Queensland Government
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South Australian Research and Development Institute

Decision Making for Insect Management in Grain Crops

Pest Management in Winter Cereals

Supported by

Dow AgroSciences

syngenta

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Pest ID: Key Aphid Species

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- Oat aphid
  - July to end Aug*
  - Crown and lower stems

- Corn aphid
  - mostly barley
  - Aug to early Sept
  - Whorl and top leaf axis

- Rose-grain aphid
  - Uncommon & sporadic
  - Upper leaves

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Impact (yield loss) of aphid damage on cereals

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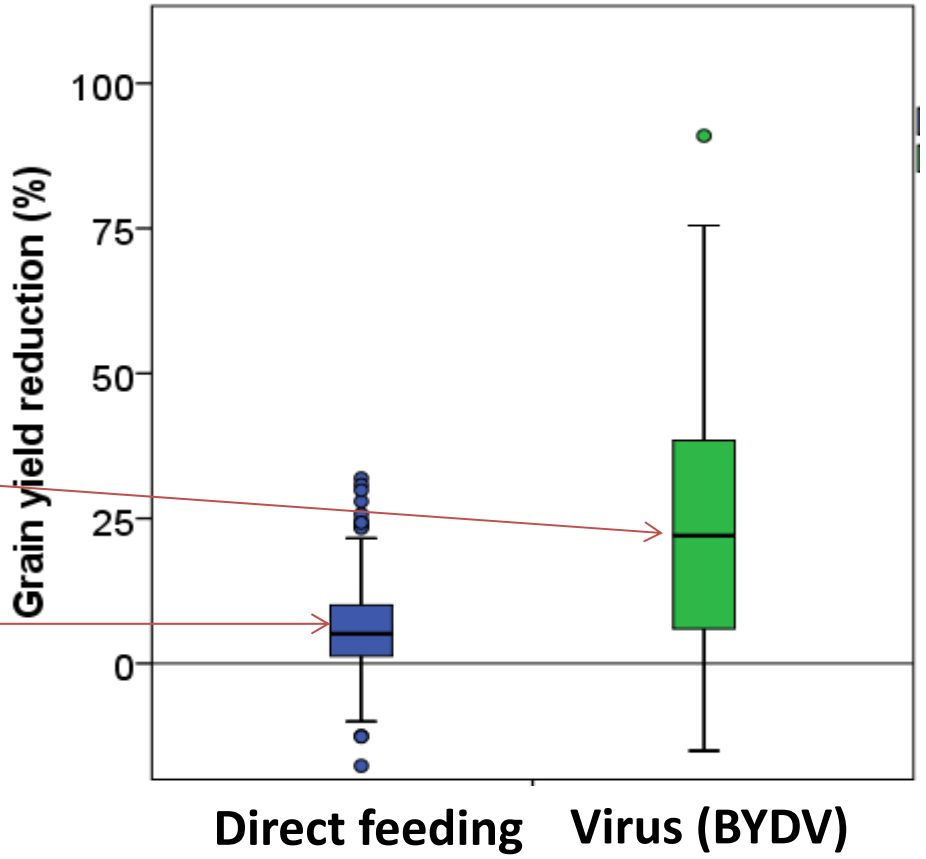
Median values

Virus transmission 21%

Direct feeding 6%

But regionally variable!



Source: Valenzuela (2013) GRDC rpt: Aphid economic impacts on grains (iva@unimelb.edu.au).

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Virus transmission

Yellow dwarf viruses

- Transmitted by aphids
- Yield losses
  - early infection 12 - 79% (rare)
  - infected post-tillering 6-9%
- Summer/autumn "green bridge" increases aphid and virus survival

