Section V
Pests of Wine Grapes & Small Fruit

FIELD EVALUTATION OF NON-INVASIVE METHODS TO CONTROL SPOTTED WING DROSOPHILA IN BLUEBERRY

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Major research emphasis for the 2011 season was to explore non-invasive methods to make commercial applications of insecticides at initial blueberry ripening and through the harvest period. The three control tactics researched that will enable growers with different economic constraints good options for successful management outcomes were: trellising, helicopter application and micro-sprinkler chemigation. Trellising and good pruning practices will allow a grower more flexibility with his standard orchard sprayer while minimizing fruit drop, facilitating handpicking, machine harvesting and other cultural management activities such as mowing. Helicopter applications provided excellent contact knockdown of active adult populations in a blueberry canopy laden with ripening fruit. Micro-sprinklers give the grower flexible timing options for field-wide applications given SWD population level, weather conditions such as wind and rain, harvesting schedules and opportunity to tank mix pesticides. The main challenge for this unique chemigation system is to calibrate each stand-alone system to consistently deliver the recommended field rate on target with minimal wash-off and drift of the insecticide.

Trellising to maintain alleyway access

Two unreplicated, 1.5 acre blocks of un-trellised and trellised 'Bluecrop' and two similar blocks of 'Bluejay' were established in Woodland, WA. Both six-years-old and heavily pruned prior to placing #12 gauge high tensile wire approximately 4 ft above the ground. The wires were held in place by 12 in hooks attached to metal posts in the row spaced at 18 ft and anchored at both

ends with traditional wooden end posts. The grower applied a protective spray of Brigade WSB (1 lb/ac) on 20 July and Mustang Max (4 fl oz/ac) on 26 July 2011 with a conventional orchard air blast sprayer. Five replicates of 5 mature blueberries each (n = 25) were randomly sampled from each of the 4 treatment blocks after 12 hrs. Five berries were placed in a standard Petri dish with a small wedge of water moistened dental wick. Five even aged SWD adults were placed in each Petri dish and percent mortality assessed after 1 DAT for the Brigade and Mustang Max field treatments.

Brigade residual on berries from un-trellised 'Bluejay' and 'Bluecrop' provided poor contact mortality to adult SWD of 50 ± 50 SEM, 26.7 ±43.5 and 3.3 ± 7.5 and 3.3 ± 7.5 percentages at 1 and 6 DAT, respectively. However, the trellis and upright architecture of 'Bluejay' resulted in very good coverage for Brigade with 100 and 90 percent mortality at 1 and 6 DAT, while the fuller profile of 'Bluecrop' showed large variability and only 43 and 30 percent adult mortality. Mustang Max provided excellent adult knockdown of SWD after 1 and 3 DAT for both trellised and un-trellised 'Bluejay' and 'Bluecrop'. This observation for Mustang Max was also corroborated from lab bioassays, helicopter and micro-sprinkler trials on blueberries as well. An approximation of berries dropped 2 DAT after an air blast Mustang Max application with a 1 ft^2 tile showed 1.7-fold and 1.9-fold more berries dropped from un-trellised 'Bluecrop' and 'Bluejay', respectively.

Helicopter aerial applications

Four commercial helicopter applications were monitored for contact knockdown at 24 hr after treatment and field residual on foliage from random bushes in a large 'Aurora' blueberry block near Salem, OR, 2011. Aerial applications of Malathion 8 (2 pts/ac, 3 July), Success (6 oz/ac, 30 July), Lannate LV (1.5 pts/ac, 10 August) and Lannate LV (1.8 pts/ac, 2 September) were applied at 10 gal/acre. Droplet size and distribution patterns from the helicopter were with water sensitive paper attached to screened-plastic lids placed over 16 fl oz deli cups containing 5 adult SWD and a water saturated cotton core. Adult mortality was assessed at 2, 12 and 26 hrs posttreatment. The adult sentinel cages were placed on the top, middle and lower positions from five randomly selected bushes. In addition to the sentinel cages, three leaves were collected at each level from both sides of the five bushes for a total of 30 individual sites. Sets of three leaves, along with five SWD adults were placed in standard disposable Petri dishes (30 units) and mortality assessed after 24 hours.

