LIVING LAB - ATLANTIC

Primary non-inversion shallow tillage versus moldboard plow prior to growing potatoes: impacts on potato yield and soil properties in Prince Edward Island, Canada

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Objective

Conduct a four year study (2019-2022) in commercial fields (14 sites total) to compare the conventional moldboard plow (MP) with primary non-inversion shallow tillage, also called residue tillage (RT), prior to growing potatoes.

Methods

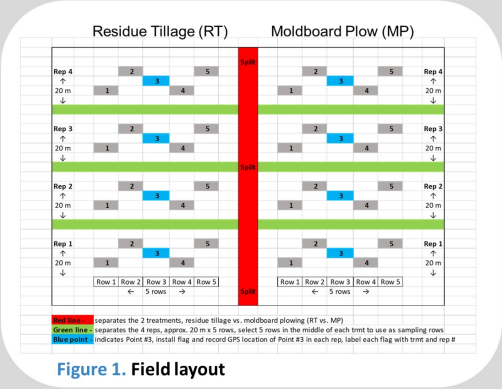


Figure 1. Field layout

The effects of tillage regimes on the following were evaluated:

- Soil temperature
- Soil moisture
- Total potato yield
- Marketable potato yield
- Specific gravity
- Aggregate stability
- Soil respiration
- Biological N availability
- Soil carbon (C) content
- Soil nitrogen (N) content
- Potato petiole nitrate
- Soil nitrate over the growing season
- Normalized Difference Vegetation Index (NDVI)

Results

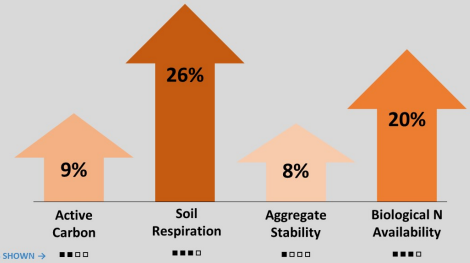


Figure 2. On average, RT increased active carbon, soil respiration, aggregate stability, and biological N availability.

Results (continued)

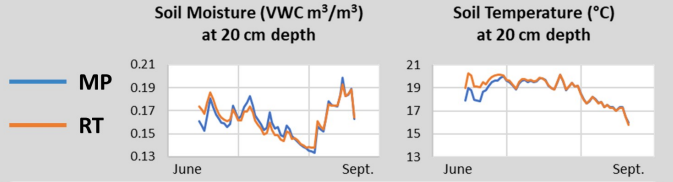
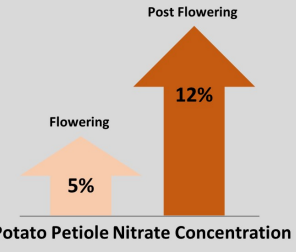


Figure 3. There was a trend towards increased soil moisture at 20 cm depth with moldboard plow depending on the year. Soil temperature values were very comparable between the two tillage regimes throughout the growing season.

Figure 4. Although not statistically significant, averaged across four years, potato petiole nitrate concentration was 5% and 12% higher with RT than MP in samples collected at the flowering and post-flowering stage, respectively.



RT vs. MP

RT		MP
Total yield	=	Total yield
Marketable yield	=	Marketable yield
Specific gravity	=	Specific gravity

Figure 5. Total potato yield, marketable potato yield, and specific gravity were comparable between the two tillage regimes.

Summary:

- Data on potato scab incidence and potato early dying complex continue to be analyzed.
- Signs of soil improvement at the early stages of primary non-inversion shallow tillage adoption were observed.
- Future studies could compare both tillage regimes over multiple growing seasons to assess their impacts over a full cycle of rotation.

Acknowledgements

Arthur Cousins & Sons Inc.
Carl & Nevin Robinson
Greenfield Farms Ltd.
Klondike Farms Ltd.
MacAulay Farms Inc.
MacSull Farms Ltd.
Monaghan Farms Ltd.
Mull Na Beinne Farms Ltd.
MWM Farms Ltd.
R & L Farms Inc.
Rollo Bay Holdings Ltd.
Townspud Inc.
PEI Potato Board
PEI Department of Agriculture and Land
Kensington North Watersheds Association
Souris and Area Branch of the PEI Wildlife Federation