults, and nymphs. Make sure all items are pest free before you move them. Help keep this pest from spreading.

Check before you move

Recreational or Camping Items

- | | | |
|------------------------------------------------|------------------------------------------------|--------------------------------|
| <input type="checkbox"/> Backpacks | <input type="checkbox"/> Ice chests | <input type="checkbox"/> Tarps |
| <input type="checkbox"/> Basketball backboards | <input type="checkbox"/> Motorcycles | <input type="checkbox"/> Tents |
| <input type="checkbox"/> Bicycles | <input type="checkbox"/> Motor homes | <input type="checkbox"/> Other |
| <input type="checkbox"/> Boats/Boat trailers | <input type="checkbox"/> Recreational vehicles | |
| <input type="checkbox"/> Campers | <input type="checkbox"/> Snowmobiles | |

Outdoor Household Items

- | | | |
|----------------------------------------------------|-------------------------------------------------|---------------------------------------------------------|
| <input type="checkbox"/> Barrels | <input type="checkbox"/> Propane or oil tanks | <input type="checkbox"/> Storm/Screen doors and windows |
| <input type="checkbox"/> Cardboard or wooden boxes | <input type="checkbox"/> Trash cans | <input type="checkbox"/> Window awnings |
| <input type="checkbox"/> Outdoor poles | <input type="checkbox"/> Refrigerators/Freezers | <input type="checkbox"/> Outdoor furniture |
| <input type="checkbox"/> Plant containers | <input type="checkbox"/> Storage sheds | <input type="checkbox"/> Other |
| <input type="checkbox"/> Firewood | <input type="checkbox"/> Shutters | |

Building Materials

- | | | |
|-----------------------------------------------|----------------------------------------------|----------------------------------------------|
| <input type="checkbox"/> Bricks/Cinder blocks | <input type="checkbox"/> Roofing materials | <input type="checkbox"/> Skidsters/Forklifts |
| <input type="checkbox"/> Cement mixing tubs | <input type="checkbox"/> Tools and toolboxes | <input type="checkbox"/> Pipes |
| <input type="checkbox"/> Lumber | <input type="checkbox"/> Workbenches | <input type="checkbox"/> Other |

Yard and Garden Items

- | | | |
|-----------------------------------------------------------------------|-------------------------------------------|---------------------------------------------------|
| <input type="checkbox"/> Dog houses, rabbit sheds, chicken coops, etc | <input type="checkbox"/> Garden tillers | <input type="checkbox"/> Signs and posts |
| <input type="checkbox"/> Barbecue grills | <input type="checkbox"/> Yard decorations | <input type="checkbox"/> Storage sheds |
| <input type="checkbox"/> Carts | <input type="checkbox"/> Garden tools | <input type="checkbox"/> Tractors and trailers |
| <input type="checkbox"/> Cold frames | <input type="checkbox"/> Backhoes | <input type="checkbox"/> Trees, shrubs and plants |
| <input type="checkbox"/> Fencing | <input type="checkbox"/> Lawnmowers | <input type="checkbox"/> Other |

Children's Playthings

- | | | |
|---------------------------------------|---------------------------------------------|--------------------------------|
| <input type="checkbox"/> Play houses | <input type="checkbox"/> Bicycles, scooters | <input type="checkbox"/> Other |
| <input type="checkbox"/> Kiddie pools | <input type="checkbox"/> Sandboxes | |

Invasive Exotic Plant Species: *Ailanthus (Ailanthus altissima)*

Matthew Yancey, Extension Agent, Natural Resources, Northwest District

Background

Ailanthus, also known as tree-of-heaven and paradise-tree, is a major nuisance to foresters, farmers, and homeowners alike. Its prolific seeding and ability to sprout from roots and stumps and grow quite rapidly just about anywhere make it a serious competitor and threat to native species and cultivated crops. On top of that, *ailanthus* is allelopathic, producing substances that are toxic to and inhibit the growth of neighboring plants.

Identification

Leaves – When present, the leaves are compound and typically measure 1 to 3 feet in total length with 11 to 25 individual leaflets.

Twig – Twig is smooth to fuzzy with large shield-shaped leaf scars after the leaves drop. *Ailanthus*'s most convincing identification feature is the inside of a broken twig, which smells like rancid or burnt peanut butter and even resembles it in appearance.

