LIVING LAB - ONTARIO

Soil Health - Physical Quality 2022

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Research Objective:

- To determine soil physical quality and health under selected cropping treatments as indicated by bulk density, plant-available air and water capacity, and saturated hydraulic conductivity

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

Dan Reynolds, Ph.D. | Répertoire des scientifiques et des professionnels (science.gc.ca)

Methodology: Collect undisturbed soil core samples from 2.5-12.5 cm depth

Parameters Measured:

- **Bulk Density (BD):** measure of soil compaction which indicates the resistance crop roots experience when growing in the soil
- **Plant-Available Air Capacity (PAAC):** index of soil aeration that indicates the soil's ability to store and provide air, which is essential for crop growth and yield
- **Plant-Available Water Capacity (PAWC):** index of soil water holding capacity that indicates the soil's ability to store and provide water which is essential for crop growth and yield
- **Saturated Hydraulic Conductivity (K_{SAT}):** measure of soil permeability which indicates the soil's ability to infiltrate crop-essential water and drain excess water

Collecting soil core samples

What Does This Project Mean for Agriculture in Ontario?

- Increase the knowledge on the impacts of long term cover cropping on soil health indicators
- Understand the impact of cover cropping on increasing crop yields and providing greater resilience to weather extremes such as drought, flooding and increased temperatures.

Joann Gignac processing soil core samples

Sites Sampled

Mike Groot

24 cores collected from the corn, soybean, and grazing treatments

Woody Van Arkel

20 cores collected from treatments with and without perennial cover crop treatments

Greg Vermeersch

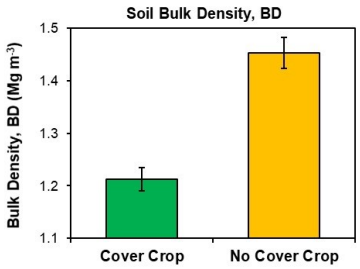
20 cores collected from the soybean and barley, relay and double crop treatments

Example Results

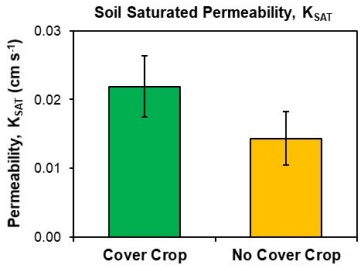
Soil Cores

Cover Crop | No Cover Crop

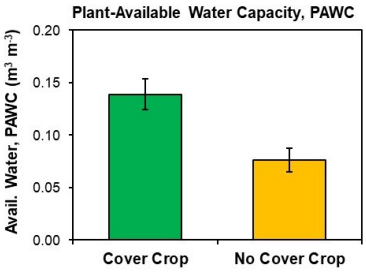
Soil under cover crops is more porous and has a greater number of large bio-pores, such as worm holes and root channels, as illustrated in these photos and data from a cover crop study at the AAFC Woodslee Research Station.



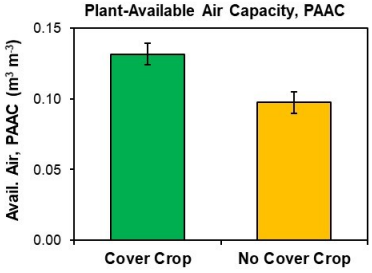
Lower soil BD under cover crops promotes greater growth and penetration of crop roots.



Greater soil K_{SAT} under cover crops enhances the soil's ability to infiltrate water for crops and drain excess water.



Greater soil PAWC under cover crops increases crop resilience to soil water deficits and drought.



Greater soil PAAC under cover crops increases crop resilience to soil water excesses and heavy rains.