



# Crop establishment pests





# Why look at crop establishment?

- Crop establishment is the most susceptible growth stage of plant development to pests & can also be the challenging period for applying IPM
- Canola, medics and clovers are generally more susceptible to insect attack compared with cereals, grasses and pulses





# What are the IPM options for crop establishment?

- Cultural ✓
- Biological ?
- Chemical ✓ ....can we be more strategic?

Key principles which underpin management strategies (esp. chemical) include pest ID, monitoring, and understanding the 'which', 'when' & 'how' about pesticides



# Key crop establishment pests

- > 40 invertebrate species threaten seedling establishment in crops and pastures
- Control tactics for these species presently relies heavily on the application of pesticides

Pest group	Example species
Earth mites	redlegged earth mite, blue oat mite
Lucerne flea	lucerne flea
Slugs	grey field slug, black keeled slug
Beetles & weevils	false wireworm, vegetable weevil, pasture cockchafer
Caterpillars	common cutworm, pasture webworm
Other	earwigs, millipedes, slaters & snails



Pest identification is  
essential to making  
decisions

# Who am I?

1. RLEM
2. Blue oat
3. Lucerne flea
4. Balaustium
5. Brown wheat
6. Bryobia



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# Key differences for field ID



RLEM

-No spot



BOM

-Globular spot



*Balaustium*

-Pads front feet



*Bryobia*

-Long front legs

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
RLEM												
BOM												
Balaustium												
Bryobia												



# Damage symptoms can assist ID



Balaustium



Lucerne flea



BOM



RLEM





First: assess pre-season risk



# Risk profiles for crop establishment

Example: Earth mites and lucerne flea

High risk	Reduced risk	Low risk
<ul style="list-style-type: none"> <li>• Seasonal forecast is for dry or cool, wet conditions that slow crop growth</li> <li>• Pasture going into crop</li> <li>• Susceptible crop being planted (canola, pasture, lucerne)</li> </ul>	<ul style="list-style-type: none"> <li>• Thin/sparse pasture density in the previous spring</li> <li>• Low weeds in paddocks and along fence-lines</li> <li>• Higher sowing rate used</li> <li>• Optimal plant growing conditions during establishment</li> </ul>	<ul style="list-style-type: none"> <li>• Following a cereal or pulse rotation in paddock with low weeds</li> <li>• Sandy soils (lucerne flea only)</li> </ul>

*Full Risk profile table in printed resources*



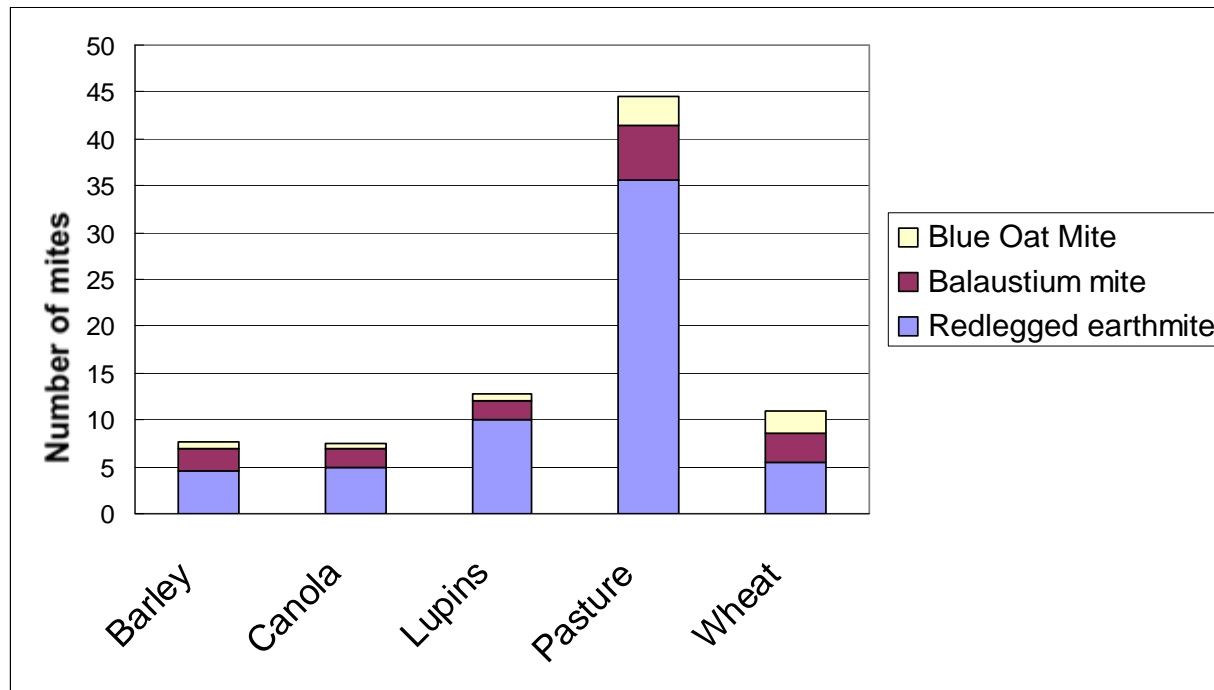
# Make use of paddock histories

- Knowing paddock histories will benefit decision-making for establishment pests (e.g. crop selection to reduce pest populations and negate the need for chemicals)
  - We can predict likely pest issues for ‘resident’ pests (e.g. slugs, mites and cockchafer) if there is paddock history information
  - Predictions are far more difficult for ‘transient’ species that are more mobile and move large distances
  - Records of paddock histories and soil type are particularly useful when planning to sow susceptible crops, such as canola



