



Biological Control of Fungus Gnats with Beneficial Nematodes

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2013 Tri-State Greenhouse IPM Workshop

Responsible

Economical

Proven

Beneficial Nematodes:

- Natural enemies of soil-dwelling insect larvae
- Obligate insect parasites (must attack an insect host to survive)
- Only the 3rd stage juvenile is free-living (also called the “IJ” or “dauer larva”)

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Steinernema feltiae

-
- Effective on fungus gnat larvae
 - Completely safe to humans
 - EPA exempt from registration
 - Compatible with many pesticides
 - Easy to apply

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Steinernema feltiae



**3rd stage IJ has
NO mouth-
parts; it does
not feed**

Responsible

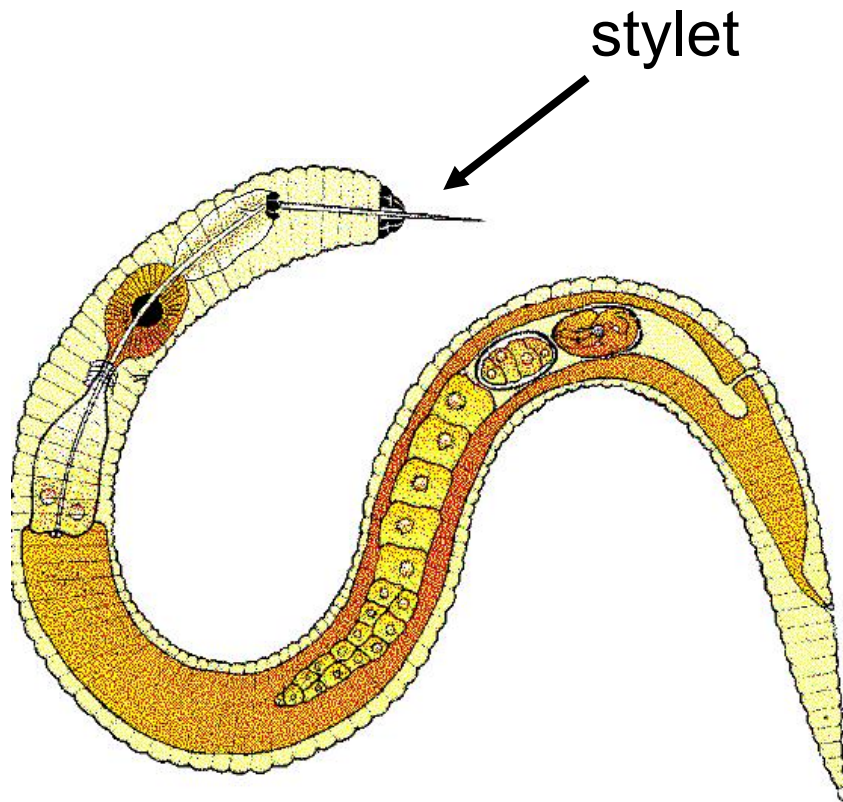
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Steinernema feltiae



**Plant-parasitic
nematodes
have a “stylet”
mouthpart
designed to
penetrate plant
tissues**

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Fungus Gnats

Fungus Gnat
Larva



Fungus Gnat
Adult



Responsible

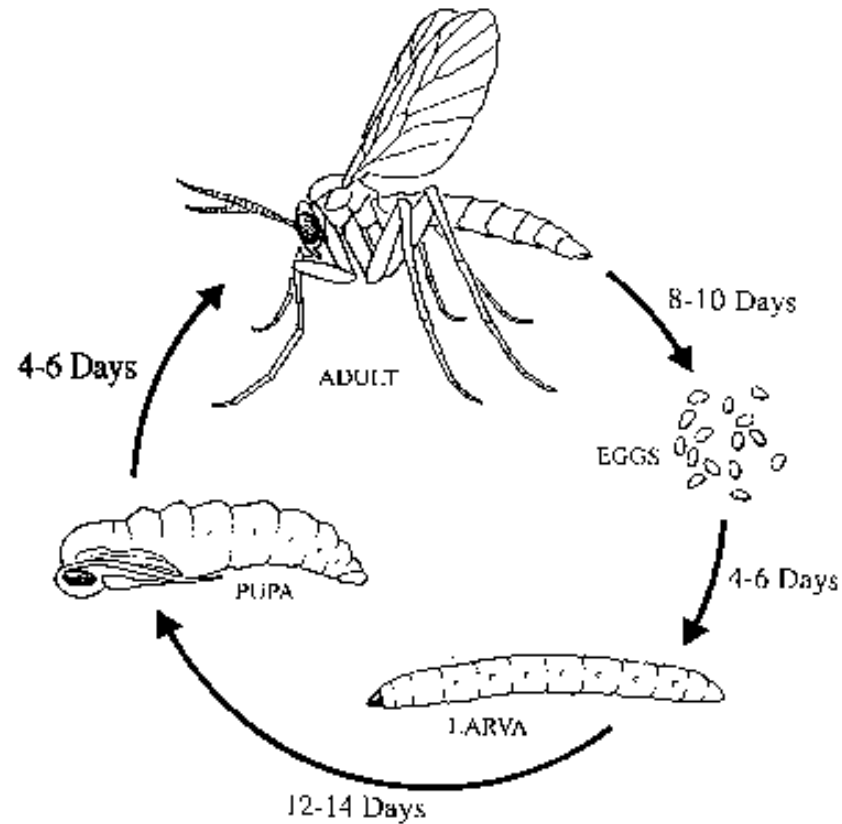
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Fungus Gnats



