EVALUATION OF HELICOPTER APPLIED INSECTICIDES AGAINST SWD IN PNW HIGHBUSH BLUEBERRY

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Introduction

Ever since its detection in the United States in 2009, spotted wing drosophila (SWD) has greatly disrupted integrated pest management (IPM) regimes in numerous crops, and growers continue to battle with this pest, despite improved management practices and regular pesticide applications. Many growers must make 5-10 insecticide applications to produce marketable fruit, whereas prior to SWD's introduction, many crops, such as blueberries, required few if any insecticide applications. Blueberries are among SWD's favorite hosts, and Oregon and Washington account for a large portion of the market, with 2014 resulting in a total combined yield of 182 million pounds of fruit valued at over $227 million (NASS 2014).

One of the biggest challenges blueberry growers face when their fruit ripens in fields that have closed canopies is the fruit drop that occurs when machines are driven up and down the rows when a pesticide application must be made. Since the loss can be severe, some growers will opt to apply insecticides via helicopter late in the season. Due to low delivery volume, pesticides applied with a helicopter may not reach the middle to lower levels of the canopy. The purpose of this study was to test the efficacy of several insecticides applied via helicopter in their ability to control SWD in blueberries.

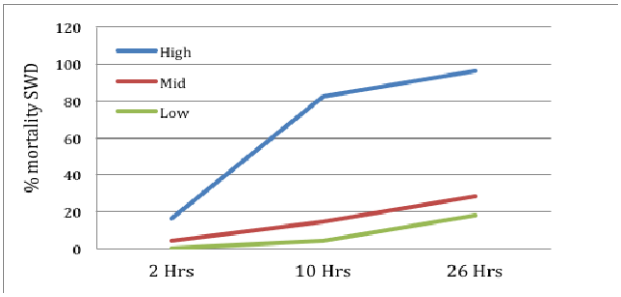
Methods

Helicopter insecticide applications (10 gal/acre) to mature highbush blueberry with closed canopies were evaluated for SWD efficacy between 2011 – 2014 in Salem, Oregon. In 2011, evaluations included screened bioassay cages, each containing 10 SWD from the WSU NWREC colony (Fig. 1). Cages were positioned at different heights (upper, middle and lower) within 5 randomly selected bushes, to evaluate penetration by the helicopter applications. Percent mortality was calculated at 2, 12 and 26 hours after treatment (HAT) (Figs. 3, 4, 5 & 6). Evaluations of helicopter treatments in 2012 were made using leaf residue bioassays consisting of leaves collected from upper, middle and lower positions on each side of randomly selected plants. Bioassays conducted in 2013 contained leaves from upper and middle positions (not evaluated separately), and bioassays in 2014 contained leaves from upper and middle canopy positions (evaluated separately). Each bioassay consisted of 3 leaves, and 5 mixed-sex SWD adults in a Petri dish (Fig. 2), and these were evaluated for percent mortality 24 hours after being assembled.

Figures 1 and 2. Bioassay cage with water sensitive paper affixed to lid in picture on left, and leaf bioassay with SWD in picture on right.

Results

Four insecticide applications were evaluated in 2011: 3 July, Malathion® 8 Aquamul (1.8pts/A); 30 July, Success™ (1.8pts/A); 10 August, Lannate® LV (1.5pts/A) and 2 September, Lannate® LV (1.8pts/A) (Figs. 3, 4, 5 & 6). Mortality was highest in cages placed high in the canopy, and the lowest mortality rates were seen in cages placed in low positions. Both Malathion® 8 Aquamul and Lannate® LV were extremely effective against SWD positioned high in the treated canopy according to 26 HAT evaluations.



