

IPM Fact Sheet Series

UMass Extension Fruit Team
Fact Sheet # IPMG-001

What are Entomopathogenic Nematodes?

Overview Nematodes are microscopic worms that lack color, body segments, and appendages. Beneficial nematodes often work by attacking and killing a host through entering their body, releasing bacteria, and then eating the host's tissue. Nematodes in the genus *Steinernema* act as biological control against pests, usually larvae, in the soil. Because nematodes are highly effective at killing many pests, safe around humans and animals, have been shown to not kill beneficial or non-target pests, and organic, using them as pest control is a safe and viable option for many crop growers.



Figure 1. Entomopathogenic nematode (EPN) (species: *Heterorhabditis bacteriophora*). Inside the plump wax moth cadaver are thousands of wiggly EPNs, ready to serve as biocontrols against soil-dwelling crop pests. The cadavers can be placed in orchard or greenhouse soil, and the nematodes will emerge to protect crops from pests such as citrus root and black vine weevils

ID/Life Cycle (Figure 1):

Infective juveniles (IJs) locate a host and enter through an opening or the membrane in between segments of the host's body. Once inside they produce symbiotic bacteria that cause the host to die, allowing the nematode to feed on the bacteria and liquified host tissues. The nematodes feed and develop into male and female. In the genus *Steinernema*, reproduction

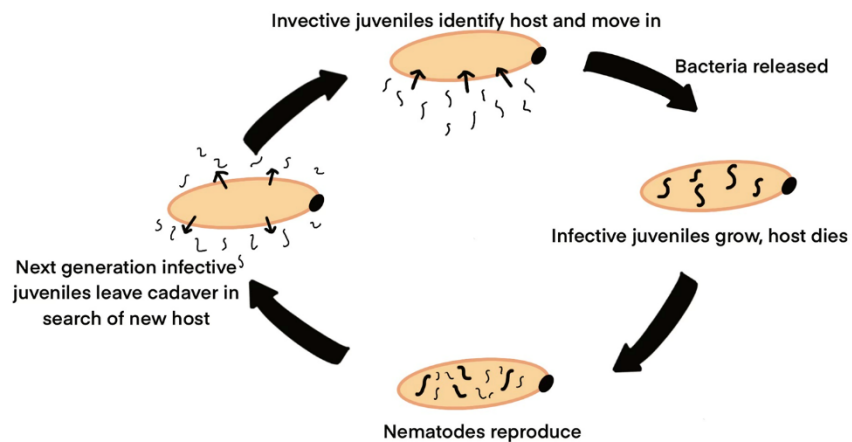


Figure 2. Life cycle of an entomopathogenic nematode.

occurs through cross fertilization between males and females. If enough food is available, 2-3 generations will be produced within the host, which will then emerge from the cadaver as IJs and find new hosts. The life cycle (Fig. 1) usually lasts a few days under optimal conditions.

Uses (Figure 3):

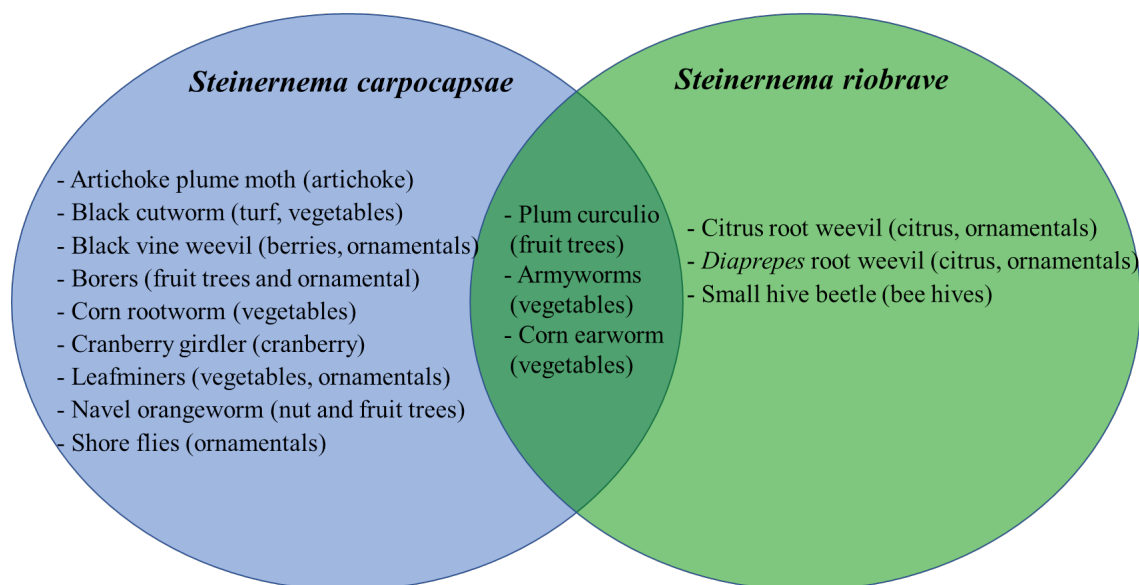


Figure 3. Diagram shows which pests are most susceptible to two common EPN species. The ones in the middle are susceptible to both EPN species.

Field Application: One way to use EPNs in commercial apple orchards is to apply them at the base of apple trees to kill the soil-dwelling stages of plum curculio. This is done by applying a certain amount of nematodes (e.g., 1 million IJ/m²), along with some water (depending on how saturated the soil is) into the soil. This should be done after apple fruitlets, suspected to be infected with plum curculio larvae, have fallen. The EPNs will attack and kill the plum curculio larvae, leading to a decrease in adult emergence.

For a video showing EPN application against plum curculio under field conditions click [HERE](#).

Date: December 2021

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This work was supported in part by funding provided by USDA NIFA Extension Implementation Program, Award No. 2021-70006-35388.