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Steinernema feltiae Mode of Action

- Actively search for hosts
- Enter through natural opening
- Nematode releases a symbiotic bacterium into the insect host
- Nematode molts to the next stage & develops mouthparts

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Steinernema feltiae Mode of Action

- Insect larva dies within 24-48 hours
- Cause of death is blood poisoning due to the bacterial infection
- Nematode continues it's life cycle
- Insect tissues serve as nematode food

Responsible

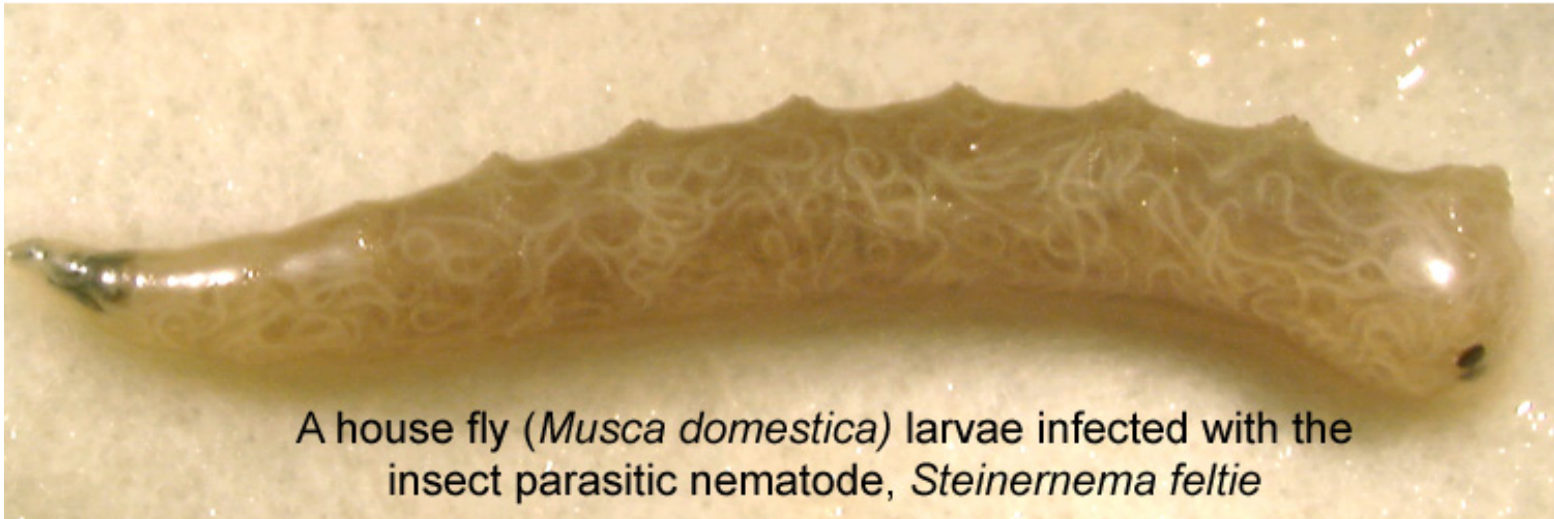
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Steinernema feltiae

Mode of Action

- Adult nematodes mate & multiply
- Next generation IJ nematodes are released into the environment

