

Aphidoletes-System

Aphids can become a pest in a very short time. Therefore early control of aphid hot spots is very important. The gall midge *Aphidoletes aphidimyza* looks for the aphid hot spots and lets her progeny finish them.

APHIDS

Biology

Aphids are Hemiptera of about 1 - 4 mm. There are hundreds of species of aphids, each with its typical appearance, life cycle and host plants in many field and greenhouse crops.

Aphids have a round to pear-shaped body with two projections on their abdomen, called cornicles. These cornicles not only secrete honeydew, but also 'alarm pheromones', that warn their fellow aphids of danger. Conspicuous features that allow to distinguish between aphid species are the cornicles, the cauda ('tail'), the antennae and the head front.

There are polyphagous and host plant specific aphid species. Polyphagous species feed on different types of host plants. The most common polyphagous species in greenhouses are the green peach aphid (*Myzus persicae*), the cotton aphid (*Aphis gossypii*), the potato aphid (*Macrosiphum euphorbiae*) and the glasshouse potato aphid (*Aulacorthum solani*). Some host plant specific species in greenhouses are the chrysanthemum aphid (*Macrosiphoniella sanborni*) and the rose aphid (*Macrosiphum rosae*).

The life cycle of aphids is very diverse and complicated. A common feature is the predominantly viviparous reproduction. This means that the female does not lay eggs, but gives birth to completely developed nymphs. Nymphs look like small adults and immediately start feeding on plant sap. There are 4 nymphal stages followed by the adult stage. When moulting to another stage, they leave typical white cast skins behind, that betray the presence of aphids.

Some aphid species change host plant in winter, while others stay on the same host plant all the time. Winter hosts are often woody plants. When changing host plants, or at higher population densities, winged adults (alates) appear. Once they arrive on their winter host or in colonies on their summer host, again wingless aphids (aptera) appear.

In most aphid species, males are born in autumn and mating occurs. In other periods of the year reproduction is asexual (parthenogenesis) and males are not necessary.

The development time of aphids varies a lot and depends on the aphid species, the kind and the quality of the host plant, the climate and the population density. Thanks to the mainly asexual and viviparous reproduction an aphid population can develop very rapidly. One female can produce 40 to 100 offspring, or 3 - 4 nymphs per day. Often a next generation is already present inside a recently born nymph.

Damage

Aphids can cause damage to crops in several ways:

1. They extract nutrients from the plant, which affects plant growth. Infestations on young leaves may cause deformations later on.
2. The excess of sugar they absorb is secreted as honeydew, on which sooty moulds can grow that foul the plant.
3. They can transmit viruses.
4. They can bring toxic substances into the plant.

APHIDOLETES APHIDIMYZA

Aphidoletes is a gall midge that occurs naturally in Europe, North-America and Asia. Contrary to some other gall midge species *Aphidoletes* does not cause damage by forming galls on leaves.

The adult is about 2.5 mm long, with long legs and a slender body. Males have long antennae that are bent backwards and are covered with long hairs, while females have shorter, darker antennae.

Aphidoletes is mainly active at night. After sunset the female deposits her eggs in aphid colonies. The number of eggs depends on the climate and the nutrition the gall midge has had as a larva and as an adult, but it mostly mounts up to more than hundred. After 2 to 3 days, eggs hatch to larvae that almost immediately start sucking aphids around them. There are 3 larval stages. Initially the larva is transparent orange, but later on it turns, depending on its food, orange, red, brown or grey. After a life of 7 to 14 days (at 21°C or 69.8°F) as a larva,

it pupates in the ground. Therefore it makes an oval, brown cocoon covered with sand grains, aphid skins and excrement. Seven to fourteen days later, an adult gall midge emerges.

Since the larva looks for its prey in the surrounding 6 cm of its birth place, the female gall midge prefers to deposit her eggs in sufficiently big aphid colonies. One larva needs minimally 5 aphids for its development, but it will kill more if there are more available. The larva first injects a poison in the aphid, which paralyses the aphid and dissolves its body contents in 10 minutes. *Aphidoletes aphidimyza* is known to eat at least 70 different aphid species.

The adult feeds on honeydew. The adult life span is 7 to 10 days, but it might be shorter if there is a lack of honeydew. Dry conditions also shorten the life span. Mating usually occurs after sunset, before sunrise or on a fresh and shady place low in the crop.

In nature the pupa enters diapause from the end of September until May (in temperate regions). In the greenhouse this diapause is interrupted by higher temperatures in early spring.

APPLICATION

The main benefit of *Aphidoletes aphidimyza* is its applicability on several crops on which any kind of aphid occurs. The gall midge can be introduced preventatively with an aphid parasite (*Aphidius colemani*, *Aphidius ervi* or *Aphidius abdominalis*) at 0.1 *Aphidoletes*/m². As soon as the first aphid colonies are detected or flying aphids are seen on yellow sticky plates (BUG-SCAN®), *Aphidoletes* can be released curatively. Depending on the crop and the aphid species, 0.5 - 2 *Aphidoletes* /m²/week are introduced. In hot spots, weekly introductions of 5 - 10 gall midges are recommended.

In soil cultures larvae can pupate in the ground and successive generations can occur. In substrate cultures the pupae do not find appropriate sites for pupation and many die. Therefore

a biological balance with aphids is not possible in substrate cultures. In this case, *Aphidoletes* should be considered as a temporary control of developing aphid colonies (biological corrector).

For controlling further developed colonies, the ladybird *Adalia bipunctata* can be released in the hot spots or the selective pesticide pirimicarb (Pirimor ...) can be used.

APHIDOLETES-SYSTEM

Aphidoletes aphidimyza is delivered per 1000 pupae mixed with vermiculite. The best introduction method for *Aphidoletes* is to open the plastic bottle and to place it under the aphid colonies or to sprinkle the contents in the provided bucket in which the insects can mate. These introduction methods increase the chance for the males and the females to meet for copulation. The more successful the copulation is, the quicker the population density of this gall midge is built up. It is possible to store *Aphidoletes* for a short time at 12°C.

ADVANTAGES

- **Applicable in several crops;**
- **Controls all aphid species;**
- **Excellent searching ability;**
- **Curative control of aphid colonies;**
- **Kills more aphids than necessary for development.**