Cover Crops

Soils and Soil Organic Matter (SOM)

“As the Soil Turns”

Written by Bryon Kirwan (NRCS IL Economist)

There seems to be some question as to what soil organic matter is. Understanding Soil Organic Matter (SOM) is critical to understanding soil productivity, and changes in the soil. Multiple speakers have been apparently using different definitions of SOM. This only serves to confuse those we work with; and may lead to unrealistic expectations by landowners and producers as the capabilities and values of their soils. As individuals look at some of the differing costs and benefits of Soil Health, it is important that consistent terms and definitions are used.

Soil organic matter as defined in soil textbooks and technical literature has traditionally been the soil component referred to as ‘humus’. That is a significant portion of what provides the underlying productivity (or productive capacity) of a soil. It also is what provides soil its color. It is normally what is measured when soils are submitted for soil testing and analysis. In the glossary of soil science terms (SSSA, 1997) soil organic matter is defined as the organic fraction of the soil exclusive of undecayed plant and animal residues; and is considered synonymous with humus. (1) This is still how SOM is defined by the Soil Science Society of America in 2013.(3)

In discussing soils, Midwestern prairie soils are darker and more productive soils than many of the Eastern soils. This is explained in part of how they were formed. Many of the Eastern soils were formed under forest while Midwestern soils formed under tall grass prairie. The associated organic matter content is greater in the Midwest soils due to the dense rooting system of the prairie and hence their darker color. Higher organic matter content soils are typically darker in color than lower organic matter content soils.

Organic matter content is also a major economic driver in the value of soil. Farms in Central Illinois will sell at a premium to farms in Southern Illinois due to the difference in the soil organic matter and soil productivity. The measurements of the SOM of a farm listed for sale will be reflective of the humus content. This is consistent with established testing and reporting protocols. This SOM measure provides a proxy for the productive capacity of the soil of the farm, and part of the basis for establishing the value of the farm.

If SOM is able to be changed at the rate being promoted and reported by some in regards to cover crops and soil health, this would indicate that those soil productivities and values would change as well. This would have huge economic and productivity impacts across the state of Illinois, and the country.

For example, a Hoyelton soil in Southern Illinois would have a typical SOM content of 2%, while a Central Illinois Ipava soil would have a typical SOM content of 4% (all based upon soil humus content). If the ‘new SOM’ measurements indicate a .4% increase in “SOM” per year (2) that should mean that the Hoyelton soil would then be as productive as the Ipava soil in a 5 year timeframe. As we understand the science currently, the soil will not change to that degree. This change in ‘SOM’ would not cause a Hoyelton soil to become as productive as an Ipava soil. Even if changes extended to include no till farming and cover crops, the type of permanent productivity change as described will not occur. This is not to say that there will not be changes in the soil, or that those changes are not beneficial. However changes to the very stable humus fraction will not occur in this short time frame.

Adding additional residue to the soil is typically beneficial, may increase soil microbial activity, and begin the process of building SOM (which takes up to a century). This action combined with nutrient cycling may also lead to the ability to reduce some commercial fertilizer applications. Adding residue does not increase SOM in and of itself; if not carefully monitored, could lead to production losses due to carbon-nitrogen ratios being out of proportion.

What needs to come out of this discussion is a description for the contemporary measurements that are being made of changes to the soil. This would allow the discussion to continue on terms that are not in conflict with currently established norms and measurements; yet provide a pathway for inclusion of positive (and negative) effects that may be able to be measured within the soil due to the short term changes that are being made in soil management.

1. R.Nieder, D.K. Benbi, *Carbon and Nitrogen in the Terrestrial Environment*
2. *Hoorman and Islam-Ohio State University-Nutrient Recycling with Manure and Cover Crops*
3. [*https://www.soils.org/publications/soils-glossary#*](https://www.soils.org/publications/soils-glossary)