FINAL PROJECT REPORT

Project Title: Assessing the field efficacy of SPLAT in the control of *D.suzukii*

PI: Dalila Rendon, postdoctoral research associate
Organization: Oregon State University, Mid-Columbia Agricultural Research and Extension Center, Hood River.
Telephone: 5036797690
Email: Dalila.rendon@oregonstate.com

Co-PI: Vaughn Walton, professor
Organization: Oregon State University, Department of Horticulture
Telephone: 5417404149
Email: Vaughn.walton@oregonstate.edu

Cooperators: Steve Castagnoli, ISCA technologies Inc., Cooper Orchards (owner: Stacey Cooper).

Other funding sources: None

Total Project Funding: $11,480

Budget:
Year 1 (2017): $11,480

Item	**2017**
Wages[1]	$6,000
Benefits[2]	$600
Equipment[3] **and consumable supplies**[4]	$4,500
Travel[5]	$380
Total	$11,480

Footnotes:
[1]Wages: 400hr for a Biological Science Tech. at $15.00/hr (40 hrs per week for 10 weeks).
[2]OPE: 10% of the wage.
[3]Equipment: Sprayer backpack, replacement nozzles and hoses, personal protective equipment.
[4]Supplies: Traps, lures, containers, insect cages.
[5]Travel: Weekly travel to orchards in The Dalles for 10 weeks, at $0.535 per mile.

OBJECTIVES

1) To evaluate the efficacy of the insecticidal bait SPLAT-SWD used in conjunction with a growers conventional spray schedule during the cherry growing season in controlling SWD fruit infestation and adult populations.
2) To evaluate the post-harvest efficacy of the insecticidal bait SPLAT-SWD in controlling SWD fruit infestation and adult populations, when no other insecticides are being applied and SWD pressure is high

SIGNIFICANT FINDINGS

1) *D. suzukii* pressure during pre-harvest was too low to draw any significant conclusions of the efficacy of SPLAT SWD. We did not find any flies in traps or cherry infestation, presumably due to the conventional insecticide spray schedule.
2) *D. suzukii* populations slightly increased after harvest; we found that even though SPLAT SWD treatment plots had fewer *D. suzukii* traps counts, this result is not statistically significant and cannot be positively attributed to the SPLAT SWD applications
3) We did not find any infested cherries in either SPLAT SWD or untreated control plots. Again, this might be a result of low *D. suzukii* pressure in 2017, and conventional insecticide applications.
4) Future testing should be done outside of the growing season (post-harvest) to avoid any interference with conventional insecticide sprays, and to have a more robust *D. suzukii* population that will allow for comparisons.

RESULTS AND DISCUSSION

Initial *D. suzukii* populations from both control and SPLAT SWD treatment conditions were low; however, these increased later in the experimental period (Figure 1). The analysis showed no significant difference between SWD trap counts in control and SPLAT treatment plots ($F_{1,260}$=0.006, p=0.94, Table 1). In addition, there was no statistically significant difference between the treatments and plot location ($F_{1,260}$=0.59, p=0.44, Table 2).

These Regina blocks were sprayed for SWD with a rotation of Spinetoram (6/3), Lambda-Cyhalothrin (6/14), and imidacloprid (6/24). Harvest was completed on 7/21.

The main objective of this experimental trial was to decrease the population of *D. suzukii* laying eggs actively in the crop. However, we were unable to assess infestation rates in the cherry samples collected, since there was no infestation found in the SPLAT SWD treatment or in the control plots. Out of all the cherries collected from the orchard, not a single cherry had been infested by *D. suzukii*.

Before this trap and kill alternative strategy can be implemented against SWD, it will require improvements. For instance, in blueberry crops, SPLAT SWD seemed to wear off in a short amount of time, which can decrease the length of volatile exposure in the crop (Park K., personal communication). In addition, the spinosad concentration in the SPLAT SWD is very small compared to the maximum amount of spinosad per acre that can be applied. Increasing the concentration of spinosad in the bait spray might result in significantly differences between the two treatments.

Any potential effects of SPLAT SWD can also be overshadowed by the standard spray schedule (a rotation of spinosyns, pyrethroids, and neonicotinoids). Future trials should be done in either unsprayed blocks, or after harvest when no other commercial insecticides are being applied. We only

started finding flies in traps on 8/31 (Figure 1), after the seventh SPLAT SWD application, 40 days after harvest (7/21), and more than two months after the last SWD conventional insecticide spray (imidacloprid on 6/24). This means that six SPLAT applications were wasted in the sense that there were no flies in any traps to make any comparisons at all. In general, 2017 was a low-pressure year for *D. suzukii* in the Hood River and Wasco counties, and fewer traps counts were recorded compared to 2016 and 2015 (Lynn Long, personal communication). A general low presence of *D. suzukii* and absence of oviposition makes it difficult to assess the true efficacy of SPLAT SWD. As such, it is recommended that this product continue to be tested to account for *D. suzukii* population fluctuations in future seasons, but SPLAT applications and trap and fruit monitoring should begin after harvest.

From an economic perspective, SPLAT SWD applications involve more labor than other conventional insecticide applications. SPLAT was applied by one investigator using a backpack sprayer walking between orchard rows. The approximate time spent to do applications was one acre per hour (by foot). This is because SPLAT SWD has to be aimed directly at the tree trunk, preferably above the irrigation line, and this can be time consuming in trees with large canopies. For large scale growers, this is clearly not an effective method. Future applications should be done in ATV. It is possible to also place uniform surfaces along the orchards where SPLAT can be automatically applied (such as wooden planks or plastic sheets), thereby saving time by not focusing on having to avoid contact with fruit or foliage.

