OREGON STATE UNIVERSITY EXTENSION SERVICE

SWD series #6

Improved Chemical Control Strategies for Spotted-wing Drosophila

Insecticide Efficacy and Seasonal Application Strategies

S. Mermer, L. Brewer, D. Dalton, R. Nieri, K. Park, F. Pfab, M.V. Rossi-Stacconi, V. Walton

Factors that influence control

Several factors should be considered when selecting a management strategy against spotted-wing drosophila. The level of control achieved will depend on:

- The population structure (percent of each life stage) of the SWD population.
- The product effectiveness.
- The timeliness of insecticide application.
- The coverage of the fruit with the insecticide.

The population structure of SWD varies throughout the year. During winter and early spring, all SWD are believed to be adults. As the population begins to build and adults begin laying eggs, the relative proportion of adults decreases and larger portions of the total population are immature life stages: eggs, larvae and pupae. Adult SWD are believed to make up 5%–15% of the SWD population during the growing season. Adult flies are more susceptible to contact pesticides than any other SWD life stage.

Several insecticides provide adequate control of SWD, but most insecticides are effective in the field for 10 days or less. Rain or overhead irrigation wash off chemicals and limit insecticide longevity. When establishing new plots, consider installing drip irrigation. Many Oregon growers allow up to 14 days between insecticide applications in the early spring, but shorten the interval between sprays to protect late-ripening crops. As the spray interval is shortened, consider the seasonal limits for each product and the minimum time between sprays.

Insecticide efficacy varies based on SWD life stages. Malathion-based insecticide applications provide good adult control but are limited in controlling immature life stages. Spinetoram-based insecticide applications

Key points from this fact sheet

- *During the growing season, only 10% to 15% of the total spotted-wing drosophila (SWD) population is in the adult life stage.*
- *Most insecticides are effective in the field for a maximum of 10 days. Rain or overhead irrigation significantly reduce this time.*
- *Early in the growing season, insecticides can be applied less often, with up to 14 days between applications.*
- *Spray intervals should be shortened for late-ripening crops, when environmental conditions speed the SWD life cycle.*
- *Always rotate chemical classes of insecticides to limit the risk of insecticide resistance development.*
- *Follow all label instructions and pay special attention to preharvest interval (PHI), re-entry interval (REI) and maximum residue limit (MRL).*

Oregon State University

EM 9266
December 2019

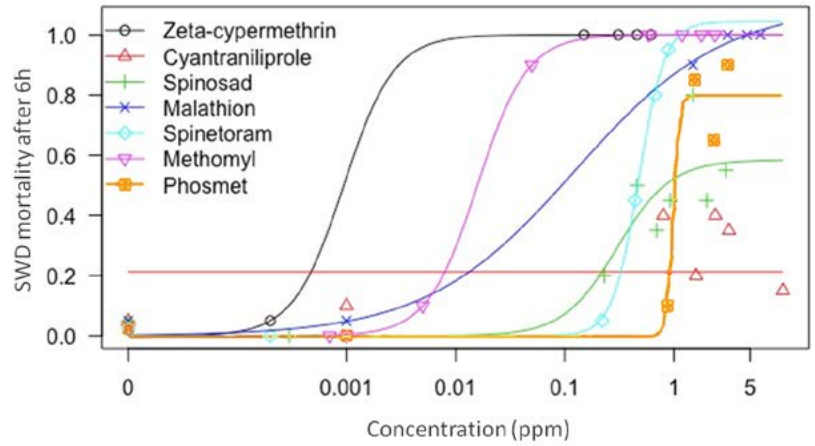

Illustration: Ferdinand Pfab and Vaugh Walton, © Oregon State University

Figure 1. Knockdown potential of various insecticide active ingredients against adult SWD after six hours in laboratory trials. Mortality is reported as the proportion of flies killed for different concentrations (in parts per million); the higher the curve, the greater SWD mortality. Field-recommended doses are indicated by a black dot; other concentrations tried in these experiments are indicated by hollow dots. (Trade name indicated in bold. Zeta-cypermethrin = **Mustang Maxx**; Methomyl = **Lannate SP**; Cyantraniliprole = **Exirel**; Malathion = **Malathion 8F**; Spinosad = **Entrust**; Spinetoram = **Delegate WG**; Phosmet = **Imidan 70-W**).

