

Survey for the invasive spotted lanternfly, *Lycorma delicatula* (White) (Hemiptera: Fulgoridae) on thirty tree species in southeastern Pennsylvania

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ABSTRACT

Brown sticky bands were used to survey for the invasive spotted lanternfly, *Lycorma delicatula* (White), on thirty tree species in southeastern Pennsylvania. Bands were serviced every two weeks from May to October. A total of 3,627 lanternflies were killed on the bands across twenty-five tree species. Spotted lanternflies preferred *Ailanthus altissima* to non-*Ailanthus* trees overall, but 1st–3rd instar nymphs were just as likely to frequent other tree species. Earlier instars were collected from a broader range of tree species than 4th instars or adults. These later stages were rarely captured on bands but were observed aggregating on *Ailanthus* and wild grapevine during the mating season.

INTRODUCTION

- The spotted lanternfly (SLF) is a new invasive planthopper in North America.
- First detected in September 2014 in Berks County, Pennsylvania¹.
- SLF is native to China, India, and Southeast Asia and has been introduced into Japan and South Korea¹.
- In South Korea, SLF is a univoltine pest with a broad host range including cultivated grape, stone fruits, and apples².
- Primary host for SLF is tree-of-heaven (*Ailanthus altissima*)².
- Entomologists with the Pennsylvania Department of Agriculture (PDA) have been monitoring SLF using brown sticky bands on the trunks of *A. altissima* since May 2015.
- We used brown sticky bands on thirty non-*Ailanthus* tree species to better understand the host range of SLF in eastern North America.



FIGS 1–3 . SLF on *Ailanthus altissima*: FIG 1. 2nd instar nymphs on shoots; FIG 2. 4th instar nymphs and an adult on trunk; FIG 3. Adult.

OBJECTIVES

- Determine the host range for SLF in Southeastern Pennsylvania
- Assess if host preference changes as SLF matures
- Determine if SLF load on non-*Ailanthus* trees is influenced by nearby *Ailanthus* trees

METHODS

- Four study sites in quarantine area that were positive for SLF in 2014
- Thirty tree species monitored from 15 May to 2 October
- Trees chosen for the study were within 10m from an edge and had a >6 in. DBH
- The distance each tree was from the nearest *Ailanthus* was measured
- Brown sticky bands were placed on the trunks of the trees and serviced every two weeks.
- The total number of SLF and life stage for each insect was recorded when bands were changed.

RESULTS

- Over 3,600 SLF killed on sticky bands
- Bands were effective for capturing 1st–3rd instars only
- 24 new North American tree species added to SLF host list (Table 1)
- SLF preference for *Ailanthus* confirmed (Fig 4)
- SLF persisted on *Ailanthus* 50 days after last observed on banded non-*Ailanthus* tree species
- 1st–3rd instars as likely to be on non-*Ailanthus* trees as *Ailanthus* (Fig 5)
- Few SLF adults were on non-*Ailanthus* trees (Aug–Nov); however, large adult congregations were observed on *Ailanthus* during this period
- Distance to nearest *Ailanthus* did not influence SLF load on non-*Ailanthus* trees (ANOVA not significant, $p=0.25$)

TABLE 1. North American tree species positive for SLF in our study. * = host trees from literature.

Scientific Name	Common Name
<i>Acer</i> – 4 spp.	Maple
<i>Ailanthus altissima</i>	Tree-of-heaven
<i>Amelanchier canadensis</i>	Serviceberry
<i>Betula lenta</i>	Black birch
<i>Betula papyrifera</i>	Paper birch
<i>Carya glabra</i>	Pignut hickory
<i>Carya ovata</i>	Shagbark hickory
<i>Cornus</i> *	Dogwood
<i>Fagus grandifolia</i>	Beech
<i>Fraxinus americana</i>	White ash
<i>Juglans nigra</i>	Black walnut
<i>Liriodendron tulipifera</i>	Tulip poplar
<i>Nyssa sylvatica</i>	Black gum
<i>Phellodendron amurense</i> *	Cork tree*
<i>Platanus occidentalis</i>	Sycamore
<i>Populus grandidentata</i>	Big-toothed aspen
<i>Prunus serotina</i>	Black cherry
<i>Quercus</i> – 3 spp.	Oak
<i>Salix</i> spp.	Willow
<i>Sassafras albidum</i>	Sassafras
<i>Syrax japonicus</i> *	Japanese snowbell*
<i>Tilia americana</i>	Linden
<i>Ulmus rubra</i>	Slippery elm
<i>Vitis</i> spp.	Grape

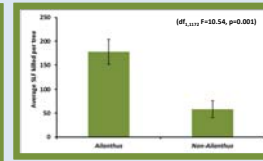


FIG 4. Average number of SLF captured on bands on *Ailanthus altissima* and all non-*Ailanthus* tree species in our study. Significant

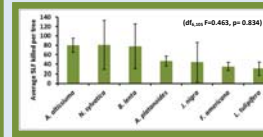


FIG 5. Average number of SLF captured on bands on *Ailanthus altissima* and six non-*Ailanthus* tree species. Not significant

TABLE 2. Average number of SLF present per tree for eight non-*Ailanthus* tree species.

Species	n	Mean SLF/Tree
<i>A. platanoides</i>	4	46.5
<i>A. saccharum</i>	15	16.667
<i>A. altissima</i>	69	80.145
<i>B. lenta</i>	14	77.857
<i>F. americana</i>	9	34.778
<i>J. nigra</i>	2	44.5
<i>L. tulipifera</i>	11	31.091
<i>N. sylvatica</i>	4	81

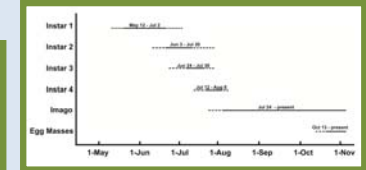


FIG 6. The emergence dates of SLF life stages. The bands were not effective after 30 July 2015; 4th instar, adult, and egg mass emergences were documented by observation.

CONCLUSION

- Immature SLF are broad generalists and have the potential to impact numerous tree species in North America
- Adult preference for *Ailanthus* allows for targeted management opportunities
- As the eradication plan calls for *Ailanthus* removal later this year, monitoring non-*Ailanthus* hosts should continue

SIGNIFICANCE

Results from this study will be presented to the PDA and USDA Technical Working Group on SLF during the development of the eradication plan for 2016.

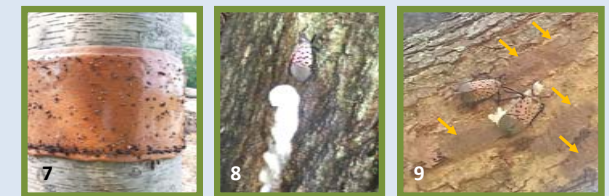


FIG 7. Brown sticky band on *Betula lenta* with 2nd instar SLF along bottom; FIG 8. Feeding damage on *Ailanthus altissima*; FIG 9. Egg laying on *Salix* sp. (cryptic egg masses indicated)

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