

# Darkwinged Fungus Gnat



## Biology

Darkwinged Fungus Gnat (Sciaridae or Lycoriidae) : *Sciara* sp., *Bradysia* sp. Keroplatidae: *Orfelia* sp. (syn.: *Lyproua* sp.) are small, 4-6 mm long, black fragile insects. The adult insects fly zigzag over the substrate surface.

The 4-7 mm long larvae are transparent, whitish, slim with a black head capsule. They live in humid substrates and eat decomposing plant tissue, but big populations can also damage living plants. The darkwinged fungus gnats often occur in connection with fungus infestation in the thick roots of *Phalaenopsis* and *Paphiopedilum*. Weak plants or plants pre-damaged by harmful fungi are very attractive places to lay their eggs. The larvae are often imported into the stands in sphagnum. The eggs are small, oval, transparent whitish and lain in humid substrates. The development from egg to adult takes about 4 weeks. The main species found in greenhouses are *Sciara* and *Bradysia*.

The *Orfelia* larvae are significantly bigger and slimmer, 15-20 mm long animals have been found in roots. The adult animals (8-10 mm) are also much bigger than the darkwinged fungus gnats and also markedly differ in habitus. The back part of the body has horizontal stripes. Most animals of this gnat species all over the world live on fungi, fungus infested substrates, in moss or under the barks of trees. This may confirm the theory that the gnat was imported in orchid-breeding companies in substrate containing bark and sphagnum.

## Damage

In humid substrates the larvae eat soft roots and as a consequence of that, parasitic root fungi can infest the plants. If infestation is more severe, the structure of the substrate is destroyed relatively quickly by fine crumb-like substances. This can be regarded as the real damage on orchids.

*Orfelia* gnaws in the thick roots of various orchid varieties and in some cases, the stem base is severely damaged, whereas the fine roots remain intact in the initial phase of infestation. Usually, only few larvae are found in the damaged plants, at times even only one single larva causes the damage. Obvious are also the markedly visible slime traces on the substrate surface. These insects mainly infest *Phalaenopsis* and *Miltonia*, but also other pot orchids such as *Dendrobium*, *Oncidium* or *Cambria* hybrids.

## Control

Greenhouses must be clean and free from wet places with algae and peat. Yellow catchboards can be used to determine the degree of infestation of *Orfelia* und *Sciara*, in addition light traps can be hung up. To check if any larvae are present, the substrates should be checked for slime traces and the roots of weakly growing plants should be checked, too. It might also be good to hang up yellow catchboards not only in the plant stand, but also in the workshop close to artificial lighting and in the substrate storage room.

## Biological plant protection

Parasitic nematodes (*Steinernema* sp., *Heterorhabditis* sp.): When infestation with *Bradysia* or *Orfelia* has been detected, insect pathogenous nematodes of the *Steinernema* species and *Heterorhabditis* can be applied. The long-time larvae of the nematodes are able to locate harmful larvae and penetrate them through body openings. By secreting a bacterium, the cell structures in the gnat larvae dissolve. A few days later the larvae die. This can be seen when parasitised gnat larvae come to the substrate surface and look milky-white.

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Depending on the degree of infestation, 250,000 to 500,000 nematodes per m<sup>2</sup> are applied on the plants in water. Applications on spliced young plants are recommended and meristems seem to be slightly more prone than seedlings. As *Orfelia* is a relatively big larva, *Heterorhabditis* are certainly better to use than *Steinernema*, they effectively control the gnat larvae that usually occurs in combinations. As it is difficult to find out which of the larvae really causes the respective damage, combined treatment with both nematode species would be best.

