Woolly apple aphid
- is it about reducing costs or increasing pack outs?
• Woolly apple aphid
• Woolly apple
Ecology Based Control Approach

- Lifecycles and biology: Where is it now? What is it doing? How can I best attack it?
- Control programs: Look for weakest, most efficient control point
Ecology Based Control Approach

• Lifecycles and biology: Where is it now?  What is it doing?  How can I best attack it?
• Control programs: Look for weakest, most efficient control point
• Best product fit in context of other products
Ecology Based Control Approach

- Lifecycles and biology: Where is it now? What is it doing? How can I best attack it?
- Control programs: Look for weakest, most efficient control point
- **Best product fit in context of other products**
- Interactions with other pests and controls
- Relationships with IPM and resistance aspects
- Other aspects to think about
Woolly Apple Aphid
Woolly apple aphid
Ecology Based Control
<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>Mainly on roots</td>
<td>Resting/feeding</td>
<td>Majority of population</td>
</tr>
<tr>
<td></td>
<td>In bark injuries</td>
<td></td>
<td>Old trees worse</td>
</tr>
<tr>
<td></td>
<td>On dormant shoots</td>
<td></td>
<td>Especially if warm/dry winter</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>Early Spring</td>
<td>Roots</td>
<td>Multiplying</td>
<td>Drenches applied now</td>
</tr>
<tr>
<td></td>
<td>Trunks</td>
<td>Crawlers migrating</td>
<td>Can trap now Oil + insecticides applied 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>
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<td>-----------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td><strong>Spring</strong></td>
<td>Leaf axils initially</td>
<td>Growing/breeding - many cycles</td>
<td>Ready sap source</td>
</tr>
<tr>
<td></td>
<td>1 year old and new wood</td>
<td>Crawlers migrating</td>
<td>Insecticides effective now as easy target and small canopy</td>
</tr>
<tr>
<td><strong>Late Summer</strong></td>
<td>1 year old and new wood</td>
<td>Dispersal by winged forms</td>
<td>Insecticides just ‘taking the top off’ the colonies now.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Crawlers migrating</td>
<td></td>
</tr>
</tbody>
</table>
WAA became a problem in ‘warmer’ countries (Aust, NZ, RSA) when spraying for CM commenced. This lead to rootstock breeding for ‘the colonies’.

Hail-netting, longer pruning, improved agronomy, newer varieties, some rootstoks increase WAA pressure
How to control Woolly Apple Aphid

1. **IPM** *(WAA not problem in neglected/organic orchards)*
2. Treat above ground
3. Treat below ground
4. Combine all 3 is best approach
How can I best attack it?

- The best control is the free one – The Wasp!
- So get to know The Wasp.
- Overwinters in the WAA bodies, protected from weather but still vulnerable to sprays.
- Emerges later that WAA crawlers so a timing issue.
- Easy to knock over with insecticides; Gusa, Endo, Lorsban, carbaryl.
- Calypso, Altacor, Samurai, Delegate foliar are softer and Confidor/Samurai drenches very safe
How can I best attack it?

• Wasp can explode late in season **but** usually too late

• – may need to establish *early control with insecticides*.

• Look for wasps and WAA bodies with holes.

• Strip sprays late summer onwards.

• Rain affects WAA and wasp’s effectiveness
Insecticide Control

Cover sprays for CM suppress WAA
(Calypso, Folidol and even Gusa)
Leaf axils infested with woolly aphid

Trial results

Days after treatment 4

Percent

Untreated Caly (4)/Gusa Gusathion

ADM 193 Stanthorpe, Qld 2000/01
<table>
<thead>
<tr>
<th></th>
<th>Altacor</th>
<th>Delegate</th>
<th>Samurai</th>
<th>Calypso</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>28</td>
<td>5</td>
<td>4A</td>
<td>4A</td>
</tr>
<tr>
<td>Codling Moth</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>LBAM</td>
<td>✓</td>
<td>✓</td>
<td>Suppression</td>
<td></td>
</tr>
<tr>
<td>Woolly Aphid</td>
<td></td>
<td>✓</td>
<td>Suppression</td>
<td></td>
</tr>
<tr>
<td>Mealy Bug</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>O F M</td>
<td>✓</td>
<td>✓</td>
<td>✓ (SF)</td>
<td>✓ (SF)</td>
</tr>
<tr>
<td>Heliothis</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dimpling Bug</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
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</tbody>
</table>
Lorsban has a role, but harmful to the parasitic wasp.
Lorsban has a role, but harmful to the parasitic wasp.
Pipfruit growers raise concerns about woolly aphid outbreaks

