2013 Western Region Blueberry Pesticide Decline Evaluations

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International pesticide maximum residue level (MRL) issues remain a major concern for blueberry growers seeking effective season-long spotted wing drosophila (SWD) control. Although many US and foreign agricultural agencies are working towards global MRL harmonization, political and cultural differences could be difficult to overcome. In the meantime, developing an effective resistance management spray program is an ongoing priority for our Pacific Northwest growers, especially when exporting to the Pacific Rim where vastly different MRL requirements exist. Understanding season-long insecticide field declines is the best insurance to avert crop rejection concerns. Designating a field for a particular export country allows a tailored management program specifically suited, with little risk of exceeding tolerances. For blueberry growers with smaller acreages, initially adopting a more restrictive rotational spray program designed to fit multiple potential export countries, may be more feasible. Either way, knowledge of insecticide decline curves is essential to berry exporters.

To better understand season-long field decline in blueberries, a weekly insecticide application program was performed on late-season 'Aurora' highbush blueberries, from July through late September 2013, as part of a program to control SWD at Pan-American Berry Growers, Salem, OR. Multiple applications of the most utilized insecticides for SWD control: Malathion 8 Aquamul, Mustang® Maxx and a single late season Danitol® application, were conducted at commercial rates. Previous research indicated application methods (helicopter, airblast and chemigation/mistigation) result in different MRLs. This insecticide decline study examined pesticide residues on marketable fruit after pesticide application by two commercial application techniques being used by the grower, chemigation using Netafim™ nozzles (mistigation) and airblast sprayer (Fig. 1).

Fig. 1. Airblast sprayer application to mature 'Aurora' blueberry, 50 gpa at 100 psi.

Both application methods were conducted on the same day to compare residue decline differences due to application method. For this study, marketable berries were sampled before

chemical application (-1), and at 0, 1, 3, 5, 7, 10, and 14 days after treatment (DAT) (Fig. 2). Danitol residues were sampled through 24 DAT because of its anticipated longer decline curve. The berries were chilled in the field at sampling, stored at -10 ^{0}C, and then transported by refrigerated shipping to the WSU Food Environmental Quality Laboratory (WSU-FEQL) in Richland, WA for residue determination. A strict protocol, field documentation, and many quality control provisions were instituted to assure sample integrity and good science from field collection through chemical analysis.

Fig. 2. Sampled berries and leaves were taken at three positions (upper, middle, lower) from multiple sites on both sides of the selected row to minimize field variability.

MRL and Field Decline Results. Figure 3 shows malathion field residues before and after applications in late July and early August 2013. For this study, the two applications of Malathion 8 Aquamul were conducted at 1.25 pts per acre.

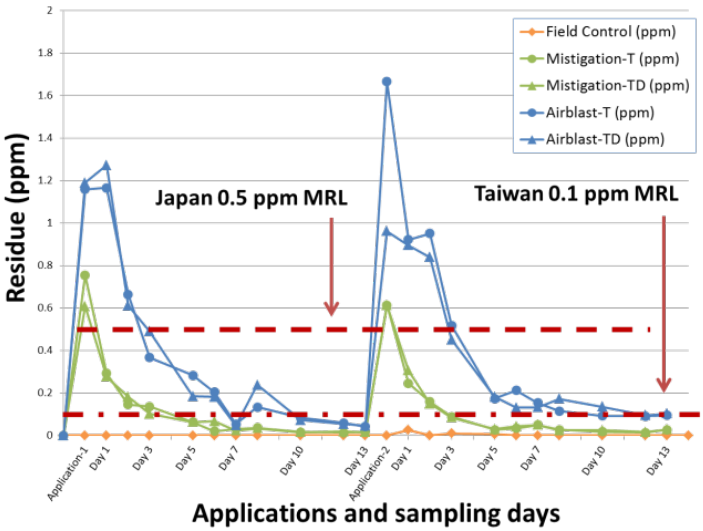

Fig. 3. Field decline of malathion residues in/on blueberries after two applications spaced at two-week intervals during the 2013 spray season.

Malathion was observed to rapidly decline after repeated applications. The US MRL tolerance for malathion is 8 ppm. Korea's tolerance for malathion is favorable at 10 ppm. However, exporting malathion treated berries picked at the current 1 day PHI to Japan (0.5 ppm) would be risky and to Taiwan (0.01 ppm) not advisable (Fig. 3). Delaying harvest to 3-5 days after

application for Japanese market customers may be a tactic to further reduce residue levels but carries some risk.

Mustang Maxx. Figure 4 shows field residues before and after Mustang Maxx applications in early to late August 2013 at a rate of 4 fluid oz per acre.

