UF IFAS Extension UNIVERSITY of FLORIDA

EENY-215

doi.org/10.32473/edis-in372-2001

Darkwinged Fungus Gnats, *Bradysia* spp. (Insecta: Diptera: Sciaridae)[1]

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The Featured Creatures collection provides in-depth profiles of insects, nematodes, arachnids and other organisms relevant to Florida. These profiles are intended for the use of interested laypersons with some knowledge of biology as well as academic audiences.

Introduction

Most species of darkwinged fungus gnats (Sciaridae) feed on fungi and decaying organic matter and are not considered economic problems. A few species, however, attack healthy tissue of such economic plants as potatoes, wheat, red clover, alfalfa, cultivated mushrooms, pine seedlings, and various ornamentals, including tulip bulbs, ferns, begonias, coleus, geraniums, cacti, young orchids, areca palm, and dracaenas. Sciarids are a problem in Florida greenhouses, mostly concerning injury to plants, but large numbers of flying gnats can be an occasional nuisance to workers.

Some growers have had difficulty achieving adequate control of fungus gnats, and more information is needed on effective insecticides, dosage rates, methods of application, and possible phytotoxicity.

Synonymy

Sciaridae was formerly a subfamily in Mycetophilidae, and, for a short time, sciarids were called lycoriids (Lycoriidae). Many of the species formerly in genera *Sciara* and *Neosciara* are now in the genus *Bradysia*.

Distribution

Steffan (1966) reported that *Bradysia* was represented by 65 species in North America and is the largest genus in the family in North America and Europe. It also is found on all other continents and on most of the major islands. In the USA, the species seem to be mostly in the northern and western states. Examples of *Bradysia* have been collected from all regions in Florida, but very few have been determined to species. Based upon the available literature, R.J. Gagne, USDA Systematic Entomology Lab, Washington, DC, identified sciarids from greenhouses in the Apopka area, Orange County, as *Bradysia coprophila* (Lintner) and *Bradydia impatiens* (Johannsen). He also identified *B. coprophila* from Punta Gorda, Charlotte County, and Gainesville, Alachua County.

Description

Larvae

The larvae are white, slender, and legless with a black head and smooth semi-transparent skin revealing digestive tract contents; length when fully grown is 1/4 inch (6 mm). There are no similar greenhouse pests.

1. This document is EENY-215, one of a series of the Entomology and Nematology Department, UF/IFAS Extension. Original publication date July 2001. Revised December 2014 and June 2021. Visit the EDIS website at https://edis.ifas.ufl.edu for the currently supported version of this publication. This document is also available on the Featured Creatures website at http://entnemdept.ifas.ufl.edu/creatures/.

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Figure 1. Darkwinged fungus gnat, *Bradysia coprophila* (Linter), larvae feeding on cactus tissues.
Credits: Division of Plant Industry

Figure 2. Darkwinged fungus gnat larvae feeding in rotten potato.
Credits: Jim Kalisch, University of Nebraska - Lincoln

Adults

The adults are small, up to 1/8 inch (3 mm) delicate flies, dark brown body, dusky wings, small head, rounded, moderately prominent eyes that meet above the bases of the thread-like antennae, and legs and wings comparatively long. Fungus gnat adults are about 1/8 inch long, spindly flies with long legs and long, thread-like antennae. They look more like tiny mosquitoes than common flies.

Valley (1975) described behavior of adult sciarids. He wrote that when disturbed, the gnats run rapidly or take flight, which usually consists of short darting or hovering movements over a small area.