Flower – Clusters of yellow-green flowers bloom in late spring to early summer. Male flowers have a disagreeable scent, similar to that of the broken twig.

Fruit – Fruit is a samara, similar to the fruit found on maple trees.

Bark – Bark is smooth and green when young, eventually turning gray and resembling a cantaloupe.

Form – *Ailanthus* first grows as a single, unbranched stem or multiple stems from the ground, particularly when cut back. An *ailanthus* mono-cultural thicket will eventually result. Individual stems can grow eight feet in one year and ultimately up to 100 feet in high.



Leaf



Pith



Bark



Leaf scar

Look-alike species

Ailanthus is often confused with native sumacs (*Rhus* spp.), but can usually be distinguished by sumac's small, red, fuzzy drupe (fruit) that persists through the winter. Black walnut (*Juglans nigra*) is also sometimes mistaken for ailanthus when young, due to its compound leaves and large shield-shaped leaf scars. Both of these features are much larger on ailanthus, and the characteristics described above should help make ailanthus less mistakable.

Control

Ailanthus regeneration habits dictate that cutting alone will not kill the tree, but instead promote it to resprout vigorously. Cutting must be combined with chemical control unless excavating the entire root system is feasible, which usually is not. Triclopyr has been verified to provide effective control of ailanthus through basal, foliar, and cut-stump applications. The use of a surfactant for basal and foliar applications is also recommended. For a basal spray application, a 12 percent triclopyr-in-oil solution is recommended. The plant should be sprayed to the point of runoff. For foliar spray, a 2 percent triclopyr in either a water or oil solution is advised. Cut-stump treatments require a 44 percent triclopyr-in-water solution.

The following table displays many general-use chemical formulations labeled for control of ailanthus in forested setting.

Manufacturer	Product Name	Active Ingredient (ai)	Percent ai	Application Method*
Nufarm Turf and Specialty	Vanquish	Dicamba	56.8	F, C, B, S
DuPont	Krenite S	Fosamine	41.5	F, C
Dow AgroSciences	Accord Concentrate	Glyphosate	53.8	F, C
BASF	OneStep	Glyphosate + Imazapyr	69.51 + 8.36	F
BASF	Arsenal AC	Imazapyr	53.1	F, C
BASF	Chopper	Imazapyr	27.6	F, C, B
BASF	Stalker	Imazapyr	27.6	C, B
DuPont	Escort XP	Metsulfuron Methyl	60	F, S
Dow AgroSciences	Pathway	Picloram + 2,4-D	5.4 + 20.9	C
Dow AgroSciences	Pathfinder II	Triclopyr	13.6	B, C
Dow AgroSciences	Garlon 3A	Triclopyr	44.4	F, C
Dow AgroSciences	Garlon 4	Triclopyr	61.6	F, B, C
Nufarm Turf and Specialty	Tahoe 4E	Triclopyr	61.6	F, B, C

* F: Foliar, B: Basal bark, C: Cut stump, S: Basal soil

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Swearingen, J., K. Reshetiloff, B. Slattery, and S. Zwicker. 2002. Plant Invaders of Mid-Atlantic Natural Areas. National Park Service and U.S. Fish & Wildlife Service, 82 pp.

Burch, Patrick L. and S. M. Zedaker. 2003. Removing the invasive tree *Ailanthus altissima* and restoring natural cover. *Journal of Arboriculture* 29(1): 18-24.

Disclaimer: Commercial products are named in this publication for informational purposes only. Virginia Cooperative Extension does not endorse these products and does not intend discrimination against other products which also may be suitable.

Reviewed by Bob Smith, associate dean and professor, College of Natural Resources.

Guidelines for the Control of Spotted Lanternfly

THE GUIDELINES BELOW ARE DESIGNED FOR CONTROL OF SPOTTED LANTERNFLY AND TREE OF HEAVEN AND REFERENCE THE USE OF PESTICIDES. WHEN USING ANY PESTICIDE, READ THE PESTICIDE LABEL FOR DIRECTIONS, APPLICATION RATES, APPLICATION METHODS, AND APPROPRIATE PROTECTIVE CLOTHING AND EQUIPMENT. THESE GUIDELINES DO NOT CONSTITUTE AN ENDORSEMENT OF ANY PRODUCT OR PESTICIDE PRODUCER. THE PESTICIDES REFERENCED HAVE NOT BEEN TESTED ON SPOTTED LANTERNFLY, SPECIFICALLY AND THEIR EFFICACY AGAINST THIS PEST IS UNKNOWN.

