



BIOLOGICAL SERVICES



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Aphids

Aphids are one of the most abundant pest groups in the world. They belong to the order Hemiptera, and the suborder Homoptera (aphids, hoppers, whitefly and scales) and form the superfamily Aphidoidea. Due to their enormous reproductive capability and often broad host ranges, many species can cause severe damage to both commercial crops (both indoors and outdoors) and residential gardens.

The majority of aphids feed on young leaves and shoots of plants, by sucking sap directly from the plant. Aphid feeding can cause damage to plants in many ways:

- ◆ Nymphs and adults draw nutrients from the plant and disturb the growth hormone balance. Because of this, growth is slowed/ halted and the leaves may curl up, or if the infestation occurs early in the season, the plant may die altogether. Arrested growth or leaf loss usually results in reduced yields.
- ◆ Plant sap lacks protein and is rich in sugar, therefore aphids must ingest a lot of sap in order to get enough protein. The excess sugar is excreted by the aphids as honeydew. Sooty moulds (*Cladisporium spp.*) can grow on the honeydew, and downgrade fruit/flowers making them unsaleable. In situations with very heavy sooty mould development, the ability of the plant to photosynthesise is also compromised and yields may be reduced.
- ◆ Toxic substances may be transferred to the plant from the aphid while feeding (via aphid saliva) causing reactions within the plant that can result in galls, feeding rings and/or misshapen leaves and fruit.
- ◆ Many aphid species also have the ability to transmit damaging plant viruses.



Aphid giving birth to live young



Winged aphid

Due to their ability to reproduce very quickly and in high numbers, resistance to many chemical groups can develop very quickly.

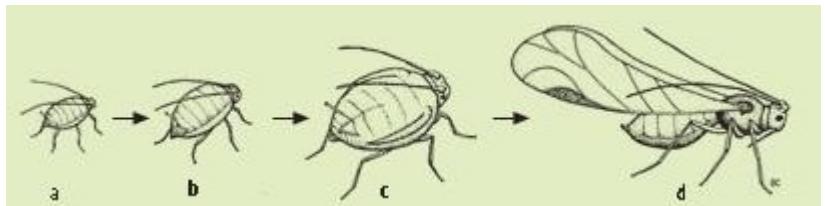
Description and Biology:

Aphids have a complicated life-cycle and exhibit polymorphism. This means that adults can be either winged or wingless, depending on the circumstances. Winged aphids generally occur where there is overcrowding, stress, or when there is a change of host plant. They can then move to other plants.

Aphids can therefore react quickly and effectively to changes in their surroundings.

For much of the season, an aphid population consists of females which produce live young. Young aphids are born complete and immediately start feeding on plant sap. They grow quickly and moult four times before they become adult. Their characteristic white cast skins betray their presence.

The time taken by aphids to develop depends on



Life cycle of green peach aphids

Different development stages: life cycle may follow the sequence a, b, c, a or a, b, c, d, a.

many factors, including the host plant species and its food quality, the climatic conditions and the population density. Under optimal conditions the development of young aphids to adults can be completed in only a few days.

Searching behaviour and distribution in the crop

The first aphids are usually found scattered throughout the crop. Because of the fast multiplication of aphids, dense colonies are formed quickly. When they are discovered early enough, these "hotspots" can be controlled with local treatments. As colonies grow, aphids spread to neighbouring plants. When the population becomes too dense, winged forms develop, and these migrate over the whole crop.

Aphids react to the colour of plants. A greenish yellow colour is particularly attractive. The colour of the leaves gives the aphid information about the age and the quality of the leaf. Younger leaves are preferred as a food source. Scent plays a role only at very short distances (1m).

An aphid will first probe a leaf that looks attractive. In doing this it senses with its sucking mouthparts (proboscis) whether the leaf has the right structure. Only after sucking the plant sap is the aphid capable of judging its food value.

Because of the huge number of species of aphids that exist, we will deal with only six of the key horticultural pest species that may be found in many crops in Australia.

Cotton (or melon) aphid—*Aphis gossypii*

Cotton aphids are major pests (as the name suggests) of cotton, melon and other cucurbits, and many ornamentals crops. Worldwide, the species *Aphis gossypii* consists of an unknown number of strains that do not change their host and some strains that have a unique relationship with their host. For example in the UK, cotton aphids occur on chrysanthemum and cucumber. The strain that occurs on chrysanthemum does not occur on cucumber or vice versa. Both strains, however, can develop on cotton. The strain that occurs on chrysanthemum is resistant to organophosphate and carbamate insecticides, but the one that lives on cucumber is not.

Cotton aphids are distinguished from other aphids by the colour of two projections on their abdomens (siphunculi). These siphunculi are always black, no matter what colour their body is (figure 6.3). Body colour varies from light yellow to greenish black, depending on the temperature, the food source and population density. Large specimens are mostly dark green to black, while aphids produced in overcrowded colonies at high temperatures can be small and yellow or yellowish white. They measure 1-2 mm long and have relatively short antennae (about half the body length), and red eyes.