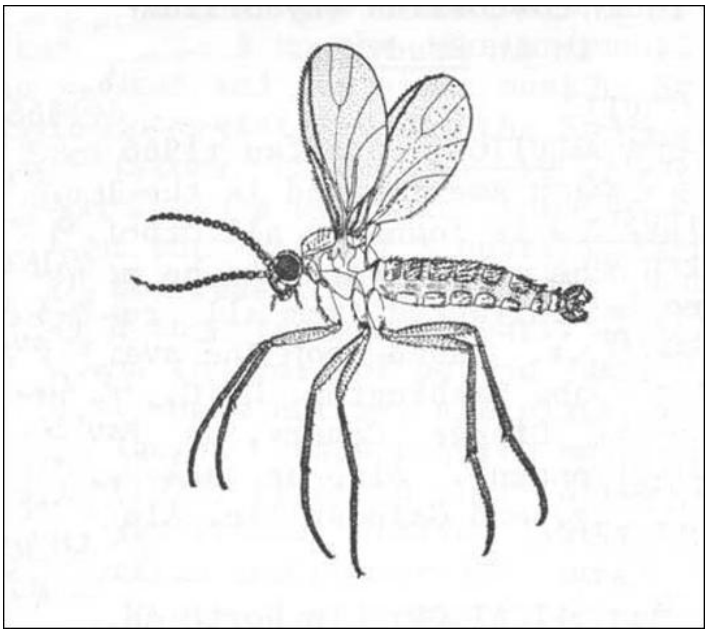

Figure 3. Adult darkwinged fungus gnat, *Bradysia coprophila* (Linter).
Credits: Steffen (1966) slightly modified

Figure 4. Adult darkwinged fungus gnat.
Credits: Jim Kalisch, University of Nebraska - Lincoln

Identification

In North America, the key to sciarid genera by Shaw (1953) has been superseded by Steffan (1966). Identification at the species level is difficult because it is based primarily on males which must be cleaned with NaOH or KOH and mounted on slides, a somewhat delicate procedure. The primary references are Johannsen (1912) and Pettey (1918), but as Steffan (1966) pointed out, many of the older descriptions are inadequate by current standards, and type material must be seen to ensure accuracy of determinations.

Bionomics

The bionomics of *Bradysia impatiens* are well treated in the two papers by Wilkinson and Daugherty (1970a and b), which were inspired by observations of Daugherty in

1965 that larvae of *B. impatiens* attacked roots of soybean seedlings grown under aseptic conditions in a laboratory. They (1970a) reported that at 75°F (24°C) in the laboratory the average fecundity of a female was 75 eggs, and length of life cycle about 27 days; however, when temperatures were fluctuated to produce optimum development, the life cycle was about 19 days. Kennedy (1974) reported that the strain of *B. impatiens* he worked with had greater fecundity and shorter mean developmental time (15.6 days at 77°F) (25°C) than the population used by Wilkinson and Daugherty.

Kennedy (1974) reported on the significance of fungi in survival and development of *B. impatiens*, a fungus gnat found commonly in greenhouses of New York State. He reported that larvae of this species frequently feed on the root and stem tissue of many greenhouse plants. His experiments suggested that fungi provide an essential nutrient source for the larvae of *B. impatiens*, and that if fungi are in low supply in the immediate vicinity of a living plant, there is a tendency for the larvae to use the plant as an alternate food source.

Hungerford (1916) reported the life cycle of *Sciara* (=*Bradysia*) *coprophila* was 24 to 32 days from egg-laying to egg-laying adult female. Thomas (1931) presumably working with coprophila, wrote that the life cycle from date of egg laying to date of fly emergence was 18 to 23 days at 63 to 70°F (17 to 21°C). At lower temperatures, development time was longer. Both Hungerford (1916) and Thomas (1931) illustrated life history stages of *B. coprophila* and plant damage caused by feeding. In Florida, the Florida State Collection of Arthropods has a record of *B. coprophila* being a severe problem on Christmas cactus, *Zygocactus truncatus* Schum., at a research center in Apopka during August 1977. There also is a record of it damaging 50 percent of 1000 seedlings of longleaf pine, *Pinus palustris*, at Punta Gorda during February 1975. The collector, Charles W. Chellman, noted the larvae invaded the tap roots and fed on lateral roots near the soil line.

Management

Sound crop culture denies fungus gnats the conditions necessary for development, reduces need for pesticides and promotes parasites. Fungus gnat problems may result from over wet conditions and diseased roots and should alert growers to poor culture. Potting media should be stored dry, and pots and production areas must be well drained. Fungus gnats can exist on soil fungi, algae under benches, and on damp mossy benches. Some growers apply hydrated lime to eliminate the fungal food source (Price 1997).

The best growers stress good water management, good root health and are prepared to use insecticides correctly when fungus gnats are not otherwise controlled. When such practices are followed, fungus gnats should not be a problem.

Most of the larvae are in the top inch of soil. Rogue out any old plants and rotting materials. Avoid overwatering plants, since fungus gnats require moist to very moist soil or substrate for development. Steffan (1966) reported that, in general, both commercial greenhouse firms and commercial mushroom growers, practicing good cultural techniques, sustain very few losses from direct sciarid injury.

See Lawn, Landscape and Ornamental Plants pest Management for more information.

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