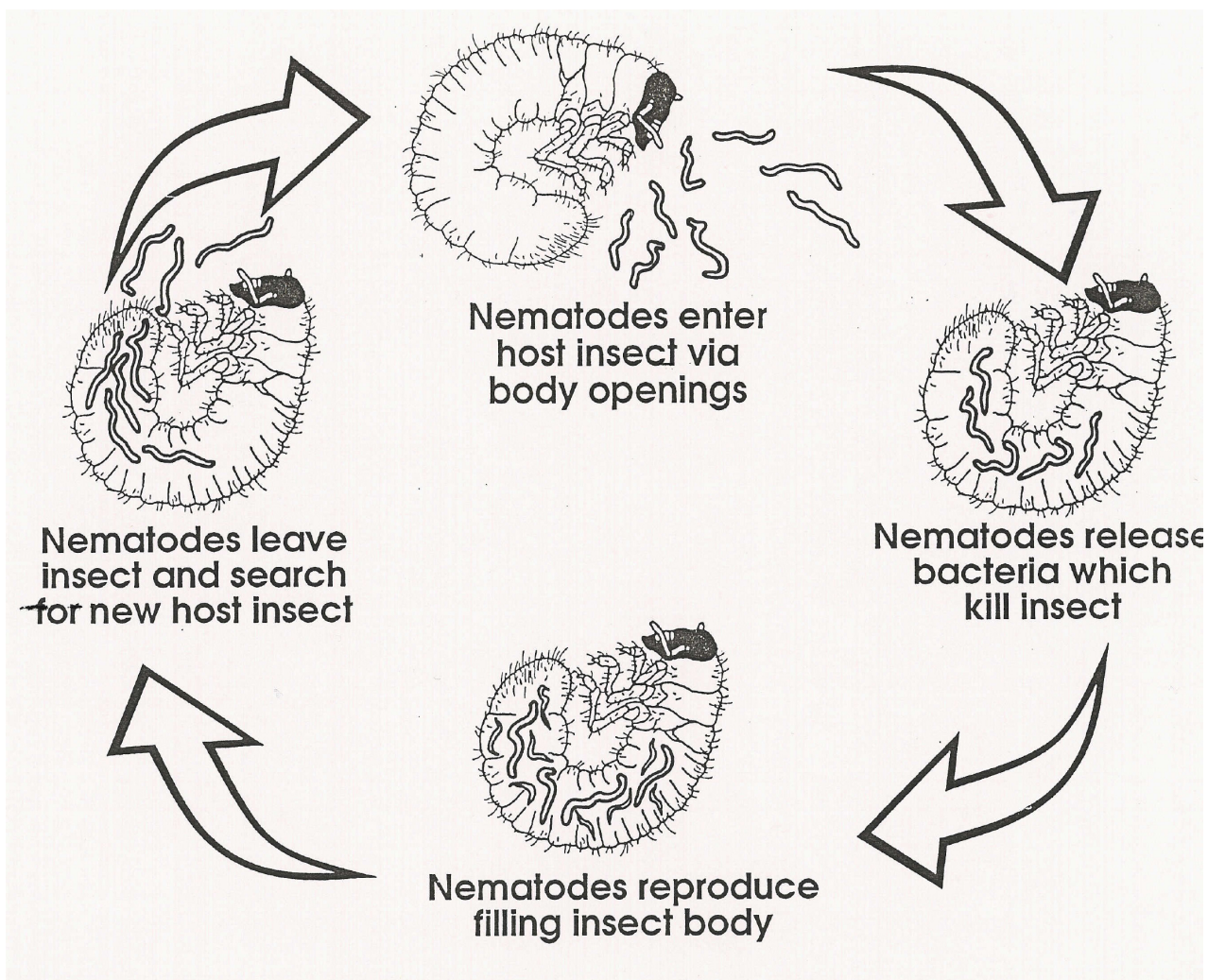


A house fly (*Musca domestica*) larvae infected with the insect parasitic nematode, *Steinernema feltiae*

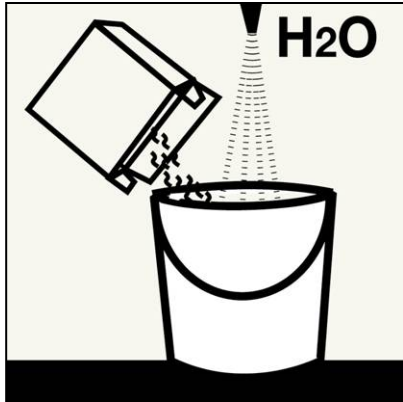


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S. feltiae Life Cycle



Using Beneficial Nematodes



- Empty content of box into bucket containing *cool* water (~50-60°F)
- Stir well and transfer contents to spraying device
- Use the entire package
- Immediately apply nematode solution after preparation

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Using Beneficial Nematodes



- Max. pressure 200 psi
- Min. nozzle opening ½ mm
- Use a standard rate of 50 mm nematodes per 1000 ft²
- Remove all screens to be safe
- Follow application with an irrigation and keep media moist