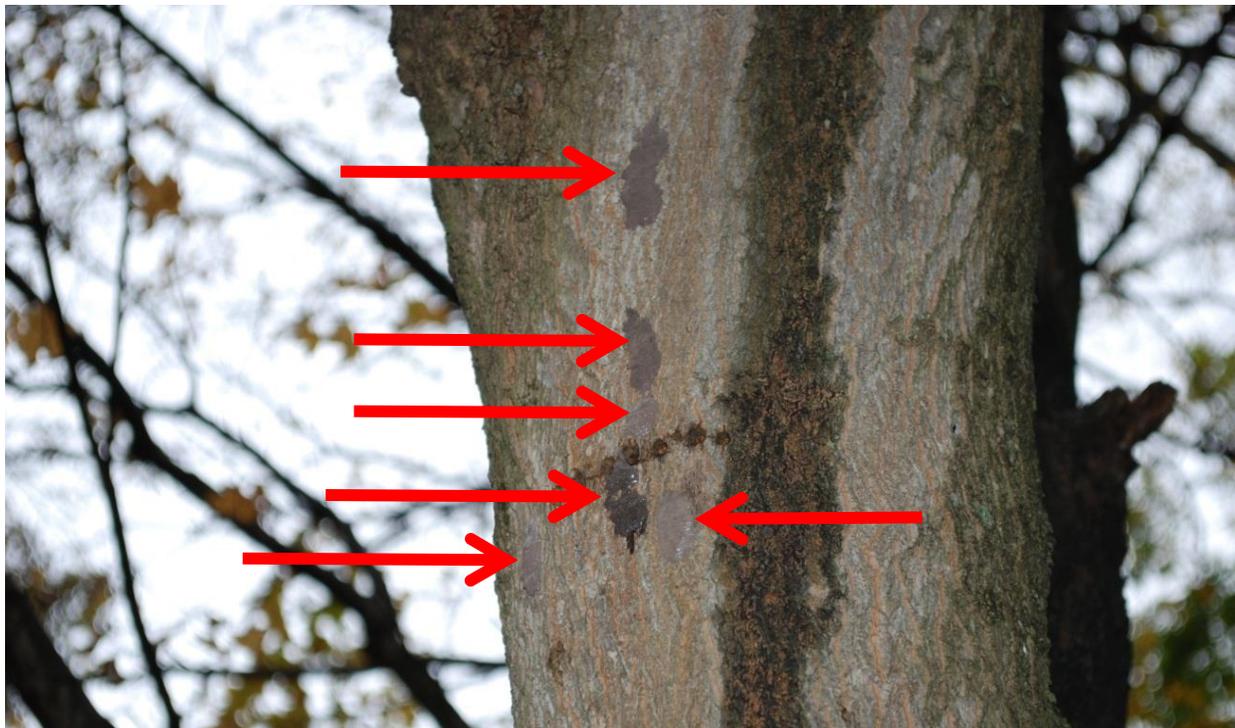
Property owners can help contain and control spotted lanternfly (SLF) by implementing a management strategy using a combination of mechanical control, host reduction, and chemical control. These guidelines have been developed for use by the Pennsylvania Department of Agriculture (PDA) Spotted Lanternfly Eradication Program. The guidelines target SLF at different stages of its lifecycle, and may lead to dramatic reduction in SLF populations where implemented.

Mechanical Control: October - July

Mechanical control includes egg mass scraping and tree banding.

Egg Mass Scraping:

SLF adults lay eggs starting in October and will continue to lay eggs through the first few hard frosts. SLF eggs are laid on many surfaces including trees, rocks, and manmade objects which are stored outside. Egg masses contain an average of 30-50 individual eggs, and are covered with wax. The wax, when it is first deposited, is light gray, but it takes on the appearance of mud as it dries. Property owners can scrape egg masses whenever encountered. This can be done using any hard or rigid tool such as a stick, a putty knife, or credit card. It is unknown if eggs scraped onto the ground can survive, so the best advice is to scrape egg masses in a downward direction into a container with rubbing alcohol or hand sanitizer.



