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2014 CCE Summer Internships

CATEGORY ARCHIVES: EMPLOYING BIOLOGICAL CONTROL MEASURES TO MANAGE SPOTTED WING DROSOPHILA (SWD) IN COMMERCIAL AND ORGANIC SMALL FRUIT PRODUCTION SYSTEMS.

SWD Monitoring in NYS

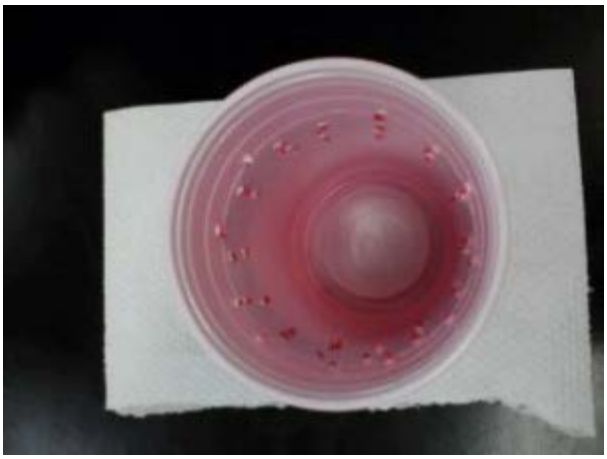
Posted on **July 23, 2014** by **angara2450**

This summer, New York State will be using standardized SWD monitoring traps to aid in data collection. You may see these SWD monitoring traps around your favorite local farm – likely located near the forest line or a berry patch.

Here's a picture of the outside of an SWD monitoring trap:

The cups are red and black because existing research indicates SWD are most attracted to red and black. Why? It may be because raspberries (often red) and blackberries (black) are very attractive soft fruit for the flies.

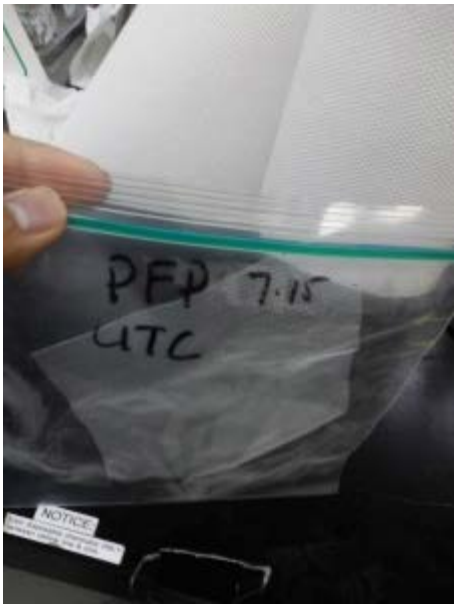
The trap also has about 40 holes to allow SWD to enter.



Inside the cup, we have hot glued a smaller “bait” cup. A yeast bait goes into this small cup.

The yeast bait is very attractive for SWD. It consists of the ingredients above – dry yeast, whole wheat flower, sugar, apple cider vinegar – as well as water. Mesh and a cap with a hole in it are placed over the small bait cup. The cap hole allows the smells to better travel out of the trap and attract SWD. The mesh prevents SWD from going into the bait cup.

Instead, the SWD fall into some apple cider vinegar that we place at the bottom of the red solo cup trap. To check the monitoring trap, we pour out the contents of the apple cider vinegar onto a thin mesh, as shown below:



We label a zip lock bag with the location and date, and place the corresponding mesh with filtrates into the bag. At the lab, we analyze the insects under a microscope to check for the presence of SWD.

Posted in **Employing Biological Control Measures To Manage Spotted Wing Drosophila (SWD) In Commercial and Organic Small Fruit Production Systems.**

How do we find the ideal SWD attractant? [Part III]

Posted on **July 15, 2014** by **angara2450**

Data is only useful when statistically analyzed. The last post gave an overview of which attractants were tested and gave insight into the raw data.

