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SOILS AT GUELPH

Soil carbon and Christmas stockings

If you are a bit foggy on how carbon plays a role in these things, Soils At Guelph has some resources for you.

Not since kids started worrying about getting a lump of carbon-rich coal in their Christmas stockings has there been as much interest in Ontario households about carbon and the carbon cycle.

Well, maybe that's a bit dramatic, but carbon dynamics and the economic ripple effects of a carbon economy do seem to be making it into the news cycle and shop talk these days.

If you are a grower or advisor, getting a handle on soil carbon dynamics can impact plans for on-farm water management, nutrient management, and soil health more generally. It can also drive decisions on cropping systems, like crop rotation and tillage management, as well as economic returns on investment.

If you are a bit foggy on how carbon plays a role in these things, Soils At Guelph has some resources for you. Four case studies look at Soil Carbon from four different perspectives – 1) Soil Carbon, 2) Soil Biology and Agriculture, 3) Soil Health, and 4) Using and Losing Soil Nitrogen in Agriculture. Each case study is built around an Ontario farmer or CCA.

For example, the Soil Carbon Case Study shows how to visualize the amount of carbon in the top 30 cm of soil if soil has 1% organic matter (OM) vs 6% OM.

If both soils have the same bulk density (1.5 tonnes/m3), then a field with 1% OM will have 10 tonnes of carbon (or 4 pick-up truck equivalents of C) in an acre vs. a field with 6% OM, which will have 63 tonnes of carbon (or 28 pick-up truck equivalents) in an acre.

Photo - Stuart and Carolyn Wright.

And if you need a refresher on the components of soil, the case studies are sprinkled with visuals. Figures 1 and 2 remind us that about 5% of the soil is made of organic matter, and that more than half of that (58%) is composed of soil organic carbon.

The experience of long-time soil conservation advocate, Stuart Wright, is featured in the Soil Carbon Case Study. By implementing an 'organic matter building package' on his farm in Wellington County, he noticed an improvement in the soil's ability to deal with extreme weather like droughts or large rainfalls.

"You can't control the weather, but you can control how you prepare the ground to take advantage of the weather when it comes", quotes Wright in the Case Study.

Wright's OM-building package includes:
• improved drainage
• use of manure or organic amendments
• minimum tillage
• an extended rotation, including corn, soybeans, winter wheat with clover, followed by hay.

The Case Study also showcases Ontario-based long-term research trials out of Elora and Ridgetown that demonstrate profitable opportunities coming from increasing soil carbon, echoing Wright's observations.

The significance of storing carbon in the soil extends beyond the farmgate. The Soil Ecosystem

In dry weather years, the research demonstrated that crops were more resilient in soils with higher levels of soil carbon, yielding 2-5% higher in corn and 20-30% higher in soybeans, depending on tillage type, compared the business as usual. directly impacts local and global water, nutrient, and atmospheric systems. Canadian soils, including agricultural and forested lands, are estimated to be storing about one-fifth of the world's carbon storage. Even so, Canadian soils have the potential to store far more carbon and further stabilize these essential systems.*

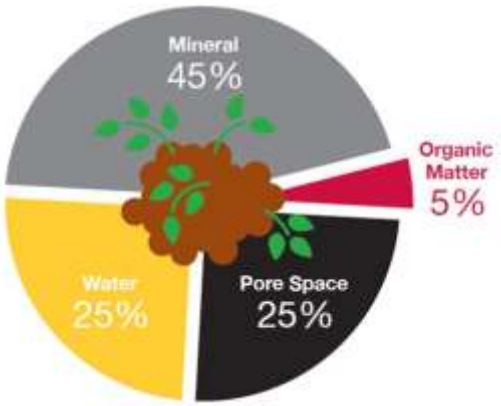

Figure 1 – Components of the soil

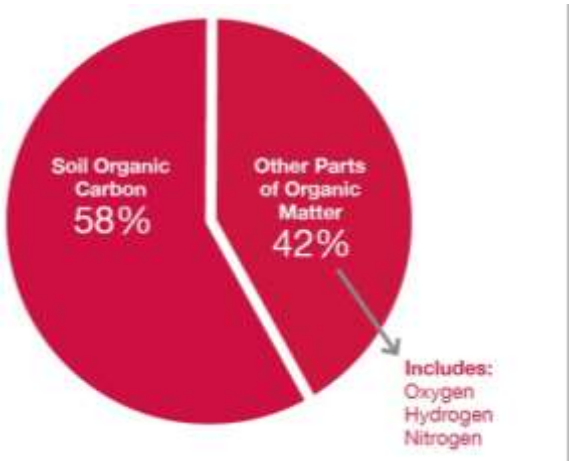

Figure 2 – Components of organic matter

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This article first appeared in the Ontario Farmer Tuesday December 5th, 2023. It was part of a four-part series by Soils At Guelph to support growers and their advisors in understanding the essential role of soil carbon in crop production and the provisioning of ecosystem services. To see the case study series in full, visit our website, www.soilsatguelph.ca

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