Suppressing Spotted-wing Drosophila Egg-laying with Micro-sprinkler Insecticide Application in Highbush Blueberry

Serhan Mermer, Gabriella Tait, Ferdinand Pfab, Edwin T. Harris, Linda Brewer, Christopher Adams and Vaughn Walton

Key findings

- Exirel® and Delegate® applied by backpack sprayer provided better control than application by micro-sprinkler.
- However, model simulations indicated that micro-sprinkler applications of Exirel® and Delegate® had a suppressive effect on SWD.

Introduction

Blueberry growers have asked whether micro-sprinklers can deliver insecticides to a blueberry canopy to reduce egg-laying by spotted-wing drosophila (SWD) in the developing crop. Growers must control SWD because rapid fruit infestation spikes can cause large losses at packing houses.

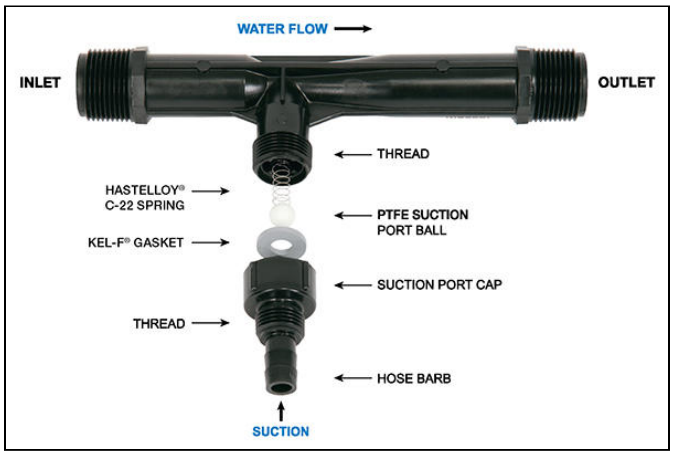

Figure 1. Mazzei® Model 584 venturi injector (3/4") (Mazzei Injector Company LLC) was coupled with a drip irrigation fogger mister to deliver insecticides into the blueberry canopy.

Credit: Mazzei.net

Micro-sprinklers are commonly used in blueberry production for irrigation, frost protection and crop cooling. Would micro-sprinklers also be an efficient insecticide application tool when high SWD infestations require a rapid response? Oregon State University Extension researchers set out to answer that question.

Our study compared on-farm micro-sprinkler application of Exirel® (cyantraniliprole) and Delegate® (spinetoram) in 'Duke' blueberry to backpack sprayer application of the same chemicals. The 2020 study on a university farm in Corvallis, Oregon, included an untreated control.

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Researchers applied the insecticides during a mid-June SWD population increase. They followed label instructions for application rates. Seven blueberry bushes received the insecticide treatment, and researchers collected data from the five middle bushes.

To monitor egg-laying after insecticide applications, researchers released five mated female and five male 8-day-old SWD adults into mesh bags placed over clusters of 10–20 blueberries.

The berries were retrieved, and the bags were replaced with five mated SWD pairs onto similar fruiting branches on days four, seven, and 11 after the insecticide applications. Researchers delivered the insecticides via fogger misters using Venturi injectors (Mazzei® Model 584, Mazzei Injector Company LLC, Bakersfield, California). (Figures 1, 2). The researchers then examined the berries in a lab for eggs one, four, seven and 11 days after the insecticide applications.

Backpack applications more consistently suppressed SWD populations than micro-sprinklers. On day one, although there was a *numerical* difference, there was no *statistically significant* difference in the percentage of egg infestations among any treatments. All were lower than the untreated control except for Delegate® applied by micro-sprinkler.

There were numerical differences among the treatments in the number of infested berries on day four, but none of these differences were statistically significant. On day seven, a statistically significant greater number of berries treated with Delegate® by micro-sprinkler were infested than berries treated with backpack-sprayed Delegate®.

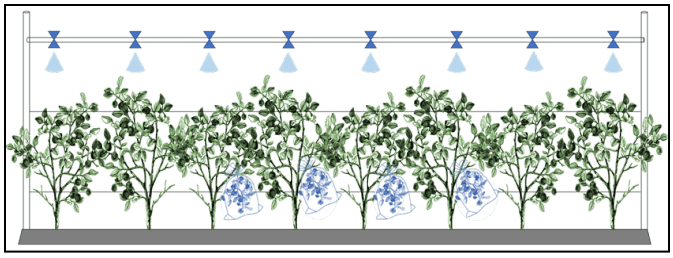

Figure 2. The micro-sprinkler assembly used in a highbush blueberry field in Corvallis, Oregon, in 2020. The micro-sprinklers were suspended from the center line just above the tops of the canopies and were pointed downward. We installed one micro-sprinkler per bush for a total of seven micro-sprinklers. Egg infestations were consistently high throughout the study in the untreated control plots.

