Aphids

Several species of aphids are troublesome pests of greenhouse crops, orchards, gardens and indoor plantscapes. Green peach aphid (*Myzus persicae*) is common in greenhouses, while melon aphid (*Aphis gossypii*), potato aphids and others also occur.

Damage
Aphids suck plant sap, which causes distortion of enlarging leaves and shoots and reduces the vigour of plants. As they feed, aphids produce sticky honeydew which drips onto leaves and fruit below. The honeydew is colonized by sooty molds, which reduces the quality of greenhouse vegetables and ornamentals.
Some species of aphids also transmit plant viruses.

Description
Aphids are soft-bodied, pear-shaped insects, 2-4 mm (1/16-1/8 inch) long; most are wingless, but some have wings, which are transparent and held roof-like over their backs.
Immature aphids look like smaller versions of wingless adults.

Aphids generally develop in crowded colonies on the undersides of leaves and along stems; they occur most often on the oldest (lowest) leaves and on the young shoots of plants.

Life Cycle
Aphids reproduce very quickly because, for most of the year, the colony is entirely made up of females.
During the growing season, aphids continuously give birth to live young, without mating.
On outdoor plants, in the fall, in response to short daylength, male aphids develop in colonies; they mate with the females, which produce eggs. The eggs overwinter and hatch in the spring.
In greenhouses, aphids may continue to reproduce all winter without laying eggs.
Winged aphids develop when aphid colonies become crowded. These fly to new plants and can be transported very long distances in air currents to quickly infest a crop.

Monitoring Tips
Use a 10-15 X lens to inspect plants, weekly, for developing aphid colonies. They are first found on the older lower leaves and then move on to new growth. Later, honeydew on leaves is a sign of aphids (or other sucking insects) on the leaves above; in greenhouses with poly floors the floors will also become sticky with honeydew.
Use yellow sticky traps at a rate of 1 card/50-100 m^2 (500-1000 ft^2) to trap winged aphids. Traps can help identify when the winged aphids are present outdoors as well as where they may be entering greenhouses.

Weekly plant inspections, rather than traps, should be used to locate infestations inside greenhouses. By the time winged aphids are produced from colonies inside a greenhouse, it means that overcrowded aphid colonies are already present on plants.

Biological Controls
Several biological controls are available for control of aphids. They differ in their effectiveness at certain times of the year or at high or low aphid populations. Aphids reproduce so quickly that it is often advisable to use two or more biological controls together to suppress the aphid population.

It may be necessary to control ants in greenhouses, conservatories and around outdoor trees because they can protect aphid colonies by removing predators.

'Aphidius' *(Aphidius matricariae, A. colemani, A. ervi)*: *Aphidius* species are a group of parasitic wasps that parasitize many common species of aphids in greenhouses and outdoor crops (e.g., green peach aphid). For more information, see Sheet 242.
Aphidius is efficient at finding aphids and are most effective when applied preventatively, before aphids are detected, or when aphid populations are very low. Aphidius alone will not provide control when aphid populations are high. During spring and summer, aphid populations grow too fast to be controlled by the parasite alone therefore should be used with other aphid predators such as Aphidoletes and lady beetles.
Aphidius does not diapause in response to short days, so it can be used year-round. Effectiveness may be reduced in late summer when Aphidius itself may be attacked by naturally occurring parasitic wasps (called hyperparasites)
In crops, such as pepper, which are very attractive to aphids, a banker plant system has been developed using trays of barley infested with barley aphids. The barley aphids acts as an alternate host to allow Aphidius to become established.

Note: Aphidius does not attack some common aphid species, such as potato aphid, but Aphidoletes and lady beetles (see below) will feed on most species of aphids.

'Aphidoletes': Larvae of *Aphidoletes aphidimyza* are predators of over 60 species of aphids and can be used on indoor and outdoor plants. For more information, see Sheet 240.
They are efficient at finding aphid colonies and effective against low and high aphid populations.
Aphidoletes diapauses in short day conditions, therefore are most active from mid-March to September in most greenhouses, unless supplemental lighting is used.

