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SECTION 1:

Project title: Evaluating Visual Cues to design a Trap-and-Kill Device to Control Spotted Lanternfly

Principal Investigator with contact info: Carlos Andres Antolinez, Hudson Valley Research Lab, Cornell University, Highland NY. Email: caa245@cornell.edu Phone 951-462-8397

Co-PI Collaborators with contact info: Co-PI: Greg Loeb, Department of Entomology, Cornell AgriTech, Cornell University, Geneva, NY. Email: gme1@cornell.edu; Phone: 315-787-2345. Collaborator: Jeremy Schuster, Viticulture Extension Specialist, Cornell Cooperative Extension. Email: jds544@cornell.edu Phone: 845-372-4780

New Research ☒ **Continued Research** ☐

Amount Funded **$** 27,023

SECTION 2:

Project Summary Impact Statement:

The spotted lanternfly (*Lycorma delicatula*, SLF) is an invasive pest causing significant economic and ecological damage in vineyards and other agricultural systems in New York. This project evaluated the role of visual cues in SLF behavior to inform the development of an effective trap-and-kill device. Laboratory assays revealed that SLF adults avoided red and green color sticky cards but showed no strong preference for other tested colors and were significantly attracted to UVA-light–supplemented sticky cards. Field trials with multimodal pole traps demonstrated that UVA-light traps numerically captured more SLF when compared to non-illuminated traps, although differences were not statistically significant. These findings suggest SLF provide critical insights into SLF visual behavior, supporting the design of improved, targeted trap-and-kill strategies. Ultimately, this research will advance environmentally sustainable management of SLF in New York vineyards, reducing pest populations while minimizing non-target impacts.

Objectives:

1. To evaluate the attraction of SLF to different visual stimuli in laboratory conditions

1.1 Evaluation of SLF preference to sticky cards of different colors. We will evaluate the preference of the SLF for six colors (yellow, blue, green, black, white, and purple) through behavioral assays conducted under controlled conditions.

1.2 Evaluation of SLF to sticky cards supplemented with light sources. We will evaluate the

attraction of the SLF to different light wavelengths. The study will include lights within the spectrum of ultraviolet (UV-A), white, violet, and blue.

2. To assess the effectiveness of multimodal traps in attracting and killing SLF under field conditions. We will test the attraction of SLF to vertical traps that combine visual (colors or lights) in a field setting.

Materials & Methods:

Objective 1. Evaluate the attraction of SLF to visual stimuli.

Three cubic cage arenas (1 × 1 × 1 m) were constructed using a wooden frame and mesh enclosure. The upper portion consisted of a cube assembled from twelve 1-m-long wooden beams (3 × 3 in), with all sides enclosed in mesh screening except for the bottom face. The base consisted of a 1 × 1 m plywood platform bordered by 10-cm-high plywood side panels, allowing the upper mesh structure to rest securely on the base.

Within each cage, two vertical wooden poles (60 cm height; 3 × 3 cm cross-section) were installed at the center. Each pole was supported by a square base constructed from four 9-cm-long wooden pieces. The poles were positioned 30 cm apart.

1.1 Evaluation of SLF preference to sticky cards of different colors: A dual-choice assay was conducted within each cage arena. A clear sticky card (control) was attached to the top of one pole, while a colored sticky card (treatment) was attached to the top of the second pole. Twenty adult SLF were released at the center of the cage, and the number of individuals captured on each card was recorded at 6, and 24 h after release. The color cards evaluated were yellow, blue, green, black, white, and violet. A minimum of five replicates was conducted for each color treatment.

1.2 Evaluation of sticky cards with light sources: In a separate experiment a second dual choice assay was established with a clear sticky card supplemented with a led light vs a card with no light. SLF preference was evaluated for lights in the spectrum of purple, blue, white and UV.

Objective 2. Assess the effectiveness of multimodal traps in field conditions.

