



# *Farm Life Tropical Foliage Fungus Gnat*

## *Control Program*

### Instructions for using Beneficial Nematodes, *Steinernema feltiae*, for the Control of Fungus Gnat Larvae in Interiorscape Planting Media

#### **Program Outline**

The program consists of two phases. The first phase is conducted at Farm Life Tropical Foliage. The plants you have ordered from Farm Life have been treated with beneficial nematodes to ensure they do not arrive with fungus gnats. In order to keep the nematodes working at their optimum level, it is best if the soil does not dry out. The second phase involves you and your maintenance team. The Bug Lady recommends treating every plant before it is placed into a building or job site. Use the heavy application rate for your initial treatment of all plants on your account, at your facility as well as before any new plants are installed. Use yellow sticky cards with your normal scouting routine to determine the frequency and potency of future treatments. Adult fungus gnats will not be killed by the nematode treatments, but will die naturally within 5-7 days. The sticky cards will trap some of these adults and help monitor population levels.

#### **Purchasing the beneficial nematodes**

- *Nemasys*<sup>®</sup> or *Entonem*<sup>®</sup> are the recommended products.

##### **Nemasys**

- Purchased from BWI Company.
- The minimum order is 5 trays of 50 million nematodes. (250 million nematodes in total). Orders placed before 1 pm Monday through Thursday will arrive the following day. No deliveries on weekends or Mondays. Current cost is \$31.00 per tray plus \$25 for next day delivery (\$31.00 x 5 = \$155.00 plus \$25 = \$180.00) Larger quantities are available. Order BWI item #DSNEM50M for *Nemasys*<sup>®</sup>. Visa, MasterCard & Discover are accepted with phone orders. You may also establish a credit account with BWI.

##### **Entonem**

- Purchased from Koppert Biological.
- Minimum order 1 pack of 50 million nematodes. The product is called ENTONEM and can be found on their website at [www.koppert.com](http://www.koppert.com).

#### **Applying beneficial nematodes**

We have found that one of the easiest ways to apply the beneficial nematodes is to create a concentrated solution of water and nematodes and apply to moist planting media using a 2 gallon hand held or backpack sprayer. Should this not be a desirable method for you, you may use the recommended dilution rates to develop a method that works best for you and your team. Please note the importance of removing all inline filters or screens (50 mesh or less) to minimize the potential for physical damage to the nematodes. Nematodes, once placed into water, should be used the same day they are mixed. Unopened or opened but resealed trays need to be kept in a refrigerator between 40°F and 45°F. Please note that plants should receive their normal watering routine before being treated.

#### **Directions based on using a 2-gallon sprayer with fan nozzle**

- Water the target plant material using your normal watering routine prior to application of nematodes
- Calibrate your sprayer prior to mixing the nematodes to determine the amount of trigger pulls or seconds per pull needed to disperse the appropriate amount. Use the “Application Rates for Nematodes” table provided to record your volume of concentrate.
- Mix 1 tray (50 million) of nematodes into 2 gallons of cool water and let sit for 3 to 5 minutes.
- Prior to the application, gently agitate the sprayer to prevent the nematodes from settling and continue to agitate during the application period. Apply the correct volume of concentrate to the soil based on your findings for heavy or preventative treatment. The sprayer should always remain cool (less than 80 °F).

- After the application of nematodes, apply just enough water to help move the nematodes into the first 1 to 3 inches of the soil. Water in the beneficial nematodes within 10 to 15 minutes after applying them to the soil.
- Left over concentrate should be discarded, because the nematodes will no longer be effective after 24 hours if not applied to your plant material. There is no harm in over applying beneficial nematodes.

## **Rates for 50 million nematode tray** **Based on 2 gallons of water concentrated solution**

### **10” or 3-gallon containers**

**Preventative program:** this quantity will allow you to treat 2,048 - 10” pots with 24,779 nematodes per pot.  
2 gallons of water = 2,048 applications of 1/8 ounce each

**Heavy infestation:** this quantity will allow you to treat 1,024 - 10” pots with 50,000 nematodes per pot.  
2 gallons of water = 1,024 applications of ¼ ounce each

### **14” or 7-gallon containers**

**Preventative program:** this quantity will allow you to treat 682 - 14” pots with 48,566 nematodes per pot.  
2 gallons of water = 682 applications of 3/8 ounce each

**Heavy infestation:** this quantity will allow you to treat 512 - 14” pots with 97,272 nematodes per pot.  
2 gallons of water = 512 applications of ½ ounce each

### **17” or 10-gallon containers**

**Preventative program:** this quantity will allow you to treat 512 - 17” pots with 71,611 nematodes per pot.  
2 gallons of water = 512 applications of ½ ounce each

**Heavy infestation:** this quantity will allow you to treat 341 - 17” pots with 143,636 nematodes per pot.  
2 gallons of water = 341 applications of ¾ ounce each

### **21” or 15-gallon containers**

**Preventative program:** this quantity will allow you to treat 457 - 21” pots with 109,275 nematodes per pot.  
2 gallons of water = 457 applications of 5/8 ounce for each 21” container.

