Beneficial Arthropods in the Farm Landscape

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Maintaining Diverse Landscapes on Farms

- Production Vs biodiversity
- Land sharing Vs Land sparing
- Research shows that maintaining a diversity of species across the farm benefits crop and livestock production
- Climate changes mean we need to be flexible and adaptive.

Benefits of Biodiversity

- Greater use of "ecosystem services"
  (eg. pollination, nutrient cycling & pest manag't)
- Less dependence on artificial inputs
- Farming systems "in balance"
- Maintaining farm resources (soils, plant and animal species)

Pest Outbreaks

- Are often signs of ecological imbalances
- Can often be linked to use of broad spectrum insecticides
- Often a result of resistance to commonly used chemicals
- Are exacerbated by large scale monocultures

Crops can be inhospitable to natural enemies

- large monocultures,
- weeds well controlled within crop,
- long distance to non-crop vegetation (hence shelter & foods)
- insecticide use.

Farming Practices that Effect the Arthropod Fauna

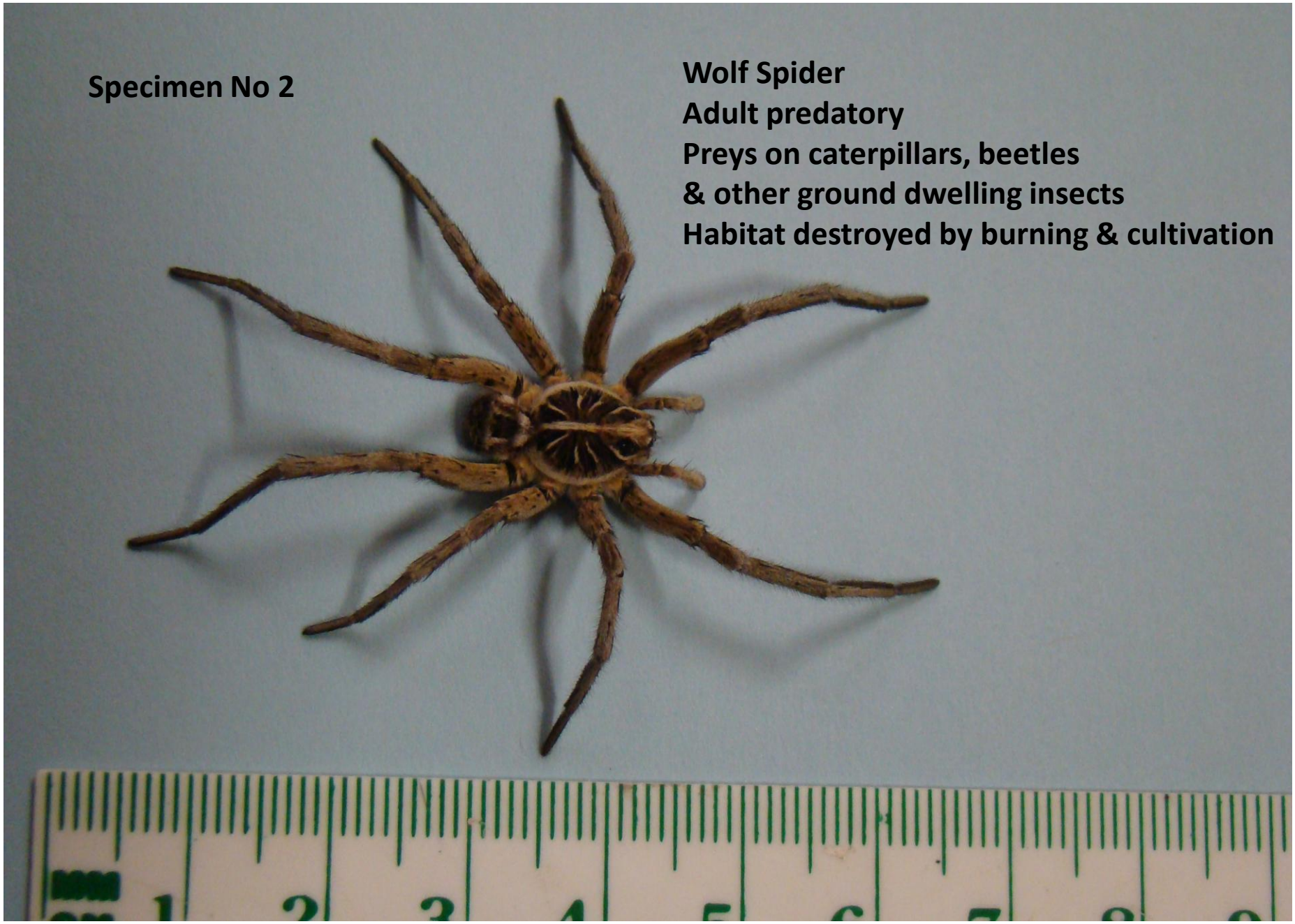
- Cultivation
- Surrounding crops or vegetation
- Crop rotation choices
- Growing large areas under monocultures
- Pesticide Use for Weed and Pest Control

