

Soil health is a whole meal deal, says researcher

The properties of healthy soils are interlinked and good management addresses all of them, says Gurbir Dhillon

By Jennifer Blair



This device, developed by Manitoba Agriculture, compares run-off (collected in the top row of jars) to water that seeps through soil. Management practices can significantly increase the ability of soil to absorb water — but water retention, organic matter, aggregation, soil structure compaction and nutrient cycling are all interconnected, says Farming Smarter researcher Gurbir Dhillon. Photo: Alexis Stockford

properties,” he said. “For example, lack of soil aggregation leads to poor soil structure and compaction, while lack of organic matter leads to poor nutrient cycling and water retention. Similarly, water infiltration is linked to erosion. All of these are interconnected.”

So an effective soil management plan needs to consider each of the three key elements — physical (including soil structure, texture, and stability), biological (including active populations of bacteria, fungi, and insects) and chemical (including soil organic matter, nutrients, and micronutrients).

“These different physical, chemical, and biological properties interact amongst themselves to provide a healthy soil — and these properties can be used as parameters of soil health,” he said.

“Using a subset of these properties will not be sufficient to manage soil health. A comprehensive assessment of soil health should include physical and biological components, along with the chemical properties of the soil that are generally evaluated in soil-testing labs.”

The link between these three elements and soil health is well known, he said, but it’s hard to establish “a universal target in absolute terms” for soil health across the province.

“Since other outside factors, such as climate or topography, may influence these soil properties, the soil health assessment needs to include baseline or reference values in order to enable identification of management impacts on soil health.”

That’s exactly what he’s hoping to accomplish through a new soil health benchmarking project that Farming Smarter is part of, along with 11 other agricultural research associations across the province.

“This project will establish a soil health benchmark database for Alberta by obtaining a baseline of soil biological, physical, and chemical parameters associated with soil health across the province,” he said.

Your soil is a little like a supply chain — an interconnected series of chemical, physical, and biological interactions that help make your lands productive and your crops profitable.

But just one weak link in that chain can cause problems on your farm.

“Soil is irreplaceable, so it has to be sustainable,” said Gurbir Dhillon, research scientist at Farming Smarter.

“A healthy soil should be able to provide all of its ecological functions, rather than one at the expense of others.”

But that doesn’t always happen, Dhillon said at Farming Smarter’s virtual

‘plot hop’ at the end of June. Across the province, farmers are faced with issues like compaction, erosion, water loss, and poor biodiversity above and below the soil.

“All of these things are linked to different soil



Gurbir Dhillon Ph.D.
photo: Supplied

The project will also monitor the effects of management practices on soil health, while improving understanding about soil health among Alberta producers, he added. In total, at least 220 sites will be sampled across the province over the course of three years (until 2022) for inclusion in the database.

“From these samples, physical, chemical, and biological parameters will be analyzed,” said Dhillon, adding that farmers can contribute samples. “Sampling has been done for 2019, and it’s ongoing for this year. It will be repeated again for next year, and then all of this information will be entered into a database for the province of Alberta.”

For more information about the project, or to contribute a sample, visit farmingsmarter.ca