The average aerial knockdown for the three positions after 26 HAT were: Malathion 8 (47.3 ± 24.5), Success (44.0 ± 11.6), Lannate (96 ± 2.3) and Lannate (85.3 ± 12.7). The contact toxicity and warm weather fuming activity of Lannate was excellent through the canopy of mature sized 'Aurora' bushes, especially in early August. The 1 and 6 DAT residual mortality of Lannate on

foliage support the sentinel aerosol knockdown results given 1 DAT foliage mortality for both treatments dates at 94.9 ±1.5 and 92 ± 3.6 percent and 89.2 ± 5.8 at 8 DAT and 98.3 ± 1.7 at 6 DAT.

Micro-sprinkler chemigation

A novel chemigation application method using Netafim® micro-sprinklers for control of SWD was field tested on a 22 acres mixed block of 7-year-old 'Elliott', 'Liberty' and 'Aurora' near Salem, OR. The 139 Supernet #90 nozzles/acre were installed seven years agoto cool maturing blueberries when temperature reach 95 ^{o}F. The nozzle size is .069 in and operates at about 23.8 GPH, 23 ft diameter wetted coverage and are space 12 ft apart in every other row. This spacing and offset of 6 ft between rows of micro-sprinklers resulted in an overlapping spray pattern whereby each bush is covered by three sprinklers. Mustang Max at 4 fl oz/ac was chemigated through the main pumping station on 10 August. Challenge was to calibrate this system to provide an 8-minute application wave from the nearest and furthest area of the field. Gallonage required to deliver 4 fl oz/ac of Mustang Max was about 350 gallons. One hour after application, the injector lines were purged for 8 minutes. Sentinel traps with 10 adult SWD each were placed at two sites in 4 middle rows at the top, middle, lower and inside locations (i.e., 8 x 4 = 32 sentinels). The average adult mortality for all of the sentinels was 83.8 ± 5.1 after 1 DAT. The top position averaged 98% mortality while the inside position was 70%. Field-aged residuals were bioassayed for 3 leaves per sentinel site and placed in Petri dishes with 5 SWD adults. These were scored for mortality after 24 hrs. Average percent mortality for all foliage collected 2 and 6 DAT was 95.3 ±3.0 and 71.9 ± 1.8, respectively. Blue dye will be used to determine lag time from the in-line injectors for the 22 acres for the next chemigation on the farm. Without the dye, we aren't certain that our predetermined calculation for an 8-minute injection period for this 22 acre block is on the mark. Though our contact and residual activity with live flies indicated good precision and placement throughout the blueberry canopy.

After replacement of two shut off valves, the researchers felt confident that the next chemigation applied on 17 September with Mustang Max at 4 oz/ac + Activator 90 (16 fl oz/ac) would make a more accurate application than the previous Malathion 8 chemigation that may have under dosed the 22 acre block. Row 10 ('Elliot'), row 72 ('Liberty') and row 110 ('Liberty') were randomly selected and 4 bush sites were randomly selected in each row. Six leaves were collected from each bush replicate for a total of 24 samples. The six leaves were divided in half and each 3 leaf subsample were placed in Petri dishes with 5 adult SWD and a moisten portion of a standard dental wick. Mortality was assessed after 24 hours. Calibration of the chemigation with blue dye and placement of the first micro-sprinkler at the head position of each row in a 5 gal bucket corroborated accurate injection and cessation of the 8 minute injection period for Mustang Max. The bioassay for adult mortality on foliar aged residues at 1,

4 and 7 DAT was 99.2 ± 0.8, 100 and 91.9 ±10.9. These results are very encouraging and reflect the precision of a calibrated micro-sprinkler system to deliver an accurate field rate of Mustang Max during blueberry harvest.