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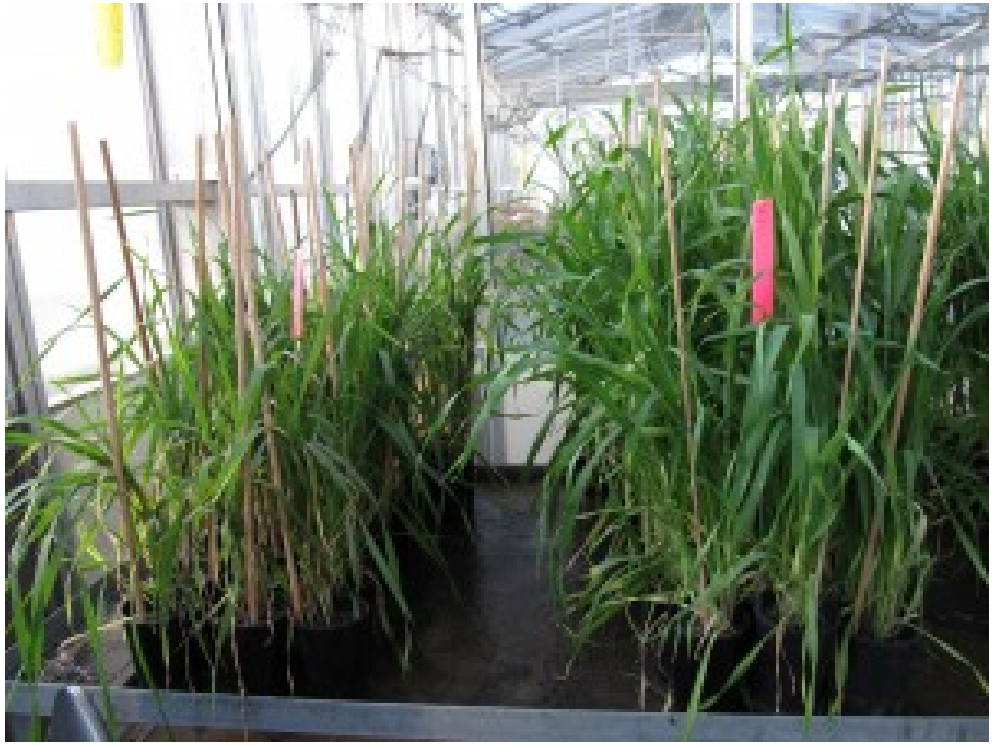
Direct feeding

- Retarded growth through nutrient removal
- Honeydew & sooty mould
- Toowoomba 2012 expt: early vs late infestation
- Impact: dry matter, # tillers, # heads , seed weight reduced after early prolonged infestation



Early (Z12) and continuous infestation

Late (Z24) infestation

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Direct feeding results

Parameter	Early infestation	Late infestation	Control	LSD
Number of tillers	4.3a	6.3b	6.7b	0.5
Plant height (cm)	57.6a	63.6b	65.3b	3.9
Effective heads per plant	2.8a	4.8b	5.8c	0.47
Seed weight per plant	0.8a	1.6b	2.1c	0.3
100 seed weight	4.6a	4.8a	5.0a	0.37

Impact: dry matter, # tillers, # heads , seed weight reduced after early prolonged infestation

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Aphid management considerations

- timing
- beneficials
- monitoring
- thresholds

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The weather and timing of aphid invasions

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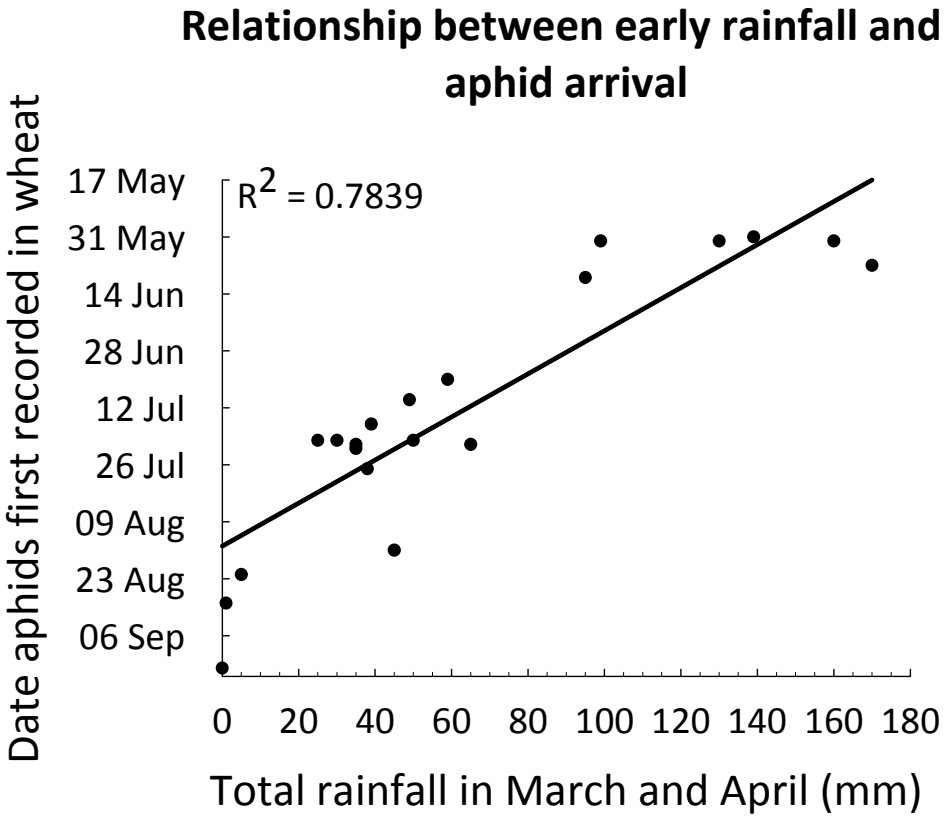
Strong correlations:

- Early autumn rains can bring earlier invasions
- Earlier invasions can bring BYDV



