

# SPOTTED LANTERNFLY

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**Figure 1.** *Adult Spotted Lanternfly.*

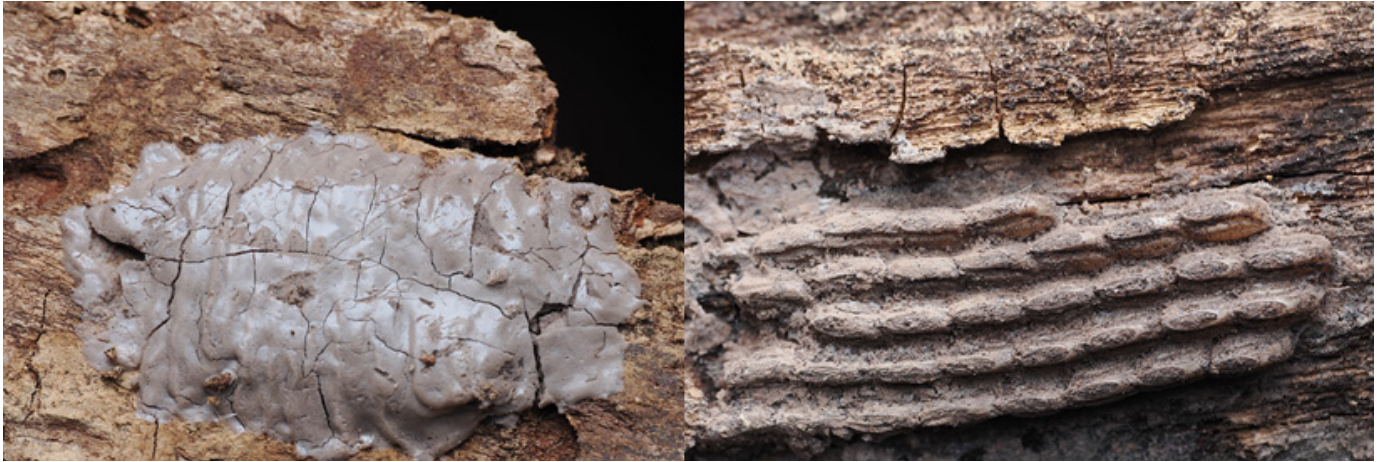
*Lawrence Barringer, Pennsylvania Department of Agriculture, [BugGuide.net](http://BugGuide.net)*

The spotted lanternfly (SLF), *Lycorma delicatula* (White), is a planthopper (Hemiptera: Fulgoridae) whose nymphs and adults feed on many plants. This pest has a needle-like mouthpart that it uses to suck sap from branches and twigs. Adults are approximately 1 inch to 1 5/8 inches long with light brown to gray forewings that have black spots centrally and wing tips exhibiting black dashes arranged in a brick wall pattern (Fig. 1). The hindwings have a red band closest to the body with black spots followed by a white band and then a black band at the wing tips. The head and legs are black while the body is yellow with broad black bands. The first, second and third instar nymphs are black with white spots while the fourth instar nymph is red and black with white spots and more colorful (Fig. 2). The egg masses are brown with a gray waxy covering and may contain up to 60 eggs. The waxy covering can weather and disintegrate, exposing the eggs over time (Fig. 3).



