



# Pest & Beneficial Identification

Accurate ID is essential to making decisions



# Contents

- Mites ID
- Beetles ID
- Caterpillars/larvae in canopies ID
- Monitoring
  - Pre-sowing & crop establishment (night active)
  - Pre-sowing & crop establishment (day active)
  - Post crop establishment (e.g. aphids, caterpillars)
- How often? Where? and How much sampling?



# Many similar looking pests behave very differently!



RLEM



BOM



*Balaustium*



*Bryobia*

## ID and Seasonality?

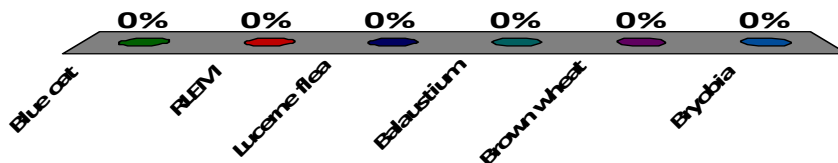
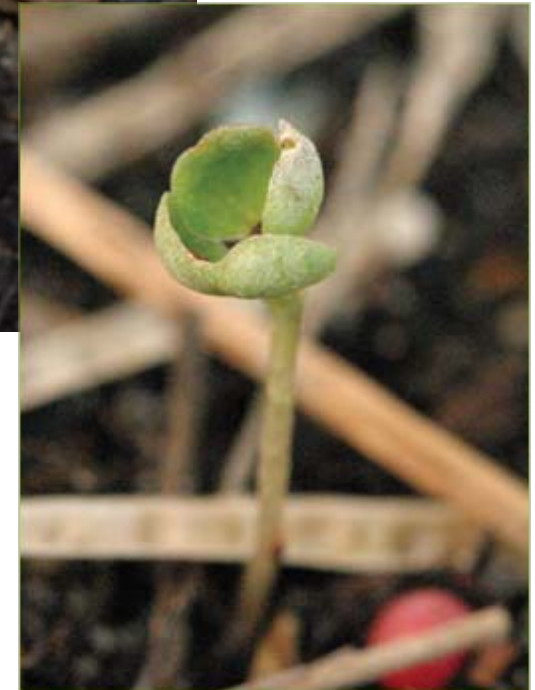
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
RLEM												
BOM												
<i>Balaustium</i>												
<i>Bryobia</i>												

## ID and Damage?



# Who did this?

1. RLEM/blue oat mite
2. Slugs
3. Lucerne flea
4. Balaustium mite
5. Bryobia mite

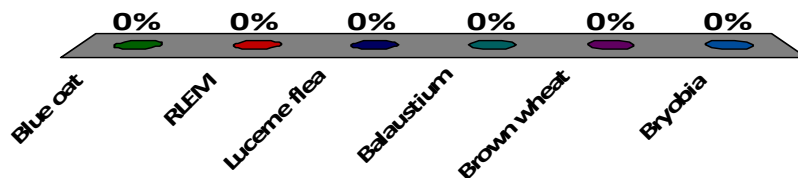


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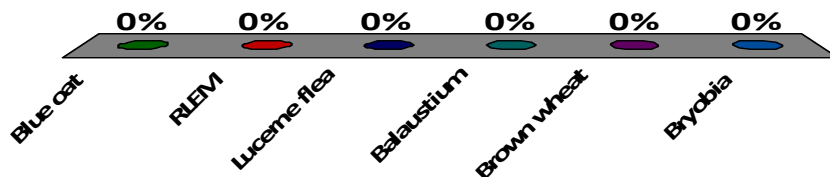
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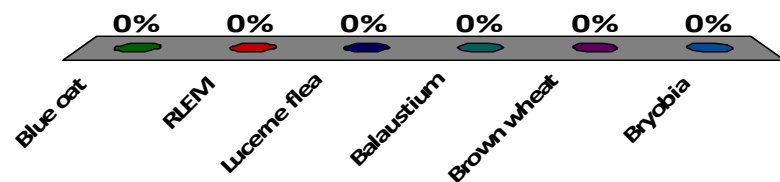


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MA Nash 2012

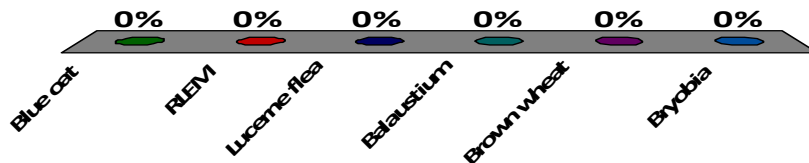


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# Beneficials / Natural enemies

## Lucerne Flea predators

- Spiny snout mite  
(*Neomulgus capillatus*)
- Pasture snout mite  
(*Bdellodes lapidaria*)



Spiny snout mite

Photo: Tas DPIWE



Pasture snout mite

## Earth mite predators

- The Anystis mite (*Anystis wallacei*)
- A number of generalist native predators, including mesostigmata mites



Anystis mite

Photo: SARDI



Mesostigmata mite





# Beetles





# Don't confuse BFB with predatory carabid beetles!



Beneficial  
Carabid

? Pest Tenebrionids  
(false wireworm  
beetles)!

