Project Title:
Comparison of indigenous and commercial strains of the nematode *Heterorhabditis bacteriophora*

Project Summary:
Concerns over environmental and human health risks posed by the widespread use of chemical insecticides have prompted pest managers to seek alternative methods to manage insect pests. In turf grass environments, the use of insect parasitic nematodes may provide a safe alternative to conventional insecticides, but factors associated with nematode efficacy have hindered the widespread adoption of these potentially useful biological control agents. This research compared the virulence, fecundity and field efficacy of three locally-collected strains of the insect parasitic nematode and one commercially-available strain in order to characterize variation in biological attributes of the different nematode strains and clarify how these attributes influence field efficacy. We hypothesized that locally collected strains would be more efficacious than the commercially available strain due to the advantage provided by their adaptation to local climatic conditions. While nematode strain had no significant influence on infectivity in the laboratory, infectivity increased with nematode concentration. Nematode fecundity varied between strains with two of the three local strains outperforming the commercial strain. Local strains also outperformed the commercial strain under field conditions. Results indicate that locally adapted nematode strains may provide a better biological resource for insect pest management than commercially available strains.
Comparison of indigenous and commercial strains of the nematode *Heterorhabditis bacteriophora*

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**ABSTRACT**

Concerns over environmental and human health risks posed by the widespread use of chemical insecticides have compelled pest managers to seek alternative methods to manage insect pests. In turfgrass environments, the use of insect parasitic nematodes may provide a safe alternative to conventional insecticides, but factors associated with nematode efficacy have hindered their widespread adoption. This research compared the virulence, fecundity and field efficacy of three locally-collected strains of the insect parasitic nematode *Heterorhabditis bacteriophora* in order to characterize variation in biological attributes of the different nematode strains and clarify how these attributes might be improved. The locally-collected strains were more effective than the commercially available strain due to the advantage provided by their adaptation to local climatic conditions. Local strains had a significantly higher infectivity in the laboratory, infectivity increased with nematode concentration. Nematode fecundity varied between strains with two of the three local strains outperforming the commercial strain. Results indicate that locally adapted nematode strains may provide a better biological resource for insect pest management than commercially available strains.

**RESULTS**

- Nematode strain had no influence on infectivity.
- However, concentrations of 4, 8, and 10 nematodes/µl seemed to result in nematode infections at different rates.
- The concentration of 1 nematode/µl had a significantly lower rate of infectivity.

**MATERIALS AND METHODS**

- **Test for virulence**
  - Four strains of the nematode *Heterorhabditis bacteriophora*; one commercial strain (HP88) and three locally-collected strains (Hb123, Hb109, Hb96) were placed in Petri dishes (9.0 cm diameter) on moist filter paper in three different concentrations (1, 5, 10 nematodes/µl).
  - Five larvae of the greater wax moth, *Galleria mellonella*, were added to each Petri dish and infection was monitored over time.

- **Measuring reproductive potential**
  - After infection, the larvae were placed on White’s traps (White, 1927) so that the juvenile nematode could leave the cadaver and enter the spring wheat plants.
  - After the cadavers were in place, the resulting juvenile populations were estimated by averaging the number of infective juveniles in three 10 µl sub-samples taken each day.

- **Measuring field efficacy**
  - Japanese beetle adults were trapped and 40 (50:50 sex ratio) were caged on turf using PVC cylinders in order to ensure exposure to the field plots.
  - On July 12, nematodes were applied at the rate of 2.5 billion/ha to each plot in order to control 1st instar Japanese beetle larvae.
  - In October, the soil directly underneath each cylinder was examined to a depth of 1 cm and the number of Japanese beetle larvae in each sample was recorded.

**CONCLUSIONS**

- In both laboratory and field trials, the local strains performed as well as or better than the commercial strain in terms of virulence, reproductive potential and field efficacy.
- In the field, the local strains were more effective at suppressing a resident grub population.
- Although Hb109 did not perform exceptionally well in the laboratory, it was the most effective in the field. Therefore, reproductive potential does not appear to be as good a predictor of field efficacy.
- Nematode strains found in the soil of some residential lawns prove to be more effective against pests than the commercially available strain.
- Results indicate that local nematode strains may have a greater potential for managing local insect pest due to adaptation to local environmental conditions.

**REFERENCES**