**Figure 2.** *SLF nymphs and adults on tree of heaven from Davidson County.*

*Picture Credit: Rebekka Horn, University of Tennessee.*



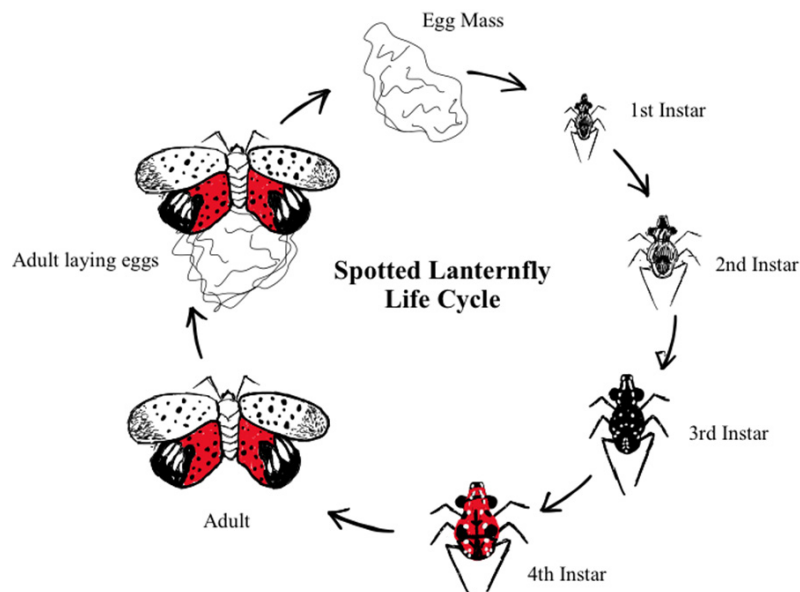
**Figure 3.** SLF egg masses from Davidson County.  
 Picture Credits: Alfred Daniel Johnson, Tennessee State University

### DISTRIBUTION, HOSTS AND LIFE HISTORY

SLF is native to China, India and Vietnam and has been introduced into Korea, Japan and Taiwan. It was first detected in the United States in Pennsylvania in September 2014. Additionally, other states such as New Jersey, Virginia, Delaware, West Virginia, Maryland, Connecticut, New York, Ohio, Illinois, Indiana, Michigan Massachusetts, North Carolina, Tennessee, Kentucky, South Carolina and Georgia have confirmed SLF populations.

In September 2023, the Tennessee Department of Agriculture confirmed detection of SLF in Tennessee. SLF adults were first found near a railroad track in Davidson County in Middle Tennessee where train cars are often left for a few days. Since the initial detection, SLF populations have been confirmed in other Tennessee counties. SLF is known to feed on more than 103 species of plants. The first, second and third instars feed on the tender plant tissue of a broad range of host plant species. The fourth instars and adults tend to have a narrow host range with the preferred hosts being tree of heaven (Fig 2) *Ailanthus altissima* (Mill.) Swingle, grapes (*Vitis* spp.), black walnut (*Juglans nigra* L.), silver maple (*Acer saccharinum* L.), red maple (*Acer rubrum* L.) and willow (*Salix* spp.).

Adult female SLF lay egg masses in September through November on host plants and other smooth surfaces. In Middle Tennessee, egg masses were found on railroad ties, under rock ledges, on tree of heaven, bush honeysuckle, poison ivy, downed tree limbs and logs. Additionally, egg masses also were found under peeling tree bark, in hollow trees and on the underside of plywood and lumber. Egg masses overwinter, and the firstinstar nymphs begin emerging in April. Nymphs mature to the second and third instar stages in May and June and reach the more colorful fourth instar in June. Adults emerge in the beginning of June and feed in large numbers on host plants for the rest of the summer (Fig 4). Aggregation of adults peak in September followed by mating and laying of egg masses.



**Figure 4.** SLF Life Cycle, Illustrated by Rebekka Horn,  
 Adapted from Penn State University

## INJURY AND PEST STATUS

SLF utilize piercing and sucking mouthparts to take in plant nutrients. The economic impact from SLF to key commodities could be direct or indirect. Direct damage occurs when large numbers of adults feed on a single plant causing branch or vine dieback or flagging. In Pennsylvania, flagging on black walnut has been observed. However, to better understand the feeding damage to ornamental and woody plants, more studies are warranted. Additionally, SLF adults are highly mobile and can lay eggs nearly anywhere, and could potentially lead to quarantine and inspection requirements for the landscape nursery, timber and Christmas tree industries.

