

SUMMARY OF SPOTTED WING DROSOPHILA ACTIVITIES IN THE SIMILKAMEEN VALLEY SUMMER 2010

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We undertook a spotted wing drosophila monitoring and public education program for fruit stands and tourists in the Similkameen Valley held a meeting for orchardists and undertook a few additional research projects. The following provides a summary of our activities and a few personal notes on our various projects.

Billboard and Poster

We designed a billboard for our public education program featuring the slogan “Bury, Bag or Freeze”, to encourage passers-by to dispose of unwanted fruit carefully. Since the process of getting approval for the use of public land would have been lengthy, we approached Edith and Wolfgang Schwetje who own and operate the Mariposa fruit stand at the west entrance to Keremeos on the highway. They graciously provided us with billboard space at no cost. See figure 1 in the appendix for the billboard design.

We also designed posters for our public education project that were similar to the billboard, but with more detailed information. See appendix figure 2. These posters were distributed to all fruit stands in Keremeos and Cawston, the Similkameen Visitor’s Centre, the Cawston Store, Valu-Plus Foods in Keremeos and South Valley Sales in Keremeos. We received several additional requests for the poster and modified it for use outside of the Similkameen Valley. It is currently in the process of being translated into Punjabi.

Fruit Stand Operator Education Project

We spoke with every fruit stand operator in Keremeos and Cawston about the risks SWD poses to the soft fruit industry. Most expressed concern about SWD when informed of its ramifications and all agreed to put up posters and traps. We asked everyone how they dealt with their spoiled soft fruit. Some used it in milkshakes or donated it for animal feed. The majority threw the fruit into orchard rows or composted it. We informed operators of safer options for disposal of unsellable fruit such as burying, bagging or freezing. Many expressed concern about the time it would take to process waste and resistance to abandoning their existing composting methods. Several did not have access to enough freezer space for waste fruit or did not have the means to bury it. We checked with operators throughout the summer to see how they were managing their soft fruit waste and found that only a few changed their method of dealing with fruit.

Fruit Stand Monitoring Program

We placed traps at 12 fruit stands in Cawston and Keremeos . These were checked weekly from June 4 and are still being monitored. They were placed next to compost piles and in orchards rows where

spoiled fruit was tossed. We expected to find SWD at fruit stands earlier, particularly with the importation of cherries in June from California and the subsequent arrival of berries from the coast. However SWD did not show up until late July .See figure 3 in appendix. The number of SWD being caught in fruit stand traps is currently still on the rise.

Fifteen additional traps were deployed in a few small orchards run by fruit stand operators at their request (their orchards were not being monitored in the larger SWD monitoring program), in backyard berry patches and near mulberry trees. Far greater numbers of SWD were found in these traps than in the fruit stand traps. Mulberry trees were found to be notable hosts and we suspect that these trees and neglected berry patches could be a fertile breeding ground for SWD. The few homeowners that we have spoken to are concerned about being a source of SWD infestation and we think that this demographic would be a good group to target for further education.

Grower meeting

On August 16 we held a meeting for orchardists at the Cawston Hall. We provided samples of SWD larvae and adults for viewing, demonstrated how to test fruit for larvae, updated people on research and monitoring and had a discussion on potential control strategies for next year. A large part of the discussion focussed on the importance of orchard sanitation and possible methods for dealing with culls. Bagging and freezing culls is impractical for most growers. Potential sanitation methods discussed were tossing fruit into the centre of orchard rows and flail mowing (efficacy of this is untested) and covering cull piles tightly with 1-2 ml clear plastic and allowing it to reach an internal temperature above 35°C for 1 week. A successful sanitation program will require the participation not only of orchardists but of vineyards and home gardeners and implementation will require easily adopted methods and an effective public and grower education program.

Cold storage experiment

We undertook a small pilot study with the help of Cawston Cold Storage to examine the potential of cold storage and/or modified atmospheric packaging (MAP bags) to prevent egg and larval development in nectarines. This study was loosely based on a 1939 report by T. Kanzawa in Japan. Culled nectarines infested with SWD were used in this experiment. Three treatments plus a control were tested; cold storage, cold storage plus MAP bag, and MAP bag at room temperature. Room temperature was kept at approximately 18°C and cold storage fluctuated between -2.2 and +0.4°C Cold temperatures used in the experiment are unrealistic but this is what we had to work with at the time. Fruit was packaged into 20-18 lb boxes with 5 boxes randomly assigned to each of the four treatments. Ten pieces of fruit from each box were randomly selected with a total of 50 pieces of fruit sampled for each treatment combination. Fruit was tested for larvae at 0, 24, 48, 72 and 96 hours by submerging it in an 18% brix solution for 15 minutes. Results can be found in the table below.

