CEREAL APHIDS
FACT SHEET

GRDC Grains Research & Development Corporation

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NORTHERN REGION

Aphid control in cereals can pay

In high-pressure seasons, cereal aphids can cause yield loss in winter cereals in northern NSW and Queensland.

KEY POINTS

- Aphids can be controlled in three ways: natural enemies, pre-sowing seed treatment and foliar pesticide sprays in response to infestation.
- Aphids have the greatest impact on moisture-stressed crops, with large populations exacerbating the impact of the lack of moisture.
- Small or moderate aphid populations have less impact and can be controlled by natural enemies, although speed of control can be a problem.
- As crops mature and come into head, aphids tend to disappear.
- Recent research indicates oat aphids affect yield by reducing the number of viable tillers.
- Identifying the presence of aphids and their natural predators before making insecticide decisions is important.

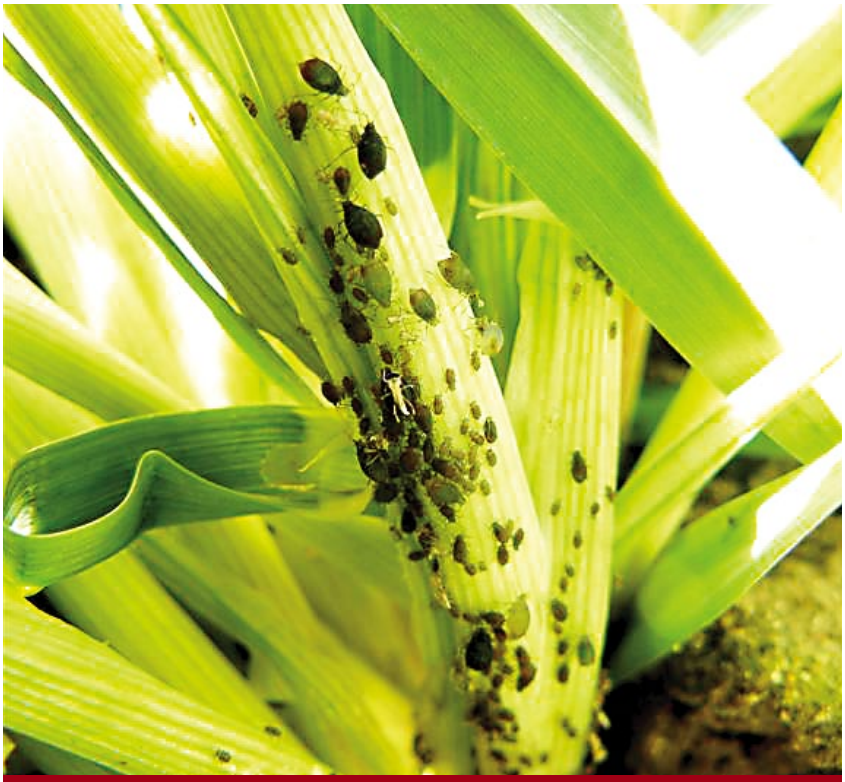


PHOTO: NORTHERN GROWER ALLIANCE

Heavy infestations of these sap-sucking aphids (oat aphids) cause the crop to turn yellow, be stunted and generally appear unthrifty.

New research indicates there can be financial benefits from controlling the three main species of aphids that threaten cereal crops in the northern region. Oat aphid, corn aphid and rose-grain aphid favour barley, but are found in all cereal crops.

Heavy infestations of these sap-sucking insects cause the crop to turn yellow, be stunted and generally appear unthrifty. All three aphids can damage crops by feeding on them and in some instances by spreading barley yellow dwarf virus.

Barley yellow dwarf virus (BYDV)

Cereal aphids are vectors of BYDV, a disease that attacks all cereal crops. However, BYDV does not appear to have a major yield impact in northern NSW and Queensland but can be highly detrimental to crop yield in other regions.

Oat aphids are known vectors of BYDV and these aphids are found each year in crops in the northern region. However, there has been little detection of BYDV in the northern region except in crops on the Liverpool Plains of northern NSW.

