



# Healthy Soils – Healthy Farms

## Part 1 of 2

by Ross Wilson, CCA-ON 4R-NMS

*“The nation that destroys its soil, destroys itself.” — Franklin Delano Roosevelt*

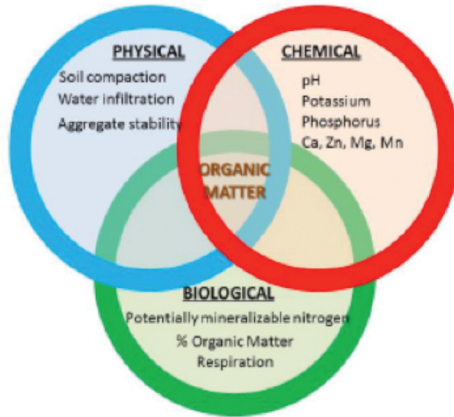
**Healthy soils are critical.** It has long been recognized that healthy soils are critical for stable and sustained delivery of a variety of ecosystem services. In agricultural systems, the service focus is on the production of food and fibre products but healthy soils also provide nutrient and water cycling services in more naturalized environments. There is a wise and age-old adage that humanity owes its existence to six inches of topsoil and the fact that it rains. Until we learn to control rainfall patterns, care and maintenance of the topsoil is the only factor that we can control. History is littered with civilizations that ignored their topsoil and ultimately disappeared\*. Today's modern farming practices can hasten this demise, but can also delay or, hopefully, avoid this demise.

**Complexity is challenging.** Soil health is challenging to understand, as there are chemical, biological and physical elements, all interrelated. In order to understand this complexity, we attempt to simplify and study each of these elements independently. This is done with the knowledge that they are interconnected and do not behave independently as reflected in this illustration from the OMAFRA Soil Health and Conservation Strategy.

**Healthy soils are dynamic.** There are known methods to measure each of these properties. However, the interpretation of the results is more challenging, as these properties are dynamic and can improve or degrade over time. For each property, *when* the analysis was performed is very important in helping to understand the status of that particular property. For example, taking compaction measurements with a cone penetrometer immediately before and after heavy vehicle traffic demonstrates that soil compaction can take seconds to go from good to bad. Unfortunately, it may take months and years to slowly go from bad to good with natural processes or possibly much quicker when assisted with deep ripping equipment. However, the same test may reveal that there is no compaction

between the tire tracks. As a result, both *when* and *where* you sample are very important components of a soil health sampling strategy.

**Definitions of soil health vary.** Many people are weighing in on the soil health issue. As a result, many different definitions of soil health exist, depending on each person's unique perspective. Over the years, soil health has been lumped in with or confused with soil quality, yield stability, greenhouse gas management as well as resilience to weather extremes. This has led to important questions. *What actually is soil health? How do I get it? How do I keep it? What do I measure to actually confirm that I have it?* To answer these questions, we need to begin with a good definition. My favourite definition of soil health,



as distinguished from soil quality is cited from MacEwan (2007)\*\*

**Soil quality** is the *capacity of soils* within landscapes to sustain biological productivity, maintain environmental quality, and promote plant and animal health.

**Soil health** is the *condition of the soil in relation to its inherent or potential capability* to sustain biological productivity, maintain environmental quality, and promote plant and animal health

To put it in hockey terms, an NHL player who has the *capacity* to score 100 points but is only scoring 50 points is in an **“unhealthy”** condition and not performing to his inherent or potential capability. This is overly simple as soil health is best understood as a suite of performance measures, in the same way that the hockey players aren't evaluated solely on their offensive performance. Unlike this hockey analogy, what we need and don't have yet is a good way of measuring overall soil health relative to soil quality. When we identify a good way to accomplish this task, we will be in a much better position to evaluate the status of soil health in our agricultural soils.

*Part 2 of 2: Measuring Soil Health, coming soon.*

\*-Soil Health for Victoria's Agriculture. Context, Terminology and Concepts. Final Report MIS 07898

\*\* David Montgomery (2017). Growing a revolution – Bringing our soil back to life.

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