- Stubble Burning


Scale = approx 5mm
Specimen No 1

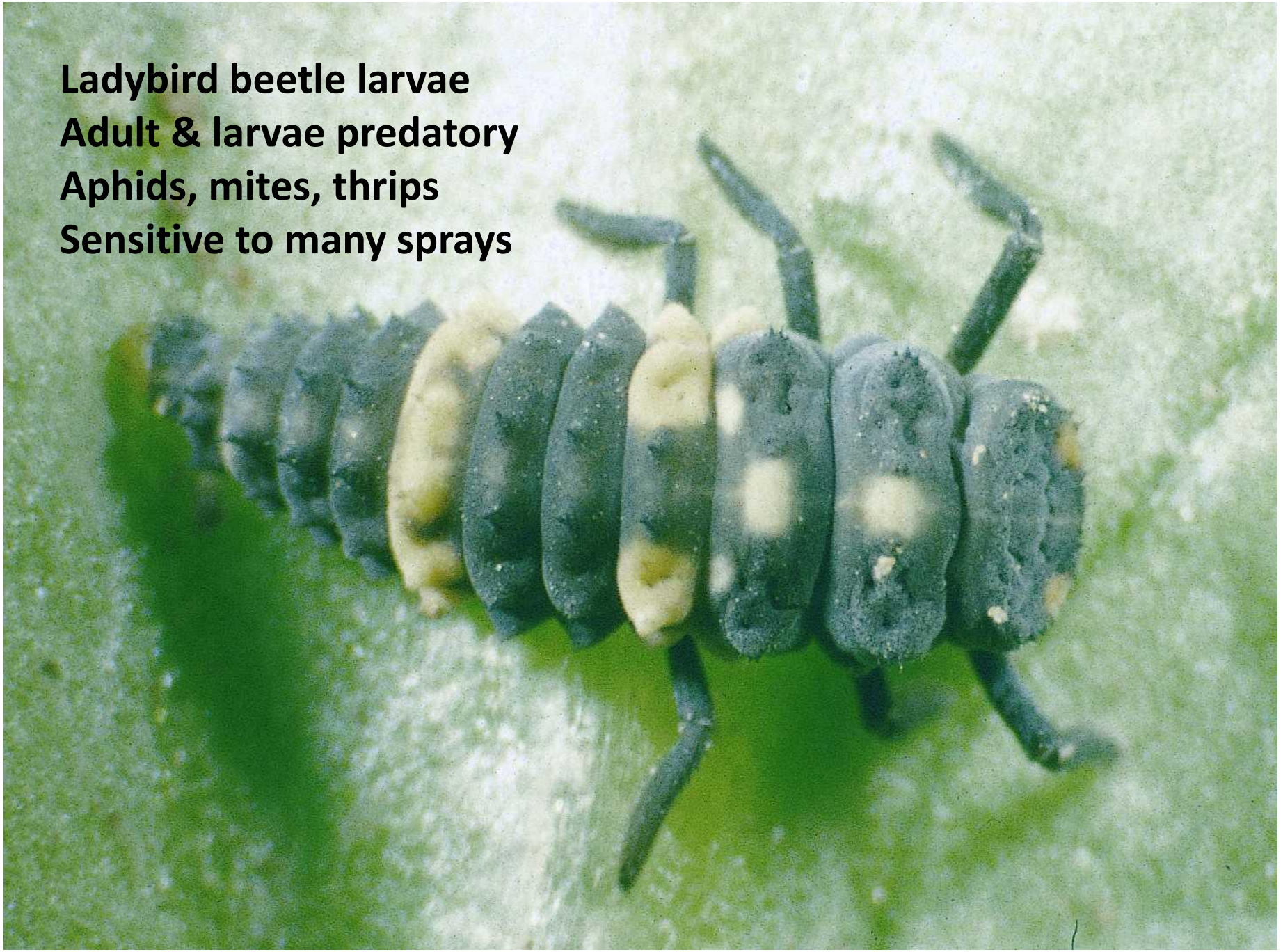

Ladybird beetle
Adult & larvae predatory
Aphids, mites, thrips
Sensitive to many sprays

Specimen No 2