BYDV infects all cereals and can have a significant impact on wheat, oats and barley. Even low populations of aphids can spread the virus.

In other regions, plants infected with BYDV have less above-ground biomass and a reduced root system, resulting in smaller grain size and lower grain yield. Researchers in the northern region have found it difficult to detect symptoms of BYDV by visual inspection because the signs are similar to those of heavy aphid infestation or moisture stress.

Nasty little suckers

OAT APHID (*Rhopalosiphum padi*)
Despite their name, oat aphids can be found on all cereals including wheat, barley and oats and in most years of high infestation are the most abundant species. A vector of BYDV, the oat aphid colonises the lower portion of the plant with infestations extending from around the plant's base, up on to the leaves and stems as the crop starts elongation. Mature adults are about 2 millimetres long and may have wings that are dark green and rounded or pear shaped, while the juveniles are paler and smaller. Both are characterised by a dark reddish patch on the tip of the abdomen.

CORN APHID *(Rhopalosiphum maidis)*
While they are most likely to be found in barley crops, corn aphids also occur in wheat as well as sorghum and maize. More rectangular in shape than the oat aphid, adults are 2mm long and may have wings with legs and antennae that are typically dark and a green-blue body, sometimes with a waxy appearance. Colonies generally develop within the furled emerging leaves of tillers and they can be difficult to see. Corn aphids can be important vectors of BYDV, if arriving early in crops.

ROSE-GRAIN APHID
(Metopolophium dirhodum)
The rose-grain aphid tends to colonise the leaves higher on the plant, making it easy to detect and identify. Adults are up to 3mm long, and are a large, pale aphid with a dark stripe down the midline of the back. Clusters of juveniles are common on leaves.

A fourth species, rice root aphid (*Rhopalosiphum rufiabdominalis*) exists in the northern grain region, but does not cause as much damage to cereals.

Natural enemies and parasites of aphids

Predatory insects, such as hoverflies and ladybirds together with parasitic wasps, will naturally control aphid populations in cereals. Unfortunately, there can be a lag as the parasite and predator populations build up and aphids will continue to cause damage. Parasitic wasps such as *Lysiphlebus testaceipes* are particularly important in the north. These tiny wasps inject eggs into aphids causing them to become 'mummies'.

If mummified aphids make up greater than 10 per cent of the aphid population, it is a sign that parasitic wasps are active. This most likely means that the majority of aphids have been parasitised and the population is likely to crash within two weeks.

Dimethoate and synthetic pyrethroids are highly disruptive to natural enemies. Applying these insecticides early may result in later reinfestation of the crop because small numbers of surviving aphids are no longer controlled by natural enemies.

The lifecycle of a cereal aphid

When winged cereal aphids fly into crops from grass weeds, pasture grasses or other cereal crops, colonies of aphids start to build-up within the crop. In Australia, all aphids in a cereal crop are females, able to give birth to live young without the need to mate.

The immature aphid nymphs have several growth stages, moulting at each stage into a larger individual. Sometimes the delicate pale cast skins can be seen near colonies.

When host plants become unsuitable or overcrowded, winged aphids, called alataes, develop and migrate to other crops or plants.

Mummified corn aphids: natural predators can help control small populations of aphids. Both aphids and predator numbers should be assessed before in-crop insecticides are applied.

Latest research

In 2008, the Northern Grower Alliance (NGA) in association with Industry & Investment NSW (I&I NSW) conducted trials at four locations on three barley varieties, assessing the impact and economics of managing aphids. Three species of aphid were found, with peak populations between 70 and 110 aphids/tiller at all four sites. Net economic benefits from control averaged $33 per hectare to $37/ha from either an aphid active seed treatment (imidacloprid) or a well-timed foliar insecticide (pirimicarb or dimethoate).

Dimethoate sprays applied to 'crown' colonising oat aphids did not provide significant levels of control, although there was a weak trend to reduced aphid counts. Sprays were effective once these aphids moved from below ground level into the lower canopy as the weather warmed up during August.

Aphid numbers were not influenced by barley variety.

In 2009, NGA conducted two intensive trials at Moree and Edgeroi evaluating a range of management options on the barley varieties Grout(1) and Fitzroy(1). In addition, eight trials were conducted in collaboration with I&I NSW and the Queensland Department of Employment, Economic Development and Innovation (DEEDI) at Dalby, Lundavra, Yallaroi, Bullarah, Cryon, Tamworth, Spring Ridge and Gilgandra. These trials compared the impact of aphids on barley, bread wheat and durum.

At all sites, three species of aphid occurred – oat, corn and rose-grain. Peak aphid populations varied from less than one per tiller at Dalby to 45/tiller at Bullarah. At the Moree site the populations of all three species were assessed weekly. Patterns of the rise and decline of each species were almost identical on the two barley varieties, indicating that the growth patterns of the barley had little impact on its attractiveness to the aphids (Figure 1).

In 2009, two rates of imidacloprid were included in all trials (Figure 2). All treatments had the equivalent loading of a fungicide seed treatment: triadimenol (Baytan®) in barley and tebuconazole (Raxil®) in wheat and durum.

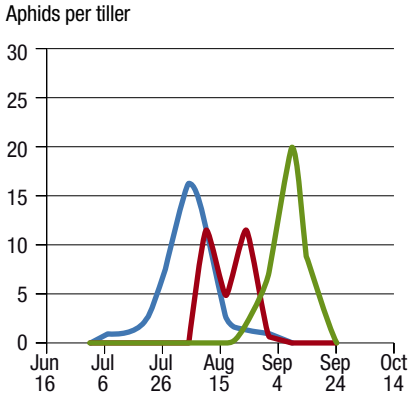
Key treatments in all 2009 trials were:

- Zorro® on barley at 400mL/100kg seed and Hombre® on wheat and durum at 400mL/100kg seed (Figure 2). Both contain 180g/L imidacloprid or 72mL/100kg seed.
- Emerge® at 240mL/100kg seed on all crops which contains 600g/L imidacloprid or 144mL/100kg seed; and
- later foliar applications of pirimicarb in the form of Pirimor® applied when the aphid population was at 10/tiller and rising.

Aphid impact on yield and economics of control

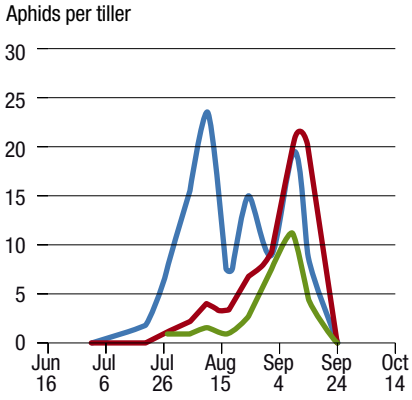
- NGA trial results in 2009 suggested aphids caused up to 10 per cent loss in head number compared with plots where aphids were controlled with either seed treatments or foliar insecticides. Oat aphids appeared to have the greatest impact on head number.
- Over two seasons, NGA found yield increases averaged around 11 per cent in barley and durum, and 5 per cent in wheat. However, economic returns from controlling aphids in wheat were still worthwhile due to higher grain prices.

FIGURE 1 Aphid population dynamics on untreated Fitzroy(1) at Moree, 2009



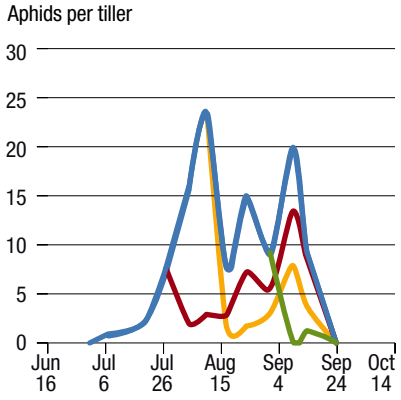
Three distinct peaks are evident with each aphid species building up rapidly then declining. Flag leaves opened in late August corresponding with the decline in the corn aphid population.

FIGURE 2 Efficacy of imidacloprid seed dressing rate on total aphid population at Moree, 2009



Control – Baytan® fungicide, no effect on aphids.

