



West Coast Seeds

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How to use the predatory nematodes

Contents: 5 million *Steinernema carpocapsae* and *Heterorhabditis bacteriophora*

Storage: The nematodes in the little bag are alive and can be stored for 3 weeks at a storage temperature of 8-12 degrees Celsius in the dark until you are ready to apply them. Do not freeze this package! Do not expose the nematodes to bright sun or hot temperatures!

How they work: Beneficial (or parasitic) nematodes are naturally occurring organisms and are not harmful to humans, pets, wildlife, birds, soil, earthworms, water sources, or the atmosphere. They are safe and legal on all crops. The nematodes migrate through the soil, finding insect larvae by detecting either a slight increase in temperature or a release of methane gas. The microscopic infective juveniles enter the larvae and multiply and release bacteria that eventually kill the host. The nematodes feed on the bacteria and the decomposing host tissue where they reproduce until numbers drive them out to find a new host.

Parasitic nematodes are effective against over 250 species of insect pests. Only insects that have a soil dwelling stage (egg, larvae, pupae or adult) can be controlled by nematodes. Therefore, the nematodes are best used as a preventative. In field crops they infect cutworms, grubs, root borer larvae, root weevil larvae, flea beetle larvae, carrot rustfly larvae and other pests. Parasitic nematodes invade and destroy white grubs, pill bugs eggs & larvae, Japanese beetle larvae, crane fly larvae, and other harmful pests commonly found in lawns and turf.

The nematodes in the little bag are species that are known to do well in cooler soils. They survive over a wide temperature range and reproduce within 10 days.

Application: Apply in early spring (after air temperatures are about 9-10 C) or late summer or fall when temperature is moderate. It is best to apply on an overcast day or very early in the morning or in late evening. Never release them onto hot dry ground or ground which is flooded. As a rule of thumb, "if an earthworm can survive, a nematode will also". Try to time your application no more than 3 months before the pest is active in the soil. Water soil thoroughly before you apply the nematodes or if it is raining, water after applying the nematodes.

Place contents of the bag into a container of room temperature water and agitate to rinse out the pouch thoroughly. If only tap water is available, let it sit in a bucket for several hours or overnight so the chlorine will disperse. Slosh the bag about several times, dispersing the nematodes into the water. You now have a concentrate. You will further dilute the concentrate before applying it to soil. You must apply the nematodes within 2 hours of making up the concentrate.

To apply, use a watering can, bucket or sprayer (that is *not* equipped with a superfine sand filtre). The nematodes can withstand pressure up to 300 psi. Keep the water agitated to ensure even coverage.

After application, moisten the area again with more water (turn on your sprinkler) to carry the nematodes into the soil.

To determine how to dilute the concentrate:

You should wet the area you want to cover with plain water using your watering can or sprayer and record how much water was needed. You will then dilute the concentrated nematode solution to give you the amount of solution that it took to cover the area. For example, if it took 5 full **watering cans** of water to cover the area -- you would divide the concentrated nematode solution into 5 equal parts and add one part to each of the next 5 cans. If it took 2 full **sprayers** to cover the area with plain water, you would divide the nematode solution in 2 parts and add one part to each sprayer of water.

Water out to the drip line of rhododendrons, along the rows of vegetables, or cover the lawn completely.

Coverage: The strains supplied by West Coast Seeds are very vigorous, reproduce rapidly and have strong searching and quick killing ability. These potent high-quality strains are the result of several hundred generations reared for these characteristics and thus fewer numbers of the nematodes are required to cover a selected area.

The five million nematodes you have prepared in the one gallon of water will cover an area of 4,500 square feet (50'x 50') (186 square meters) or a small greenhouse (20x50 feet). An application in spring, another in fall followed by another spring application should build up an active population in your soil that will be self-sustaining, only requiring a boost in 3 years.

Nematode Biology: These Entomopathogenic nematodes, or EPNs, are very small worm-like organisms that make their living killing insects. The nematodes do not act alone to kill insects rather they merely serve as a delivery service for the actual organism that kills the insect, a bacteria! A good way to think of this relationship is to picture a missile with an explosive warhead. The nematode is the "rocket motor" and the "guidance system" which delivers the bacterium ("warhead") to the insect, resulting in the insect's early demise. Here's how the process works: The "infective juvenile" stage locates a host insect, usually an immature form (larva or pupa) in or on the soil, and then it enters the insect through the mouth, anus, or breathing tube. Once inside the insect, the nematode releases the bacteria from its gut, and the bacteria starts growing, ultimately killing the insect. While this is going on, the nematode is feeding on the bacteria and what was once the insect. The nematode is also continuing to grow and develop to an adult, ultimately going through one or more generations (usually 2-3) inside the carcass of the insect. Once the bacteria and nematodes use up all the nutrients in the host insect, more infective juveniles (ijs) are produced which load up on the bacteria then emerge from the now long-dead insect and continue the cycle. Two important points to remember though, is that the only free-living form of the nematode is the infective juvenile, and that the bacteria is usually found only with the nematode and/or the insect it killed.

Your Notes:

Prevalence of pest:

Date package arrived:

Date coverage area planned:

Date used:

Observation of pest population: