Queensland Government
Department of Agriculture, Fisheries and Forestry

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Decision Making for Insect Management in Grain Crops

Pest Management in Winter Cereals

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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

Impact (yield loss) of aphid damage on cereals

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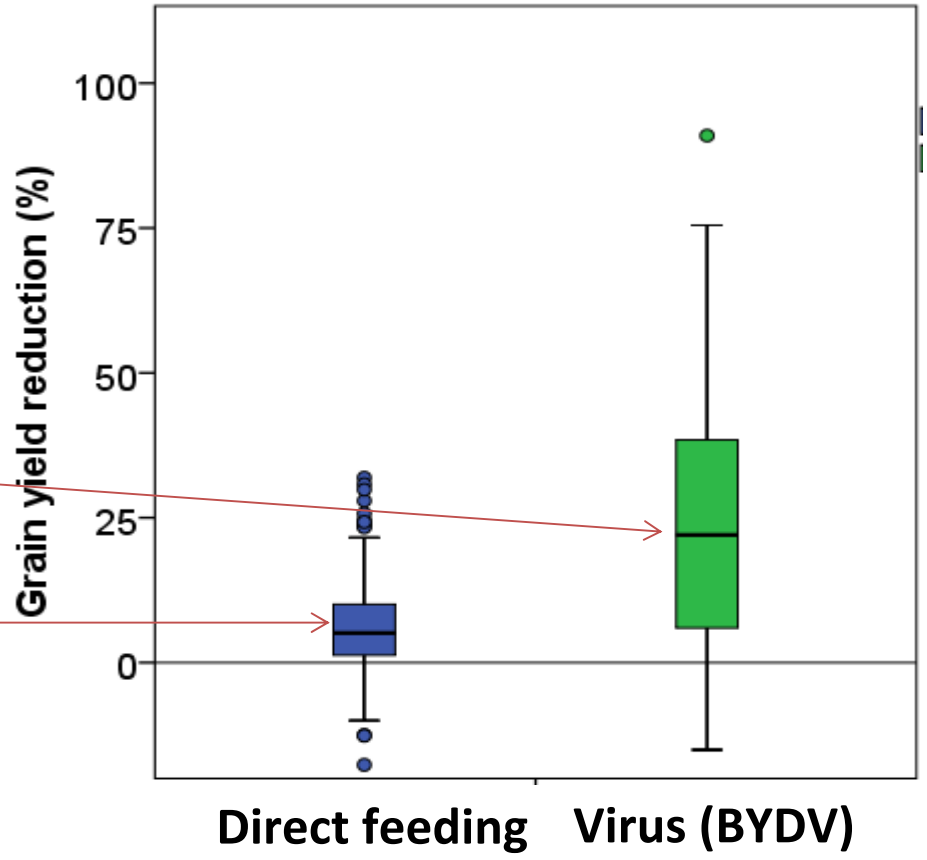
Median values

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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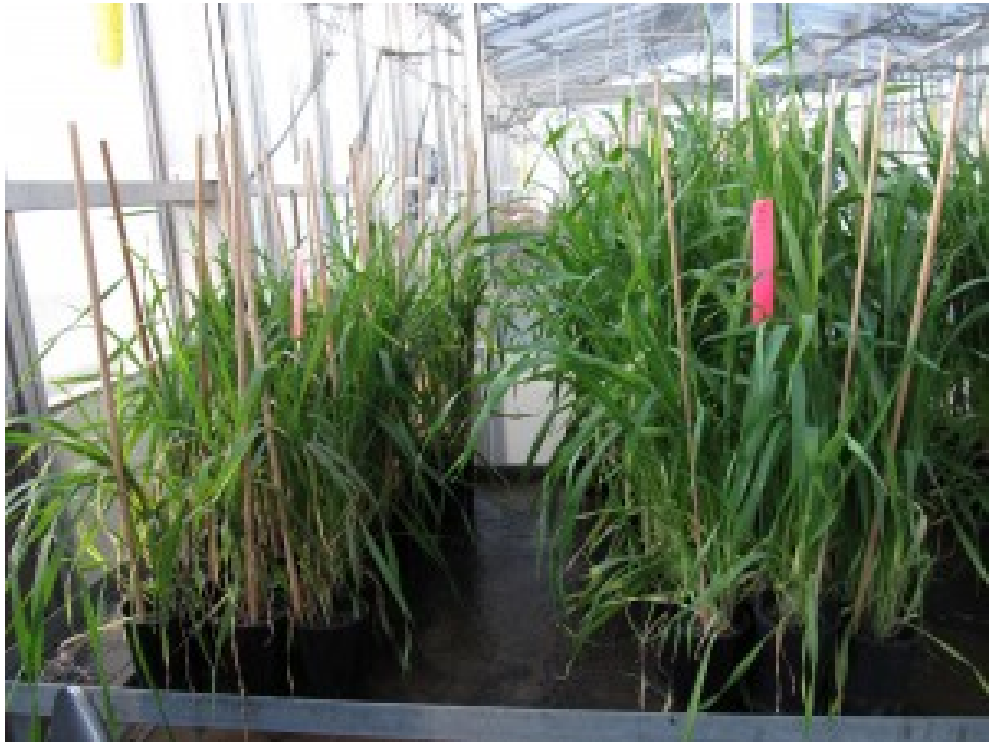
Virus transmission