Indirect damage occurs when the adults and nymphs of SLF excrete a sugary substance known as honeydew as they feed. Honeydew is an ideal substrate for the growth of fungal mats of sooty mold at the base of trees and on the foliage of the host plants. SLF does not feed directly on fruit; instead, sooty mold can make apples and grapes unmarketable and also hinder the photosynthesis process. This damage weakens the plants, making them more susceptible to other insects and disease-causing organisms. The amount of honeydew and the growth of sooty mold on honeydew blackens tree trunks and any surfaces that are beneath feeding SLF populations, covering automobiles, porches and outdoor equipment (Fig 5). This indirect damage makes SLF a nuisance pest in landscapes and to homeowners.



**Figure 5.** Heavy deposits of honeydew and some sooty mold at tree base.  
Lawrence Barringer, Pennsylvania Department of Agriculture, [Bugwood.org](http://Bugwood.org)

Significant damage, such as reduced starch concentration in vine roots and sugar in the fruit at harvest, reduced yield in the subsequent year and potential death of vines, has been reported from SLF extensively feeding on grapevines. SLF has been reported to spread almost 5 miles a year on its own. The biggest concern is the movement of the adults and egg masses. Having similar egg-laying behavior as the European spongy moth, *Lymantria dispar* L., adults have been seen flying into trucks and rail cars, and egg masses can potentially be laid on any outdoor object. With its wide host range, high reproductive rate and egg-laying behavior, SLF will likely become established in a much wider range in the United States. In China and Korea, it is a pest on many ornamental plants and trees and has impacted the grape industry. In the United States, SLF adults are impacting Pennsylvania's vineyards, and studies are being conducted to determine the effect of SLF on other important plants. High populations of the pest can move into vineyards from nearby woodlands in the late summer and fall. Heavy feeding during this period can severely stress plants (Fig 6).



**Figure 6.** SLF on apple. Erica Smyers, Penn State University

## MANAGEMENT

Management for the spread of SLF is of the utmost importance. The best strategy for controlling SLF outbreaks is to prevent them in the first place. With the spread of SLF due to human movement, quarantine zones have been established in areas where SLF is known to be established. Careful inspection for egg masses and other life stages should be made on many types of products stored outdoors before they are moved and shipped or before shipments are accepted. High-risk materials such as firewood should especially be inspected and certified as pest-free before shipping. Educational programs for the public on inspecting for SLF should be promoted. Certain products, such as firewood, should not be moved by the public anywhere in the state. All of these actions should be used to prevent the further spread of SLF.

Circle traps (Fig 7) and sticky bands have been utilized for monitoring SLF. A circle trap is made by attaching a metal mesh funnel to the tree trunk to direct SFL into the collection container or bag (Fig 7). Those SLF entering the collection container or bag are trapped inside or killed using an insecticide strip inside the container. The sticky trap is deployed by wrapping sticky tape around the tree trunk. However, sticky bands are not the best option due to unintended trapping of non - target organisms such as beneficial insects, lizards, small birds, etc.. Mechanical removal of SLF, particularly in the egg mass stage, has been recommended as a control option. Egg masses can be monitored using a lampshade trap (Fig 8). Reference the [construction of the lampshade trap](#) on the University of Massachusetts Amherst Center for Agriculture, Food, and the Environment site.



**Figure 7.** Circle trap for monitoring SLF.

Picture Credit: Cindy Bilbrey, Tennessee Department of Agriculture



**Figure 8.** Lampshade trap for monitoring SLF egg masses.

Picture Credit: Midhula Gireesh, University of Tennessee

Recent studies found that exclusion netting reduced SLF population by 99.8 percent in grapevines. Trained canines showed the ability to detect both new and 1-year-old egg masses with an accuracy of at least 90 percent. This method could be utilized to detect SLF by smell, specifically in places such as shipping ports and rail lines. Currently, no known natural enemies of SLF are thought to effectively reduce populations in the United States. Two naturally occurring fungal pathogens of insects, *Beauveria bassiana* and *Batkoa major*, have been found in isolated locations in the United States, where they have infected and killed some SLF. While strains of *B. bassiana* are sold as biopesticides that can be applied as needed in crop settings, more research is warranted to further optimize the use and formulations of *B. bassiana* against SLF.

