Aphids spreading virus in brassicas and lettuce in the Lockyer Valley

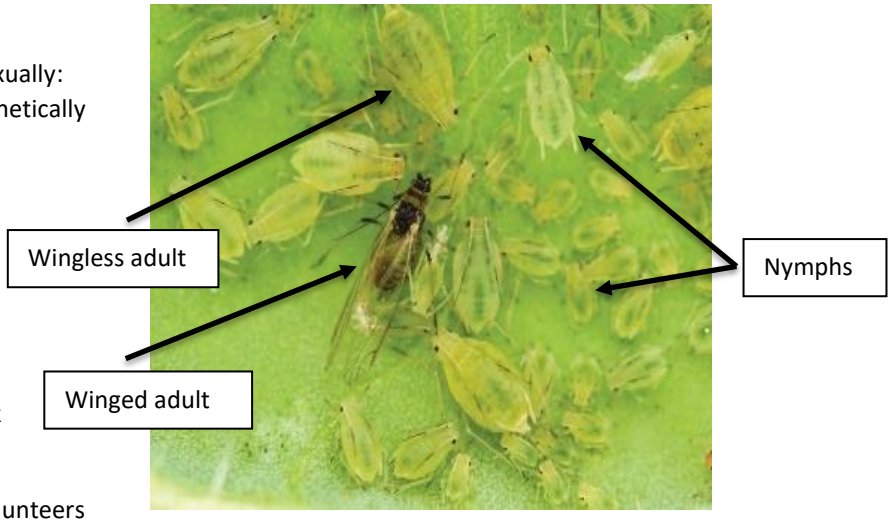
Background

The major aphid species which spread viruses to lettuce and brassica crops in the Lockyer Valley include green peach aphid (GPA), cabbage aphid, sowthistle aphid and turnip aphid. Table 1 shows what hosts these aphids affect and which viruses they spread.

Lifecycle

In Australia aphids mainly reproduce asexually: females produce live young which are genetically identical to the parent.

Populations consist of winged adults, wingless adults and nymphs. Winged adults are produced when populations are large and aphids are overcrowded. They move on wind currents and are efficient in locating host plants. Wingless adults are also quite mobile and can walk between plants.



Aphid life stages

SOURCE: John Palumbo, University of Arizona, taken from 'Growing Produce' website https://www.growingproduce.com/vegetables/field-scouting-guide-green-peach-aphid/

Aphid populations build up on weeds, volunteers and old crops, then migrate into newly planted crops. They generally migrate in from the field margins, so are often found on the crop edges first.

Most aphid species prefer mild conditions in autumn and spring. Under ideal conditions populations can increase very quickly.

Green peach aphid – Myzus persicae

SOURCE: Tsuchida, T (2016) Molecular basis and ecological relevance of aphid body colours. Current Opinion in Insect Science 17, 74-80

Cabbage aphid – Brevicoryne brassicae

SOURCE: Cesar Pty Ltd http://cesaraustralia.com/sustainable-agriculture/identify-an-insect/insect-gallery/pest-insects/aphids-and-bugs/cabbage-aphid/

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Table 1 List of aphid species, the hosts they affect and the viruses they spread.

Common name	Species name	Hosts	Virus
Green peach aphid	*Myzus persicae*	Very wide host range	Turnip mosaic virus (TuMV) Cauliflower mosaic virus (CaMV) Turnip yellows virus (TuYV)
Cabbage aphid	*Brevicoryne brassicae*	Cruciferous crops/weeds	
Turnip aphid	*Lipaphis pseudobrassicae*	Cruciferous crops/weeds	
Sowthistle aphid	*Hyperomyzus lactucae*	Sowthistle, does not breed in lettuce	Lettuce necrotic yellows virus (LNYV)

Turnip aphid – Lipaphis pseudobrassicae

SOURCE: IPM Images USA (but taken from the DPIRD website: https://www.agric.wa.gov.au/autumn/cabbage-and-turnip-aphids-cabbage-pests-indonesia-and-western-australia)

Sowthistle aphid – Hyperomyzus lactucae

SOURCE: APHOTOFAUNA https://www.aphotofauna.com/bug_aphid_hyperomyzus_lactucae.html

Monitoring

Monitor regularly, particularly during periods of high risk after high rainfall, and during spring and autumn. Pay particular attention to crop edges and monitor at several points as distribution may be patchy. Monitor weeds at least occasionally.

Control – Use insecticides strategically

Insecticides are generally not useful for prevention of in-crop spread of viruses by aphids. Some aphid species, including green peach aphid, have wide-spread resistance to many insecticides, including organophosphates, carbamates, synthetic pyrethroids and neonicotinoids.

Insecticides can agitate the aphids making them more mobile, so that they spread the virus further and more rapidly. This is particularly problematic for non-persistently spread viruses (e.g. TuMV and CaMV), where aphids need to feed for less than a minute to pick up the virus and to deposit it into another plant.

Broad spectrum products can kill beneficials and flare aphids and other pests. Where possible choose products that are less harmful to beneficials. Apply insecticides as spot sprays or border sprays so that beneficial populations are conserved in unsprayed areas. Targeted applications of systemic herbicide or insecticide on weedy areas can help prevent virus being introduced into crops by migrating aphids.

Rotate between insecticide groups and spray based on monitoring, to help slow the development of insecticide resistance.

Control – beneficials

A range of naturally occurring predators, parasitoids and fungal diseases can help to manage pest populations and suppress virus spread. Effective aphid natural enemies include:

- Parasitoids, e.g *Aphidius*
- Ladybirds – both the larvae and adults are voracious aphid predators
- Hoverflies – larvae are good aphid predators, adults are important pollinator species
- Lacewings and damsel bugs – generalist predators

You can encourage natural enemies in your crop by using pesticides strategically and preserving areas of native vegetation and flowering plants.

