100% CM Control with a Brand New Insecticide, Guaranteed!

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Smokin’ Hole
Best Chance for Success

*Interrupt life cycle at all stages*

- Adulticides or Pheromones
- Nematodes Parasites Predators Virus
- Ovicides or Larvicides
- CM protected in fruit - virus and delayed mortality
What’s Wrong with CM Management?

• Economic hardship = reduced inputs
• Improper monitoring program = wrong decisions or assumptions
• Spray coverage limited due to horticulture or sprayer technology
• Improving product choice and timing
• Managing insecticide resistance
Best Chance for Success

• Reducing oviposition
  – Adulticides limited to pyrethroids
  – Pheromone still effective
    • Best in areawide situation
    • MD + insecticides best approach in high pressure
Best Chance for Success

• Killing eggs
  ▪ **Esteem, Diamond** effective if applied under eggs (100DD)
  ▪ **Intrepid** effective if under or over eggs
  ▪ **Oil** effective if over eggs
Ovicides for Controlling CM

• What level of control can be expected

<table>
<thead>
<tr>
<th>Insecticide</th>
<th># tests</th>
<th>Ave. % control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guthion</td>
<td>16</td>
<td>96.3%</td>
</tr>
<tr>
<td>Diamond*</td>
<td>4</td>
<td>89.7%</td>
</tr>
<tr>
<td>Intrepid</td>
<td>6</td>
<td>71.9%</td>
</tr>
<tr>
<td>Esteem**</td>
<td>2</td>
<td>70.0%</td>
</tr>
<tr>
<td>Oil</td>
<td>9</td>
<td>52.0%</td>
</tr>
</tbody>
</table>

* Product not yet registered for use on tree fruit
** 1st generation only
Best Chance for Success

• Preventing larval entries
  – Fast acting chemicals optimal for fruit protection
  – Guthion, Imidan, Assail, Calypso, Success/Entrust, Avaunt, Warrior
Larvicides for Controlling CM

• What level of control can be expected

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<tr>
<td>Guthion</td>
<td>16</td>
<td>96.3%</td>
</tr>
<tr>
<td>Imidan</td>
<td>2</td>
<td>92.3%</td>
</tr>
<tr>
<td>Warrior</td>
<td>2</td>
<td>91.1%</td>
</tr>
<tr>
<td>Assail</td>
<td>21</td>
<td>87.3%</td>
</tr>
<tr>
<td>Calypso</td>
<td>16</td>
<td>83.4%</td>
</tr>
<tr>
<td>Success</td>
<td>10</td>
<td>82.9%</td>
</tr>
<tr>
<td>Entrust</td>
<td>2</td>
<td>75.1%</td>
</tr>
<tr>
<td>Avaunt</td>
<td>10</td>
<td>66.5%</td>
</tr>
</tbody>
</table>
Best Chance for Success

- **Difficult once larvae are in fruit**
  - Growth regulators (*Intrepid*), virus
  - Slower mode of action, effect greatest on next generation
Virus for Controlling CM

• **Product Choice**
  • Bioassays show no difference in toxicity
    ▪ Cyd-X, Carpovirusine, Virosoft CM
  • Field-aged residue studies
    ▪ Break in efficacy noted between 7-14 days
    ▪ 10 day treatment interval likely
Larvicides for Controlling CM

• What level of control can be expected

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Rate AI/A (OBx10^{13})</th>
<th>Interval</th>
<th>1st generation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>% injury</td>
</tr>
<tr>
<td>Cyd-X</td>
<td>0.27</td>
<td>14 d</td>
<td>40.0</td>
</tr>
<tr>
<td>Cyd-X</td>
<td>0.27</td>
<td>7 d</td>
<td>29.2</td>
</tr>
<tr>
<td>Carpovirusine</td>
<td>0.40</td>
<td>10 d</td>
<td>34.8</td>
</tr>
<tr>
<td>Virosoft</td>
<td>0.38</td>
<td>10 d</td>
<td>38.8</td>
</tr>
<tr>
<td>Untreated</td>
<td>- - -</td>
<td>- - -</td>
<td>48.2</td>
</tr>
</tbody>
</table>
Assumptions: NO OP resistance; High CM pressure

DD from biofix

- Moth flight
- Egg hatch

Month: May, June, July, Aug., Sept.

Insecticides: Guthion, Assail, Imidan
Assumptions: OP resistance problem; High CM pressure

Bloom

Mating Disruption

- Esteem
- Assail + Intrepid
- Oil
- Intrepid
- Assail + Intrepid
- CM virus

DD from biofix:
- Moth flight
- Egg hatch
Assumptions: OP resistance present; moderate CM pressure

- Assail + Intrepid
- Intrepid
- Oil
- CM virus

Mating Disruption

- Bloom

DD from biofix

- Moth flight
- Egg hatch

Success?
Organic Control in Royal Slope

• 270 acres using full rate of MD

• 2002
  ▪ CM / trap - 67.0 (3 weeks in Aug.)
  ▪ Hand removal - 158 bins, 989 man hours
  ▪ % injury - 5% at harvest
  ▪ Packout - 16 of 25 boxes/bin

• 2003
  ▪ CM / trap - 45.6 (1st gen.)
  ▪ CM / trap - 3.6 (2nd gen.)
  ▪ % injury - < 1% no hand culling
  ▪ Packout - 21 of 25 boxes/bin

<table>
<thead>
<tr>
<th>Year</th>
<th>$ controls</th>
<th>losses</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>407</td>
<td>368 bins</td>
</tr>
<tr>
<td>2003</td>
<td>487</td>
<td>38 bins</td>
</tr>
</tbody>
</table>
Organic control at Carson Frenchman Hill orchard - 2003

Mating Disruption (400 dispensers per acre)

- Moth flight
- Egg hatch

Was used only in selected high pressure blocks

Bloom

Oil

Entrust

CM virus

DD from biofix

May June July Aug. Sept.
Best Chance for Success

- Be creative, don’t keep doing the same thing if it is not working!
- Establish a consistent monitoring program
- Use mating disruption as a base to your CM control program
- Use new products correctly - rates and timing
- Mix modes of action of new products