Currently, an established infestation of SLF is managed through chemical control. In the states where SLF is established, products containing bifenthrin, beta-cyfluthrin and dinotefuran are found to be highly effective on both nymphs and adults and are used mainly in vineyards. Dinotefuran and imidacloprid have been reported to be highly effective for managing SLF on trees. These systemic insecticides can be applied in different ways such as drench, injection and bark spray (Dinotefuran). Tree of heaven has been utilized as a trap tree in eradication efforts.

With the trap tree technique, most of the tree of heaven trees in an infested area are cut down and the remaining uncut tree of heaven are treated with a systemic insecticide. Care should be taken to ensure that chemical controls are applied precisely to limit risk to non-target organisms, such as beneficial insects.

The Tennessee Department of Agriculture Plant Certification section along with USDA APHIS PPQ, TN Department of Agriculture Division of Forestry, University of Tennessee Extension and Tennessee State University Extension are actively working to manage SLF populations in Tennessee. Eradication efforts have been underway since the initial detection. Weekly efforts were made to survey all instars. Smaller populations were mechanically controlled, and large congregations of adults were chemically treated. Approximately 3,953 newly deposited egg masses and 2,570 old egg masses were destroyed in 2023. Additionally, Extension and outreach activities, such as presenting at industry and public meetings, responding to reports from the public and distributing SLF educational postcards and swag (stickers, temporary tattoos, drink coasters, and scraper cards), are creating awareness among the public.

If you encounter a SLF, PLEASE take a picture and complete the [“Report a Pest” form](#) on the Tennessee government site for Protect TN Forests. Smash egg masses or scrape them using a scraper card into a container with soapy water or hand sanitizer. Scraper cards look like credit cards and can be used to crush and remove egg masses. Each egg mass destroyed in the fall reduces next year’s population by 30-50 individuals. Each egg must be crushed when removed from its hiding place. Eggs can still hatch if scraped off a tree and left on the ground. Be sure to crush nymphs and adults. It is critical that we find and eliminate the SLF before this pest spreads further in Tennessee.

## ONLINE RESOURCES

NYSIPM Interactive Spotted Lanternfly Map - [lookerstudio.google.com/u/0/reporting/b0bae43d-c65f-4f88-bc9a-323f3189cd35/page/QUckCI](https://lookerstudio.google.com/u/0/reporting/b0bae43d-c65f-4f88-bc9a-323f3189cd35/page/QUckCI)

UMASS Construction Lampshade Trap - [umass.edu/agriculture-food-environment/sites/ag.umass.edu/files/pdf,doc,ppt/lampshade\\_trap\\_for\\_slf\\_egg\\_masses\\_lewis\\_2022.pdf](https://umass.edu/agriculture-food-environment/sites/ag.umass.edu/files/pdf,doc,ppt/lampshade_trap_for_slf_egg_masses_lewis_2022.pdf)

“Report a Pest” Form - [tn.gov/protecttnforests/resources/report-a-pest.html](https://tn.gov/protecttnforests/resources/report-a-pest.html)

Southern Spotted Lanternfly Working Group: [southernslf.org](https://southernslf.org)

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## PRECAUTIONARY STATEMENT

To protect people and the environment, pesticides should be used safely. This is everyone's responsibility, especially the user. Read and follow label directions carefully before you buy, mix, apply, store or dispose of a pesticide. According to laws regulating pesticides, they must be used only as directed by the label and registered for use in your state.

## DISCLAIMER

This publication contains pesticide recommendations that are subject to change at any time. The recommendations in this publication are provided only as a guide. It is always the pesticide applicator's responsibility, by law, to read and follow all current label directions for the specific pesticide being used. The label always takes precedence over the recommendations found in this publication. Use of trade or brand names in this publication is for clarity and information; it does not imply approval of the product to the exclusion of others that may be of similar, suitable composition, nor does it guarantee or warrant the standard of the product. The author(s), the University of Tennessee Institute of Agriculture and University of Tennessee Extension assume no liability resulting from the use of these recommendations.



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