Tools for Protecting Trees from ACP

Phil Stansly
SWFREC Immokalee, Florida
Acknowledgements

AgraQuest
Bayer CropScience
Dow AgroSciences
DuPont Crop Protection
Gowen Co.
Nichino America

Syngenta Crop Protection
Valent USA
A Duda & Sons
Citrus Research and Development Foundation
SWFREC Entomology Team
Living with HLB in Florida

• In lieu of “magic bullet” integration of all available tools required to manage HLB effectively

• Insecticides to slow spread of HLB
  – Criteria: effectiveness, resistance management, conservation of natural enemies
  – Dormant sprays of pyrethroids and/or OPs. preferably area wide
  – Different and more selective chemical classes for growing season depending on pest populations
  – Systemic insecticides for young trees
  – Thresholds for infected groves?

• Cultural practices to improve tree health
  – Corrective foliar nutrition to compensate for HLB deficiencies
  – High density plantings and fertigation for rapid growth and production
  – Metalized mulch for psyllid repellency in new plantings
Tools for Protecting Trees from ACP

- Spray schedules with presently available products
- Conserving natural enemies
- Oil program?
- Recent trials with foliar applied insecticides.
- New product features
- Spray Schedules with new products included
- Young tree program
- Conclusions and recommendations
# Spray Calendar for Pest Management

## Criteria

- **Efficacy**
  - Adults/nymphs
  - Secondary pests

- **Resistance management**
  - Frequency of use
  - Rotation MOAs

- **Conservation beneficials**
  - Broad-spectrum vs Selective

## Dormant → Growing

<table>
<thead>
<tr>
<th>Months</th>
<th>Nov-Dec</th>
<th>Jan</th>
<th>Feb-Mar</th>
<th>Apr</th>
<th>May - June</th>
<th>July - Aug</th>
<th>Sep-Oct</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Products</strong></td>
<td>OP</td>
<td>Pyrethoroid</td>
<td>Movento Portal Micromite Intrepid Delegate</td>
<td>OIL</td>
<td>Delegate Movento Abamectin AgriFlex Voliam Flexi Knack</td>
<td>Oil</td>
<td>Micromite Delegate Portal Movento</td>
</tr>
<tr>
<td><strong>Pests</strong></td>
<td>ACP</td>
<td>ACP Weevils</td>
<td>ACP Mites Leafminer Weevils Scales</td>
<td>Everything</td>
<td>ACP Rust mite Leafminer Scales</td>
<td>Everything</td>
<td>ACP Leafminer Rustmite Scales Mealybugs</td>
</tr>
</tbody>
</table>
Effectiveness of Biweekly LV (2 Gal/Ac) Sprays with 435 Oil

**Grower Standard Sprays**

- **2011**
  - 23-Mar: Carbaryl 4L 3-3-gal
  - 8-Apr: Aza Direct 6oz
  - 21-Apr: Actara 5.5oz
  - 14-Jun: abamectin 10oz
  - 30-Jun: Dimethoate 20oz
  - 29-Jul: Delegate 4oz

- **2012**
  - 17-Jan: Danitol 16oz
  - 12-Mar: Micromite 6.25oz
  - 11-Jul: Delegate 3oz
  - 17-May: abamectin 16oz
  - 10-Aug: Dimethoate 16oz
Beneficials: Worth Conserving!

Selective Insecticides during Growing Season
'Valencia' orange trees planted 1998

Trees pruned with a hand-held hedger to induce new growth and encourage ACP infestation

Both bed and swale sides of the trees were sprayed 22 Jan 2013 using a Durand Wayland 3P-10C-32 air blast speed sprayer @ 50 gpa or Proptec™ rotary atomizer sprayer @ 5 gpa

RCBD design, 4 replicates

5 trees per plot, 3 central trees included in post treatment evaluations

1. Mustang 4.0 oz proptec 5 gpa
2. Mustang 4.0 oz 50 gpa
3. Baythroid 3.0 oz 5 gpa
4. Sivanto 7.0 oz 5 gpa
5. Sivanto 7.0 oz 50 gpa
6. Sivanto 10.5 oz 5 gpa
7. Sivanto 10.5 oz 50 gpa
8. Movento MPC 16.0 oz 50 gpa
   + 435 Oil 2 gal.
Evaluation Methods

- **Estimation of ACP adults**
  - "tap sample"
  - 22 x 28 cm laminated white paper sheet or clipboard
  - Tap branches three times

- **Estimation of nymphal and larval densities of ACP and CLM**
  - 8 or 10 randomly selected shoots per plot collected and examined under a stereomicroscope in the laboratory to count ACP nymphs
  - Three fully expanded leaves on each shoot examined to count CLM larvae

Qureshi and Stansly, 2007
3 -year old Hamlin, 10-tree plots, Sprayed 7 Jul 2012 Durand Weyland speed sprayer with fan disengaged

All treatments included 2% oil
3-year old Hamlin, 12-tree plots, Sprayed 31 July 2012
Durand Weyland speed sprayer with fan disengaged

