Codling Moth - is it about reducing costs or increasing pack outs?
Codling moth  
– the ‘key pest’ of pome fruit
Ecology Based Control Approach

• Lifecycles and biology: Where is it now? What is it doing? How to best attack it?

• Control: Look for it’s weakest link

• Interactions with other pests, IPM & resistance

• Products & Solutions should fit in context of other products
Codling Moth
Codling Moth
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Codling Moth
Codling Moth
<table>
<thead>
<tr>
<th>Season</th>
<th>Where is it now?</th>
<th>What is it doing?</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Winter</td>
<td>Asleep in cocoon</td>
<td>Transforming from a pupae to a moth</td>
<td>Bark, props &amp; large prunings. Not in grass or windbreaks</td>
</tr>
<tr>
<td>Early Spring</td>
<td>On bark or leaves</td>
<td>Emerging, flying, looking for mates</td>
<td>Weak flier (usually) Trap now Use MD now</td>
</tr>
<tr>
<td>Early Spring</td>
<td>Orchard skyline</td>
<td>Mating</td>
<td>Temp, time &amp; wind</td>
</tr>
<tr>
<td>Season</td>
<td>Where is it now?</td>
<td>What is it doing?</td>
<td>Comments</td>
</tr>
<tr>
<td>--------</td>
<td>-----------------</td>
<td>------------------</td>
<td>----------</td>
</tr>
<tr>
<td>Spring</td>
<td>On leaves &amp; fruitlets</td>
<td>Laying eggs</td>
<td>Flat, hard to see. Use insecticide now</td>
</tr>
<tr>
<td>Spring</td>
<td>On leaves &amp; fruitlets</td>
<td>Hatching and crawling</td>
<td>Use insecticide now</td>
</tr>
<tr>
<td>Spring</td>
<td>Fruit</td>
<td>Entering fruit</td>
<td>Use insecticide now</td>
</tr>
<tr>
<td>Season</td>
<td>Where is it now?</td>
<td>What is it doing?</td>
<td>Comments</td>
</tr>
<tr>
<td>-------------------</td>
<td>------------------</td>
<td>--------------------------------------</td>
<td>----------------------------------------</td>
</tr>
<tr>
<td>Late Spring - Early Summer</td>
<td>Fruit</td>
<td>Emerging from fruit</td>
<td>Drops with or without fruit</td>
</tr>
<tr>
<td></td>
<td>From ground to bark</td>
<td>Finding next pupation site</td>
<td>Crawls to site</td>
</tr>
<tr>
<td>Summer</td>
<td>2nd &amp; 3rd Generation</td>
<td></td>
<td>Use insecticide now</td>
</tr>
<tr>
<td>Autumn</td>
<td>Pupates for the winter</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Granite Belt codling moth trap catches.
(average of 351 traps)

Moths per trap per week.

1996-97
1997-98
Hygiene

- Orchard props
- Wooden bins/packing sheds
- Tree age/bark type
Mating Disruption

- Block size
- Uniformity of trees
- Initial moth population
- Border situation
- Earliness of application
- Correct rates
- Correct height
Mating Disruption + Insecticides

- Use both to ‘crash’ a population
- Border spraying good practice
- Minor pests may flare
- Skip MD every few years?
- MD ‘wasteful’ on Gala apples?
IPM options

- Virus
- *Trichogramma* Wasps
- Bt
- Mating Disruption major ‘soft’ option
- Some insecticides part of IPM
Insecticides

• When to start

• Traps & Day degrees
Insecticides

• When to start

• How often to apply

• Traps & Day degrees

• 7, 10, 14, 21 days
Insecticides

- When to start
- How often to apply
- Application
- Traps & Day degrees
- 7, 10, 14, 21 days
- Tops & insides
Insecticide Choices

- Don’t work anymore
  - Carbaryl, Endosulfan, Lannate, Supracide, Folimat, Maldison

- Average control
  - Insegar, Folidol, Avatar, Success/Entrust, Talstar, Lebaycid, Gusathion, Mimic, Insegar

- Good control
  - Calypso
Insecticide Choices

- Don’t work anymore
- Average control
- Good control
- Carbaryl, Endosulfan, Lannate, Supracide, Folimat, Maldison,
- Insegar, Folidol, Avatar, Success/Entrust, Talstar, Lebaycid, Gusathion, Mimic, Virus
- Calypso
Insecticide Choices

