Improving the Early Detection and Monitoring of the Invasive Spotted Lanternfly (*Lycorma delicatula*) in Massachusetts

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Background:

The Spotted Lanternfly (*Lycorma delicatula*) (SLF) is an invasive planthopper native to China, India, and Vietnam. It was first detected in the US in Pennsylvania in 2014[1]. Though its preferred host is Tree of Heaven (*Ailanthus altissima*), it readily feeds on over 100 species of trees[2], making it a prolific threat to agriculture, commercial horticulture, and our native ecosystems.

Introduction:

When attempting to combat an invasive species, it is necessary to know its range and effective attractants. SLF is known to be established in Pennsylvania, and recently in parts of Connecticut and New York, but reported sightings in Massachusetts indicate that its range may be expanding further.

This project seeks to investigate whether the SLF has established populations in Western Massachusetts, as well as compare newly developed lure technology to existing lures with the goal of increasing the likelihood of early detection in expanding locations of the SLF's introduced range.

Fig. 1: SLF Life Stages

Fig. 2: Amanda and I setting up a circle trap

Methods:

Stands of *Ailanthus* trees were scouted throughout the Pioneer Valley area as potential sites to place traps for SLF. 13 sets of 3 traps each were set up at the sites indicated in Figure 8.

In each repetition of traps, a putty-like substance known as SPLAT (Specialized Pheromone and Lure Application Technology), which contains a semiochemical newly developed by the Forest Pest Methods Laboratory (USDA-APHIS-PPQ-CPHST), is applied to tree A in 5 columns of 5, 3-gram dollops. A packet containing a plant volatile, methyl salicylate, the current lure being used widely to detect SLF, is attached to the trap on tree B. Tree C, the control, is not baited with a lure (trap only).

The SPLAT treatment is replaced every other week and the trap bags are replaced weekly by lab technicians. The bycatch is counted, identified to Order, and preserved in tubes of ethanol. If a spotted lanternfly life stage is detected, University, state, and federal cooperators would be immediately notified.

Fig. 3: Treatment A (SPLAT)

Fig. 4: Treatment B (methyl salicylate)

Fig. 5: Treatment C (control)

