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

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The Economics of Soil Health

Abstract
The term "economics of soil health" has been used frequently in an attempt to quantify and validate the value of improving soil health. The traditional thinking about assigning dollar values to soil health metrics, which are many, can be very challenging and it is easier said than done.

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IOWA STATE UNIVERSITY
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Integrated Crop Management

The Economics of Soil Health

May 23, 2017

The term “economics of soil health” has been used frequently in an attempt to quantify and validate the value of improving soil health. The traditional thinking about assigning dollar values to soil health metrics, which are many, can be very challenging and it is easier said than done.

One of the challenges in putting a dollar value on soil health is that the improvement in health is a long-term process. Expecting an immediate economic return can defeat the purpose of the long-term sustainability of soil health and its cumulative effects on soil productivity.

It is imperative to view soil health economics in two ways: 1) the impact of the conservation system in reducing operational costs and 2) its effect on improving the soil’s biological, physical and chemical attributes as main components of soil health metrics. These two benefits are mutually interconnected.

Practices that improve soil health

The drivers for improving soil health are many, but we can name a few including the conservation system illustrated in Figure 1, which includes no-till, the use of cover crops, residue management, buffer strips, etc. To quantify the economic value of improving soil health, the focus should be on the outcomes and impacts of a system-based approach for return on investment (ROI).

Many long-term studies have documented that conservation systems such as no-till, strip-till, cover crops and filter strips (i.e., prairie strips) significantly reduce input cost per acre and provide ecological services such as reductions in soil erosion and soil nutrient losses. A long-term tillage and crop rotation study in Iowa, showed that input costs with conventional tillage for corn production were 7.5 percent and 5.7 percent greater than that with no-till and strip-till, respectively.

These practices (no-till and strip-till) have been documented to improve the soil health metrics of soil biology, soil water processing (i.e., infiltration rate) and soil physical attributes of aggregate stability and water-holding capacity, to name a few.

Sustainability is profitable

The shift to a system that provides economic incentives in terms of reducing operation costs such as labor, fuel, machinery, chemicals, etc., while providing ecological services reflected in the improvement of soil health, is essential to sustaining crop productivity. This approach will result in a more resilient production system that minimizes risks associated with variability in climatic conditions.

The link between different components of the system highlights the economic value of improving soil health through improvement in soil carbon sequestration and water quality. Thus, improvement of the soil ecological system, reduction in input cost and stabilizing crop productivity can be realized by moderating the severe impact of climate variability events during a growing season as the best economic indicators for improving soil health with a lasting economic impact on sustaining a system's productivity.

New thinking is needed

New thinking needs to emerge to address the economic value of soil health. It is essential to protecting and sustaining the soil system from long-term degradation resulting from

destructive and unbalanced management practices such as intensive tillage as a leading cause of soil and water quality degradation in the Midwest. This new thinking for soil health economics needs to be linked to the system effects on the ecological level. Furthermore, those who have been pioneering conservation systems for many decades need to be recognized in the agriculture market place, such as crop insurance.

To encourage the adoption of soil health, there needs to be a mechanism, which reflects the economic benefits or incentives of soil health by linking crop insurance rates, for example, to the improvement in soil health as currently advocated by some economists. It has been documented that conservation systems improve soil health and reduce input cost. Crop insurance can be used as a tool to provide incentives to encourage emerging adopters and existing practitioners of conservation systems to improve and sustain soil health and ROI.

Summing up: Soil health is an indicator of system performance in rejuvenating and enhancing the soil's ecological, environmental and economic services. Its economic value is an integral part of the system's returns and benefits. In conclusion, the case for soil health economics has to be articulated in a systems approach that reflects the mechanism by which we develop and maintain healthy soil as the foundation for a productive and sustainable agriculture.

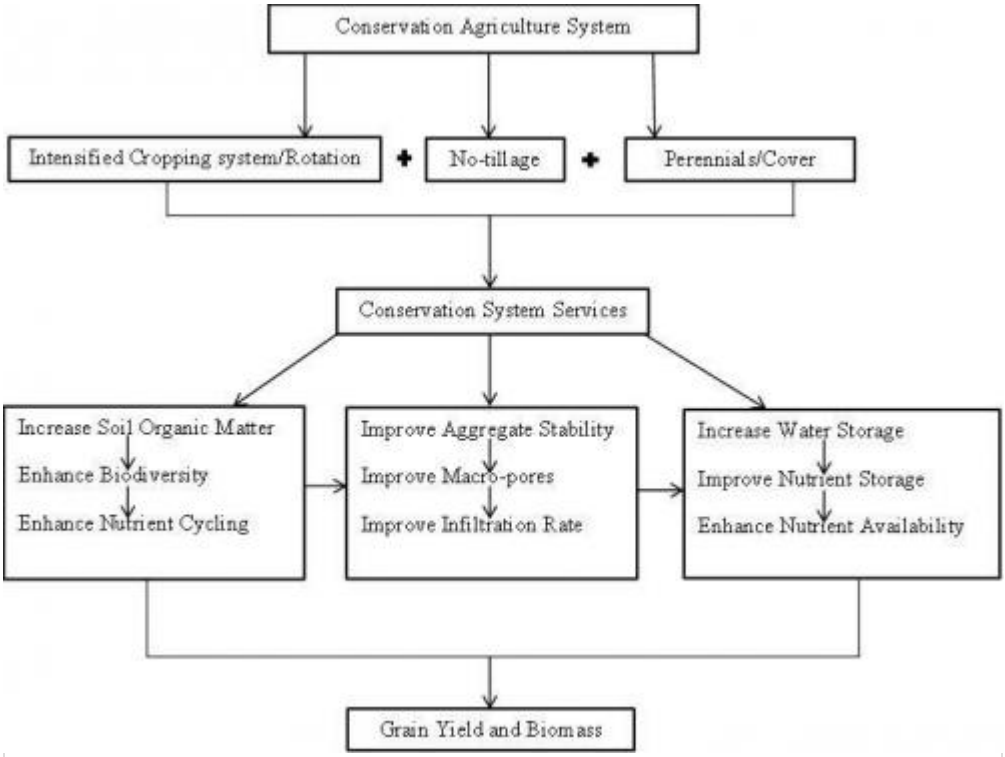

Figure 1. System approach for building soil health and productivity (Al-Kaisi, 2015)

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Crops:

Corn Soybean Cover Crop

Tags: soil health Soil Management

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...