Pest Management in Canola
Contents

• Canola aphids
• Diamondback moth (DBM)
• Native budworm
• Insecticide options in canola
• Key messages
### Key canola pests

<table>
<thead>
<tr>
<th>Pest group</th>
<th>Emergence</th>
<th>Vegetative</th>
<th>Flowering – Grain fill</th>
</tr>
</thead>
<tbody>
<tr>
<td>Earth mites</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lucerne flea</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Caterpillars (cutworms, loopers)</td>
<td></td>
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<tr>
<td>Beetles (weevils, false wireworms)</td>
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<tr>
<td>Slugs</td>
<td></td>
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<tr>
<td>Earwigs, millipedes, slaters</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Snails</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Aphids</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Diamondback moth</strong></td>
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<td></td>
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<tr>
<td><strong>Native budworm</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Rutherglen bug</td>
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</tr>
</tbody>
</table>
Canola establishment
Decision timeline

Planning ahead gives you more options

Monitor
- Pasture grazing
- Timerite for RLEM

Stubble management
- Weed control
- Seed treatment
- Sowing tactics
- Bare earth spray
- Post emergent spray
- Selective spray
- Biological control

Monitor
- Winter
- Spring

Previous spring
- Autumn
- Sowing

GRDC
Cultural Biological Chemical

Decision Making for Insect Management in Grain Crops
Decision timeline

What are the risks?

- Mites, lucerne flea, Stubble management, Monitor
- Slugs, snails, earwigs, millipedes, slaters
- Bare earth spray, Biological control, Selective spray, Monitor
- Sowing tactics, Seed treatment
- Post emergent spray
- Pasture grazing, Timerite for RLEM
- Winter

Sowing

- Chemical
- Biological
- Cultural

Spring
Canola Aphids
Canola aphids

**Cabbage aphid**
- Greyish colonies on growing tips
- Thick powdery wax covering

**Turnip aphid**
- Yellow/green colonies on growing tips
- Finer wax covering
- More common in drier years

**Green peach aphid**
- Sparse colonies on the underside of lower leaves
- Important vector of BWY Virus

Decision Making for Insect Management in Grain Crops

GRDC Grains Research & Development Corporation
Aphid damage

Direct feeding – high populations
• Sucking, removal of nutrients
  – wilting, flower abortion, reduced pod set
• Impact on the crop depends on:
  – timing (early vs late)
  – severity (intensity and duration)
  – plant stress (compensation, aphid growth)

Virus spread – few individuals needed
• Beet Western Yellows Virus spread by green peach aphid

Cabbage aphid colony on the main raceme
Risk factors

• *Brassica* green bridge (virus)
• **Weather**
• Low beneficial activity
• ‘Hard’ chemistry (any pest)

Mitigating factors

• **Weather**
• Beneficials

- Lacewings
- Hoverflies
- Nabids
- Ladybirds
- Parasitoids
Yield impact / thresholds

- Estimating infestation – plants/stems
- Crop stage & stress
- Predicted weather
- Potential for compensation?

Few demonstrated examples of yield loss in Australian literature

- Thresholds: 10-50% infestation + limited compensation capacity

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Yield (t/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>2.07 a</td>
</tr>
<tr>
<td>10% of terminals removed</td>
<td>1.93 a</td>
</tr>
<tr>
<td>50% of terminal removed</td>
<td>1.98 a</td>
</tr>
<tr>
<td>90% of terminal removed</td>
<td>2.01 a</td>
</tr>
</tbody>
</table>

Treatments followed by the same letter are not significantly different ($P < 0.05$).
# Best bet table – options for management and control

<table>
<thead>
<tr>
<th>Season</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Spring</strong></td>
<td>Monitor trends in aphid and beneficial populations in crops over time. Use thresholds to guide spray decisions, considering crop stage (% flowering) and moisture stress. High risk where&lt;br&gt;- Infestation rapidly increasing during early flowering to bud formation&lt;br&gt;- Forecast is for warm and dry conditions to continue&lt;br&gt;- Low/no parasitism and beneficial activity (note: this can also happen if SPs/OPs are used to control DBM/native budworm).&lt;br&gt;<strong>If spraying:</strong>&lt;br&gt;- Consider border sprays with a selective aphicide (pirimicarb) to prevent/delay build-up and retain beneficiais&lt;br&gt;- Use soft products (pirimicarb or petroleum spray oils) to retain beneficiais&lt;br&gt;- Rotate insecticide MOAs to reduce resistance selection in green peach aphid.</td>
</tr>
</tbody>
</table>
Green peach aphid: Insecticide options

Managing GPA in canola and pulses

• Possible resistance to imidacloprid?