Arrows indicating location of spotted lanternfly egg masses on a tree

Tree Banding:

SLF nymphs emerge from the egg masses in early May and pass through four nymph stages. The nymphs crawl up and down trees to feed each day. Though the nymphs can be found on many types of plants, they strongly prefer tree of heaven (*Ailanthus altissima*) and banding these trees with an adhesive trap is effective in capturing the first three nymphal stages. The PDA Spotted Lanternfly Eradication Program can supply volunteers with tree bands for their property. Bands can also be purchased from private vendors. Research from Korea indicates that brown colored adhesive bands are most effective. Starting at the end of April bands should be placed on tree of heaven that are at least six inches wide at chest height. The adhesive portion of the tree band should be facing away from the tree surface and cut so that the edges of the band overlap each other by an inch. Push pins can be used to help secure the band. Bands should be replaced every two weeks until the last few weeks of July.



Spotted lanternfly nymphs captured on a tree band

Host Tree Reduction: All Year

**NOTE: PDA DOES NOT RECOMMEND TREE OF HEAVEN REMOVAL
UNLESS ACCOMPANIED WITH AN HERBICIDE APPLICATION**

Although SLF will feed on other trees and plants, all life stages strongly prefer tree of heaven, and adult SLF seem to require a meal from these trees prior to laying eggs. This provides an opportunity to concentrate the SLF population on a property by performing host tree reduction. This method involves removal or killing of most tree of heaven on an infested property while leaving a few to serve as trap trees.

Tree of Heaven Control Methods:

Control of tree of heaven requires suppression of the regenerating root system of this species. Because of this, many tree of heaven infestations require multiple treatments to control a population with continued monitoring for regrowth. Various methods of treatment may have to be utilized for complete control. Establishing a native or non-invasive groundcover may help in control of sprouts and seedlings following herbicide treatments.

Foliar sprays:

A foliar spray with a recommended herbicide is the most common control for tree of heaven. The spray should cover the leaves and shoots that are at an attainable height. Foliar sprays are effective for control of sprouts and suckers, and are best if used with a surfactant to obtain better coverage and absorption into the leaves. Optimal time for treatment with a foliar spray is June to September.

Basal bark spray:

Basal bark sprays can be an effective means of control for young tree of heaven that are less than four inches in diameter. Spray the recommended herbicide with an oil carrier on the lower twelve to eighteen inches of the stem, until the bark is wet, but not running off. This treatment works well for control of smaller trees in summer and late winter, as it chemically girdles the stem where applied.

Stump treatments:

Applying a recommended herbicide to a freshly cut stump is **essential** to deter sprouting and suckering. Herbicide treatment should be made immediately after the cut so that it may be absorbed into the roots. This method works best during the active growing season of the tree from June through September.

Hack and Squirt:

Hack and squirt treatment is an effective treatment for control of tree of heaven and is made by making a series of downward cuts into the bark with an axe or machete. The cuts which form small cups and are approximately chest height are made evenly around the tree. Herbicide is then applied to each cut where it is taken up into the tree. Hack and squirt does not girdle the stem as there is spacing between the cuts, which allows the herbicide to be transported through the trees conductive system. Best results occur during the June to September growing season.