A t-test was chosen as a simple and effective choice for understanding the data. The null hypothesis of a t-test states that the difference between the means of two different groups is zero. Thus, a rejection of the null hypothesis would indicate that the two attractants in the binary test had the same usefulness.

```
> data = read.csv("50FF-50ACV v. RI.csv")
Warning message:
In read.table(file = file, header = header, sep = sep, quote = quote,  :
  incomplete final line found by readTableHeader on '50FF-50ACV v. RI.csv'
> data
  X50..FF...50..ACV RI
1                 9  6
2                 7  7
3                 9  7
4                 8  6
> FFACV = data[1]
> RI = data[2]
> FFACV
  X50..FF...50..ACV
1                 9
2                 7
3                 9
4                 8
> RI
  RI
1  6
2  7
3  7
4  6
> t.test(FFACV, RI)

    Welch Two Sample t-test

data:  FFACV and RI
t = 3.1305, df = 4.927, p-value = 0.02647
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 0.3065742 3.1934258
sample estimates:
mean of x mean of y
     8.25      6.50
```

Figure 1. A sample of the R-code used to perform the two sample t-tests. The result of the test [bottom of image] indicates a p-value of 0.02647 at a confidence interval of 95%. 0.02647 < 0.05, so the difference between the two attractants is significant.

Overall, the important findings can be envisioned as followed:

Standard yeast bait <

Raspberry Vinegar Infusion <

75% ACV / 25% Raspberry Juice Concentrate =

50% ACV / 50% Raspberry Juice Concentrate <

100% Raspberry Juice Concentrate

Posted in **Employing Biological Control Measures To Manage Spotted Wing Drosophila (SWD) In Commercial and Organic Small Fruit Production Systems.**

How do we find the ideal SWD attractant? [Part 2]

Posted on **July 15, 2014** by **angara2450**

In Part I, I explained the basic methods behind a typical binary attractant experiment. But what substances did we actually test? And what were the results of those tests?

We tested three main attractants, along with various combinations of each:

– Apple Cider Vinegar

– Raspberry Vinegar Infusion

– Raspberry Juice Concentrate

Figure 1. From left to right: Raspberry Juice concentrate, ACV, Raspberry Infusion

We also tested various combinations, notably:

– 50% Raspberry concentrate / 50% ACV

– 75% Raspberry concentrate / 25% ACV

After conducting the aforementioned binary attractant tests, data was retrieved regarding the attractant efficiencies. The two way comparisons gave several trials of useful information, organized as seen below:

75% ACV/25%	RI
5	6
7	6
6	7
7	3
9	3
7	4

Figure 2. Each column represents the respective substance. Each row represents one replicate of the binary comparison test. The numbers indicate number of SWD collected from the respective attractant during the replicate.

Posted in **Employing Biological Control Measures To Manage Spotted Wing Drosophila (SWD) In Commercial and Organic Small Fruit Production Systems.**

How do we find the best SWD attractant? [Part I]

Posted on **July 2, 2014** by **angara2450**

The major goal of this project is to create an organic product that will combat SWD for organic growers. The product will have two components: An attractant, and an insecticide.

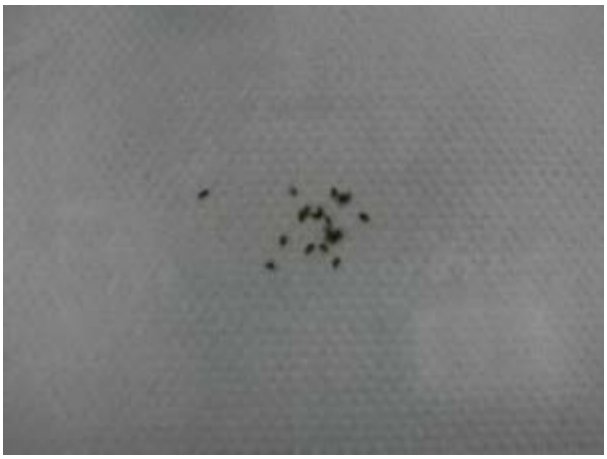
We began testing for effective organic attractants a few weeks ago. After a few preliminary tests to determine an ideal experimental set-up, the following binary attractant test was chosen:

Binary Attractant Test: Two small petri dishes with four holes drilled into their lids are filled with 5 mL of two different attractants. The petri dishes are placed on opposite sides of the container's bottom. Between the two petri dishes, a cylindrical tower is placed with a large petri dish on its top. The container lid has fine mesh to allow the exchange of air in the container while prevention SWD escape.

HVL has a colony of SWD that was used to find SWD for the binary attractant tests.

A typical fly tube: The plastic tube contains blue fly media that allows the SWD to grow and reproduce.

The tubes were refrigerated to put the flies to sleep. An equal number male and female flies were collected for each test replicate (normally about 12 – 14 flies per replicate) using an aspirator.



Flies are put on an ice pack to keep them asleep during the sorting process.