**Heavy infestation:** this quantity will allow you to treat 227 - 21” pots with 218,181 nematodes per pot.  
2 gallons of water = 227 applications of 1 1/8 ounce for each 21” container.

### **Mass Plantings or Planter Beds**

A full tray of 50 million nematodes mixed in 2 gallons of cool water will treat approximately 1,100 square feet for a preventative application and 550 square feet for a heavy infestation application.

# *Farm Life Tropical Foliage Fungus Gnat Control Program*

## Steps to Get Your Nematode Program Up and Running

### Equipment

Nematodes are easy to apply. A watering can may be used but it is hard to determine application rates. For more accurate application, use a small sprayer. With our experimentation, we found a 2 gallon sprayer simple, convenient and more accurate in applying the concentrate.

- 2 gallon sprayer
- Spray wand with fan spray nozzle. This is useful for even distribution of concentrate to the media surface.
- Small cooler with ice packs. This will keep the nematodes cool in transit. Keep in mind that the nematodes will be too cold if placed directly on ice packs. Use something to separate the nematodes from the ice packs like a kitchen towel or rag. Nematodes should be held close to refrigerator temperatures (40°F to 45°F).
- Measuring container (in ounces) for calibration. Minimum 5 oz. capacity.

### Amount of Product

By looking at the “Application Rates for Nematodes” table, you can determine the amount of concentrate that is needed to treat the problem area.

### Calibrate

Calibration of your sprayer is very important. Do this prior to mixing the beneficial nematodes.

- Remove all inline filters or screens 50 mesh or less. This could trap or injure the nematodes when they are applied.
- Fill sprayer with cool water.
- Calculating discharge or application rate
  - Time how long it takes for your sprayer to fill a 5 ounce measuring container.
  - Divide this number by 40, rounding up to the nearest second (the result will probably be 1 second)
  - This is the time it takes to disperse 1/8 oz of concentrate. Fill this number in on the column “Your seconds per pot” on the “Application Rates for Nematodes” table. The rate for larger size pots will be based on your seconds per 1/8 ounce of concentrate.

$$\frac{\text{Time it takes to disperse 5 oz.}}{40} = \text{Discharge seconds for 1/8 oz of concentrate}$$

### Important Things to Remember

- Although not recommended, in the case that only a portion of a single tray is used, the tray needs to be properly re-sealed and kept refrigerated at about 40°F to 45°F. It can be stored up to one month or until the expiration date, whichever is sooner.
- Nematodes in water concentrate kept under 80°F and out of direct sunlight, will remain viable up to one day.
- The nematode concentrate can be applied in excess of the recommended rate without any damage to the plants.
- For your first treatment, it is recommended that you use the heavy infestation rate. A heavy infestation may require a follow up preventative application 3-4 weeks after the initial treatment.
- Before and after applying the nematode concentrate, irrigate the media.
- Remember adult fungus gnats will not be affected by nematodes, so use yellow sticky cards to help trap the adults. Adult fungus gnats live 5-7 days.
- Do not exceed 300 psi when applying nematodes.

These rates are for the *Nemasys*® and do not apply to other nematode products or other nematode species.

# Farm Life Tropical Foliage Fungus Gnat Control Program

## Life Cycles

### Fungus Gnats (family Sciaridae)

Adult fungus gnats are small (2.5 mm), grayish to black flies. They resemble tiny mosquitoes with their long legs and long skinny antenna. They are relatively weak fliers and generally remain near potted plants, often running or resting on growing media or foliage. Adults live 5 to 7 days and in this time adult females can deposit 100 to 150 eggs. The eggs are laid in strings of 3 to 40 on the media's surface, and can hatch within 4 days of being laid. The larvae are clear to creamy-white with a black head capsule and grow to about 5.5 mm long. The larvae feed on root hairs and small feeder roots as well as fungi and decaying organic matter in the media. After feeding for approximately 14 days, the larvae pupates. In about 3 ½ days an adult will emerge from the media. The total life cycle takes 2 to 4 weeks.



