Regenerative and Sustainable Agriculture for Climate Change Adaptation and Carbon Sequestration: Rebuilding Soil Health and Increasing Crop Productivity of Canadian Potato Production Systems

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Regenerative and sustainable agricultural practices (RSAPs) are being studied in several locations across Canada to mitigate soil degradation and loss of bio-diversity caused by intensive farming practices and ensure long-term viability of potato farms.

Trials conducted at McCain Foods Farm of the Future in New Brunswick are showing multispecies mixes not only increased soil health but ensured a tighter cycling of nutrients, thus reducing carbon dioxide and nitrous oxide losses to the atmosphere. Researchers also found a longer crop rotation with perennial multispecies mix improved soil health indicators. Disease risk was also reduced with potato early dying (PED) severity and the abundance of *Verticillium dahliae* was found to be lower in more diversified crop rotations. Trials are ongoing to see how test results vary in different environmental systems.

In Quebec, trials are testing how a two-year potato system using multi-species service crop as green manure under reduced tillage and fall/spring cover crops compares to a conventional two-year system of potatoes and corn/soybeans. Another trial is testing two RSAPs crop production systems. These include a cash crop in the spring of the first rotation year followed after harvest by a multi-species service crop mixture, and a mix of annual and perennial species sown as cover crops until the next spring with a green manure plant species mixture planted as a fall/spring cover crops until the seeding of potato crops in the next spring.

The team in Ontario is testing the effect of improved crop production systems with greater plant diversity and fumigation compared to unfumigated soils under a continuous potato on soil quality and biodiversity, crop growth and productivity and disease management. This growing season, seven trials were established at four

Bagging plant samples for testing at Agriculture and Agri-Food Canada Fredericton Research and Development Centre.
Photo: Toban Dyck

Soil samples at Agriculture and Agri-Food Canada Fredericton Research and Development Centre. Photo: Toban Dyck

experimental hubs and trials at 18 flagship farms were also planted. Collection of plant, soil and gas samples is ongoing.

KEY TAKEAWAYS:

- Trials are showing multispecies mixes not only increase soil health but ensure a tighter cycling of nutrients, reducing greenhouse gas losses to the atmosphere.
- A longer crop rotation with perennial multispecies mix was found to improve soil health indicators.
- Disease risk was reduced with potato early dying (PED) severity and the abundance of *Verticillium dahliae* was found to be lower in more diversified crop rotations.

Potato rows at McCain Farm of the Future in Riverbank, N.B.
Photo: Toban Dyck