Standard sample = 2 qt berries, salt solution 1 qt at a time, 1/4C salt in 1 qt of warm water
<table>
<thead>
<tr>
<th>Date</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
<th>Collected Salt</th>
<th>Date</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
<th>Total</th>
<th>Collect Salt</th>
</tr>
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<tbody>
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<td>1</td>
<td>1</td>
<td>30-Jul</td>
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<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23-Jul knocked over</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1-Aug</td>
<td>0</td>
<td>1</td>
<td>1</td>
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<td></td>
</tr>
<tr>
<td>23-Jul</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>1-Aug</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23-Jul</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1-Aug</td>
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<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23-Jul</td>
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<td>0</td>
<td>1</td>
<td>1</td>
<td>1-Aug 83</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>1-Aug</td>
<td>0</td>
<td>1</td>
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<td></td>
</tr>
<tr>
<td>24-Jul knocked over</td>
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<td></td>
<td></td>
<td></td>
<td>1-Aug</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
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<td>24-Jul</td>
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</tr>
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<td>0</td>
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<td>2</td>
<td>30-Jul</td>
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<td>1</td>
<td>1-Aug</td>
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<td>1</td>
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</tr>
<tr>
<td>24-Jul</td>
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<td>0</td>
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<td>1-Aug</td>
<td>0</td>
<td>1</td>
<td>1</td>
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</tr>
</tbody>
</table>

Section of Blueberry Record 2012
Fld Count 7/16=64, 7/24=61
From machine picker on 7/25

<table>
<thead>
<tr>
<th></th>
<th>Slow freeze</th>
<th>Fast freeze</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual</td>
<td>8</td>
<td>6</td>
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<tr>
<td>Float</td>
<td>132</td>
<td>113</td>
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## Samples from Commercial Vineyards 2012

<table>
<thead>
<tr>
<th>Date</th>
<th>Variety</th>
<th>Location</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
<th>Total fruit</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-Sep</td>
<td>Natives</td>
<td>At. Co.</td>
<td>4</td>
<td>3</td>
<td>7</td>
<td>29</td>
</tr>
<tr>
<td>5-Sep</td>
<td>Natives</td>
<td>At. Co.</td>
<td>1</td>
<td>5</td>
<td>6</td>
<td>102</td>
</tr>
<tr>
<td>11-Oct</td>
<td>2 rows in</td>
<td>At. Co.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>41</td>
</tr>
<tr>
<td>4-Oct</td>
<td>Syrah</td>
<td>Richwood</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4-Oct</td>
<td>Merlot</td>
<td>Richwood</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1-Oct</td>
<td>Cab Sauv old</td>
<td>Cumb. Co.</td>
<td>3</td>
<td>2</td>
<td>5</td>
<td>33</td>
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<tr>
<td>1-Oct</td>
<td>Cab Sauv</td>
<td>Cumb. Co.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>11-Oct</td>
<td>Cab Sauv</td>
<td>Richwood</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Spotted Wing Drosophila in PA

Kathy Demchak
David Biddinger
Neelendra Joshi
Penn State University
2012
General Observations

- First catches in July
- No catches in June strawberries
- Found all summer long in cherries with no crop
- PA Dept. of Ag found SWD in August in lumberyards and mills while looking for beetles (Why? Sap? Cherry wood?)
- Highest catches so far from wild blackberry patches, also in pokeberries
2012 Commercial Berries

- 2011 hot spot (commercial raspberries, Adams Co.) had few problems this year
  - Manageable if growers take vigilant proactive approach – keeping fruit harvested, spraying to keep populations low
- Other operations where SWD “got ahead of them” had to shut down harvest
  - Blueberries, blackberries, day-neutral strawberries
- Unclear regarding wine grapes
Right now

- Still catching high numbers (literally hundreds/trap/day)
  - Especially in wooded settings (wild blackberries, protection?) - nearly 100% SWD
  - Also around compost piles (warmth? protection?)
- Some in high tunnels, but mostly other fruit fly species
Survey results may not reflect reality

15 Respondents from 5 counties in CT

40 / 110 acres affected

Cherry: 0
June strawberries: 0
Summer raspberries: 50 half pints, $125
Fall raspberries: ~2,100 lb., $9,400
Blackberry: total loss, $1,000 – 2,000
Blueberry: 40 half pints, $160
Other: grape, 5% loss (35 lb.)
Reality

Sweet cherries
damaged if not protected with spray

Blueberries
major losses if “holes” in spray program

Raspberries and blackberries
some infestation with best spray program
sanitation required