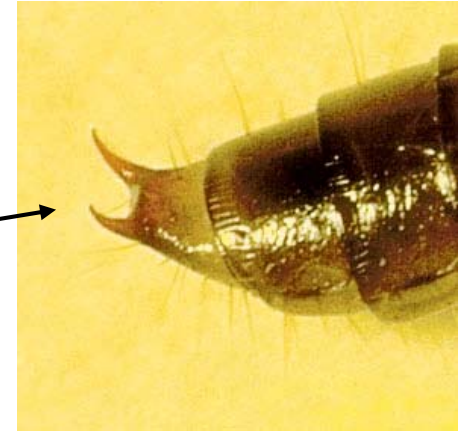




# Don't confuse BFB with predatory carabids!

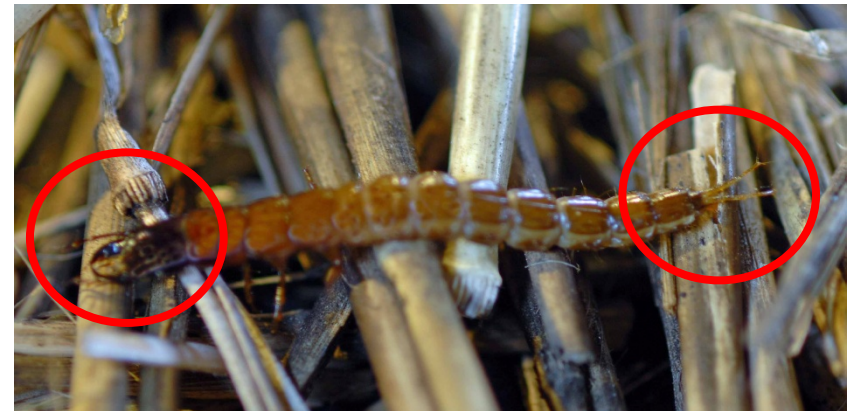


**Bronzed field beetle larvae** have 2 upturned spines on the last body segment



**Carabid beetle larvae:**

- forward facing mouthparts
- 2 longer hair-like spines on last body segment





# Larvae in crop canopies

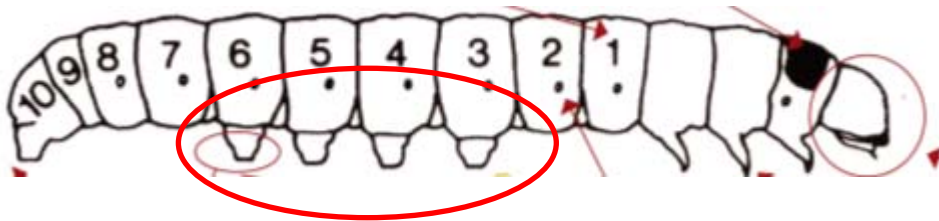






# Larvae in crop canopies

Caterpillars (moth larvae) eg budworm,  
DBM, loopers



Fly larvae (eg hoverfly larvae)

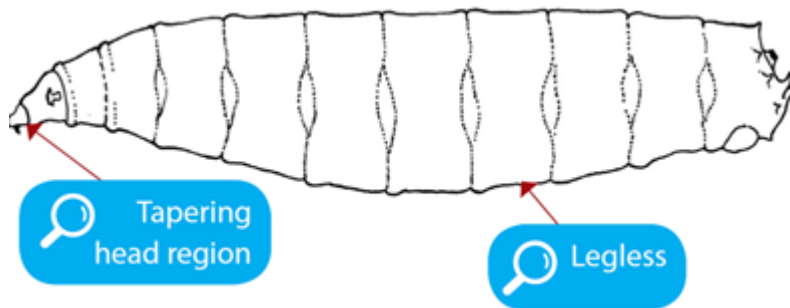


Photo: A. Weeks (cesar)

Beetle larvae (eg ladybird larvae)

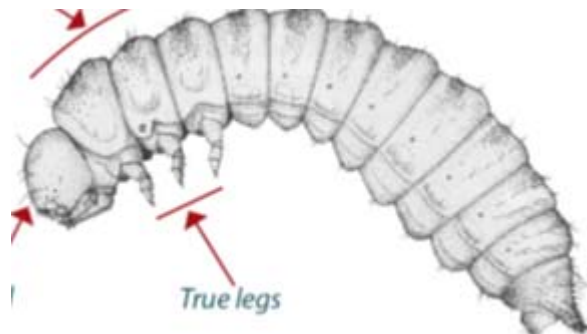


Photo: A. Weeks (cesar)



