

Canadian Farmers: Stewards for Healthy Soils

Farmers across Canada are increasingly aware of the importance of soil health. Soil is a key partner in their farming success. It can also be a major solution to pressing environmental concerns such as climate change.

It all comes down to six basic principles. These are known as the **6Cs of Soil Health**.

This Fact Sheet is one of a series that describe these basic principles for building healthy soils & provide video interviews with Canadian farmers who are putting these principles into practice.

The 5th C: Crop and Animal Diversity

Optimizing diversity is a key principle in building healthy soils because it fosters a rich and resilient ecosystem underground.

Here's how diversity contributes to soil health:

- **Increased Microbial Diversity:** Soil is home to a vast array of microorganisms, including bacteria, fungi, archaea, protozoa, and algae. Greater microbial diversity means a wider variety of functions and interactions within the soil ecosystem. Different microbes perform various roles, such as nutrient cycling, organic matter decomposition, pathogen suppression, and soil aggregation, contributing to overall soil fertility and health.
- **Enhanced Nutrient Cycling:** Diverse microbial communities in the soil efficiently decompose organic matter and recycle nutrients. Each type of microorganism specializes in breaking down specific types of organic material, releasing nutrients in forms that plants can absorb. This nutrient cycling process ensures a steady supply of nutrients for plant growth and helps maintain soil fertility over time.
- **Improved Soil Structure:** Soil structure refers to the arrangement of soil particles and pore spaces. Soil aggregates, which are



The Bernards employ an 8-year rotation to grow grains on their organic farm and their beef cattle are part of that complex mix. By increasing the diversity of their operation they have been able to better build organic matter and to increase the resilience of their soil to drought and other



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clusters of soil particles bound together by organic matter and microbial activity, are essential for soil structure.

- Greater microbial diversity contributes to the formation and stability of soil aggregates, resulting in improved soil porosity, aeration, water infiltration, and root penetration.
- **Disease Suppression:** Diverse soil microbial communities can help suppress plant diseases by outcompeting or antagonizing pathogenic organisms. Some microbes produce antibiotics or enzymes that inhibit the growth of pathogens, while others stimulate the plant's natural defense mechanisms. A diverse soil microbiome can help maintain a balance between beneficial and harmful organisms, reducing the incidence of soil-borne diseases.
- **Increased Resilience to Environmental Stress:** Diverse soil ecosystems are more resilient to environmental fluctuations and disturbances. Different microbial species have varying tolerances to changes in temperature, moisture, pH, and other environmental factors. A diverse soil microbiome can adapt more effectively to adverse conditions, ensuring the continued functioning of essential soil processes even under challenging circumstances.
- **Enhanced Biodiversity Above Ground:** Soil diversity is closely linked to biodiversity above ground. Healthy soils support diverse plant communities, which in turn provide habitat and food sources for a wide range of above-ground organisms, including insects, birds, and mammals. This interconnected web of life contributes to ecosystem stability, resilience, and productivity.



The Bernards are committed to building diversity both above ground, with their rotations and integration of beef cattle, and below ground, through the application to their soils of microbially diverse compost. The Johnson-Su reactor, pictured above, is designed to produce a fungal-dominant compost with very high levels of microbial diversity.

Overall, optimizing diversity in soil ecosystems promotes soil health by enhancing nutrient cycling, improving soil structure, suppressing diseases, increasing resilience to environmental stress, and supporting overall ecosystem biodiversity.

Canadian Farmers: Bringing Soil Health to Life



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