Drosophila suzukii Infestation Analysis in Washington County

Introduction

The Spotted Wing Drosophila (SWD) or *Drosophila Suzukii*, also known as the Japanese Fruit Fly, is an invasive species that is particularly harmful to blueberry and cane berry farmers in Washington County, Oregon. Since it is a relatively new invasive species, there have not been extensive research efforts aimed at helping small specialty berry farmers understand the effect of insecticide application on SWD infestations.

Current efforts to map the population distribution are focusing on a state-wide scale, showing the total population per county, and are lacking any local scale analysis, (Dreves, 2011).

Local berry farmers could benefit from a system that can help them monitor and understand the effectiveness of infestation management techniques such as insecticide application on their crops.

This project aims to create a system of georeferenced traps in berry fields on Iowa Hill, Washington County, from which population counts of SWD can be collected. This count data along with information collected from the farmers on insecticide use can then be brought into ESRI's ArcGIS to map and analyze the effect of insecticide spraying on the distribution and population count.

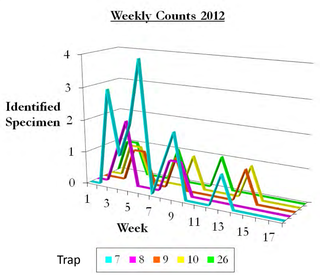
Methodology

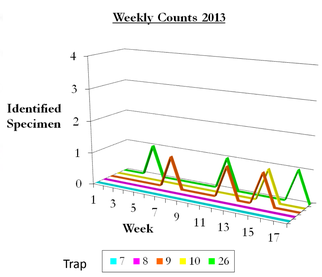
Traps, clear 20 oz. plastic cups with holes punched in the side, attractant in the bottom, and a lid on top, were placed in four of the Iowa Hill blueberry fields. The location of the traps were chosen for their different proximity to the target species overwintering grounds (forested areas) and their location either outside or within the areas where perimeter spraying of insecticide occurs. These fields were chosen for this study because of their close proximity to one another, and the differing land cover in the areas around each field.

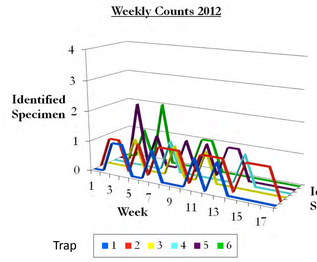
The SWD Trap, Field Polygon, and Spray line data were collected with a Juno Trimble 3B, real-time WAAS enabled differential correction using the WGS 84 datum, then projected using ITRF 2000. The average occupation time for each point gathered was approximately three to four minutes.

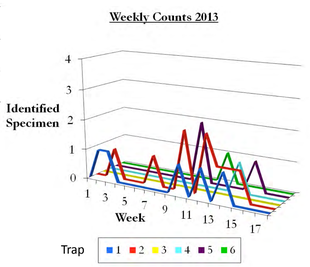
Monitoring begins the first week of May, as this species begins to prey on berry crops in May, and continues for 18 weeks. The counts of identified species for the 2012 and 2013 harvest seasons were provided by Rick's Independent Crop Consulting Service. The basemap is Esri's satellite imagery. The spray area is based on a 70 foot buffer along the spray lines, which corresponds with the area where insecticide application occurs.

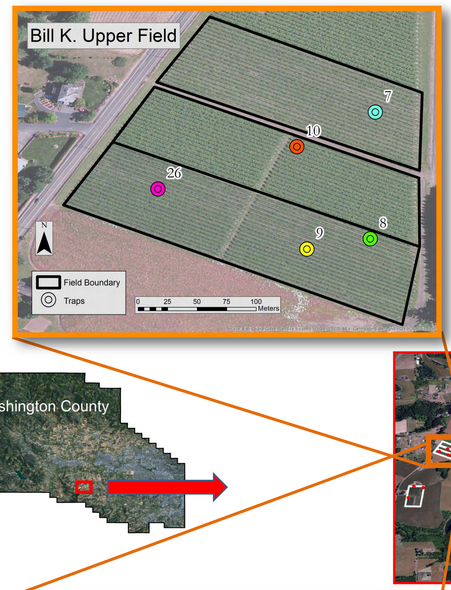
Our analysis consists of two parts. The first part is to collect and organize SWD count data into a database and create charts and corresponding maps that will make it easy to visualize patterns of population counts and spatial distribution. The second part aims to show relationships between population counts and the areas on the fields where insecticides are used.





