Application of Biocontrol Nematodes for Control of Corn Rootworm

Elson Shields and Tony Testa, Entomology, Cornell Univ. Ithaca

Cornell University Cooperative Extension

Introduction

Biocontrol nematodes used for the control of Corn Rootworm are easily applied through slightly modified commercial pesticide sprayers by following the instructions listed below.

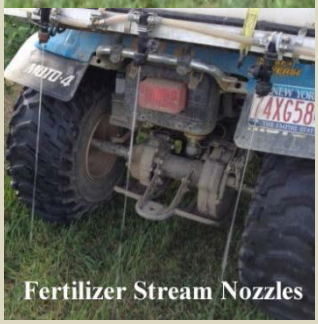
Sprayer Requirements

Any commercial pesticide sprayer can be used to apply biocontrol nematodes with a few minor modifications.

1) All screens and filters have to be removed. Nematodes cannot pass through them.
2) Sprayers need to be cleaned in a similar manner as required when changing pesticides for applications.
3) Non-chlorinated water must be used to fill the sprayer.
4) Standard pressures (40-60 psi) are best for nematode survival.
5) Sprayers need to apply a minimum of 50 gallons per acre (total from all nozzles) but we only use a portion of the nozzles so the actual application rate of water is less. A calibration example is below to help.

Nozzles: The best results require that a nematode-water stream is applied to the soil surface with as little as possible of the solution remaining on the plants. Any nozzle adjustment which sends a single stream down to the soil surface is best. The typical flat fan or flooding nozzle leaves too many nematodes on plant foliage or on the soil surface where they are killed with UV light. Total coverage typical of a pesticide application is neither required nor desired. The goal is a stream of water (with nematodes) wetting the soil surface in a narrow band with separation between the bands.

Open Nozzle Body Method



Fertilizer Stream Nozzles

These solid streams of water can be achieved in several ways. On sprayers with short booms, open nozzle bodies without screens and nozzles works great. On longer booms where maintaining pressure for the boom length is a problem, nitrogen drop nozzles or fertilizer stream nozzles (0010, 0015) in the nozzle bodies work great (no screens).

Full activity will be in effect in the spring of year two. Nematode cost for is $90 per acre.

Calibration example:

Application:

All nozzles are used and the application rate of water needs to be a minimum of 50 gpa. The number of nematodes added to the sprayer is calculated in the following manner:

- Size of the sprayer in gallons (example – 300 gal) / 50 gpa = each sprayer fill treats 6 ac
- # of nematodes/ac (3 cups) x # of acres treated per sprayer fill (6 ac) = 18 cups of nematodes/sprayer fill

Remember that you are mixing two species of nematodes in the tank for application and they need to be added to the spray tank in approximate equal quantities. One cup of S. carpocapsae and two cups of S. feltiae

Biocontrol Nematode Species:

S. carpocapsae 'NY001' *S. feltiae* 'NY04' *H. bacteriophora* 'Oswego'

Application Timing:

Biocontrol nematodes should be applied to corn field within the window from pre-plant to growth stage V4. Nematodes can be applied later, but establishment will be delayed due to a timing mismatch with corn rootworm larvae in the field. In addition, applications should be made **late in the day (after 6 pm)** or during cloudy and/or rainy days to minimize nematode death from intense UV sunlight.

Care of Nematodes after receiving them:

You will be receiving the biocontrol nematodes in 16 oz. plastic cups filled with saw dust/wood chips. If you open the containers, you will see numerous decomposing insect larvae on the surface of the wood chips, a dirty looking film on the sides/lid of the container and be greeted with an offensive odor. Most of the 25 million nematodes are distributed throughout the sawdust/wood chips. Until application, these cups of biocontrol nematodes need to be kept cool (60-70°F); biocontrol nematodes are living organisms. Upon receipt, these biocontrol nematodes can be held under cool conditions for 2-4 days without a major impact on nematode viability.

Nematode preparation for application:

In order to prepare the biocontrol nematodes for application, they have to be removed from the sawdust/wood chips and the sides of the 16 oz. container.

1) To remove the biocontrol nematodes from the wood shavings or saw dust and other biological material, the contents of the cup is dumped onto a wire screen (20 mesh, 841 µm openings) and the nematodes are washed through, into a lower container with a large volume of non–chlorinated water. Window screen is very close to 20 mesh and can be used to screen out the biological debris during the initial washing by fastening a single layer of window screen to a rigid frame.

2) The solution passing through the initial screen from the initial washing needs to be poured through a second finer screen to remove finer debris which will still clog nozzles. We recommend a 40 mesh (400 µm opening) screen. If window screen is doubled with the holes of each layer misaligned when fastened to a frame, the result is a screen similar to a 40 mesh screen.

3) After the second screening, the solution containing nematodes is ready to be dumped into the spray tank for application. Please remember to remove all internal filters and screens from the sprayer because those filters/screens will become plugged with nematodes and prevent them from being applied to the soil.

Initial washing (coarse screen)

Secondary filtering (fine screen)

1) Once the biocontrol nematodes are washed out of the sawdust/wood chips and poured into the spray tank, they need to be applied within an hour to reduce nematode death. Nematode death accelerates once they are placed in water due to the shortage of oxygen in the water. Agitating the spray tank help to incorporate more oxygen into the spray solution, but there are so many nematodes in solution, oxygen is quickly depleted and the nematodes begin suffocating.

2) Once the biocontrol nematodes are washed out of the sawdust/wood chips and poured into the spray tank, they need to be applied within an hour to reduce nematode death. Nematode death accelerates once they are placed in water due to the shortage of oxygen in the water. Agitating the spray tank help to incorporate more oxygen into the spray solution, but there are so many nematodes in solution, oxygen is quickly depleted and the nematodes begin suffocating.

Applications of biocontrol nematodes should be made late in the day (after 6 pm) or on days with thick clouds to protect the nematodes from UV light while they are entering the soil.

For More Information
Visit our website: www.alfalfasnoutbeetle.org or
Contact local CCE educator

NORTHERN NEW YORK AGRICULTURAL DEVELOPMENT PROGRAM
NYFVI NEW YORK FARM VIABILITY INSTITUTE, INC.
NORTHEAST SARE Sustainable Agriculture Research & Education
We thank the following for their long-term and continuing support