Pole traps consisted of 16-ft wooden poles topped with a framed structure wrapped in deltamethrin-impregnated netting, with a catchment below to collect adult SLF dislodged from the net. All frame components were 2 × 2 in lumber. The top frame included two parallel 8-in pieces connected by three 4-in crosspieces, with 14-in vertical supports at each end and two additional 8-in crosspieces 6 in from the base for stability. The frame was wrapped in netting with a 2.5-in overhang and mounted atop the pole, which was also netted down to 6 ft above ground. Two types of traps were used: with lights and without lights. Lighted traps included a UV-A light mounted in the frame, powered by a 12-Ah battery charged via a solar panel, with a timer set from 16:00 to 04:00 h. Traps were deployed along the borders of three vineyards with high SLF populations from September to November, secured to the trellis system with lag bolts, and inspected weekly to count and remove SLF from the catchment and netting.

Results/Outcomes/Next Steps:

Objective 1.
1.1 SLF preference to sticky cards of different colors: There were no differences between the captures in clear sticky cards when compared to yellow, purple, black and blue (Figure 1). However, clear sticky card captures were significantly higher when compared to green and red captures, so interestingly the data suggests the insects avoid red and green.

1.2 Evaluation of sticky cards with light sources SLF captures were significantly higher in traps supplemented with UV light compared to non-illuminated traps (Figure 2d), whereas no significant differences were observed for other lights colors (Figure 2abc).

Objective 2.
There were no statistically significant differences in the number of adult SLF captured between traps with and without lights at any of the three sampling sites (Figure 3a–c). However, UV-light–supplemented traps captured numerically more SLF overall (85.9 insects per trap), with approximately 46% more insects than non-illuminated traps (58.3 insects per trap) (Figure 4).

Technology Transfer Plan:
Results will be presented to growers at the Geneva Field Day on July 30, 2026, at Cornell AgriTech. While the findings do not yet yield a ready-to-use field solution, they suggest that UV-A light is a promising attractant. Future studies should test higher-intensity lights, as the 60-watt bulbs used may limit attractiveness. This work lays the groundwork for further elucidation of SLF visual preferences in field conditions, guiding the development of improved trap-and-kill devices.

Attachments: Figure 1, Figure 2, Figure 3, Figure 4

SECTION 3:

Project summary and objectives:
We evaluated the preference of SLF to different colors (yellow, blue, green, black, white, and purple) and different light spectrums (UV-A, white, violet, and blue) as a tool to develop attract and kill devices to control SLF in the field. We observed adults avoided red and green colors and were attracted by UV-A lights. Further studies should evaluate the effect of light intensity on the attraction of SLF to see if more attractive devices could be developed.

Importance of research to the NY wine industry:
Spotted lanternfly (SLF) is an emerging threat to New York vineyards, capable of damaging grapevines and reducing yields. Our research provides the first experimental evidence that adult SLF avoid red and green colors in laboratory assays and are attracted to UV-A light in both laboratory and field settings. Although UV-light traps did not produce statistically significant differences in the field, they numerically captured approximately twice as many SLF as non-illuminated traps, demonstrating their potential for future management. These findings provide a foundation for developing targeted, sustainable trap-and-kill strategies to protect vineyard productivity and reduce reliance on broad-spectrum insecticides.

Project Results/next steps:
Laboratory assays indicate that adult SLF avoid red and green colors but are strongly attracted to UV-A light, whereas other tested colors and light spectra had limited effects. Field trials with

multimodal pole traps showed that UV-A–supplemented traps numerically captured approximately twice as many SLF as non-illuminated traps, although these differences were not statistically significant. These results suggest that visual cues, particularly UV-A light, can be leveraged to enhance trap effectiveness. However, for the development of an effective trap-and-kill device, the number of insects killed will need to be substantially improved, as the trap design tested captured only a small fraction of the overall SLF population in the field. Next steps include testing higher-intensity UV-A lights, evaluating additional light spectra and trap configurations, and optimizing trap placement to maximize SLF capture in vineyards.