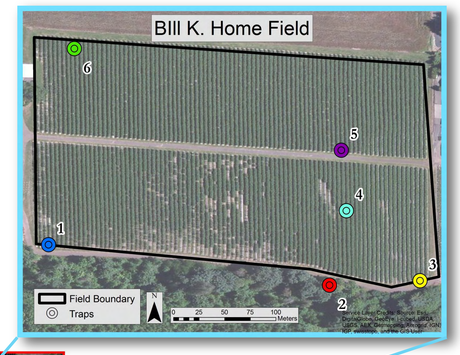


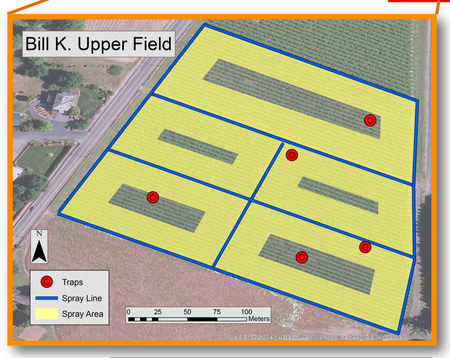




Analysis Part 1:

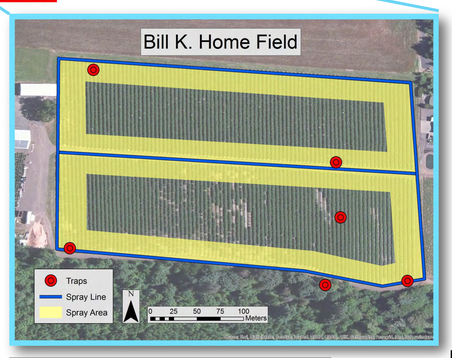
The charts above show the population counts for each trap for the 18 weeks. The location of the traps are shown on farmer Bill K.' s upper and home field in the corresponding maps.

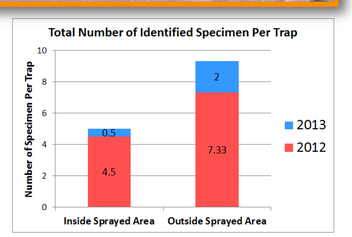


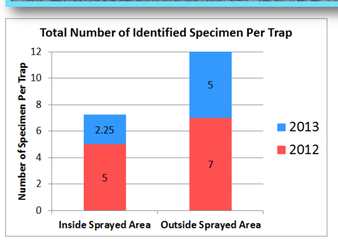


Analysis Part 2:

The maps to the left and right show the location of the traps on the fields and the areas of the fields that receive insecticide applications. The following tables sum up the total average number of population counts in traps located inside sprayed areas vs. outside sprayed areas.







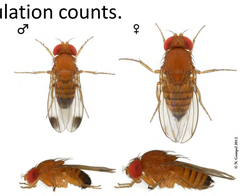
Precision & Accuracy

Horizontal
Mean = 2.71m.
Median = 2.7m.
Min. = 2.3m.
Max. = 3.6m.
Vertical
Mean = 4.9m.
Median = 4.8m.
Min. = 3.7m.
Max. = 6.2m.
Max. Potential Dilution of Position (PDOP)
Mean = 2.39
Median = 1.8
Min. =1.4
Max. = 16.6

Results & Conclusions

The results from the first part of the analysis show that the relationship between the population counts and the locations of the corresponding traps on the fields vary between each week and year but there are in fact some noticeable clusters and patterns. The second part of the analysis shows that the traps located outside of sprayed areas have greater population counts and population counts are overall less in 2013 than in 2012.

We decided to focus on years 2012 and 2013 because there have not been any identified specimen for the current year as of May, 2014. The usefulness of our database system is that as the 2014 season progresses and the SWD emerge and become active, the weekly collected data can then be recorded and the same analysis can be conducted. This infestation analysis can continue to be employed for future years to better understand the spatial distribution of this invasive species. This analysis could also potentially be used to analyze other infestation management techniques besides insecticides. It is important to note that a limitation to this project is that since we were not able to obtain actual dates of insecticide applications, we cannot positively correlate the insecticide applications to dips in weekly population counts but we can make predictions as to which weeks the insecticides were sprayed based on rises and falls of population counts.



Source: www.happyberry.fr

Photo: Ian Blem

References:
Dreves, A.J., Langellotto-Rhodaback, G.A. (2011) *Protecting Garden Fruits From Spotted Wing Drosophila.* Retrieved from: http://spottedwing.org/system/files/em9026_0.pdf
Dreves, A.J., Ohrn, A. (2014) *A Warm-up: Management Tools for SWD.*

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Rick's Independent Crop Consulting Service

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June 9, 2014