

Vienna 2019 Abstract Submission

Title

Spotted Lantern Fly: A Potentially Devastating Invasive Species Affecting Wine Grapes

I want to submit an abstract for:

Conference Presentation

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Keywords

invasive species, spotted lanternfly, economic impact, wine grape production

Research Question

What is the economic impact of a newly discovered invasive species on the economic viability of wine grape production?

Methods

Evaluation of insect management and yield records from wine grape growers in southeastern Pennsylvania (USA)

Results

The spotted lanternfly has the potential to be a devastating pest in wine grapes in the northeastern United States and potentially in North America.

Abstract

Spotted lanternfly (SLF; *Lycorma delicatula*), an invasive insect species first discovered in Pennsylvania in 2014 could have a potentially devastating impact on North American wine grape growers. SLF is a planthopper native to China, India, and southeast Asia. Efforts to quarantine the insect have probably slowed its spread, but it is now in 13 counties in Pennsylvania. It has also been found in New Jersey (with 3 counties under quarantine), Delaware, New York, Connecticut, and Virginia. The lack of native predators has resulted in an explosion of SLF numbers in the past three years.

Tree-of-heaven, an invasive plant that is also from China and southeast Asia, is a preferred host for SLF, but SLF also feeds voraciously on grapevines (wild and cultivated), tree fruit, and various hardwood trees. Eggs are laid in

masses on any solid surface (trees, posts, stones, buildings, etc.) in the Fall. Their egg laying behavior is of particular concern for potential spread of SLF because they are known to also lay eggs on cars, trucks, trailers, and rail cars. They hatch in the spring and go through four nymphal instars (immature growth stages), producing one generation per year in Pennsylvania. Adults emerge in mid- to late July and die with the onset of winter. Both nymphs and adults are feeding on grapevine.

SLF is a phloem feeder, similar to leafhoppers, aphids, and other pests with piercing-sucking mouth parts. SLF feeds on the vine trunk, shoots, and leaves of wine grapes and can feed through bird netting. SLF excretes large amounts of honeydew, which can cause sooty mold outbreaks on the leaves and fruit. Because honeydew attracts yellow jackets (*Vespula maculifrons*) and other wasps, this also poses a stinging hazard for agricultural workers harvesting ripe fruit in the vineyard. SLF is also a major nuisance pest for homeowners and other landowners because the sticky honeydew and subsequent growth of sooty mold greatly diminishes outside recreational values and uses.

In 2017, the owners of a heavily affected winery and grape/tree fruit orchard described an almost 90% loss in grape tonnage and a corresponding loss in fruit quality of \$400,000, despite several insecticide applications. In early 2018, additional growers reported vines that had failed to fruit or even died due to large numbers of SLF feeding in the preceding year. Of particular concern for both growers and researchers is the effect that heavy SLF feeding will have on the winter hardiness, disease susceptibility, and long-term viability of vines and trees. SLF threatens grape production, which is valued at over \$113 million in the northeastern United States alone (USDA-NASS, 2017). Should SLF invade other states or counties with larger wine grape industries, the economic impact could be staggering. To get a preliminary assessment of the economic impact of SLF on wine grapes, spray records and yield data were collected from operators of five Pennsylvania vineyards infested by SLF in the Fall of 2018. In the past, insecticide sprays in wine grapes were generally very limited for Pennsylvania's wine grape growers. Most sprays are for disease management, with an insecticide added if needed. The spray records for the five vineyards in this analysis indicate that the average number of applications that included insecticides increased from 4.2 applications in 2016 to 14.0 applications in 2018 (Table 1, see pdf). As expected, the cost of insecticides has also increased significantly since 2016. On average, insecticide cost has increased from \$54.63 per acre in 2016 to \$147.85 per acre in 2018 (+271%). For individual growers the change in the cost of insecticides varied from \$28.15 to \$159.36 per acre.

Data for wine grape yield impact is currently available from only one grape grower. This grower has seven vineyard blocks and the change in the value of the grapes produced (based on yield solely) declined in all seven blocks from 2016 to 2018 (Table 2, see pdf). The largest decline was 76% for a block of Syrah grapes (B7) and the smallest decline was 7% for a block of Chardonnay (B5). The changes in values only reflect changes in yield; quality attributes (like sugar content) that might be affected by SLF feeding are not reflected in these estimates. In addition, low yields in 2018 may also be the result of high disease incidence caused by record amounts of rainfall. Additional data is being collected from growers to determine their loss in fruit quality and yield due to SLF.

Note to reviewers: The data presented here represent the results of a preliminary evaluation of the economic impact of SLF on wine grape growers conducted in November 2018. Additional data on wine grape yields and management costs will be collected this winter. If this paper is selected for presentation, this additional data will be included. The potentially devastating impact of this pest on wine grape production was the motivation for developing this abstract and bringing it to the attention of the AAWE.

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Spotted Lantern Fly: A Potentially Devastating Invasive Species Affecting Wine Grapes

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Tree-of-heaven, an invasive plant that is also from China and southeast Asia, is a preferred host for SLF, but SLF also feeds voraciously on grapevines (wild and cultivated), tree fruit, and various hardwoods. Eggs are laid in masses on any solid surface (trees, posts, stones, buildings, etc.) in the fall. Their egg laying behavior is of particular concern for potential spread of SLF because they are known to also lay eggs on cars, trucks, trailers, and rail cars. They hatch in the spring and go through four nymphal instars, producing one generation per year. Adults emerge in mid- to late July and die with the onset of winter. Both nymphs and adults are feeding on grapevine.

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Table 1. Change in Insecticide Costs for Five Southeastern Pennsylvania Vineyards, 2016-2018.

Vineyard	Insecticide Applications			Change in insecticide cost (\$/acre)		
	2016	2017	2018	2016-2017	2017-2018	2016-2018
V1	1	3	12	\$12.51	\$53.62	\$66.13
V2	4	4	22	\$4.96	\$154.40	\$159.36
V3	10	9	11	\$63.68	-\$35.53	\$28.15
V4	4	4	--	\$10.56	--	--
V5	2	2	11	\$0.00	\$138.50	\$138.50
Average	4.2	4.4	14.0	\$18.34	\$74.87	\$93.21

Data for wine grape yield impact is currently available from only one grape grower. This grower has seven vineyard blocks and the change in the value of the grapes produced (based on yield solely) declined in all seven blocks from 2016 to 2018 (Table 2). The largest decline was 76% for a block of Syrah grapes (B7) and the smallest decline was 7% for a block of Chardonnay (B5). The changes in values only reflect changes in yield; quality attributes (like sugar content) that might be affected by SLF feeding are not reflected in these estimates. In addition, low yields in 2018 may also be the result of high disease incidence caused by record amounts of rainfall. Additional data is being collected from growers to determine their loss in fruit quality and yield due to SLF.

Table 2. Change in the Value of Wine Grapes based on Yield Decline, one Southeastern Pennsylvania grower, 2016-2018.

Block	Cultivar	Change in value of grapes %		
		2016-2017	2017-2018	2016-2018
B1	Albariño	-18%	-28%	-42%
B2	Chardonnay	-56%	-20%	-65%

B3	Grüner Veltliner	66%	-45%	-8%
B4	Chardonnay	-24%	-50%	-62%
B5	Chardonnay	-55%	107%	-7%
B6	Pinot noir	-28%	4%	-26%
B7	Syrah	-43%	-58%	-76%
All blocks		-27%	-28%	-47%

Note: Wine grape prices used in this analysis are crop insurance indemnity prices for New York in 2018.

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