FIGURE 3 Efficacy of pirimicarb foliar sprays on total aphid population at Moree, 2009



Sprays were aimed to control populations of each species when they were building up and at around 10 aphids per tiller (see Figure 1). The spray targeting the oat aphid (T1) was delayed until the aphids moved from below ground into the lower canopy. Each plot received a single spray at one of the three timings. Pirimor® treatments gave quick knockdown of the targeted populations.

From one year of trials in 2009 by the Northern Grower Alliance the following financial analysis showed:

- over all the trials, in a low aphid pressure season imidacloprid at the low rate gave a net economic benefit in 61 per cent of comparisons, with an average net gain of $15/ha;
- the higher imidacloprid rate at cost of approximately $11/ha, gave the greatest net economic return, giving a positive return in 74 per cent of cases and an average benefit of $36/ha;
- the net return for a pirimicarb spray averaged $12/ha. A positive return on investment was achieved in 60 per cent of comparisons.

Should I consider controlling aphids from seeding this year?

Based on trials reported here, evidence suggests there is a case to use seed treatments in barley. This is because in barley it was found the need to apply a foliar spray later in the season was high in both years of the trial if a seed treatment was not used.

NGA intends to conduct further trials in 2010 to determine the consistency of responses in wheat and durum. One of the challenges of electing to use a prophylactic treatment such as a seed dressing is that aphids are a sporadic pest and will not reach damaging levels every year.

Aphid monitoring in winter cereals

Start checking for aphids in July. Oat aphids appear first and tend to colonise the crown or sub-crown of the plant before moving on to the lower stem in late winter/early spring. To check for aphids, pull up 10 to 20 plants from across the field and inspect the crown and lower stem for aphids and natural enemies. In barley crops, also check for corn aphids inside the unfurled leaf at the top of the tiller.

If aphids are detected, implement a structured sampling strategy.

Sampling should occur away from the edge of the paddock. Aphid numbers tend to be higher around the margins because this is where infestations start. The rest of the area will be more representative of the infestation in the majority of the paddock.

Estimate aphid infestation on individual tillers rather than whole plants. It can be difficult to determine where an individual plant starts and stops, and the number of tillers per plant is variable.

Check five tillers at six sites within a paddock. If the majority have 10 or more aphids per tiller a foliar insecticide spray should be considered. Be aware that this is a working threshold.

If aphid numbers are close to the notional threshold and there are lots of juveniles (small nymphs), the population may be building quickly. Shorten the rechecking interval.

It may be useful to rate the number of aphids above and below the flag leaf separately. Corn aphids sitting at the top of plants will be more readily contacted than oat aphids at the base of plants. This will be particularly useful for assessing how effective a spray has been and determining if surviving aphids are those that may have simply not been contacted.

Take time to sit quietly in the paddock to observe natural predators.

To spray or not to spray

Factors to keep in mind when deciding when to apply an in-crop insecticide spray are:

- The presence and numbers of natural predators.
- Heavy rain will reduce aphid populations by knocking or washing the individuals off plants. It may be worth rechecking numbers after a storm if you had scheduled a spray.
- Corn aphids are likely to disappear naturally once the flag leaf has unfurled as they become exposed to parasites and predators.
- Pirimicarb is a soft option for cereal aphid control, but it does have a withholding period.
- Applying insecticide to oat aphids at the base of the plant can be difficult in a dense crop and with aerial application.

Useful resources:

- **Northern Grower Alliance – Lawrence Price** **07 4639 5344** **Email lawrie.price@nga.org.au**
- **DEEDI – Dr Melina Miles** **07 4688 1369** **Email melina.miles@deedi.qld.gov.au**
- **The Beat Sheet – Insect Pest Management for Australia's Northern Grain Region** **www.thebeatsheet.com.au**
- ***Crop Insects: the Ute Guide – northern grain belt edition*** **Ground Cover Direct, freephone 1800 11 00 44, ww.grdc.com.au/bookshop**
- **GRDC Pestlinks** **www.grdc.com.au/pestlinks**

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