

Across The Eastern U.S.A.: A Comparative Literature Review of *Lycorma delicatula* Management Methods

DAVID CASCO¹, BRENDAN SHIU², EDDIE CASTILLO³

¹United Charter High School for the Humanities, ²Pelham Lab High School, ³Fordham University



Introduction

The Spotted Lanternfly (*Lycorma delicatula*), is an invasive insect that feeds on tree sap. Originating from Asia, *L. delicatula* has been found throughout the Eastern United States. The origin of its introduction started at Berks County, Pennsylvania in 2014 before spreading towards neighboring states (Zhang et al., 2023). Spotted lanternflies use oviposition, the biological act of an animal (namely insects and fish) laying eggs outside its body, a process involving specific behaviors to deposit eggs on a suitable substrate for development. Egg laying is problematic because their eggs are durable against cold temperatures (usually laying during the summer - fall) and are difficult to not only find but to destroy, being well blended with tree trunks. This literature review study examines different methods of elimination or containment of *L. delicatula* populations and egg masses, including biological, mechanical, and chemical methods.

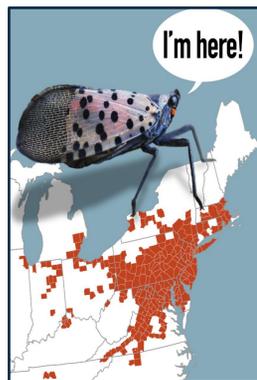


Fig 1: Map of Northeastern United States where many lanternflies were spotted.

(Image source: PA DPT of Agriculture /NY State)

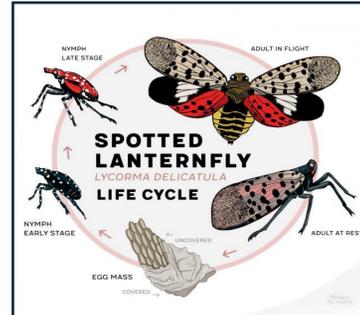


Fig 2: The lifecycle of a spotted lanternfly or *L. delicatula*.

(Image sourced from Mt. Cuba Center, The Life Cycle of the Spotted Lanternfly.)

Methodology

Literature database: Mendeley, a website used by researchers to find scientific articles and organize articles into groups, was used to compile literature sources. We also used Google Scholar as a secondary search engine for scientific articles.

Literature Review: A literature review on articles detailing the management of *Lycorma delicatula* was performed. A total of 22 articles about spotted lanternfly management in the United States were evaluated for this project, which involved both classifying and combining their categories of management into a data table. The methodology and results of each article were evaluated and classified as mechanical, biological, or chemical management. The amount of articles read during the literature review was 20 and most were mechanical and biological ways to manage lanternflies.

Management techniques:

- **Mechanical** is defined as the act of humans using traps, inventions, or stepping on *L. delicatula* to manage their population.
- **Biological** is defined as the act of animals, insects and fungi adapting to *L. delicatula* to act upon as a natural management technique.
- **Chemical** is defined as the act of using toxins/poisons to manage *L. delicatula* population. Ex: Pesticides.



Fig 3: An sample trap *L. delicatula*, showing a circle trunk trap (modified pecan weevil trap) used in field trapping assays, attached to the tree *Ailanthus altissima*.

(Image source: Environ Entomol, Volume 49, Issue 2, April 2020, Pages 269–276, <https://doi.org/10.1093/ee/nvz166>)

Abstract

Spotted lanternflies (*L. delicatula*) are an invasive species native to Asia predominantly seen in China, Vietnam and Japan. Because they have caused severe damage to flora all over North Eastern America, It is important that we study how we can stop their spread. We performed a literature review in order to determine which of three prominent management and monitoring techniques (Biological, Mechanical, Chemical) are most prevalent in articles published within the timeline of 2019–2025 in the United States. Over the course of the literature review a total of 20 articles were read. Of the 20 articles, 8 used mechanical methods, 8 used biological methods and 4 used chemical methods. This small amount of papers studying chemical techniques highlights its lack of research, creating gaps in knowledge of potential dangers and bycatch that may pose significant threats from chemical exposure that affect ecosystems and living conditions.

Research Questions & Hypotheses

Question: Which method of management for *L. delicatula* (Biological, Mechanical, or Chemical) would be the most prevalent in the literature review?

