Optimizing traps for SWD and monitoring update

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1. 2016 SWD monitoring network
2. Optimizing trap design for SWD
3. SWD winter morph studies
4. Mark-release-recapture studies
2016 SWD Monitoring Network
SWD: 2016 Monitoring Network

- 16 trap checkers
- 180 sites, 22 counties
- 27,439 SWD counted
- Weekly reports (11)
Seasonal catch in MI cherry in 2016

Southern L.P.

Date by when traps were checked

Avg SWD per trap (bars)

% traps capturing SWD (dots)

Northern L.P.

Date by when traps were checked

Avg SWD per trap (bars)

% traps capturing SWD (dots)
Seasonal catch in MI cherry in 2016

**Southern L.P.**

- SWD were detected in a majority of the trapping sites and populations were building during harvest
- Growers applied 4-plus insecticide sprays directly targeting SWD
- Keeping fruit SWD-free required a 7-day spray interval with effective materials and excellent coverage

**Northern L.P.**

- 1-2 insecticide sprays targeting CFF sufficient to control SWD
- Timing of threshold-based program and fruit susceptibility program were similar
SWD captures and fruit infestation, 2015

**Southwest**

Average SWD/trap

- Tart cherry harvest

**Northwest**

Average SWD/trap

- Tart cherry harvest

Sample date

**Sample date**

- SWD /150 sentinel cherries

- SWD /150 sentinel cherries

- Sample date
Keeping the MI cherry industry informed

- Weekly reports (e.g., AgNews - 10 articles)
- Presentations
- Management guides and Online resources
Optimizing SWD Trap Design
Certain colors strongly promote SWD alightment.
Novel trap design

- Red hollow sphere
- Coated with Tangle-Trap glue
- Baited with Scentry lure
Field comparison of colored sphere traps

- Conducted in raspberry high tunnels
- 8 different colored sphere traps baited with commercial lure
Results of trap color field study

Mean SWD Catch (±S.E.M.)

<table>
<thead>
<tr>
<th>Color</th>
<th>Mean SWD Catch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>65 ± 5</td>
</tr>
<tr>
<td>Yellow</td>
<td>45 ± 4</td>
</tr>
<tr>
<td>Blue</td>
<td>50 ± 5</td>
</tr>
<tr>
<td>Purple</td>
<td>30 ± 3</td>
</tr>
<tr>
<td>Green</td>
<td>35 ± 3</td>
</tr>
<tr>
<td>White</td>
<td>20 ± 2</td>
</tr>
<tr>
<td>Black</td>
<td>70 ± 7</td>
</tr>
<tr>
<td>Fluorescent Red</td>
<td>55 ± 5</td>
</tr>
</tbody>
</table>

Significant differences are indicated by different letters (A, B, AB).
Trap type comparison study

Sphere + Scentry
Panel + Scentry
Deli-Cup + Scentry
Deli-Cup + Yeast
Trap type comparison study

Mean D. suzukii Catch (± S.E.M.)

<table>
<thead>
<tr>
<th>Trap Type</th>
<th>Catch Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sphere + Scentry</td>
<td>100</td>
</tr>
<tr>
<td>Panel + Scentry</td>
<td>80</td>
</tr>
<tr>
<td>Deli-Cup + Scentry</td>
<td>40</td>
</tr>
<tr>
<td>Deli-Cup + Yeast</td>
<td>50</td>
</tr>
</tbody>
</table>

F<sub>3.19</sub> = 14.8, P < 0.001
Proportion of SWD catch to non-target catch

- **Sphere**
  - SWD: 50,000
  - Non-targets: 40,000

- **Panel**
  - SWD: 40,000
  - Non-targets: 30,000

- **Sentry Cup**
  - SWD: 5,000
  - Non-targets: 4,000

- **Yeast Cup**
  - SWD: 2,000
  - Non-targets: 1,000
Novel Attractants

- Compared four volatiles and the yeast sugar solution
- 5 Michigan cherry orchards in SW MI
Effect of yeast, H. uvarum, on SWD oviposition and feeding
B. Mori et al. J. Appl. Ecol. 2015

Effect of yeast, H. uvarum, on SWD oviposition and feeding
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(a) Attraction

(b) Feeding & Consumption

Swedish University of Agricultural Sciences
SWD Winter Morph Studies
Winter diapause: Key bottleneck period

- Harsh winters can efficiently reduce the number of overwintering individuals

And consequently effect the population in the spring and summer
Where are SWD overwintering?

- Traps in cherry orchards and in adjacent woodlots
- Red traps and clear cup traps
  - Liquid baits and lures
Overwintering trap study

Average SWD catch ± S.E.M. (all sites combined)

- Red + Scentry
- Red + Wine/ACV
- Clear + Scentry
- Clear + Wine/ACV

Woods
Cherry
Winter morph and summer morph attractants

- Do summer and winter morphs respond to the same attractants?

- Electroantennogram studies with known attractants or repellents

- Optimize early season trap for monitoring winter morph SWD
Mark-Release-Recapture of *D. suzukii*
Mark-Release-Recapture of SWD

Single trap, multiple release
Trapping area, maximum dispersal distance, and plume reach

*not drawn to scale
Mean proportion catch = .012
Catch back 1.2% of released SWD
Transformed data: Miller Plot

Maximum dispersal distance for *D. suzukii*:
Max dispersal 115 m
Trapping radius = 115 m + 5 m = 120 m

Trapping area = \pi \times 120^2 = 45,216 \text{ m}^2 = 11.2 \text{ acres} = 4.5 \text{ hectares}
# SWD population estimation

\[ D.\ suzukii\ per\ Trapping\ Area = \frac{\text{Catch in Trap}}{\text{Proportion Caught}} \]

<table>
<thead>
<tr>
<th>Catch per single monitoring trap</th>
<th>( D.\ suzukii\ per\ trapping\ area\ (4.5\ hectares) )</th>
<th>( D.\ suzukii\ per\ hectare )</th>
<th>( D.\ suzukii\ per\ acre )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>171</td>
<td>38</td>
<td>15</td>
</tr>
<tr>
<td>10</td>
<td>1,706</td>
<td>379</td>
<td>153</td>
</tr>
<tr>
<td>50</td>
<td>8,528</td>
<td>1,895</td>
<td>767</td>
</tr>
<tr>
<td>100</td>
<td>17,055</td>
<td>3,790</td>
<td>1,534</td>
</tr>
<tr>
<td>500</td>
<td>85,277</td>
<td>18,950</td>
<td>7,672</td>
</tr>
<tr>
<td>1000</td>
<td>170,554</td>
<td>37,901</td>
<td>15,345</td>
</tr>
</tbody>
</table>
One panel trap samples:
$45,216^2 \text{ m} = 11.2 \text{ acres (ac)} = 4.5 \text{ hectares (ha)}$

Maximum dispersive distance for *D. suzukii*: 115 m

Plume reach for red baited panel trap: < 5 m
Acknowledgements

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  - MI Horticultural Society
  - MI Project GREEEN
  - MI Project GREEEN AABI
Thank you!

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