# Pre-season planning & crop selection

Number of mites in canola following 2 years of various crops



- Be careful following pastures, unless management in the previous season controlled mite populations





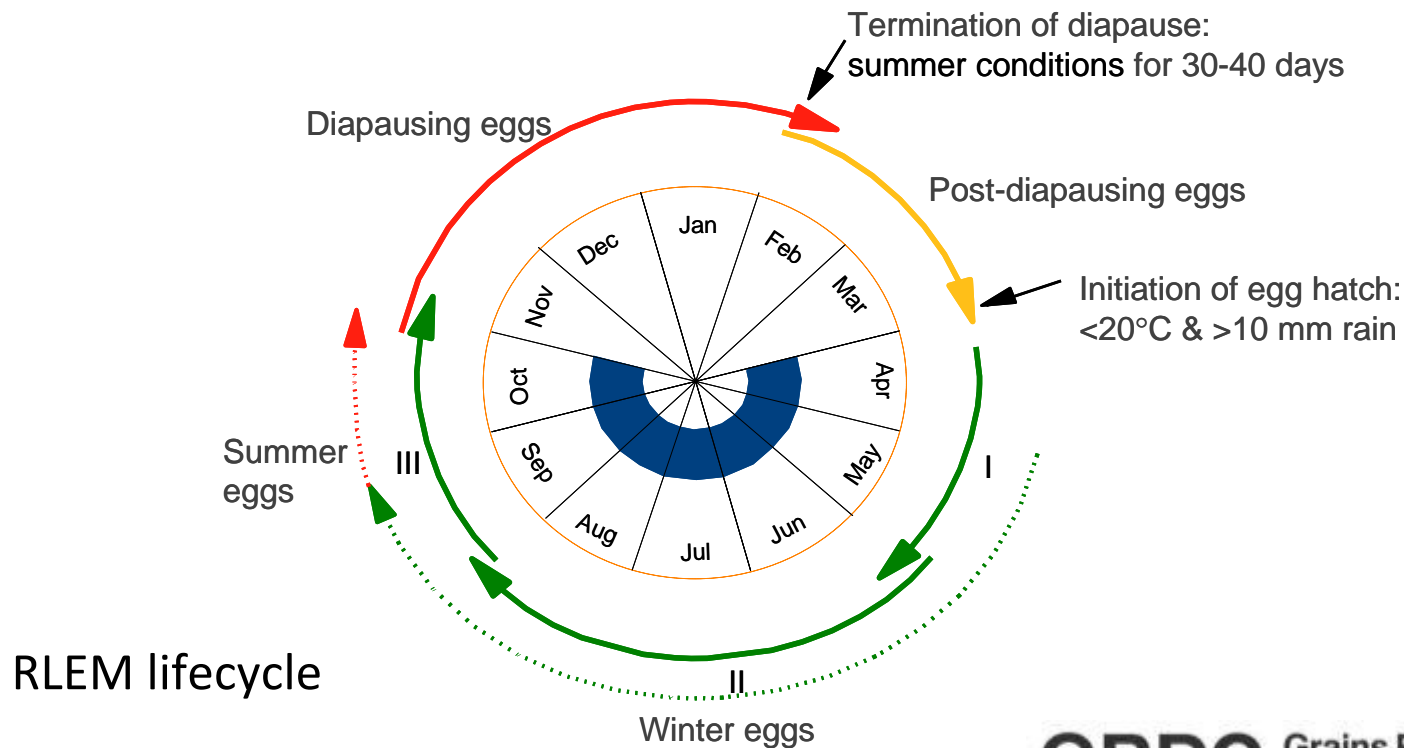
# Earth mites and lucerne flea





# Timerite for RLEM

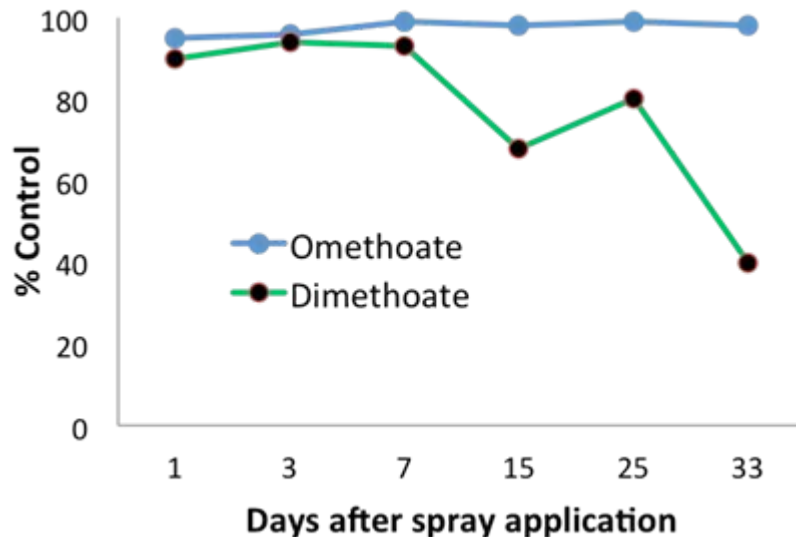
- Reduces the carry-over of pest eggs
- Timing of spray is critical
- Freely available tool



