



**Recruiting Soil to Tackle
Climate Change:**
A Roadmap for Canada



The Soil Food Web FAQs

What is the soil food web?

All soils are ecosystems, teeming with life. This life ranges in size from microscopic bacteria and fungi to highly visible insects and earthworms. The *soil food web* is the term scientists use to describe this living system, including *all the underground creatures and the relationships between them*.

Why is the soil food web so important?

The interactions of the organisms in the soil food web are the source of what we call *soil functions*. These functions are vitally important. A healthy, well functioning soil generates fertility, manages water quality and availability, suppresses diseases and pests, fosters biodiversity, and sequesters carbon. All of these functions are important, but the carbon sequestration is the primary focus of this report.

How do soil organisms contribute to carbon sequestration?

Soil organisms have the innate ability to convert organic inputs, such as plant residues, animal wastes, and plant root secretions, into substances that stay in soil for long periods of time, from years to millennia. Although they do use some carbon for energy, releasing it back to the atmosphere as CO₂, a substantial portion can be retained. If the amount retained routinely exceeds the amount released, carbon levels rise over time.

If carbon is sequestered naturally by soil organisms, why are current soil carbon levels so low?

Soil organisms can “spend” more carbon than they “save”. The key to carbon sequestration is the ratio of how much carbon soil organisms use, and release as CO₂, (“spending”) to how much is retained in the soil (“saving”). This vital ratio depends on both conditions in the soil (e.g., good structure, adequate moisture, etc.) and the overall size, diversity, and balance of the soil food web itself. The challenge for soil managers is to foster a soil food web that saves more than it spends.

How can soil managers create the best soil environment for promoting carbon sequestration?

Like human societies, the organisms in soil ecosystems need a stable environment, reliable sources of energy and nutrients, and inherent diversity (the latter provides resilience). Given these things, a soil food web will self-organize into a productive, high functioning system, which includes high levels of on-going carbon retention. The job of soil managers is to adopt and maintain practices that respect the needs of their “underground army”. For more details, see the backgrounder *Principles of Soil Health*.

What are the most important soil organisms when it comes to sequestering carbon?

All soil organisms play important roles in fostering soil health and sequestering carbon. *However, many studies indicate that fungi are key players*. Bacteria and fungi are at the base of the soil food web – they are both able to break down organic matter and release nutrients from mineral rock, generating natural soil fertility. But fungi are more efficient than bacteria. This means that in soils where fungi have similar or greater numbers than bacteria, saving typically exceeds spending. Unfortunately, fungi are less resilient to disturbances than bacteria, and their numbers and diversity are often low in managed soils. This is another reason why the soil health principles are so important: they focus on creating the right conditions for soil fungi to thrive.