Credit: Mazzei.net

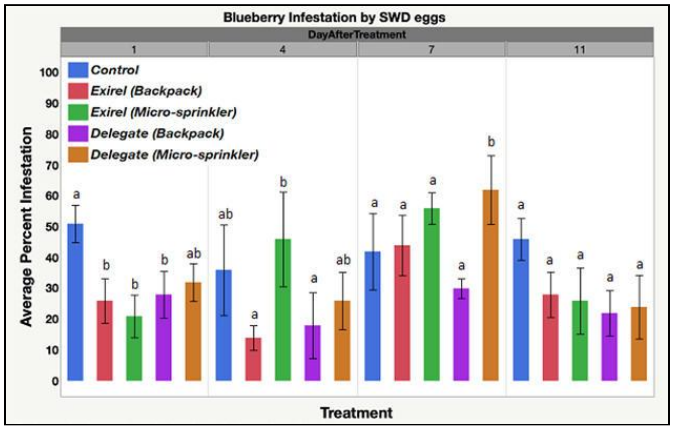

Figure 3. Percent infestation of blueberry by SWD eggs in highbush blueberry (cv 'Duke') in Corvallis, Oregon in 2020. The residual effect of insecticides was assessed on days one, four, seven, and 11 after the application of Exirel® or Delegate® by micro-irrigation or by backpack sprayer.

Credit: Oregon State University

When comparing berries treated with Delegate® applied by backpack sprayer to berries treated with Exirel® applied by either technique, researchers found numerical differences but no statistical difference. There was no significant difference among any infestation rates (21% to 28%) on day 11.

Researchers fed field study data into an SWD population model to estimate subsequent population growth for each delivery method. We incorporated the field data with SWD population model because the model allows us to directly compare fruit infestation and population growth under different insecticide treatments and application methods.

Model simulations of SWD populations indicated that growers applying Exirel® and Delegate® by backpack sprayer could expect a nearly 50% reduction in juvenile life stages from either insecticide and a nearly 20% reduction when applying by micro-sprinkler (Figure 4). This may have been due to the difference in action between the backpack sprayer and the micro-sprayer. Micro-sprayers use gravity and wind to cover the crop. Backpack sprayers provide greater overall coverage. In this study, backpack applications continued until just before the product runoff point. Both sides of the leaves and berry clusters were more fully covered by the backpack applications. Overall, the backpack applications provided consistent suppression of SWD populations. Micro-sprinklers were less consistent in suppressing SWD populations. The number of micro-sprinkler nozzles and their positions could be adjusted based on the blueberry canopy structure.

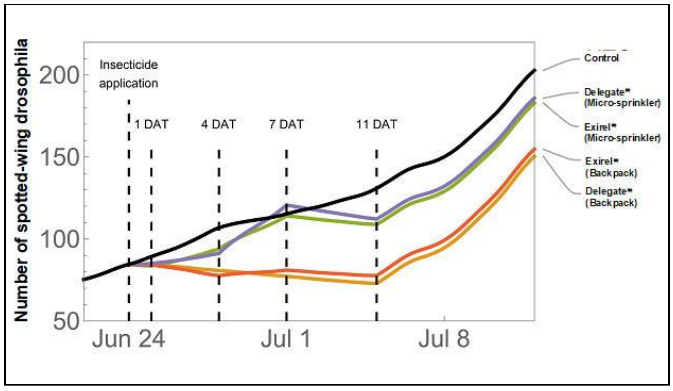

Figure 4. Population modeling results for spotted-wing drosophila following applications of Exirel® and Delegate® using micro-sprinkler or backpack sprayers in Corvallis, Oregon, 2020. Model simulations started with 100 adult SWD individuals in the field on April 1. Insecticides were applied on June 24 and egg counts were conducted on days one, four, seven, and 11 after treatment.

Credit: Oregon State University

Deployment of more micro-sprinklers per bush would provide greater canopy coverage and likely increase the efficiency of such applications.

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Resources

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