**Insect-pathogenous bacteriae (*Bacillus thuringiensis israelensis* = B.t.i.):** Products with the bacterium B.t.i. are brought onto the plant by watering. The bacterium forms permanent spores and at the same time protein crystals (the so-called endotoxin crystals). If these bacterial products are eaten by the sensitive insects, the crystals destroy the cells of the bowel walls. The bacterium gets into the body, the insects die within a very short time. B.t.i. is no contact product, but a pure feed poison. After intake of the bacterium, the larvae stop eating very quickly. The smaller and younger the larvae are the quicker and better the effect of the products applied. B.t.i. takes effect only against gnat larvae. Compared to nematodes, bacteriae have a very short life. Usually, the effect is over after a maximum of one week, so several applications are necessary in case of infestation. It also has to be considered that they take no effect against adult insects, maggots or eggs, but only against the larvae that take them in with their food. Due to the relatively high damage potential caused in orchids by *Orfelia*, accompanying measures using nematodes or B.t.i. should be carried out on Orchids, until no more larvae or adult insects are seen.

**Predatory mites (*Hypoaspis miles*, *H. aculeifer*):** Predatory mites are ideal for biological plant protection. These beneficial insects are very polyphagous, they feed on many different insect larvae and among them also the larvae of *Bradysia*. and *Sciara*. *Hypoaspis* can reduce the pest when applied regularly and as a prophylactic to slow down the population growth. They are effective later than nematodes and therefore are not suitable for direct, quick treatment, but rather as a medium to long-term strategy to control the pest. For this purpose, about 200-250 animals per m<sup>2</sup> are spread prophylactically every 4-6 months in the greenhouse. The predatory mites are especially effective, when orchid substrates mixed with sphagnum are available. In these conditions the predatory mites multiply quickly in the greenhouse and even after some months there is still a sufficient number of them in the stands. As the predatory mites have a comprehensive prey spectrum and eat their prey in the upper ground layer, those animals can stay in greenhouses for a relatively long time and be active there up to 6 months in high population densities.

**Robber flies (*Coenosia attenuata* Stein):** *Coenosia* robber flies are predatory species of the *Muscidae* family. In many orchid stands these flies settled as spontaneous beneficial animals and have taken over an important task in the treatment of darkwinged fungus gnats. The robber flies which come from North Africa resemble our common flies, but they are a bit smaller. They have probably been accidentally imported into greenhouses in young plants. The adult animals sit still on leaves in the stand and wait for their prey and catch insects flying by. They open their soft-skinned body parts and suck their prey. Proof of their successful activity is empty skins of the pests on the upper leaves. In addition to darkwinged fungus gnats they also feed on white flies, peat flies and leaf-mining flies. The *Coenosia* larvae are predatory and live in the substrate and among other insects also feed on the larvae of darkwinged fungus gnats.

Animal pests

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Fungus gnats (*Sciara*) on yellow adhesive trap



UV light trap



Miltonia: *Lyprauta* at young plants



Miltonia: *Lyprauta* at young plants



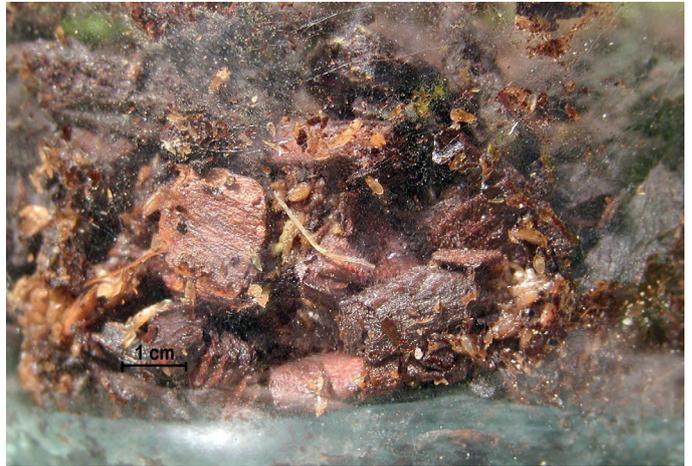
*Coenosia*-robber-fly

Animal pests

# Darkwinged Fungus Gnat



*Lyprauta (Orfelia)* at yellow boards



*Lyprauta (Orfelia)* larvae



*Epidendrum*: damage caused by *Lyprauta (Orfelia)*



root damages caused by *Lyprauta (Orfelia)*

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