Source: Thackray et al 2009 on Oat aphid

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Common aphid beneficials

Lacewings


Hoverflies



Ladybirds



Wasp parasitoids



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Monitoring aphids

- Monitor and record
  - Aphids and beneficials
  - Changes in pop'n dynamics?
- Repeat sampling
  - Seedling, tillering, ripening
- 3-6 locations
  - 5 random plants at each

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Suggested thresholds

High virus risk (region & weather)?
For susceptible varieties **-** zero tolerance at crop establishment stage

Early crop stage (NGA: Qld/NSW)
20% of tillers - 10 + aphids

Late crop stage (WA)
50% of tillers -15 + aphids

NOTE: Populations can change quickly & often don't reach thresholds

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Management considerations

- Weather conditions?
- Virus risk?
- Crop development stage?
- Is the population increasing?
- Beneficial activity?
- Intensity, duration and distribution of infestation?
- Chemical choices (pirimicarb, seed dressings, border sprays)

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Best Bet Table: Aphids

Pre-season	Establishment	Winter	Spring
Remove green bridge (weed & volunteer hosts)	<u>High risk</u> Wet summer/ autumn: consider seed dressing Areas that favour virus: consider seed dressing Early control along edges or patches may delay infestation	<u>High risk</u> Warm conditions Monitor/record density aphids and beneficials Delay chemical control if rain (>20 mm) forecast Selective insecticide	<u>High risk</u> Warm dry spring Monitor/record density aphids and beneficials Thresholds Selective insecticide Infestations later than milky grain: No yield loss

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Armyworms

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Armyworms

- Smooth bodied
- 3 stripes collar

Damage

- Defoliation at establishment
- Sever (barley) heads

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Armyworms

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- Monitor
  - Sweep net, ground searches
  - Scalloped leaves, droppings
  - Increase frequency at ripening
- Thresholds
  - Barley – 2 med sized armyworm/m^2
  - Wheat and oats - 10 larvae/m^2

How useful are these fixed thresholds? Is head lopping inevitable?

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Following armyworm infestations. NNSW spring 2013.

Location	Large larvae (/m2)	Total larvae (/m2)	Total number of tillers examined	Number of heads with feeding damage (awns/grain)	% of heads with feeding damage	Number of heads lopped
Crooble 1	1.3	23	1000	2	0.2	0
Crooble 2	2.6	8.6	774	24	3.1	0
Crooble 3	1.3	6	888	3	0.3	0
North Star 1	sprayed	sprayed	746	44	5.9	0
North Star 2	4	22	938	4	0.4	0
North Star 3	1.3	26	1148	10	0.9	0

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Armyworm economic thresholds

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Cost of control ($/ha)	Crop value ($/t)			
	100	150	200	250
20	0.6	0.4	0.3	0.2
25	0.7	0.5	0.4	0.3
30	0.9	0.6	0.4	0.3
35	1.0	0.7	0.5	0.4

The economic threshold (larvae/ m2) based on a total potential yield loss per larva of 350 kg/ha (7 heads lopped per day x 5 days)

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Best Bet Table: Armyworm

Establishment	Winter	Spring
<u>High risk</u>: (cereals into standing stubbles in wet years) Monitor for leaf scalloping	<u>High risk</u> Monitor for larvae at dusk with sweep net/bucket Ground search for larvae and droppings Look for scalloped leaf margins Control larvae when small	<u>High risk</u> ↑ monitoring as crop dries down Consider crop stage before control Control late in day when larvae feeding

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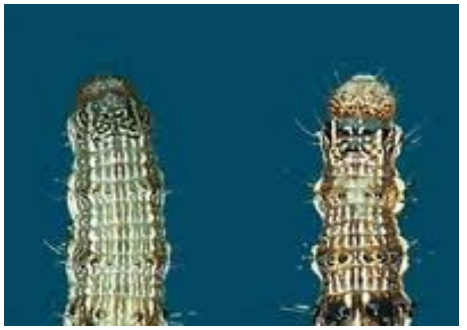
Helicoverpa

Helicoverpa armigera

Damage

- Graze on exposed tips
- Economic impact is rare



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Caterpillar pests - IPM opportunities

- Early recognition of problem
  - –Use “pest alerts”
  - –Smaller larvae easier to control
- Selective chemistry
  - – preserve beneficials to do control for free
- Biopesticide
  - – NPV effective for Helicoverpa, not for armyworm

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Helicoverpa thresholds

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Estimated consumption of one larvae = 2.4 g

One larvae per square metre can cause 24 kg grain loss/ha.

Cereal price ($/t)	Value of crop loss		
	4 larvae/m²	6 larvae/m²	8 larvae/m²
150	14.4	21.6	28.8
200	19.2	28.8	38.4
250	24.0	36.0	48.0
300	28.8	43.2	57.6
350	33.6	50.4	67.2
400	38.4	57.6	76.8
450	43.2	64.8	86.4

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