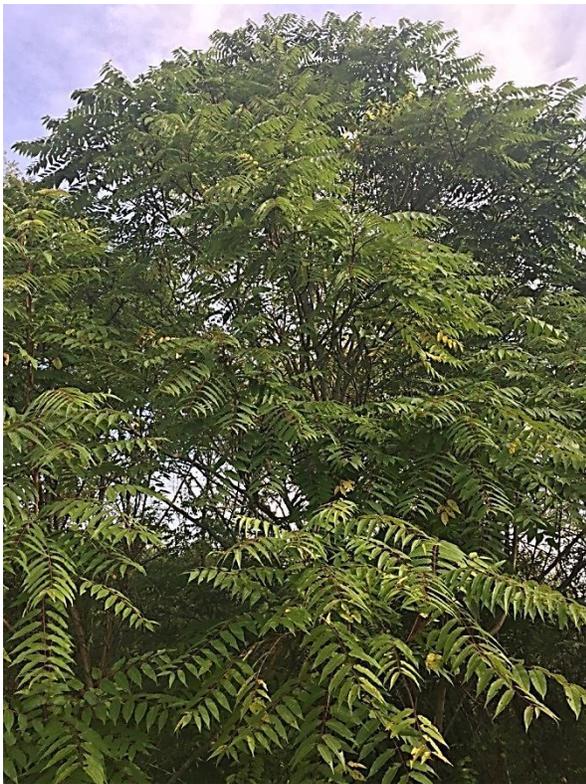
Tree treated with hack and squirt method

Chemical Control: Mid-May through August

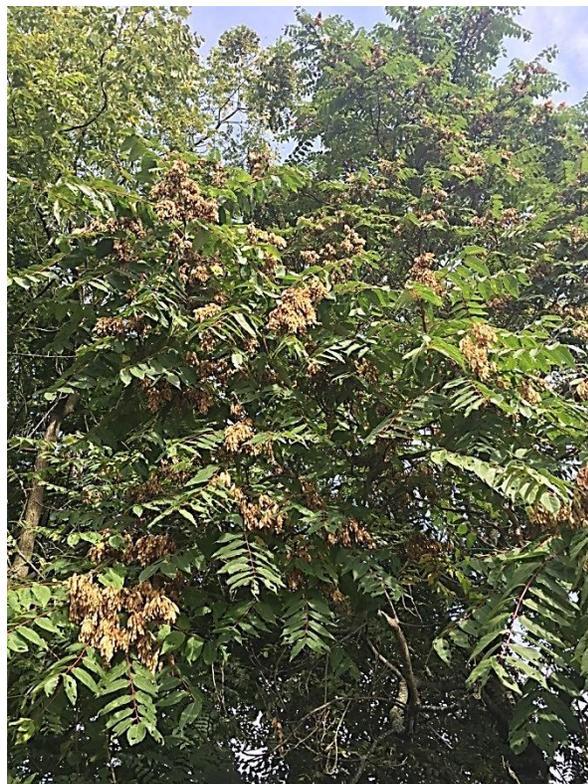
Though many insecticides appear to be effective against SLF, it is difficult to deliver the insecticide to the pest throughout much of their life cycle. Many of the egg masses are deposited in hidden protected areas, and research from Kutztown University has shown that nymphs spread out and can be found almost anywhere on a property through the last nymphal instar. Starting around mid-July late instars and adults start to actively seek tree of heaven. It is at this point in their life cycle that a property manager can concentrate the population and deliver an effective insecticide application. This tactic is also known as an "attract and kill" approach. It is recommended that host tree reduction is done in conjunction with insecticide application.

Trap Trees:

Due to the fact adult SLF must feed on tree of heaven starting in mid-July, an effective method for the delivery of insecticide to SLF on a property is the establishment of trap trees. Trap trees are created by leaving a small number of live tree of heaven on a property after host tree reduction has been done. Because most tree of heaven have been removed, when the late instar and adult SLF start looking for tree of heaven to feed on, they are only left with the trap trees as an option. Ideal trap trees should be at least 10 inches wide, and be male trees. Tree of heaven has both male and female trees. Male trees are preferred as trap trees because the females produce seed which can repopulate the property.



Male tree of heaven without seeds



Female tree of heaven with seeds

Control of SLF is achieved by treating the trap trees with a systemic insecticide. No efficacy data currently exists for any of the available systemic insecticides. PDA has elected to use a bark spray application of Dinotefuran due to the targeted application method and active ingredient delivery mechanism (Insects must feed on tree of heaven to be exposed). Because very few other organisms

feed on tree of heaven, exposure of non-target organisms is kept to a minimum. The insecticide is applied prior to the SLF becoming adults from mid-May through August. New adult SLF seek out the trap trees, feed on them, and this results in mortality. Currently the number of trap trees needed per property has not been determined. The application of insecticide to the trap trees will need to be repeated each year until no SLF are detected on a property.



Spotted lanternfly adults attracted to trap trees and killed by systemic insecticide



 Time to use management practices.

