

Management of Fungus Gnats in Ornamentals ¹

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Fungus gnats can be present in flower and foliage production areas during any part of the year, but hot rainy periods are ideal. Growers can manage fungus gnats successfully and ship healthy potted plants without shipping the insects.

Biology

Fungus gnat adults (Figure 1) 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. Larvae live in the soil and are difficult to find. If fungus gnats are present, larvae are most likely found in the early morning in the topsoil layer of a thoroughly wet pot. Larvae are translucent gray to white, about 1/4 inch long, worm-like with no legs, and with shiny black heads. There is not a similar insect in the production area or interiorscape.

These insects can infest a crop from soil or algae under benches, from contaminated potting soil or by flying short distances into the production area. Fungus gnats almost always are present in growing areas, at least at low densities.

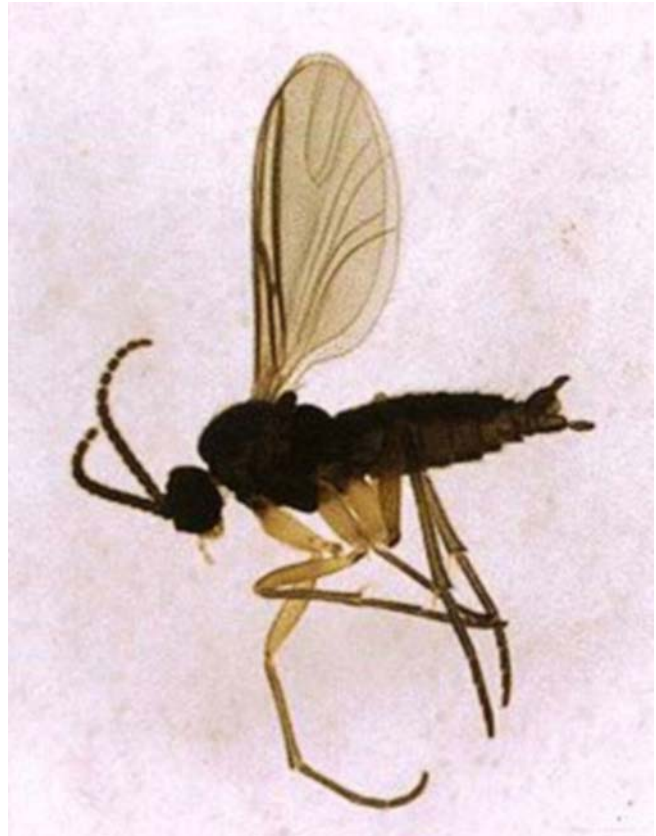


Figure 1. Fungus gnat.

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Life Cycle

Females live about a week and lay 30 to 120 eggs singly or in batches of up to 30 on the soil. Eggs hatch in 4 to 7 days (Steffan 1966). Larval development requires about 8 to 20 days, depending upon temperatures. The resting pupal stage lasts about 3 to 5 days and is located near the soil surface.

Adult flies do not damage plants directly, but are objectionable to consumers and cannot be tolerated on potted plants in hospitals, grocery stores, or florist shops. Adults can emerge from immature forms after sale even when none were evident earlier.

Larvae feed on decaying matter and on healthy and diseased roots in the soil medium. They can be particularly damaging to seedlings and other small plants. Damaged roots provide conditions for root diseases, further complicating fungus gnat management and crop health.

Management

Sound crop management 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 cultural conditions. 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.

Biological Control

Sometimes naturally occurring parasites can become established and regulate fungus gnat populations. This frequently occurs when broad-spectrum pesticides are not used in the production area. Fungus gnat parasites are fragile appearing wasps, much smaller than fungus gnats and may be seen walking on pot surfaces.

Adult fungus gnats are attracted to yellow sticky traps. These traps can be used to detect their presence or scouts can look for adults moving on pot surfaces. If fungus gnats become a problem within a few weeks

of anticipated sales of potted plants, a pesticide control program may be required.

Pesticides

Pesticides for controlling fungus gnats (Table 1) can be applied as drenches to pots or as sprays to foliage, pots, beds, or other soil surfaces as label directions indicate. Many of the products act as larvacides when applied as drenches to pots and soil underneath benches. Treated larvae will die, as will larvae that develop from the eggs already in the soil. However, these materials do not kill adults present at application nor the adults that will develop from pupae present at application. Therefore effects may seem disappointing for the first few days.

