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UNIVERSITY OF MARYLAND EXTENSION

# Beneficial Nematodes Workshop

Entomopathogenic nematodes (EPNs) are a type of unsegmented roundworm that specifically target and kill insects. These nematodes are used as biological control agents in agriculture and horticulture to manage pest populations.

**Life Cycle**

1. **Parasitic Nature**: EPNs infect and kill their host by entering the insect's body through natural openings or by directly penetrating the cuticle.
2. **Symbiotic Bacteria**: EPNs have a mutualistic relationship with symbiotic bacteria. The nematodes carry the bacteria in their gut and release them into the insect's body cavity, where the bacteria multiply and produce toxins that kill the insect.
3. **Life Cycle**: The EPN life cycle includes the infective juvenile stage, which seeks out and infects hosts, and several reproductive stages within the host. Once the host is consumed, new infective juveniles emerge to seek new hosts.

**Major Species**

- ***Steinernema feltiae***: These nematodes are associated with *Xenorhabdus* bacteria. They are used in biological control to target fungus gnats and soil-dwelling stages of thrips.
- ***Heterorhabditis bacteriophora***: These nematodes are associated with *Photorhabdus* bacteria. They are known for their ability to control soil-dwelling and boring larvae of many species of beetles and flies. This nematode is especially effective against the black vine weevil.

**Best Applications Practices**

**A. Upon Arrival/Storage**
- Check the expiration date on the package. Different formulations have different lengths of time they can be stored. Order as needed.
- Store in refrigeration at 40°F (Do not freeze)

**B. Viability**
- Check viability upon arrival, during application, after application, and when troubleshooting.
  - Viable: Nematodes will be of various shapes and will be moving
  - Not Viable: Nematodes will be straight and not moving.

**C. When to Apply**
- Preventative applications are best.
- Target the correct life stage of the pest
- Apply early mornings/evenings to avoid high temperatures, UV radiation, and desiccation.
- Ideal soil/media temperatures are 54-86°F.

- Potting media should be moist when nematodes are applied and remain moist for 2 weeks after application.

**D. Mixing**

- Let the nematode package acclimate to room temperature (60°F), **do not** take them from the fridge and put them in warm/very cold water.
- Keep nematodes in cool water and well agitated.
  - Mechanical Circulation: use suspension within 2 hours
  - Air Circulation: use suspension within 4 hours

**E. Applications**

- Apply through commonly used applications equipment. **Do not fog**.
  - Use adjuvant/spreader sticker
  - Remove all filters of 50 mesh or smaller
  - Avoid nozzle apertures smaller than 0.5mm
  - Do not exceed 300 psi pump pressure

*Figure 1. Viable Nematodes*

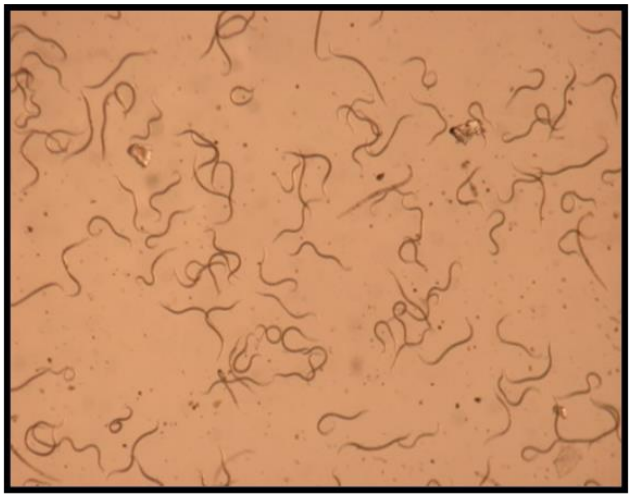

*Figure 2. Non-viable Nematodes*