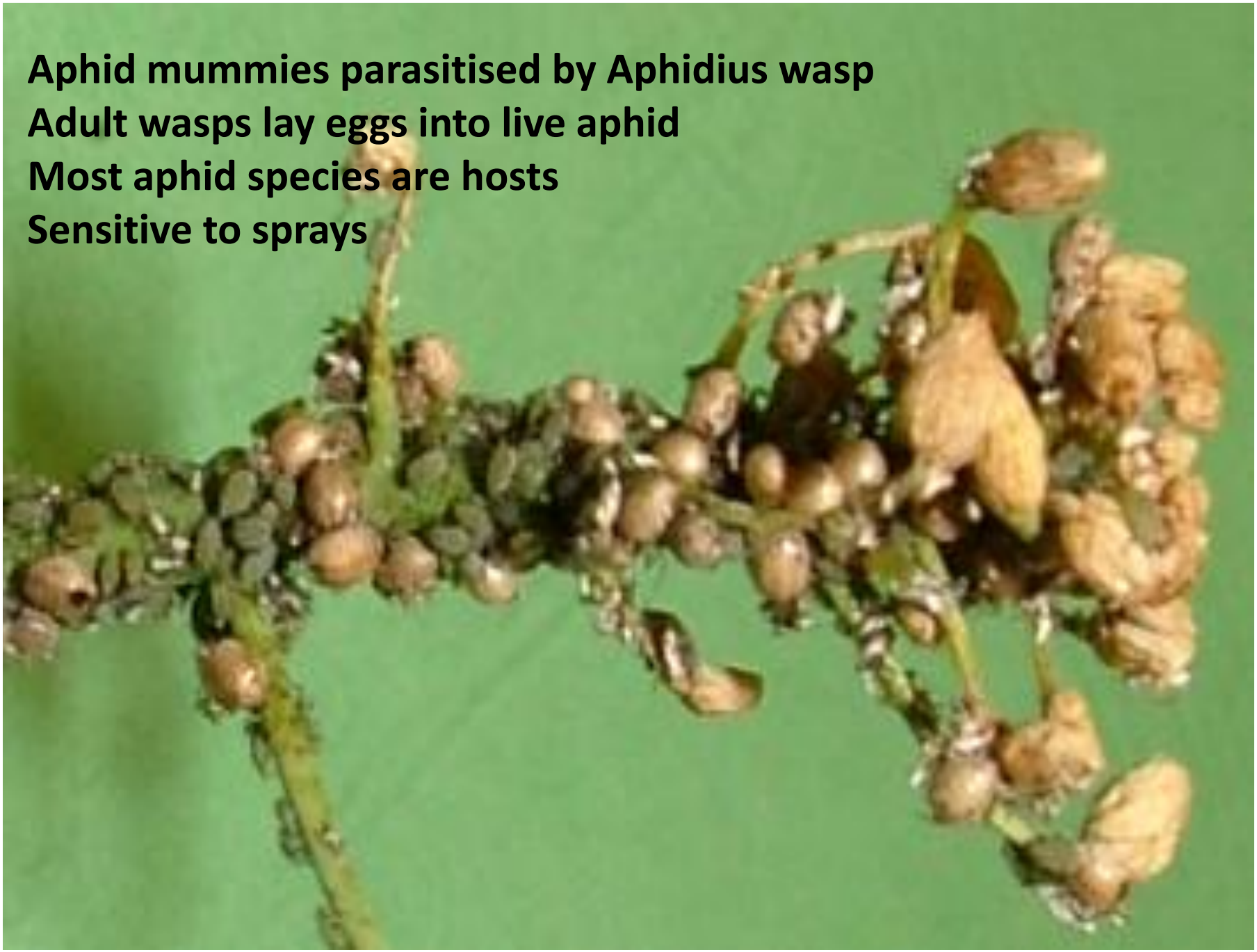

Specimen No 2
Wolf Spider
Adult predatory
Preys on caterpillars, beetles
& other ground dwelling insects
Habitat destroyed by burning & cultivation