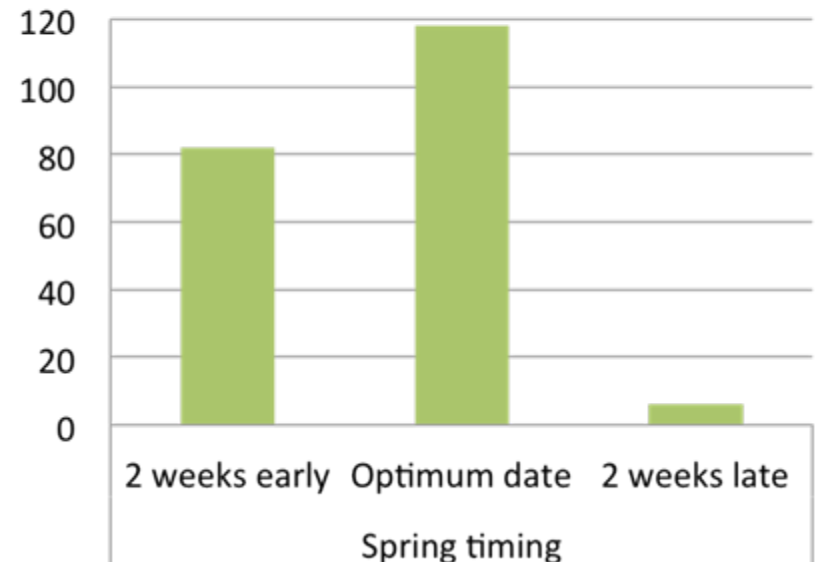


# Timerite for RLEM (cont.)

- Residual chemicals needed to target later emerging eggs
- Timerite provides excellent control of RLEM, in autumn
- Not applicable to other mites and lucerne flea



**% increase in canola seedlings in Autumn**

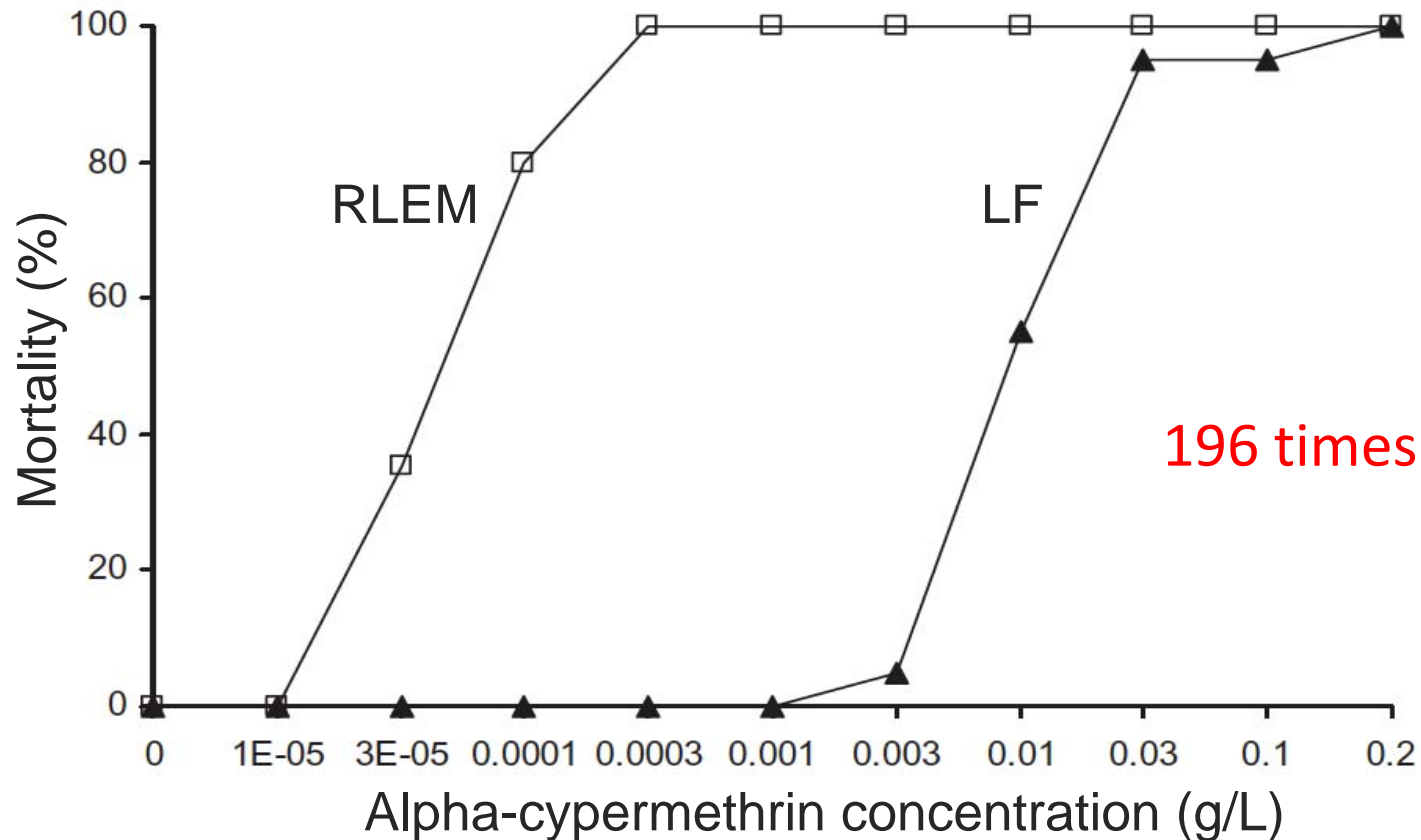


Adapted from AWI Ltd: Timerite© Information Package (sourced from Bayer)



