



Application Instructions for Fungus Gnat & Western Flower Thrips Control NemaShield®

NemaShield is a sprayable formulation that contains the beneficial nematode *Steinernema feltiae*. It is ideally suited for the control of fungus gnat larvae (*Bradysia* spp.) and thrips species that spend a portion of their life cycle in the soil or potting media. A properly applied single application of NemaShield will kill fungus gnat larvae that are feeding on plant roots. To prevent severe infestations, NemaShield should be applied at the first sign of pests or when pest pressure is still low. One unit of NemaShield containing 100 million infective stage *Steinernema feltiae* on a clay/gel carrier will treat 1100-3400 square feet, depending on insect pressure. NemaShield is available in 100, 250, and 500 million and 2 billion nematodes per unit.

Fungus gnats can cause both direct and indirect damage to plants. Direct damage occurs when the larvae feed on plant roots. Damaged roots do not function efficiently and are susceptible to disease organisms. Fungus gnat adults are nuisance pests and have been known to disperse spores of plant disease fungi such as *Botrytis*, *Fusarium* and *Pythium*.

NemaShield controls fungus gnats by attacking and feeding on the larvae in the potting media. This stops further damage to the plant and disrupts the insect's life cycle. If present, adult fungus gnats can linger for several weeks after a NemaShield treatment as they gradually age and die. NemaShield does not control shore flies (*Scatella* spp.). Shore flies are a distinct group of flies that predominately feed and reproduce in algal mats, not in potting media.

NemaShield is effective in a control program for Western Flower Thrips (*Frankliniella occidentalis*) because it targets the pre-pupae and pupae in the soil. Apply nematodes to the potting media at the same rates recommended for fungus gnats.

Application Guidelines

The following instructions pertain to applications of NemaShield to the potting medium. Do not use as a foliar spray.

- Potting media should be moist when nematodes are applied.
- Add a wetting agent or surfactant if desired to enhance the wetting ability of the spray mix and encourage nematode movement.
- Wet the surface of the soil media evenly with the spray containing nematodes.
- Do not apply in direct sunlight (UV light is highly damaging to nematodes).
- Ensure that the potting media remains moist for 2 weeks after application.

Mode of Action

After application, the infective juvenile stages in NemaShield will actively seek out fungus gnat larvae or thrips pre-pupae and pupae. The nematodes enter these life stages through respiratory, mouth or anal openings. Once inside their host, the nematodes molt to the next stage and release symbiotic bacteria from their intestinal tract. The bacteria multiply rapidly within their host, dissolving the inner body tissue. The nematode feeds on the insect's tissues, gradually molting to the nematode adult stage. The host insects die within a few days. The subsequent nematode generation is released into the environment where they can search out and attack additional fungus gnat larvae or thrips pre-pupae and pupae.

Compatibility

NemaShield is compatible with all other beneficial organisms, including RootShield® (Granules and WP). It is compatible with soils previously treated with botanical insecticides like pyrethrins, rotenone, nicotine sulfate and neem-based products. It is not compatible with many carbamates and organophosphates. See the NemaShield Product Compatibility Chart for products compatible in a tank mix.



Rates

Fungus Gnat Control Thrips Pre-Pupae and Pupae Control	Coverage per Unit Container (100 Million Nematodes)
Light Infestation	3400 sq ft with 100 gal water
Heavy Infestation	2200 sq ft with 70 gal water
Highly susceptible crops & newly stuck cuttings	1100 sq ft with 50 gal water

Preparation for Use

(Large volume equipment, overhead irrigation, applying with injector; see below for small volume)

- Do not prepare or apply in direct sunlight. Sunlight will reduce the efficacy of NemaShield.
- Use the entire tray during application. Do not split or use partial trays.
- Put the contents of the tray into a bucket containing at least 1 gal water at 60-75 °F.
- Stir gently for 5 minutes.
- **For Sprayers:** Pour entire contents into a partly filled spray tank with agitation running. Add the amount of water required to meet the desired rate recommendation. Use at least 3 gal water/100 sq ft of treated area.
- **For Injectors:** Set the injector ratio to 1:100, maintain constant agitation, and make the application. Use at least 3 gal water/100 sq ft of treated area.
- Begin with agitation and maintain constant agitation throughout the application.
- Spray immediately after preparation or at least within one hour after mixing.
- Wash hands following these preparations.