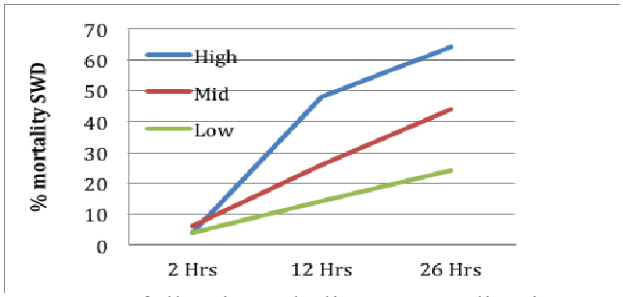
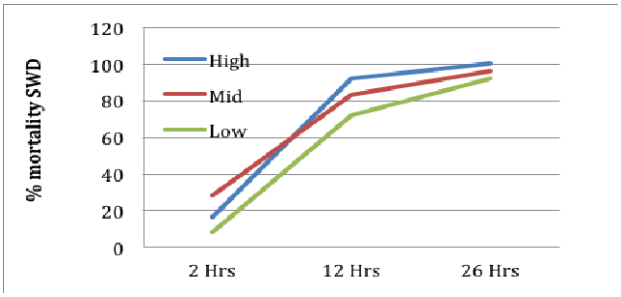


Figure 3 and 4. Percent mortality of SWD in bioassay cages following a helicopter application of 1.8pts/A Malathion® 8 Aquamul on 3 July 2011 in graph on left, and percent mortality of SWD in bioassay cages following a helicopter application of 1.8pts/A Success™ on 30 July in graph on right.



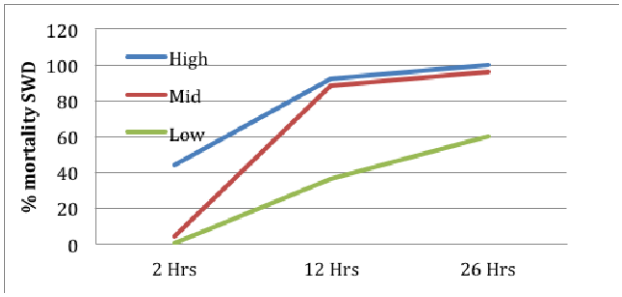
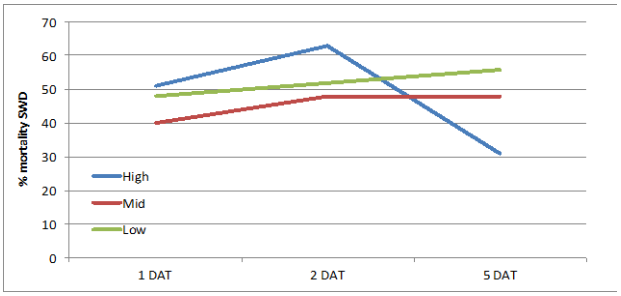
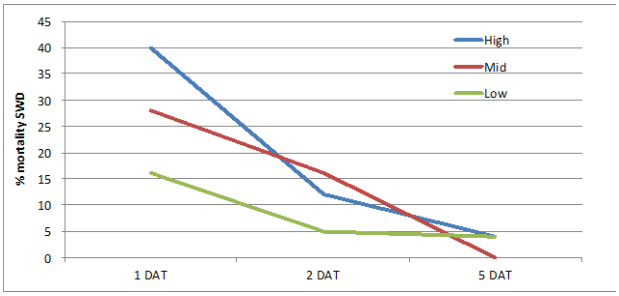


Figure 5 & 6. Percent mortality of SWD in bioassay cages following a helicopter application of 1.5pts/A Lannate® LV on 10 August 2011 in graph on left and percent mortality of SWD in bioassay cages following a helicopter application of 1.8pts/A Lannate® LV on 2 September in graph on right.

Three insecticide applications were evaluated in 2012 via leaf bioassays: 22 July, Mustang Maxx® (4oz/A) (Fig. 7); 22 July, Lannate® (1.8pts/A) (Fig. 8); 22 July, Imidan 70W (1.33lbs/A) (Fig. 9). Leaves were collected from three different canopy positions- high, middle and low, and evaluated separately. Mortality rates followed a similar trend compared with data from 2011, although this was not always consistent. Leaves high in the canopy treated with Mustang Maxx® provided adequate control of SWD for the first couple of days after treatment, while leaves high in the canopy treated with Imidan 70W provided excellent SWD control for the first couple of days before dropping off.