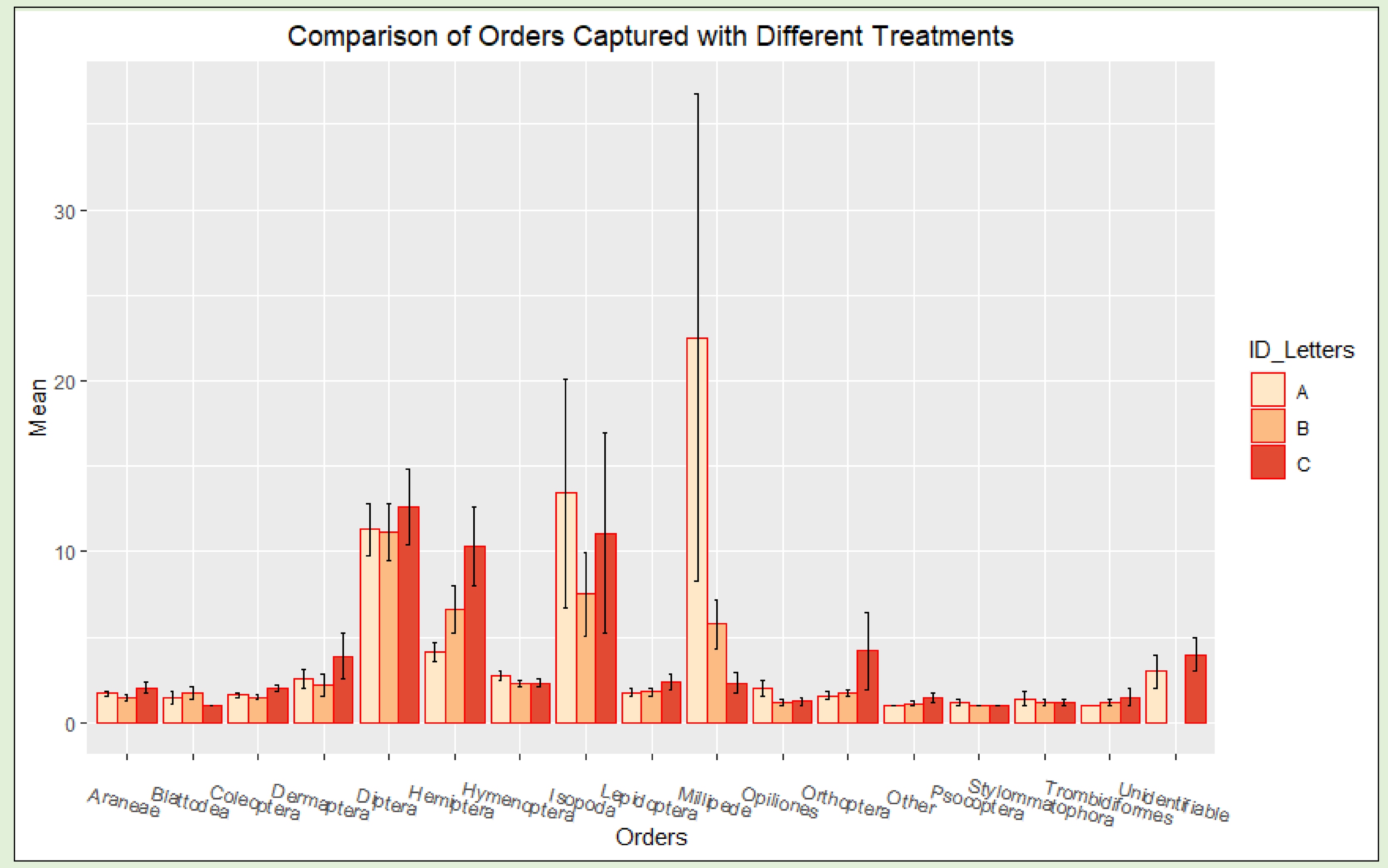

Fig. 6: Means of Orders Captured by Each Treatment

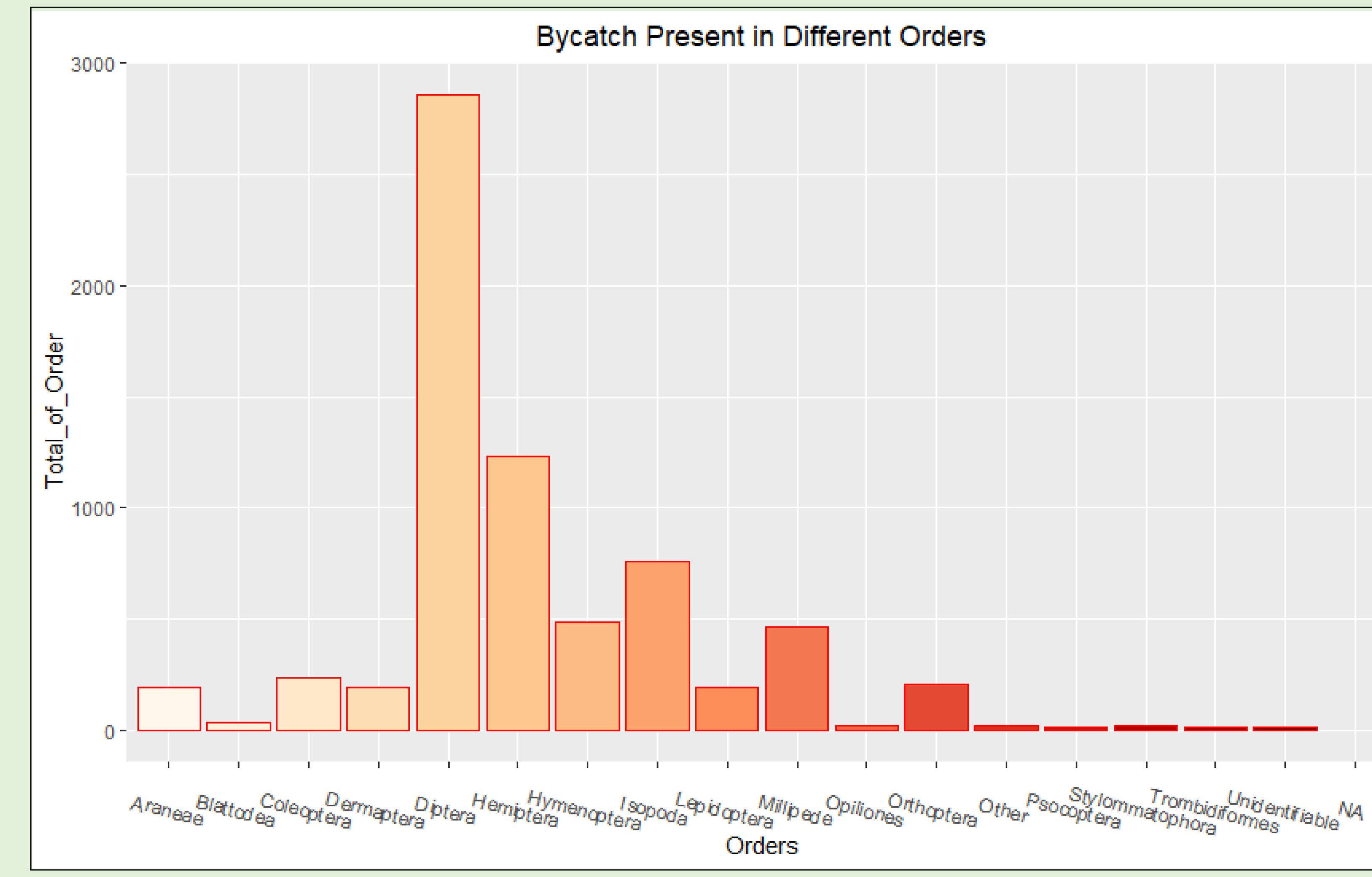

Fig. 7: Total Bycatch Across All Treatments by Order

Results:

No SLF have been detected by the Elkinton Lab at any of our trapping locations. As indicated in Figure 7, the traps accumulated a variety of bycatch, or non-target insects and their relatives collected in the traps.

Of the Orders documented, Diptera (the true flies) were the most frequently captured. Hemiptera (true bugs; the Order to which the SLF belongs) were the second most frequently captured, followed by Isopoda (pill bugs, sowbugs, and their relatives). Hemiptera were most frequently captured by the control traps and millipedes were most frequently captured by SPLAT treated trees, as indicated in Figure 6. Isopoda were least frequently captured by the methyl salicylate treated traps, and Orthoptera were most frequently captured in the control traps.

Conclusions:

Given that no *L. delicatula* were captured in this study, it can not be confirmed that *L. delicatula* has established populations in Western Massachusetts. Additionally, whether the semiochemical SPLAT is a more effective attractant for *L. delicatula* than methyl salicylate or a control remains unknown, as no data was collected that would allow for analysis of this hypothesis. It should be noted that swarms of midges tended to get trapped as a group, which may account for the higher numbers of Diptera captured than any other order. There are apparent treatment preferences in many of the Orders, though further statistical analysis would need to be performed to confirm the statistical significance of these trends and is planned for the future.