# Insecticide considerations

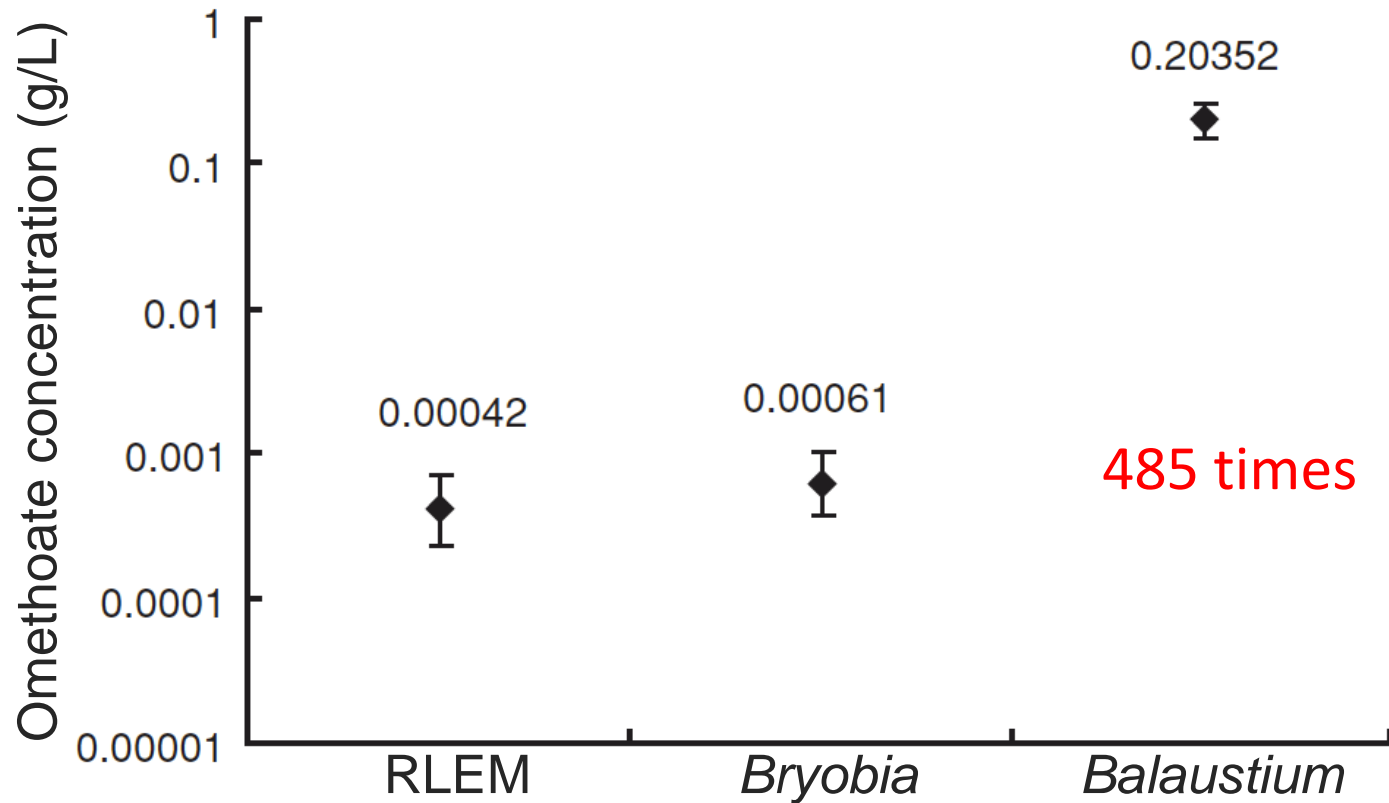
## Chemical tolerance of lucerne flea





# Insecticide considerations (cont.)

## Chemical tolerance of mites



# cesar chemical testing

Chemical	RLEM*	BOM*	Bal.	Bry.	LF*
Omethoate (eg. LeMat)	•	•	V Low	•	•
Dimethoate (eg Dimethoate)	•	•	V Low	?	•
Chlorpyrifos (eg. Lorsban)	•	•	V Low	•	•
Phosmet (eg. Imidan)	•	•	V Low	•	•
Bifenthrin (eg. Talstar)	•	•	Low	•	V Low
Alpha-cypermethrin (e.g Fastac)	•	•	V Low	V Low	V Low
Lambda-cyhalothrin (eg. Karate)	•	•	Low	V Low	V Low
Gamma-cyhalothrin (eg. Trojan)	•	•	Low	•	V Low
Esfenvalerate (eg. Sumi Alpha)	•	•	V Low	?	Low
Methidathion (eg. Suprathion)	•	•	V Low	V Low	•
Imidacloprid (eg. Gaucho)**	•	•	V Low	?	?

**Efficacy**

- V High
- High
- Low
- V Low

\* Other pesticide products are registered

\*\* Tested as seed dressing only



# Insecticide resistance in RLEM

- RLEM have been controlled using chemicals for > 50 years in Australia
- In 2006, chemical control failures experienced at 1 location
- 4 separate applications over a period of 3 weeks
- Paddock history: repeated applications of synthetic pyrethroids > 5 years