Supporting attachments: (Choose a maximum of 1 supporting figure or table to demonstrate results if desired)

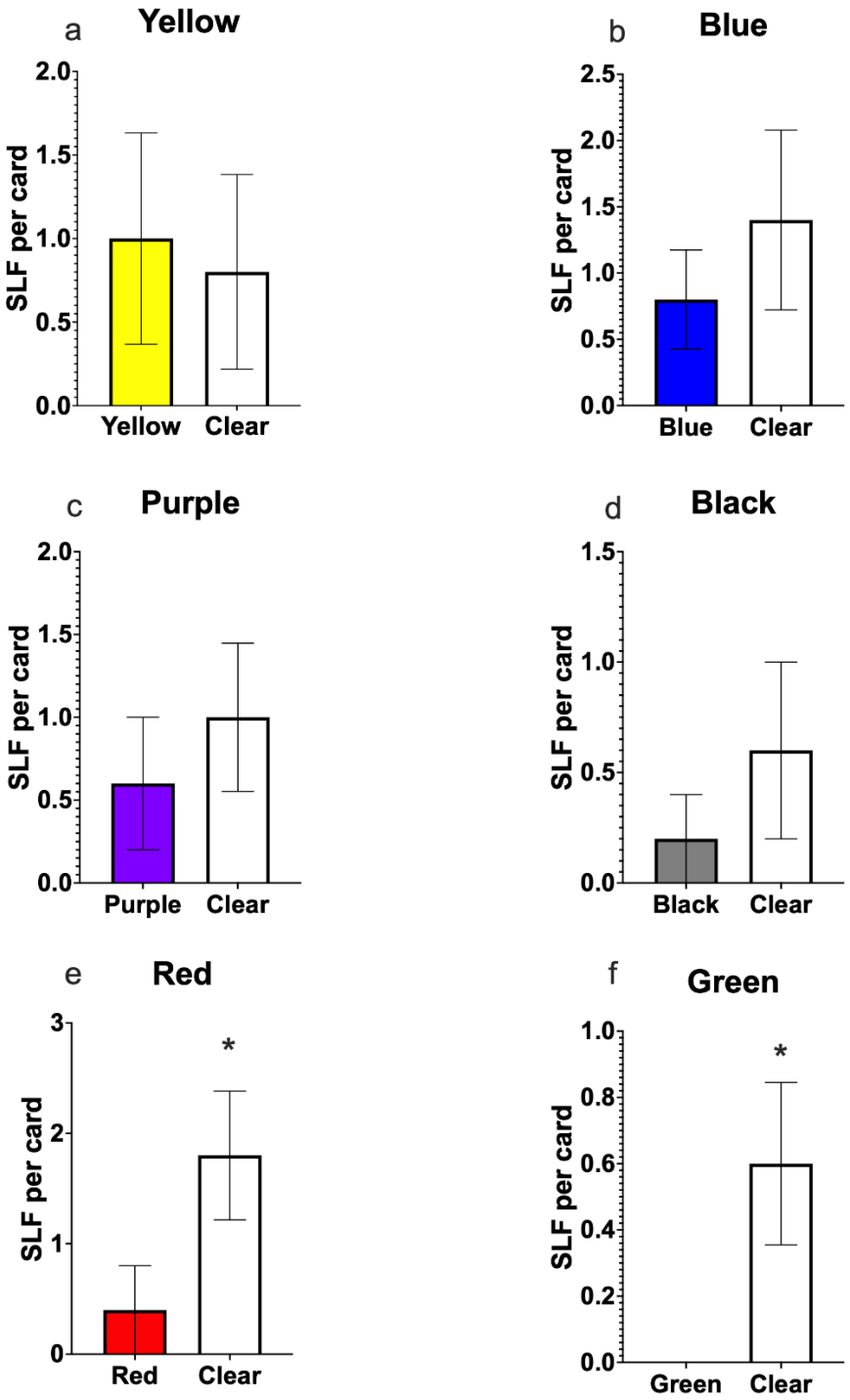

Figure 1. Comparison of adult spotted lanternfly (SLF) captures in colored versus clear sticky cards across six dual-choice assays. Bar graphs show captures for yellow (a), blue (b), purple (c), black (d), red (e), and green (f) sticky cards compared to clear controls. Each panel represents a separate color comparison, with bars indicating mean (± SE) SLF captures. Asterisks (*) denote statistically significant differences between colored and clear sticky cards within each comparison according to Mann-Whitney U test.

