



LIVING LAB - ONTARIO

Biodiversity - Nematodes

April 2022

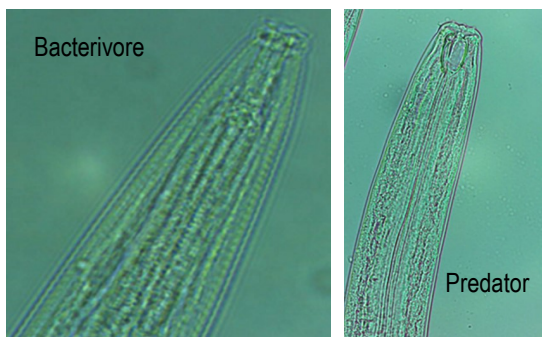
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Research Objectives:

- Evaluate the effect of cover crops on nematode communities as bio-indicators of soil health
- Compare nematode abundance, diversity, and community structure in soil with and without cover crops

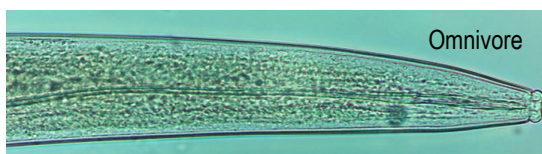


Herbivore



Bacterivore

Predator



Omnivore

Types of Nematodes in soil

Photo credit: Sultana lab

What are Nematodes?

- Nematodes (roundworm) can be found almost anywhere, ~5-10 million species are believed to exist on the earth
- Part of the microbial communities in soil and several other environments
- Different types of nematodes in soil: bacterivores, fungivores, herbivores (plant parasitic), omnivores, and predators
- 10% of nematodes are plant parasitic resulting in annual yield loss of 15% and world economic losses of \$173 billion

What Does This Mean for Agriculture in Ontario?

- By understanding beneficial nematode communities under different BMP systems, we can help growers choose practices to increase soil quality and potentially their yield
- Determine whether the use of cover crops has an added advantage in managing plant parasitic nematodes to reduce crop loss due to nematode damage
- Use nematodes as a soil health marker to assess the impacts of practices



Agriculture and Agri-Food Canada

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Canada

Sites Sampled

Henry Denotter

Soybean in corn-soybean-winter wheat rotation



Ken Laing

Covers in vegetable production: spinach

Greg Vermeersch

Soybean double cropped with barley

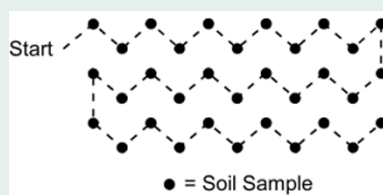


Brett Israel

Organic soybean tilled, no-till and double cropped

Sampling and Analysis

- Soil samples collected twice per year (pre-plant and post-harvest) from each crop field
- Nematode community characterized two ways:
 - Morphological identification
 - Metabarcoding



Bags of soil samples and field sampling pattern

Early Results

Shannon Diversity Index: Used to measure the nematode diversity in the community (the higher the number, the higher the diversity)

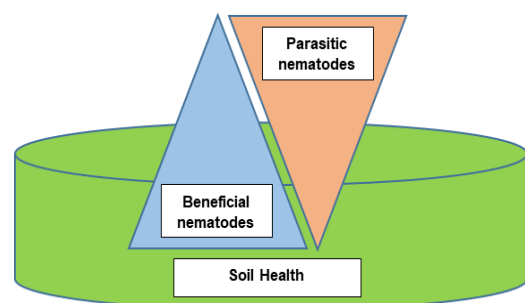
Index	Site 6	Site 7
Shannon Diversity Index	1.07	1.21

From this example it can be generally concluded that:

- Site 6 is less disturbed (structured) compared to Site 7
- There is more microbial activity in Site 7 than Site 6

Nematodes as Bio-Indicators of Soil Health

- Ratio of bacterial to fungal-feeding nematodes indicates the rate of nutrient cycling
- Good indicators of soil health since they are very diverse in their functions and participate in many trophic levels in a food web



Key Terms

- **Morphological Identification:** identification of nematodes by traditional method using microscopes and differentiating them by using different body characteristics
- **Metabarcoding sequencing:** Identification of nematodes by using DNA sequencing using high end technology