Figures 7 and 8. Percent mortality of SWD in bioassays on field-aged leaf residues following a helicopter application of Mustang Maxx® at 4oz/A on 22 July 2012 in graph on left and percent mortality of SWD in bioassays on field-aged leaf residues following a helicopter application of Lannate® at 1.8pts/A on 22 July in graph on right.

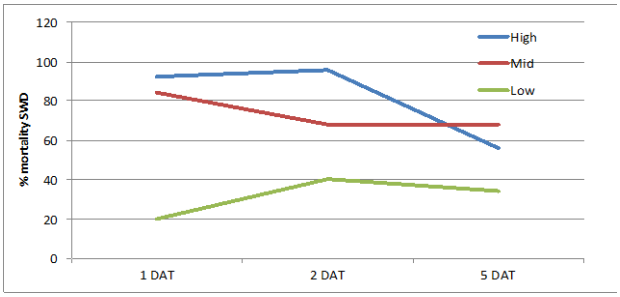
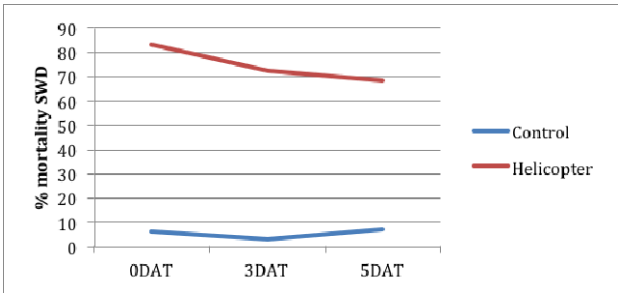


Figure 9. Percent mortality of SWD in bioassays on field-aged leaf residues following a helicopter application of Imidan 70W at 1.33lbs/A on 22 July 2012.

On 4 August 2013, 4oz/A of Mustang Maxx® were applied by helicopter to mature 'Bluecrop' and a bioassay was performed on leaves collected from 2 canopy locations, but these were not evaluated separately as they had been during other years (Fig. 10). Mortality rates were higher in bioassays containing leaves treated with the helicopter-applied insecticide compared with the control. In 2014, 8oz/A Mustang Maxx® + 4oz/A Abound® were applied 20 July. Bioassays were performed at -1, 0, 1, 3, 5 and 7 DAT, and leaves collected from high and middle level canopy positions were evaluated separately (Fig. 11). Mortality rates were similar between bioassays containing leaves from high and middle level canopy positions.



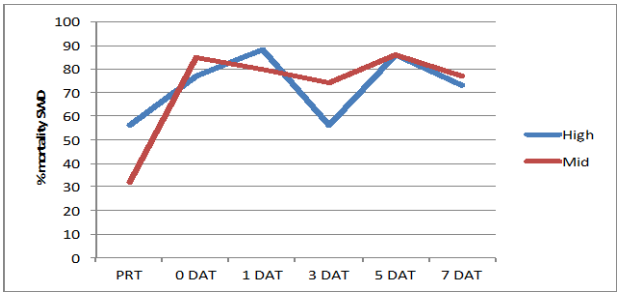


Figure 10 & 11. Percent mortality of SWD in bioassays on field-aged leaf residues following a helicopter application of Mustang Maxx® at 4oz/A, 4 August 2013 in graph on left, and SWD bioassay of field-aged leaf residues following a helicopter application of 8oz/A Mustang Maxx® + 4oz/A Abound®, 20 July 2014.

Discussion

Based on the results obtained from these trials, it was demonstrated that helicopter-applied insecticides can provide adequate coverage on the canopy surface, but may not penetrate the canopy, depending on the chemicals and the extent of canopy closure. It can therefore be concluded that insecticides applied by helicopter will provide quick knockdown against SWD in large fields however, this form of application is expensive and is only economical in large fields.

Works sited

National Agricultural Statistics Service. 2014. 2014 Blueberry Statistics. http://www.nass.usda.gov/Statistics_by_State/New_Jersey/Publications/Blueberry_Statistics/2014%20Blueberry%20Statistics.pdf. Accessed 11/24/15.