Hamlen and Mead (1979) demonstrated that some insecticides applied as sprays to soil surfaces were as effective for fungus gnat control as were drenches of the same materials. Sprays normally should be reapplied once or twice at 10-day to 2-week intervals.

The best growers stress good water management and 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.

Table 1 summarizes the chemical control measures that are available to commercial flower producers in Florida and includes microbial insecticides that may be considered components of biological control. Pesticide labels sometimes provide for the product's use on any "ornamental," "foliage," or "flower" crop and sometimes for use only on specifically named flower or foliage crops. This summary provides the chemical options available for use in the field, shade house and greenhouse production and interiorscape maintenance settings for any ornamental flower or foliage crop and the additional specific options available for use on certain named flower or foliage crops.

Table 1 is organized into two target crop categories, beginning with a general category "All Flower and Foliage Crops." This is followed by a short section that refers the reader to product labels to find specifically named flower and foliage crops.

Commercial products available for control of fungus gnats are grouped by active ingredient. Usually, only one example of any particular formulation is given. Other examples or other formulations may exist that are as effective as those mentioned. Notes are provided to qualify some uses and precautionary statements and re-entry intervals are given to aid in the safe use of the pesticides. Hyperlinks to the indicated pesticide labels are not provided in the electronic forms of this summary, but a search at the Websites of CDMS (<http://www.cdms.net/manuf/default.asp>), C&P Press (<http://www.greenbook.net/>) or the affiliated manufacturer may provide the desired label.

This summary is only a guide to aid in the selection of pesticides. Care has been given to provide accurate and up-to-date information, but it is possible that, through label changes, author error, etc., improper uses may be indicated. In all cases it is the applicator's responsibility to read and comply with the label that accompanies each pesticide container.

Warnings

All insecticides should be handled with caution and the safety precautions on the container must be followed. Wear protective devices and clothing if they are indicated. Read the entire label, including the small print, before opening the container. Avoid drift of pesticides to adjacent areas or to crops that may be eaten by man or animals. Do not allow pesticides to get into streams or water supplies. Store pesticides in their original labeled containers, out of reach of children, irresponsible people, pets, and store pesticides under lock and key. When containers are empty, rinse with water three times and pour rinsate into the spray tank. Dispose of empty containers promptly and safely.

As an additional precaution, keep the telephone number and address of the nearest County Poison Control Center listed in a convenient location in case of an accidental pesticide poisoning. Also, keep clean copies of labels of all pesticides that are on the premises. In the event of a poisoning, the label of the pesticide involved should be taken to the Poison Control Center or hospital. If a product is labeled for use specifically in Florida (special local need), make

sure you get a copy of the supplemental label from your supplier when you purchase the product.

References Cited

Hamlen, R. A. and F. W. Mead. 1979. Fungus gnat larval control in greenhouse plant production. *J. Econ. Entomol.* 72(2):26971.

Steffan, Wallace A. 1966. A generic revision of the family Sciaridae (Diptera) of American North of Mexico. *Univ. of Calif. Pub. in Entomol.* 44-16-22.

Table 1. Pesticides registered for control of fungus gnats on various ornamental crops in production and interiorscape maintenance. Parenthetical information in the "Trade Name" column refers to the sites where the product is permitted for use: field production (F), greenhouse production (G), and interiorscape maintenance (I).

