SPOTTED LANTERNFLY, A NEW INVASIVE INSECT IN VINEYARDS: IS IT A THREAT TO GRAPEVINES?

Authors: Michela CENTINARI[1 *], Andew HARNER[1], Taran ROWELS[1], Claudia SCHIMDT[2], Flor ACEVEDO[3], Cristina ROSA[4]

[1]*Department of Plant Science,* Penn State University, University Park, PA 16802, USA
[2]*Department of Agricultural Economics, Sociology, and Education* , Penn State University, University Park, PA 16802, USA
[2]*Department of Entomology,* Penn State University, University Park, PA 16802, USA
[2]*Department of PPEM,* Penn State University, University Park, PA 16802, USA

*Corresponding author: mzc22@psu.edu

Abstract:

Context and purpose of the study – The spotted lanternfly (SLF; Lycorma delicatula) is a phloem-feeding polyphagous insect invasive to the Eastern U.S.. Since its first detection in Pennsylvania (U.S.) in 2014, large infestations and economic damage (e.g., decreased yield, vine decline, greater pesticide use) have been reported in an increasing number of vineyards, threatening the sustainability and growth of the wine industry in infested regions. Our team has been investigating the impacts of SLF phloem-feeding on physiological processes, fruit production, juice, and wine composition of different grape cultivars, and also evaluated if the SLF can transmit important grapevine pathogens. In addition, we are working closely with stakeholders to better enumerate the economic damage caused by this pest. These findings will provide relevant information to grape and wine producers to help identify action thresholds and develop a more targeted integrated pest management program.

Material and methods – Experiments have been conducted with field- and pot-grown grapevines within the quarantine area over four growing seasons. Field-grown Cabernet Franc, Chardonnay, Riesling, and Noiret vines were exposed for approximately a month to a range of SLF (nymphs or adults) population densities, and effects on gas-exchange, resource allocations, sap flow, wine growth, fruit production and composition were monitored. In 2022, potted Cabernet franc were pulsed with ^{13}C CO_2 to determine if and how SLF modifies carbon partitioning amongst major sink organs. Pathogen-transmission trials were conducted in a quarantine facility for major pathogens such as North American grapevine yellows (NAGY), *Xylella fastidiosa*, and Grapevine red blotch virus. Lastly, in 2022 we surveyed grape growers and winery owners in the Eastern U.S. to gain more information about the economic impacts and producer perception of this invasive pest.

Results – Collectively, our results indicate that prolonged phloem-feeding by high SLF adult populations can significantly affect grapevine resource allocation, mainly carbon dynamics in above- and below-ground woody tissues and fruit. In some extreme cases, this can lead to resource starvation and affect plant growth and health the following year. Preliminary work conducted by our group suggests that SLF transmits NAGY with a low transmission rate, and we are conducting more experiments to measure the exact rate. Results from our grower survey indicated that growers perceive SLF as a threat to the grape and wine industry and that economic damage from SLF depends on many vineyard-specific factors and other biotic and abiotic stressors.

Keywords: Grapevine, invasive pest, carbon dynamics, pathogen