Table 1. Percentage of fruit infested with SWD larvae per treatment at 0, 24, 48, 72 and 96 hours.

Treatment	0 hours	24 hours	48 hours	72 hours	96 hours
Control	12%	22%	18%	4%	4%
Cold	16%	8%	0%	0%	0%
MAP bag	12%	4%	2%	0%	0%
MAP + Cold	13%	0%	0%	0%	0%

Plans were to repeat this study on peaches if infested fruit becomes available. Happily this did not happen for peach growers packing fruit at Cawston Cold Storage. I recently spoke with Judy Johnson of the USDA in California and she has been working on cold storage effects on drosophila in grapes in her lab. Her preliminary results suggest that 7 days in cold storage at +0.5°C will pretty much kill 100% of larvae in grapes. More research in this area is required.

Trap colour preference experiment based on work done by Jana Lee (USDA Oregon)

Methods

Thirty apple cider vinegar traps for *Drosophila suzukii* were deployed in 5 fruit trees at a small orchard in Keremeos B.C. Traps were cups of one of 6 colors; black, red, orange, white, clear and yellow. Clear, white and red traps were plastic beer cups purchased from a local grocery store. Beer cups were painted for black, orange and yellow traps. Tree locations were selected because of high trap catches found during monitoring earlier in the season. At each location six traps (one of each color) were set out randomly around the crown of the tree at approximately 1.5 m. Traps were checked 3 times between September 4 and September 30. Flies were identified using keys from Agriculture Canada. Data were analyzed using analysis of variance in R statistical software version 2.10.1. Model assumptions were examined by visual assessment of residual plots and a square root transformation was applied to the response variable. Protected t-tests were used for all post-hoc means comparisons as the p-values for all Anova's were <0.05.

Results

Black and red traps consistently had the highest trap counts on all sampling occasions. Yellow traps consistently had the lowest trap counts on all sampling occasions; see figures 1-3. Tables with mean insect counts are included.

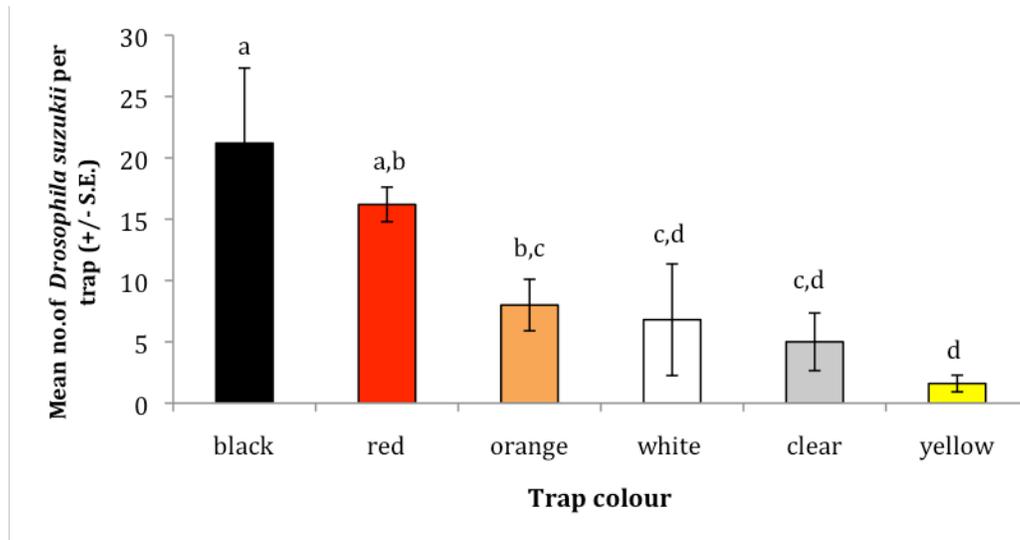


Figure 1. Mean number of *Drosophila suzukii* caught in traps of 6 different colors between September 4 and September 14 was significantly different (ANOVA, $F_{5,24}=6.591$, $p=0.00054$). Trap colors with error bars bearing the same letters did not differ significantly.

Table 1. Mean trap counts and mean trap counts by sex for traps deployed between September 4 and September 14.