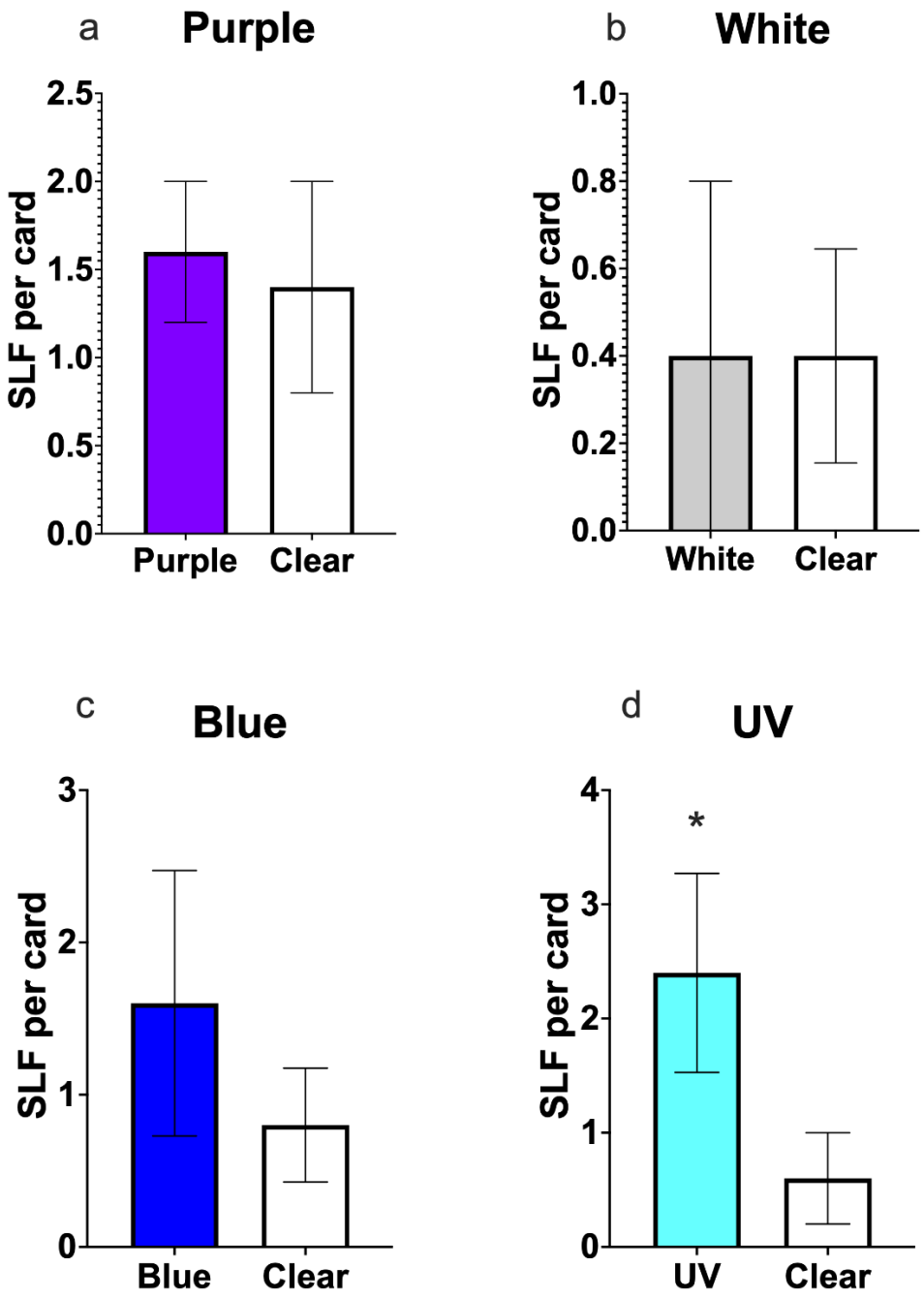

Figure 2. Comparison of adult spotted lanternfly (SLF) captures in sticky cards with and without led light across four dual-choice assays. Bar graphs show captures for purple (a), white (b), blue (c), and UV-A light (d) treatments compared to non-illuminated controls. Each panel represents a separate light comparison, with bars indicating mean (± SE) SLF captures. Asterisks (*) denote statistically significant differences between illuminated and non-illuminated sticky cards within each comparison.

