Navigating Through a Soil Health Assessment

Mahdi Al-Kaisi
Iowa State University, malkaisi@iastate.edu

Follow this and additional works at: https://lib.dr.iastate.edu/cropnews

Part of the Agricultural Science Commons, and the Agriculture Commons

Recommended Citation
https://lib.dr.iastate.edu/cropnews/2492

The Iowa State University Digital Repository provides access to Integrated Crop Management News for historical purposes only. Users are hereby notified that the content may be inaccurate, out of date, incomplete and/or may not meet the needs and requirements of the user. Users should make their own assessment of the information and whether it is suitable for their intended purpose. For current information on integrated crop management from Iowa State University Extension and Outreach, please visit https://crops.extension.iastate.edu/.
Navigating Through a Soil Health Assessment

Abstract
Building soil health is important to sustain soil resiliency and productivity. Many conservation practices can maintain and enhance physical, chemical and biological soil properties that contribute to overall soil biological functions as fundamental drivers that support plant growth and productivity. However, these properties are complex and interrelated as each function is influenced by a central building block, soil organic matter (SOM). Soil health is one of the co-benefits of improving SOM through soil carbon sequestration or storage.

Disciplines
Agricultural Science | Agriculture

This article is available at Iowa State University Digital Repository: https://lib.dr.iastate.edu/cropnews/2492
Navigating Through a Soil Health Assessment

June 7, 2018

Building soil health is important to sustain soil resiliency and productivity. Many conservation practices can maintain and enhance physical, chemical and biological soil properties that contribute to overall soil biological functions as fundamental drivers that support plant growth and productivity. However, these properties are complex and interrelated as each function is influenced by a central building block, soil organic matter (SOM). Soil health is one of the co-benefits of improving SOM through soil carbon sequestration or storage.

Therefore, when we think about soil health, we need to keep in mind the role of SOM as a central property in choosing management practices that rejuvenate a soil biological system and function. There is a tendency to oversimplify and divide these properties into discreet parameters with no linkage to SOM in assessing soil health indicators. The approach to the assessment of soil health by focusing on SOM can reduce the commercialization of soil health. Overall, it was documented by research and is well accepted that there is a relationship between the improvement of SOM and soil physical, chemical, and biological properties. In addition, there is a consensus that SOM plays an essential role in a biologically diverse and well-balanced soil system. A good example is the highly productive Mollisol soil in the Midwest, which is high in organic matter compared to other soil that has low organic matter. It is true that a gradient in SOM is influenced by the soil forming factors of climate, organisms, time, topography and parent materials, which collectively define soil properties. However, among these factors, climate and organisms are defined as active factors compared to time, topography and parent materials, which are passive factors because their effects are not immediately observed.

The interactions between factors involved in soil formation requires a careful approach of assessing soil health in order to create a matrix that is easy to understand, reflects
management effects and is economically affordable. There are two approaches to determining soil health parameters:

1. The basic research approach to understand the fundamental processes and relationships between soil parameters and to shed light on the mechanisms governing those relationships (i.e., ecosystem services).
2. The applied approach which determines the influence of management practices (tillage, crop rotation, cover crops, etc.) on SOM as the main driver of soil health indicators (physical, chemical and biological).

The applied approach to determining soil health indicators in relation to soil management focuses on SOM as an essential property along with biological indicators, that we need to focus on, in order to achieve the soil health benefits as an outcome of SOM improvement. Improving the SOM is a slow and long-term process in detecting significant changes as in any conservation system. This long-term process is due to the instability and potential susceptibility of SOM to loss through soil tillage and weather conditions (loss as CO₂, leaching, sediment loss, etc.). Thus, the focus on soil biological system assessment as an indicator for the short-term SOM improvement is important to consider.

To improve soil health we need to keep in mind that it is a long-term commitment that requires using a system approach of stacked conservation practices that includes diverse crop rotations, less soil disturbance (i.e., no-till), integration of perennial grasses on marginal land and a growing plant during the off-season (i.e., cover crop). The benefits of using a system with multiple practices over a singular practice will improve SOM, soil resiliency, and ecosystem services.
Change in soil system under no-till and cover crop.

Change in soil system under conventional tillage.

Links to this article are strongly encouraged, and this article may be republished without further permission if published as written and if credit is given to the author, Integrated Crop Management News, and Iowa State University Extension and Outreach. If this article is to be used in any other manner, permission from the author is required. This article was originally published on June 7, 2018. The information contained within may not be the most current and accurate depending on when it is accessed.

Category: Soils

Crops: Corn  Soybean
Tags: soil health  soil organic matter

Author:

Mahdi Al-Kaisi  Professor of Soil Management/ Environment

Mahdi Al-Kaisi is a professor of agronomy and extension soil and water specialist at Iowa State University. His current research and extension in soil management and environment focuses on the effects of crop rotation, tillage systems, residue management, and nitrogen input on soil carbon dynamic...