Common Chemical Name	Trade Name (Site) ¹	Pre-Caution	REI (Hrs) ²	Notes from Label ³
AVAILABLE FOR ALL FLOWER AND FOLIAGE CROPS:				
Acephate	1300 Orthene TR (G)	Caution	24	
Acephate & Fenpropathrin	Tame/Orthene TR (G)	Warning	24	Do not apply within 48 hours of a previous application.
Acetamiprid	TriStar 70 WSP (F, G)	Caution	12	Larvae; do not make more than five applications per year. Do not apply more than 22 water soluble packs per acre (0.55 lb a.i./acre) per year.
Azadirachtin	Azatin XL (F, G, I)	Caution	4	
	Ornazin 3% EC (F, G, I)	Warning	12	
<i>Bacillus thuringiensis israelensis</i>	Gnatrol (G, I)	Caution	4	Larvae; soil drench
<i>Beauveria bassiana</i> ATCC 74040	Naturalis L (F, G, I)	Caution	4	Do not tank mix with fungicides. Wait a minimum of 48 hours after application before applying fungicides.
Bifenthrin	Attain TR (G)	Danger	12	For commercial use only. Not for residential use.
	Attain TR Micro (G)	Warning	12	For commercial use only. Not for use in and around residential areas.
	Bifenthrin Pro (I) TalstarOne Multi-insecticide (I)	Caution	when dry	Adults
	Onyx (I)	Warning	when dry	Adults
	Talstar GC (I)	Caution	12	Adults
	Talstar GH (G, I) Talstar Flowable (G, I)	Caution	12	
	Talstar N, Talstar Nursery (F, G)	Caution	12	Shade house & nursery; do not apply more than 0.2 lbs. a.i. per acre per year for outdoor applications.
	Talstar Nursery Granular (F)	Caution	12	Containerized plants; larvae
Chlorfenapyr	Pylon Miticide (G)	Caution	12	Early stage fungus gnat larvae (<i>Bradysia</i> sp.).
Chlorpyrifos	Duraguard ME (F, G)	Caution	24	Larvae; direct spray to some open blooms may cause petal drop. Do not spray on kalanchoes.
Chlorpyrifos & Cyfluthrin	Duraplex TR (G)	Warning	24	Not for residential use.

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Common Chemical Name	Trade Name (Site) ¹	Pre-Caution	REI (Hrs) ²	Notes from Label ³
Cyfluthrin	Decathlon 20WP, WSP (F, G, I)	Caution	12	
	Tempo 20WP, WSP, SC Ultra (I)	Caution	when dry	
Cyfluthrin & Imidacloprid	Discus (F)	Caution	12	Nursery; application can not exceed a total of 244 oz. per acre per year for outdoor ornamentals grown in beds. On plants with a production cycle of less than one year, application frequency can not exceed more than once each 16 weeks for a particular plant. On stock plants and woody crops with a production cycle of greater than one year, application may not exceed once a year.
Cyromazine	Citation (F, G, I)	Caution	12	Shade house; larvae
Deltamethrin	Deltaguard GC 5SC (F)	Caution	12	Nursery
Diflubenzuron	Adept (F, G, I)	Caution	12	Bed, bench & container-grown; shade House (F) & enclosed commercial structures (G). Do not apply to poinsettias, hisbiscus, and Reiger begoinia. Do not apply to plants grown on capillary water mats
Fenoxycarb	Precision (F, G, I)	Caution	12	Container grown; shade house
Permethrin	Astro (G, I)	Caution	12	Do not apply moe than 2.0 lb. a.i. per acre per year.
	Dragnet SFR Termiticide/Insecticide (I)	Caution	when dry	
	Perm-Up 3.2 EC (F, G, I)	Caution	12	Nursery (F); marginal leaf burn may occur on salvia, dieffenbachia and pteris fern. Application to blooming plants may cause browning of petals.
	Permethrin Pro (F, I)	Caution	12	Nursery stock (F); do not apply more than 2.0 lbs. A.I. per acre per year.
	Tengard SFR One Shot (I)	Caution	12	
Pyrethrins & Piperonyl Butoxide	1100 Pyrethrum (G)	Warning	12	
	Pyrenone Crop Spray (F, G, I)	Caution	12	
	Evergren EC (F,G)	Caution	12	

Table 1. Pesticides registered for control of fungus gnats on various ornamental crops in production and interiorscape maintenance. Parenthetical information in the "Trade Name" column refers to the sites where the product is permitted for use: field production (F), greenhouse production (G), and interiorscape maintenance (I).