ACP Nymphs/CLM Larvae

3 DAT  7 DAT  13 DAT  21 DAT  28 DAT  CLM 3 DAT

ACP NAdults per tap

3 DAT  7 DAT  13 DAT  21 DAT  28 DAT  35 DAT  42 DAT

*Applied with 2% oil
5 –year old Hamlin, 5-tree plots, Sprayed 4 Oct 2012
Durand Weyland Speed sprayer with fan disengaged

All treatments with 1% oil
New insecticides for ACP control in Florida Citrus

<table>
<thead>
<tr>
<th>Product</th>
<th>MOA*</th>
<th>Label</th>
<th>Rate (Oz/ac)</th>
<th>PHI</th>
<th>Bees</th>
<th>Other Pests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Closer</td>
<td>4c</td>
<td>Now</td>
<td>2.75-5.75</td>
<td>1 d</td>
<td>Advisory</td>
<td>Aphids, CRS</td>
</tr>
<tr>
<td>Sivanto</td>
<td>4(abcd?)</td>
<td>Jun 14</td>
<td>10-14</td>
<td>1 d</td>
<td>Advisory</td>
<td>Aphids thrips scales mealybugs whiteflies</td>
</tr>
<tr>
<td>Exirel</td>
<td>28</td>
<td>Jul 13 ?</td>
<td>13.5-20.5</td>
<td>1 d</td>
<td>Toxic</td>
<td>CLM</td>
</tr>
<tr>
<td>Apta</td>
<td>21</td>
<td>Sep 13?</td>
<td>14-27</td>
<td>14 d</td>
<td>Toxic</td>
<td>CRM</td>
</tr>
</tbody>
</table>

*4: Nicotinoid  
28: Diamid  
21: METI (Mitochondrial electron transport inhibitor)
## Spray Calendar for Pest Management

### Months

<table>
<thead>
<tr>
<th>Months</th>
<th>Nov-Dec</th>
<th>Jan</th>
<th>Feb-Mar</th>
<th>Apr</th>
<th>May - June</th>
<th>July - Aug</th>
<th>Sep-Oct</th>
</tr>
</thead>
</table>

### Products

<table>
<thead>
<tr>
<th>Dormant</th>
<th>Growing</th>
</tr>
</thead>
<tbody>
<tr>
<td>OP</td>
<td>OP</td>
</tr>
<tr>
<td>Pyrethroid</td>
<td>Pyrethroid</td>
</tr>
<tr>
<td>Mvento Portal Micromite Intrepid Delegate Exirel</td>
<td>Oil Apta Micromite Exirel Closer Sivanto</td>
</tr>
<tr>
<td>Delegate Movento Abamectin Exirel Closer Sivanto Knack</td>
<td>Oil Apta Closer Sivanto Micromite</td>
</tr>
<tr>
<td>Micromite Delegate Apta Movento</td>
<td>Micromite Closer Sivanto</td>
</tr>
</tbody>
</table>

### Pests

<table>
<thead>
<tr>
<th>ACP Weevils</th>
<th>ACP Mites Leafminer Weevils Scales</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACP Weevils</td>
<td>ACP Mites Leafminer Weevils Scales</td>
</tr>
<tr>
<td>ACP Mites Leafminer Weevils Scales</td>
<td>Mites Scales Leafminer Weevils Aphids</td>
</tr>
<tr>
<td>ACP Rust mite Leafminer Scales Aphids</td>
<td>Mites Leafminer Weevils Scales Mealybugs</td>
</tr>
<tr>
<td>ACP Leafminer Rustmite Scales Mealybugs</td>
<td>ACP Leafminer Rustmite Scales Mealybugs</td>
</tr>
</tbody>
</table>

### Criteria

- **Efficacy**
  - Adults/nymphs
  - Secondary pests
- **Resistance management**
  - Frequency of use
  - Rotation MOAs
- **Conservation beneficials**
  - Broad-spectrum vs Selective
Protecting Young Trees
Rotations of Neonicotinoids and Verimark (cyazypyr): 3-year Study

Suspension delivered by an EZ-Dose® sprayer operating at a pressure of 45 PSI and a flow rate of 3.7 gallons per minute
Incidence of HLB


Treated

Untreated
Tree Growth Jan 2013 (3 years)

Trunk x-sectional area 2.2 in²

Trunk x-sectional area 4.0 in²
Metalized UF Reflective Mulch:

Psyllid Infestation

Trunk Cross Section

Incidence HLB in 40 trees
Conclusions and Recommendations

- Best to apply organophosphates and especially pyrethroids only once during dormant season
- More selective sprays during growing season
  - Target problem pests
  - Rotate modes of action
  - Conserve beneficials
- Agriflex (4A, 6) and Voliam Flexi (4A, 28) looked good in 2012 trials
  - Both are premixes and employ 2 modes of action
  - Both contain neonicotinoids needed for young trees
- Exeril (28), Apta (21A), Closer (4C) and Sivanto are promising new ACP products
- Verimark will provide an additional systemic MOA
  - Exeril and Verimark are the same product; share an MOA (28) with Voliam
- Frequent LV applications of oil useful
- UV Reflective mulch provides additional protection to young trees