Hypothesis: Biological management techniques would be mentioned most often in the literature on spotted lanternfly management in the United States

Results & Figures

Management and Monitoring Techniques in Literature

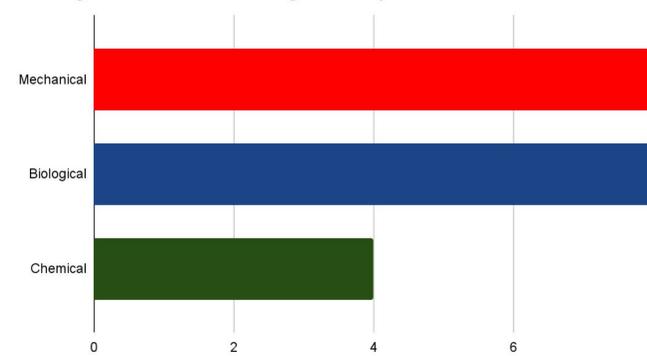


Fig 4: A bar graph showing the distribution of management techniques across different articles.

Number of articles read

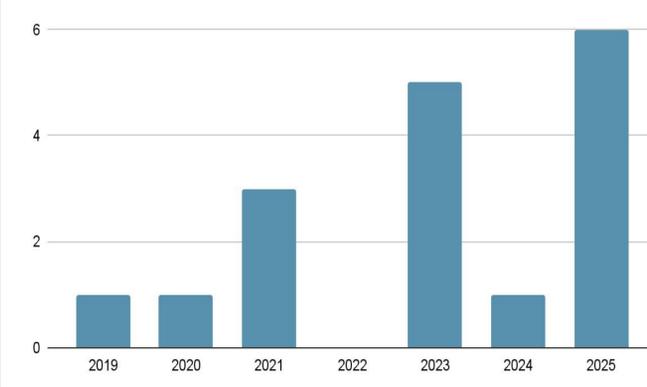


Fig 5: A bar graph displaying the distribution of articles read over the course of time published between 2019 to 2025.

Conclusion/Discussion

This literature review demonstrated a higher abundance of articles favoring both mechanical management techniques and biological management techniques as people preferred to use both physical and biological traps to capture and to control the spread of *L. delicatula*. This means that while other forms of management techniques were used during the course of this review, mechanical and biological seemed the most popular in terms of managing and monitoring *L. delicatula*.

This refutes the hypothesis as it stated that the most prevalent method of managing *L. delicatula* would be biological. Instead, the graph stated that mechanical and biological was the most discussed method of managing *L. delicatula* within literature published from 2019 to 2025.

In conclusion, a total of 20 sources were read and categorized into different ways of managing and monitoring *L. delicatula*: biological, mechanical, and chemical. These results are important, because they can be used to better manage and eradicate spotted lanternfly populations in the US. For example, these results can be used by future citizen scientists to know what way is most effective at managing *L. delicatula*.

Fig 6: QR Code leads to a complete source list of articles utilized for this Literature Review.



Acknowledgements

We would like to thank Fordham University, Pinkerton Foundation, Project True, Wildlife Conservation Society, Max Falkenberg, Eddie Castillo, Kerwyn Jean, Lowell Iporac, and Brian Saville for aiding us in crafting this project.

References

1. Spotted in The Sap: A Survey on *L. delicatula* Abundance & Fungal Activity in the Bronx Zoo. [Castillo et al., 2025](#)
2. Faal, H., Meier, L. R., Canlas, I. J., Murman, K., Wallace, M., Carrillo, D., & Cooperband, M. F. 2022. Volatiles from male honeydew excretions attract conspecific male spotted lanternflies, *Lycorma delicatula* Hemiptera: Fulgoridae). *Frontiers in Insect Science*, 2, 982965. <https://doi.org/10.3389/finsec.2022.982965>
3. Hajek, A. E., Everest, T. A., & Clifton, E. H. 2023. Accumulation of Fungal Pathogens Infecting the Invasive Spotted Lanternfly, *Lycorma delicatula*. *Insects*, 14(12), 912. <https://doi.org/10.3390/insects14120912>
4. Hoover, K., Iavorivska, L., Lavelly, E. K., Uyi, O., Walsh, B., Swackhamer, E., Johnson, A., & Eissenstat, D. M. 2023. Effects of long-term feeding by spotted lanternfly Hemiptera: Fulgoridae) on ecophysiology of common hardwood host trees. *Environmental Entomology*, 52(5), 888899. <https://doi.org/10.1093/ee/nvad084>
5. Keena, M. A., Hamilton, G., & Kreitman, D. 2023. The potential climatic range of spotted lanternfly may be broader than previously predicted. *Frontiers in Insect Science*, 3. <https://doi.org/10.3389/finsec.2023.1092189>
6. Zhang, Y., Bao, K., Xin, B., Cao, L., Wei, K., Dang, Y., Yang, Z., Lv, Z., & Wang, X. 2023. The biology and management of the invasive pest spotted lanternfly, *Lycorma delicatula* White Hemiptera: Fulgoridae). *Journal of Plant Diseases and Protection*, 130(6), 11551174. <https://doi.org/10.1007/s4134802300794-w> Tekieli, Stan. 2022. *Trees of New York Field Guide Tree Identification Guides*)