Common Chemical Name	Trade Name (Site) ¹	Pre-Caution	REI (Hrs) ²	Notes from Label ³
Pyrethrins, Piperonyl Butoxide & N-octyl bicycloheptene dicarboximide	1600 X-clude (I)	Caution	when dry	Do not use on cyclamen and nasturtium.
Pyriproxyfen	Distance IGR (F, G, I)	Caution	12	For foliar spray application, apply Distance no more than two times per cropping cycle or no more than two times per 6 months. For srench application, if a second application is needed, allow a minimum of 21 days between applications. For drench application: Do not drench plants more than one time per crop cycle. Do not apply to salvia, ghost plant, Boston fern, schefflera, gardenia or coral bells. Do not apply to poinsettia after bract formation.
<i>Steinernema carpocapsae</i>	Millenium (F, G, I)	Caution	0	
<i>Steinernema feltiae</i>	Nemasys (F, G, I)	None	0	Nursery (F); if fungus gnats are established it may take 2 to 3 weeks before the number of adults is noticeably reduced. Treat entire houses or plant inventory as soon as possible after placement in greenhouse. In propagation areas, treat new plants as they are introduced. Interiorscape plants should be treated prior to placement. Do not use through drip irrigation or mist system.
S-Kinoprene	Enstar II (G, I)	Warning	4	Application should be made to poinsettia before bract formation. Foliar damage on some sensitive varieties can result. Some varieties of roses, such as yellow blooded roses, show delayed damage. Slight to moderate injury has occurred on some blooms under certain conditions, suggest application be made in prebloom stage.
Thiamethoxam	Flagship 25 WG (F, G)	Caution	12	Containers, field nursery and shade house (F); do not exceed 8 oz. per acre per crop or year, whichever is shorter.

Table 1. Pesticides registered for control of fungus gnats on various ornamental crops in production and interiorscape maintenance. Parenthetical information in the "Trade Name" column refers to the sites where the product is permitted for use: field production (F), greenhouse production (G), and interiorscape maintenance (I).

Common Chemical Name	Trade Name (Site) ¹	Pre-Caution	REI (Hrs) ²	Notes from Label ³
AVAILABLE FOR CERTAIN FLOWER AND FOLIAGE CROPS (SEE LABEL TO DETERMINE WHICH CROPS):				
Azadirachtin	Aza-Direct (F, G)	Caution	4	For ornamental use other than Christmas trees. Do not exceed 57 oz. of Aza-Direct per acre per application.
Refined Petroleum Distillate	Saf-T-Side Spray Oil (G)	Caution	4	Oil removes the glaucous (blue) bloom from such evergreens as Colorado blue spruce and Koster spruce. Always use lower dosage or test spray oil sensitive plants such as cryptomeria, smoke tree, chamaecypris, juniper, Japanese holly and spruce. Tendency toward sensitivity: red cedar and Douglas fir. Do not spray when buds have fully opened and shoot elongation is occurring. Do not spray walnut foliage. Caution: spray no more than four consecutive sprays. The frequency of consecutive sprays should not exceed once every 2 weeks. Early morning applications are recommended. For fall dormant applications, reduce rate to 2 gal. oil per 100 gal. water and limit use to: American red oak, Japanese black pine, dogwood, weeping cherry, cornelian cherry, crabapple, Norway maple, and purple leaf plum. For greenhouse pests listed, use once a week initially, then, as the pest is controlled, decrease the frequency to every 2-3 weeks as needed. Do not tank mix with insecticide or miticide whose label indicates that it should not be used with oil. Do not use with captan, chlorothalonil, dimethoate, methiocarb, oxythioquinox, propargite, or any product containing sulfur. This list is not exhaustive; therefore for products not included in this list consult label for compatibility information.

Table 1. Pesticides registered for control of fungus gnats on various ornamental crops in production and interiorscape maintenance. Parenthetical information in the "Trade Name" column refers to the sites where the product is permitted for use: field production (F), greenhouse production (G), and interiorscape maintenance (I).

Common Chemical Name	Trade Name (Site) ¹	Pre-Caution	REI (Hrs) ²	Notes from Label ³
<p>¹Usually only one example of each formulation is given. There may be other products available that are as effective as those listed.</p> <p>²REI = Re-entry Interval or period between application and earliest normal entry into treated area.</p> <p>³Notes are taken from product labels and restrict use to the condition indicated (suppression, adults, containerized plants, etc.), limit number or patterns of applications, provide phytotoxicity precautions, etc.</p>				