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Managing aphids and viruses in lupins

Department of Primary Industries and Regional Development, Western Australia

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Managing aphids and viruses in lupins

DPIRD-95

Aphids reduce yields by direct feeding damage, which causes flower and pod abortion and occasionally plant death in lupins. The extent of damage varies between seasons, but losses can be severe in years that favour aphid population development.

Lupins are most vulnerable to aphids during budding and flowering, as severe feeding damage on growing tips can cause buds to drop, flowers to abort, and reduced pod set. Some lupin varieties are more susceptible to aphids than others.

Aphids transmit serious virus diseases, which reduce yields and contaminate seed stocks. Some species of aphids are more difficult to control than others.

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Species that attack lupins

All 5 species of aphids found on lupins in Western Australia (WA) are introduced. The 3 most common species are

- cowpea aphid (*Aphis craccivora*)
- bluegreen aphid (*Acyrtosiphon kondoi*)
- green peach aphid (*Myzus persicae*)

This page pertains to the 3 common aphid species, which often occur together in a lupin paddock.

Two minor species sporadically recorded on lupin are:

- leafcurl plum aphid (*Brachycaudus helychrisi*)
- potato aphid (*Macrosiphum euphorbiae*)

Symptoms

Cowpea aphid

Description

- The cowpea aphid has a black body and black and white legs. It tends to arrive in lupin crops earlier than green peach or bluegreen aphids.
- The contrast of their black bodies against green plants makes them very visible.
- Cowpea aphids often form dense colonies on a single plant before moving on to surrounding plants.
- Heavy colonisation can cause rapid wilting.



Image 1: Cowpea aphids on lupin



Image 2: Cowpea aphids cause feeding damage to lupin

Host range

The cowpea aphid's host range includes pasture medics, faba beans, and tree lucerne.

Bluegreen aphid

Description

- The bluegreen aphid is the largest of the three common species, measuring up to 3 mm long.
- Both the winged and wingless forms are a matt bluish-green, similar in colour to the mature leaves of narrow-leaf lupins.
- The winged form has a light beige thorax.



Image 3: Bluegreen aphid

Host range

- This species prefers to feed on legumes and is a common pest of medic and sub-clover pastures.
- Large numbers of winged bluegreen aphids fly from pastures to lupin crops later in the growing season.
- This species builds up to heavy colonies throughout the crop on susceptible lupin varieties.

Green peach aphid

Description

- Green peach aphids tend to be shiny or waxy and range from yellow, to green to pink.
- The yellow-green forms are similar in colour to young, unfurled lupin leaves.
- The winged forms have a dark patch on their backs.
- Green peach aphid tends to be evenly distributed throughout the lupin crop, unlike cowpea aphid, which has a patchy distribution.
- The size of their colonies is usually smaller than those of bluegreen aphid and cowpea aphid.



Image 4: Green peach aphids on underside of leaf. Photo – courtesy L Marquis©, SES Agronomy Service

Host range

- Green peach aphid colonises a wide host range and is often found on a variety of weeds, including wild radish, wild turnip, doublegee, and blackberry nightshade.
- When selecting a suitable chemical to use against an aphid infestation that is mainly green peach aphid, be aware that some populations of this species have developed resistance to chemicals.

Aphid survival between growing seasons

The timing of first aphid arrival (migration) during the growing season largely depends on availability of green plant hosts during the preceding summer and autumn.

Small numbers of aphids can survive the hot dry conditions experienced during summer if their host plants are available.

Rainfall in late summer and early autumn encourages survival of aphid host plant material, leading to early aphid flights into crops soon after seeding.

Damage caused by aphids

Virus transmission

Aphids are vectors of two important lupin viruses: cucumber mosaic virus (CMV); and bean yellow mosaic virus (BYMV). Yield losses are greatest when aphids have arrived early in the crop. BYMV is not seed borne, whereas CMV can be.

Feeding damage

Lupins are most vulnerable to aphids during budding and flowering, as severe feeding damage on growing tips can cause buds to drop, flowers to abort, and reduced pod set.

Aphids produce a sticky substance called honeydew which coats the plant surface. Sooty mould grows on this honeydew and can further reduce plant health.

The lupin variety grown will influence the potential size of the aphid population and subsequent damage. Narrow leaf lupin varieties vary in their susceptibility to aphids. Albus lupins are resistant to aphids.