Application Considerations

- Irrigate plants prior to application. Then lightly irrigate plants again immediately following application. Water is essential to help move the nematodes into the growing media. After making the NemaShield application, do not irrigate to the point of runoff from the tops of pots/liners. Also, do not irrigate to the point of leaching from the drain holes.
- For optimum results, apply at dusk, especially for outdoor plants.
- Use with a pressure sprayer, injector or hose-end sprayer, irrigation, hand-held backpack sprayer, or watering-can.
- If using an injector, set dilution ratio to 1:100.
- Remove all in-line and nozzle filters (50-mesh or less), and screens on the intake tube, or replace the tubing without a filter. Remove pump filters.
- Maintain continuous and vigorous agitation as this is essential to prevent the nematodes from settling out. When providing agitation with a pump, ensure that the pump does not build up heat in the nematode suspension.
- Set sprayer at a coarse setting; use spray nozzle openings of at least 0.5 mm (35-mesh).
- NemaShield should pass through all pumps. DO NOT exceed 300 psi.
- Spread the solution evenly over the area to be treated; keep soil moist for 2 weeks.
- After application, water plant foliage with a fine spray to remove any NemaShield on the foliage.
- NemaShield does not kill fungus gnat adults, pupae or eggs. It only kills the larvae.
- NemaShield does kill thrips pre-pupae and pupae in the potting media or soil.



For Hand-Held Backpack Sprayers (Small volume for limited areas or single pots):

1. Make a concentrated stock solution by filling a clean bucket with 2 gal cool water, adding one 100 million unit of NemaShield and allowing the product to hydrate and disperse for at least 5 minutes. Stir well.
2. Measure out the stock solution following the dilution rate chart below. Put it into the sprayer, fill to the final spray volume of 3 gal and mix well. Re-mix stock solution each time before measuring out.

Application	Amount of Stock Solution Needed	Final Volume of Spray
Light Infestation	8 fl oz	3 gal
Heavy Infestation	12 fl oz	3 gal
Highly susceptible crops or newly propagated cuttings	24 fl oz	3 gal

3. Apply the final volume of spray solution (3 gal) to 100 sq ft of moist soil or media. Use all of the solution within 1 hour of mixing and agitate while spraying to prevent nematodes from settling to the bottom of sprayer tank.
4. Continue to repeat step 3 on additional areas with the remaining stock solution.
5. Lightly irrigate immediately to wash nematodes off plants and onto soil media surface. After making the NemaShield application, do not irrigate to the point of runoff from the tops of pots/liners. Also, do not irrigate to the point of leaching from the drain holes.

Re-application Rates and Intervals

For light or heavy infestations, treat the entire house or plant inventory as soon as insect pests appear. Re-apply in 14 to 21-day intervals at the light infestation rate. For heavy infestations on highly susceptible crops or newly propagated cuttings, follow the rate recommended above and re-apply at the light infestation rate when necessary after 5 to 7 days.

Application Conditions

- Apply when soil temperature is 50-86 °F. Optimum temperature is 74 °F.
- The moisture content of the soil must be high.

Storage

- Optimum storage is 40 °F (see Expiration Date on package). Be sure there is good air circulation around each tray.
- Refrigerated NemaShield will retain viability for about 4 weeks after delivery.
- DO NOT FREEZE

Refer to product labels for complete application details. Additional technical information is available on our website (www.bioworksinc.com) or from your BioWorks technical sales representative. Always read and follow label instructions