



## Using Beneficial Nematodes for Grub Control

### Nematode Biology

Nematodes are microscopic, non-segmented worms which occur naturally in soil all over the world. Thousands of strains exist with different lifestyles. Beneficial nematodes attack only soil-dwelling insects and leave plants alone. Beneficial nematodes and the bacteria they spread are not known to be harmful to humans, animals, plants, earthworms and other non-target organisms, but they do aggressively pursue insects like grubs. When they sense the temperature and carbon dioxide emissions of soil-borne insects, beneficial nematodes move toward their prey and enter the pest through its body openings. The nematodes carry an associated bacterium (*Photorhabdus* species) that kills insects fast (within 48 hours). Several generations of nematodes may live and breed within the dead pest; they emerge and seek more pests in the soil. Beneficial nematodes have been shown to be as much as 96% effective against Japanese beetle grubs in field studies.

### Nematode Use Guide

Although many species of beneficial nematodes are available, *Heterorhabditis bacteriophora* (Hb) nematodes are most effective against Japanese beetles, European chafers and other grubs that are lawn pests. They are more efficient than the *Steinernema carpocapsae*. Hb nematodes work better because they are cruiser nematodes that burrow down in the soil searching for deep soil-dwelling pests. They also have a special “tooth” that helps them get into the grub.

Nematodes are shipped in the infectious juvenile stage of their life cycle and can be stored in the refrigerator for up to 2 - 3 weeks. They may come on a sponge, in gels, granules or liquids.

The best time to apply nematodes depends on the weather and grub species. Most summers mid to late August is about right. The grubs should be actively feeding and in their second or third instar when they have larger spiracle openings. The nematodes enter the grubs through the spiracles, mouth and anus and release a fungus which then consumes the grubs.

The nematodes are neutralized by exposure to strong sunlight, so they must be applied in heavily overcast or rainy conditions; at dusk or during rainfall is an ideal time. Nematodes prefer a moist environment. If the ground is very dry, it helps to pre-irrigate the area with at least 0.5 inches of water.

Follow the label and mixing instructions carefully. To treat a 2000 sq. ft. lawn area, mix 1 million nematodes in at least 4 gallons of water that is under 86° F. Carefully pour the nematodes into a hand sprayer, hose-end sprayer or pressurized backpack sprayer and use the spray solution immediately. The sprayer nozzle opening should be at least 0.02 inches and any screens should be removed. Evenly spread the solution over the area to be treated. Continuous mixing should take place to prevent the nematodes from sinking to the bottom. After application apply 0.25 inches of water to wash the nematodes off the grass blades, and then keep the soil moist for at least two weeks to help them get established.

### OVER

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After treatment, monitor the lawn carefully. If grub damage continues, apply nematodes a second time. Infected grubs take on a brown appearance (see below).



### Where to Purchase Beneficial Nematodes

Company Name	Company Location	Contact Information
BioLogic	P.O. Box 177 Willow Hill, PA 17271	717-349-2789 <a href="http://www.biologicco.com">www.biologicco.com</a>
O'Donal's Nursery	6 County Road, RFD #4, Gorham, ME 04038	207-839-4262 <a href="http://www.odonalsnurseries.com">www.odonalsnurseries.com</a>
North Country Organics	P.O. Box 372, Depot Street Bradford, VT 05033	802-222-4277 <a href="http://www.norganics.com">www.norganics.com</a>
Skillin's Greenhouses	89 Foreside Road - Falmouth, 04105	207-781-3860 <a href="http://www.skillins.com">www.skillins.com</a>
Fedco Seeds	PO Box 520, Waterville, ME 04903	207-873-7333 <a href="http://www.fedcoseeds.com/ogs.htm">www.fedcoseeds.com/ogs.htm</a>
Hydro-Gardens	P.O. Box 25845 Colorado Springs, CO 80936-5845	888-693-0578 <a href="http://www.hydro-gardens.com">www.hydro-gardens.com</a>
Griffin's Greenhouse & Nursery Supplies	50 West Gray Road Gray, ME 04039	207-657-5442 <a href="http://www.griffins.com">www.griffins.com</a>