

# 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 2nd C: Cultivate Carefully

### Why should frequent soil disturbance be avoided?

Frequent tillage has been the norm in agriculture for thousands of years. This is easily understandable, as tillage provides a whole raft of benefits. It creates a nice seed bed, controls weeds, can be used to incorporate inputs, facilitates residue decomposition, warms up the soil in spring, and produces a flush of fertility just when it is needed – at planting time.

Unfortunately, tillage has longer-term detrimental effects on soil. Each time we till, we damage the soil's structure by breaking up aggregates and disrupting the many intricate networks created by beneficial organisms such as soil fungi. Tillage also introduces more oxygen into the soil, which boosts the activities of decomposer organisms, such as bacteria. This more rapid decomposition is what provides the fertility flush, but it also releases more soil carbon as CO<sub>2</sub>, reducing levels of soil organic matter (SOM). This explains why SOM levels have been dropping on farms in eastern Canada for decades despite substantial increases in productivity. As SOM levels drop and routine disturbance continues, microbial diversity also drops, leading to poor soil structure, reduced soil functions, less resilience, and the need for more and more inputs to achieve the same results.



**Randy Dykstra** is a no-till farmer. He knows how important soil life is for his crops and he knows that disturbing the soil with tillage is a disaster for organisms like soil fungi, who are so important for fertility, soil structure, disease suppression, and many other functions. He practices many of the 6Cs, but it all starts with the 2<sup>nd</sup> C – careful cultivation.



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## The benefits of reduced soil disturbance

Reduced disturbance allows soil microbial communities to achieve higher levels of diversity and efficiency. Over time, this results in higher soil-health scores for soils that have been managed with less disturbance. Greater soil health means increased soil functions, including fertility, pest and disease suppression, and resilience in the face of climate extremes.

### How farmers reduce soil disturbance.

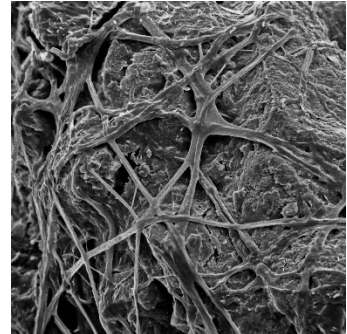
**No-till.** No-till has become fairly common in Western Canada. Under these systems, seeding is done into untilled soil using drills or by creating a narrow furrow.

**Conservation tillage.** There are many different types of conservation tillage, including ridge till, vertical till, and strip till. The general principle in each is to minimize the area of soil disturbance while still obtaining some of the benefits of tillage in selected regions (e.g., narrow strips).

**Other forms of weed suppression.** If tillage is not used to control weeds, the alternatives include chemical control, retaining crop residues on the surface and planting cover crops.

### Challenges to reducing soil disturbance

Reducing tillage has different challenges in different climates. For instance, in Eastern Canada and BC the climate is wetter than in Western Canada; accordingly, tillage is commonly employed in the spring as a means of drying the soil. Another challenge involves the need for changes to equipment: residue management, pest and disease management, and planting all require equipment changes or adaptation when low-disturbance systems are adopted. In essence, adopting such an approach involves changing an entire system, rather than a single practice. Last, but not least, the beneficial soil functions that come from reduced disturbance are not experienced immediately. Soil microbial communities take time to evolve in response. This can result in a gap between the costs involved and the benefits realized.



This is a microphotograph of a soil aggregate. The fungal threads, or hyphae, can be seen to be holding the aggregate together, like a net. Aggregates are fundamental to good soil structure and are dependent on good levels of fungi in the soil.

Credit: Thilo Eickhorst & Rolf Tippkoetter.

## Canadian Farmers: Bringing Soil Health to Life



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