*Nelson Mail, Nelson, 12 August 2008, p15*

Growers at the Pipfruit NZ conference expressed concern that the push for low residue fruit markets in Europe was jeopardising other markets. For example, Hawkes Bay growers changed a spray for codling moth to satisfy the Taiwan market and the woolly apple aphid population ‘exploded’. Subsequently four exporters have been suspended from supplying China after the discovery of woolly aphids in consignments of Hawkes Bay apples.
Delegate on WAA Parasite

• Stanthorpe 2008-09 season.
• 11 Delegate sprays
• Isolated apple orchard
• Bad WAA previous year
Delegate on WAA Parasite

• Stanthorpe 2008-09 season.
• 11 Delegate sprays
• Isolated apple orchard
• Bad WAA previous year

<table>
<thead>
<tr>
<th>Date</th>
<th>% Parasitised</th>
<th>% Parasitised and emerged</th>
<th>Total % parasitised</th>
<th>% Unparasitised</th>
</tr>
</thead>
<tbody>
<tr>
<td>19/02/09</td>
<td>15.0</td>
<td>3.7</td>
<td>18.7</td>
<td>81.3</td>
</tr>
<tr>
<td>18/03/09</td>
<td>20.1</td>
<td>5.0</td>
<td>25.1</td>
<td>74.9</td>
</tr>
<tr>
<td>08/04/09</td>
<td>39.6</td>
<td>22.6</td>
<td>62.2</td>
<td>37.9</td>
</tr>
</tbody>
</table>
Delegate on WAA Parasite

- Stanthorpe 2008-09 season.
- 11 Delegate sprays
- Isolated apple orchard
- Bad WAA previous year

Conclusion; “Eleven applications of Delegate did not prevent the parasitoid *Aphelinus mali* establishing in a commercial Granny Smith orchard and increasing in numbers and eventually controlling a woolly apple aphid infestation”
Insecticide Control

CM cover sprays for suppress WAA
(Calypso, Folidol and even Gusa)

3 spray approaches;
• True systemic eg Kilval
• Knockdowns eg Lorsban and Folidol
• Systemic/knockdown eg Calypso, Samurai and new product
Timing: when to start, how often to apply.

- Go early when colonies small & crawlers vulnerable.
- ADB and MBug sprays can overlap.

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- Use rainfall
- Protect wasp by strip spraying.
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- Use high volume water, maybe wetter.
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- Go early when colonies small & crawlers vulnerable.
- ADB and MBug sprays can overlap.
- Use rainfall
- Protect wasp by strip spraying.
- Use high volume water, maybe wetter.
- Pheromones can cause flares.
- Short season varieties eg Galas can be source of wasp
Insecticide Control

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3 spray approaches;
• True systemic eg Kilval
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Or . . . . . Magic Drenches: Confidor and Samurai
2 Season Trial

Percent of leaf axils infested with WAA

- No drench
- Confidor 200 SC @ 3 mL/tree
- Confidor 200 SC @ 12 mL/tree
IPM = “I”PM

- Drenches allow wasp to work very well, if manage late season insecticides (or use pheromones).
- Calypso can suppress WAA
- Cold store the wasp.
- Rootstocks - Northern Spy M and MM series (MM106, MM111) M9, M26, CG series
- Pruning style, crop load-shoots, Regalis
Resistance

• Kilval fell over in Tassie then distributed via nursery stock.

• Wasp + insecticides should delay resistance developing
Getting Good WAA Control

- Base strategy on resident WAA population
- Confidor or Samurai drench if high pressure orchard
- Knockdowns must be early & high volume
- Some CM and MB sprays can control/suppress WAA
- Wasp cornerstone of long term control