Lady beetles (*Harmonia*, *Hippodamia* and others): Both adult and larval lady beetles feed on a variety of aphid species. For more information, see Sheet 244.
They are effective against high aphid populations, however, field collected ladybeetles enter diapause so are not effective indoors in winter months.
Lady beetles will not survive in the absence of prey, therefore should be released after aphids are detected.

Lacewings: The larvae of lacewings (*Chrysoperla* spp.) are predators of aphids and other soft-bodied insects; they will also attack other biocontrol agents as well as cannibalize their own species. Lacewings do not reproduce well in most greenhouse situations, therefore the eggs and larvae are generally used as a one-time control (like a pesticide) rather than with the expectation they will become established (for more information, see Sheet 280).

Chemicals
Insecticidal soap can be used as a clean-up for aphids, before releasing biological controls, as it has no residual effect. It can be used in aphid 'hot spots' without harming pupal stages of Aphidius and lady beetles, but will affect other stages.
Nicotine fumigant (PlantFume®) can also be used before release of biological controls as it has a 1-day residual effect.
Pirimicarb (e.g., Pirliss®) can be used to reduce aphid numbers in 'hot spots' without harming the pupal stage of Aphidius. It is also only slightly toxic to Aphidoletes, but the repellent effect of the pesticide disperses the aphids. It also has been found to repel Aphidoletes females from laying eggs on leaves with pirimicarb residues, therefore avoid frequent use.
Kinoprene (Enstar®) may be used in aphid 'hot spots', without harming biological controls, but it is only registered for use on ornamentals.

Other Measures
In gardens and on some indoor plants, wash high populations of aphids from plants with a strong spray of water before introducing biological controls.
Keep the greenhouse weed-free to remove alternate hosts for aphids, and maintain a 3-m (10 ft) wide, weed-free border around the greenhouse.
To prevent aphids entering greenhouses from outdoors, screen all entry points.
Closely inspect all new plant material before bringing it into the greenhouse.

Summary of IPM for Aphids in Greenhouses
Remove weeds in and around the greenhouse.
Screen vents if aphids are likely to enter greenhouses from outside.
Monitor weekly by inspecting plants; use yellow sticky traps to detect flying aphids.
Reduce high aphid populations with insecticidal soap sprays or other pesticides that are least harmful to biological control agents.
From mid-March to mid-September:
Release Aphidius preventively or at first sign of aphids if the aphids are a species they will attack.
Release Aphidoletes and Harmonia lady beetles at first sign of aphid infestation.
If aphid populations are high, spot spray with soap or kinoprene (Enstar®, for ornamentals only) and/or mass release field collected lady beetles.
Release lacewings if Aphidius populations are being reduced by hyperparasites in late summer.
From mid-September until March, many aphid predators will diapause unless supplemental lighting is used, however, Aphidius parasitic wasps can be used effectively.
At the end of the crop, do a thorough clean-up with naled (Dibrom®) and remove all plant debris.

Summary of IPM for Aphids Outdoors
Monitor weekly by inspecting plants.
Wash high populations of aphids from plants with a strong spray of water or spray

insecticidal soap before introducing biological controls.
Release Aphidoletes at the first sign of aphids.
A late summer release of Aphidoletes can be used to establish a wintering over population in orchards to control aphids in the spring.

COMPARISON OF APHID BIOLOGICAL CONTROLS

Characteristics	Aphidoletes	Aphidius	Harmonia	Hippodamia	Lacewings
Attacks most aphid species	X		X	X	X
Attacks some aphid species		X			
Release in high aphid density	X		X	X	X
Release at low aphid density		X			
Diapauses in short-day conditions	X*			X	X

*Diapause prevented if supplemental lighting is used.