

SPOTTED LANTERNFLY

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Classification and Description

The spotted lanternfly, *Lycorma delicatula* (White) (SLF) is a planthopper (Hemiptera: Fulgoridae) whose nymphs and adults feed on many host plants. This pest has a needlelike mouthpart that it uses to suck sap from branches and twigs. Adults (Figures 1 and 2) are approximately 1 inch to 1 5/8 inch long with light brown to gray forewings that have black spots centrally and tips exhibiting black dashes similar to a brick wall pattern. The hindwings have a red band closest to the body with black spots followed by a white band 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 instars nymphs (Figure 3) are black with white spots while the fourth instar nymphs (Figure 4) are red and black with white spots. Egg masses (or ootheca) (Figure 5) are usually laid on hosts and other fairly smooth surfaces. The egg masses are brown with a gray waxy covering and may contain up to 60 eggs. The waxy covering can weather and expose the eggs over time (Figure 6).



Figure 1. Adult SLF. Lawrence Barringer, Pennsylvania Department of Agriculture, BugGuide.net

Distribution, Hosts and Life History

SLF is native to China, India and Vietnam and has been introduced into Korea, Japan and Taiwan (Hua 2000, Han et al. 2008, Kim et al. 2013)



Figure 2. Adult SLF. Lawrence Barringer, Pennsylvania Department of Agriculture, Bugwood.org

It was first detected in the United States in Pennsylvania in September of 2014. Since arriving in the United States, SLF has expanded its range from Pennsylvania to nearby states such as Delaware, Maryland, New Jersey, Virginia and West Virginia (Barringer et al. 2015, Day 2018, Murillo 2018, and Frank 2019). Recently several other states have confirmed SLF as well, and up-to-date information can be accessed at nysipm.cornell.edu/environment/invasive-species-exotic-pests/spotted-lanternfly.



Figure 3. Early instar nymph. Seth Ausubel, BugGuide.net



Figure 4. Fourth instar nymph. Lawrence Barringer, Pennsylvania Department Agriculture, BugGuide.net

SLF has also been detected in Connecticut, Massachusetts, New York and as far away as California by inspectors searching planes for Japanese beetles (*Popillia japonica*, Rieger 2019). SLF is known to feed on more than 70 species of plants. Tree-of-heaven (*Ailanthus altissima* (Mill.) Swingle) is the preferred host while apple, grape, hops, maple, walnut, willow and stone fruits are just a few of the recorded hosts (Barringer et al. 2015, Dara et al. 2015). Adult female SLF begin to lay egg masses in September through November on host plants and other fairly smooth surfaces.



Figure 6. Weathered egg mass with exposed eggs. Emelie Swackhamer, Penn State University, Bugwood.org



Figure 5. Egg mass. Lawrence Barringer, Pennsylvania Department of Agriculture, Bugwood.org

Egg masses overwinter and the first instar nymphs begin emerging in May. Nymphs mature to the second and third instar stages in June and July and will reach the more colorful fourth instar in July. The adults emerge in July and feed in large numbers on host plants for the rest of the summer. Aggregation of adults peaks in September followed by mating and laying of egg masses.



Figure 7. SLF on apple. Erica Smyers, Penn State University



Figure 8. SLF on grape. Erica Smyers, Penn State University

Injury and Pest Status

Both the adults and nymphs of spotted lanternflies excrete a sugary substance known as honeydew. The honeydew is an ideal substrate for the growth of fungal mats of sooty mold (Figure 9) at the base of trees and on the foliage of the host plants (Han et al. 2008, Lee et al. 2009, and Park et al. 2009).



Figure 9. Heavy deposits of honeydew and some sooty mold at tree base. Lawrence Barringer, Pennsylvania Department of Agriculture, Bugwood.org

SLF does not feed directly on fruit; instead, sooty mold can make apples and grapes unmarketable and also hinder the photosynthesis process. This weakens the plants, making them more susceptible to other insects and disease. The amount of honeydew and sooty mold in the quarantine area can be so great it can be a nuisance, covering automobiles, porches and other outdoor equipment (NYSIPM 2019, Griffith & Gillett-Kaufman 2018, and Dara et al. 2015).

SLF has been reported to spread almost 5 miles a year on its own. The most concern is the movement of the adults and egg masses. Having similar egg laying behavior as the European gypsy moth (*Lymantria dispar dispar* L.), SLF can spread by normal human transportation methods. 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 (Dara et al. 2015, Griffith & Gillett-Kaufman 2018).

In China and Korea, it is a pest on many ornamental plants and trees and has impacted the grape industry.

SLF is currently impacting the grape industry in Pennsylvania. 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. Pennsylvania State University Extension Associate Heather Leach reported seeing damaged grapevines that failed to produce flowers the following spring while 2.5 acres of Pinot Noir attacked in the fall of 2017 were found completely dead by spring 2018 (Prengaman 2019). In Pennsylvania, current year feeding of established populations has caused 80-90 percent yield reductions while surviving vines fail to set fruit (Pfeiffer et al. 2019). Thirty to forty wine grape growers in the quarantined area of Eastern Pennsylvania experienced SLF damage in their vineyards in 2018 (Prengaman 2019).

As of December 2019, the expected economic damage due to SLF in the 14-county southeastern Pennsylvania quarantine zone is estimated to be \$50.1 million per year with a loss of 484 jobs (Harper et al. 2019).

Management

Management is of the utmost importance for stopping the spread of SLF. The best strategy for controlling SLF outbreaks is to prevent them in the first place. Since SLF spreads mostly via 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 general public on how to inspect for SLF should be promoted. Certain products, such as firewood, should not be moved by the general public anywhere in the state. All these actions should be used to prevent further spread of SLF.

Natural enemies of native planthoppers and other sucking insects in Pennsylvania have not been shown to control SLF effectively (Barringer et al. 2015). The introduction of natural enemies of SLF from the countries of its origin in Asia is being investigated.

Currently, the best method of controlling an established infestation is through chemical control. SLF has shown to be highly susceptible to broad-spectrum insecticides (Barringer et al. 2015). Tree-of-heaven trees have been used as trap trees in eradication efforts. 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.

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