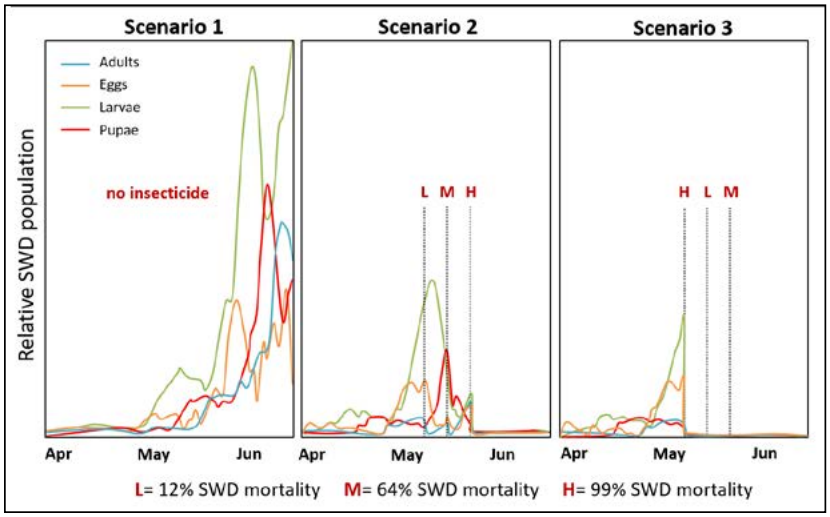

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Figure 2. Simulation of three SWD chemical control scenarios in the early season: 1) no insecticide, 2) initial low-efficacy insecticide (L), followed by a moderate- (M) and high-efficacy (H); and 3) initial high-efficacy insecticide, followed by a low- and moderate-efficacy insecticide. The vertical lines in scenarios 2 and 3 indicate spray events.

will kill up to 95% of adults and pupae, but affect a lower percentage of eggs and larvae. Methomyl-based insecticides will kill more than 95% of all life stages.

Mathematical models can help to optimize insecticide application scheduling (Figure 1). Several model simulations have shown that initial applications of insecticides that are more effective in killing all SWD life stages will provide better and longer pest control than initial applications of low efficacy pesticides.

When high SWD populations exert greater pressure on the crop, consider the knockdown potentials of different insecticides against SWD adults (Figure 2).

When the same insecticide class is applied repeatedly during the growing season, there is an increased chance of developing insecticide resistance and the loss of those chemistries for SWD management. Rotating insecticide classes throughout the growing season will minimize risk of insecticide resistance development. Every product has an Insecticide Resistance Action Committee (https://www.irac-online.org/) code on its label, indicating its pesticide class. Design your spray program to rotate among the products and classes labeled for your pest and crop. This principle is fundamental to delaying the onset of insecticide resistance.

Apply insecticides at the specified labeled rate. Consider the preharvest interval (PHI), re-entry interval (REI) and maximum residue limit (MRL) when planning any insecticide spray program.

Further reading

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About the authors

Serhan Mermer, graduate student, environmental and molecular toxicology, Department of Horticulture; Linda Brewer, senior faculty research assistant, Department of Horticulture; Daniel Dalton, graduate student, horticultural entomology, Department of Horticulture, all of Oregon State University; Jana Lee, research entomologist, U.S. Department of Agriculture Horticultural Crop Research Unit; Rachele Nieri, post-doctoral researcher, horticultural entomology, Department of Horticulture; Kyoo Park, graduate student, Department of Horticulture, both of Oregon State University; Ferdinand Pfab, post-doctoral researcher, ecology, evolution and marine biology, University of California, Santa Barbara; Marco Valerio Rossi-Stacconi, post-doctoral researcher, horticultural entomology, Department of Horticulture; Gabriella Tait, post-doctoral researcher, horticultural entomology, Department of Horticulture; and Vaughn Walton, professor of horticultural entomology, Department of Horticulture, all of Oregon State University.

We acknowledge contributions from multiple funding sources and collaborators. Oregon State Blueberry Commission, United States Department of Agriculture (USDA), National Institute for Food and Agriculture awards #2010-51181-21167, #2015-51181-24252, USDA OREI #2014-51300-22238, USDA NWCSFR, and Oregon State University Agriculture Research Foundation. We also thank Drs. Bernadine Strik, Chad Finn, Dave Bryla and Wei Yang for providing blueberry plots. We thank the many growers who have collaborated with us to better understand this pest. We thank OSU NWREC, OSU MCAREC and Lewis-Brown research farm staff, WSU Research and Extension Center Staff, Prosser, WA for assisting in field setup, maintenance, trials and sample analysis.

About this series

This publication is one of a series of nine publications focused on strategies for controlling spotted-wing drosophila in Oregon. Find them at https://catalog.extension.oregonstate.edu/. The publications in this series include:

- *EM 9261: How Seasons Affect Population Structure, Behavior and Risk on Spotted-wing Drosophila*
- *EM 9262: Cultural Control Strategies to Manage Spotted-wing Drosophila*
- *EM 9263: Host Range and Characteristics Affecting Fruit Susceptibility to Spotted-wing Drosophila*
- *EM 9264 Alternate Reproductive Substrate Used By Spotted-wing Drosophila*
- *EM 9265: Chemical Control of Spotted-wing Drosophila: Spray applications*
- *EM 9266: Chemical Control of Spotted-wing Drosophila: Insecticide Efficacy*
- *EM 9267: Monitoring Techniques for Spotted-wing Drosophila*
- *EM 9268: Potential Impacts of Irrigation on Biocontrol on Spotted-wing Drosophila Populations*
- *EM 9269: Biocontrol of Spotted-wing Drosophila*

Published December 2019