# Insecticide resistance in RLEM (cont.)

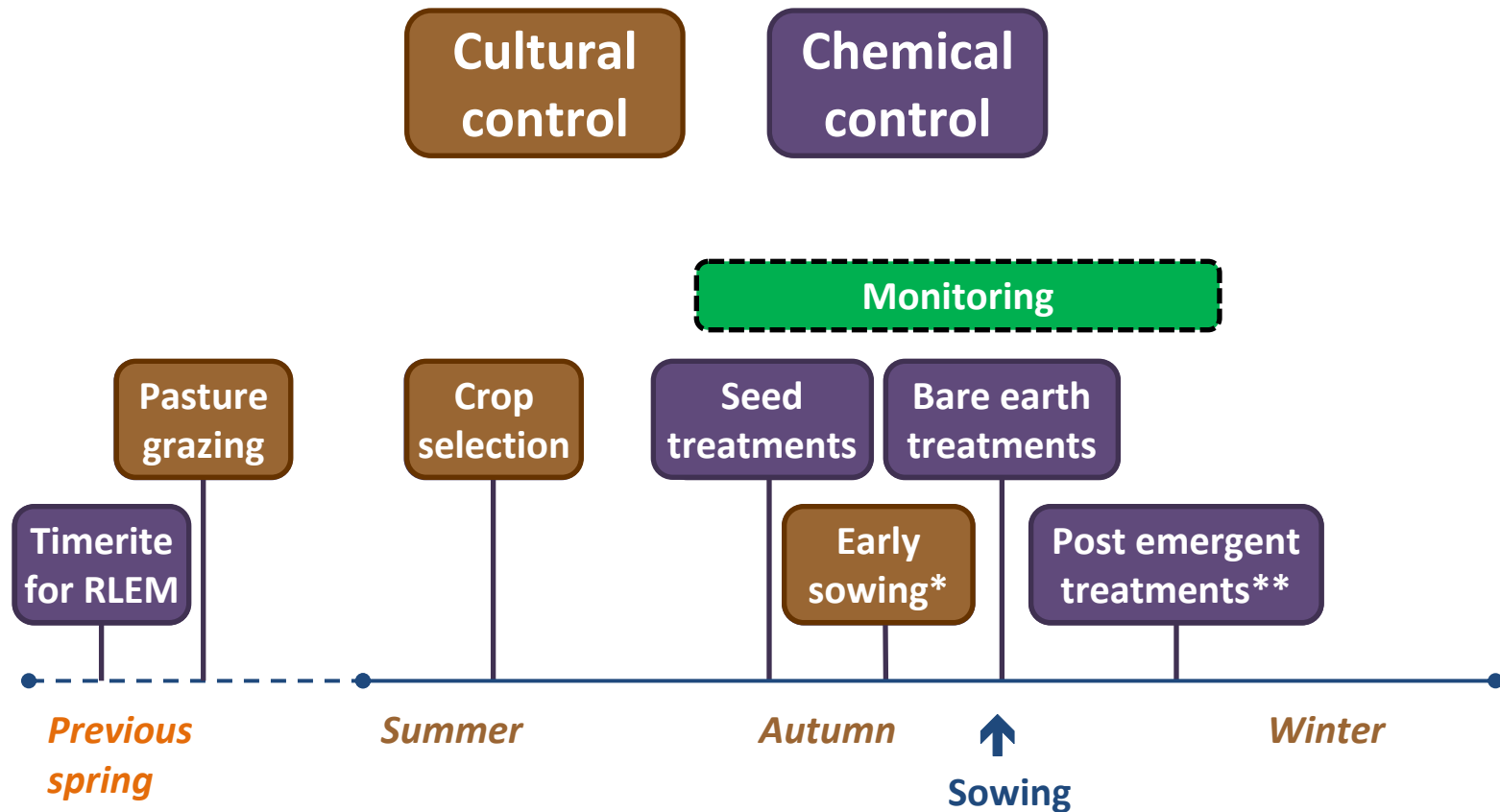
Chemical	Population	LC50 value	Resistance ratio
Bifenthrin	Control	0.03	
	WA	6881.97	243,027
	Control	0.03	
	WA (Gen 2)	7122.17	268,694
Alpha-cypermethrin	Control	0.02	
	WA	942.81	59,353
Omethoate	Control	0.10	
	WA	.26	---

- Resistance also found to be heritable
- Resistance located > 20 properties in WA (>900 km apart)
- Movement is known between WA & east coast





# Decision timeline for earth mites & lucerne flea



\* Also consider other sowing tactics (eg. increased seed density)

\*\* Consider spot spraying for lucerne flea



# Slugs





# What drives slug numbers?

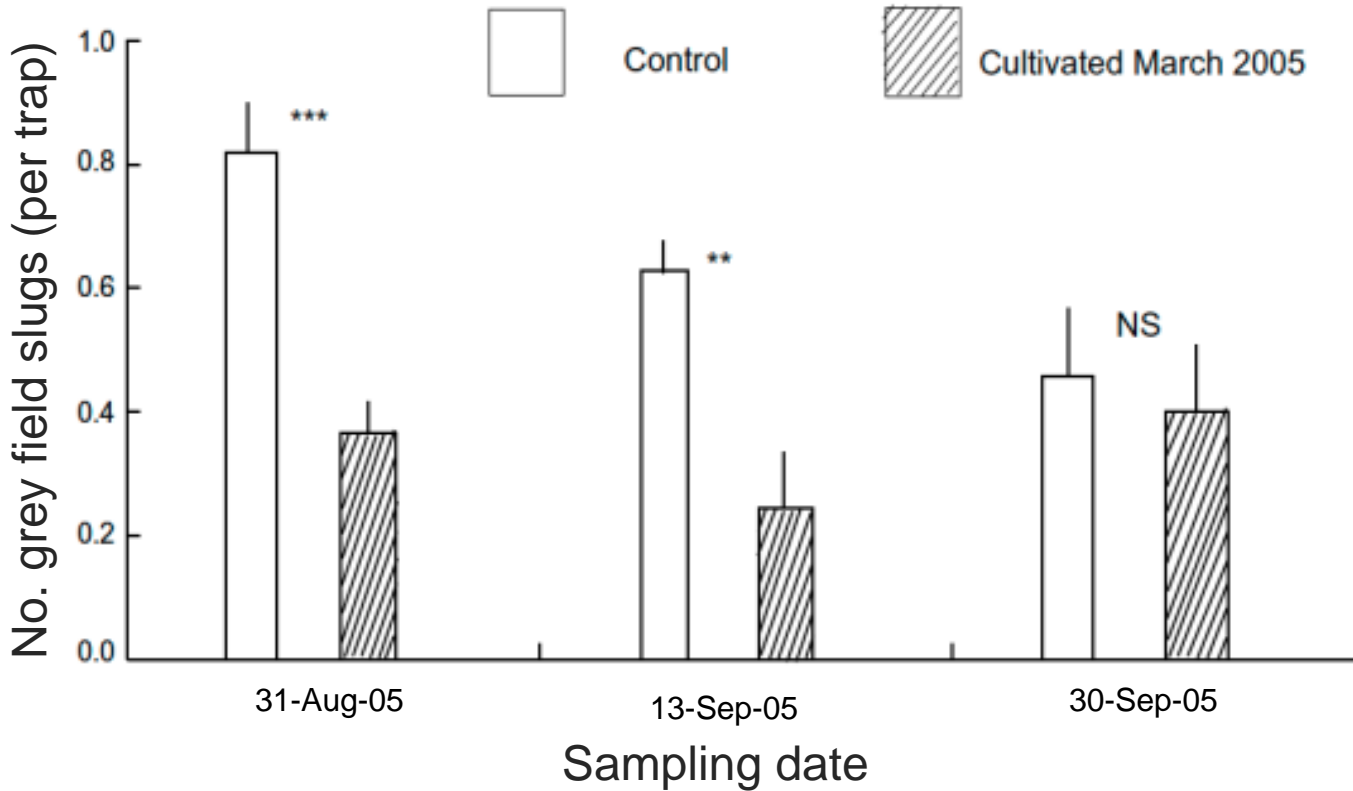
## Contributing factors to pest build-up:

- Previous paddock history/pop'n size
- Low/no cultivation (which otherwise helps to kill slugs)
- Stubble retention provides habitat and retains surface moisture
- Heavier soils which more readily retain moisture
- Rainfall: >450mm/year, summer rainfall facilitates pop'n build-up





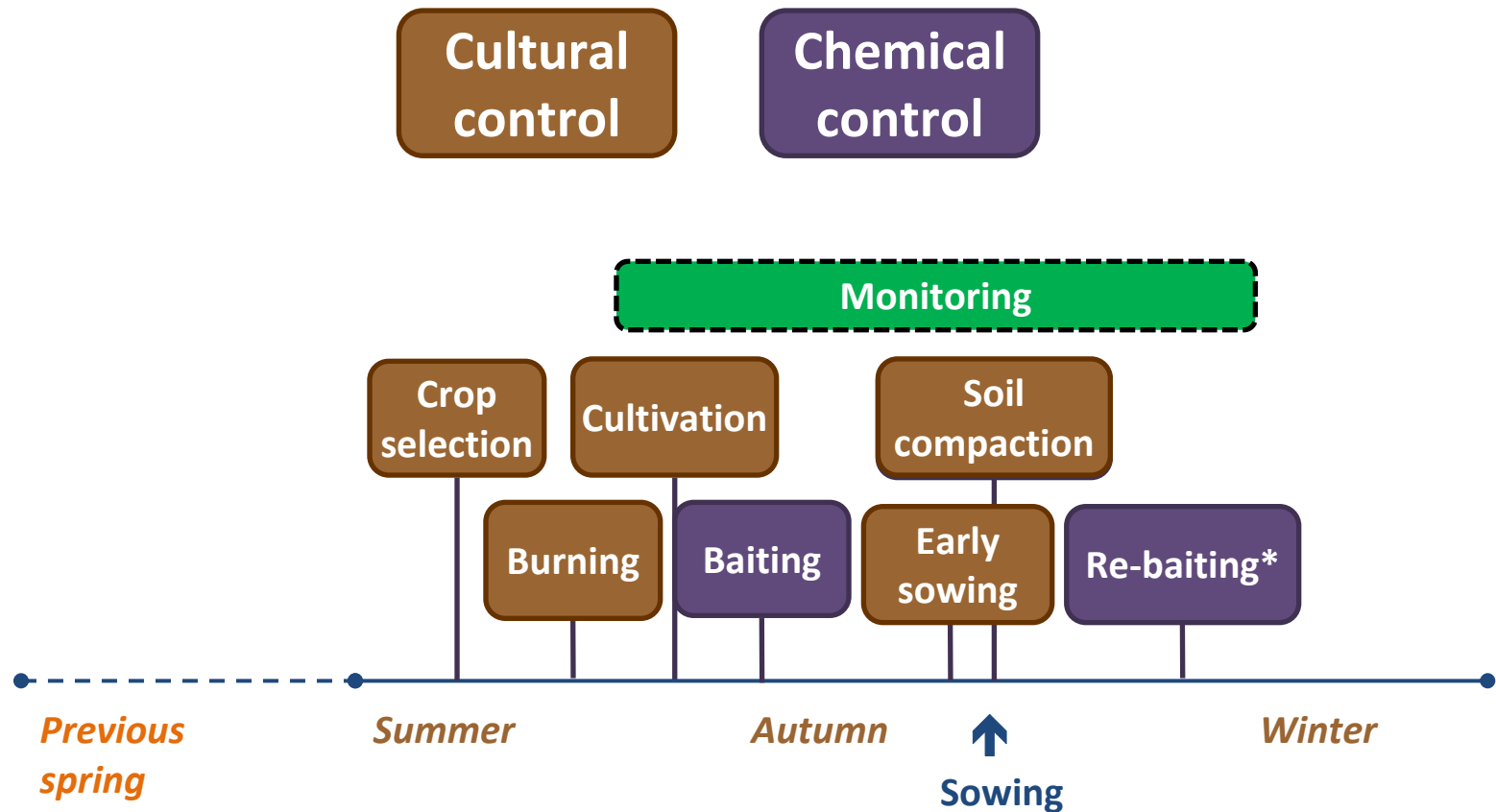
# Cultivation & slugs



- Cultivation reduces slug numbers
- Rolling also consolidates seed bed, restricts slug movement



