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DEVELOPING TRAPS FOR THE SPOTTED LANTERNFLY

Joseph A. Francese[1], Miriam F. Cooperband[1], Everett G. Booth[1], Sarah M. Devine[1,2], Kelly M. Murman[1,3], Stefani L. Cannon[1,3], and Matthew S. Wallace[3]

[1] USDA APHIS PPQ S&T, Otis Laboratory, 1398 West Truck Road. Buzzards Bay, MA 02542
[2]Xavier University, Department of Biology, 3800 Victory Parkway, Cincinnati, OH 45207
[3]East Stroudsburg University, Department of Biological Sciences, 200 Prospect Street, East Stroudsburg, PA 18301

ABSTRACT

The spotted lanternfly (SLF), *Lycorma delicatula*, is a phloem-feeding fulgorid generalist from China that was recently discovered in the United States. It is a serious pest of grapes and cultivated tree crops, and has been documented causing branch dieback on walnut and killing cultivated grape and hops plants. Trapping technology so far has been based primarily on sticky bands wrapped around tree trunks, usually on their primary host, *Ailanthus altissima*. These bands are messy and need to be replaced often, as they become covered in both target and non-target insects and debris. While relatively effective at capturing first and second instar nymphs, they have shown limitations in their ability to capture later nymphal stages and adults which demonstrate a tendency to avoid walking on the sticky surface. Manufacturers can also change their glue formulations without notice, potentially causing possible changes in insect capture rates. Vertebrate by-catch when using strong glues has been problematic as well. Therefore, trap technology specifically designed with SLF behavior in mind in order to improve trap efficacy is desperately needed. Our goal is to design novel traps and redesign and improve upon commercially available traps in order to optimize trap design and technology. In addition, we hope to move away from single use sticky based traps, if possible, and design traps that capture more late stage SLF, as well as fewer non-targets including vertebrates.

Prior to 2018, sticky bands were used to monitor for SLF populations. In 2018, a new trapping system, BugBarrier was tested. This trap is designed to prevent insects from walking over the glue-coated material as they will either be directed across fiber batting and onto the sticky material, or, because the glue faces inward, caught in the glue on their dorsum or wings. Following testing, more SLF nymphs and adults were captured, and in low density sites more detections occurred, on BugBarrier bands than on Webcote bands.

Circle trunk traps, a non-sticky trap to exploit the walking behavior of SLF, were modified from pecan weevil traps. Pecan weevil trap collection cups were replaced with a 1.9 L screw-top plastic jar (Lance et al. 2013). A pesticide strip was placed inside the collection container to knock down and kill the captured SLF. The opening of the trap was also expanded from 0.6 cm to 1.5 cm. These traps were then compared with BugBarrier bands, with a tree rotation halfway through the trapping period so that all trees tested both trap types. More late instar nymphs and early adults as well as mid adults, and late adults SLF were caught in circle trunk traps than on BugBarrier bands. At later periods in the year, the collection jars on some traps filled up over the course of a two week period (Francese et al. 2020).

Based on results from 2018, circle trunk traps were commercially produced and purchased by the SLF program for use in 2019. An assay was conducted in 2019 to compare circle trunk traps fitted with jars with circle trunk traps fitted with a gusseted plastic bag. The bag trap would be a potential improvement over the jar trap as it would allow the user to easily replace the full bag with an empty one, and transfer the full bag to the lab or office for sorting. To produce the circle trunk bag trap, the end of the original pecan weevil trap cup is removed, and a "tongue" created from acetate sheeting was glued to the inside of the cup. The tongue assisted in keeping the bag from collapsing so that the opening was not obstructed as the bag filled.

Traps were placed on pairs of *A. altissima* trees in the field on 19 June, and were then checked and rotated to the opposite tree in the pair, to reduce tree effects, every 3 weeks until 21 October. All SLF were returned to the lab, and sorted by developmental stage, and adults were sexed. All SLF collected have been summed over the entire field season. A total of 106,321 individual SLF were caught over the trapping period. Significantly more total nymphs and approximately 4x more adults were caught in circle trunk traps fitted with bags than with jars. More 1st and 2nd instar nymphs were also caught in bags than in jars.

The increased trap catch in the bag over the jar may be due to several factors. While the bag is periodically changed throughout the season, the jar is reused and can become covered in honeydew and sooty mold, so light entering the jar may be reduced overtime and interfere with positive phototaxis. Due to the weight of the jar, the jar must be fastened to the tree to reduce issues from the entry becoming obstructed from accumulations of dead SLF. However, the bag trap is held open by the "tongue which prevents the bag from closing on itself. Also, the flexible nature of the bag over the rigid jar allows the insects collected to fall down into the bag rather than to die obstructing the entry port.

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