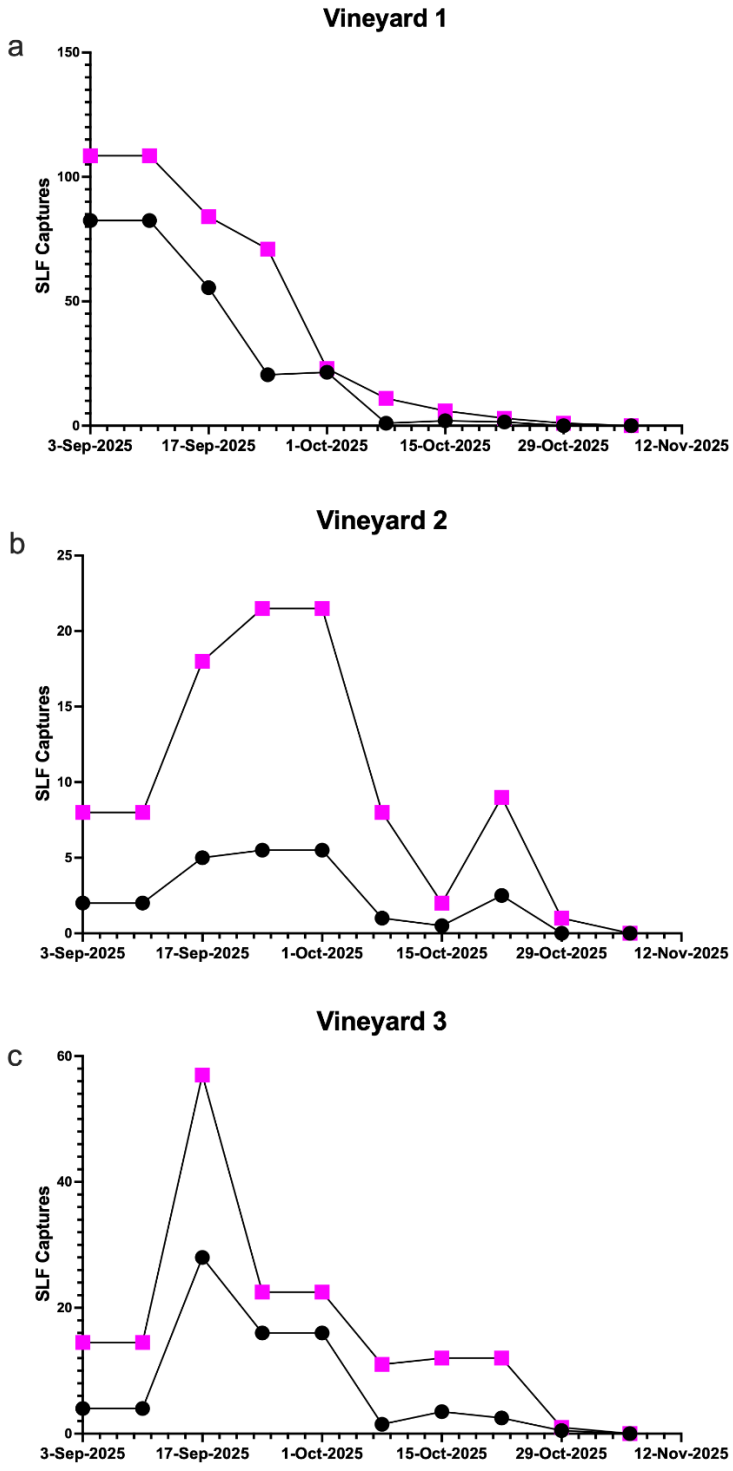

Figure 3. Temporal dynamics of adult spotted lanternfly (SLF) captures in pole traps with and without UV-A light across three vineyard sites. Line graphs show SLF captures over time for traps equipped with UV-A light (violet squares) and non-illuminated traps (Black circles). Panels (a–c) represent data from three different vineyards. Points indicate mean SLF captures per sampling date.

