MICRO-SPRINKLER CHEMIGATION FOR CONTROLLING SPOTTED WING DROSOPHILA IN HIGHBUSH BLUEBERRY

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The popularity of blueberries has spurred tremendous increase in new blueberry plantings around the world in the last decade. In the northwest, mid to late season blueberries become more valuable because they supply the fresh market in August to September when global blueberry supply volume is low. Some mid to late season blueberries are prone to high temperature damage when air temperature exceeds 95°F. To lower air temperature in the plant's canopy in a blueberry field near Salem, OR, a Netafim® micro-sprinkler system was installed above the canopy to cool the ripening blueberry fruit and reduce fruit damage. Because the cooling system is independently operated from the irrigation system, it can be configured to deliver chemicals over the plant canopy. In this study, we evaluated the coverage of Mustang Maxx® insecticide by this cooling system for controlling spotted wing drosophila (SWD).

Methods

The study site was a 160-acre commercial blueberry farm in Salem OR (45.0165N, 122.9405W). The micro-sprinkler system was installed within the center of alternate 500-foot long rows running from north to south. There were 41 micro-sprinklers per row spaced 12 feet apart. Planting spacing was ten feet between the rows and 2.5 feet within the rows. The placement of the micro-sprinklers resulted in an overlapping spray pattern for the none-sprinkler rows receiving coverage from neighboring rows. The study acreage was approximately one acre of a seven-year-old late season 'Aurora' northern highbush blueberry that was eight feet high with complete canopy closure when bearing fruit. Five non-sprinkler rows (replications) were selected for chemigation coverage evaluation. On 3 October 2013, two 15 minute micro-sprinkler applications of Mustang Maxx® at 4 fl oz per acre were made, each followed by a 15 minute drying period. One day after the Mustang Maxx® application, leaf collections were taken as described below.

The experimental design was a nested factorial with two canopy positions (upper and middle) and five locations evenly spaced along the 500-foot rows. At each row location, four fully expanded mature leaves were randomly selected and harvested using Nitrile gloves (which were changed at the end of each row) from the upper and/or middle canopy of two consecutive plants for the SWD bioassay. Leaves for the SWD bioassay were shipped overnight via FedEx to the Northwestern Washington Research & Extension Center at Mt. Vernon OR. The SWD bioassay was conducted with 4-10 SWD adult flies in a

Petri dish containing two leaves and 0.5 cm^2 plug of diet. There were two Petri dishes per sample for a total of 100 bioassays. After 24 hours, the percentage of dead flies in each Petri dish was recorded. Another set of 40 leaves from a mid and high level location were sampled similarly to those collected for the bioassay from 12 consecutive plants (approximately 28 feet down the row) for leaf chemical residue determinations of zeta-cypermethrin, the active ingredient in Mustang Maxx®. Leaves for chemical analysis were frozen at -40°C and shipped via freezer truck to the Food & Environmental Quality Lab in Richland, WA (Leaf residue data is not available yet).

Results

Coverage along the row equipped with 41 nozzles was uniform resulting in no difference in the percent of SWD killed in the leaf bioassay (Figure 1). There was no observed difference in SWD control between upper and middle canopy leaf collections (Figure 2).

Figure 1. Effect of sampling location on coverage along a 500 foot row*

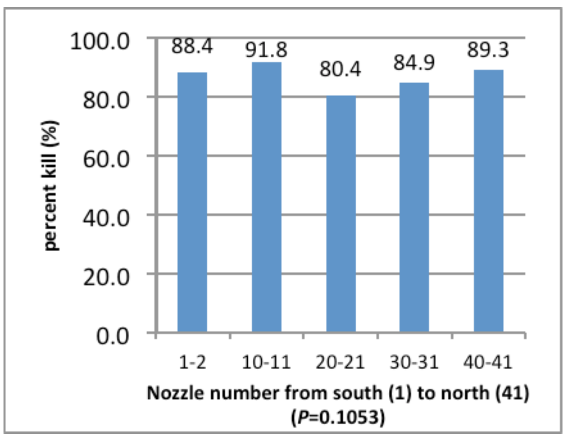
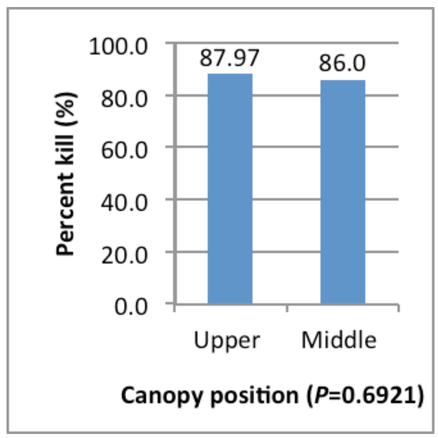


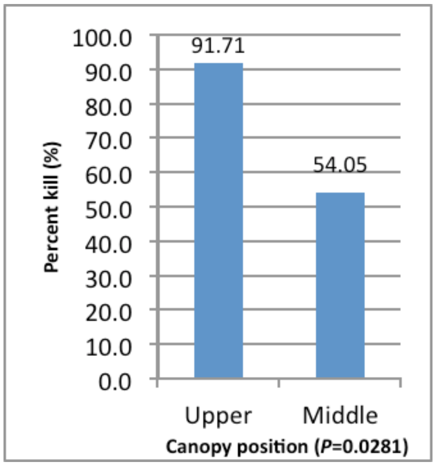
Figure 2. Effect of canopy position on coverage along a 500 foot row

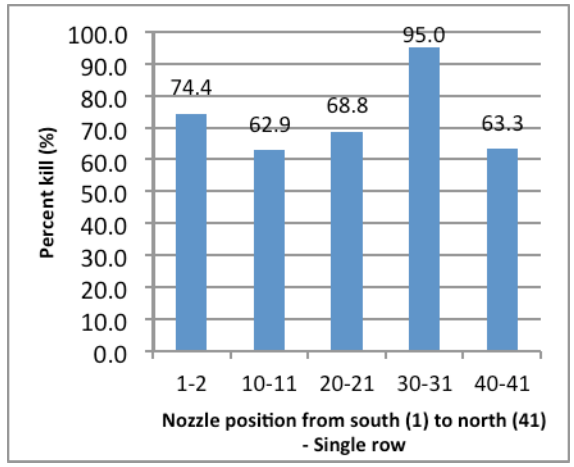


*Only rows 116 (rep 1), 118 (rep 2), 120 (rep 3), 122 (rep 4) were used for data analysis.

Significant differences in percent kill in leaves between upper and middle canopy positions were, however, observed when just one side of the canopy was under coverage (Figure 3). Here, the variation in kill was also observed to be greater than the overlapping rows that were chemically treated.

Figure 3. Effect of canopy position on coverage along a 500 foot row when only the west side of the canopy received spray coverage*





*Samples were taken on the west side instead of the usual east side of the canopy, row 124.