SPOTTED LANTERNFLY MANAGEMENT CALENDAR

	JAN	FEB	MAR	APRIL	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC
Destroy egg masses												
Destroy most <i>Ailanthus altissima</i> trees ¹												
Treat most <i>Ailanthus</i> trees with herbicide ^{2,3}												
Use sticky bands to destroy nymphs												
Treat <i>Ailanthus</i> trap trees with systemic insecticides ³												
Registered contact insecticides may be effective ³												
Avoid moving gravid (fertilized) females ⁴												
Avoid moving viable egg masses ⁴												

PEDDOMINANT LIFE STAGE PRESENT - (one generation per year in Pennsylvania in 2015 and 2016)

eggs												
nymphs												
adults												

¹ Destroying all *Ailanthus* trees (Tree of Heaven) may result in spotted lanternfly moving to surrounding plants and increase the pest pressure on them. It is recommended about 10% of *Ailanthus* trees are left alive to serve as trap trees to attract the spotted lanternflies. Leave only male trees if possible.

² *Ailanthus* trees will re-sprout vigorously from cut stumps and roots, unless they are treated with a systemic herbicide. Repeat applications of herbicide may be necessary.

³ ALWAYS READ HERBICIDE AND INSECTICIDE LABELS AND FOLLOW THE DIRECTIONS

⁴ Before you move outdoor items from the quarantine area, check for spotted lanternfly egg masses, adults, and nymphs and destroy them.

Use the checklist at http://www.agriculture.pa.gov/Protect/PlantIndustry/spotted_lanternfly/Documents/SLF%20Checklist%2011-12-2014.pdf

People are looking for specific approaches to pest management to minimize off-target exposure to pesticides. This type of strategy is known as Integrated Pest Management (IPM). The Pennsylvania Department of Agriculture (PDA) has been using an IPM strategy for spotted lanternfly infestations, and landowners may consider using the same IPM strategy on their properties, or hiring a professional service to do it.

IPM Strategy for the Spotted Lanternfly:

1. Locate *Ailanthus altissima* trees on the site. For reasons not understood, spotted lanternfly seem to prefer some individual *Ailanthus altissima* trees over others. Try to identify the specific *Ailanthus* trees that are most attractive to the insects, based on how many are feeding on them. For information on how to identify *Ailanthus altissima* and how to control it, see this fact sheet: <https://pubs.ext.vt.edu/420/420-322/420-322.html>.
2. Destroy approximately 90% of the *Ailanthus altissima* trees, leaving only a few that are most attractive to the insect. They will serve as "trap" trees. It is recommended that you try to kill all the female *Ailanthus altissima* trees, because they produce seed and contribute to the spread of this invasive tree.

Be careful handling *Ailanthus altissima* wood, leaves, and branches. Chemicals in the sap of this tree can cause headaches, nausea, and possible heart problems. Wear gloves and protect yourself from exposure.

When you cut down *Ailanthus altissima* trees, they will sprout profusely from the stumps and can grow back in a few years. Because they regenerate so easily, it is highly recommended that you treat the stumps with a herbicide to kill them and prevent them from sprouting new shoots.

Herbicides that are labelled for this use usually contain one of the following active ingredients: triclopyr, dicamba, imazapyr or glyphosate. Use the herbicide carefully and according to the label directions. Alternative methods for using herbicides to kill *Ailanthus altissima* trees include foliar sprays, basal bark applications, and a method called frill application or "hack and squirt." For more information about these methods go to <http://extension.psu.edu/publications/uh174>. Whatever method you choose, remember that you will have dead *Ailanthus* trees which may eventually have to be removed.

3. Treat the remaining *Ailanthus altissima* trees with a systemic insecticide that will move throughout the tree. The insecticide must be applied according to the label and at the right time of year for the trees to absorb it. When spotted lanternflies feed on correctly treated trees, they will die. Systemic insecticides that are labelled to treat ornamental trees usually contain the active ingredients dinotefuran or imidacloprid. The PDA is using dinotefuran in their IPM strategy.

Treating only a few trap trees with a systemic product can reduce the amount of insecticide released into the environment and may help conserve beneficial insects.

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extension.psu.edu

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