Day neutral strawberries
barely manageable, like fall raspberries
Costs

Increased sprays, chemical and labor
Trap and scouting labor

Increased losses

Damage to peaches in fruit stand
Removed 150 vines in vineyard, out of business
Sanitation removal of all fruit, restart
Loss of fruit from poor efficacy of Pyganic
Two-bucket picking of raspberries, wine
Rhode Island
Heather Faubert

Set traps - 6/21/12
1st SWD - 6/27/12
1st larvae - 7/6/12
High tunnel fall raspberries

9/18/12 – 89% infested
  21 larvae/berry

10/1/12 – 97% infested
  15 larvae/berry

10/15/12 – 96% infested
  11 larvae/berry
Compare V/G/A with V/G/A + yeast
Yeast-enhanced trap >2x SWD
Wood-edge traps

Yeast-enhanced vs. straight V/G/A
Northeast Field Update
New York

Spotted Wing Drosophila

Juliet Carroll
Fruit IPM Coordinator
NYS IPM Program
People monitoring SWD - 2012

**Traps – 11 people**
- Faruque Zaman, CCE Long Island HREC
- Emily Klamberg Cook, CCE Ulster County
- James O’Connell, CCE Ulster County
- Mike Fargione, CCE HVFP
- Peter Jentsch, Entomology, Highland
- Laura McDermott, CCE Capital District V&SFP
- Amy Ivy, CCE Clinton County
- Hans Walter-Peterson, CCE FLGP
- Art Agnello, Entomology, Geneva
- Greg Loeb, Entomology, Geneva
- Juliet Carroll, IPM, Geneva
- Marion Zeufle, IPM Geneva
- Debbie Breth, CCE LOFP

**1st detection late June**
**Peak catch August to September**
**Peak larval infestations late August**

**Rearing – 6 people**
- Faruque Zaman
- Peter Jentsch
- Amy Ivy
- Greg Loeb
- Juliet Carroll
- Marion Zeufle

**Now it’s statewide**

**Larvae in fruit – many people**
- Growers, Montgomery & Broome Counties, etc., etc.
- Cathy Heidenreich, Horticulture, Ithaca
- Master Gardeners, CCE Chautauqua County
- Jim Eve, Eve Farm Service
- Stephanie Mehlenbacher, CCE Steuben County
- Jeff Miller, CCE Oneida County
- Sue Gwise, CCE Jefferson County
- Paul Hetzler, CCE St. Lawrence County

10X the number of flies in 2011
Crops and wild hosts SWD - 2012

**Crops**
- June strawberry
- day neutral strawberry
- summer raspberry
- fall raspberry
- blackberry
- blueberry
- sweet cherry (?)
- plum (?)
- peach
- grape

**Wild hosts**
- buckthorn
- dogwood
- honeysuckle
- pokeweed
- pokeweed nightshade

Based on rearing in the lab or dissecting eggs.

Impacts of spotted wing drosophila

- Customer complaints
- 30% loss in blueberry
- Raspberry plantings abandoned
- Sanitation/clean-harvesting labor-intensive
- Insecticide sprays marginally effective
Spotted wing Drosophila:
2012 NY Monitoring Results as of July 6, 2012

**Getting the word out**
Mike Fargione, CCE Hudson Valley Fruit Program – The Map
Cathy Heidenreich, Horticulture – Berry Pest Alerts & Blog
Juliet Carroll, IPM – Cornell Fruit Blog
Spotted wing Drosophila:
2012 NY Monitoring Results as of July 6, 2012
Spotted wing Drosophila: 2012 NY Monitoring Results as of July 13, 2012

SWD Monitoring Results

- No traps present
- No captures
- First detection
- Multiple detections
Spotted wing Drosophila: 2012 NY Monitoring Results as of July 20, 2012

**SWD Monitoring Results**

- SWDmonitor
  - No traps present
  - No captures
  - First detection
  - Multiple detections

Legend:
- Orange: First detection
- Suffolk: Multiple detections

Map showing counties in New York State with spotted wing Drosophila monitoring results.
Spotted wing Drosophila: 2012 NY Monitoring Results as of July 27, 2012
Spotted wing Drosophila: 2012 NY Monitoring Results as of August 3, 2012

SWD Monitoring Results

<table>
<thead>
<tr>
<th>SWDmonitor</th>
<th>Legend</th>
</tr>
</thead>
<tbody>
<tr>
<td>No traps present</td>
<td>Light gray</td>
</tr>
<tr>
<td>No captures</td>
<td>Light gray</td>
</tr>
<tr>
<td>First detection</td>
<td>Light blue</td>
</tr>
<tr>
<td>Multiple detections</td>
<td>Dark blue</td>
</tr>
</tbody>
</table>
Spotted wing Drosophila: 2012 NY Monitoring Results as of August 10, 2012

