

# Fungus Gnats

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## 1. Introduction

The Bibionomorpha are an infraorder of the suborder Nematocera. One of its constituent families, the Anisopodidae, is the presumed sister taxon to the entire suborder Brachycera. Several of the remaining families in the infraorder those shown without common names are former subfamilies of the Mycetophilidae, which has been recently subdivided. The family Axymyiidae has recently been removed from the Bibionomorpha to its own infraorder Axymyiomorpha [1-3].

## 1. Systematic

Most representatives of the Bibionomorpha are saprophages or fungivores as larvae with the Cecidomyiidae being predominantly gall-formers. Some sciarids are common indoor pests, developing large populations in potting soil that has become moldy from overwatering. The larvae of the Bibionidae sometimes migrate in large, snake-like masses to minimize dehydration while seeking a new feeding site [1-3].

### Superfamilies and families:

Superfamily Anisopodoidea Knab, 1912.

Family Anisopodidae.

Superfamily Bibionoidea Fleming, 1821.

Family Bibionidae.

Hesperinidae Walker, 1848.

Superfamily Mycetobioidea Winnertz, 1863.

Family Mycetobiidae Winnertz, 1863.

Superfamily Scatopsoidea Newman, 1834.

Family Canthyloscelidae Shannon, 1927.

Family Scatopsidae Newman, 1834.

Family Valeseguyidae Amorim & Tozoni, 1994.

Superfamily Sciaroidea Billberg, 1820.

Family Bolitophilidae Winnertz, 1863.

Family Cecidomyiidae Newman, 1834.

Family Diadocidiidae Winnertz, 1863.

Family Ditomyiidae Edwards, 1921.

Family Keroplatidae Rondani, 1856.

Family Lygistorrhinidae Edwards, 1925.

Family Mycetophilidae Newman, 1834.

Family Rangomaramidae Jaschhof & Didham, 2002.

Family Sciaridae Billberg, 1820.

Family Pachyneuridae, 1864 [1-3].

## 1.2. Life cycle

Fungus gnats measure 2-5 mm, are dark in color, and are easily recognized by their dancing flight. The larvae measure 6-7 mm, are off-white, and have a black head. It is the larvae that damage the plants, as they feed on the roots. The generation cycle takes just 3 weeks, with females laying up to 160 eggs. Thus, mass reproduction easily occurs if the land is sufficiently moist. Larvae usually feed on organic materials, such as fungal hyphae, soft leaves, moss, and algae. But sometimes they attack the roots, which causes seedlings, cuttings, and young plants to wilt. The larvae present in the substrate, in addition to feeding on fungi in organic matter, also ingest plant roots, damaging their development and forming microlesions that become a gateway for pathogens, that is, microorganisms that can cause diseases in plants. The larvae favor and inoculate plants with various fungi and bacteria such as *Pythium* sp., *Botrytis*, *Verticillium* sp., *Fusarium* sp., *Thielaviopsis* sp., *Cylindrocladium* sp., and *Sclerotinia* sp. that can cause serious infections [3-5].

They tend to appear when there is abundant organic matter and humidity, the same type of environment that favors fungi in reproduction. Thus, some types of plants end up being victimized more frequently than others. Cacti and succulents are unlikely to be affected, but carnivorous plants, orchids, violets, and many other plants that appreciate humidity favor reproduction. In 2017, in Brazil, one of the problems affecting semi-hydroponic strawberry cultivation was the occurrence of fly larvae, known as fungus gnats [5-7].

## 1.3. Symptoms of fungus gnat infestation.

When roots are damaged, plants may show several signs of disease, including yellowing leaves, wilting, spotting, and falling. Symptoms of nutrient deficiencies (sick growth, leaf discoloration, etc.) may occur despite having the correct pH

and adequate nutrients. The seedlings weaken, fall, and die. Stunted growth and low yields [6-7].

#### 1.4. Control and prevention

It is necessary to get rid of the substrate contaminated by the larvae, purchase a new one, or treat it. If you want to treat it, know that the plant must be removed from the ground before this process begins. After removing the plant from the pot, you must apply hot water to wash the soil and let it dry completely for 30 days in bright places, away from humidity and watering. With the larvae eliminated, moderately fertilize the new soil and replant [8-14].

Remove dead leaves, waste, and other dirt from the pot, as this helps the fly larvae to develop further. Cleaning the region is a recurring practice, ideal both for treating already contaminated plants and for preventing other pests [8-14].

A safe solution to prevent larvae is to use 10 volume hydrogen peroxide diluted in 2 liters of water. Water the soil every 3 days for 15 days. It is important to use this mixture to treat fungus gnats in a targeted manner, so as not to kill the beneficial mosquitoes that live in the substrate. As fungus gnats prefer to lay their eggs in damp substrate, it is essential to let it dry between waterings, so as not to allow the adults to lay eggs. If you already have infested pots, replacing the first few centimeters of substrate with new soil can help a lot [8-14].

You can also cover the top part of the soil with something that makes this first layer dry more quickly and easily, such as sand, perlite, expanded clay, pine bark, or stones. The most effective traps are hard plates, usually yellow, and sticky, designed to catch flying pests, which you can place right next to the substrate of the pots, the best place to catch them. You can find these traps in any store that sells gardening and horticultural products [8-14].

Apple cider vinegar is sweet enough to attract fruit flies to this trap. In a jug, pour approximately two centimeters of apple cider vinegar and a drop of dishwashing liquid. Cover the container with plastic wrap and tie it with string. Pierce the plastic so flies can get in. In addition to removing bad odors and unclogging the drain, the mixture of baking soda and white vinegar can reduce the incidence of mosquitoes. Just put a spoonful of baking soda in the drain, then pour a cup of white vinegar and wait for 5 minutes. Another way to keep flies away by smell is by using basil and bay leaves [8-14].

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