Image 5: A hotspot of lupin plants damaged by aphids.
Photo – courtesy Peter Elliot-Lockhart, Elders©

Table 1 Susceptibility of narrow leaf lupin varieties grown in Western Australia to aphid colonisation and aphid borne viruses: cucumber mosaic virus (CMV; seed borne) and bean yellow mosaic virus (BYMV)

Variety	Aphids	CMV (seed borne)	BYMV
Belara	S	MS	S
Coromup	R	MR	MS
Coyote	NA	MR	MRMS
Danja	MR	MR	S

Variety	Aphids	CMV (seed borne)	BYMV
Gidgee	NA	MR	MS
Gungurru	MRMS	MS	S
Jenabillup	R	MRMS	MR
Jindalee	MRMS	MS	S
Kalya	R	MRMS	S
Mandelup	R	MRMS	S
Merrit	MRMS	MS	S
Myallie	MS	MRMS	MS
PBA Barlock	R	MR	MS
PBA Bateman	R	MRMS	MR
PBA Gunyidi	R	MRMS	MS
PBA Jurien	R	MRMS	MR
PBA Leeman	R	MS	MS
Quilinock	MS	MR	MR
Rosemont	NA	MR	MR
Tallerack	VS	S	MS
Tanjil	R	R	MS
Wonga	R	R	MS
Yorrel	VS	MS	S

Key

VS=very susceptible, S=susceptible, MS= moderately susceptible, MR=moderately resistant, R=resistant, VR=very resistant, NA=not available. Source: Pulse Breeding Australia.

Management strategies

Thresholds for feeding damage

Failure to control aphid feeding damage can result in yield losses (in the absence of virus infection) of up to 90% in susceptible varieties and up to 30% in varieties with intermediate resistance.

Controlling aphids when they are at threshold, which is 30% of flowering buds with 30 or more aphids, will give a yield response.

How to monitor for aphids

After buds start to appear on the crop, check 15 plants at 4 different sections of the paddock. Look on the youngest inflorescences. Don't count individual aphids – instead, look for clusters of aphids or symptoms of leaf curling.

Correct identification of the aphids is critical. Green peach aphids are resistant to organophosphorous, carbamate, and synthetic pyrethroid insecticides, and can be difficult to control.

Green peach aphids are easily identified - they tend to be found on the underside of leaves and vary in colour from bright green to pink.

Spraying

If aphids are at threshold in the crop, the only option is to spray. Before spraying, consider:

- delaying sprays if there is a cold front expected. Heavy rain combined with low temperatures (that is, less than 5°C) can severely reduce aphid numbers
- using 'soft' chemicals (such as pirimicarb) that are aphid-specific or short-term residual sprays. Aphid predators can keep low to moderate levels of aphids under control.

Perimeter spraying

In some cases, the whole paddock may not need treatment, as aphid infestation often starts on the edges of a crop. If most of the infested plants are on the edge, a perimeter spray may control most of the aphids in your paddock, saving time and money.

Cultural control strategies for aphids

High sowing rates

Use a high sowing rate of at least 80 kilograms per hectare to achieve a density of 45 plants per square metre. High plant densities form a closed crop canopy faster which is less attractive to aphids.

Stubble retention

Retained stubble help to repel aphids from landing. Stubble retention may be particularly beneficial in wide-row spaced crops, which form closed canopies later than normal-row spaced crops.

Weed control

Good weed control before and after seeding decreases the availability of alternate hosts for aphids. It also reduces the spread of viruses from weeds into the lupin crop and back again.

Encourage aphid predators and parasites

Control by predators and parasites is very reliable when low to moderate numbers of aphids are present. However, when aphids reach high levels, predators and parasites have less impact on overall numbers of aphids. Predators commonly found in lupin crops include ladybirds, lacewings, and hoverflies.

Parasites include certain wasp species that are efficient at seeking out aphids. They sting the aphid and lay an egg inside. The larvae hatch and slowly consume the aphid. This slows or stops reproduction, and eventually kills the aphid. The parasite larvae create a 'mummy' by spinning a cocoon inside the aphid, then pupate, and emerge as an adult. Presence of bloated aphids with a pale gold or bronze sheen indicates parasite activity in your lupin crop.

How to avoid virus transmission in crops

If aphids are likely to be present in the crop, consider sowing varieties resistant to viruses. The key strategies to reduce the likelihood of viruses being present or building up in the crop are outlined in factsheets for Bean yellow mosaic virus in lupins and Cucumber mosaic virus in lupins.

Contact us

Svetlana Micic, Grains Senior Research Scientist
+61 8 9892 8581 | [Email Svetlana Micic](#)

Geoff Thomas, Principal Research Scientist
+61 8 9368 3262 | [Email Geoff Thomas](#)

More information

Refer to the department website for more information about the following:

- Diseases and pests of lupins
- Bean yellow mosaic virus and its management in lupins
- Cucumber mosaic virus and its management in lupins
- Western Australian crop sowing guide

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