Specimen No 3

Scale =approx 10mm


Ladybird beetle larvae
Adult & larvae predatory
Aphids, mites, thrips
Sensitive to many sprays

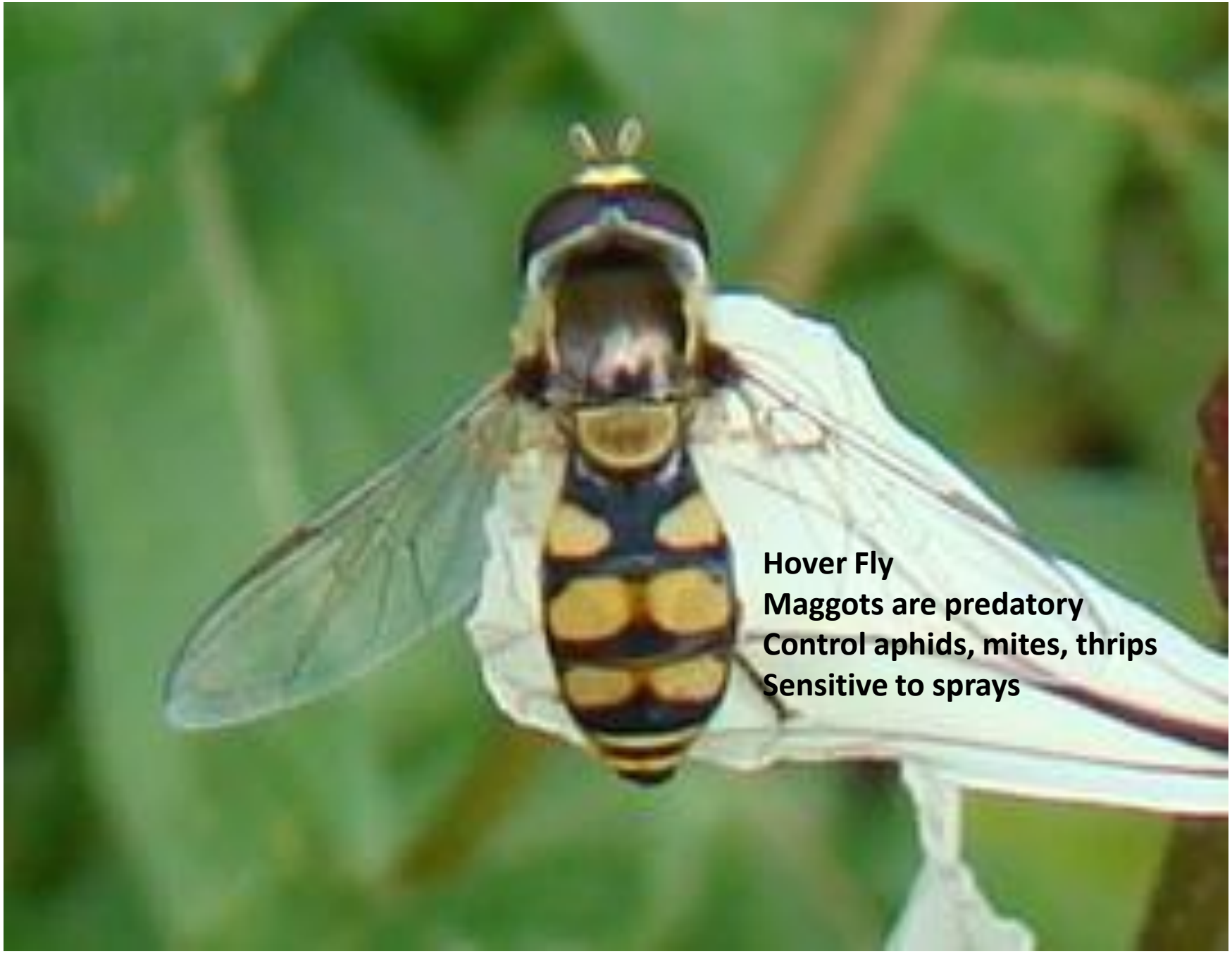

Specimen No 4


Aphid mummies parasitised by Aphidius wasp
Adult wasps lay eggs into live aphid
Most aphid species are hosts
Sensitive to sprays


