Life Without AZM: Pest Management Options for Cherry Growers in 2013

Larry Gut
Current programs:

• Effective and economical
• Primarily OP (e.g., AZM) & pyrethroid-based

Regulatory changes

➤ Phase-out for AZM:

   Ratcheting down of annual application rates
   1.5 lbs ai/A in 2008 & 2009, 0.75 lbs ai/A in 2010-2012

   Use of existing stocks extended to Sept 30, 2013
Newer compounds for CFF control

Application timings:
Catch + 7d, 14d later

Evaluation:
Collect 500 fruit, place over sand, count emerging pupae

UTC

Guthion (1.5 lb)

Provado (8.0 fl oz)

Calypso (4.0 fl oz)

Assail (3.4 fl oz)

Actara (4.5 fl oz)

Warrior (3.76 fl oz)

Puparia per 500 fruit

0 2 4 6 8 10 12
Control of CFF and Drosophila in tart cherry-2011

- **Tolfenpyrad (Apta)**, anticipated registration in 2013
- **Exirel** anticipated registration in 2013

<table>
<thead>
<tr>
<th>Insecticide</th>
<th>Larvae/lb fruit</th>
<th>CFF</th>
<th>Drosophila</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bexar</td>
<td>17 fl oz/ac</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Actara</td>
<td>5.5 oz/ac</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voliam Flexi</td>
<td>7 oz/ac</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Endigo</td>
<td>6 fl oz/ac</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Movento</td>
<td>9 fl oz/ac</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cyazypyr</td>
<td>13.5 fl oz/ac</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rimon</td>
<td>20 fl oz/ac</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Imidan</td>
<td>2.5 lb/ac</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Check</td>
<td>2.5 lb/ac</td>
<td>a</td>
<td>a</td>
</tr>
</tbody>
</table>
Chemical Control of Cherry Fruit Fly

- After oviposition eggs are under skin and protected.
- Conventional contact poisons (Guthion) toxic to flies.
- Timed for adult egg laying period (7-10 days after first emergence).
- Residual activity important due to immigrating flies.
Alternative Compounds

- Compounds requiring ingestion are timed for pre-oviposition period after first emergence.

- Oviposition deterrents need to be applied before emergence and coverage maintained through flight.
Monitor for CFF Adults

Mean No. of Flies per Trap ± SEM

- High Trapping height
- Standard Trapping height
- Low Trapping height

ca 15'
ca 7'
ca 4'
Newer materials for PC control
OBLR efficacy trials in cherry

- Small plots – 4 replicates
- 1 application on June 2
- Assessed 11 days post-treatment

Number of infested or damaged terminals/2 min obsv.

- Belt: a
- Apta: a
- Proclaim: a
- Entrust: a
- Voliam Flexi: a
- UTC: b
OBLR efficacy trial in apple

Harvest evaluation

- Altacor (2 oz)
- Proclaim/Oil (4.8 oz/0.5%)
- Rimon (20 oz)
- UTC

% injured fruit
Monitor for adult OBLR

activity was down in 2012, especially 2\textsuperscript{nd} generation
## Building a program