Trap color	Males	Females	Total
Black	11.4	9.8	21.2
Red	6	10.2	16.2
Orange	2.8	5.2	8
White	4.2	2.6	6.8
Clear	2.4	2.6	5
Yellow	1	0.6	1.6

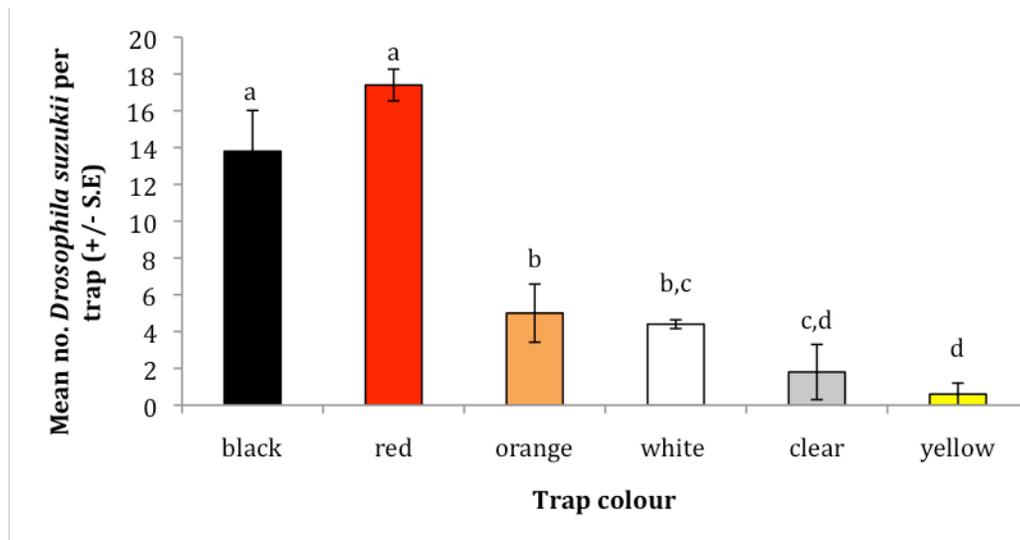


Figure 2. Trap catches of *Drosophila suzukii* between September 14 and September 22 were significantly different in traps of different colors (ANOVA, $F_{5,24}=22.17$, $p=2.08e-08$). Trap catches with error bars bearing the same letters are not significantly different.

Table 2. Mean trap counts and mean trap counts by sex for traps deployed between September 14 and September 22.

Trap color	Males	Females	Total
Black	6.2	7.6	13.8
Red	7.6	9.8	17.4
Orange	3	2	5
White	2.2	2.2	4.4
Clear	0.8	1	1.8
Yellow	0.2	0.4	0.6

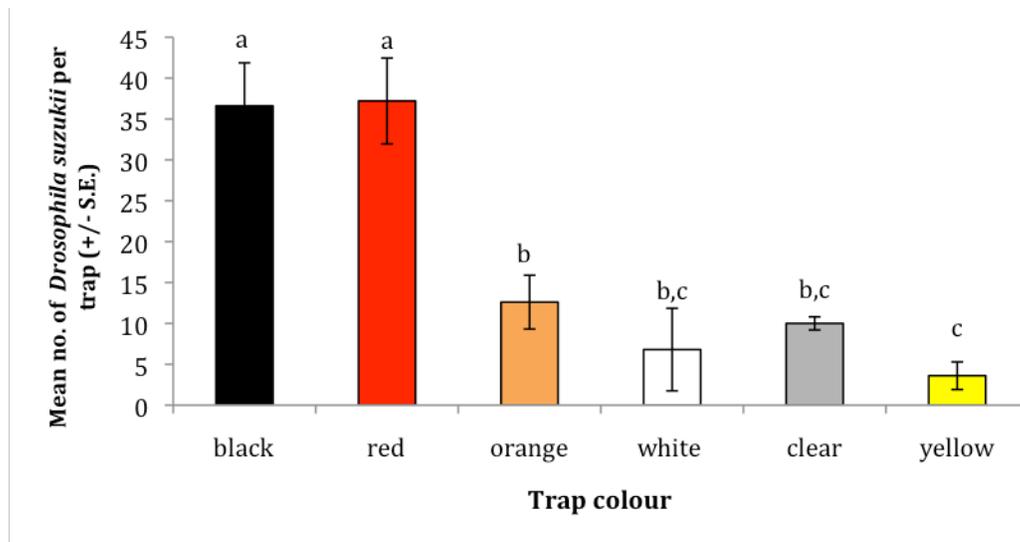


Figure 3. Trap catches of *Drosophila suzukii* between September 22 and September 30 were significantly different in traps of different colors (ANOVA, $F_{5,24}=12.04$, $p=6.59e-06$). Trap catches with error bars bearing the same letters are not significantly different.