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

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

Aphid management considerations

- timing
- beneficials
- monitoring
- thresholds

The weather and timing of aphid invasions

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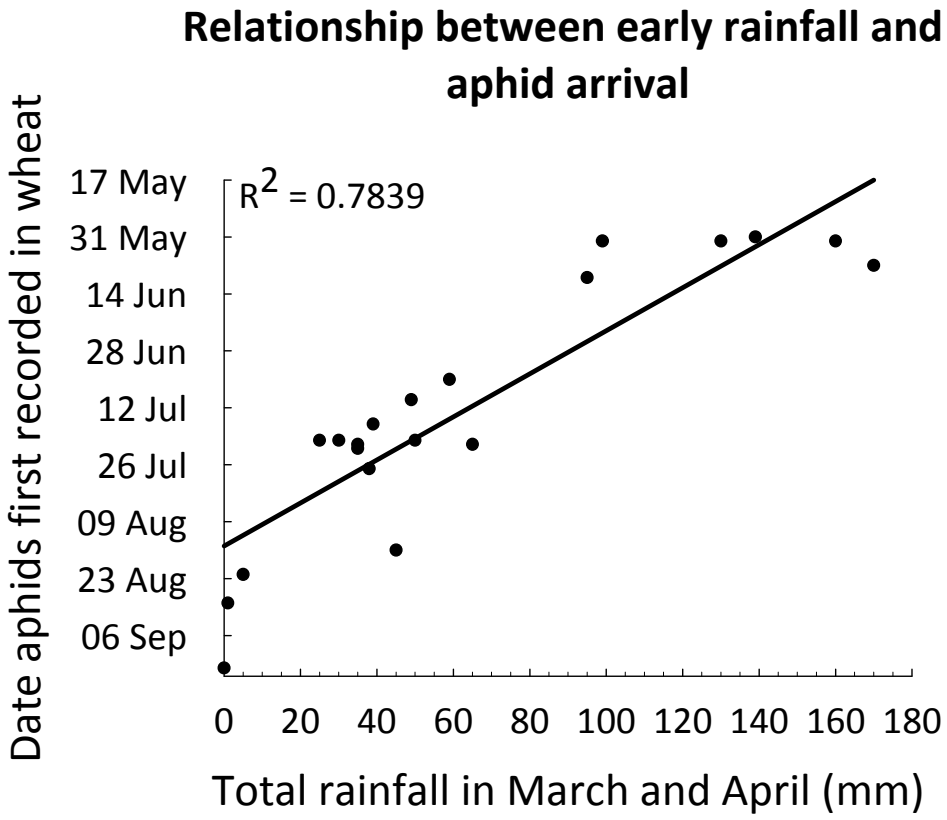
Strong correlations:

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



Source: Thackray et al 2009 on Oat aphid

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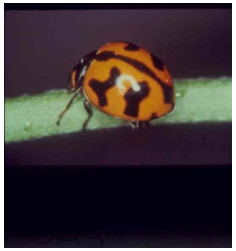
Common aphid beneficials

Lacewings


Hoverflies



Ladybirds



Wasp parasitoids



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

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

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)

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

Armyworms

Armyworms

- Smooth bodied
- 3 stripes collar

Damage

- Defoliation at establishment
- Sever (barley) heads

Armyworms

- 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
Croobie 1	1.3	2.3	1000	2	0.2	0
Croobie 2	2.6	8.6	774	24	3.1	0
Croobie 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)

Best Bet Table: Armyworm

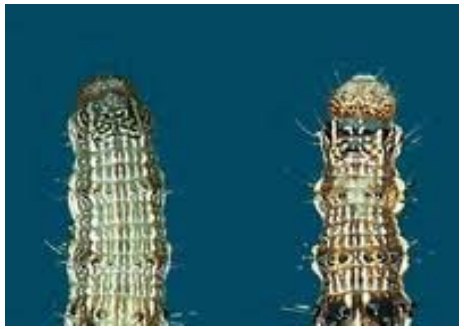
Establishment	Winter	Spring
<u>High risk</u>: (cereals into standing stubbles in wet years) Monitor for leaf scalloping	<u>High risk</u> Monitor for larvae at dusk with sweep net/bucket Ground search for larvae and droppings Look for scalloped leaf margins Control larvae when small	<u>High risk</u> ↑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

Helicoverpa

Helicoverpa armigera

Damage

- Graze on exposed tips
- Economic impact is rare



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

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