<table>
<thead>
<tr>
<th>Insecticide</th>
<th>CFF</th>
<th>PC</th>
<th>OBLR</th>
<th>GFW</th>
<th>BCA</th>
<th>SJS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avaunt</td>
<td></td>
<td>**</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Intrepid</td>
<td></td>
<td>**</td>
<td>**</td>
<td>**</td>
<td>**</td>
<td>**</td>
</tr>
<tr>
<td>Esteem</td>
<td></td>
<td>**</td>
<td>**</td>
<td>**</td>
<td></td>
<td>***</td>
</tr>
<tr>
<td>Delegate</td>
<td>** *</td>
<td>*</td>
<td>**</td>
<td>**</td>
<td>**</td>
<td>*</td>
</tr>
<tr>
<td>Rimon</td>
<td>** *</td>
<td>*</td>
<td>**</td>
<td>**</td>
<td>**</td>
<td>**</td>
</tr>
<tr>
<td>Altacor</td>
<td>** *</td>
<td></td>
<td>**</td>
<td>**</td>
<td>**</td>
<td>**</td>
</tr>
<tr>
<td>Belt</td>
<td></td>
<td></td>
<td>**</td>
<td>**</td>
<td>**</td>
<td>**</td>
</tr>
<tr>
<td>Admire</td>
<td>** *</td>
<td>*</td>
<td></td>
<td></td>
<td>**</td>
<td>**</td>
</tr>
<tr>
<td>Actara</td>
<td>** *</td>
<td>**</td>
<td>**</td>
<td></td>
<td>**</td>
<td>**</td>
</tr>
<tr>
<td>Assail</td>
<td>** *</td>
<td>**</td>
<td>**</td>
<td></td>
<td>**</td>
<td>**</td>
</tr>
<tr>
<td>Movento</td>
<td>** *</td>
<td></td>
<td></td>
<td></td>
<td>**</td>
<td>**</td>
</tr>
<tr>
<td>Pyrethroid</td>
<td>** *</td>
<td>**</td>
<td>**</td>
<td>**</td>
<td></td>
<td>**</td>
</tr>
<tr>
<td>Imidan</td>
<td>** *</td>
<td>**</td>
<td></td>
<td>*</td>
<td></td>
<td>**</td>
</tr>
</tbody>
</table>
## Building a program

<table>
<thead>
<tr>
<th>Insecticide</th>
<th>Label rate</th>
<th>Timing</th>
<th>Target pest(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delegate 25 WG</td>
<td>4.5 - 7 oz/ac</td>
<td>Late bud burst/ Petal-fall</td>
<td>Fruitworm</td>
</tr>
<tr>
<td>Altacor 35 WDG</td>
<td>3 - 4.5 oz/ac</td>
<td></td>
<td>Leafrollers</td>
</tr>
<tr>
<td>Belt 4 SC</td>
<td>3 – 4 oz/ac</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rimon 0.83 EC</td>
<td>20-40 oz/ac</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avaunt 30 WG</td>
<td>5 - 6 oz/ac</td>
<td>Shuck split</td>
<td>Plum curculio</td>
</tr>
<tr>
<td>Assail 30 SG</td>
<td>5.3 - 8 oz/ac</td>
<td>350 DD after bloom</td>
<td></td>
</tr>
<tr>
<td>Actara 25 WG</td>
<td>4.5 - 5.5 oz/ac</td>
<td>12 mm fruit</td>
<td>Cherry fruit fly</td>
</tr>
<tr>
<td>Assail 30 SG</td>
<td>5.3 - 8 oz/ac</td>
<td></td>
<td>Plum curculio</td>
</tr>
<tr>
<td>Guthion 50WP</td>
<td>1.5 lb/ac</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Admire 2 F</td>
<td>6 - 8 oz/ac</td>
<td>20-22 mm fruit</td>
<td>Cherry fruit fly</td>
</tr>
<tr>
<td>Delegate 25 WG</td>
<td>4.5 - 7 oz/ac</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Change in CFF activity in some orchards relying on new insecticides for control

- Earlier flight
- Increased catch
- Increased CFF activity
  - Newer insecticides
  - Std. insecticides
Post-harvest treatment

- Similar results in 2010 and 2011 on-farm trials

<table>
<thead>
<tr>
<th>Site</th>
<th>PH - Provado</th>
<th>No PH treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.2</td>
<td>0.6</td>
</tr>
<tr>
<td>2</td>
<td>1.8</td>
<td>1.4</td>
</tr>
<tr>
<td>3</td>
<td>1.8</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>1.8</td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>1.2</td>
<td>1.1</td>
</tr>
</tbody>
</table>
Timing for post-harvest management of CFF

- Application timings: within 7d post-harvest, more than 7d post-harvest
- Evaluation: collect 500 fruit, place over sand, count emerging pupae
Spotted wing drosophila: A new concern

• Unlike native vinegar flies, SWD females lay eggs in intact fruit, using serrated ovipositor.

• Adult flies live for 3-9 weeks, and females can lay over 300 eggs.