Table 3. Mean trap counts and mean trap counts by sex for traps deployed between September 22 and September 30.

Trap color	Males	Females	Total
Black	18.6	18	36.6
Red	22.4	14.8	37.7
Orange	6	6.6	12.6
White	3.8	3	6.8
Clear	4.4	5.6	10
Yellow	1	2.6	3.6

Note: These results should be interpreted with caution as color preference may be different in other months.

APPENDIX

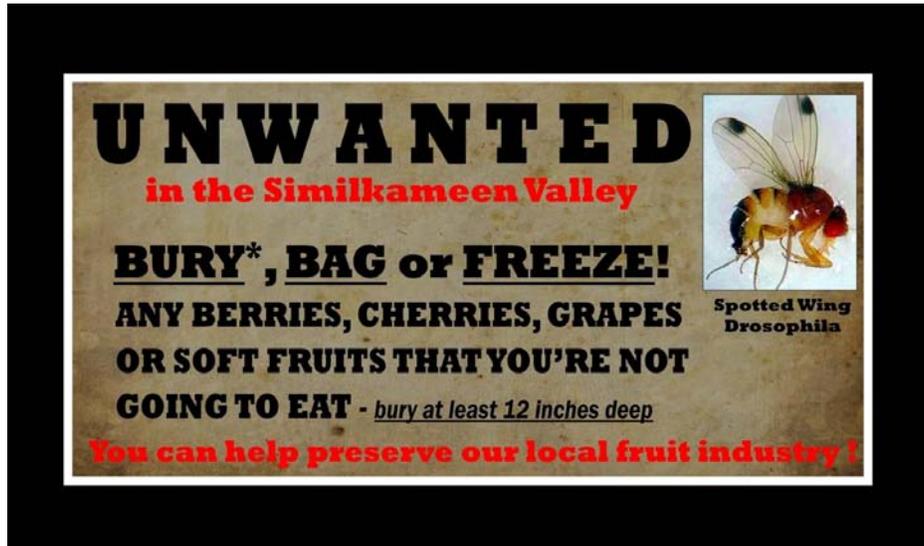


Figure 1. SWD billboard at Mariposa Fruit Stand



Figure 2. Poster created for public education in fruit stands

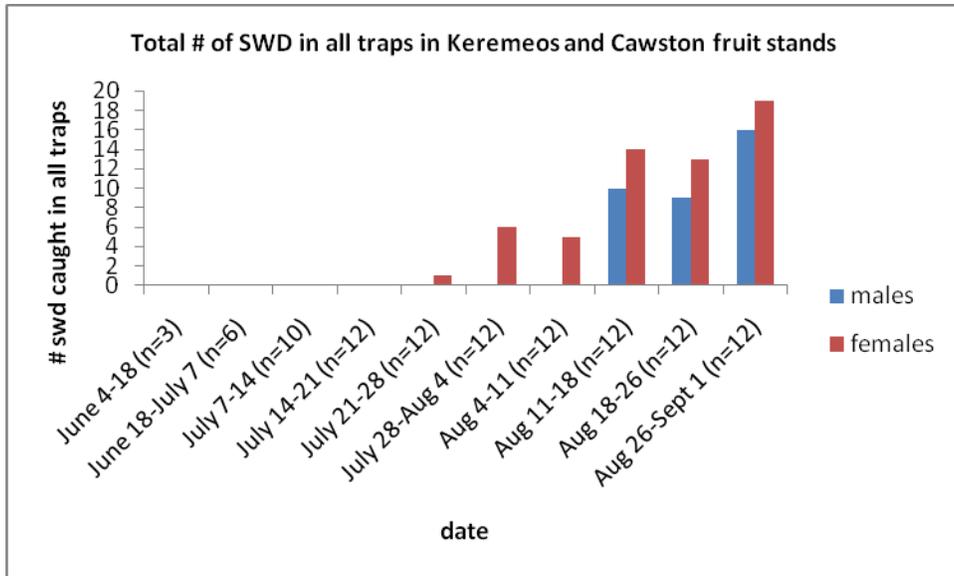


Figure 3. Trap catches of spotted wing drosophila at fruit stands in Cawston and Keremeos. Traps were put up as soon as fruit stands opened, n represents the number of traps up during the time interval.