

# 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

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- Crop Insects: the Ute Guide (GRDC)
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