

A new alternative to chemicals for fungus gnat control

Norman L. Gauthier

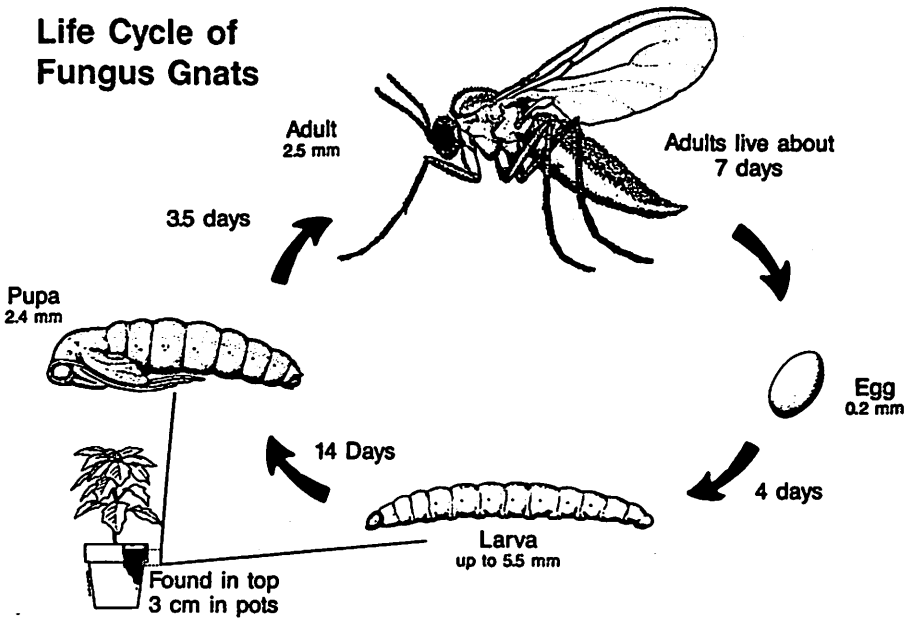
Extension Educator - Entomologist

Description and Biology

The term "fungus gnat" is a general name used to describe insects belonging to the Sciaridae, Phoridae and Mycetophilidae families of flies (Diptera). The larvae or maggots of fungus gnats can cause severe root damage in many species of plants grown in greenhouses or containers. Infestations can occur in heavy peat mixtures used in various plantings or potting media used in greenhouses, indoors or in outdoor nursery propagation beds. Populations generally peak during the winter and spring in greenhouses, but the gnats can be present throughout the year.

Adult fungus gnats (small grey to black flies) live approximately one week and lay eggs on the top of the soil near the plant stems. Eggs hatch within four days. Larvae (maggots) are small (up to 1/4 inch), clear in color with a black head. In containers, the larvae feed on root hairs and roots in the upper layers of the pots and later burrow into plant stems, resulting in extensive damage. Feeding may also occur on algae and fungi growing on the pot or container surfaces, under benches or on bench surfaces. Larvae feed for two weeks and then enter a pupal stage for three to four days. After this period, emergence of new adult flies occurs. The following chart summarizes the fungus gnat life cycle:

Life Cycle of Fungus Gnats



Reprinted from "For Fungus Gnat Control in Greenhouses... Vectobac Biological Larvicide...the Biorational Approach" by Abbott Laboratories.

Damage Symptoms

Damage becomes apparent by a general wilting of infested plants. Various root rots often set in after the fungus gnat larvae have damaged the roots. If wilting or leaf distortion occurs, check roots for larvae and damage. Entire greenhouse crops have been destroyed by this pest. Highly organic soils including peat-lite mixes attract the female flies to lay their eggs. It is suspected that in many cases, peat shipped for potting mixtures may already be contaminated with fungus gnat eggs. These eggs hatch after cuttings or seedlings are potted and watered.

Preferred Crops

Poinsettias, as well as bedding plants, vegetable sets grown in plugs, gerbera daisies, gloxinias, most bulb crops, cyclamens, hybrid impatiens, salvia, geraniums and ornamental peppers, are particularly vulnerable. Tender tissue-culture plugs are especially susceptible to fungus gnat attacks.

Microbial Pest Control and Mode of Action

A new strain of *Bacillus thuringiensis* (B.t.-14) has been isolated by Abbott Laboratories and formulated as Vectobac Biological Larvacide. It is available in two liquid formulations: Vectobac-AS, having a potency of 600 international toxic units (ITU)/mg and Vectobac-12AS, having a potency of 1,200 ITU/mg. The active ingredient is composed of viable endospores and crystals of B.t.-14.

Larvicidal activity is dependent upon the crystals which must be ingested by the larvae of the fungus gnats. Upon ingestion, pH conditions and enzymes in the gut of the larvae rapidly break down the crystals into the toxic substances which attack the midgut. General gut paralysis occurs within a few hours and insect activity ceases. The cells of the larval midgut become extensively damaged. Death results in 24 to 48 hours. Fungus gnat larvae generally become flaccid or moribund (lifeless) within 24 hours. After 48 hours, pots with severe infestations will have numerous dead larvae floating to the soil surface after watering. This product does not control fungus gnat adults.

Recommendations for Control

Vectobac should be applied as a soil drench by sprays for larval control. It can also be injected undiluted into irrigation systems such as overhead or drip systems. Under bench or wet areas should also be treated as they are a source of reinfestation. The spray drench should thoroughly wet the first two inches of soil and may be applied on containers or raised beds. The following chart gives the suggested rate ranges for large and small gallonages:

Habitat	Vectobac-AS	Vectobac-12AS
Plants in greenhouse or nursery plants in potting soil mixes	Light infestation: 16-32 oz./100 gal. or 1-2 tsp./gal. as soil drench with high % of peat	Light infestation 8-16 oz./100 gal., or 1/2-1 tsp./gal.
	Heavy infestation: 64-128 oz./100 gal. or 4-8 tsp./gal.	Heavy infestation: 32-64 oz./gal. or 2-4 tsp./gal.

Preventive treatments can also be made to newly potted plants on a weekly basis to control larval hatches in the peat contaminated with fungus gnat eggs. Vectobac-AS can be used at 1-2 pints/100 gal.; or 1/2-1 pint/100 gal. for Vectobac-12AS. There is no reentry time with this product.

Preventive treatments can also be made to newly potted plants on a weekly basis to control larval hatches in the peat contaminated with fungus gnat eggs. Vectobac-AS can be used at 1-2 pints/100 gal.; or 1/2-1 pint/100 gal. for Vectobac-12AS. There is no reentry time with this product.

Precautions

This product should not be injected in combination with fertilizers or fungicides containing copper or chlorine as this may neutralize the active ingredients. Chlorine levels in potable water supplies should not present a problem. Do not apply soil drenches with this product to plants under water stress or follow applications with excessive amounts of water. The best results are obtained when soil drenches are applied towards the end of the irrigation period.

Product Effectiveness

Greenhouse tests conducted by Abbott Laboratories using B.t.-14, diazinon, chlorpyrifos, azinphos-methyl, methomyl and resmethrin indicated that the new microbial larvacide was equal to or better than these chemicals at recommended rates for controlling larvae. Effectiveness of control may also be monitored for adult populations present with yellow sticky traps.

Registration

Vectobac is nationally registered by the EPA, with greenhouse use in the northeastern states (including Connecticut) approved.

A new product called Gnatrol, specifically formulated for greenhouse use, will soon be appearing on the market.

For further information contact:

Abbott Laboratories
Technical Representative
Dr. Stephan Sears
RFD #2, Baptist Hill Road
Palmer, MA 01069
Tel: (413) 283-7877