Adult cotton aphids live for two to three weeks and produce three to ten young aphids a day. *A. gossypii* can multiply itself four times (in aubergine) to twelve times (in cucumber) in seven days.



3 different colour forms of the cotton aphid

Cotton aphids are important carriers of viruses, transmitting at least 44, such as cucumber mosaic virus. The cotton aphid may also cause damage in the same way as other aphids: by sucking plant sap, secreting honeydew and depositing toxic substances. The species has a preference for the underside of leaves and young tissue.

Cotton aphids are controlled by *Aphidius colemani* (*Aphidius*)

Green Peach Aphid—*Myzus Persicae*

The green peach aphid (*Myzus persicae*), also called the peach potato aphid, is an important pest of capsicum, eggplant, potato, tobacco and many other vegetable, flower and ornamental crops.

The adult green peach aphid measures 1.2-2.3 mm long. Wingless specimens are commonly smaller than winged forms. They are greenish white, light yellow to green, grey-green, pink or red coloured. Winged specimens have a black spot in the middle of their abdomens.

The nymphs, from which winged adults develop, are mostly orange or pink

A mixture of winged and wingless individuals are produced on summer host plants. The winged females move within the crop and among several other crops, where they produce new colonies and spread viruses.

The green peach aphid is the most important aphid carrier of virus diseases. This species can transmit at least 100 viruses, which makes it a much feared insect, particularly in potato and sugar beet. The green peach aphid causes damage in the same way as other aphids - by sucking plant sap, secreting honeydew and injecting toxic sub-



Green peach aphid adult and juveniles

stances.

Green peach aphids are controlled by *Aphidius colemani* (Aphidius), *Aphidius ervi* (Ervi), and *Aphelinus abdominalis* (Aphelinus).

Potato aphid -*Macrosiphum euphorbiae*

The potato aphid occurs on many crops such as potato, rose, tomato, aubergine, chrysanthemum and lettuce. The adult potato aphid measures approximately 4.0 mm, is pink or green in colour, and has long, green siphunculi and a long cauda (tail). Winged females are slightly shorter than wingless ones. Pink wingless aphids have a yellowish head and a yellowish pink thorax.

The life-cycle of the potato aphid is the same as the life-cycle of the green peach aphid. Overwintering can take place as an egg, but also asexually, for instance in glasshouse lettuce.



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Potato aphids and shed skin

The potato aphid is found especially on young parts of the plant. The aphid is very active and can therefore spread within the crop quite quickly. In potato, the species causes curled tops, the symptoms looking like the potato leaf roll virus. In tomato they can often be found on the lower parts of the plant, on leaves, and on the main stem.

Potato aphids are controlled by *Aphidius ervi* (Ervi) and *Aphelinus abdominalis* (Aphelinus).



Glasshouse potato aphids

Glasshouse potato aphid—*Aulacorthum solani*

The glasshouse potato aphid (also known as the foxglove aphid) occurs especially in potato, chrysanthemum, lettuce, capsicum, bean and eggplant (aubergine) and sometimes in tomato.

The adult glasshouse potato aphid is green with a dark head and thorax. The siphunculi are light green. The winged female has very clear dark stripes on her abdomen. The glasshouse potato aphid can cause curly tops in capsicums and potatoes by injecting a toxic substance into the plant while feeding.

Glasshouse potato aphids are controlled by *Aphidius ervi* (Ervi) and *Aphelinus abdominalis* (Aphelinus).



Adult rose aphid with various aged young

Rose Aphid—*Macrosiphum rosae*

The rose aphid is a key pest of roses grown both indoors and outdoors.

Rose aphids are a medium sized, spindle shaped aphid, approx. 2-3mm in length and can range in colour from a glossy light to dark green to pink or red-brown. They have long yellow and black antennae. Winged adults have a black head.

Rose aphids can be parasitised by *Aphelinus abdominalis* (Aphelinus).

Strawberry aphid—*Chaetosiphum fragaefolii*

Strawberry aphids are key pests of strawberry crops, both indoors and outdoors.

They are a small aphid, 1-2mm long. They are an elongate oval shape, and are translucent yellowish white to pale green in colour.

Aphids feed particularly on unfolding strawberry leaves. Aphids tend to concentrate on the underside of a leaves, along main veins, particularly at the base of a petiole. If present in high numbers, strawberry aphids can stunt plant growth and due to the honeydew produced, sooty moulds can then develop, inhibiting the plants ability to photosynthesise. They can induce plant withering in susceptible cultivars. Strawberry aphids are major vectors of strawberry viruses. This aphid is not able to be controlled with any of the parasites commercially available in Australia at this moment.



Strawberry aphids on a developing leaflet