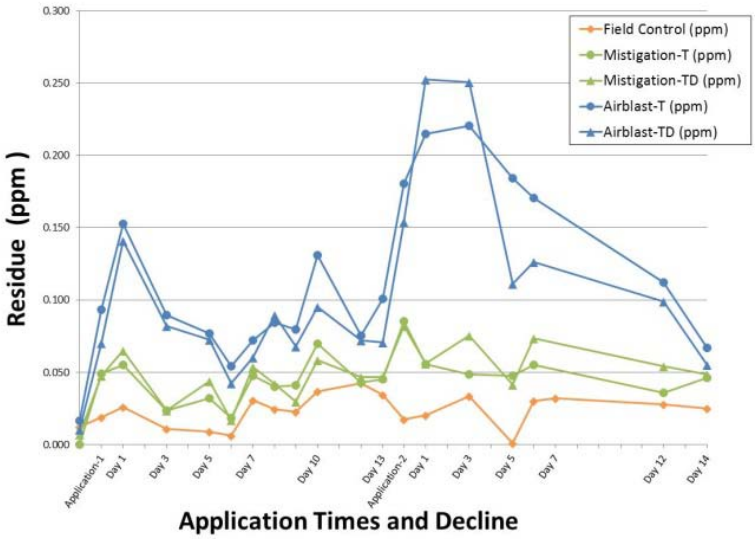

Fig. 4. Field decline of Mustang Max residues in/on blueberries after two applications spaced at two-week intervals during the 2013 spray season.

Mustang Maxx berry residues were lower than US (8 ppm) and Korea and Japan MRLs (10 ppm and 0.5 ppm respectively). Taiwan does not post a tolerance for the active ingredient in Mustang Maxx (zeta cypermethrin) and any detected residue could result in a violation. The much slower rate of field residue decline compared to organophosphate insecticides is typical of pyrethroid insecticides. We consistently observed higher levels of Mustang Maxx residues after the second airblast application. For this reason, growers should be cautious about making too many consecutive applications of this active ingredient, especially if planning to export to countries with lower MRLs.

Danitol. Danitol (fenpropathrin) has been underutilized by the blueberry industry. This research highlights its long field residual and how it could potentially reduce the number of seasonal sprays for SWD control (Fig. 5). Currently Danitol can be applied twice during the growing season at a rate of 16 oz per acre. In our study, it was used in late August as a clean-up application to insure protection of high-cash value, late season berries, as the flies slowly transition towards the overwintering phase.

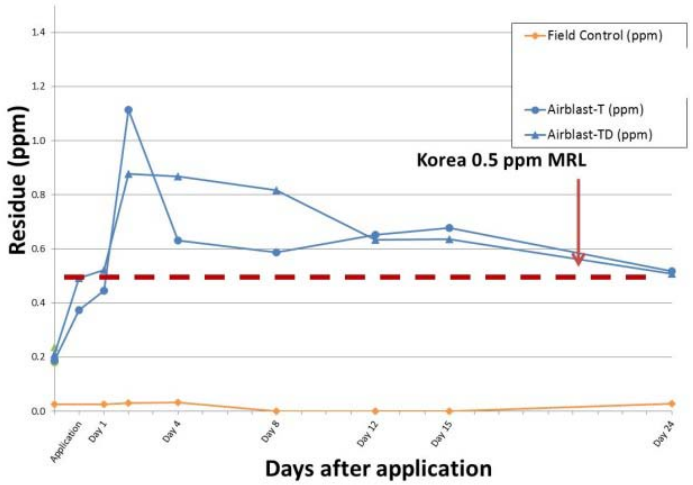

Fig. 5. Field decline of Danitol residues in/on blueberries one application by air blast during the 2013 spray season.

Cumulative Season-long Field Residues. Malathion, Mustang Maxx, and Danitol blueberry residues were measured in the field on 32 separate sampling events from late July through mid-September. Residues of Imidan 70-W (phosmet) at a rate of 1.33 lbs per acre were also assessed over the 48-day spray period. Figure 6 provides the residue data for the 4 compounds. This profile illustrates how residues can accumulate, resulting in an increase in efficacy as the season progresses. SWD has been part of the blueberry landscape for nearly 5 years, since 2009 and growers remain challenged but increasingly confident in managing this first direct pest. This confidence allows research to further refine SWD control through development of spray reduction programs.

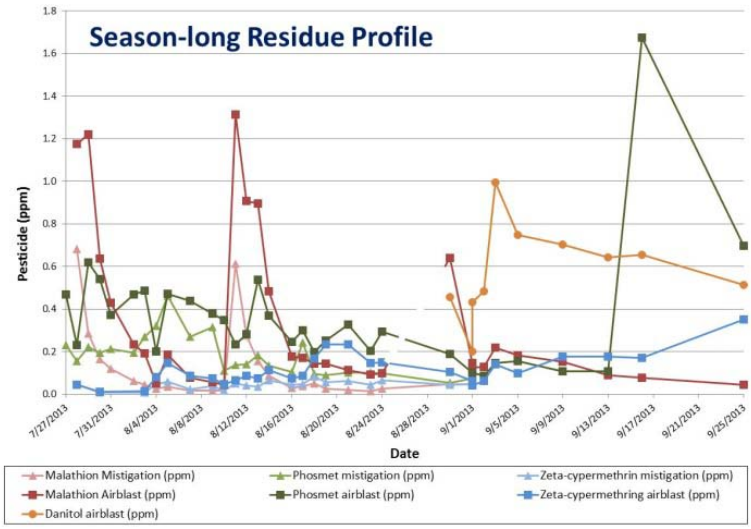

Fig. 6. Season-long cumulative residues in/on blueberries.

Acknowledgments
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