Posted in **Employing Biological Control Measures To Manage Spotted Wing Drosophila (SWD) In Commercial and Organic Small Fruit Production Systems.**

Experimental Locations

Posted on **June 4, 2014** by **angara2450**

Field work differs greatly from lab work in that **geography and weather play an important role in determining experimental outcome**.

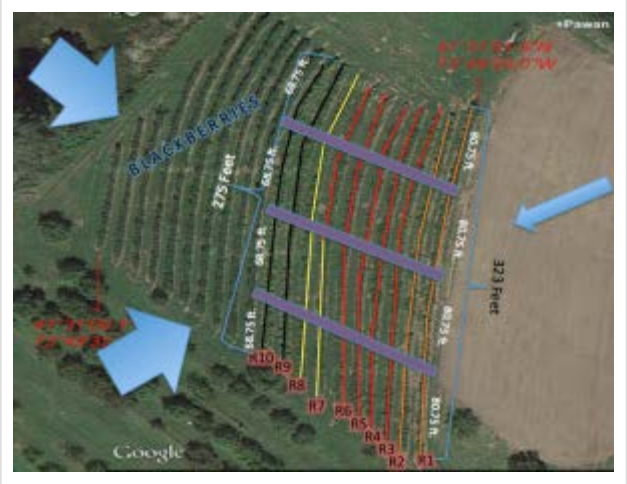
SWD move into an orchard from the forest. Therefore, it is important that we take the forest line into account when retrieving and analyzing data.

This SWD experiment focuses on raspberries – a soft fruit that greatly attracts SWD. The type of raspberry (i.e. Mac black raspberry vs. Yellow Raspberry) will likely affect SWD damage and resistance.

We visited the three experimental sites: Fishkill Farms, Poughkeepsie Farm Project, and Westwind Orchard to get a better understanding of raspberry row length, distance from forest line, and other important geographic features to note.

Most of my work will be conducted at Fishkill Farms. That being said, here are two maps I created that represent several important aspects of the experiment:

The yellow line highlights the forest line. The blue arrows indicate possible SWD impact from forest line (considering forest density and proximity to the berry patch).



MAP KEY:

RED = Red Raspberry

ORANGE = Prelude Raspberry

YELLOW = Yellow Raspberry

BLACK = Mac black Raspberry

Blue arrows indicate possible SWD impact from forest line.

Purple bars indicate boundaries of quadrants.

Posted in **Employing Biological Control Measures To Manage Spotted Wing Drosophila (SWD) In Commercial and Organic Small Fruit Production Systems.**

Introduction

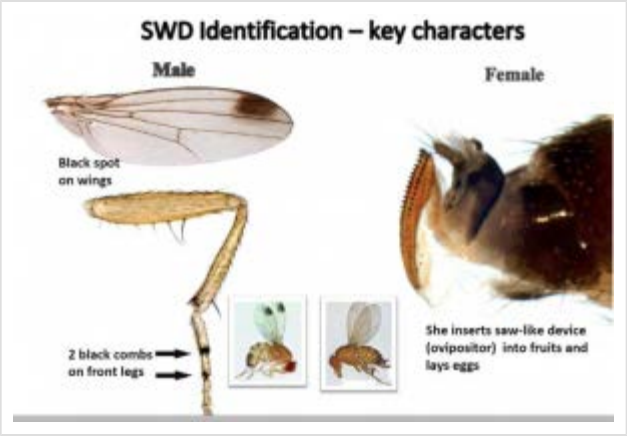
Posted on **June 4, 2014** by **angara2450**

Hello blog readers! My name is Pawan Angara, and I am a rising junior in Cornell CALS.

This summer, I am working with a great team at Hudson Valley Laboratory to **research biological control methods for Spotted Wing Drosophila (*Drosophila Suzukii)*.**

You might be wondering something along the lines of **"Why does this project matter?"**

Well, Spotted Wing Drosophila (SWD) has become a major issue for NYS farmers within the last three years. SWD, an invasive species from Asia, **has the ability to oviposit in soft fruit (raspberries, blackberries, cherries, etc.) at any time during the fruit's lifecycle.** SWD stands in stark contrast to *Drosophila melanogaster,* which can only oviposit in fruit that are overripe or already damaged.



Subsequently, **SWD causes major economic loss for farmers by ruining perfectly viable fruit.**

Organic farmers, who do not use chemical pesticides on their crops, would greatly benefit from a way to biologically control SWD. This project will focus on **using the entomopathogenic fungus, *Beauveria bassiana*, to control SWD populations in small organic fruit production systems.**

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