Specimen No 5
Scale = approx 10mm


Green Lacewing Larvae
Larvae voracious predators
Aphids, mites, thrips, caterpillar eggs, scales, mealy bugs
Sensitive to sprays


Specimen No 6
Scale = approx 10mm


Hover Fly
Maggots are predatory
Control aphids, mites, thrips
Sensitive to sprays

Beneficials & Integrated Pest Management (IPM)

- IPM in cropping/pastures largely focused around encouraging natural enemies.
- Beneficials can be natural enemies to pests or providing ecosystem services such as nutrient cycling and pollination.
- Need to know biology and role that common species play interacting with pest species in crop ecology.
- Learn to identify common beneficials (or signs of activity)
- Many beneficials destroyed by common farming practices (stubble burning, use of broad spectrum insecticides, cultivation)

Predatory Arthropods

- Beetles (Ladybird, Red & Blue beetles, Carab beetles, Green Soldier beetles)
- Bugs (Shield, Damsel, Big-Eyed & Assassin bugs)
- Wasps (Mud wasp, Sphecid wasp)
- Lacewings (Green & Brown lacewing)
- Flies (Hover Flies, Robber fly)
- Spiders (Wolf, Lynx & Jumping spider)
- Mites (Chilean, Monty, Doreen & Victoria predatory mites)

Parasitic Arthropods

- Wasps (Ichneumonid, Trichogramma, Scelio, Aphytis & Encarsia wasps)
- Flies (Tachnid, Sarcophagid & Bee flies)
- Nematodes (Mermithids,Entomopathogenic)

Encouraging Beneficials

- Use pest specific products (eg pirimicarb)
- Use of Biopesticides such as Dipel® (Bt), Gemstar® (PHV) and GreenGard®.
- Use systemic seed dressing (eg imidocloprid)
- Limit broad spectrum insecticides to border sprays or “hot spots”, especially early season.
- Reduce monocultures (strip cropping, interplant or undersown crops).
- Minimum Tillage/Zero Tillage.
- Conserve stubbles, no burning if possible.

- Planting refuge crops that can harbour beneficials (eg. lucerne)
- Use of trap crops to attract pests, and hence increase beneficials.
- Corridors of natural vegetation across the farm, particularly with a range of flowering understorey plants.
- Fallows/rotations that include perennials to maintain groundcover
- Leave verges and paddock boundaries unsprayed.
- Fence off remnant trees and leave these areas ungrazed.

NO Insurance Sprays!!!

- Destroy non target arthropods & beneficials.
- Increase risk of developing resistance.
- Increase pesticide use.
- Have only a short term benefit.
- Chemical control of one pest may be at the expense of the beneficials that keep another pest under control
- Defy all IPM principles!!

Aphids in Canola, 2008

Aphids 2008

- Many crops suffered heavy aphid pressure in Sept/Oct 2008
- Crops developed earlier due to the mild conditions & good moisture (2 weeks??)
- Aphids responded earlier
- Beneficials (Parasitic wasps, Ladybirds & Hover flies) slow to develop
- Pirimicarb not available in many areas
- Other more toxic sprays used (dimethoate permit)

Aphids in 2009

- Mild conditions meant aphids survived through winter
- Large numbers on cereals & canola
- Beneficials also active and gave good control within weeks
- Huge numbers of Hoverflies & Ladybeetles in plague proportions

References

- The Good Bug Book (Australasian Biological Control)
- Crop Insects: the Ute Guide (GRDC)
- Ecological Engineering for Pest Management – Advances in Habitat Manipulation for Arthropods (Gurr, Wratten & Altieri)
- Holloway, Furlong & Bowden (2008) Management of beneficial invertebrates and their potential role in integrated pest management for Australian grain systems. (AJEA 48, 1-12)

- Websites www.bugsforbugs.com.au
  www.goodbugs.org.au
  www.biocontrol.com.au

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