Adult fungus gnats are more than just a nuisance to interiorscapers. Fungus gnats can spread plant pathogens such as *Pythium*, *Cylindrocladium*, *Phytophthora* and others. They do not spread human pathogens.

### Beneficial Nematodes (*Steinernema feltiae*)

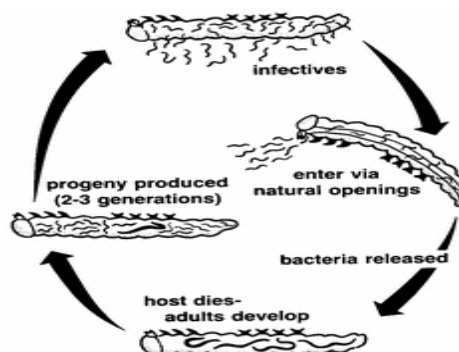
Nematodes are the most numerous multicellular animals on earth; in fact there are many thousands of individual nematodes in every single handful of garden soil. They are very small non-segmented worms that can be free-living, predaceous, or parasitic. The parasitic or “beneficial” nematodes can kill many different insect pests naturally. The species *S. feltiae* is beneficial because it targets pests such as fungus gnat larvae and western flower thrips. Once the beneficial nematodes have been applied to the media, they are ready to attack fungus gnat larvae. They enter into the body of the pests, causing death within a day or two. Inside the dead host, the nematodes will reproduce over the next few weeks eventually leaving to find a new host.



The product *Nemasys*® contains the nematode species *S. feltiae*. It is the most commonly used species for fly larva control. With a 10x hand lens this species can be seen moving in a droplet of water. Because nematodes are not insects, they are compatible with most of the commonly used insecticides. See the *Nemasys*® label for compatibility information. ([www.beckerunderwood.com](http://www.beckerunderwood.com))

Nematodes are natural products that are not genetically modified. They are approved for use in organic production. They are safe for users, consumers and the environment.

**This diagram shows how the beneficial nematodes (infectives) penetrate pest insect larvae, kill them, reproduce and leave to look for more host pests.**





## *Farm Life Tropical Foliage Fungus Gnat Control Program*

### Application Rates for Nematodes Beneficial Nematode *Steinernema feltiae*

Rates for Tray size = 50 million

For Preventative treatment: 1 tray treats 1,100 sq. ft\*

For Heavy Infestation: 1 tray treats 550 sq. ft.\*

\*based on 2 gallons of water

#### Preventative Program

#### Heavy Infestation Program

Pot Size	Square Foot per Pot	Target # Nematodes per Pot	Number of Pots Treated with 50 Mil - 1 Tray	Nematode Concentrate (nematodes + water)	Record Your Seconds per Pot	Target # Nematodes per Pot	Number of Pots Treated with 50 Mil Tray	Nematode Concentrate (nematodes + water)	Record Your Seconds per Pot
6"	.23	10,000 - 24,779	2,048	1/8 oz		20,000 - 50,000	2,048	1/8 oz	
8"	.38	17,000 - 24,779	2,048	1/8 oz		34,000 - 50,000	1,024	1/4 oz	
10"	.55	24,779	2,048	1/8 oz		50,000	1,024	1/4 oz	
12"	.79	35,909	1,392	1/4 oz		71,818	682	3/8 oz	
14"	1.07	48,566	682	3/8 oz		97,272	512	1/2 oz	
17"	1.58	71,611	512	1/2 oz		143,636	341	3/4 oz	
21"	2.4	109,275	457	5/8 oz		218,181	227	1 1/8 oz	
24"	3.14	142,727	341	3/4 oz		285,454	170	1 1/2 oz	
28"	4.27	194,267	256	1 1/8 oz		388,181	128	2 oz	
32"	5.58	253,737	194	1 1/4 oz		507,272	102	2 1/2 oz	

**For mass plantings or bedding planters, same rates apply.**

Due to the difficulty of measuring amounts smaller than 1/8 ounce, it is recommended that the smaller pot sizes (6, 8 and 10 inch) are treated with no less than 1/8 ounce of concentrate. Applying more nematodes than required is not harmful to your plants. Farm Life's preventative rate is equivalent to the heavy infestation rate listed on the Nemasys® label.

This information has been developed by Farm Life Tropical Foliage with the help of Buglady Consulting, and Becker Underwood.