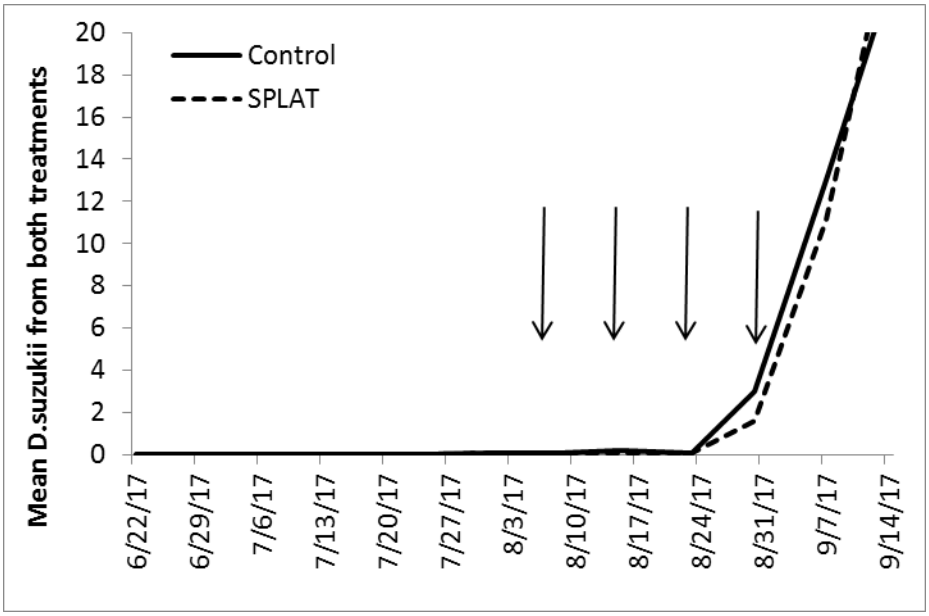

Figure 1. The weekly total number of *D. suzukii* adults of either gender, collected from the monitoring trap using yeast and sugar water. The four arrows indicate the last four SPLAT SWD applications.

Table 1. SWD trap count (mean ± SD) in the two treatment plots in Cooper orchard during 2017.

Treatment	Total SWD
SPLAT	3.43±8.786
Control	3.52±8.66

Table 2. SWD trap count (mean ± SD) collected from two different plot locations per treatment.

Treatment	Plot Location	Mean
SPLAT	Edge	3.51±9.37
SPLAT	Middle	3.35±8.23
Control	Edge	2.77±7.62
Control	Middle	4.25±9.59

EXECUTIVE SUMMARY

This report provides an assessment of a developing product, SPLAT SWD by ISCA technologies. The aim is to develop an effective chemical lure for an attract-and-kill strategy that can be implemented in cherry orchards against *D. suzukii*. A SPLAT SWD bait spray was applied to commercial cherry plots weekly for eight weeks, two pre-harvest, and six post-harvest applications. We compared number of *D. suzukii* trap counts and percent infested fruit in SPLAT SWD treated plots (n = 3), and untreated control plots (n = 3); both treatments still received the grower's conventional insecticide applications before harvest. There were numerically fewer *Drosophila suzukii* adults in SPLAT SWD treated plots compared to control plots without SWD SPLAT applications, however, these differences were not statistically significant. We found no *D. suzukii* infestation (eggs or larvae) in cherries from either SPLAP SWD or untreated control plots. While there may be limitations to be improved with the chemical formulation of SPLAT SWD, a low-pressure year also made it difficult to draw conclusions regarding its effectiveness. As such, it is important to continue testing this product to account for natural population fluctuations in different years. To test the efficacy of SPLAT SWD without interference from grower's conventional insecticide sprays, we recommend applying and monitoring later in the season, and potentially perform all SPLAT applications post-harvest, when *D. suzukii* trap counts can be compared. We also make recommendations on how to apply SPLAT; for instance, perform the applications on a motorized vehicle, and install spray surfaces on the orchard to apply SPLAT SWD more easily without the hassle of having to avoid contact with fruit and foliage. As we learn more about the chemical ecology and population biology of *D. suzukii*, we believe that it is essential to continue the quest for environmentally-friendly and cost effective management methods.

REFERENCES:

Bolda, M. P., Goodhue, R. E., & Zalom, F. G. (2010). Spotted wing drosophila: potential economic impact of a newly established pest. *Agric. Resour. Econ. Update*, *13*, 5-8.

Dreves, A., Walton, V. M., Fisher, Glenn C, & Oregon State University. Extension Service. (2009). *A new pest attacking healthy ripening fruit in Oregon : Spotted wing Drosophila: Drosophila suzukii (Matsumura)* (EM (Oregon State University. Extension Service) ; 8991). Corvallis, Or.]: Oregon State University, Extension Service.

National Agricultural Statistics Service. Agricultural Statistics 2015. United States Department of Agriculture. https://www.nass.usda.gov/Publications/Ag_Statistics/2015/Ag_Stats_2015_complete%20publication.pdf

Rota-Stabelli, Omar, Blaxter, Mark, & Anfora, Gianfranco. (2013). Drosophila suzukii. *Current Biology*, *23*(1), R8-R9.

Tochen, S., Dalton, D. T., Wiman, N., Hamm, C., Shearer, P. W., & Walton, V. M. (2014). Temperature-related development and population parameters for Drosophila suzukii (Diptera: Drosophilidae) on cherry and blueberry. *Environmental Entomology*, *43*(2), 501-510.

Walsh, D. B., Bolda, M. P., Goodhue, R. E., Dreves, A. J., Lee, J., Bruck, D. J., ... & Zalom, F. G. (2011). Drosophila suzukii (Diptera: Drosophilidae): invasive pest of ripening soft fruit expanding its geographic range and damage potential. *Journal of Integrated Pest Management*, *2*(1), G1-G7.