LIVING LAB - ONTARIO

Soil Health - Microbiome 2022

Researcher: Lori Phillips (lori.phillips@agr.gc.ca)

Team: Brent Seuradge

Research Objectives:

- Determine how management practices alter soil biological health, including the specific impacts on beneficial bacteria and fungi that cycle nutrients and support crop resilience
- Evaluate accepted and emerging methods to measure soil health

Pour plus d'informations sur le chercheur d'AAC, en français :

Dr Lori A. Phillips | Répertoire des scientifiques et des professionnels (science.gc.ca)

Parameters Measured:

- **Accepted soil health indicators:** pH, Cation Exchange Capacity, plant available nitrogen (N), phosphorus (P) and potassium (K), total N, organic matter (OM)
- **Emerging soil biological health indicators:** respiration, active carbon (C), CNP enzyme activity
- **New DNA-based soil microbiological health indicators**: quantitative PCR of CNP nutrient cycling functions and plant beneficial bacteria and fungi, sequencing-based soil biodiversity

2020 Baseline soil health tests at 6 living lab farms: What are normal operating ranges of proposed soil health indicators on SW Ontario farms?

What Does This Project Mean for Agriculture in Ontario?

- Improved methods to characterize soil health, including biological health
- Determine which soil health measures are most relevant to Ontario farmers
- Increase knowledge on the resiliency of different cropping systems to varying climate conditions

2021 Cover crop trials: Do cover crops increase plant-beneficial functions in the root zone?

Sites Sampled

Temporal sampling of inter-row and aisle locations (4 sites) as well as in plot composites (2 sites). Examples of systems sampled:

Mike Groot

Plot-based sampling from crazy strip trials

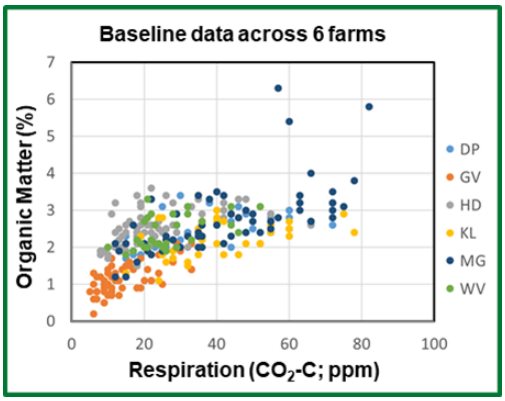
Woody Van Arkel

Aisle and inter-row from perennial cover crops

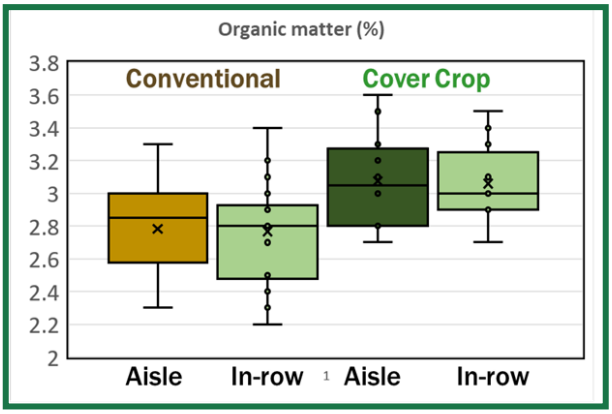
Greg Vermeersch

Aisle and inter-row from relay crops

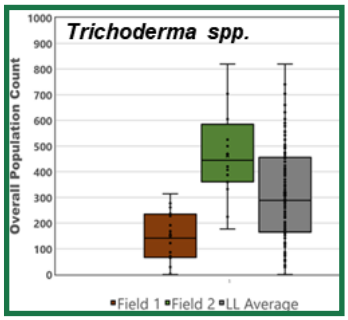
Early Results



Respiration measures overall microbial activity, which generally increases as OM increases. It is a useful indicator within a system but not across systems



Gradual accumulation of organic matter was evident after two years of perennial cover crops



Beneficial taxa, such as *Trichoderma spp.*, may be effective indicators of management impacts on soil health across systems

Key Terms

- **Soil microbiome:** The interacting community of bacteria, fungi, archaea and other organisms that underpin soil health
- **Plant beneficial taxa:** Bacteria and fungi that provide the crop with improved disease and drought resilience , as well as enhance nutrient uptake