SWD Monitoring Results
- Red: Larvae found in fruit
- SWDmonitor
  - Light Blue: No traps present
  - No captures
  - Light Blue: First detection
  - Blue: Multiple detections

Miles
0 12.5 25 50
Spotted wing Drosophila: 2012 NY Monitoring Results as of August 17, 2012

SWD Monitoring Results
- Larvae found in fruit
- SWDmonitor
  - No traps present
  - No captures
  - First detection
  - Multiple detections

Miles
0 12.5 25 50
Spotted wing Drosophila: 2012 NY Monitoring Results as of August 24, 2012
Spotted wing Drosophila:
2012 NY Monitoring Results as of September 14, 2012

SWD Monitoring Results
- Red: Larvae found in fruit
- SWDmonitor
- Light blue: No traps present
- Medium blue: No captures
- Dark blue: First detection
- Dark blue: Multiple detections

Miles
0 12.5 25 50
Spotted Wing Drosophila In Maine 2012
Maine SWD Trapping 2012

- SWD Traps
- 18 oz. red Solo® cups
- Cowles Bait
- One trap in crop, one in wood line
- Emptied, re-baited 1/wk
Maine SWD Trapping 2012
Maine SWD Trapping 2012
Maine SWD Trapping 2012
Maine SWD Trapping 2012
Maine SWD Trapping 2012
Overall SWD Catch Maine, 2012
Sum of 20 locations, 2 traps/location

flies/trap

SWD/trap/week

SWD by Region, Maine 2012

- Coastal
- Southern
- Northern
SWD by Trap Location: Woodline vs. Crop

- X-axis: Dates from 7/13/2012 to 10/19/2012
- Y-axis: SWD/trap/week
- Line graph comparing Woods and Field locations with peak activity observed in late September and early October.

Legend:
- Woods
- Field
Effects of Post-Harvest Chill/Freeze Treatments to Raspberry Fruit on SWD Emergence

Average number of SWD Larvae emerged from 5 fruit, 14 days post-treatment. Chill = 34 °, Freeze = 22 ° (12 hr)
For 2013:

- Maine State SCRI Block Grant
- Drummond, Dill & Handley
- Investigate improved trapping
- Work toward IPM
Volunteer small fruit farmers trapping and reporting +/- (all southern Vermont)
Bait system-Red solo cup with apple cider vinegar bait
Traps placed before fruit ripening

- Guilford-Positive found 7/30/12
- Marlboro-Positive found 7/30/12
- Dummerston-Positive found 7/30/12
- Shrewsbury, VT-Positive found 8/13/12

Horticultural Research Station-South Burlington, VT
Bait system-Red solo cup with Cowles bait:
- 56% grape juice (reconstituted Welch’s Frozen 100% White Grape Juice Concentrate,
- 37% apple cider vinegar, 5% strength.
- 6% 95% ethanol
- <1% Surfactant to break surface tension (unscented detergent).

Traps placed on 7/9/12 before fruit ripening in grape vineyard, wild grapes and crabapples
- Positives found in crabapples: 8/13/12, 9/10/12, 9/17/12, 9/24/12, 10/8/12
- Positives found in wild grapes: 9/10/12, 9/17/12, 9/24/12, 10/8/12
- Positives found in vineyard: 8/27/12, 9/4/12, 9/10/12, 9/17/12, 9/24/12, 10/8/12

Traps removed on 10/8/12
General notes/observations
SWD liked the warm fall temperatures and dropped off after the cold snap.
One grower discovered an easy tip for figuring out if fruit is infected which has been helpful in picking. If the receptacle of the raspberry is stained after picking then it likely has SWD larvae.
One grower in the second year with SWD (they were the first farm in VT to report it last year after Irene) is once again getting great quality fall raspberries late in the season, after trying some organic spray earlier and then just walking away in disgust. Not sure if it is a temperature or photoperiod thing?
Seems like Entrust/Pyganic/early picking may be effective. Would like to see research on netting of different types.
Spotted wing drosophila
Ontario 2012 update

OMAFRA SWD Team:
Anne McDonald Host, SWD monitoring coordinator 2012
Hannah Fraser, Denise Beaton, Margaret Appleby,
Leslie Huffman, Janice Leboeuf, Wendy-McFadden Smith,
Melanie Filotas, Pam Fisher,
2010
– CFIA survey
– 1st SWD detected Nov 2010 in Niagara backyard