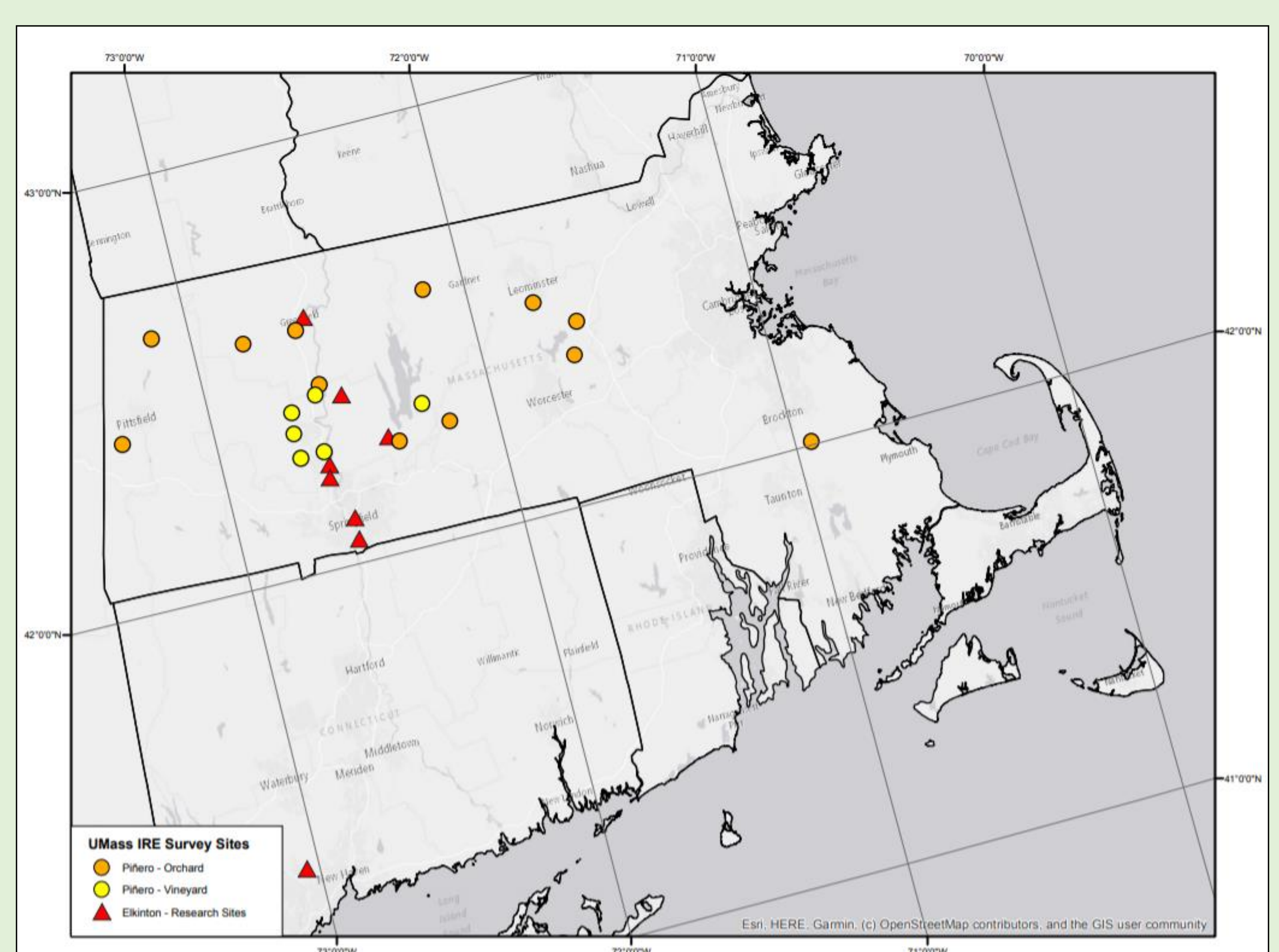

Fig. 8: Map of SLF trap sites. Elkinton Lab sites are red triangles.

Implications for Future Projects:

Though no SLF were trapped during this study, the methods could be replicated in a location where SLF are known to have established populations. A future study in an invaded location could help determine whether the SPLAT treatment is more, less, or equally effective to methyl salicylate or the control.

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United States Department of Agriculture
National Institute of Food and Agriculture

References: Fig. 1. "4 images of the spotted lanternfly in different stages." *NPS*, April 22, 2021. URL https://www.nps.gov/articles/000/spotted-lanternfly.htm. Fig. 2. Tawny Simisky. "Amanda Halperin and Caroline Schelleng Setting Up a Circle Trap to Monitor for Spotted Lanternfly in Hampshire County, MA." *Umass.edu*, July 23, 2021. URL https://ag.umass.edu/landscape/news/monitoring-for-spotted-lanternfly-in-Massachusetts. Fig. 8: Jeremy Andersen, 2021. **[1]** Murman, Kelly, et al. 2020. Environ. Entomol. 49, 1270-1281. **[2]** Barringer, Lawrence, et al. 2020. Environ. Entomol. 49, 999-1011.