<table>
<thead>
<tr>
<th>Highest risk</th>
<th>Lower risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cherries</td>
<td>Pears</td>
</tr>
<tr>
<td>Strawberries</td>
<td>Apples</td>
</tr>
<tr>
<td>Raspberries</td>
<td>Tomato</td>
</tr>
<tr>
<td>Nectarines</td>
<td></td>
</tr>
<tr>
<td>Blueberries</td>
<td></td>
</tr>
<tr>
<td>Blackberries</td>
<td></td>
</tr>
<tr>
<td>Peaches</td>
<td></td>
</tr>
<tr>
<td>Grapes</td>
<td></td>
</tr>
</tbody>
</table>

Alternate hosts

• Wild plants similar to crops
  • Snowberry
  • Elderberry
  • Others in Michigan?
MI Survey and Detection Program

In 2012:

- Two trap types
- Over 120 traps deployed in 12 counties
- SWD captured in >75% of sites

Yeast-baited  ACV-baited
SWD distribution in Michigan

Based on APHIS–confirmed samples sent through MSU Diagnostics

SWD first detected in…

- 2010
- 2011
- 2012

New confirmed finds in Antrim and Grand Traverse Counties in 2012
SWD Trapping: ACV vs Yeast baited

Earlier and higher catches in yeast-baited trap
Timing of SWD activity in cherry:
Earlier in 2012

- 2012:
  - July 15
  - Aug 6
  - Sep 16

- 2011:
  - Aug 22
  - Sep 22
  - Oct 10
Fruit infestation

Cherries

- SW - few fruit, no infestation
- NW – 5/5 orchards with infested fruit (4 sweet, 1 tart)

Blueberries infested

Raspberries: Heavily infested
Field bioassay trials, 2012 (R. Isaacs, blueberries)

Treatments applied to small plots using a backpack sprayer.

Shoots with 20 leaves and 10 fruit picked at 1, 3, 5, 7, 10 DAT.

Add 5 male, 5 female SWD for 7 days.

Measure % fly mortality at 48 hours, number of larvae after 9 days.
Field trials – residual control, 2012

![Graph showing percent control over different DATs for various pesticides.](image-url)
Control of Drosophila in tart cherry

- **Small plots – 4 replicates**
- **3 applications beginning at flight + 7d**

### Insecticides

<table>
<thead>
<tr>
<th>Insect</th>
<th>Insecticide</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ladybug</td>
<td>Imidan</td>
<td>70 W (2.125 lb)</td>
</tr>
<tr>
<td>Cherry fruit fly</td>
<td>Pounce</td>
<td>25 WP (12.8 oz)</td>
</tr>
<tr>
<td>Spotted wing drosophila</td>
<td>Entrust</td>
<td>80 WP (1.25 - 2.5 oz)</td>
</tr>
<tr>
<td>Comments:</td>
<td>See &quot;Invasive and Emerging Pests&quot; section for information on spotted wing drosophila.</td>
<td></td>
</tr>
</tbody>
</table>

### Insects

- CFF
- Drosophila
Detection of a new invasive: Fig Fruit Fly

Final Report

Dr. Jim Zablotny confirmed this new county record (Ottawa) for Zapriounus indianus
Fig Fruit Fly - *Zaprionus indianus* (Gupta)

- Native to Africa, the Middle East, and southern Eurasia
- Spread to Western Hemisphere (Brazil-1999), and into the USA (Florida – 2005; CA, GA and AZ – 2006; OK and SC – 2007)
Biology

• Generally found on injured and rotting fruit (on tree or ground)
• In native regions found infesting 74 fruit species, fig, banana, guava, persimmon, avocado, citrus, etc. (also peach in western hemisphere)
• Adult longevity – avg. 80-90 d
• Females lay about 60 eggs
• Egg to adult – 35-40 days
• Multiple generations / year
Fig Fruit Fly Detection in MI

Total collected = 32
Thanks to the many who have contributed to these efforts

Peter and Mike many grower cooperators

John Wise & the TNRC crew

Funding provided by:
- Cherry Research Committee
- USDA, EPA, AFT
- MSU and Project GREEEN
- Industry supported