Aphid parasitoids and predators are also commercially available, although additional releases may be unnecessary if natural populations are conserved.

Mummified aphids (above) and the adult wasp Aphidius laying eggs in an aphid nymph (below).

Ladybird larva on the left, Lacewing larva in the centre and a hoverfly larva on the right.

SOURCE: Mummified aphids & adult wasp: ©2015 oneminutebugs.com.au (Denis Crawford); Ladybird larva: Zara Hall; Lacewing larva: C. Freebairn, DAF; Hoverfly larva: Cesar Australia - http://www.cesaraustralia.com/sustainable-agriculture/identify-an-insect/insect-gallery/beneficial-insects/wasps-and-flies/hoverfly/

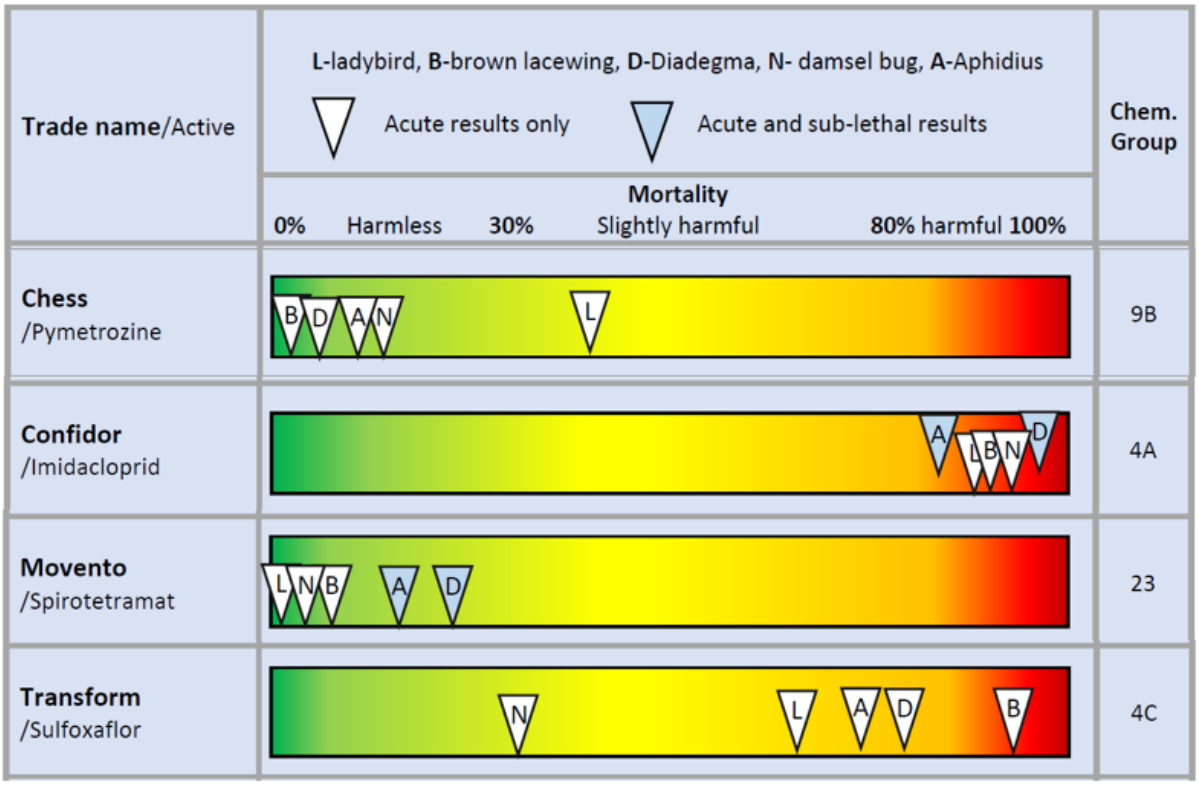
Control – cultural

Control weeds and other alternative hosts of aphids and viruses. Suggested options for cultural control:

- destroy harvested or abandoned crops as soon as practically possible. These crops are very important sources of virus and aphids on farm and within the district. Undertaking this across neighbouring farms or across a production area will have greater positive impact.
- separate new crops from maturing crops where possible. Separating crops by as little as 50 to 100 m can be beneficial and planting new crops upwind from older crops can also help
- separate crops using blocks of unrelated non-host species
- consider tall barrier crops to separate blocks
- destroy weeds well before the first planting of crops. This will encourage the aphids to move away from the production area prior to crops being planted.

Pesticides and beneficials

Recent research has evaluated the effects of a range of popular pesticides on key beneficial species used in vegetable IPM. The below four products are registered in brassicas for control of sucking insect pests including aphids.



Summary of the effect four popular pesticides have on key beneficial insects. The effect is colour-coded from green which is not harmful through to red which is very harmful.

Further information

Full versions of the pesticide guides can be downloaded from: https://ausveg.com.au/biosecurity-agrichemical/crop-protection/#IPM

Factsheets on viruses affecting vegetable crops and the principles of an area wide management approach to their control can be downloaded from: https://www.horticulture.com.au/search/?search=VG16086

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The information provided in this factsheet is combined from research funded by two Hort Innovation projects, using the Vegetable research and development levy and contributions from the Australian Government with co-investment from the Queensland Department of Agriculture and Fisheries; Victorian Department of Economic Development, Jobs, Transport and Resources; The Northern Territory Department of Primary Industry and Resources; the Western Australia Department of Primary Industries and Regional Development and the University of Tasmania. The research was also in collaboration with IPM Technologies and SARDI.