• Don’t work anymore

• Average control

• Good control

• Carbaryl, Endosulfan, Lannate, Supracide, Folimat, Maldison,

• Insegar, Folidol, Avatar, Success/Entrust, Talstar, Lebaycid, Gusathion, Mimic

• Calypso
Insecticide Choices

- Don’t work anymore
- Average control
- Good control

- Carbaryl, Endosulfan, Lannate, Supracide, Folimat, Maldison,
- Insegar, Folidol, Avatar, Success/Entrust, Talstar, Lebaycid, Gusathion, Mimic
- Calypso, Altacor, Delegate, Samurai
<table>
<thead>
<tr>
<th></th>
<th>Altacor</th>
<th>Delegate</th>
<th>Samurai</th>
<th>Calypso</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Group</strong></td>
<td>28</td>
<td>5</td>
<td>4A</td>
<td>4A</td>
</tr>
<tr>
<td><strong>Codling Moth</strong></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td><strong>LBAM</strong></td>
<td>✓</td>
<td>✓</td>
<td>Suppression</td>
<td></td>
</tr>
<tr>
<td><strong>Woolly Aphid</strong></td>
<td></td>
<td>✓</td>
<td>Suppression</td>
<td></td>
</tr>
<tr>
<td><strong>Mealy Bug</strong></td>
<td></td>
<td>✓</td>
<td></td>
<td>✓ (SF)</td>
</tr>
<tr>
<td><strong>O F M</strong></td>
<td>✓</td>
<td>✓</td>
<td>✓ (SF)</td>
<td>✓ (SF)</td>
</tr>
<tr>
<td><strong>Heliothis</strong></td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Dimpling Bug</strong></td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
</tr>
</tbody>
</table>
Codling moth damaged apples, Stanthorpe 1997-98
ALTACOR

% Apples Damaged by Codling Moth
Stanthorpe 2004-05

<table>
<thead>
<tr>
<th>Product</th>
<th>% Damaged Fruit</th>
</tr>
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<tbody>
<tr>
<td>UNTREATED</td>
<td>45</td>
</tr>
<tr>
<td>Altacor 14-21 days</td>
<td>5</td>
</tr>
<tr>
<td>Altacor 21 days</td>
<td>10</td>
</tr>
<tr>
<td>Gusathion 14-21 days</td>
<td>18</td>
</tr>
</tbody>
</table>
% Apple Damaged by Codling Moth

<table>
<thead>
<tr>
<th>Insecticide</th>
<th>Days</th>
<th>% Damaged</th>
</tr>
</thead>
<tbody>
<tr>
<td>Untreated</td>
<td></td>
<td>60%</td>
</tr>
<tr>
<td>Altacor 14-21 days</td>
<td></td>
<td>5%</td>
</tr>
<tr>
<td>Altacor 21-28 days</td>
<td></td>
<td>10%</td>
</tr>
<tr>
<td>Calypso 14-21 days</td>
<td></td>
<td>20%</td>
</tr>
<tr>
<td>Penncap 14-21 days</td>
<td></td>
<td>30%</td>
</tr>
</tbody>
</table>
DELEGATE

2006-07 Stanthorpe
100 fruit harvested

Gusathion
Calypso
Untreated

Delegate
Samurai

G. Del, South Australia, 2006-07

% fruit damaged

- Untreated
- Samurai 20g/100L
- Samurai 40g/100L
- Avatar
Getting Good Codling Control

- Base strategy on last year’s population (trap)
- Start at correct time (trap and temp.)
- Target the 1st generation hard
- Choose and rotate chemicals
- Fit your CM insecticide into bigger picture.
1. What should influence your CM and LBAM choice?

Your MAIN pest
Your other pest profile
Affects on predators
Withholding periods
Re-entry periods
1. What should NOT influence your choice?

Price
<table>
<thead>
<tr>
<th></th>
<th>Altacor</th>
<th>Delegate</th>
<th>Samurai</th>
<th>Calypso</th>
<th>Penncap-M</th>
<th>Gusathion</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Withholding period</strong></td>
<td>14 Days</td>
<td>7 Days</td>
<td>21 Days</td>
<td>21 Days</td>
<td>14 Days</td>
<td>14 Days</td>
</tr>
<tr>
<td><strong>Re-entry period</strong></td>
<td>nil</td>
<td>When Dry</td>
<td>When Dry</td>
<td>When Dry</td>
<td>5 Days</td>
<td>5 Days</td>
</tr>
<tr>
<td><strong>No. per season</strong></td>
<td>3</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>No Limit</td>
<td></td>
</tr>
<tr>
<td><strong>Poison Schedule</strong></td>
<td>-</td>
<td>S5</td>
<td>S6</td>
<td>S6</td>
<td>S7</td>
<td>S7</td>
</tr>
<tr>
<td><strong>Mite Predators</strong></td>
<td>Safe</td>
<td>Safe</td>
<td>Safe</td>
<td>Safe</td>
<td>Harsh</td>
<td></td>
</tr>
<tr>
<td><strong>WAA Predators</strong></td>
<td>Safe</td>
<td>Safe</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Harsh</td>
</tr>
</tbody>
</table>