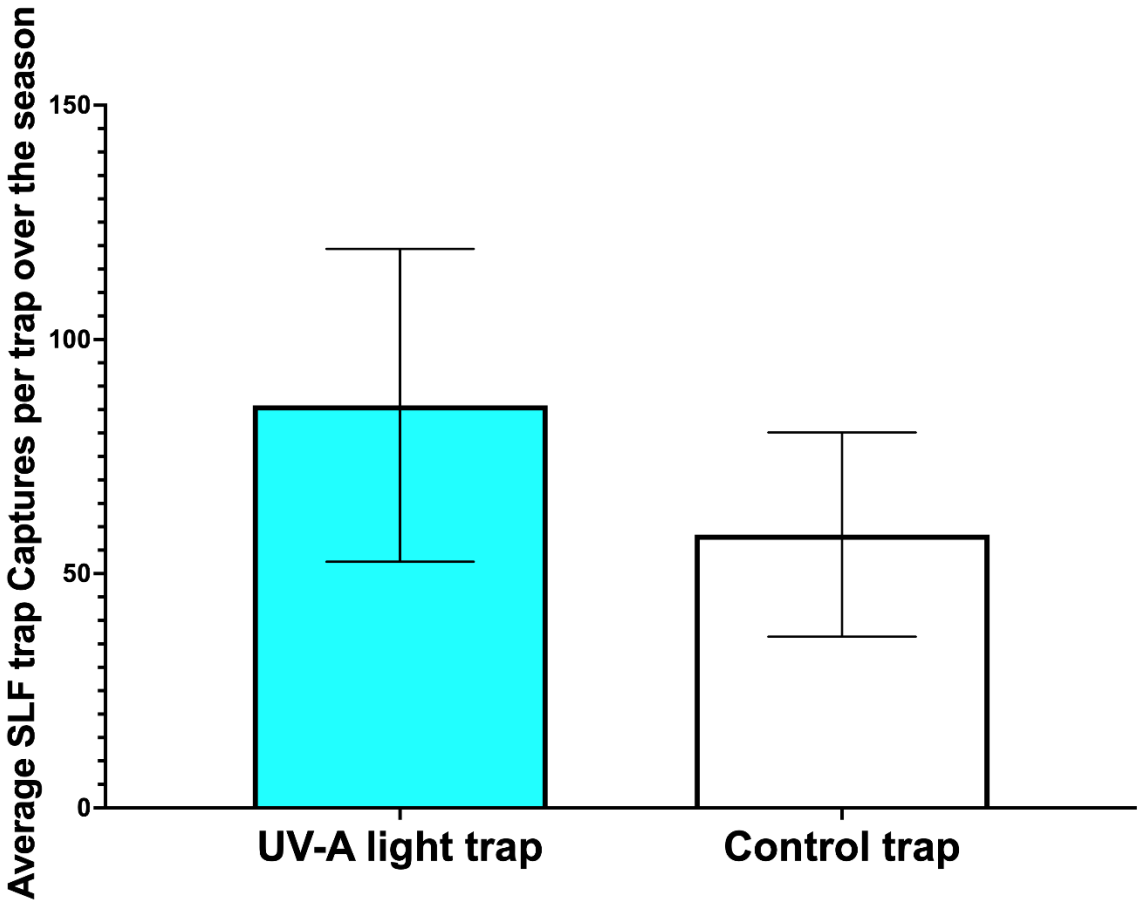

Figure 4. Seasonal average captures of adult spotted lanternfly (SLF) in UV-A light–supplemented versus non-illuminated control traps. Traps were deployed in three vineyards, with both light and control traps at each site. Values represent the mean (± SE) of total SLF captures across all vineyards for the entire sampling period.