• Implement resistance management strategies, such as rotating chemicals, avoid ‘insurance sprays’ and apply chemicals only after monitoring and correctly identifying pest species

• Report chemical control failures; don’t necessarily assume application issue (includes imidacloprid!)

• Reduce the availability of alternative plant hosts and consider border sprays

• Consider role of beneficials; monitor trends over time
Economics of spraying

Expected yield x price

<table>
<thead>
<tr>
<th>Crop Value per ha</th>
<th>$10</th>
<th>$15</th>
<th>$20</th>
<th>$25</th>
<th>$30</th>
<th>$35</th>
<th>$40</th>
</tr>
</thead>
<tbody>
<tr>
<td>$500</td>
<td>2 (%)</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>$750</td>
<td>1.3</td>
<td>2</td>
<td>2.7</td>
<td>3.3</td>
<td>4</td>
<td>4.7</td>
<td>5.3</td>
</tr>
<tr>
<td>$1000</td>
<td>1</td>
<td>1.5</td>
<td>2</td>
<td>2.5</td>
<td>3</td>
<td>3.5</td>
<td>4</td>
</tr>
<tr>
<td>$1250</td>
<td>0.8</td>
<td>1.2</td>
<td>1.6</td>
<td>2</td>
<td>2</td>
<td>2.8</td>
<td>3.2</td>
</tr>
<tr>
<td>$1500</td>
<td>0.7</td>
<td>1</td>
<td>1.3</td>
<td>1.7</td>
<td>2</td>
<td>2.3</td>
<td>2.7</td>
</tr>
<tr>
<td>$2000</td>
<td>0.5</td>
<td>0.8</td>
<td>1</td>
<td>1.3</td>
<td>1.5</td>
<td>1.8</td>
<td>2</td>
</tr>
<tr>
<td>$2500</td>
<td>0.4</td>
<td>0.6</td>
<td>0.8</td>
<td>1</td>
<td>1.2</td>
<td>1.4</td>
<td>1.6</td>
</tr>
</tbody>
</table>

Table values: % future yield loss before spraying is economically justified
Diamondback moth (DBM)
Diamondback moth (DBM)

- Periodic outbreaks in canola
  - every 3-4 years in SA and NSW, Victoria
- Larvae feed on leaves, buds, flowers and pods
  - defoliation, reduced seed number & size
## Risk factors for DBM

<table>
<thead>
<tr>
<th>High risk</th>
<th>Reduced risk</th>
<th>Low risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>• High summer rainfall creates <em>Brassica</em> green bridge</td>
<td>• Significant heavy rainfall (&lt;10mm) dislodges and drowns larvae</td>
<td>• Cool, moist conditions late winter through spring</td>
</tr>
<tr>
<td>• Warm and dry conditions July through spring</td>
<td>• High beneficial activity and/or DBM parasitism</td>
<td>• Epizootics of fungal disease (e.g. <em>Zooplhera radicans</em>)</td>
</tr>
<tr>
<td>• No significant rainfall events (&gt;10mm)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Lincoln weed**
Perennial DBM host

**Diadegma semiclausum**
Key DBM parasitoid
Insecticidal control challenges

- Overlapping generations
- Larvae distributed throughout canopy
- Spray penetration
- Rapidly evolves insecticide resistance
- Product selection, good coverage critical
Treated under an emergency permit in 2007

Treated with a synthetic pyrethroid
DBM management

- Manage *Brassica* green bridge
- Frequently monitor DBM numbers and risk of exceeding thresholds
- If spraying:
  - Bt (<8mm larvae)
  - New chemistry
  - Rotate MOA across seasons
  - Avoid SPs

Parasitised DBM pupa
- note capsule shape
DBM monitoring and thresholds

- Plant moisture status is key
- Minimum of 5 sets of 10 sweeps
- Calculate larvae per 10 sweeps

<table>
<thead>
<tr>
<th>Crop stage</th>
<th>Moisture stressed?</th>
<th>Spray threshold</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-flowering</td>
<td>Yes</td>
<td>&gt; 30 larvae / 10 sweeps</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>&gt; 50 larvae / 10 sweeps</td>
</tr>
<tr>
<td>Majority in flower</td>
<td>Yes</td>
<td>&lt; 100-200 larvae per 10 sweeps</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>&gt; 100-200 larvae / 10 sweeps</td>
</tr>
</tbody>
</table>
Native budworm
Native budworm in canola