2011
– OMAFRA survey, 60 sites,
– first capture on commercial farm August 13.
– 60% sites with SWD in traps by November

2012
– OMAFRA survey, 110 sites
– first capture commercial farm June 29
– 90% sites with SWD in traps by November

Used apple cider vinegar in Contech (2011) or deli cups traps (2012)
SWD was captured at 90% of monitored sites in 2012
Damage

2011:
• reared SWD flies from fruit after harvest
• no commercial damage reported or observed

2012:
• first flies reared from blueberries collected July 11
• first fruit damage in field (blueberries and high tunnel raspberries) and July 25
• easy to find damage in unsprayed blueberries and raspberries by August 14
• significant damage occurred before flies were trapped in blueberries
SWD trap catches 2012

Average No. SWD per trap
Total no. SWD

25-May 08-Jun 22-Jun 06-Jul 20-Jul 03-Aug 17-Aug 31-Aug 14-Sep 28-Sep 12-Oct

0 2000 4000 6000 8000 10000 12000 14000

0 20 40 60 80 100 120 130

Average No. SWD per trap
Total no. SWD
SWD damage in 2012

Crops suffering economic damage in absence of sprays
- blackberry
- blueberry
- fall-bearing raspberries
- day neutral strawberries

Growers and consumers slow to recognize the problem
Confused with
- poor shelf life
- finger bruising
- hot weather
Reared SWD from:

- Sea buckthorn
- Goji berry
- Wild brambles
- Buckthorn
- Pokeweed
- Elderberry
- Pin cherry
- Nightshade
- Dogwood
What we learned

- A lot from west coast colleagues!
- Ontario has a lot of wild hosts!
- ACV bait/traps not good enough
- Picking often, and clean, helps for raspberries, and strawberries
- Insecticides reduce damage (Growers used Malathion, or Delegate. Ripcord, Entrust, Pyganic also registered)
- Many expensive changes to production practices required
SWD Research in Ontario

Development of a reporting and management program for spotted wing drosophila
Hannah Fraser, Leslie Huffman, Pam Fisher, Denise Beaton, Margaret Appleby, Janice Leboeuf, Wendy-McFadden Smith, Melanie Filotas, OMAFRA

Enhanced monitoring and management of spotted wing Drosophila, an invasive pest of soft skinned fruit in Ontario
Dr. Rebecca Hallet, University of Guelph; Rose Buitenhuis, Vineland Research and Innovation Center; Hannah Fraser, OMAFRA; Tara Gariepy, AAFC

Life history and seasonal movements of the spotted wing drosophila, Drosophila suzukii, in a multi-crop setting
Dr. Rose Buitenhuis, Vineland Research and Innovation Centre; Hannah Fraser, OMAFRA

Molecular identification methods and indigenous natural enemies
Dr. Tara Gariepy, AAFC

Threat Assessment for the Spotted Winged Drosophila (SWD) in Southern Ontario
Dr. Jonathan Newman, University of Guelph; Dr. Megan Rua, University of North Carolina; Denise Beaton, OMAFRA
Ministry of Agriculture - MAPAQ

Jean-Philippe Légaré and Joseph Moisan-de Serres (Diagnostics Laboratory)

Christian Lacroix and Liette Lambert (Berry crop advisors)
Sophia Boivin (Pest management and invasive alien species specialist)

Researchers (entomologists)
Nathalie Roullé, M.Sc, UQAM
and Valérie Fournier, Ph.D., Laval University
In 2010:
No monitoring but....

SWD found by CFIA on 1 domestic compost pile (Quebec city) on October 25

Monitoring in 2011 – traps at 21 sites
Including 2 Public Markets (Montreal) and 1 food processing site

= 0 SWD
Evolution of SWD adults in 2012

Trapping started on June 21th
on 24 sites (8 in the south part of the province)

Average no SWD / trap

Visible damage on berries

1st capture: July 19 - Quebec
2nd: July 24 – Montreal

Jean-Philippe Légaré, M.Sc., Biol. Entomologist, MAPAQ
July 31, 2012 – SWD located at 5 sites
Mid-August 2012 – SWD is everywhere

Intensive trapping on 30 sites

In September
Are grapevines hosts?

Adult SWD found in traps on October

Finally, adults SWD emerge from fruit samples (Seyval blanc) on October 5th!
End of August

THANK YOU!

A raspberry soup!

Mating ritual!

The favorite: Blackberry

Eggs in blackberry

Photos: Liette Lambert (MAPAQ)