# Decision timeline for slugs



\* Pending monitoring results



# Beetles and weevils



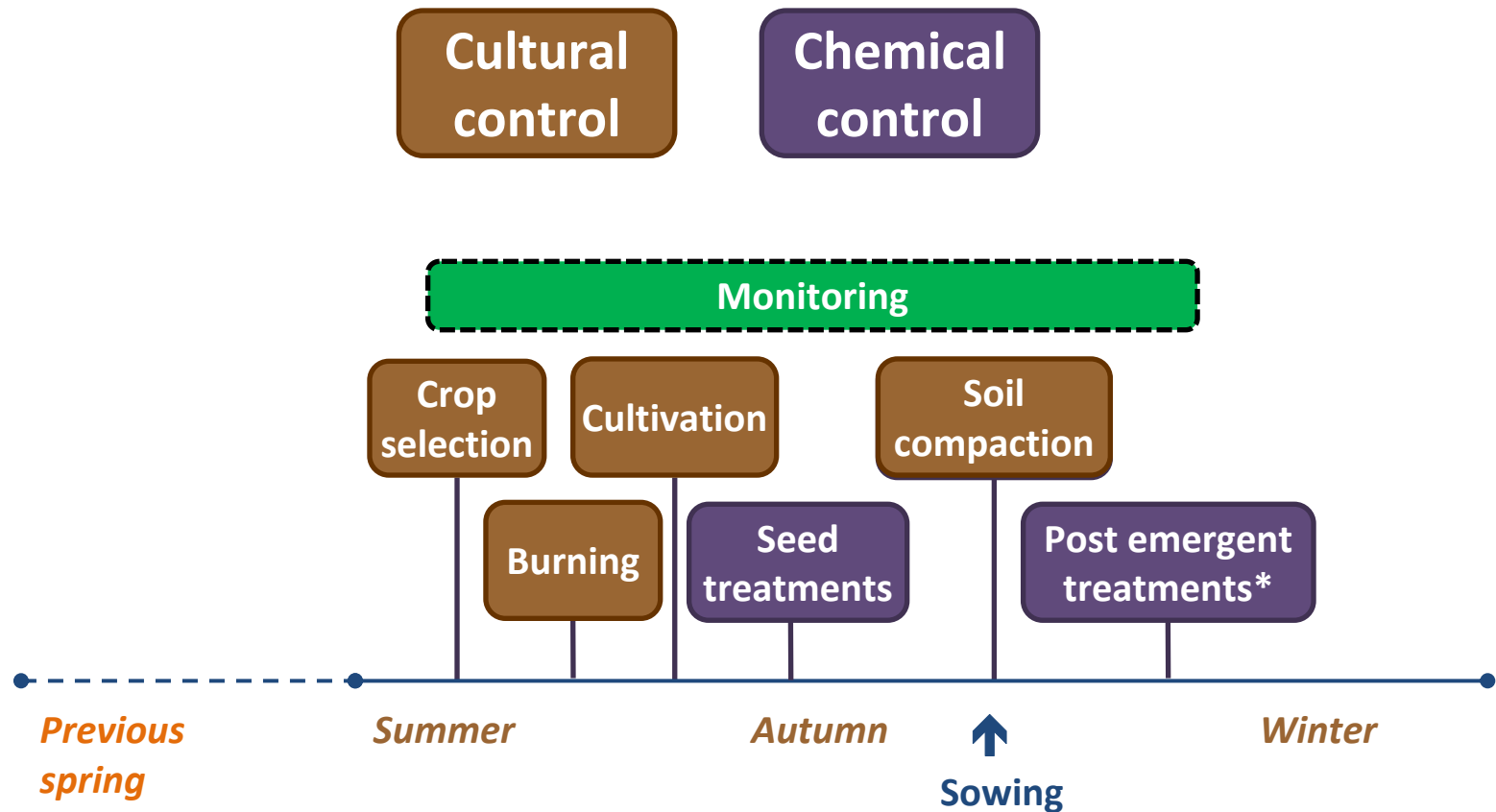
# Beetles and weevils

- Beetles and weevils are diverse groups, consisting of important crop establishment pests and many beneficial insects
- **ID is very important** (e.g. many weevils are crop specific, thus assessments can be made about likely damage & need to spray, beneficials often mis-identified as pests)
- **Minimum tillage and stubble retention can favour their survival**





# Decision timeline for beetles & weevils



\* For limited species where applicable (e.g. BHPC)