- Sweep net from flowering/podding until late maturity
- Dynamic thresholds based larvae per 10 sweeps
- SPs may impact DBM/aphids
- *Bt* or NPV for small larvae (< 7-8mm)

Mature native budworm larva burrowing into a canola pod
Native budworm life stages

*Helicoverpa punctigera*

**Eggs:** fresh, brown ring, about to hatch **Only 0.6 mm diameter**

**Large larva 30 mm**

4 pairs of prolegs

<table>
<thead>
<tr>
<th>Helicoverpa size categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very small</td>
</tr>
<tr>
<td>1-3 mm</td>
</tr>
</tbody>
</table>

90% of damage caused by these larvae
Monitoring budworm

Early warning – moth activity

– Pheromone traps

In-crop monitoring

– Sweep net
Dynamic thresholds for native budworm

<table>
<thead>
<tr>
<th></th>
<th>K – grain loss kg/larva/ha</th>
<th>P – grain price $/tonne</th>
<th>C – cost of control $/ha</th>
<th>ET – larvae per 10 sweeps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field peas</td>
<td>50</td>
<td>350</td>
<td>10</td>
<td>0.6</td>
</tr>
<tr>
<td>Lentils</td>
<td>60</td>
<td>435</td>
<td>10</td>
<td>0.4</td>
</tr>
<tr>
<td>Faba bean</td>
<td>90</td>
<td>335</td>
<td>10</td>
<td>0.3</td>
</tr>
<tr>
<td>Chickpeas - desi</td>
<td>30</td>
<td>275</td>
<td>10</td>
<td>1.2</td>
</tr>
<tr>
<td>Canola</td>
<td>6</td>
<td>580</td>
<td>10</td>
<td>2.9</td>
</tr>
<tr>
<td>Lupins</td>
<td>7</td>
<td>300</td>
<td>10</td>
<td>4.8</td>
</tr>
<tr>
<td>Field peas</td>
<td>50</td>
<td>350</td>
<td>10</td>
<td>0.6</td>
</tr>
</tbody>
</table>

\[
ET = \frac{(C \times 1000)}{(K \times P)}
\]

*Developed in Western Australia: Source: DAFWA*
Insecticide options in canola
# Insecticide options in canola

<table>
<thead>
<tr>
<th>MOA</th>
<th>Canola aphids</th>
<th>DBM</th>
<th>Native budworm</th>
<th>Rutherglen Bug</th>
<th>Beneficial toxicity</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td><em>Bt</em></td>
<td>&lt;8mm</td>
<td>&lt;8mm</td>
<td></td>
<td>Very Low</td>
</tr>
<tr>
<td></td>
<td>NPV</td>
<td></td>
<td></td>
<td></td>
<td>Very Low</td>
</tr>
<tr>
<td></td>
<td>Petroleum spray oils</td>
<td>(s)</td>
<td>Mix <em>Bt</em></td>
<td>(s)</td>
<td>Very Low</td>
</tr>
<tr>
<td>1A</td>
<td>Pirimicarb</td>
<td></td>
<td></td>
<td></td>
<td>Very Low</td>
</tr>
<tr>
<td>6</td>
<td>Emamectin</td>
<td></td>
<td></td>
<td></td>
<td>Mod</td>
</tr>
<tr>
<td>5</td>
<td>Spinetoram</td>
<td></td>
<td></td>
<td></td>
<td>Mod</td>
</tr>
<tr>
<td>1A</td>
<td>Methomyl</td>
<td>R?</td>
<td>WA</td>
<td></td>
<td>High</td>
</tr>
<tr>
<td>1B</td>
<td>OPs</td>
<td>R</td>
<td></td>
<td></td>
<td>High</td>
</tr>
<tr>
<td>3A</td>
<td>Pyrethroids</td>
<td>R</td>
<td></td>
<td></td>
<td>Very High</td>
</tr>
</tbody>
</table>

**Registered**  
**R** = resistance  
**(s)** = suppression
Key messages

- **Planning ahead** gives you more options
- **Assessing risk** (establishment pests, aphids/DBM) helps decide which management approach to take
- **Manage resistance** in DBM by rotating MOAs across seasons
- Avoid using hard chemistries (SPs/OPs) in spring canola
  - Resistance management
  - Aphid flares
Supporting research organisations

Financial workshop support

Workshop facilitation