Photo: A. Weeks (cesar)



# Insect Monitoring

## Making *informed* decisions





# Monitoring



**Confidence in monitoring will result in improved IPM decision making.**

**Monitoring pests and beneficials is one of the most important tools for making informed decisions around pest management**

# Why do we monitor?

## Why do we monitor?

- Minimise risk of crop damage
- Detect any changes in pest populations
- Determine if natural enemies keep pests in check
- Maximise effective control

Start monitoring at seedling stage





# What monitoring technique?

Technique depends on:

- time of year
- type of pest

Pre-sowing & crop establishment pests

- Nocturnal grazers and chewers (mostly)
- Day-active (mostly smaller mites & LF)



Post-crop establishment pests

- Canopy active pest (aphids, caterpillars)





# Monitoring:

## Pre-sowing & crop establishment

1. 'Grazers & chewers' (slugs, earwigs, millipedes, slaters, snails, false wireworms, cutworms, weevils and beneficials)

-Nocturnal, often sedentary invertebrates

-Need moisture (and daytime shelter)

- Shelter traps
- Pitfall traps
- Baits
- Nocturnal inspections





# Monitoring: Pre-sowing & crop establishment

## Shelter/ refuge traps

- Refuges can be tiles, wet carpet or hessian squares

*Target species: slugs, cutworms, weevils, earwigs, millipedes*



## Baits

- Seed germinating baits

*Target species: false wireworms*



# Monitoring: Pre-sowing & crop establishment

## Pitfall traps

- Open mouth containers dug into soil
- Top flush with soil allows capture of crawling invertebrates – size small enough to avoid vertebrate capture
- Fluid at bottom( water/detergent or glycol) to immobilise organisms



**Target species:** ground dwellers,  
beetles, mites, spider ants.  
*Effective in autumn through spring*

# Monitoring:

## Pre-sowing & crop establishment

2. Day active feeders (mites, lucerne flea, some false wireworms..... and beneficials)

- Can be very small or inconspicuous

- Visual inspections

- Presence/absence
- Damage

- Grid counts





# Monitoring: Pre-sowing & crop establishment

## Visual observations

- Searching and digging, grid counts
- Inspect for damage: roots / foliage
- Night inspections
- Uncover and turn over stubble or wood

***Target species: mites, false wireworms***





# Monitoring: Post-establishment

## 3. Crop canopy pests (aphids, caterpillars, )

Transient pests; mostly 'fly in' from short or long distances

- Sweep nets
- Beat sheets
- Pheromone traps
- Sticky traps
- Visual inspections



# Monitoring: Post-establishment

## Sweep net



Sweep of 180° arc covers large area

Use in conjunction with visual observations of underside of leaves and lower in canopy

**Target species:** *Aphids, caterpillars and beneficials, hoverfly, lacewings and ladybirds. Most effective in spring*



## Brushing or beat sheet

Brush foliage over white paper or containers  
Use white material and beat plants against sheet to dislodge invertebrates for observation

**Target species:** *bugs, caterpillars, aphids. Most effective in spring*





# Frequency of sampling

## Key considerations

- **Risk**
  - Seasonal pest abundance
  - Crop susceptibility/vulnerability
  - Management/control options available
  - Response time
- **Environmental factors**
  - Temperature
    - rate of crop growth
    - Rate of pest population growth
  - Rainfall
    - Can reduce pest populations
    - Make sampling difficult/impossible



Photo: A. Weeks (cesar)



# How many samples?

*A compromise between time and precision*

Be aware of variability between samples when averaging

- Use appropriate sampling strategy for target pest
- Experience with the pest can guide

Confidence (in estimates) more important as pest population approaches thresholds

# If pest distribution is patchy

## Pest biology

- reproduction, infestation and rate of dispersal – hotspots

## Crop

- difference in growth/attractiveness, uneven maturity

**Random sampling best for patchy pests**







# The threshold is very low – do I need to bother with sampling?

## Risks of not sampling

- applying insecticide when not needed
- timing of action – early or late
- missing other pests
- miss impact of beneficials/weather



# Monitor beneficials

Monitor when checking for pests

Observe:

- Beneficials (eggs, adults and juveniles)
- Parasitism
- Parasitised eggs
- Changes in pest populations over time



# Record keeping

## Essential for:

- Estimating pest densities (assessing variability)
- Reviewing trends in pest populations
- Post-treatment assessments
- Assessing risk from season to season
- Planning
- Learning





# Appropriate monitoring underpins informed decisions

**Decision Making**  
for Insect Management  
in Grain Crops