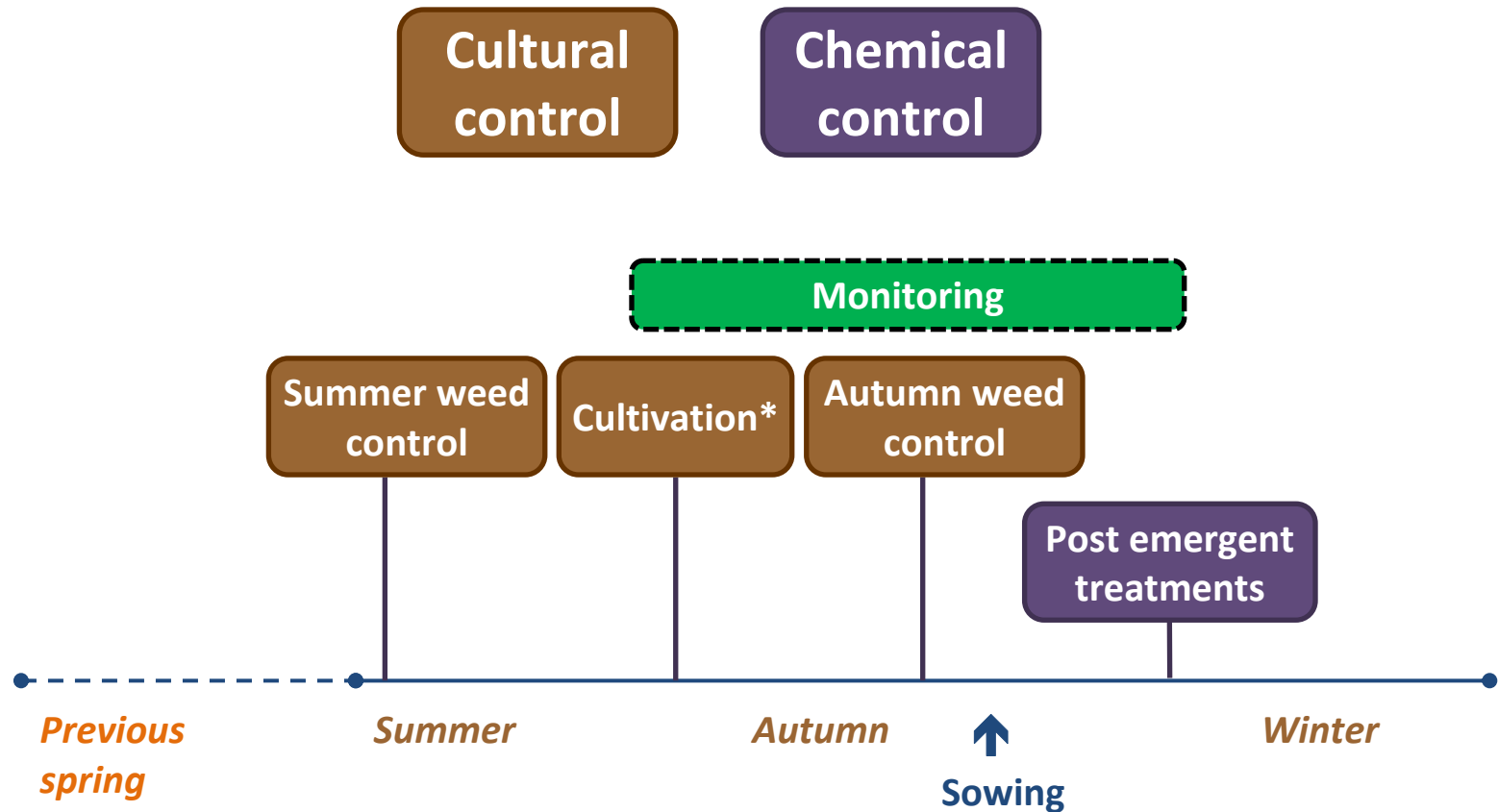


# Caterpillars





# Decision timeline for caterpillars



\* For soil-dwelling species (e.g. corbies)



# Establishment pests 'Best Bet' IPM strategy



## 'Best Bet' example: Earth mites and lucerne flea

Pre-season (previous spring/summer)	Pre-sowing	Emergence	Crop establishment
<p><u>Assess risk</u></p> <p>High risk when:</p> <ul style="list-style-type: none"> <li>• History of high mite pressure</li> <li>• Pasture going into crop</li> <li>• Susceptible crop being planted (eg. canola, pasture)</li> <li>• Seasonal forecast is for dry or cool, wet conditions that slow crop growth.</li> </ul> <p>If risk is high:</p> <ul style="list-style-type: none"> <li>• Ensure accurate ID</li> <li>• Use Timerite (RLEM)</li> <li>• Heavily graze pastures in early-mid spring</li> </ul>	<p>If high risk:</p> <ul style="list-style-type: none"> <li>• Use seed dressing on susceptible crops</li> <li>• Plan to monitor more frequently until crop establishment</li> <li>• Use higher sowing rate to compensate for seedling loss</li> <li>• Consider scheduling a post-emergent insecticide treatment</li> </ul> <p>If low risk:</p> <ul style="list-style-type: none"> <li>• Avoid seed dressings (esp. cereals/pulses) &amp; plan to monitor until crop establishment</li> </ul>	<ul style="list-style-type: none"> <li>• Monitor susceptible crops through to establishment (direct visual searches) **</li> <li>• Be aware of edge effects; mites move in from weeds around paddock edges</li> </ul> <p>If spraying:</p> <ul style="list-style-type: none"> <li>• Ensure accurate ID before deciding on chemical</li> <li>• Consider border sprays (mites) and 'spot' sprays (lucerne flea)</li> <li>• Spray prior to the production of winter eggs to suppress populations and reduce risk in the following season</li> </ul>	<ul style="list-style-type: none"> <li>• As the crop grows, it becomes less susceptible unless growth is slowed by dry or cool, wet conditions</li> </ul>

Full 'Best Bet' table in printed resources



# Take home messages

- Crops are particularly vulnerable at establishment, esp. canola and medics
- Planning pre-season is important (time constraints to monitor sufficiently at establishment period)
- Pest ID is vital (e.g. mites, weevils, scarabs)
- We have the ability to foresee many establishment pest issues before they happen... as they are 'residents'
- Monitoring, early planting, and stubble management are often common cultural strategies
- Beneficial species often only play a support role at crop establishment (diff. b/w crops & pastures)