Responsible

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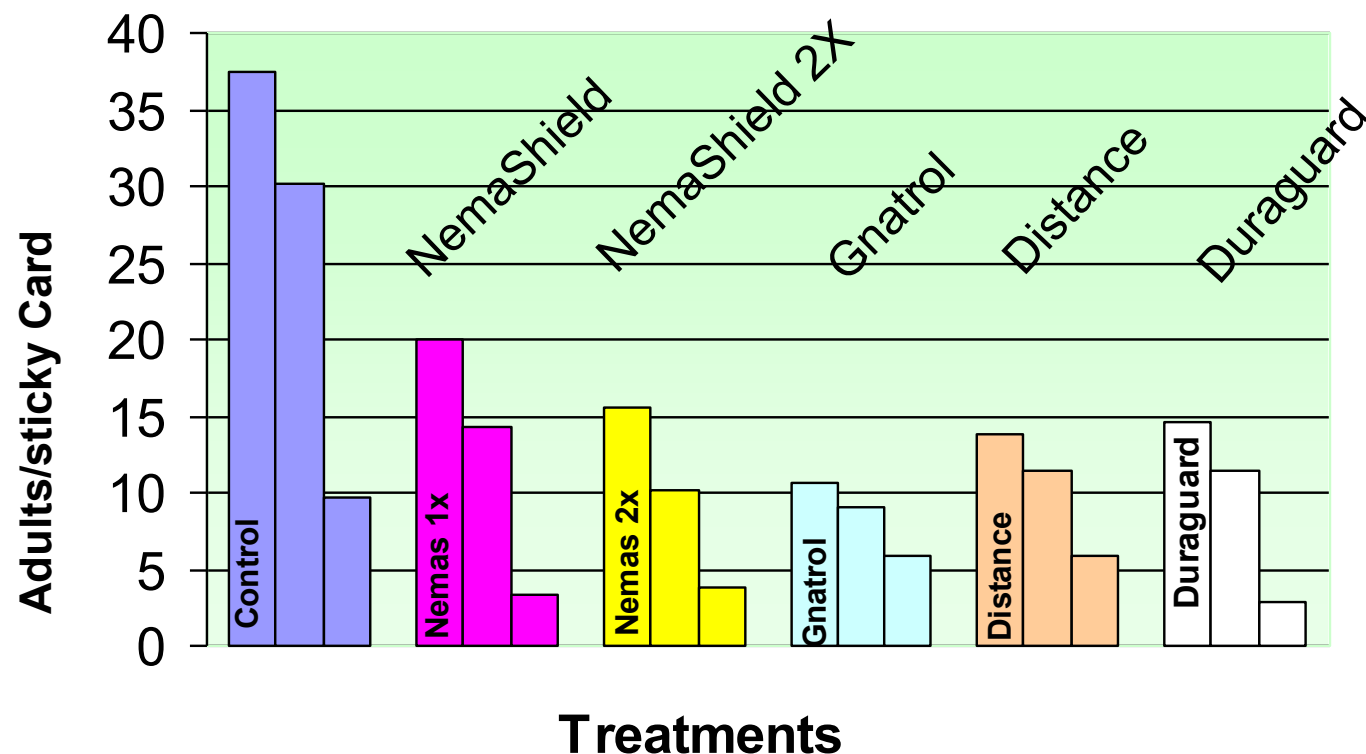
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Steinernema feltiae

Average Fungus Gnats/Card Week 1 - 3 , 2003



**Data from
Jim
Willmott,
Rutgers
University**



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Beneficial Nematode Questions

**What is the most common matrix
that contains the nematodes?**

It is a non-toxic, crystalline-free silicate 'clay' and
'biodegradable gel' material

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Beneficial Nematode Questions

What can I do to ensure the greatest chances at success?

- Do not apply too soon or too late
- Do not apply to dry media
- Follow the application with a little water to rinse nematodes from the foliage and media surface
- Do not apply just before or after a significant watering



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Beneficial Nematode Questions

How long will the nematodes stay active in the potting media?

- In general, 10-14 days
- Too much water will flush away nematodes

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Beneficial Nematode Questions

How often do I need to apply them?

- Depends on insect pressure and greenhouse watering schedule
 - low pressure – every 2 weeks
 - medium pressure – weekly
 - high pressure – every 5 days
- Too much watering may wash the nematodes away

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Are nematodes compatible with other materials used in the greenhouse?

- Nematodes can be used in with many materials, including fertilizers and fungicides
- Many products can even be tank-mixed with Nematodes (consult compatibility sheet)
- For example: ***Adept (diflubenzuron), Distance (pyroproxifen), Gnatrol (Bti), Acephate, and pyrethroids*** are tank-mix compatible

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