Spotted wing drosophila in blueberries – 2013 Findings

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Spotted wing drosophila (SWD) has established itself as the most economically damaging pest to blueberry and caneberry production in the Pacific Northwest. Growers have responded to the challenge of controlling SWD through calendar spray programs and attempted resistance management (IRM). To maximize market flexibility, growers should initially adopt the most restrictive spray program followed by a cautious re-introduction of insecticides to meet changing field conditions and market demands. Access to regionally specific degradation curves, will allow growers the ability to utilize a wider range of insecticides including those with more marginally acceptable tolerance levels, through careful seasonal application timing and PHI adjustment to safely reach target MRL levels.

Despite its predictable late season population build-up, SWD damage in early and mid-season blueberry varieties still remains challenging due to a lack of predictable trends. Concurrent berry crops such as red raspberry, wild Himalayan blackberry and late season caneberries may provide a reservoir for re-infestation throughout the blueberry season. Data gathered over the past few seasons from lab bioassays and field residue tests have provided a list of insecticides effective against SWD <http://www.mountvernon.wsu.edu/ENTOMOLOGY/pests/SWD.html>. The most commonly applied insecticides all exhibited good to excellent contact and moderate residual activity to adult SWD on small fruits.

We studied the efficacy of rotational sequence partners, possessing different mode of action chemistries, applied with an airblast in commercial blueberries with our foliar bioassay method in 2013.

Blueberry rotation trial.
Unlike other insecticide degradation studies, we looked at the three challenges berry growers face: harvesting a clean, uninfested crop; staying under target export MRLs and maintaining a protective level of residues on the leaves (where SWD spend the majority of their time) to achieve SWD control. This required that we accurately measure field-aged residues on the berries, leaves and simultaneously perform bioassays using a subset of the leaves. The residue analyses were performed by Dr. Vince Hebert, Director of the WSU/Tricities FEQL laboratory, using GLP standards. This research toxicology laboratory can individually design protocols best suited to the specific insecticide groups increasing recoverable residues and information. Other degradation studies simply look at berry MRLs without providing growers with the knowledge of how these levels equate to SWD control! While MRLs refer to levels of daily dietary intake, these same levels must also provide effective SWD control to warrant their use. Our study investigates this parallel relationship.

The Rears dilute orchard airblast sprayer used at the Pan-American Berry farm in Salem, OR was equipped with 6 D-3 hollow cone nozzles per side to deliver 50 gpa at 100 psi at 6.5 mph at the Pan-American Berry farm, Salem, OR. Foliage samples from 8 year-old ‘Aurora’ bushes were

collected from high and low positions in designated, alternative rows one day before (-1) and at 0, 1, 3, 5 and 7 days after treatment (DAT) for foliar bioassays. Bioassay arenas consisted of two blueberry leaves placed topside up in 100x15 mm Petri dishes with 5-8 even-aged SWD adults replicated 10 times. Mortality was evaluated after 24 hours. Two rotations of Malathion 8 Aquamul and Mustang Maxx were applied on 7-day rotations beginning on 28 July and a Danitol applied on 1 September. These data provided a quantitative understanding of how calendar spray rotations with different MOA insecticides, can provide season-long fruit protection by creating a toxic field habitat for the flies. This protective habitat resulted from cumulative, carryover exposure, while protecting ripening berries at or below MRL tolerances for target export markets. <http://www.mountvernon.wsu.edu/ENTOMOLOGY/pests/SWD.html>. Results (% mortality) of lab bioassays based on field-aged blueberry foliar residues, always underestimates overall field performance. The lower than expected % mortality of the bioassayed flies doesn't reflect the repeated insecticide exposure that the flies encounter in the field. Fruit samples subjected to the salt-dunk method (e.g., salt-water solution of 1 cup salt in 1 gallon of water) to detect SWD infested berries, were negative for the presence of any larvae. Foliage analyses not reported here, indicated residue declines during the 7 day rotations for the 3 insecticides, remained toxic to SWD adults through continued exposure to layers of overlapping dried residues by the 3rd seven-day rotation. Danitol (not registered in Canada) provided over 95% adult mortality at 15 days posttreatment. Leaf residue analyses showed a 7-fold decline from the 4th to 15 day posttreatment with no significant differences between their mortality levels (Fig. 1). Leaf bioassays, coupled with foliar residue degradation curves, indicate recommended treatment intervals are adequate for protecting the fruit. The residue studies highlighted the cumulative effect from weekly applications, providing both lethal and sublethal protection resulting from layer upon layer of chemicals. Furthermore, insecticides with longer persistency such as the pyrethroid Danitol, could be applied as the first *knockout* application of the season as well as the *clean-up* treatment at the end of harvest. Scheduling more persistent chemistries preceding shorter residual materials such as spinosad or OPs could fortify contact residuals of these insecticides. It is conceivable that we will soon have the knowledge to develop rotation schemes that would even delete a rotation because of its long persistency or because SWD populations were below the economic threshold by the 3rd or 4th rotation in a long and late maturing cultivar such as 'Aurora'.

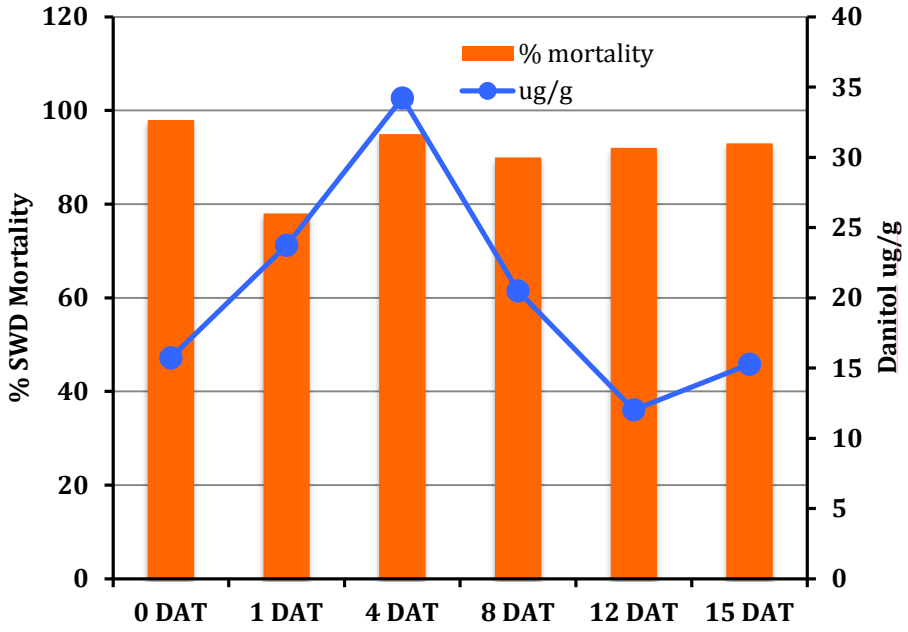

Fig. 1. Danitol leaf residue concentrations and bioassay mortality.

Acknowledgments

The dedication for sample collections by Heather Andrews and Margaret Parks during the study is much appreciated. The project was in part supported by the Clackamas County Innovation Grant program in 2013.